

NOTICE OF REQUEST FOR QUALIFICATIONS

Hazard Mitigation Plan – 2028 Update

The Metropolitan Water District of Salt Lake & Sandy (Metro Water) invites the submittal of Statements of Qualifications (SOQs) from qualified Consultants interested in the procurement described herein.

This request for SOQs will be posted on Metro Water's website and on the Utah Public Procurement Place (U3P).

SCOPE OF SERVICES

The Metropolitan Water District of Salt Lake & Sandy is a water wholesaler organized in 1935 to develop and provide high-quality water to its member cities (Salt Lake City and Sandy City). Metro Water operates two water treatment plants, two large-diameter pipelines, and multiple treated- and raw-water reservoirs. Consultants are encouraged to visit www.mwdsls.gov to become more familiar with Metro Water's vision, values, facilities, and governance.

Metro Water regularly updates four plans that influence its capital improvement strategy. The subject of this request for qualifications is the Hazard Mitigation Plan (HMP), which assesses and recommends projects and strategies to address external risks on Metro Water assets, both natural (e.g., earthquake, landslide, wildfire) and non-natural (e.g., security, malevolent acts). To maintain eligibility for federal non-emergency funding, the HMP must be updated, approved by FEMA, and adopted by Metro Water every five years. The current HMP was adopted in October 2023.

Metro Water seeks the assistance of a Consultant in updating the HMP to 1) inform Metro Water's capital planning and 2) favorably position Metro Water for future mitigation project funding. The project should deliver an actionable and user-friendly written assessment that follows FEMA requirements for mitigation planning and provides a foundation for effective use and future updates.

While the 2023 HMP will provide a foundation for the update, it is not a template for the requested plan updates. Consultants should consider spot checks and updates to hazard maps, assumptions, outcomes, and conclusions where necessary. Consultants should identify ways to simplify the comparison of diverse hazards and their impacts to Metro Water facilities.

Some Metro Water projects, such as an upcoming rebuild of key portions of the Little Cottonwood Water Treatment Plant, may include hazard mitigation tasks. The Consultant should consider how to appropriately separate and report on the parts of these projects that may be eligible for hazard mitigation funding.

A redacted version of the 2023 HMP is attached. Consultants are advised to look for opportunities to improve accessibility by tailoring the report to a non-technical audience and reducing potentially confusing redaction. State and FEMA recommendations for the update are included in the attached FEMA Final Approval Packet.

An unredacted version of the 2023 HMP will be provided to the successful Consultant following signature of the Professional Services Agreement and Non-disclosure Agreement.

SUBMITTAL REQUIREMENTS

Consultants are advised to adhere to the submittal requirements of this request for qualifications. Failure to comply with instructions of this request for qualifications may cause the SOQ to be rejected. Submittal of an SOQ in response to this request constitutes acceptance of all requirements outlined herein.

The SOQ should showcase the Consultant's capabilities and process. There is no page limit, font size, or similar restriction. Consultants are encouraged to be creative and unique as they respond to the evaluation criteria and requirements listed below. At a minimum, the SOQ should include:

- Name, title, mailing address, email address, and telephone number of the primary contact person for the Consultant.

- Name and title of the individual who will sign the project agreements on behalf of the Consultant.
- Age and financial stability of the Consultant.
- Summary of relevant similar work performed by the Consultant.
- References from at least three customers for work similar to that described in this request for qualifications. Include the following information for each reference:
 - Client name and location.
 - Contact name, email address, and telephone number.
 - Brief description of Consultant's role in the program/project.
- The time, manner, and schedule of project delivery, including key milestones and workshops.
- Qualifications and role of key personnel and subconsultants for the project.
- Proposed project deliverables.
- A scope of work detailing all workshops and steps to accomplish the HMP update. This is intended to be included as Exhibit A within the Professional Services Agreement (description of services) and will provide justification for the Consultant fee (to be provided later).
- A statement indicating the Consultant will comply with the terms and conditions of Metro Water's standard Professional Services Agreement (attached) and Non-disclosure Agreement. Any exceptions to the terms, conditions, or requirements of either agreement must be identified and included with the SOQ. Such exceptions will be considered in the evaluation and award processes. Metro Water shall be the sole determiner of the acceptability of any exception.

Do not include a schedule of fees and expenses as part of the SOQ. Cost is not part of the selection criteria. The selected Consultant will be asked to provide the schedule of fees and expenses after selection.

Metro Water reserves the right to request clarification of any item in an SOQ or to request additional information necessary to properly evaluate SOQs. All requests for clarification and responses will be via e-mail. Metro Water's request for qualifications does not obligate Metro Water to award any contract or to pay any costs incurred in the preparation of an SOQ, interview, or associated materials.

Metro Water is subject to the Utah Government Records Access and Management Act, Title 63G, Chapter 2 of the Utah Code (GRAMA). If a Consultant claims any portion of their SOQ contains proprietary information, it is responsible to understand and implement any protection provided by GRAMA, including Section 63G-2-309, as that section may be amended. Metro Water will not be bound by any instructions or watermarks, stamps, or similar designations contained in an SOQ, but rather, will only be governed by GRAMA and Metro Water GRAMA regulations. All materials become the property of Metro Water and may be returned at Metro Water's option.

SUBMITTAL INSTRUCTIONS

SOQs are to be submitted electronically via U3P no later than Tuesday, November 3, 2026 at 3:00 pm MT. Any SOQs received after the specified time will not be considered. It is the Consultant's responsibility to assure submission of the SOQ. SOQs received after the deadline will not be considered (special or extenuating circumstances may permit a grace period as deemed reasonable by Metro Water).

Metro Water will be the sole judge as to which SOQs best meet the selection criteria. Metro Water reserves, at its sole discretion, the right to reject any or all responses received, to waive any submission requirements contained within this request for SOQs, or to waive any irregularities in any submitted response.

For questions regarding this solicitation, please contact the Project Manager:

Ammon Allen
allen@mwdsls.gov
 801-942-9687

EVALUATION AND SELECTION PROCESS

A selection committee consisting of Metro Water representatives will evaluate the SOQs. The recommendation of the selection committee is expected to be presented to Metro Water's Board of Trustees on December 14, 2026 for action. Results from the selection will be available following the board action.

SOQs will be evaluated based upon the following criteria:

- **Consultant firm experience and qualifications** (12%)
 - Presents history of successfully developing hazard mitigation plans for local governments that receive state and federal approval, ideally on the first submission
 - Client references
- **Consultant project team experience and qualifications** (28%)
 - Demonstrates individual knowledge, trainings, and professional background, including
 - regulatory knowledge and compliance,
 - federal law, FEMA regulations and policies, states laws, and local ordinances,
 - emergency management,
 - resilience concepts,
 - hazard diagnosis and assessment and mitigation development,
 - FEMA Local Mitigation Planning Policy Guide, and
 - FEMA Local Mitigation Planning Handbook
 - Illustrates dynamic client, stakeholder, and public engagement skills
 - Recognizes unique local demographic, geographic, technical, and political considerations
- **Project approach** (32%)
 - Builds effectively on existing plan
 - Demonstrates understanding of, and an approach to resolving, FEMA and state feedback from previous plan
 - Facilitates and elicits meaningful staff, stakeholder, and public feedback
 - Meets requirements for FEMA acceptance
 - Successfully integrates State of Utah and FEMA into process
 - Includes quality assurance strategies and progress reporting
- **Project management and deliverables** (20%)
 - Provides a clear, realistic timeline ensuring plan adoption and approvals by October 2028
 - Properly prioritizes diverse recommendations based upon strategic impact
 - Suggests methods for separation of projects into hazard and non-hazard elements
 - Presents data simply with achievable recommendations
- **Overall quality (e.g., presentation, creativity, clarity) of SOQ** (9%)

Metro Water may award a contract resulting from this request for qualifications to the responsible Consultant who is most advantageous to Metro Water based on the evaluation criteria and may reject any SOQ and/or waive informalities and minor irregularities in any SOQ received.

ATTACHMENTS

1. Professional Services Agreement
2. Non-Disclosure Agreement
3. MWDSLS Utility-Wide Multi-Hazard Mitigation Plan (redacted)
4. October 2023 FEMA Final Approval Packet

Attachment 1

Professional Services Agreement

PROFESSIONAL SERVICES AGREEMENT

Hazard Mitigation Plan – 2028 Update

This Professional Services Agreement (Agreement) is made and entered into by and between the Metropolitan Water District of Salt Lake & Sandy (Metro Water) and [Consultant name], a [State] corporation (Consultant).

PURPOSES

The expertise of Consultant is required by Metro Water in order to support Metro Water staff. Consultant was selected through a competitive Statement of Qualifications process in accordance with Utah Code Section 63G-6a-15 and Metro Water procurement regulations. The Consultant and its principals and employees are qualified by experience and training to provide, and the Consultant has indicated an interest and a willingness to provide, these services for Metro Water. The parties desire to have in place an agreement which describes the terms and conditions under which Consultant will provide the described work.

TERMS

In consideration of the mutual benefits described in this Agreement, the parties agree as follows:

1. DESCRIPTION OF SERVICES. Consultant will perform those services required to update Metro Water's Hazard Mitigation Plan. This work is referred to as the Project, and is described in Exhibit A attached, which is incorporated by reference as if restated here.

2. SERVICES OF CONSULTANT. Consultant shall provide services to Metro Water as an independent contractor in accordance with the applicable professional standards of care, and in a reasonably timely, efficient, and professional manner, consistent with this Agreement.

3. RESPONSIBLE STAFF MEMBERS. Responsible principals or staff members of Consultant, and any subconsultants identified by name in each Task, shall be committed to the task. Upon submitting a request for payment for services, Consultant shall provide verification of the names of staff members, their respective rates, and the number of hours worked by each staff member. Responsible principals or staff members, or contractors, who retire, quit, or die shall be replaced by individuals who are equally qualified, each of whom shall be subject to Metro Water's approval under this Agreement. Failure to comply with the requirements of this provision shall be grounds for terminating this Agreement.

4. PRICE. The scope of services described in Exhibit A for the Project is awarded on a time and materials basis not to exceed \$[amount]. Consultant shall receive payment based on the hourly rates and expenses described in the schedule of fees and expenses included with Exhibit A.

Metro Water has the right to reject any expenses not specifically identified on Exhibit A. If Consultant deems an expense necessary for the Project that is not identified on Exhibit A, Consultant shall first receive approval from Metro Water in writing. Such approval shall not increase the price of this Agreement without an associated contract amendment. Equipment purchased by Consultant specifically for, and invoiced to, the Project shall be provided to Metro Water in working condition at the conclusion of the Project. One-way mileage charged to the project shall be no more than that from the Consultant's primary office to the Project destination.

5. SCHEDULE OF PAYMENTS. Consultant shall submit reasonably detailed invoices each month for any work performed. Invoices shall refer to Metro Water's project name and number. Metro Water shall remit payment to Consultant within thirty (30) days of receipt of each request for payment that is presented in the proper form.

6. PERIOD OF SERVICE. This Agreement shall be effective upon signing and shall terminate on December 31, 2028.

7. METRO WATER'S RESPONSIBILITIES. Metro Water shall provide Consultant with such information as is available to Metro Water and as may be reasonably requested by the Consultant related

to the work and Consultant shall, to the extent reasonable under the circumstances, be entitled to use and rely upon all such information in performing its services. Metro Water will examine all documents submitted by Consultant to Metro Water and, if requested by Consultant, Metro Water will render decisions relative thereto in a timely manner in order to avoid unreasonable delay in the progress of Consultant's services. Metro Water shall provide Consultant access to Metro Water facilities and premises, and act reasonably to provide necessary access to private property, as may be reasonably requested by Consultant.

8. SECURITY AND OWNERSHIP OF INFORMATION. Metro Water facilities are critical public infrastructure. Certain information that Metro Water must provide to Consultant for Consultant to perform its work is sensitive. The Consultant will strictly comply with Metro Water written security protocols provided by Metro Water to Consultant as these written security protocols may be changed from time to time. Such protocols may include, but are not limited to, restrictions of numbers of copies to be kept in any form by Consultant, the form of the information storage, the security precautions to be followed, restrictions as to who may have access to information, the non-disclosure agreement to be signed by individuals before they may be given access, the methods and means by which copies of information will be destroyed upon completion or termination, the methods and means by which destruction will be verified to Metro Water, the steps that will be taken by Consultant in the event of any breach or suspected breach of security or security protocols. Metro Water security protocols and any changes which are provided to Consultant will be immediately complied with by Consultant. If Consultant has concerns or questions regarding such protocols or changes to protocols such concerns will be brought to Metro Water's attention immediately.

Each document and each item of information prepared in the performance of this Agreement, whether in hard copy or electronic form, is the property of Metro Water, including, but not limited to, tracings, drawings, estimates, field notes, investigations, design analyses, studies, computer programs, or other data. Consultant shall sign and affix its professional seal(s) to all final plans, technical specifications, and consulting data prepared in the performance of this Agreement.

9. BACKGROUND CHECK. At the discretion of Metro Water, Consultant or any of Consultant's employees or subcontractors with access to Metro Water works or facilities may be required to comply with Utah Code Section 11-40-101, et. seq. providing for criminal background checks of persons undertaking to perform contracting or employment services on treatment or other works of Metro Water. Such checks may include submission of fingerprints and/or criminal background checks by the Utah Bureau of Criminal Identification and the Federal Bureau of Investigation. Should such a background check reveal an employee, subcontractor, or other representative of Consultant under this Agreement has failed to accurately disclose a criminal history that Metro Water determines indicates a potential risk to Metro Water works or systems or to patrons of the utility, Metro Water may deny, or give notice of immediate termination of, that person's access to systems or works in accordance with statutory provisions.

10. COMPLETENESS AND ACCURACY. Consultant shall be solely responsible for the completeness and accuracy of all of its final work product, including, but not limited to, plans, supporting data and technical specifications prepared pursuant to this Agreement. Consultant shall be responsible to Metro Water for any error or omission by any of its employees, subconsultants, or suppliers. Consultant shall correct all errors or omissions at its own expense. This provision is not intended to prevent Consultant from seeking reimbursement or indemnity from any employee, subconsultant, or supplier. Any additional cost or damages incurred by Metro Water as a result of such errors or omissions shall be the responsibility of Consultant.

11. RIGHT OF TERMINATION. Metro Water reserves the right, at its discretion, to terminate this Agreement, or to abandon any portion of Project issued hereunder at any time. In the event Metro Water terminates this Agreement or abandons any portion of Project hereunder, Metro Water shall notify Consultant in writing. Immediately upon receipt of such notice, Consultant shall discontinue services as directed by Metro Water and deliver to Metro Water all drawings, technical specifications, hard copy and electronically stored information, computer programs and data, estimates, and any other documents or items of information, in whatever form or media, developed or gathered by Consultant in the performance of this Agreement, whether entirely or partially completed, together with all materials supplied by Metro Water. Consultant shall document its services through the termination date, and submit such documentation to Metro Water for its evaluation. Consultant shall receive compensation for services performed up through the date of termination or abandonment.

12. INDEMNIFICATION AND INSURANCE. In no event will any fault of Consultant or Consultant's employees, subconsultants, or contractors be reapportioned to Metro Water, its officers, Trustees, or employees. Consultant will indemnify and hold Metro Water and its officers, Trustees, and employees harmless from any such reapportionment of fault.

To the extent that Metro Water is not otherwise indemnified by a policy of insurance, Consultant will indemnify Metro Water from any claim of third parties to the extent caused by Consultant's breach of this Agreement or by the negligence or other fault of Consultant, or that of any of Consultant's employees, subconsultants, or contractors. Any invalidity of any portion of this indemnification duty will not defeat any remaining portion of this described indemnification duty. This indemnity shall be interpreted to provide Metro Water and its Trustees and employees with indemnity to the greatest extent allowed by law.

Consultant, at its own cost and expense, shall secure and maintain policies of insurance in accordance with Exhibit B.

13. INSPECTION OF CONSULTANT'S RECORDS. Consultant shall maintain accounting records in accordance with generally accepted accounting principles and practices to substantiate all costs incurred by Consultant and billed to Metro Water. Consultant shall maintain records necessary to confirm compliance with Metro Water security protocols. Such records shall be available to Metro Water during Consultant's normal business hours for a period of one year following the date of final payment under this Agreement.

14. WAIVER OF CLAIMS. Prior to acceptance of final payment, Consultant shall submit in writing to Metro Water any known claim that Consultant or any of Consultant's employees, subconsultants, or contractors may have against Metro Water or any of its employees. The acceptance of final payment by Consultant will constitute a waiver of any such claim other than those claims previously made in writing and submitted to Metro Water. Consultant shall hold Metro Water harmless from any claims, including costs and attorneys' fees, by any of Consultant's employees, subconsultants, or contractors which are not made in writing prior to acceptance of final payment. The tendering of final payment by Metro Water will not constitute a waiver of any claim Metro Water might have against Consultant, whether known or unknown at the time such payment is made.

15. SUCCESSORS AND ASSIGNS. The services to be provided by Consultant under this Agreement shall not be subcontracted or assigned without the prior written consent of Metro Water. This Agreement shall extend to and be binding upon the heirs, executors, administrators, successors, and assigns of the parties hereto.

16. NOTICES AND APPROPRIATE LINES OF COMMUNICATION. Except to the extent necessary to respond to emergencies, communications regarding material matters relating to this Agreement shall be deemed given when mailed or delivered to:

If to Metro Water:
Metropolitan Water District of
Salt Lake & Sandy
Attn: General Manager
3430 East Danish Road
Cottonwood Heights, Utah 84093

If to Consultant:

[Consultant]
Attn: [Contact]
[Address]
[Address]

Each party may change the designation of the addressee or the address for that party to receive notice by sending written notice of the change.

17. BOYCOTT RESTRICTIONS. Pursuant to Utah Code Section 63G-27-201, the Consultant certifies that it is not currently engaged in a boycott of the State of Israel or an economic boycott. The Consultant agrees not to engage in a boycott of the State of Israel for the duration of this Agreement. The Consultant agrees to notify Metro Water in writing if it begins engaging in an economic boycott.

18. GOVERNING LAW AND JURISDICTION. This Agreement shall be enforced and governed under the laws of the State of Utah, and jurisdiction for any action based on this Agreement, whether brought by Metro Water or Consultant, shall be with the District Court of Salt Lake County, State of Utah.

19. SPECIAL PROVISIONS. Consultant shall comply with all applicable federal, state, and local laws and ordinances, and shall not discriminate against any person on the basis of race, color, or national origin in the performance of this Agreement. Any terms which Metro Water, as a governmental entity is mandated by applicable statute or regulation to include in this Agreement, including any terms which are mandated by applicable provisions of the Utah Procurement Code, shall be considered a part of this Agreement.

20. PARTIAL INVALIDITY. If any portion of this Agreement is determined to be invalid, the remaining portions of this Agreement shall remain valid and enforceable.

21. ENTIRE AGREEMENT. This Agreement constitutes the entire understanding and agreement between the parties and cannot be altered except through a written instrument signed by the parties.

22. NO THIRD-PARTY BENEFITS INTENDED. This Agreement is not intended to create rights in any person or entity who is not a party to this Agreement.

23. REPRESENTATION OF AUTHORITY. Those persons signing as representatives of the parties warrant and represent they have been duly authorized to sign on behalf of the party they represent.

IN WITNESS WHEREOF, the parties have executed this Agreement effective the ____ day of December, 2026.

METRO WATER:

Metropolitan Water District of
Salt Lake & Sandy

By: _____

Annalee Munsey
General Manager

CONSULTANT:

[Consultant name]

By: _____

Name
Position

Attachment 2

Non-Disclosure Agreement

NON-DISCLOSURE AND CONFIDENTIALITY AGREEMENT

AGREEMENT PURPOSES

The Metropolitan Water District of Salt Lake & Sandy (Metro Water) has contracted [Consultant name] (Consultant) for development of the Hazard Mitigation Plan – 2028 Update (Project). [Subconsultant name] (Subconsultant) will be a subconsultant to Consultant.

Metro Water provides treated drinking water to its member cities, Salt Lake City and Sandy City, as well as others. Metro Water operations and facilities are critical to the health, safety, and welfare of the public. In connection with the Project, Consultant [and Subconsultant] will be given information and generate work product that must be kept secure and confidential in order to protect Metro Water operations and facilities and the health, safety, and welfare of the public.

AGREEMENT TERMS

Those signing below agree as follows:

Certain information that Metro Water must provide to the Consultant [and Subconsultant] to perform [its/their] work is confidential and security sensitive. This includes information disclosed physically, electronically, orally, visually, or the substantial equivalent thereof. That information is being provided solely for use in the Project. The work product generated as part of the Project, including but not limited to analysis, drafts, calculations, recommendations, and the final report, are also confidential and security sensitive. Together, the confidential and/or sensitive information provided by Metro Water and the work product generated as part of the Project are referred to as the "Sensitive Information." Sensitive Information does not include information that (a) was part of the public domain at the time of disclosure by Metro Water or properly became part of the public domain, by publication or otherwise; or (b) Consultant [and Subconsultant] received from a third party without similar restrictions and without breach of this Agreement.

All those obtaining or having access to the Sensitive Information shall use deliberate and thoughtful care and caution to maintain in confidence, not disclose, and prevent unauthorized access to the Sensitive Information.

All persons and entities signing this Agreement agree not to reproduce or distribute by any means the Sensitive Information except as reasonable and necessary for the Project. The Sensitive Information shall not be disclosed or revealed to anyone, and shall be protected against unauthorized access by anyone, except: (a) trustworthy employees of the Consultant [and Subconsultant], and trustworthy employees of any subcontractors or vendors of the Consultant, who have a need to know the information for Project purposes; and (b) who have first read this Agreement and signed a copy of the attached Acknowledgement agreeing to be bound by all terms of this Agreement and returned such signed copy to Metro Water by email. The Consultant shall be responsible to see that each and every employee and each and every employee of any subcontractor or vendor receiving the Sensitive Information has first read this Agreement and signed a copy of the attached Acknowledgement and returned it by email to Metro Water. If Consultant is required to disclose Sensitive Information to a governmental agency to further the objectives of the Project, Consultant shall notify Metro Water and consult with and assist Metro Water in establishing protections for such disclosed Sensitive Information prior to the disclosure. If Consultant is required by a court of competent jurisdiction to disclose Sensitive Information, Consultant shall notify Metro Water and consult with and assist Metro Water in obtaining a protective order prior to such disclosure.

Upon notice from Metro Water, all copies of the Sensitive Information shall be returned promptly to Metro Water or destroyed as instructed by Metro Water, at Metro Water's option, and electronic files disclosing the same shall be deleted, including deletion of all backup copies. Consultant may, however, retain (a) one copy of any Sensitive Information solely to the extent required to defend or maintain any litigation relating to this Agreement, or to comply with applicable laws and regulations, subject to the same confidentiality conditions described herein, and (b) copies of Sensitive Information contained in routine archived back-ups created as part of the Consultant's information technology system back-up and disaster recovery protocols, where such back-ups are used only for such purposes and are not accessible in the ordinary course of

business. Each person signing this Agreement shall certify full compliance in writing upon completion of destruction or return.

All persons and entities signing this Agreement or the attached Acknowledgement shall employ all reasonable efforts to maintain the Sensitive Information as highly confidential and security sensitive. Such efforts will be no less than the degree of care employed to preserve and safeguard such person or entity's own highly confidential and security sensitive information. Such efforts shall not be less than a reasonable degree of care. At a minimum, only one electronic copy of the Sensitive Information will be kept in a password protected file at all times, with access to the password restricted to a need-to-know basis and each hard copy of the Sensitive Information will be kept in a locked location with access restricted to a need-to-know basis. No archived back-ups may be kept unless created as part of the Consultant's information technology system back-up and disaster recovery protocols, and such back-ups are used only for such purposes and are not accessible in the ordinary course of business.

This Agreement expresses the entire agreement and understanding of the parties with respect to the subject matter hereof and supersedes all prior oral or written agreements, commitments and understandings pertaining to the subject matter hereof. Any modifications of or changes to this Agreement shall be in writing and signed by both parties.

Dated this __ day of December, 2026.

Metropolitan Water District of Salt Lake & Sandy

Annalee Munsey, General Manager

Dated this __ day of December, 2026.

[Consultant]

[Name, Position]

Dated this __ day of December, 2026.

[Subconsultant]

[Name, Position]

ACKNOWLEDGMENT

The undersigned hereby acknowledges that they have read the attached Non-Disclosure and Confidentiality Agreement for the Metropolitan Water District of Salt Lake & Sandy regarding development of the Hazard Mitigation Plan – 2028 Update. The undersigned understands the terms of the Agreement and agrees to be bound by the terms of the Agreement.

Name: _____

Position: _____

Company: _____

Email: _____

Signature: _____

Attachment 3
MWDSLS Utility-Wide Multi-Hazard Mitigation Plan (redacted)

MWDSLS Utility-Wide Multi-Hazard Mitigation Plan

Prepared for
Metropolitan Water District of Salt Lake & Sandy (MWDSLS)
Cottonwood Heights, Utah
May 31, 2023



Prepared by:
ELWELL Consulting Group Team
3014 W. Chimney Rock Circle
Taylorsville, Utah 84129
(801) 870-9709



Acknowledgements

Elwell Consulting Group acknowledges the valuable contributions made by Metropolitan Water District of Salt Lake & Sandy (MWDSLS, or District) staff and the planning team in conducting the MWDSLS Utility-Wide Multi-Hazard Mitigation Plan (MMP).

Specifically, the project team recognizes the following District personnel for their efforts:

- Wayne Winsor, Project Manager
- Ammon Allen
- Nathan Scown
- Matt Tietje
- Eric Sorensen
- Ryan Nicholes

Key consultant team members included:

- Bryon Elwell, Elwell Consulting Group, Project Manager
- Jeremy Williams, Hazen and Sawyer
- Mike Wilson, CRS Engineers
- Hiram Alba, GeoStrata



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Addenda

Addendum #1: Board Resolution

Annexes

Annex 1: Salt Lake Aqueduct Hazard Mitigation Plan

Annex 2: Little Cottonwood Water Treatment Plant Hazard Mitigation Plan



List of Abbreviations

ac-ft is acre feet.

AI is aggressiveness index.

ACH is aluminum chlorohydrate.

ASR is aquifer storage and recovery.

cfm is cubic feet per minute.

cfs is cubic feet per second.

CT is disinfection contact time.

DBP is disinfection by-product.

DCB is disinfection contact basin.

fpm is feet per minute.

FSB is flocculation/sedimentation building

FWR is finished water reservoir.

GAC is granular activated carbon.

GIS is geographical information systems.

gpcd is gallons per capita per day.

gpd is gallons per day.

gpm is gallons per minute.

HAA is halogenated acetic acids.

HAB is harmful algal bloom.

HMI is human-machine interface.

HMP is the Hazard Mitigation Plan

HVAC is heating, ventilation, and air conditioning.

LCR is the lead and copper rule.

LOX is liquid oxygen.

M&I is municipal and industrial.

MCL is maximum contaminant level.

MG is million gallons.

MGD is million gallons per day.

mg/L is milligrams per liter.

MP is the Master Plan of System Improvements, 2020 Update.

O&M is operation and maintenance.

OMR&R is operation, maintenance, repair, and replacement.

PAC is powdered activated carbon.

PACI is poly-aluminum chloride.

PCS is process control system.

PEA is an anionic polymer.

PEC is a cationic polymer.

PFAS is perfluoroalkyl and polyfluoroalkyl substances.

P&ID is piping and instrumentation diagram.

PID is proportional-integral-derivative controller.

PLC is programmable logic controller.

psi is pounds per square inch.

R&R is repair and replacement.

RWR is raw water reservoir.

SCADA is supervisory control and data acquisition.

sf is square feet.

SI is saturation index,

T&O is taste and odor.

THM is trihalomethanes.

TOC is total organic carbon.

UFRV is unit filter run volume.

UV is ultraviolet.

VFD is variable frequency drive.

WTP is water treatment plant.

Proper Acronyms

BCWTP is SLC's Big Cottonwood Water Treatment Plant

CRS is CRS Engineers

CUP is Central Utah Project

District is Metropolitan Water District of Salt Lake & Sandy (see also, MWDSLS)

DDW is Utah Division of Drinking Water

ECG is Elwell Consulting Group

EPA is Environmental Protection Agency

Hazen is Hazen and Sawyer

JVWCD is Jordan Valley Water Conservancy District.

JVWTP is Jordan Valley Water Treatment Plant

LCC is Little Cottonwood Creek

LCC is the Little Cottonwood Conduit

LCWTP is Little Cottonwood Water Treatment Plant

MWDSLS is Metropolitan Water District of Salt Lake & Sandy (see also, District)

POM is Point of the Mountain. This is the general location near the Salt Lake County and Utah County boundary where the Provo River Aqueduct system and Jordan Aqueduct system converge

POMA is Point of the Mountain Aqueduct

POMWTP is Point of the Mountain Water Treatment Plant

PRP is Provo River Project

PRWUA is Provo River Water Users Association

SLA is Salt Lake Aqueduct

SLC is Salt Lake City

SLCDPU is Salt Lake City Department of Public Utilities



Introduction

The Metropolitan Water District of Salt Lake & Sandy (MWDSLS, or District) is a public water system that provides wholesale finished drinking water to its two member cities, Salt Lake City (SLC) and Sandy City (Sandy). MWDSLS was created on August 30, 1935, pursuant to the provisions of the Metropolitan Water District Act of Utah. It is classified as a “community” type system, Public Water System ID No. UTAH18016. MWDSLS functions primarily as a wholesale provider of on-demand, finished water to SLC and Sandy. SLC was the only member city of MWDSLS from 1935 to 1990. MWDSLS annexed Sandy in 1990 and these two cities now comprise the member cities of MWDSLS.

MWDSLS is governed by a board of seven trustees, five of whom are appointed by the City Council of SLC and two of whom are appointed by the City Council of Sandy. All trustees serve four-year terms. Each trustee must be a resident of the city that appoints them. The Board elects a Chairman, Vice-Chairman, and Secretary from its membership and appoints a General Manager to assist in its duties.

MWDSLS and its member cities collectively provide retail service to more than 450,000 people in the Salt Lake Valley. MWDSLS supplies approximately 40-60 percent of the water used by SLC and approximately 50-75 percent of the water used by Sandy. SLC and Sandy, as member cities of MWDSLS, have a statutory preferential right to purchase MWDSLS’s water supplies for use within each city. Both District member cities provide retail water service outside their city boundaries. This is particularly true for SLC, which serves some 135 square miles and about as many connections outside city boundaries as inside.

MWDSLS’s raw water supply comes from Little Cottonwood Canyon, Bell Canyon, the Provo River Project, the Ontario Drain Tunnel, Little Dell Reservoir, and the Central Utah Project. Through the Provo River Project, MWDSLS is a shareholder of the Provo River Water Users Association (PRWUA). The Provo River Project includes the Duchesne Tunnel, Weber-Provo Canal, Deer Creek Dam, Provo River Aqueduct (PRA), and the Salt Lake Aqueduct (SLA). The Central Utah Project includes Jordanelle Reservoir, Jordan Aqueduct System, and the Jordan Valley Water Treatment Plant.

MWDSLS provides water on a surplus basis to various water agencies and irrigation companies as well as treating and transporting water for others through MWDSLS’s system. In addition, MWDSLS plays an important role in water resource planning, development, and management within SLC and Sandy service areas and in coordination of the area’s water distribution systems.

To better understand the inherent risks associated with operating and maintaining MWDSLS’s water system, which is critical to its member cities and others for providing their life sustaining water supply, MWDSLS has embarked on a hazards assessment for each of their [REDACTED] water system facilities. This MWDSLS Multi-Hazard Mitigation Plan (MMP, or Plan) was developed from a hazards assessment of the [REDACTED] MWDSLS’s water system including incorporation of two previous Hazard Assessment Projects for the SLA and associated facilities in 2020, and the Little Cottonwood Water Treatment Plant (LCWTP) in 2021. The primary purpose of this project was to identify [REDACTED] assets within MWDSLS’s water system to prevent damage and loss of life against all hazards (natural, dependency, proximity, and malevolent acts), while helping MWDSLS carry out their mission statement:





The District's Mission Statement was used to develop the following four ranking criteria for prioritization of MWDSLS' facilities/assets (see Section 2.4.1 and Appendix A for details):

1. Reliability: Consistently delivering water services to customers
2. Quality: Meeting all Federal, State, and internal water quality standards for drinking water
3. Safety: Ensure employee and public safety from injury/illness/deaths. This does not include water quality safety issues already covered by the Quality criterion.
4. Stewardship: Efficient and cost-effective management of assets (e.g., costs, property, value, employees, customers).

The District has planned extensively for capital improvement and capital replacement projects with the most recent version of their Master Plan of System Improvements, 2020 Update.

The Water System (excerpts from the MP of System Improvements - 2020 Update)

The MWDSLS water system consists of several different types of facilities that include surface water sources, diversion structures, conveyance facilities (e.g., aqueducts, pipelines), pump stations, water storage facilities, and treatment plants. The conveyance facilities move the raw water sources to the District's treatment plants and deliver treated water to the District's two member cities and other agencies. See Figure I.1 MWDSLS System Facilities and Service Area.



Figure I.1 MWDSLS System Facilities and Service Area

The District's primary types of facilities/assets within their inventory that will be identified for potential assessment in this Plan are shown in Table I-1.

Table I.1 Facility/Asset Types	
Types of Facilities/Assets	Inventory
Water Treatment Plants (WTPs) in million gallons per day (MGD)	2 ¹
Little Cottonwood WTP (LCWTP)	143 MGD
Point of the Mountain WTP (POMWTP)	70 MGD
Jordan Valley WTP ¹ (JVWTP; this facility is covered in Jordan Valley Water Conservancy District's (JVWCD) Hazard Mitigation Plan (HMP))	51.4 MGD
<u>Surface Water Sources in acre-ft (ac-ft):</u>	
Little Cottonwood Creek (LCCr)	18,500 ac-ft
Bell Canyon	700 ac-ft
Provo River Project	61,900 ac-ft
Central Utah Project	20,000 ac-ft
Ontario Drain Tunnel	2000 ac-ft
<u>Water Conveyance:</u>	
Salt Lake Aqueduct (SLA) Raw Water (RW)	
SLA Intake Structures	
SLA Finished Water (FW)	
Point of the Mountain Aqueduct (POMA) Intake	
POMA Connection to Jordan Aqueduct (JA)	
POMA RW	
POMA FW	
POMA FW Pump Station	
Sleeve Valve Vault	
LCCr – Lower Diversion	
Little Cottonwood Conduit (LCC) – RW	
Jordan Narrows Pump Station (JPNS)	
<u>Water Storage Facilities in Million Gallons (MG): Raw Water (RW) and Finished Water (FW):</u>	
SLA Terminal Reservoir (including Sam Park West Reservoir) – FW	48 MG
LCWTP FW Reservoir	9 MG
10 MG Reservoir – FW	10 MG
Point of the Mountain FW Reservoir	20 MG
42 MG RW Reservoir	42 MG
<u>Other Facilities/Systems:</u>	
Communications, Voice and Data	
Supervisory Control and Data Acquisition	
Security Control System	
Enterprise Network	
Corrosion Control System	

Notes:

1. 5/7 owned by JVWCD and 2/7 owned by MWDSLS. By agreement, operated by JVWCD.
2. 1/2 owned by JVWCD and 1/2 owned by MWDSLS. By agreement, operated by JVWCD.

An overview of some of MWDSLS's key [REDACTED] facilities is presented in the following paragraphs.

Water Treatment Plants

There are two primary Water Treatment Plants (WTPs) supplying the MWDSLS system; a third (the Jordan Valley Water Treatment Plant (JVWTP)) is covered under a separate HMP:

1. Little Cottonwood Water Treatment Plant (LCWTP): Located at [REDACTED] Cottonwood Heights, UT, the LCWTP was designed in 1957 and completed in 1960. The plant is owned and operated by MWDSLS with capacity being split between SLC and Sandy. The plant was originally designed to treat 113 million gallons per day (MGD) but was re-rated in 2012 to treat 150 MGD. This includes 7.2 MGD of recycled flow giving the plant a peak flow-through (net) capacity of 142.8 MGD. This net capacity is divided between the member cities with 117.8 MGD available for SLC and 25 MGD available for Sandy. The plant treats water from Provo River [REDACTED], Little Cottonwood Creek (LCCr), and Bell Canyon Creek. The plant is positioned in-line with the SLA such that raw water can enter the plant and finished water can be transported to four different finished water reservoirs, including: LCWTP Finished Water Reservoir (FWR) (9 MG), 10 MG Reservoir, SLA Terminal Reservoir [REDACTED] (47.8 MG), and Point of the Mountain FWR (20 MG). From the plant, finished water is conveyed to the users via turnouts on SLA and Point of the Mountain Aqueduct (POMA), as well as through several direct pipelines. Another conveyance option is via POMA to the [REDACTED] South Pipeline and Jordan Aqueduct (JA). LCWTP process consists of flash mixers, coagulation, flocculation, sedimentation, and filtration. For disinfection purposes, the facility treats raw water with ozone and chlorine and finished water with chlorine. [REDACTED] In general, more chlorine cylinders are stored on site during the summer months when water demands are high.
2. Point of the Mountain Water Treatment Plant (POMWTP): Located at [REDACTED] Draper, UT, POMWTP became operational in 2007. POMWTP is owned and operated by MWDSLS. The District's capacity at this plant is 70 MGD. This capacity is divided between the member cities with 43.75 MGD available for SLC and 26.25 MGD available for Sandy. This plant treats water from the Provo River system [REDACTED] and future Utah Lake System (ULS) supplies. Finished water can be transported to two finished water reservoirs, including: Point of the Mountain (POM) FWR and LCWTP FWR. Water from this plant is conveyed to users through one of two methods. The primary conveyance is through POMA [REDACTED]. Another conveyance option is from POMWTP to the west through [REDACTED] South Pipeline and JA. This water can then be conveyed using the District's existing capacity in the JA system. The POMWTP process consists of flash mixers, flocculation, sedimentation, and filtration. For disinfection purposes, the facility treats raw and/or finished water with ozone, ultraviolet (UV) light, [REDACTED]. There are no liquid chlorine cylinders stored on site. Ozone at POMWTP is primarily used to treat taste and odor. The plant is primarily operated to meet summer peak demands. As future water needs increase, the treatment capacity can be increased to approximately 151 MGD to match the existing hydraulic design capacity. The District's desired portion of this capacity will likely be 121 MGD. Additional capacity up to 151 MGD would require the interest and participation of others.

Surface Water Sources

The District obtains its annual water supply of approximately 90,600 acre-feet (ac-ft) from the water sources described below.

1. Provo River Project (PRP)
 - a. The [REDACTED] PRP, a 1930s-1950s vintage United States Bureau of Reclamation (BOR) project. On a long-term average, approximately 1/3 of PRP water supply comes from the Weber River, 1/3 from the Duchesne River, and 1/3 from the Provo River. Water from all three rivers is stored in [REDACTED] Reservoir on the Provo River [REDACTED]. The PRP provides water supplies to Salt Lake County, north Utah County, and Wasatch County.
 - b. The PRP Weber River water (as well as water for an earlier BOR project, the Weber River Project) is diverted at the Weber-Provo Diversion [REDACTED], and transported in the Weber-Provo Canal to the Provo River. [REDACTED]
 - c. The PRP diverts Duchesne River water at the Duchesne Diversion [REDACTED]. The Duchesne River water is transported in the [REDACTED] Duchesne Tunnel to the Provo River [REDACTED].
 - d. The PRP features described above are features of the Deer Creek Division of the PRP, are owned by the BOR, and are operated by the PRWUA. The SLA, known as the Aqueduct Division of the PRP, is owned by the District (subsequent to title transfer from BOR in 2006) and is operated by the District.
 - e. The District was one of the original petitioners for water from the PRP. This water is stored in Deer Creek Reservoir, [REDACTED]. PRWUA shareholders may holdover water from one year to another when there is available capacity in the Deer Creek Reservoir. This water remains the water of the shareholder until the reservoir spills. In addition to holdover water, in high runoff years there are periods of extra allotment. Extra allotment occurs when Deer Creek Reservoir is full and PRP water rights continue to yield available flows. During these periods, PRWUA shareholders may take PRP water supplies without it counting towards their current year allocation. Once the extra allotment period ends, the current year allocation begins to be used.
 - f. The Provo River water year starts on November 1 and ends on October 31. Therefore, accounting for the current year allotment begins on November 1. However, due to the timing of snowpack accumulation and related runoff timing, the current year allocation is not finalized until April-June in most years. In practice, this leaves only 4-6 months (sometimes less time) to potentially consume the current year allocation.
 - g. The full District allotment of this storage is 61,900 ac-ft. Dry year production from this source has been estimated at 26,967 ac-ft. This is based on a 43.5% PRP allotment experienced during the most severe recent drought year (2013). The average year is considered the full allotment.
2. Central Utah Project (CUP)
 - a. The CUP is a BOR project that is operated and maintained by the Central Utah Water Conservancy District (CUWCD). A [REDACTED] part of the District's water supply comes from [REDACTED] the CUP. The CUP municipal and industrial (M&I) system provides water supplies to Salt Lake County, Utah County, and Wasatch County. The CUP Utah Lake System (ULS) system provides water supplies to Salt Lake County and Utah County.

- b. CUP water is diverted high on several tributaries of the Duchesne River, Rock Creek (Upper Stillwater Reservoir), Hades Creek, Wolf Creek, West Fork of the Duchesne River, Currant Creek (Currant Creek Reservoir), Layout Creek, and Water Hollow. [REDACTED]
[REDACTED]
[REDACTED]
 - c. Most of the CUP water from the Enlarged Strawberry Reservoir is transported through tunnels and pipes to the Spanish Fork River. A small amount of CUP water from the Enlarged Strawberry Reservoir is released from time to time to Sixth Water Creek and Diamond Fork Creek for minimum stream flow purposes. From the M&I system perspective, CUP water in the Spanish Fork River mostly is delivered to Utah Lake in exchange for natural flow Provo River water stored in Jordanelle and Deer Creek Reservoirs that would otherwise have to go to Utah Lake to satisfy priority rights. Some CUP water is transported to Hobbie Creek to restore habitat for an endangered fish. Some CUP water from the Enlarged Strawberry Reservoir is transported in a ULS pipe to the Provo River [REDACTED] to restore habitat for an endangered fish. Some ULS water will be transported to the PRA and commingled with water from the Provo River for delivery to a variety of users, but in terms of volume, primarily the District and Jordan Valley Water Conservancy District (JVWCD).
 - d. The District has contract rights to CUP M&I water, which is stored in Jordanelle Reservoir. The contract is for 20,000 ac-ft per year. This supply was established by a petition for CUP M&I water in 1986. The intent of the 1986 petition was to meet anticipated needs of SLC's northwest quadrant. This contract allows for a variable demand and the District may be able to take up to 20 percent more than their contracted amount. The amount of additional water allowed, if any, is determined by CUWCD's board. However, their policy also requires that the five-year average allotment must be the contract amount of 20,000 ac-ft per year. Jordanelle Reservoir was designed to provide water through a multi-year drought (up to six years), but during longer drought periods, it is likely that the full contractual allotment will not be available.
 - e. The available supply from the CUP M&I source is assumed to be 20,000 ac-ft in both average and dry years, which is the contractually defined amount. The contract amount has been used because of the six-year drought buffer provided in the Jordanelle Reservoir design. Also, there is not a sufficiently long record to analyze or predict dry year yields to be any different from the contractual amount.
 - f. In 2005, on behalf of SLC and Sandy, the District petitioned CUWCD for ULS water. The amount of the petition is 5,600 ac-ft. This amount is anticipated to be divided between SLC and Sandy. The original petition for 8,600 ac-ft was reduced by 3,000 ac-ft as part of the Provo Reservoir Canal Enclosure Project. The available supply from this source for this study is assumed to be 5,600 ac-ft in both average and dry years, which is the contractually defined amount.
3. Little Cottonwood Creek (LCCr)
- a. Both SLC and Sandy own water rights in LCCr. This water is treated at Little Cottonwood Water Treatment Plant (LCWTP). The availability of this source, like all surface water sources in the region, is dependent upon annual precipitation (snowpack).
4. Utah Lake via Utah Lake Distributing Company (ULDC) Exchange Agreement
- a. Of the [REDACTED] shares of PRWUA owned by the District, [REDACTED] shares were acquired via a 1958 exchange agreement between the District and ULDC. The exchange agreement allows for the District to use secondary storage (non-primary storage) in

Utah Lake. This supply is used to meet the exchange obligations described in the exchange agreement. This water is delivered to the ULDC by the District by pumping Utah Lake water from the Jordan River or by delivering PRP water through a penstock [REDACTED]. The District has operational flexibility and discretion to meet the exchange with PRP, Utah Lake, and CUP water supplies combined or with solely Utah Lake water supplies. The District monitors storage supplies [REDACTED].

- b. The agreement states that the District shall deliver [REDACTED] cubic feet per second (cfs) to ULDC. The penstock feeds a turbine facility that is used to pump water to the north branch of the ULDC while delivering PRP water to the south branch. Normally the District would deliver [REDACTED] through the penstock to satisfy the ULDC demand. Pumped water is delivered to the north branch and the tailrace flows from the penstock are delivered to the south branch.
- c. The District historically uses PRP water [REDACTED] to avoid pumping costs. During low runoff years, the District uses ULDC water rights in Utah Lake and pumps [REDACTED] from the Jordan River to ULDC.

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

5. Little Dell Project

- a. The District is the local sponsor for the Little Dell project [REDACTED]. The federal partner for this project is the United States Army Corps of Engineers. Salt Lake County and SLC are key partners in this water resource. Completed in 1992, the Little Dell project (consisting of a new dam and reservoir [REDACTED] in Salt Lake County) was developed for flood control and municipal water supply purposes. Water rights in the name of the District provide a yield of approximately 3,100 ac-ft annually in a dry year. Average yield is estimated to be 7,940 ac-ft. By agreement, SLC is responsible for operation and maintenance (O&M) of the project. The District has ongoing responsibilities related to capital improvements at Little Dell. [REDACTED]
[REDACTED] By developing this new supply that was available to SLC [REDACTED], SLC, Sandy, and the District were able to establish relationships that included providing Sandy 7,940 ac-ft from District supplies in the Provo River system. The District's Little Dell water is transported a short distance through the natural channel of Dell Creek through the [REDACTED] Reservoir to the [REDACTED] Water Treatment Plant owned and operated by SLC and from there is delivered directly into the SLC municipal water system.

6. Ontario Drain Tunnel (ODT)

- a. On behalf of Sandy, the District acquired water from the ODT in 2005. The ODT is a historic mine drain in the Provo River watershed [REDACTED]. The availability of this source varies from year-to-year as evidenced in historical flow data. The firm yield of this supply is 2,000 ac-ft annually with the average yield estimated at 3,070 ac-ft.
- b. SLC owns an ODT water right which is a divided [REDACTED] interest in an underground water claim. This SLC supply yields an amount that is roughly one-half of the yield of the District's water right in ODT (purchased on behalf of Sandy). Historical use

patterns show that approximately 500-750 ac-ft per year has been diverted for beneficial use within the District and SLC service areas.

7. Bell Canyon Creek
 - a. Sandy owns water rights in Bell Canyon Creek. An aqueduct between Bell Canyon Creek and LCCr allows this water to be treated [REDACTED]. The availability of this source is affected by precipitation in the same way as LCCr. Water rights currently limit diversions from this source to 980 ac-ft annually, although more water is available in average years.
8. Aquifer Storage and Recovery (ASR)
 - a. The District, in conjunction with Sandy and SLC, is implementing an ASR project as a potential future water source. This option will utilize high spring runoff in the District's surface water sources that currently provides little benefit to the water system because it arrives during a period when supply is in excess of demand (early spring) and no surface reservoirs exist to store it. This water is primarily available in average and high-water years but can be available even in dry years. Some of the excess water would be injected or infiltrated into the aquifer and documented with the State Engineer. Then, in dry years, this water would be available for extraction through typical groundwater wells. The District has estimated between 2,400 ac-ft of water can be stored in the aquifer in a dry year and 8,790 ac-ft in a wet year, with an average rate of 6,000 ac-ft. Stored water can then be withdrawn directly by the District or its member cities through existing wells when needed to supplement surface water. [REDACTED]. [REDACTED]

Water Conveyance

1. Salt Lake Aqueduct (SLA)
 - a. The SLA was completed in 1951 as part of the PRP. The aqueduct is a 42-mile long, mostly 69-inch inside diameter, concrete and steel pipe that carries water from the Deer Creek Reservoir in Wasatch County to the SLA Terminal Reservoir in Salt Lake County [REDACTED]. The SLA consists of a 33-mile section of raw water pipeline that carries raw water into the LCWTP, and a 9-mile section of finished water pipeline that carries finished water from the LCWTP to the SLA Terminal Reservoir. The total design capacity of the SLA is 175 cfs (113 MGD). Water travels by gravity (meaning it gets its movement and pressure by running downhill) through the entire length of the pipeline. If needed, water can also be pumped from LCWTP to the SLA Terminal Reservoir (the finished water section of the SLA will gravity flow to 139 cfs (90 MGD) but requires pumping to achieve higher flows). Some parts of the SLA are located near the Wasatch Fault. Ownership title of the SLA was transferred to the District from the BOR on October 2, 2006.
2. Little Cottonwood Conduit (LCC)
 - a. LCC was completed in 1932 as part of a series of exchange agreements between SLC and four irrigation companies entitled to water rights in LCCr. The aqueduct is a 3.2-mile long, 40-inch by 36-inch (inside dimension) arched/elliptical concrete conduit that carries raw water from the LCCr to LCWTP and finished water from LCWTP to SLC's distribution system. The raw water section of the LCC, [REDACTED], is owned and operated by the District. The finished water section of the LCC, 14,950 feet in length, is owned and operated by SLC. The total design capacity of raw water LCC is 92.5 cfs (60 MGD). However, due to pressure restrictions of the pipe (raw water section of the LCC), the allowed capacity is limited to 55 cfs (36

MGD). Water travels by gravity through the raw water section of the LCC. The finished water section is supplied by the LCC pumping system located at LCWTP. The pumping system has a capacity of 35 MGD.

3. Point of the Mountain Aqueduct (POMA)
 - a. POMA was completed in 2007. The aqueduct includes a 2.6-mile section of 84-inch inside diameter raw water welded steel pipe, [REDACTED], and an 11.9-mile section of 60-inch inside diameter finished water welded steel pipe, [REDACTED]. POMA transports finished spring runoff water from LCWTP to the south and west areas of the Salt Lake Valley. When spring runoff trails off each year, the pipeline's direction of flow can be reversed to transport water from POMWTP to the north and east areas of the valley. [REDACTED]
[REDACTED]
[REDACTED] The design capacity of POMA depends on the flow direction of delivered water: when flowing north to south (gravity flow) the capacity equals 100 MGD (155 cfs); flowing south to north (pumped) the capacity equals 80 MGD (124 cfs).

Water Storage Facilities

1. POM Raw Water Reservoir (RWR)
 - a. POM RWR is a 44.4 MG [REDACTED] with an earthen embankment. Raw water can be received from the PRA and the JA system. [REDACTED]
[REDACTED]. The state formally inspects the POM RWR annually.
2. LCWTP FWR
 - a. LCWTP FWR located at LCWTP was put into service in 2009. This is a [REDACTED], one cell reservoir which provides fire protection, backwash supply, and storage capacity for SLC and Sandy. The capacity of this reservoir is 9 MG.
3. 10 MG Reservoir
 - a. 10 MG Reservoir is located [REDACTED], Cottonwood Heights, UT, and was put into service in 1994. This is an [REDACTED] reservoir consisting of one cell. The reservoir provides SLC with fire protection for the south end of their distribution system and increases storage capacity. The capacity of this reservoir is 10 MG.
4. SLA Terminal FWR/Sam Park West Reservoir
 - a. These reservoirs are located at approximately [REDACTED] and consists of 47.8 MG of total storage. They are located at the end of the SLA [REDACTED]. The reservoirs were constructed to provide water storage for fire protection and flexibility of water flows to allow for better distribution of water to SLC. The original SLA Terminal Reservoir was put into service in 1951. SLA Terminal Reservoir was reconstructed in 2019. It consists of three cells (north cell A (13.8 MG), north cell B (13.8 MG), and south cell B (11.3 MG)) with the ability to add a fourth cell in the future. Sam Park West Reservoir consists of one cell (8.9 MG).
5. POM FWR
 - a. POM FWR, [REDACTED], was put into service in 2007. This is an underground reservoir consisting of two 10 MG concrete cells that provide 20 MG of total finished water storage. The reservoir can receive water directly from the POMWTP and from the LCWTP [REDACTED]. The POM FWR provides system pressure for the [REDACTED] South pipeline, particularly during higher summer demand.

Other Facilities/Systems

1. SLA Finished Water Pump Station
 - a. The SLA Finished Water Pump Station contains two sets of pumps. The first set includes two pumps devoted to backwashing LCWTP filters. The second set, consisting of four pumps, is designed to supplement or boost the capacity of the finished water section of the SLA from 90 MGD of gravity flow to 110 MGD of pumped flow.
2. LCC Pump Station
 - a. LCC Pump Station consists of two sets of pumps. The first set, a combination of four pumps, can supply finished water to the LCC (up to 35 MGD) and provide emergency backwash water to the filters. The second set, consisting of three pumps, is sized to meet the demands of pressure and flow of LCWTP utility water. Utility water can also be delivered using two propane powered emergency standby pumps. The LCC Pump Station is [REDACTED] at the LCWTP.
3. POMWTP Pump Station
 - a. POMWTP Pump Station contains five pumps to transfer finished water from POMWTP to LCWTP [REDACTED] with space for a sixth pump. Four of the five existing pumps are large capacity and one of these four pumps has a variable frequency drive (VFD). The fifth existing pump is smaller capacity and includes a VFD. Additionally, there are two pumps to provide backwash water to the filters and three pumps sized to meet the demands of pressure and flow of POMWTP utility water.
4. Jordan Narrows Pump Station (JNPS)
 - a. JNPS is situated [REDACTED] on the Utah County/Salt Lake County border. JNPS is actually two pumping systems (turbine and electric pumps) that can be used separately or together to pump water into the north and south branches of the ULDC canal. The turbine facility is a PRP facility that is owned and operated by the PRWUA. The electric pump station is a District facility. These facilities are used to meet the terms of the exchange agreement between the District and ULDC.
5. SLA Intake
 - a. [REDACTED]
[REDACTED]. The intake, which was installed in 2003, delivers water to SLA. It is owned by the District and is operated by PRWUA. The design capacity of the intake is 175 cfs (113 MGD). The original intake, whose function was replaced in 2003, is still intact and its pipeline connections to the SLA are in place. The actuator is reported to be operable and has been tested regularly, though there is some question regarding the ability to operate the sluice gate in an emergency situation.
6. Raw Water POMA PRA Intake
 - a. [REDACTED]
[REDACTED] The intake structure delivers water from PRA into the raw water section of POMA and onto POMWTP. It is maintained and operated by PRWUA. The raw water section of POMA leading to POMWTP can also be supplied via a 48-inch diameter pipeline connected to JA. [REDACTED]
[REDACTED] The connection to the PRA and the connection to the JA do not operate at the same time; raw water POMA is supplied by one intake at a given time.
7. Murray Penstock (LCWTP Intake)
 - a. Murray Penstock is a 48-inch diameter steel pipe that diverts water from LCCr [REDACTED]
[REDACTED]. [REDACTED]
[REDACTED] Water in the penstock is also used to generate

power at an existing hydropower plant [REDACTED]. The hydropower plant is owned and operated by Murray City. The design capacity of the Murray Penstock is 183 cfs (118 MGD). The District diverts flow from the discharge of the hydropower plant into LCWTP.

8. LCCr and Bell Canyon Creek Intake [REDACTED]

- a. [REDACTED] The intake structure [REDACTED] is owned and operated by the District. Sandy City constructed a pipeline to move Sandy City-owned water from Bell Canyon Creek, the drainage immediately south of LCCr, to LCCr. Bell Canyon Creek water is diverted into LCCr [REDACTED] allowing for Bell Canyon Creek water to be treated at LCWTP. The original diversion was built with the LCC in 1932 but was entirely replaced in 2007. The diversion includes a radial gate and Coanda screening structure. The design capacity of the intake is 92 cfs (59 MGD); however, due to hydraulic and pressure restrictions of the pipe (raw water section of the LCC), the allowed capacity of the intake is limited to 55 cfs (36 MGD).

The MWDSLS Planning Team reviewed and ranked the top 20 assets from Table I.1, excluding Non-District assets to be included in this utility-wide MMP. There were two Treatment Plants, no Surface Water Sources, five Water Conveyance, four Water Storage Facilities, and three Other Facilities/Systems that made the list of the top 20 assets. The District's top 20 assets are shown in Section 2.4, Table 2.5 and again in [REDACTED] Table 2.7. These 20 key assets are also shown on the asset location and hazard maps in Appendix B.

Past Development (excerpts from the MP of System Improvements, 2020 Update)

A history of planning by the District includes:

- 1987 Master Plan of System Improvements
 - The District completed its first master plan since its facilities were originally constructed (1930s-1960s). The master plan consisted of five separate “reports” that included an executive summary, system hydraulics evaluation, LCWTP and SLA intake (located at Deer Creek Reservoir), LCWTP process control system (PCS)-Telemetry, and computer-PCS.
- Master Plan of System Improvements – 1998 Update
 - By 1996, the District had completed most of the recommendations of the 1987 Master Plan and desired guidance regarding future needs of the member cities anticipated to be met by the District. The District requested the member cities to develop long-term water needs expected to be furnished by the District to the member cities, focusing on both water supply volume, treatment capacity, and conveyance capacity.
 - The member cities’ master plans indicated a need for an additional 67 MGD of conveyance and treatment capacity from the District.
 - Based upon the demands in the member cities’ master plans, a study was completed by the District entitled “Master Plan of System Improvements-1998 Update” which consisted of Report 2 and Report 3. Report 2 included an evaluation of system supply, conveyance, and storage. Report 3 evaluated needs at LCWTP and the SLA intake located at Deer Creek Reservoir. The reports were finalized on August 12, 1998.



- This study also examined how to get additional treatment capacity and conveyance capacity to the member cities. It examined 21 alternatives which included a wide range of alternatives such as developing a tunnel from Jordanelle to LCWTP, expanding LCWTP, and building an additional treatment plant. Three alternatives were recommended for further analysis. These included:
 - Raw Water. Additional raw water to LCWTP and an expansion of LCWTP treatment capacity.
 - Finished Water. Deliver water from the Provo Reservoir Canal to a new water treatment plant at the POM; connect the new plant to LCWTP with a finished water pipeline.
 - Groundwater. Development of groundwater rights or development of an ASR system.
- These three alternatives, as listed above, were studied further and presented in a report entitled “Further Evaluation of Selected Alternatives, Master Plan of System Improvements-1998 Update” This report was completed in November 1998. The report recommended the finished water alternative even though it was estimated to cost \$42 million more than the raw water alternative. The District board approved this recommendation. The recommended alternative was implemented as follows:
 - 1999 - 2001, Negotiations were made between the member cities and the District to determine how project costs were to be paid, resulting in the 2001 agreement “pay for what you get” and the concept of master plan capital assessments.
 - 1999 - 2002, Design and construction of “non-capacity” projects including the SLA Intake [REDACTED], Chemical Building [REDACTED], the Administration Building [REDACTED], SLA Terminal Reservoir repair, and LCWTP Heating, Ventilation, and Air Conditioning (HVAC) system upgrade were accomplished.
 - 1999, Land acquisition for POMWTP and other project facilities began.
 - 2000, The member cities updated their master plans to confirm need for the POMWTP project. The capacity requests did not change.
 - 2001 - 2002, A year-long pilot study for treatment processes at POMWTP was executed involving the member cities and other agencies. Taste and odor were deemed to be a bigger issue than having absolute treatment barrier (membranes). This led to decision to do ozone treatment at POMWTP and LCWTP.
 - 2002 - 2003, Conceptual and preliminary design reports for POMWTP, transmission system, and LCWTP expansion were developed. Cost estimates were updated for all project features.
 - 2003 - 2004, Negotiations were made with Draper City for approval of the conditional use permit for POMWTP.
 - 2004-2009, Design and construction of the Metro Water Project was completed. The Metro Water Project consisted of design and construction of POMWTP, POMA, and rehabilitation of portions of LCWTP.

- In 2003, an update was made to the 1998 master plan entitled “2003 Master Plan Update Report”. This report summarized the changes to the Metro Water Project from the prior four years and updated project costs. This report was presented to the District board at several board meetings from May through November 2003. The member cities provided review comments as well, and the District board adopted the final report.
- The District participated in an updated projection for demand and supply that was completed in September 2007. The report was entitled “Salt Lake County Demand and Supply Study” and included participation of the District, JWCDC, Holliday Water Company, and Murray City.
- The 2008 Capital Improvement Plan, completed in October 2008, updated the capital improvement plan as the Metro Water Project was concluding. The study was the catalyst for the District to implement its formal asset management planning program. In addition to identifying new capital projects, the study reviewed prior District studies and consolidated a list of anticipated capital projects, including the Terminal Reservoir Replacement Project which ran from 2009 to 2017.
- The “2014 Supply and Demand Study” dated December 16, 2014, provided an update to prior master planning elements related to volume and capacity projections. Capital improvement projects were not a focus of this effort.
- Dated June 22, 2020, the Master Plan of System Improvements-2020 Update, was completed. The objective of this report was to review and update supply and demand assumptions; analyze facility capacity; update conveyance, storage, and treatment strategies; and develop a plan for capital improvements focused on the next 10 years based on the findings.
- Implementation of the recommendations of the 2020 update to the master plan includes further analysis of replacement of portions of the SLA and potential improvements to the LCWTP. Findings from these analyses include:
 - The SLA was installed in the 1930s and 1940s through mostly undeveloped and uninhabited land. The SLA has been at build-out for years. The District is actively planning to improve the capacity and reliability of the SLA in the next 15-20 years. Significant residential and commercial growth has occurred along most of the 42-mile alignment, creating proximity hazards, access for malevolent acts, and [REDACTED].
 - There are no plans to further expand the LCWTP, although the 2021 LCWTP Site Optimization Study recommended reconciling net plant capacity with finished water delivery requirements of 145 mgd. Accounting for a 5-percent recycle rate, this resulted in minor process increase of 2 mgd to 152 mgd gross capacity. Little Cottonwood Creek has no raw water storage, and runoff typically peaks before system demand peaks. MWDSLS is currently piloting ASR facilities [REDACTED] to take advantage of peak runoff and latent plant capacity to increase groundwater supplies for later in the year and/or drought. The SLA does not have enough raw water conveyance capacity for the LCWTP to produce 145 mgd in late summer.

Future Development (excerpts from the MP of System Improvements, 2020 Update)

Potential future development includes:

- Redundancy and reliability improvements to the SLA. This is accomplished with a parallel pipeline, known as the Salt Lake Aqueduct Replacement (SLAR) and by hardening the SLA in key hazard areas and sliplining it elsewhere.
- Replacement of the process portion of the LCWTP and water quality and chemical feed improvements, such as adding a chemical contact basin and routing all treated flow through the LCWTP FWR. This is known as the LCWTP Process Improvement Project (PIP). Timing of the PIP is coordinated with work on other WTPs within the Salt Lake Valley, suggesting construction will not begin for approximately 10 years. A series of pre-PIP projects, such as replacing chain-and-flight equipment and adding tube settlers in sedimentation basins is recommended to support the LCWTP until the PIP is constructed, and to provide operational flexibility and reliability during construction. Improvements are also recommended to increase reliability of LCCr facilities including the LCCr intake and LCC.

For all practical purposes, all demand on the District comes from its two member cities. Both member cities have completed their own supply and demand studies and reported some changes that will, or have the potential to, affect demand on the District. Changes that need to be evaluated and addressed for the District to meet its future water supply commitments include:

- SLC Land Use Changes – The relocation of the State of Utah prison to the northwest quadrant of SLC will, in effect, place an instant community of near 5,000 persons within the SLC's northwest quadrant. In addition, the plans for an inland port in the northwest quadrant will accelerate and expand projected industrial growth within that area. These land use impacts were not included in previous SLC demand projections because previous projections expected this area to develop as residential units. SLC also is experiencing densification within the downtown area and elsewhere in its system that was not anticipated in previous studies.
- Sandy Land Use Changes – While not new, the Cairns development, which is Sandy City's flagship downtown densification project, has resurfaced as a priority project. This will change the timing and magnitude of overall Sandy City water demand on the District.
- Continued Growth – While much of the District is developed, there is still significant potential for additional growth both through new development and through redevelopment. Both member cities are projecting continued growth. To meet the additional water needs of this growth, the District will need to optimize use of its existing supplies and prepare for the development of future supplies.
- Member City Supply Changes – The District is not the sole supplier of water to either member city. Both cities have access to other sources to meet their own needs. Naturally, the degree to which Sandy and SLC utilize their own sources affects the demand each has on the District. Since the last supply and demand study, there have been small changes in both member cities which have affected the way they use water from the District.
- Conservation – Both member cities have already made significant progress with conservation and both are planning for more aggressive conservation in the future. This has a positive effect on the required timing of new source development.
- Drought – Recent years of drought have emphasized the importance of planning for drought scenarios. Multiyear droughts affect water supplies most critically and several extended

periods of drought have been observed since the completion of previous studies. Consideration of these more frequent drought periods may change how the District plans for drought in the future.

- **Climate Change** – Climate change has the potential to affect both demand (e.g., irrigation season becomes longer and evapotranspiration increases with higher temperatures) and supply (e.g., less precipitation in the form of snow affects how water is available in the system). To be prepared for these impacts, the District needs to continue to consider the potential effects of climate change in its demand and supply planning.

Section 1

Planning Process

Preparation of this MWDSLS Utility-wide Multi-Hazard Mitigation Plan (MMP or Plan) was accomplished using a four-phase approach, which included:

- Phase A Planning Process
- Phase B Natural Hazard Risk Assessment
- Phase C Mitigation Strategy Development
- Phase D Plan Update and Adoption

Phase A was used to define the planning process for the Plan and included several meetings (Kickoff, Planning Team, and Asset Prioritization) with the District's Planning Team to complete the major elements of this phase. The planning process was reviewed, and the stakeholders list and outreach strategy were prepared for the public involvement program along with plan maintenance procedures. During this phase, other existing plans and resources were also reviewed for use in the Plan's development. Specifically, the 2020 SLA HMP and 2021 LCWTP HMP were reviewed, and used in the development of a Utility-wide MMP that meets the Federal Emergency Management Agency (FEMA) Local Hazard Mitigation Plan requirements. The Plan would also include new utility-wide facilities/assets not reviewed and assessed previously by the District in the SLA and LCWTP HMPs. Also, during the planning process, the District's top 20 key assets were identified and prioritized based on the District's mission specific criteria to determine their criticality. A Planning Team meeting was held with the District at the end of this phase to review all the Phase A tasks, followed by the first stakeholder meeting to solicit input, and present the scope of work and schedule for the remaining phases of the development of the new Plan.

Phase B, Risk Assessment included hazard identification and risk/vulnerability assessment. This was accomplished through tasks of hazard identification and profiling, assessing vulnerabilities, and consequence assessment. The assets identified and prioritized during Phase A Planning Process were first screened at a Risk Screening Workshop and then the MWDSLS Planning Team selected 40 natural hazard and 20 non-natural hazard asset-hazard pairs for assessment during this Risk Assessment phase. Descriptions of the natural hazards affecting key water assets were documented in Section 2.0 of the Plan including an analysis of how hazards vary across assets given the location and extent of each natural hazard. Previous hazard occurrences were also reviewed and documented including those identified from previous hazard mitigation plans in 2020 and 2021, respectively. A two-step screening process was used to limit the assets assessed to only those with high risk of hazard to limit the number of asset-hazard pairs receiving the risk assessment due to limited District resources. The vulnerability assessment task included research, document reviews, and interviews of MWDSLS staff for MWDSLS assets. The assessment also included a review of other existing plans, hazard studies, reports, and other information gathered during Phase A. A summary was documented for each of the 40 natural hazard and 20 non-natural hazard selected asset-hazard pairs for the asset's vulnerability to each hazard. This included rating of the impact of each hazard. The consequence assessment task included determining the system loss of service and cost of infrastructure repair/replacement for each of the top 5 assets for their selected asset-hazard pairs. Towards the end of this phase, a meeting was held with the District's Planning Team to review the results of Phase B. A second stakeholder meeting was

then held to present the results of Phase B to stakeholders, receive stakeholder input, and provide a scope and schedule update for the Plan.

During Phase C, the mitigation strategy was developed for the Plan. The mitigation strategy included identification of mitigation goals and actions, and development of general and specific mitigation actions based on Phase B assessment results to lower the natural and non-natural hazard risk and consequence of failure of District assets. This was accomplished by conducting the following tasks: review previous mitigation actions and determine their status, identify and develop specific mitigation actions, prioritize action items, and develop separate implementation plans for natural hazards and non-natural hazards including malevolent acts. The mitigation actions for the top 5 assets for both natural hazards and non-natural hazards were further developed with planning level rough order of magnitude cost estimates. A basic benefit-cost analysis was performed for each mitigation project using the benefits estimated during Phase B of the planning process and using the results of the consequence assessment. A mitigation implementation plan was developed for the specific hazard mitigation projects (i.e., mitigation actions of top 5 assets) and included project prioritization, potential funding source identification, and proposed implementation schedule. A Risk Assessment Workshop was held with the District's Planning Team to review the results of Phase C. Next, a third stakeholder meeting was held to present the results of Phase C to the stakeholders, receive stakeholder input, and provide a scope and schedule update for completion of this Utility-wide Plan.

During Phase D, this Utility-wide draft Plan was prepared with results from work performed during Phases A through C. The draft Plan was reviewed by the District, presented to stakeholders, then revised and submitted to the State of Utah for review. After addressing State comments, the Final draft Plan was submitted to FEMA for review and approval. After receiving conditional approval of the Final Draft Plan from FEMA, the Plan was presented to the MWDSLS Board of Trustees for adoption. Finally, the signed adoption resolution was submitted to FEMA for final Plan approval.

1.1 Planning Team

The District MMP was prepared by the Elwell Consulting Group (ECG) Team under contract and the direction of the District. The planning team was made up of District managers, supervisors, engineers, and technicians/specialists, as well as consultant civil, structural, electrical/instrumentation/controls engineers, geotechnical engineers, geologists, and GIS specialists. Team members were chosen based on their knowledge of the MWDSLS water system and their engineering expertise in the area of natural hazards, water systems, and mitigation planning. The District's key personnel and the ECG Team's project manager/HMP lead, facilities engineer, senior project manager, and geotechnical engineering lead, who served as the key planners for the Plan, are listed in Table 1.1. The remainder of the planning team members provided technical contributions throughout the planning process and are listed in Table 1.2 below.



Table 1.1 Planning Team - Key Planners

Team Member	Organization, Position Title
Ammon Allen	MWDSLS, Engineering Supervisor
Bryon Elwell	Elwell Consulting Group, Project Manager/ HMP Lead
Eric Sorensen	MWDSLS, Environmental Services Specialist
Hiram Alba	GeoStrata (ECG subconsultant), Geotechnical Engineering Lead
Jeremy Williams	Hazen and Sawyer (ECG subconsultant), Facility Specialist
Matt Tietje	MWDSLS, Operations Manager
Mike Wilson	CRS (ECG subconsultant), Sr. Project Manager
Nathan Scown	MWDSLS, Assistant Operations Manager
Ryan Nicholes	MWDSLS, Information Systems Manager
Wayne Winsor	MWDSLS, Assistant General Manager / Chief Engineer / Project Manager

Table 1.2 Planning Team -Technical Contributors

Team Member	Organization, Position Title
Annalee Munsey	MWDSLS, Assistant General Manager
Anthony Galterio	Hazen and Sawyer (ECG subconsultant), Structural Engineer
Ben Stanford	Hazen and Sawyer (ECG subconsultant), Cyber Expert
Chris Thunhorst	Hazen and Sawyer (ECG subconsultant), Electrical, Instrumentation, and Controls Engineer
Daniel Reynolds	CRS (ECG subconsultant), GIS Specialist
Eric Sorensen	MWDSLS, Environmental Services Specialist
Gordon Cook	MWDSLS, Maintenance Manager
Jeff Matheson	MWDSLS, Lab Manager
Maggie Shalvoy	Hazen and Sawyer (ECG subconsultant), Assistant Engineer II
Matthew Marcek	MWDSLS, Facilities Supervisor
Parry Osborn	Hazen and Sawyer (ECG subconsultant), Structural Engineer
Scot Collier	MWDSLS, Instrumentation and Electrical Supervisor
Sofia Agopian	GeoStrata (ECG subconsultant), Project Geologist and GIS Specialist
Steve Slack	MWDSLS, Assistant Maintenance Manager
Tim Thompson	GeoStrata (ECG subconsultant), Sr. Engineering Geologist

1.2 Stakeholder and Public Involvement

This section documents the involvement of federal, state, regional, and local stakeholders in the development of this MWDSLS Utility-wide MMP. The Plan affects many jurisdictions, agencies, and organizations including wholesale member agencies, neighboring and local jurisdictions, county or regional agencies, state and federal agencies, and others (e.g., utilities). Public involvement was attained throughout the planning process by holding periodic meetings with MWDSLS stakeholders during all four phases of mitigation planning. The meetings were provided to inform the stakeholders about the planning process, provide progress updates, brief them on evaluation results, and solicit comments and feedback. Table 1.3 identifies the stakeholder jurisdictions/agencies and



organizations, and their participation in the planning process. Comments from the various public meetings were documented by the District's mitigation planning consultant and were incorporated into the MWDSLS Utility-wide MMP, as appropriate.

The District solicited public/stakeholder participation in the planning process by sending out stakeholder meeting invitation letters to all potential interested parties. A copy of the invitation list, invitation letters, and attendance records for each stakeholder meeting held during the planning process is provided in Appendix C along with stakeholder comment sheets and survey forms completed during the planning process.

The District provided a questionnaire to all stakeholders in an effort to obtain feedback on the experiences each organization had with past hazard mitigation planning efforts and success of mitigation actions used by these organizations. The questionnaire can be found in Appendix C along with all completed questionnaires the District received. Organizations were given the opportunity to provide suggestions on implemented mitigation actions they utilized, as well as comment on the District's plan and results reported in each stakeholder meeting. Comments on past mitigation actions, effectiveness of the actions, and costs associated were all compiled and reviewed by the District. With this information, the District was able to incorporate mitigation actions and ideas that were found to be effective by other organizations.

Table 1.3 Stakeholder Planning Participation

Stakeholder	Stakeholder Meeting Attendance			
	Phase A Mtg #1:	Phase B Mtg #2:	Phase C Mtg #3:	Phase D Mtg #4:
Wholesale Member Agencies				
Salt Lake City			✓	
Sandy City		✓	✓	
Neighboring and Local Jurisdictions				
Alpine City		✓		
Cedar Hills City				
Cottonwood Heights City				
Draper City	✓	✓		✓
Highland City	✓			
Holladay City		✓		
Lindon City	✓		✓	
Millcreek City	✓		✓	
Murray City (Murray Power)	✓		✓	
Orem City			✓	
Pleasant Grove City				
Provo City			✓	✓
County or Regional Agencies				
Central Utah Water Conservancy District	✓			



Table 1.3 Stakeholder Planning Participation

Stakeholder	Stakeholder Meeting Attendance			
	Phase A Mtg #1:	Phase B Mtg #2:	Phase C Mtg #3:	Phase D Mtg #4:
Jordan Valley Water Conservancy District	✓	✓	✓	✓
Mountainland Association of Governments				
Provo River Water Users Association	✓			
Salt Lake County				
Salt Lake County Emergency Management/Unified Fire Authority	✓			
Salt Lake County - Flood Control	✓	✓	✓	
Utah County – Public Works/County Engineer			✓	
Wasatch County – Emergency Management/Flood Hazards			✓	
State Agency				
Utah Department of Transportation				
Utah Division of Drinking Water	✓	✓	✓	✓
Utah Division of Emergency Management	✓	✓	✓	
Utah Division of Forestry, Fire, and State Lands				
Utah Division of Water Resources				
Utah Division of Water Rights				
Utah Geological Survey	✓			
Federal Agency				
FEMA – Region VIII	✓			
U.S. Bureau of Reclamation	✓	✓		
U.S. Forest Service – Intermountain Region				
Other				
Rocky Mountain Power	✓	✓	✓	✓
Dominion Energy				

In addition to their involvement in stakeholder meetings, the District’s member cities (SLC and Sandy) received updates and provided input on the Plan through regular Board meetings and monthly Member Cities meetings. The member cities were heavily depended on for public involvement from SLC and Sandy. Throughout the planning process, the member cities represented their constituent’s voice and were depended on to provide feedback that represented their publics’ voice. The District’s Engineering Committee, which includes three members of the board, discussed MMP Phases B and C on February 6, 2023. The District held frequent Board meetings that were open to the public and stakeholders. These meetings provided time for the public and stakeholders to get an update on the planning process and communicate any feedback. A formal presentation was shared with the Board on February 27, 2023. In addition to these focused presentations, updates on the Plan status were provided at every Engineering Committee and Board meeting.

In addition, the District announced at their April 17, 2023, Board Meeting the opening of a public comment period for the public to be able to make an appointment to review the Draft Plan at the

District's office starting on April 17th through May 18th and make comments to the District on their Plan. Throughout this open comment period, there were no appointments made or comments provided by the public on the Draft Plan. Additionally, a presentation of the Draft Plan was also provided by the District staff to the Board at their May 15, 2023, Board Meeting that was also advertised to the stakeholders and public for their attendance. At the May Board meeting, there were no constituents that attended and therefore no comments were received from the public on the Draft Plan.

1.3 Planning Timeline

The MWDSLS MMP began at the beginning of April 2022 with approximately a 16-month planned project duration. The key milestones and their corresponding completion dates are shown in Table 1.4 below. The project was divided into four phases. Phase A, Planning Process started with the Kickoff Meeting on April 5, 2022, and ended with the Phase A Stakeholder meeting on June 1, 2022. Phase B, Risk Assessment began in June 2022 and ended on November 29, 2022, with the Phase B Stakeholder meeting. Phase C, Mitigation Strategy began in November 2022 and ended on February 7, 2023, with the Phase C Stakeholder meeting. Phase D, Plan Review and Adoption started in February 2023 and was completed upon MWDSLS Board adoption of the Plan in August 2023.

A review meeting to discuss the draft Plan was held on April 6, 2023, after which the District provided comments for incorporation into the final Plan. The final stakeholder meeting was held on April 13, 2023. The final Plan was then prepared and submitted to the State of Utah for review. During the State's review, a Draft Plan, public review and comment period (approximately 30 days) was provided from April 17 to May 18, 2023. After making State-requested changes and also addressing any public comments, the Plan was submitted to FEMA for review in May 2023. FEMA completed review of the Plan in July 2023 and granted conditional approval of the Plan pending MWDSLS Board adoption. The District presented the MWDSLS Utility-wide MMP to its Board of Trustees for adoption on August 7, 2023. The MWDSLS Board adoption resolution was submitted to FEMA, and FEMA issued a letter of Plan approval on September 8, 2023.

Table 1.4 Planning Process Timeline

Date	Action	Description
April 5, 2022	Kickoff Mtg	Kickoff meeting with District personnel lead by planning consultant to begin Multi-Hazard Mitigation Plan project
May 24, 2022	Phase A Planning Team Mtg #1 and Asset Prioritization	Planning process results reviewed with District and Phase B Asset prioritization (collaborative pair wise comparison asset criticality ranking) completed with District
June 1, 2022	Phase A Stakeholder Mtg #1	Stakeholders briefed on Phase A results and feedback/comments solicited with Stakeholder Survey #1
July 26, 2022	Phase B Planning Team Mtg #2 – Risk Screening	Workshop discussing consequences of identified hazard vulnerabilities of top 20 assets and selected highest risk 40 Asset-Hazard Pairs for Natural Hazard Risk Assessment and selected highest 20 Asset-Hazard Pairs for Non-natural Hazards
November 8, 2022	Phase B – Risk Assessment Workshop	Risk assessment results reviewed with District and Top 5 assets ranked for Mitigation Actions (Natural and Non-natural Hazards) during Phase C
November 29, 2022	Phase B Stakeholders Mtg #2	Stakeholders briefed on hazard evaluation and risk assessment results and feedback/comments solicited with Stakeholder Survey #2
January 24, 2023	Phase C Planning Team Mtg #3	Hazard mitigation actions and plan for implementation reviewed with District
February 7, 2023	Phase C Stakeholders Mtg #3	Stakeholders briefed on hazard mitigation strategy, and feedback/comments solicited from stakeholders
March 23, 2023 - April 6, 2023	District review of Draft MMP	District reviewed the draft plan and provided comments



Table 1.4 Planning Process Timeline

Date	Action	Description
April 6, 2023	Phase D Planning Team Mtg #4 – Draft Plan Review	District personnel briefed on Plan and District review comments discussed
April 13, 2023	Phase D Final Stakeholders Briefing	Mitigation plan briefing, and final stakeholder feedback/comments solicited
April 14, 2023 - May 2, 2023	State of Utah review of MMP	State of Utah reviewed the Plan and provided comments
April 17, 2023	District Board Mtg	District announced the Draft Plan – Public Review and Comment Period
April 17, 2023 – May 18, 2023	Draft Plan – Public Review and Comment Period	District provided a public review and comment period of the Draft Plan
May 15, 2023	District Board Mtg	District provided a presentation of Draft Plan to public and Board
May 31, 2023 - July 14, 2023	FEMA review of MMP	FEMA reviewed the Plan and provided conditional approval
August 7, 2023	District Board Mtg	District Board passed a resolution to adopt the District Utility-wide MMP
September 8, 2023	FEMA approval	FEMA issued final approval of the Plan
September 15, 2023	Final MMP	Final Plan submitted to the District with District Board adoption and FEMA approval

1.4 Plan Adoption

FEMA provided conditional approval of the MWDSLS MMP on July 14, 2023, pending adoption of the Plan by the local governing body for MWDSLS (its Board of Trustees). The MWDSLS Board passed a resolution adopting the Plan during a board meeting held on August 7, 2023. A copy of the signed MWDSLS Board resolution is provided in Addendum #1.

Section 2

Hazard Identification

Determination of the MWDSLS utility-wide hazards (Natural, Dependency, Proximity, and Malevolent Acts) for risk assessment included hazard identification, documentation of past occurrences, hazard significance profiling, [REDACTED] facility identification, and hazard assessment. Each of these hazard assessment steps are discussed in the following sections.

2.1 Hazard Identification

The first step in the hazard identification process was to determine which of the various hazards (Natural, Dependency, Proximity, and Malevolent Acts) have the potential of impacting MWDSLS's [REDACTED] assets. The four different types of hazards are presented below with the sources used for each potential hazard type and a brief description of each potential hazard in that hazard type provided.

2.1.1 Natural Hazards

The natural hazards [REDACTED] were identified from the comprehensive list included in the FEMA Local Mitigation Planning Handbook dated March 2013. This FEMA guidance document lists the potential natural hazards as avalanche, dam failure, drought, earthquake, erosion, expansive soils, extreme cold, extreme heat, flood, hail, hurricane, landslide, lightning, sea level rise, severe wind, severe winter weather (, storm surge, subsidence, tornado, tsunami, and wildfire. Of this all-inclusive list, the natural hazards to which the District's utility-wide [REDACTED] facilities/assets are susceptible, based on climate and location, are shown in Table 2.1.

Table 2.1 Selected Natural Hazards

avalanche	earthquake N(E), N(E-WF)	problem soils N(G)
dam failure	flood N(F)	severe wind N(W)
debris flow N(DF)	landslide N(LS)	severe winter weather N(SW)
drought N(D)	lightning N(L)	wildfire N(WF)

Note: The District added a few specific natural hazards that were not listed in FEMA's guidance document specifically but have been known to exist for their critical assets, including problem soils (collapsible soils, expansive soils, erosion, and undocumented fill), and debris flow. The landslide hazard also includes rockfall.

The nomenclature used for each of the above natural hazards (i.e., N(D), N(E), N(F), etc.) will be used in presenting the Section 3 Risk Assessment and Section 4 Mitigation Strategy information, where the N stands for Natural Hazard and the letter in parenthesis stands for the specific hazard type. The second code used for the earthquake hazard of N(E-WF) is used to define the earthquake hazard along the Wasatch Front part of the MWDSLS assets (applied to all 16 key assets assessed) which has a higher likelihood than the N(E) hazard based on a regional study performed on the Wasatch Front faults in 2016. It is also important to note that only the ten hazards (debris flow, drought, earthquake, flood, landslide, lightning, problem soils, severe wind, severe winter weather, and wildfire) are shown in the table above with the naming convention following them because they were the only hazards advanced forward through the risk screening process and are part of the 40 asset-

hazard pairs for natural hazards and the 16 assets that received the full risk assessment. For additional details on the risk assessment process, see Section 3.0. The following is a description of each of the potential natural hazards to which MWDSLS assets are susceptible.

2.1.1.1 Avalanche

Avalanches are a rapid down-slope movement of snow, ice, and debris. They are the result of snow accumulation on a steep slope and can trigger naturally or be triggered by ground shaking, sound, or a person. The two main factors affecting avalanche activity include weather and terrain – large frequent storms combined with steep slopes result in avalanche danger. Slope angles between 30 to 45 degrees are optimum for avalanches. Additional factors that can contribute to avalanches are amount of snow, rate of accumulation, moisture content, snow crystal types, and the wind speed and direction. In Utah, the months of January through April have the highest avalanche risk.

The North American Public Avalanche Danger Scale (NAPADS) is a system that rates avalanche danger and provides general travel advice based on the likelihood, size, and distribution of expected avalanches. It consists of five levels, from least to highest amount of danger: 1 – Low, 2 – Moderate, 3 – Considerable, 4 – High, 5 – Extreme. Danger ratings are typically provided for three distinct elevation bands. Although the danger ratings are assigned numerical levels, the danger increases exponentially between levels. In other words, the hazard rises more dramatically as it ascends toward the higher levels on the scale.

The severity and frequency of avalanches are expected to change due to adverse climate change impacts. Weather variability is expected to include unpredictable weather patterns. Frequency of avalanches can be anticipated to increase, with increased snow fall and warmer temperatures occurring in similar time spans, this weather combination has the potential to result in increased amount of water in rivers, which then overflows and causes flooding in nearby areas.

2.1.1.2 Dam Failure

Dam failures result from the breach or overtopping of a manmade water impoundment structure, which often results in catastrophic down grade flooding. Dams are structures that store water and divert and impound water upstream. Most dams have a spillway where the flow of water from the reservoir is controlled. Dam failures result from the breach or overtopping of a manmade water impoundment structure, which often results in catastrophic down grade flooding. Dams owned by MWDSLS are all off-stream structures and will never likely be overtopped. Failure of these structures would likely be associated with cracking of the embankment through either settlement or ground shaking associated with an earthquake.

The severity of a dam or levee failure depends on the area protected by the dam or levee, the volume and velocity of water that breaches the structure, and the structures and population in the protected area. A dam or levee breach will result in flooding of normally protected areas, resulting in impacts like those seen in areas that are within the floodplain and not normally protected by a levee. Dams are classified using a National Dam Safety Program hazard classification of the following three hazard categories: 1) High, 2) Significant, and 3) Low (see Table 2.2).

Dam failures are anticipated to be impacted by climate change and increase rainfall events. Dams were originally designed based on a specific rainfall event. Climate change has proven to produce more frequent heavy rainfall events, that infrastructure was not designed to handle. Climate change will continue to have an effect on the frequency of dam failures.

Table 2.2 CORPS of Engineers Hazard Potential Classification

Hazard Category (a)	Direct Loss of Life (b)	Lifeline Losses (c)	Property Losses (d)	Environmental Losses (e)
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

a. Categories are assigned to overall projects, not individual structures at a project.

b. Loss of life potential based on inundation mapping downstream of the project. Analyses of loss of life potential should take into account the population at risk, time of flood wave travel, and warning time.

c. Indirect threats to life caused by the interruption of lifeline services due to project failure or operational disruption; for example, loss of critical medical facilities or access to them.

d. Damage to project facilities and downstream property and indirect impact due to loss of project services, such as loss of a dam and navigation pool, or impact due to loss of water or power supply.

e. Environmental impact caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: U.S. Army Corps of Engineers, 1995

For additional details on the dam failure hazard, see pages 66-75 of the 2019 Salt Lake County Multi-jurisdictional HMP.

2.1.1.3 Debris Flow

Debris flows are water-laden masses of soil and fragmented rock often called mudslides, mudflows, or debris avalanches and usually associated with flooding types of rainfall events or rapidly melting snowmelt. The debris within a debris flow is typically comprised of soil, rock fragments, and organic material such as trees and other vegetation that are picked up by scouring of rapidly moving water as the flow moves down a confining channel. Debris flow deposits are categorized based on the water to sediment ratio and viscosity of the debris flow. Debris flows may also be generated when a landslide deposit becomes rapidly saturated with water and flows into a channel.

Intense rainfall and rapid snowmelt are generally events that may trigger debris flow movement. Debris flows and floods also occur when heavy rains on recently burned slopes results in higher-than-normal runoff and in turn channel scour. Repeated debris flows and/or flood events deposit sediment at the mouth of canyons, forming an alluvial fan. Flows may travel farther down the fan from the mouth of the canyon if the channel becomes entrenched and the flow is confined.

Debris flows can be viscous and can transport extremely large boulders (greater than 6-foot diameter). Debris flows may eventually become muddy flood waters as they deposit their debris and tend to move in pulses. Early pulses or previous debris flows can form levees that channel the flow until the levees are breached. The presence of older levees indicates the recurrence and characteristics of debris flows in a particular canyon.



The amount of debris flow is expected to be affected by adverse climate change impacts. Climate change has increased conditions, high temperatures and precipitation extremes, that have the potential to lead to an increased amount of debris flow loosened. Debris flow has secondary consequences, such as creating a dam effect from large debris in rivers or streams that can cause potential flooding as a secondary impact.

2.1.1.4 Drought

Drought is a normal recurrent, but temporary, feature of climate variability that results from long periods of below normal precipitation. Droughts can affect the availability of drinking water, but water supply development and current conservation efforts have significantly reduced this effect. Prolonged droughts have a more significant effect on agriculture, which is dependent on irrigation water supply. Droughts also heighten the risk of wildfire and risk of water quality degradation that affects treatment capacity and efficacy.

The severity and frequency of droughts is expected to increase from adverse climate change impacts. Droughts affect the availability of water for M&I, agricultural, recreational, and environmental uses alike. Drought accompanied by higher temperatures also may increase the occurrence of algal blooms that have the potential to produce harmful cyanotoxins that render secondary sources unusable and increase treatment process needs for potable use.

The United States Drought Monitor has a map that identifies areas of drought and labels them by intensity. D1 is the least intense level and D4 the most intense. Drought is defined as a moisture deficit significant enough to have social, environmental, or economic effects. D0 areas are not in a drought but are experiencing abnormally dry conditions that could turn into drought or are recovering from drought but are not yet back to normal. The five stages of drought from low to high include:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Palmer Drought Severity Index has become the "semi-official" drought index as it is standardized across various climates. The index uses zero as normal and assigns a number between 6 and -6, with dry periods having negative numbers and wet periods expressed using positive numbers (National Drought Mitigation Center, 2006, What is Drought? 15 April 2008). For additional details on the drought hazard see pages 75-83 of the 2019 Salt Lake County Multi-jurisdictional HMP.

2.1.1.5 Earthquake

An earthquake is the abrupt shaking of the earth caused by the sudden breaking of crustal rocks when they can no longer withstand the stresses that build up deep beneath the earth's surface. The crustal rocks tend to rupture along weak zones referred to as faults. This sudden release of seismic energy can cause ground shaking, surface fault rupture, and liquefaction.

Ground shaking causes the most impacts during an earthquake because it affects large areas and is the origin of many secondary effects associated with earthquakes. Ground shaking, which generally lasts 10 to 30 seconds in large earthquakes, is caused by the passage of seismic waves generated by earthquakes. Earthquake waves vary in both frequency and amplitude. High frequency low amplitude waves can cause more damage to short stiff structures, whereas low frequency high amplitude waves have a greater effect on tall (high-rise) structures. Ground shaking is measured using peak ground acceleration. Local geologic conditions such as depth of sediment and sediment

make up affect earthquake wave propagation. Deep valley sediments increase the frequency of seismic waves relative to bedrock.

During a large earthquake fault movement may propagate along a fault plane to the surface, resulting in surface rupture along the fault. Anything built on top of or crossing a fault has a high potential of major damage from fault rupture displacement. Examples of damage include cracked foundations, building structures torn apart, broken up roads, and breaks or ruptures in utility lines, pipelines, or any other utilities. Often surface fault rupture does not occur on a single distinct plane; but instead occurs over a zone several feet to several hundred feet wide known as the zone of deformation.

The ground shaking hazard was assessed for the following two statistical likelihoods:

1. A two percent probability of exceedance in 50 years (2PE50), which is equivalent to an earthquake return period of 2,475 years, or annual probability of occurrence of 0.0004. New buildings and infrastructure, particularly those responsible for health and safety, are typically designed to a 2PE50 hazard level.
2. A ten percent probability of exceedance in 50 years (10PE50), which is equivalent to an earthquake return period of 500 years, or annual probability of occurrence of 0.002. 10PE50 is a common design event for seismic rehabilitation in design codes, particularly for non-critical facilities or facilities that are too expensive to retrofit to a 2PE50 hazard level.

Soil liquefaction occurs when water-saturated cohesion-less sandy soils are subject to ground shaking. When liquefaction occurs, soils behave more like a viscous liquid (quicksand) and lose their bearing capacity and shear strength. For soils to liquefy, they must typically be sandy, loose, water-saturated soils between 0 and 30 feet below the ground surface and the ground shaking must be strong enough to cause soils to liquefy. The loss of shear strength and bearing capacity due to liquefaction causes buildings to settle or tip and light buoyant structures such as buried storage tanks and empty swimming pools to float upward. Liquefaction can also cause damage through lateral spreading, which is soil displacement of three or more feet accompanied by ground cracking and vertical displacement. Lateral spreading can cause roads, buildings, buried utilities, and other structures to be pulled apart.

Earthquakes can be categorized by the Modified Mercalli Intensity Scale, the lower numbers of the scale generally describe the manner in which people feel the earthquake while the higher numbers of the scale indicate structural damage.

- Intensity I; Shaking Not Felt, Not felt except by a very few under especially favorable conditions.
- Intensity II; Shaking Weak, Felt only by a few persons at rest, especially on upper floors of buildings.
- Intensity III; Shaking Weak, Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motors cars may rock slightly. Vibrations similar to the passing of a truck.
- Intensity IV; Shaking Light, Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound.
- Intensity V; Shaking Moderate, Felt by nearly everyone, many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
- Intensity VI; Shaking Strong, Felt by all, many frightened. Some heavy furniture moved, a few instances of fallen plaster. Damage slight.



- Intensity VII; Shaking Very Strong, Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, considerable damage in poorly built or badly designed structures, some chimneys broken.
- Intensity VIII; Shaking Severe, Damage slight in specially designed structures, considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly build structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
- Intensity IX; Shaking Violent, Damage considerable in specially designed structures, well designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
- Intensity X; Shaking Extreme, Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

2.1.1.6 Extreme Heat

During the mitigation strategy portion of the planning process, extreme heat was identified as an additional natural hazard that could impact the SCADA/PCS [REDACTED] asset in addition to lightning and flood. This extreme heat natural hazard appears in Section 4.3.4.1 SCADA/PCS [REDACTED] and Table H-1 Mitigation Benefits in Appendix H as an additional hazard for mitigating the risk of several natural hazards for this asset.

Extreme heat is classified as temperatures 80 degrees Fahrenheit and above. The Heat Index Chart, by the National Oceanic and Atmospheric Administration National Weather Service, provides classifications on the heat index.

- 80 – 90 degrees Fahrenheit is categorized as “Caution”
- 90 – 105 degrees Fahrenheit is categorized as “Extreme Caution”
- 105 – 129 degrees Fahrenheit is categorized as “Danger”
- 130 degrees Fahrenheit and higher, is categorized as “Extreme Danger”

Extreme heat is a product of climate change and global warming temperatures. Extreme heat is expected to be part of future conditions due to global warming. Extreme heat has secondary impacts on droughts and wildfire events.

2.1.1.7 Flood

Flooding is a temporary overflow of water onto lands not normally inundated by water. Often, mud/sediment/debris flows happen concurrently with flooding, causing damages sometimes more severe than what flooding alone may have caused. Factors that determine the severity of floods include rainfall intensity, duration of a storm, and rapid snowmelt. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can also result in flooding at locations where the soil has been previously saturated or if rain concentrates in an area having impermeable surfaces such as large parking lots, paved roadways, or post-burned areas. Topography and ground cover are also contributing factors for floods. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover. Frequency of flood inundation depends on the climate, soil, and channel slope. Conditions which may exacerbate floods include steeply sloped watersheds, constrictions, obstructions, debris contamination, soil saturation, and velocity.

The Federal Emergency Management Agency (FEMA) utilizes FEMA Firm (Flood Insurance Rate Map) Flood Maps to identify moderate to low risk areas and high risk areas. The 100-year floodplain is an area with a 1% annual chance of flooding. The 500-year floodplain is an area with a 0.2% chance of flooding. FEMA has designated the 500-year floodplain as a low-risk area. On the FIRM Maps the risk areas are shown and labeled according to their zone. The following classification designations are used to categorize flood zones.

- Moderate to Low Risk Areas
 - Zone B and X: Between the limits of the 100-year and 500-year floodplain. Area with a 0.2% annual chance of floodings.
 - Zone C and X 500-year floodplain, area of minimal flood hazard.
- High Risk Areas
 - Zone A: 100-year floodplain, areas with a 1% annual chance of flooding.
 - Zone AE: 100-year floodplain, The base floodplain where base flood elevations are provided.
 - Zone AH: 100-year floodplain, areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet.
 - Zone AO: 100-year floodplain, river or stream flood hazard areas, and areas with a 1% chance or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet.
 - Zone ARL Areas with a temporarily increased flood risk due to the building or restoration of a flood control system.
 - Zone A99: 100-year floodplain, areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements.
- Undetermined Risk Areas
 - Zone D: Areas with a possible but underdetermined flood hazards.

The severity and frequency of floods is expected to increase from adverse climate change impacts. As recent climate change events have indicated, climate change has produced heavier rainfall events that existing infrastructure was not designed for. Heavier rainfall events occurring at a more frequent rate, will increase the frequency of flooding.

2.1.1.8 Landslide

Landslides are the downslope movement of rock, debris, or soil. Landslides occur because of either an increase in the driving forces (weight of slope and slope gradient) or a decrease in the resisting forces (friction, or the strength of the material making up a slope). Geology, topography, water content, vegetative cover, and slope aspect are important factors of slope stability. Along the Wasatch Front, landslides often occur as a reactivation of older movements / landslides in response to increases in environmental moisture and/or steepening by erosion. The three most common types of landslides in Utah are:

1. debris flows, which consist of sediment-water mixtures that flow down a streambed or hillside, commonly depositing sediment;
2. slides, which are down slope movements of soil or rock on slopes; and
3. rock falls, which consist of rock falling from a cliff or cut slopes.

Varnes' classification of slope movements is used to classify the types of landslides. An abbreviated version of this classification is provided:

Type of Movement	Bedrock	Engineering Soils	
		Predominantly coarse	Predominantly fine
Falls	Rock Fall	Debris fall	Earth Fall
Topples	Rock Topple	Debris topple	Earth Topple
Rotational	Rock Slide	Debris slide	Earth Slide
Translational			
Lateral Spreads	Rock Spread	Debris spread	Earth Spread
Flows	Rock Flow (Deep Creep)	Debris Flow	Earth Flow
Complex	Combination of two or more principal types of movement		

The severity and frequency of landslides is expected to increase from adverse climate change impacts. As recent climate change events have indicated, climate change has produced heavier rainfall events. Heavier rainfall events negatively affect the strength of soil, until it ultimately reaches a point of failure and land naturally slides away. Increased frequency and intensities of rain fall events will increase the frequency of landslides.

2.1.1.9 Lightning

Lightning is a giant spark of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. During the development of a thunderstorm, rapidly rising air combined with movement of precipitation within a cloud cause electrical charges to build. As negative charges build up near the base of the cloud, the ground beneath the cloud and the area surrounding the cloud become positively charged. When the potential between the positive and negative charges becomes too great, there is a discharge of electricity that we know as lightning.

The severity and frequency of lightning is expected to change due to adverse climate change impacts. Weather patterns are expected to include more intense thunderstorms, producing more opportunity for lightning events. Lightning events can also lead to lightning-induced wildfires in future conditions. Lightning Activity Level (LAL) is a scale used to describe and categorize lightning activity, with values of LAL 1 to LAL 6.

- LAL 1: No thunderstorms.
- LAL 2: Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five-minute period..
- LAL 3: Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five-minute period.
- LAL 4: Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five-minute period.
- LAL 5: Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five-minute period.

- LAL 6: Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

2.1.1.10 Problem Soils

Problem soils include erosional, undocumented fill, collapsible soils, and expansive soils. Collapsible soils are low density and typically dry soils that decrease in volume when exposed to water. This type of problem soil typically occurs in alluvial fan flooding deposits, dry loess or eolian deposits or unconsolidated colluvium deposits (Owens and Rollins, 1990, 'Collapsible soil hazard map for the southern Wasatch Front, Utah (MP 90-1)'). Expansive soils are soils that undergo an increase in volume upon wetting and typically include fine grained soils such as clay. Erosion is defined as movement or migration of pipe backfill and supporting trench materials from around the SLA as a result of topographical elevation changes and stormwater. The erosion hazard was used to capture a few specific hazards that are known to exist [REDACTED] (see Annex 2).

2.1.1.11 Severe Wind

Severe wind is most likely the result of a downburst, which is a severe localized wind blasting from a thunderstorm. Downbursts fall into two categories by size – micro-bursts and macro-bursts. Micro-bursts cover an area less than 2.5 miles in diameter. Macro-bursts cover an area with a diameter larger than 2.5 miles. The effects of climate change on strong winds are a challenge to discern. Wind speeds have been reported to have reduced in some areas of the world, while increasing in others. Wind is driven by air temperature differentials and frontal systems. The temperature impacts from climate change has the potential to have secondary consequences to wind as well. Severe wind also has the capacity to increase wildfire risks and aggravate droughts.

The National Oceanic and Atmospheric Administration utilizes the Beaufort Wind Scale to categorize and classify wind activity.

- <1 knots, Calm
- 1 – 3 knots, Light Air
- 4 - 6 knots, Light Breeze
- 7 - 10 knots, Gentle Breeze
- 11 - 16 knots, Moderate Breeze
- 17 - 21 knots, Fresh Breeze
- 22 - 27 knots, Strong Breeze
- 28 - 33 knots, Near Gale
- 34 - 40 knots, Gale
- 41 – 47 knots, Strong Gale
- 48 - 55 knots, Storm
- 56 – 63 knots, Violent Storm
- 64+ knots, Hurricane

2.1.1.12 Severe Winter Weather

Severe winter weather comes in the form of snow and cold temperatures. A severe winter snowstorm deposits at least four inches of snow during a 12-hour period or six inches of snow during a 24-hour period and has winds more than 35 mph and temperatures at or below 20° F. A blizzard is a snowstorm with sustained winds of 40 mph or more or gusting winds of at least 50 mph with heavy falling or blowing snow persisting for one hour or more at temperatures of 10° F or colder. Snow fall is classified by National Oceanic and Atmospheric Administration by the Regional Snowfall Index (RSI):

- Category 1, RSI Value 1-3 is classified as “Notable”
- Category 2, RSI Value 3-6 is classified as “Significant”
- Category 3, RSI Value 6-10 is classified as “Major”
- Category 4, RSI Value 10-18 is classified as “Crippling”
- Category 5, RSI Value 18+ is classified as “Extreme”

Severe weather is a product of climate change. Severe winter weather is expected to increase due to increase in intensities of winter storms. These storms bring heavy amounts of snowfall and have secondary risks such as avalanches and flooding.

2.1.1.13 Slope Instability

Slope instability occurs in response to increases in environmental moisture and/or steepening by erosion. An increase in moisture increases soil load, thereby reducing stability. Steepening removes supporting soils. Two hazards were identified [REDACTED] based on experience:

- Raveling of [REDACTED] slope [REDACTED]
- Seepage through burrows on [REDACTED] slope [REDACTED]

Slope instability can result in slope movement (landslides or slope creep) or erosion and raveling. Slope movement can consist of shallow or deep-seated movements of earth, manifest as either slumping or translational sliding. Slope movement can be quick or slow moving. An increase in moisture increases soil load, thereby reducing slope stability.

The severity and frequency of slope stability is expected to increase from adverse climate change impacts. Climate change has produced weather patterns of larger rainfall events that directly impact the stability of slope movement and erosion.

2.1.1.14 Subsidence

Subsidence is the settling or collapse of the ground. Causes of subsidence include collapsible soils, limestone and karst terrain, gypsiferous soil, piping, peat, and mine collapse.

- Collapsible soils are loose, dry, low-density deposits that decrease in volume when saturated for the first time since deposition.
- Karst terrain is characterized by closed depressions, caverns, and streams that abruptly disappear underground. Limestone is susceptible to dissolution by ground water and surface water thus forming karst terrain, which can result in a collapse of the ground surface.
- Gypsiferous deposits, when wetted, are subject to settlement, causing sinkholes like those found in karst terrains.
- Piping is a type of subsurface erosion caused by the movement of ground water that removes fine-grained particles creating subsurface voids or channels. These channels increase in size as

more and more water is collected until the walls and roof can no longer support the weight above and collapse occurs.

- Peat consists of partially decomposed plant remains that usually accumulate in areas of shallow ground water and near standing water. When water is removed, peat can subside, compress, and settle under pressure.
- Mining removes rock and leaves underground voids that, if not supported, can collapse and cause ground subsidence and sinkholes.

2.1.1.15 Wildfire

Wildfire is an uncontrolled fire spreading through vegetative fuel. Wildfires are placed into two classifications – wildland and urban-wildland interface fires. Wildland fires are those occurring in an area where development is essentially nonexistent, except for roads, railroads, or power lines. An urban-wildland interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels. Major ignition sources for wildfires are lightning and human causes such as arson, recreational activities, burning debris, and carelessness with fireworks. Vegetation, topography, and weather are all conditions affecting wildfire behavior. The Fire Effects Index (FEI) is the measure used to determine the expected effects if a fire occurs and is based on a rating of suppression difficulty and values impacted, which identifies areas that have important values at risk to wildland fire and/or are costly to suppress. The FEI has two sets of ratings 1) Values Impacted Rating (i.e., wildland development areas, drinking water importance areas, infrastructure assets, forest assets and riparian assets) and 2) Suppression Difficulty Rating (i.e., fuel type and topography). The Fire Threat Index (FTI) is a mathematical calculation to estimate the probability of an acre igniting and the expected final fire size. Finally, the Fire Risk Index is determined by combining the FEI with the FTI resulting in the overall risk of wildfire. For additional details on the wildfire hazard, see pages 160-170 of the 2019 Salt Lake County Multi-jurisdictional HMP.

The National Wildfire Coordinating Group classifies wildfires based on the size class if the fire event:

- Class A: one-fourth acre or less
- Class B: more than one-fourth acre, but less than 10 acres
- Class C: 10 acres or more, but less than 100 acres
- Class D: 100 acres or more, but less than 300 acres
- Class E: 300 acres or more, but less than 1,000 acres
- Class F: 1,000 acres or more, but less than 5,000 acres
- Class G: 5,000 acres or more

The severity and frequency of wildfires is expected to increase from adverse climate change impacts. Climate change has produced weather patterns of higher rainfall events, severe wind, high temperatures, that all effect wildfire events. Wildfires accompanied by high winds and extreme temperatures will have a secondary impact on debris flow in nearby water sources, and will also increase the occurrence of debris flow.

2.1.2 Dependency, Proximity and Malevolent Acts

The next three categories of hazards - Dependency, Proximity and Malevolent Acts - were identified based on the ANSI J100-10 Standard for Risk and Resilience Management of Water and Wastewater Systems and the Environmental Protection Agency (EPA)'s Baseline Information on Malevolent Acts



for Community Water Systems (8/2019) for America's Water Infrastructure Act. [REDACTED]
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2.2 Previous Hazard Occurrences

The District's experience with natural hazards includes incidents related to debris flow, drought, earthquake, flood, lightning, landslide, severe wind, severe winter weather, tornado, and wildfire. Although some maintenance measures were employed where necessary to mitigate the effects of these occurrences, there were some previous hazard events that resulted in major damage to the MWDSLS system. The previous specific hazard occurrences identified by District personnel and previous MWDSLS Plans and other Plans (e.g., 2019 Salt Lake County Multi-jurisdictional HMP, 2021 Utah HMP, 2022 Mountainland Area Governments (MAG) HMP are summarized in Table 2.3.

Some of the previous natural hazard events affecting the District's assets and service area are listed in Table 2.3. These event occurrences were obtained from interviews with District personnel and two previous District asset-specific HMPs: 1) 2020 SLA HMP and 2) 2021 LCWTP HMP (see Annex 1 and 2 for additional details).

Note that while the District has experienced some flooding occurrences at some of its assets located in or crossing waterways, there are no repetitive-loss structures owned and/or operated by the District. The District, by nature of its governance, is not a direct participant in the National Flood Insurance Program (NFIP). Both member cities (i.e., SLC and Sandy) participate in the NFIP. Section 4.4.4 provides some additional information about the District and their intentions in regard to NFIP and the implementation of mitigation projects proposed in this MMP.

Table 2.3 Previous Hazard Occurrences in the MWDSLS Service Area

Hazard	Approx. Year	Occurrence Description
Debris Flow	11/1/1984	Debris flow east of LCWTP
	7/21/2009	Debris flow in Draper
	6/7/2010	Debris flow in Little Cottonwood Creek
	8/19/2010	Flood and Debris Flow in Draper
	8/9/2019	Debris flow at Lisa Falls (Little Cottonwood Canyon)
Drought	2012 to 2016	Utah Lake fell to levels causing the Utah State Engineer to prohibit diversions of more than 100,000-acre feet of secondary storage rights (junior water right holders) in Utah Lake. This forced early canal closures. The low water levels also intensified a wide-spread algal bloom in Utah Lake prompting public health advisories.
Earthquake	2/20/1981	Earthquake magnitude of 4.7 and epicenter in South Jordan
	12/17/1981	Earthquake magnitude 2.2 and epicenter in South Jordan
	5/24/2001	Earthquake magnitude of 2.9 and epicenter in South Jordan
	2/8/2006	Earthquake with magnitude of 2.1 and epicenter in South Jordan. Ground shaking felt in the Salt Lake Valley.
	5/28/2007	Earthquake with a magnitude of 2.3 and epicenter in South Jordan. Ground shaking felt in the Salt Lake Valley.
	3/18/2020	Earthquake with a magnitude of 5.7 and epicenter in Magna. Ground shaking felt over the Salt Lake Valley.

Table 2.3 Previous Hazard Occurrences in the MWDSLS Service Area

Flood	1983	Rapid melt of an above average snowpack in April caused flooding and super saturated the ground.
	10/25/2004	Flooding in Corner Canyon [REDACTED]
	[REDACTED]	[REDACTED]
	Ongoing	High flows in Provo River [REDACTED]
	6/1/2010	Flooding in Little Cottonwood Creek
	2017	Flooding in Hog Hollow drainage.
	03/2023	Flooding in Millcreek City damaged flow control equipment [REDACTED]
	03/15/2023	Rapid snowmelt from Traverse Ridge caused flooding
Lightning	2020	Lightning strikes in Draper damaged instrumentation [REDACTED]
	08/2021	Lightning strike near LCWTP damaged flow meters
Landslide	7/10/1975	Landslide in Provo Canyon [REDACTED]
	Aug 1991	~1,000 NTU Flowed into the JWTP Flocc and Sed Basins due to severe rainstorm impacting the Murdock Canal
	May 1992	Landslide in Pleasant Grove [REDACTED]
	6/8/2005	Landslide in Little Cottonwood Canyon [REDACTED]
	10/6/2006	Landslide in Lindon
Severe Wind	2/17/2016	In Salt Lake City, scaffolding collapsed on an assisted living center being built; no one was injured, but debris from the incident covered the road [REDACTED]. \$200,000 property damage
	6/12/2017	High Wind in South Salt Lake: widespread power outages. \$40,000 in damage
	3/2023	Severe winds knocked down power lines and blew breaker at LCWTP.
Severe Winter Weather	Various	Regular reduced accessibility to District structures [REDACTED].
	Various	District is on an interruptible natural gas supply for heating; severe winter weather causes outages and reliance on alternative heat sources.
Tornado	8/11/1999	F2 tornado struck downtown SLC area resulting in 1 death and \$170M in damages
Wildfire	8/8/2008	Draper City - Corner Canyon Fire. 680 acres burned but no homes impacted
	08/25/2008	Wildfire in Corner Canyon
	09/2020	Fire in Provo Canyon [REDACTED]
	08/15/2011	Wildfire in Corner Canyon
	4/15/2015	Wildfire in Salt Lake City: \$50,000 property damage
	9/1/2015	Fire east of LCWTP
	10/17/2020	Range Fire at mouth of Provo Canyon

2.3 Hazard Significance

Each of these potential natural hazards were evaluated to determine the overall risk they individually pose to the MWDSLS water system. This evaluation used Worksheet 5.1 from FEMA's Local Mitigation Planning Handbook (2013) as its basis and took into account the geographic extent of the hazard within the MWDSLS planning area, the probable magnitude of the hazard, and the likelihood of a hazard event.

The **Geographic Area Affected** was estimated for each hazard using the following metrics:

Negligible:	affects less than 10% of planning area or isolated single-point occurrence
Limited:	affects 10-25% of planning area or limited single-point occurrences
Significant:	affects 25-75% of planning area or frequent single-point occurrences
Extensive:	affects 75-100% of planning area or consistent single-point occurrences

The **Probable Strength/Magnitude** of each hazard event was estimated using the following metrics:

Weak:	Limited classification on the scientific scale, low speed of onset or short duration of event, resulting in little to no damage
Moderate:	Moderate classification on the scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of service for days
Severe:	Severe classification on the scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months
Extreme:	Extreme classification on the scientific scale, immediate onset or extended duration of event, resulting in catastrophic damage and uninhabitable conditions

To estimate the **Probability of a Future Event** for each hazard, the following metrics were used:

Unlikely:	less than 1% probability of occurrence in the next year or a recurrence interval of greater than 100 years
Occasional:	1 to 10% probability of occurrence in the next year or a recurrence interval of 11 to 100 years
Likely:	10 to 90% probability of occurrence in the next year or a recurrence interval of 1 to 10 years
Highly Likely:	90 to 100% probability of occurrence in the next year or a recurrence interval of less than 1 year

The summary results of this overall hazard significance rating are presented in Table 2.4. **The Overall Significance Rating** of each hazard to the MWDSLS water system was determined by qualitatively combining the three rating criteria as follows:

Low: Two or more criteria fall in lower classifications, or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.

Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

High: The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

Table 2.4 Hazard Significance Summary				
HAZARDS	RATING CRITERIA			OVERALL SIGNIFICANCE RATING
	Geographic Area Affected	Probable Magnitude	Probability of Future Event	
Natural				
Avalanche	Limited	Moderate	Likely	Low
Dam Failure	Negligible	Severe	Unlikely	Low
Debris Flow	Limited	Moderate	Occasional	Medium
Drought	Extensive	Moderate	Likely	Medium
Earthquake - <i>Ground Shaking</i>	Extensive	Severe	Unlikely	Medium
Earthquake - <i>Liquefaction</i>	Significant	Severe	Occasional	Medium
Earthquake - <i>Surface Fault Rupture/Fault Crossings</i>	Limited	Severe	Occasional	Medium
Flood	Limited	Moderate	Occasional	Medium
Landslide <i>including Rockfall</i>	Limited	Moderate	Occasional	Medium
Lightning	Significant	Weak	Likely	Medium
Problem Soils (<i>collapsible soils, expansive soils, erosion, and undocumented fills</i>)	Limited	Moderate	Occasional	Medium
Severe Wind	Significant	Weak	Highly likely	Medium
Severe Winter Weather	Extensive	Moderate	Highly likely	Medium
Wildfire	Limited	Moderate	Likely	Medium
Dependency				
Loss of Utilities	Significant	Severe	Likely	Medium
Loss of Employees	Extensive	Moderate	Likely	Medium
Loss of Key Suppliers	Extensive	Moderate	Occasional	Medium
Loss of Transportation	Significant	Moderate	Likely	Medium
Proximity				
Encroachments	Significant	Weak	Likely	Medium
Utilities	Significant	Moderate	Likely	Medium
Viable access by District	Negligible	Weak	Highly likely	Low
Viable access by owners	Negligible	Moderate	Occasional	Medium
Malevolent Acts				
████████████████████	████████	████████	████████	████████
████████████████████	████████	██████	████	████████
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██				



As can be seen in Table 2.4, all the potential hazards were determined to pose medium risk to the MWDSLS water system except for avalanche, dam failure, and viable access by District, which have low significance ratings. Therefore, these three hazards rated with low significance were not evaluated further; however, the other 12 natural hazards and 11 non-natural hazards were evaluated for risk on an asset-by-asset basis. To facilitate the asset-based hazard evaluation assessment of the MWDSLS water system, the 20 key assets were prioritized based on their criticality to the function of the water system, rated based on their vulnerability to each of the 12 natural hazards and 11 non-natural hazards, and classified to establish those assets which would be explicitly evaluated against each hazard (asset-hazard pairs). This asset prioritization process is described in Section 2.4 below. This process combined with the Section 2.5 Hazard Rating resulted in the determination of which assets and hazards would be combined into asset-hazard pairs for assessment during the Phase B Risk Assessments (see Section 3.1 and Tables 3.1 and 3.2).

2.4 Asset Criticality Ranking

In May 2022, a workshop to determine the criticality ranking of MWDSLS's 20 key assets was held in person at the District's office with a remote attendance. Attendees included key MWDSLS managers, supervisors, engineers, and technicians/specialists, as well as key ECG Team personnel. The major objective of the workshop was to determine the criticality ranking for the top 20 MWDSLS key assets shown in Table 2.5 in the order they were assessed but not by their criticality ranking.

Table 2.5 MWDSLS Key Critical Assets			
Asset #	Asset Name	Asset #	Asset Name
1	POMWTP - Pretreatment Complex [REDACTED]	11	10 MG Reservoir
2	POMWTP - Flash Mix, Flocc/Sed	12	Point of the Mountain Finished Water Reservoir (20 MG)
3	POMWTP - Ozone Facilities	13	42 MG Raw Water Reservoir [REDACTED]
4	POMWTP - Filters	14	Communications [REDACTED]
5	SLA Intake Structures [REDACTED]	15	SCADA/PCS [REDACTED]
6	POMA - Intake [REDACTED]	16	Enterprise Network
7	POMA - Finished Water [REDACTED]	17	SLA Segments (#18, #20, #26, and #37)
8	POMA - Finished Water Pump Station	18	LCWTP Asset #7. Flash Mix, Flocc/Sed, Storage
9	Jordan Narrows Pump Station	19	LCWTP Asset #9. Filter Bldg.
10	SLA Terminal Reservoir (48 MG)	20	LCWTP Asset #16. Lab & LCC Pump Station (PS)

2.4.1 Pair Wise Comparison

A pair wise comparison method was used to perform the facility ranking. First, the MWDSLS mission (see Introduction) was used to determine facility comparison criteria, as follow:

- Reliability:** Consistently delivering water services to customers.
- Quality:** Meeting all Federal, State, and internal water quality standards for drinking water.
- Safety:** Ensure employee and public safety from injury/illness/deaths. This does not include water quality safety issues already covered by the Quality criterion.
- Stewardship:** Efficient and cost effective management of assets (e.g., costs, property, value, employees, customers).

Pair-wise comparison of the criteria against one another resulted in criteria weighting factors shown in Table 2.6 and the complete asset pair-wise matrix spreadsheets are provided in Appendix A.

Table 2.6 Criteria Weighting Factors	
Criteria	Weighting Factor
Reliability	12
Quality	10
Safety	9
Stewardship	5

2.4.2 Asset Criticality Tier Ranking Results

Second, the 20 MWDSLS assets were compared against each other using the pair-wise comparison approach based on input from the MWDSLS representatives in attendance at the workshop. This comparison resulted in a total weighted sum (overall asset score) based on the scores for each of the four ranking criteria. The individual asset total scores were then normalized (divided) by the total maximum score possible from the pair-wise comparison. The individual assets were then grouped into four tiers of five assets [REDACTED].

[REDACTED] The results of the asset ranking, including overall asset score, priority rank, and tier grouping for each of assets, are shown in Table 2.7. The complete set of asset pair-wise matrix spreadsheets is provided in Appendix A.

Table 2.7 Asset Criticality Ranking		
Asset	Overall Asset Score	Rank
Tier 1 Assets		
[REDACTED]	2543	1
[REDACTED]	2535	2
[REDACTED]	2372	3
[REDACTED]	2350	4
[REDACTED]	2310	5
Tier 2 Assets		
[REDACTED]	2280	6
[REDACTED]	2264	7

[REDACTED]	2195	8
[REDACTED]	2187	9
[REDACTED]	2079	10
Tier 3 Assets		
[REDACTED]	1995	11
[REDACTED]	1988	12
[REDACTED]	1980	13
[REDACTED]	1952	14
[REDACTED]	1921	15
Tier 4 Assets		
[REDACTED]	1905	16
[REDACTED]	1862	17
[REDACTED]	1840	18
[REDACTED])	1445	19
[REDACTED]	1037	20

2.5 Hazard Rating

In order to prioritize the natural hazard risks, each MWDSLS key asset was rated based on its potential risk for each type of natural hazard. The non-natural hazard risks were also rated for each MWDSLS key asset for each type of non-natural hazard (dependency, proximity, and malevolent acts).

A hazard evaluation for each of the medium-risk and high-risk hazards identified in Section 2.3 was performed on 16 of the 20 key assets. The assets were scored by the project team based on the following scoring definitions:

- High (H): asset completely disabled; utility's mission fully or nearly defeated; deaths, injuries, or other high costs.
- Medium (M): asset partially disabled; utility's mission moderately impacted; moderate amount of other costs.
- Low (L): asset not or only slightly disabled; utility's mission only slightly impacted; low amount of other costs.
- Not Applicable (N/A): given threat cannot be carried out, or otherwise does not apply.

Each applicable hazard was assessed based on that hazard's impact to the asset. There were 16 of the 20 assets that were assessed for 12 natural hazards resulting in a total of 192 asset-hazard pairs. The remaining 4 of the 20 assets were already previously assessed in either the 2020 SLA HMP or the 2021 LCWTP HMP, so they were not assessed again here. Results of the preliminary hazard assessment scoring found the asset-hazard pairs summarized in Table 2.8 for the 16 assets for each of the four scoring criteria of H, M, L, and N/A.

Table 2.8 Preliminary Hazard Assessment – Scoring (Natural Hazards)					
Natural Hazards	High(H)	Medium (M)	Low(L)	N/A	Total # of Assets by Hazard
Debris Flow	0	1	6	9	16
Drought	0	5	3	8	16
Earthquake - Ground Shaking (2PE50 and 10PE50)	12	2	2	0	16
Earthquake – Liquefaction	1	2	13	0	16
Earthquake - Surface Fault Rupture/Fault Crossings	1	1	14	0	16
Flood	2	2	0	12	16
Landslide including Rockfall	1	0	13	2	16
Lightning	0	3	13	0	16
Problem Soils (including collapsible soils, expansive soils, erosion, and undocumented fills)	0	3	8	5	16
Severe Wind	0	2	14	0	16
Severe Winter Weather	0	2	14	0	16
Wildfire	0	5	11	0	16
Total # of Assets by Scoring Criteria	17	28	111	36	192

This preliminary hazard assessment which found 17 High (H) and 28 Medium (M) consequence asset-hazard pairs as shown in the second and third columns of Table 2.8 was reviewed with the District’s Planning Team at the Phase B Planning Risk Screening Workshop to screen and select up to 40 asset-hazard pairs for risk assessment. This is covered in greater detail in Section 3.1 Risk Screening.

Next, each applicable of the 11 non-natural hazards was assessed based on that hazard’s impact to the asset.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Note:

1.

[REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]

Section 3

Risk Assessment

This section covers risk screening, risk analysis, and risk assessment results for the hazards and assets defined in Sections 2.1 and 2.4, respectively.

A hazard evaluation of each of the MWDSLs selected 40 natural hazard and 20 non-natural hazard asset-hazard pairs from the risk screening conducted during the Phase B Planning Team Meeting #2 for the 16 critical assets was performed. The results of the assessments of the 40 natural hazard and 20 non-natural hazard asset-hazard pairs are discussed below by hazard type.

3.1 Risk Screening

The Phase B Risk Assessment began with a risk screening workshop conducted during the Phase B Planning Team Meeting #2 to review with the District's Planning Team the preliminary hazards assessment performed by the ECG Team discussed in Section 2.5 by reviewing the asset-hazard pair screening worksheet (see Appendix D). The purpose of the Workshop was to verify consequence ratings in the asset-hazard pair screening worksheet and thereby screen all the applicable hazards against the 16 assets. This screening of the asset-hazard pairs was done by scoring each of the 16 assets against each of the 12 natural and 11 non-natural hazards using the same scoring criteria presented in Section 2.5, with the addition of the "Not Selected" criterion as follows:

High (H): asset completely disabled; utility's mission fully or nearly defeated; deaths, injuries, or other high costs.

- Not Selected (N/S): asset initial scoring of H, but not selected by utility for further assessment due to limited resources.
- Medium (M): asset partially disabled; utility's mission moderately impacted; moderate costs.
- Low (L): asset not or only slightly disabled; utility's mission only slightly impacted; low costs.

Not Applicable (N/A): given threat cannot be carried out, or otherwise does not apply.

Scores were assigned based on the District's qualitative assessment of the level of consequence that would occur assuming the hazard does occur. The hazard likelihood and vulnerability of the asset are not considered during this screening exercise, and will be applied during the next step in the risk assessment process covered in Section 3.2 below. The District reviewed and adjusted several of the asset-hazard scores as discussed below with the complete details provided in the Planning Team Meeting #2 – Risk Screening minutes found in Appendix D. In addition, see Appendix E Geohazards Tech Memo for risk screening which specifically addresses the geohazards of debris flow, earthquake, landslide, and problem soils.

For comparison purposes, Table 3.1 shows the asset-hazard screening and selection summary for natural hazards from the Risk Screening Workshop, which when compared to Table 2.8 Preliminary Hazard Assessment Scoring shows that the number of H and M consequence Asset-Hazard pairs was reduced from 17 and 28 pairs (45 pairs total), respectively to 16 and 24 pairs (40 pairs total), which is the number of pairs that the risk assessment was performed on for natural hazards for the MWDSLs assets in the next section. Therefore, there are 5 pairs shown in Table 3.1 as not selected (N/S) out of the 45 total H and M pairs screened.

Table 3.1 Asset-Hazard Screening & Selection Summary (Natural Hazards)

Natural Hazard	High (H)	N/S	Medium (M)	Low (L)	N/A	Total # of Assets by Hazard
Debris Flow	0	0	1	6	9	16
Drought	0	4	1	3	8	16
Earthquake - Ground Shaking (2PE50 and 10PE50)	11	1	2	2	0	16
Earthquake - Liquefaction	1	0	2	13	0	16
Earthquake - Surface Fault Rupture/Fault Crossings	1	0	1	14	0	16
Flood	2	0	2	0	12	16
Landslide including Rockfall	1	0	0	13	2	16
Lightning	0	0	3	13	0	16
Problem Soils (including collapsible soils, expansive soils, erosion, and undocumented fills)	0	0	3	8	5	16
Severe Wind	0	0	2	14	0	16
Severe Winter Weather	0	0	2	14	0	16
Wildfire	0	0	5	11	0	16
Total # of Assets by Scoring Criteria	16	5	24	111	36	192

The 40 High ranking asset-hazard pairs for natural hazards include 16 of the 16 critical assets and 12 of the 12 natural hazards that advanced from the hazard significance evaluation.

Presented next are the results for the non-natural hazards screening. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[illegible]

3.2 Risk Analysis

The risk analysis was performed on the 40 natural hazard and 20 non-natural hazard selected asset-hazard pairs from the Risk Screening Workshop at Planning Team Meeting #2.

The ECG Team used a Generic Risk Assessment Tool (GRAT) for the risk analysis that assesses the Risk (R) by considering the likelihood of the hazard (T, also referred to as threat likelihood), vulnerability (V) of each asset to the hazard, and the consequence (C) of the hazard to each asset if the hazard were to occur. This can be expressed in the following equation:

$$R = T \cdot V \cdot C$$

where: R=Risk, T=Likelihood of Hazard (Threat), V=Vulnerability, C= Consequence

The variables in the risk equation were determined as described as follows for each of the 40 natural hazard and 20 non-natural hazard asset – hazard pairs: The likelihood of hazard or threat was determined for natural and dependency hazards using historical records from National Oceanic and Atmospheric Association (NOAA), FEMA flood maps, seismic reports for the Wasatch Front faults, power outage records, etc. [REDACTED]

The vulnerability against natural hazards was assessed by analyzing each asset's age,

material type, condition, etc. against the current International Code Council's International Building Code (IBC) (i.e., seismic, wind, snow load, etc.). The consequence that would be incurred for each asset if the hazard were to occur was assessed by applying consequence metrics established with the District during the risk assessment planning workshop. A summary of the results for the 16 assets analyzed for the various hazards/threats for natural hazards is presented in Table 3.3 and for non-natural hazards in Table 3.4. There were five possible relative Risk Ratings of L = Low, ML = Medium Low, M = Medium, MH = Medium High, and H = High.

Table 3.3 Risk Analysis Summary of Results (Natural Hazards)

Asset	Hazard Type	Relative Risk Rating
1 - POMWTP - Pretreatment Complex	N(E-WF)*	ML
2 - POMWTP - Flash Mix, Flocc/Sed	N(E-WF)*	ML
3 - POMWTP - Ozone Facilities	N(E-WF)*	ML
4 - POMWTP - Filters	N(E-WF)*	ML
5 - SLA Intake Structures	N(E-WF)*, N(F), N(G), N(WF)	L, L, L, L
6 - POMA - Intake	N(E-WF)*	ML
7 - POMA - Finished Water	N(DF), N(E-WF)***, N(F), N(G)	L, ML, ML, L, L
8 - POMA - Finished Water Pump Station	N(E-WF)*	ML
9 - Jordan Narrows Pump Station	N(D), N(E-WF)***, N(F), N(LS), N(G), N(WF)	L, M, M, M, L, M
10 - SLA Terminal Reservoir (48 MG)	N(E-WF)*, N(E-WF)***	ML, ML
11 - 10 MG Reservoir	N(E-WF)*	ML
12 - Point of the Mountain Finished Water Reservoir (20 MG)	N(E-WF)*	ML
13 - 42 MG Raw Water Reservoir	N(E-WF)*	ML
14 - Communications	N(E-WF)*, N(E-WF)***, N(E-WF)***, N(F), N(L), N(W), N(SW), N(WF)	L, L, L, L, ML, ML, ML, L
15 - SCADA/PCS	N(L), N(W), N(SW), N(WF)	ML, ML, ML, L
16 - Enterprise Network	N(L), N(WF)	ML, L

Note:

* Earthquake - N(E-WF) - ground shaking.

** Earthquake - N(E-WF) - ground shaking and liquefaction.

*** Earthquake - N(E-WF) - ground shaking, liquefaction, and fault rupture.

A preliminary review of the relative risk ratings received by each asset reveals that the highest relative risk rating received by any asset was 'ML' or Medium-Low risk. This is below the highest possible rating of 'H' or High but is still a concern for the District that should be addressed to lower the risks of the various hazards with ML ratings. The complete risk analysis table with all risk equation variables and their scores in addition to the overall relative risk shown in Table 3.3 is provided in Appendix F Risk Analysis and GRAT Top 5 for Natural Hazards. In Section 3.3, the risk

assessment results are further analyzed including performing a sensitivity analysis to determine those assets with highest relative risk.

[illegible]

A preliminary review of the relative risk ratings received by each asset reveals that the highest relative risk rating received by any asset for non-natural hazards

3.3 Risk Assessment Results

Next, a consequence workshop was held with the MWDSLS Planning Team to review the risk assessment results from Section 3.2 Risk Analysis of both natural hazards and non-natural hazards and confirm asset rankings using a sensitivity analysis. This was used to establish the risk tolerance of the District for selecting the cutoff point for addressing the highest risk assets based on scoring of their natural hazards and non-natural hazards asset-hazard pairs. The sensitivity analysis was performed by assigning scores of 1 to 5 for each of the five relative risk ratings of L, ML, M, MH, and H for each of the assets that were assessed during the risk analysis described in Section 3.2 above.

The scores for each asset were normalized on a relative risk scoring scale with a maximum of 5.0 points. No projects with 'H'-risk were identified that needed to proceed immediately to In Progress. The majority of the 16 assets assessed for natural hazards scored between 2.0 and 3.0; a score between 4.0 and 5.0 would require immediate attention, so scores between 2.0 and 3.0 are still quite high and should be addressed as soon as practicable depending on District resources.

Scoring for the 16 [REDACTED] assets for natural Hazards is shown in Table 3.5 where the top 9 cluster of highest risk assets from the final risk analysis have been identified with yellow highlight as Assets 1, 6, 7, 9, 10, 11, 14, 15, and 16 with scores of 2.0, 2.0, 2.0, 3.0, 2.0, 2.0, 2.0, 2.0, and 2.0, respectively. Figure 3.1 is also presented below to graphically show the relative risk of the 16 assets analyzed. For additional details on the consequence workshop and risk assessment results see the workshop minutes in Appendix F. In addition, see Appendix E Geohazards Tech Memo for risk results specifically addressing the geohazards of debris flow, earthquake, landslide, and problem soils.

Note that the initial risk assessment effort from the consequence workshop scored the top asset as the Jordan Narrows Pump Station with a relative risk score of 3.0, which was then followed by the majority of the remaining assets with a score of 2.0. Therefore, the MWDSLS Planning Team decided to review and rank the top 9 assets based on system priority. The planning team ranked the tied assets using a qualitative analysis with feedback from District staff on the difficulty of recovering from the loss of a particular asset. [REDACTED]

Asset	Relative Risk Score	Top 9 Asset Rank
1 - POMWTP - Pretreatment Complex [REDACTED]	2.0	1
2 - POMWTP - Flash Mix, Flocc/Sed	2.0	
3 - POMWTP - Ozone Facilities	2.0	
4 - POMWTP - Filters	2.0	
5 - SLA Intake Structures [REDACTED]	2.0	
6 - POMA - Intake [REDACTED]	3.0	2
7 - POMA - Finished Water [REDACTED]	2.0	3
8 - POMA - Finished Water Pump Station	2.0	
9 - Jordan Narrows Pump Station	3.0	4
10 - SLA Terminal Reservoir (48 MG)	2.0	5
11 - 10 MG Reservoir	2.0	6
12 - Point of the Mountain Finished Water Reservoir (20 MG)	2.0	
13 - 42 MG Raw Water Reservoir [REDACTED]	2.0	
14 - Communications [REDACTED]	2.0	7
15 - SCADA/PCS [REDACTED]	2.0	8
16 - Enterprise Network	2.0	9

The complete details of the GRAT top 9 sensitivity analysis discussed above are included in Appendix F. The mitigation strategies and recommendations for addressing the top 5 highest risk assets for natural hazards will be presented next in Section 4 Mitigation Strategies.

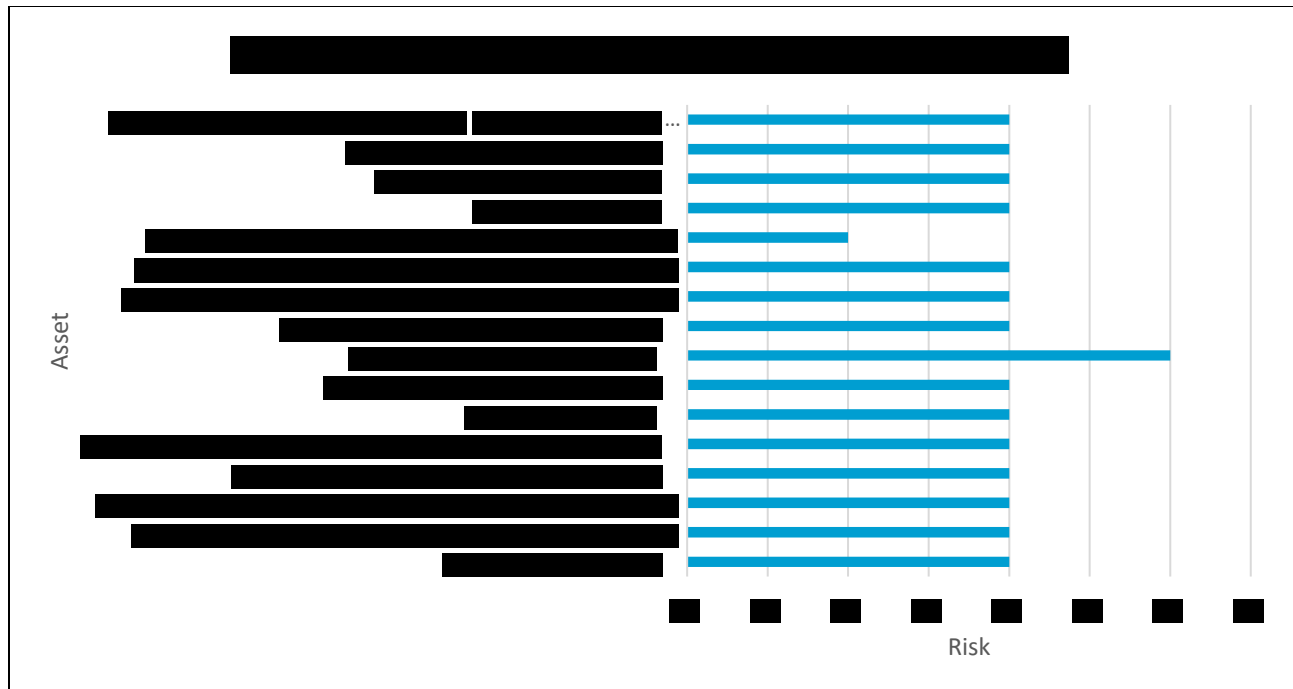


Figure 3.1 Relative Risk by Asset (Natural Hazards)

The results of the non-natural hazards risk assessment of the 20 asset-hazard pairs from the consequence workshop are reported in the paragraphs, table, and figure below. [REDACTED]



[REDACTED]

[REDACTED]		
Asset	Relative Risk Score	Top 5 Asset Rank
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	

The complete details of the GRAT top 5 sensitivity analysis discussed above are included in Appendix F. The mitigation strategies and recommendations for addressing the top 5 highest risk assets for non-natural hazards will be presented next in Section 4 Mitigation Strategies.



Figure 3.2 Relative Risk by Asset (Non-Natural Hazards)

Section 4

Mitigation Strategy

This Mitigation Strategies section will cover the following four subsections: 4.1 Mitigation Authorities, 4.2 Mitigation Goals, 4.3 Mitigation Actions/Measures, and 4.4 Mitigation Implementation.

4.1 District Authorities

MWDSLS is the only jurisdiction covered by this HMP. MWDSLS' authority falls under Utah Code Title 17B Limited Purpose Local Government Entities – Local Districts. Title 17B contains Chapter 2a Provisions Applicable to Different Types of Local Districts, which lists the 11 different types of Districts covered by this State Code. MWDSLS is recognized as a Metropolitan Water District under Part 6 Metropolitan Water District Act within Title 17B Chapter 2a.

The above State codes provide MWDSLS with authorities and policies to be able to implement the mitigation strategy presented in Section 4.4 of this Plan. The following are some of the important authorities and policies under Title 17B-2a-603 that MWDSLS has for implementing the mitigation strategy contained in this Plan:

In addition to the powers conferred on a metropolitan water district under Section 17B-1-103, a metropolitan water district may:

1. acquire or lease any real or personal property or acquire any interest in real or personal property, as provided in Subsections 17B-1-103(2)(a) and (b), whether inside or outside MWDSLS or inside or outside the state;
2. encumber real or personal property or an interest in real or personal property;
3. acquire or construct works, facilities, and improvements, as provided in Subsection 17B-1-103(2)(d), whether inside or outside MWDSLS or inside or outside the state;
4. acquire water, works, water rights, and sources of water necessary or convenient to the full exercise of MWDSLS's powers, whether the water, works, water rights, or sources of water are inside or outside MWDSLS or inside or outside the state, and encumber, transfer an interest in, or dispose of water, works, water rights, and sources of water;
5. develop, store, and transport water;
6. provide, sell, lease, and deliver water inside or outside MWDSLS for any lawful beneficial use;
7. issue bonds as provided in and subject to Chapter 1, Part 11, Local District Bonds, to carry out the purposes of MWDSLS; and
8. subscribe for, purchase, lease, or otherwise acquire stock in a canal company, irrigation company, water company, or water users association, for the purpose of acquiring the right to use water or water infrastructure.

The District will continue to coordinate with local city authorities throughout the design and implementation of mitigation projects. The design of future MWDSLS facilities will meet current Utah Building Code and International Building Code (IBC) standards, which account for conditions associated with natural hazards (i.e. earthquake, severe weather, severe winds, etc.) The District will also continue in its current efforts to address and incorporate natural hazard mitigation (i.e., seismic upgrades, backup power, etc.) into future design and construction projects whether they are for new facilities or for existing facilities. The District will coordinate and comply with all other local



jurisdictions building codes, land use and development ordinances as they implement mitigation projects in the future.

The District will utilize their above district powers and authorities in implementing mitigation actions listed in this plan. This section of the Plan documents the District's Mitigation Strategy in prioritization, funding and schedule of mitigation projects, supporting the District's ability and intention to use its authorities and resources to implement mitigation measures.

Additionally, the District has various limitations in relation to their capabilities. Funding for these mitigation projects is a limitation to their ability to implement all proposed mitigation projects. The District's funding is not able to be devoted specifically to implementing all of the mitigation actions, due to other priorities. The District worked to prioritize the mitigation projects, in order to accomplish the top priority projects and assets over a span of time. Another limitation of the District's is staffing. The District does not have the staff to manage every proposed mitigation project. The proposed Implementation Plan utilizes the available staff to complete projects yearly with staff available. In addition to these limitations within the District, there are limitations that are out of their control such as: land acquisition, working within the right of way, land use planning and zoning in other jurisdictions. The District has several assets that are located in other cities, in which land use planning, ordinances and regulations are controlled by other local jurisdictions.

4.2 Mitigation Goals

The mitigation goals established in this plan are based upon the mission of MWDSLS to provide high quality water and reliable services to their customers in a safe, timely, economical, and environmentally sensitive manner. Mitigation measures were prioritized to both avoid and mitigate the anticipated post-hazard event damage or deficiencies identified in Section 4.3 Mitigation Actions/Measures. The measures are expected to enable MWDSLS to achieve a reduction in the risks to hazards that are present for the highest-risk MWDSLS critical assets. The District also considered the mitigation goals in the 2019 Salt Lake County HMP for developing the following general mitigation goals for this mitigation plan:

- Protect the lives, health, and safety of District employees and the public before, during, and after a disaster.
- Protect and eliminate and/or reduce damages and disruptions to the District's critical facilities, structures, and infrastructure during disasters.
- Enhance and protect the communication and warning/notification systems of the District, its member cities, and emergency responders within Salt Lake County.
- Promote education and awareness programs, campaigns, and efforts designed to encourage District employees, member cities, and the public to mitigate and become more resilient to disasters.
- Advocate, support, and promote the continued coordination and integration of disaster planning efforts between the District, its member cities, partner agencies, other stakeholders, and the public.
- Advocate, support, and promote the use of laws and local regulations and ordinances (i.e., building codes and standards) aimed to mitigate hazards and to enhance resiliency.
- Improve public engagement that was conducted for Plan development during the Plan Maintenance period.
- Improve public engagement on the next 5 year Plan Update.



Some additional more specific District mitigation goals to reduce and/or avoid natural hazard vulnerabilities include:

- Retrofitting and/or constructing building structures for life safety and damage reduction
- Retrofitting and/or constructing nonstructural items for continued operation of the water system
- Performing geotechnical/geological soil strengthening to prevent structural damage and water system loss of operation
- Preventing loss of electrical power to critical water system facilities
- Maintain life safety at all manned/occupied District buildings/facilities (i.e., offices) during a natural hazard event

Development of mitigation measures (general and specific) was based on avoiding the anticipated post-hazard event damage states or deficiencies identified in Section 4.3 Mitigation Actions/Measures which are expected to enable the District to achieve a reduction in the risks to hazards that are present [REDACTED], and to meet many of its mitigation goals listed above.

The District values transparency with stakeholders and the public in sharing improvements to the water system, and doing so will continue to be a District goal. The District holds an annual tour of one of its facilities each year as part of the American Water Works Association's Water Week, held the first full week in May each year. This tour is used to educate the public on the treatment and delivery of water, or to showcase a completed project, such as the District's Terminal Reservoir Replacement Project which replaced a 1950s-era 40 MG reservoir with the new Terminal and Sam Park West Reservoirs. Similarly, the District participates in Sandy's conservation garden and both SLC's and Sandy's efforts to promote conservation.

The District meets quarterly with other local water agencies and monthly with SLC and Sandy to forecast and plan projects and system shutdowns with the goal to ensure at least two raw water pipelines and two treatment facilities within the Salt Lake Valley are available to serve the community. This effort, headed by the District about a decade ago, has promoted a regional cooperative view of supporting the community, consisting of the stakeholders and public served by multiple agencies.

4.3 Mitigation Actions/Measures

The Mitigation Actions/Measures recommended for MWDSLS are presented in the next two subsections on General Mitigation Measures and Critical Asset-specific Mitigation Actions/Measures. The general mitigation measures include actions for MWDSLS to integrate into its standard practices and the specific asset mitigation measures are projects that should be completed to mitigate hazards to specific critical assets.

4.3.1 General Mitigation Measures

The following are general mitigation measures applicable to MWDSLS with the type of hazard risk specified:

4.3.1.1 Drought Mitigation

The District receives water from local streams, the Provo River Project, and the Central Utah Project. The District's surface water rights are supplemented by its member agencies' surface water rights and Salt Lake Valley groundwater rights. The most significant vulnerabilities to the District's supplies include climate change impacts reducing snowpack and creating earlier spring runoff which



ultimately reduces stream flows during the peak usage season, water quality events in Utah Lake that shut down secondary supplies and subsequently increase demand on potable systems, and significant dependence on the Provo River and Little Cottonwood Creek watersheds.

The following are general mitigation measures applicable to facilities at risk of the drought hazard:

- Plan for drought and implement drought mitigation measures
 - Create and follow a list of priority action items that are both proactive and reactive to drought conditions. The proactive mitigation measures include mitigation projects that could be implemented prior to a drought and the reactive mitigation measures include response actions used to adapt to the available water supply level during a drought.
 - Implement mitigation measures and response actions, which include continued conservation activities, treatment plant improvements to handle impaired raw water quality (e.g., LCWTP PIP), and the ongoing ASR project.
 - Actively manage water sources during drought conditions by practicing conjunctive use (i.e., coordination with other water utilities and users to promote healthy use of the collective water portfolio).
- Monitor drought conditions at least monthly and make an official declaration prior to peak season each year

4.3.1.2 Earthquake and Landslide Mitigation

- Damage at MWDSLS facilities after an earthquake or landslide may affect structures, yard piping, storage tanks, pump stations, major conveyance pipelines, and support facilities. General mitigation measures related to earthquake risk include:
 - Non-structural seismic improvements such as anchoring and/or bracing of HVAC equipment, furniture, computer equipment, interior pipelines, electrical equipment, pumps, motors, etc.
 - Where pipeline hardening is not practical, stockpile pipeline-related material:
 - Intended for small, localized repairs where damage from ground shaking and liquefaction will be minor.
 - Reasonable amounts of pipe in various sizes.
 - Representative sizes of repair sleeves, steel plate patch material, pipe replacement segments, valves, and other spare parts/materials for immediate access after a seismic event.
 - Stockpile repair segments and clamps of each size of existing yard piping for immediate access to perform repairs following a damaging seismic event.
 - Develop priority supply contract(s) with pipe suppliers such that replacement segments can be procured expeditiously after a damaging seismic event.
 - MWDSLS should continue to incorporate response to seismic events as part of its emergency training for employees. This includes annual participation in the Great Utah Shakeout event each April and desktop emergency response exercises.

4.3.1.3 Flooding and Debris Flow Mitigation

- Minimize injury, loss of life, and property from flooding and debris flow through training employees of floodplain hazards where MWDSLS facilities cross designated floodplains.



- Create floodplain awareness in collaboration with the Utah Division of Emergency Management; Wasatch, Utah, and Salt Lake Counties; cities where MWDSLS facilities are located; and the National Weather Service.
- Implement and/or continue proper flood control monitoring as it may affect MWDSLS facilities to minimize injury and loss of life and property from flooding and encourage safe operational and maintenance practices.

4.3.1.4 Problem Soils (erodible, expansive, collapsible) Mitigation

- Educate District staff on the recognition and dangers of problem soils.
- Minimize injury, loss of life, and property from flooding and debris flow through training of employees of floodplain hazards where MWDSLS facilities cross designated floodplains.
- Create floodplain awareness in collaboration with the Utah Division of Emergency Management; Wasatch, Utah and Salt Lake Counties; cities where MWDSLS facilities are located; and the National Weather Service.
- Implement and/or continue proper flood control monitoring as it may affect MWDSLS facilities to minimize injury and loss of life and property from flooding and encourage safe operational and maintenance practices.

4.3.1.5 Wildfire Mitigation

- Natural Systems Protection:
 - Implement a fuels management program
 - Proactively manage fuels on District-owned properties
 - Coordinate with the United States Forest Service, cities and counties, and private landowners to manage fuels on lands encumbered by or adjacent to District facilities
 - Education and awareness programs:
 - Increase wildfire risk awareness
 - Educate about wildfire mitigation techniques
- Secondary impact mitigation measures for wildfire:
 - Work with watershed agencies and other stakeholders (United States Forest Service, National Resources Conservation Service, Soil Conservation Service, State Forestry and Lands, counties, cities, etc.) to perform erosion control after a wildfire
 - Monitor raw water entry points into MWDSLS raw water collection system, [REDACTED]
[REDACTED].
 - Release water from dams with multiple release levels from level not impacted by wildfire debris/runoff.

4.3.1.6 Weather-related Mitigation

- Continue to prepare, train, and manage response to weather events to sustain the MWDSLS mission. Specific risks to consider include:
 - Drought
 - Lightning
 - Wind

- Severe Winter Weather
- Loss of Power:
 - Backup Generators – maintain variety of permanent and portable emergency generators adequate to support MWDSLS emergency operations.
 - Uninterruptible power supply (UPS) backup - continue to maintain UPS systems to support District emergency operations
 - Maintain manual actuators for valves and gates in working condition

4.3.1.7 Dependency Hazard Mitigation

- Develop priority agreements with suppliers and services to reduce downtime from loss of services
- Maintain adequate on-site storage of chemicals and fuels to operate during periods of unavailability
- Invoke emergency conservation plans to reduce water demand and stretch out on-site sources

4.3.1.8 Proximity Hazard Mitigation

- Continue to monitor construction within and near District facilities to ensure District facilities are properly protected
- Place above-ground markers with signs to identify underground and at-ground District facilities
- Maintain a database of physical encroachments near District facilities to enable quicker reaction in an emergency situation
- Develop site-specific security plans to reduce unauthorized access

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

4.3.2 Specific Asset Mitigation Actions

The MWDSLS system-wide risk assessment considers two prior risk assessment efforts: Salt Lake Aqueduct (SLA) Hazard Mitigation Plan (HMP) and Little Cottonwood Water Treatment Plant (LCWTP) HMP completed in 2020 and 2021, respectively. When combined with the outcomes of the prior planning efforts, this MMP considered 21 key assets, including 2 from the SLA HMP [REDACTED], 3 from the LCWTP HMP, and 16 from the MWDSLS Utility-wide MMP. The MWDSLS Utility-wide MMP includes natural and non-natural hazards. Of the 16 assets in the MWDSLS Utility-wide MMP, the top five highest risk assets for both natural and non-natural hazards have been identified. Following the ranking of these assets, the results from the three planning processes were combined to prioritize the overall highest risks for MWDSLS based on system priority. [REDACTED]

- System [REDACTED] – SLA, Finished Water
 - Annex 1 – SLA HMP:

- 



- System [REDACTED] – District-Wide Facilities; in the MWDSLS Utility-wide MMP, the five highest risk assets each for natural and non-natural hazards were identified (see Appendix F):
 - Natural hazards:
 - [REDACTED] SCADA/PCS [REDACTED]
 - [REDACTED] Communications [REDACTED]
 - [REDACTED] Enterprise Network
 - [REDACTED] Jordan Narrows Pump Station
 - [REDACTED] SLA Terminal Reservoir [REDACTED]
 - Non-natural hazards:
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]

The following sections contain additional information for the recommended mitigation actions for each of the highest-risk assets. Prior numbering conventions from each of the planning processes

will be discontinued here. The projects will be listed by the outcome of this study and its combined prioritization process. Projects shown to be implemented within the next five years, for the assets with natural and non-natural hazards in the top relative risk scores from this MMP (see Section 3.3) and those from the SLA HMP (see Annex 1) and LCWTP HMP (see Annex 2), are described below. New projects identified in this MMP are also described below.

4.3.3 Project Descriptions, First Five Years

4.3.3.1 SLA Finished Water Project Scoping and Implementation

Description

The finished water portion of the SLA comprises [REDACTED] between the LCWTP and Terminal Reservoir. [REDACTED]

Deficiency

The existing SLA crosses faults and potential landslide and debris flow areas. It cannot be taken offline long enough to harden the affected segments, so a parallel line must first be constructed.

Damage Scenario

The primary threat(s) that elevated risk for this segment:

- Earthquake causes permanent ground deformation [REDACTED]

Mitigation Measure

This project includes an alignment study (routing analysis) for the existing and parallel pipelines, including hydraulic evaluation, geohazard identification and analysis, and targeted geotechnical field investigations to prioritize hazard avoidance and mitigate hazards that cannot be avoided. After this first phase of the project is complete, a second phase will design the parallel pipeline and segment hardening projects, and oversee construction of said projects.

4.3.3.2 SLA Raw Water Project Scoping, Projects 1 and 2

Description

The raw water portion of the SLA [REDACTED] between Deer Creek Reservoir and the LCWTP. [REDACTED]

Deficiency

The existing SLA crosses faults and potential landslide and debris flow areas. It cannot be taken offline long enough to harden the affected segments, so a parallel line must first be constructed.

Damage Scenario

The primary threat(s) that elevated risk for this segment:

- Multiple fault crossings and extensive presence in seismic uncertainty zones
- Landslides
- Drainages
- Pipe spans [REDACTED]

Mitigation Measure

This project includes an alignment study (routing analysis) for the existing and parallel pipelines, including hydraulic evaluation, geohazard identification and analysis, and targeted geotechnical field

investigations to prioritize hazard avoidance and mitigate hazards that cannot be avoided. After this first phase of the project is complete, a second phase will design the parallel pipeline and segment hardening projects, and oversee construction of said projects.

4.3.3.3 Little Cottonwood Conduit Replacement

Description

The LCC conveys raw water from LCCr at the diversion in the creek to the LCWTP for treatment. It was installed in the early 1930s and was not designed to mitigate the geohazards it encounters [REDACTED].

Deficiency

Landslides, seismic uncertainty zones.

Damage Scenario

The primary threat(s) that elevated risk for this segment:

- Extensive presence in seismic uncertainty zone, exposure to ground shaking
- Landslides

Mitigation Measure

The project will include replacing the existing line with seismically designed steel pipe, improving the alignment and ground conditions to avoid or mitigate landslides.

4.3.4 Project Descriptions, Utility-wide Natural Hazards

4.3.4.1 SCADA/PCS [REDACTED]

Description

The SCADA/PCS [REDACTED] is a complex network of sensors, mechanical equipment, electrical system components, communication system components, computer hardware, computer software, programming, and related features [REDACTED]
[REDACTED]
[REDACTED]

Deficiency

Although difficult to predict exact locations for each deficiency, the SCADA/PCS is exposed to a variety of natural hazards associated with various weather events due to the complexity of the system and diversity of locations.

Damage Scenario

The primary threats that elevated risk for this asset:

- Lightning strike causes damage to SCADA/PCS equipment. For example, communications radios are located within the same enclosures as the SCADA/PCS equipment; lightning strikes to or near radio antennas are more likely to impact SCADA/PCS equipment.
- Severe weather causes flood damage to SCADA/PCS equipment. For example, the Fortuna Turnout site experienced equipment damage caused by flooding through an electrical conduit. extreme heat causes overheating of SCADA/PCS equipment, [REDACTED]
[REDACTED]

Mitigation Measure

The project will include analyzing and identifying specific equipment and locations exposed to the primary threats. Projects to protect against lightning strikes, severe weather, and extreme heat will be given priority. Specific mitigation measures include:

- Relocate radio equipment to independent enclosures with dedicated power circuits and surge protection.
- Seal all conduits and pull boxes susceptible to flooding.
- Provide shade structures or supplemental cooling to prevent overheating of SCADA/PCS equipment in extreme heat conditions.

4.3.4.2 Communications

Description

The communications system consists of fiber optic, microwave, radio, phone, and related systems that provide for voice and data communication for MWDSLS. It is a complex system that provides redundant features to support continued communication in the event of an outage of one of the systems. Features of this system are located wherever MWDSLS facilities are located.

Deficiency

Although difficult to predict exact locations for deficiency, the communications system is exposed to a variety of natural hazards associated with earthquakes, flooding, and various weather events due to the complexity of the system and diversity of locations.

Damage Scenario

The primary threats that elevated risk for this asset:

- Lightning strike occurs at key power supply site or communications site and damages electrical and/or communications gear or causes power outage shutting down communications asset.
- Severe wind causes damages to communications equipment at various sites.
- Severe winter weather causes damages to communications equipment at various sites.

Mitigation Measure

The project will include analyzing and identifying specific equipment and locations exposed to the primary threat. Projects will protect against lightning strikes, wind, and winter weather.

4.3.4.3 Enterprise Network

Description

The enterprise network consists of computer hardware, computer software, electrical systems, and cable systems that provide support for the day-to-day business activity of MWDSLS. [REDACTED]

Deficiency

The enterprise network system is exposed to a variety of natural hazards associated with various weather events.

Damage Scenario

The primary threat that elevated risk for this asset:

- Lightning strike causes damage to network computers/equipment.

Mitigation Measure

The project will include analyzing and identifying specific equipment and locations exposed to the primary threat. Projects to protect against lightning strikes will be given priority.

4.3.4.4 Jordan Narrows Pump Station

Description

The JNPS is located adjacent to the Jordan River [REDACTED]. The facility is near the boundary between Salt Lake County and Utah County [REDACTED]. Depending on water supply conditions and operational discretion, and based on an exchange agreement established in 1958, the pump station operates in tandem with the adjacent turbine/pump facility owned and operated by PRWUA. Untreated water supplies from either the Provo River or Jordan River (Utah Lake) are delivered to ULDC for irrigation use in exchange for higher-quality water that is treated and distributed to MWDSLS's service area. Pump station capacity is 135 cfs.

Deficiency

The pump station is exposed to a variety of natural hazards associated with drought, earthquake, flooding, landslide, problem soils, and wildfire.

Damage Scenario

The primary threats that elevated risk for this asset:

- 2,500-year earthquake event occurs on the Wasatch Fault causing damages to pump station building and equipment due to liquefaction
- 100-year flood event occurs in Jordan River causing damages to the intake and/or pump station
- Landslide occurs at JNPS site and damages building and equipment
- Wildfire causes loss of power or damages to building and equipment

Mitigation Measure

The structure is above the 100-year flood plain. Seismic, landslide, and wildfire are the primary hazards requiring some mitigation. The project will include a Tier 3 structural evaluation to determine the preferred approach to harden the existing building and equipment to protect against earthquake, flooding, landslide, and wildfire damages.

4.3.4.5 Terminal Reservoir (48 MG)

Description

This reservoir located at the end of the SLA near [REDACTED], Millcreek, UT, consists of 47.8 MG of total storage. The original Terminal Reservoir was put into service in 1951. Terminal Reservoir was reconstructed in 2019. It consists of three cells (north cell A (13.8 MG), north cell B (13.8 MG), and south cell B (11.3 MG)) with the ability to add a fourth cell in the future. Sam Park West Reservoir consists of one cell (8.9 MG).

Deficiency

The reservoir is exposed to natural hazards associated with earthquake. The replacement project completed in 2019 was designed to then-current earthquake standards per adopted building and structural code in the 2010s. Remaining risk may be associated with fault rupture for yard piping and connections (e.g., replacing standard M-11 restraint harnesses with earthquake resistant expansion joints) and the potential need for non-structural hardening of equipment (e.g., anchoring equipment to meet seismic standards).



Damage Scenario

The primary threats that elevated risk for this asset:

- 2,500-year earthquake event occurs on the Wasatch Fault causing damages to reservoirs and equipment due to ground shaking
- 2,500-year earthquake event occurs on the Wasatch Fault causing damages to piping due to surface fault rupture from nearby fault

Mitigation Measure

The replacement project provided a significant upgrade over the original reservoir and the current design met the building and structural code adopted at the time. Because of the proximity of seismic hazards (several mapped faults immediately east of the reservoir), MWDSLs should periodically monitor new geotechnical information as studies are performed over time on adjacent properties, and updates to building and seismic code to determine if minor retrofits would be beneficial to reduce risk for this important structure. For example, IBC was updated in 2021 and was adopted locally in 2022, incorporating significant updates from the American Concrete Institute's (ACI) 318. ACI's 350 (Code Requirements for Environmental Engineering Concrete Structures) was updated in 2020 and also contains significant updates. The proposed scoping project will include further study (Tier 3 structural analysis) to determine if additional improvements would help mitigate risk.

4.3.1 Project Descriptions, Utility-wide Non-Natural Hazards

[illegible]

[illegible]

[illegible]

4.4 Mitigation Implementation

To facilitate development of an implementation plan for the mitigation measures identified in Section 4.3 above, the measures were combined into projects, cost estimates were prepared for each project, and the projects were prioritized and scheduled. This implementation development process is described in corresponding subsections below.

4.4.1 Packaging of Mitigation Measures

The first step in developing the mitigation implementation plan was to define mitigation projects that combine individual measures into larger, standalone projects that are more practical for execution. The mitigation projects were created based on asset features and location, the hazard being mitigated, and the type of mitigation measures (e.g., alignment studies, geological investigations and analyses, structural retrofit/replacement, non-structural retrofit, and security measures). The funding sources (e.g., O&M, Capital Improvement Plan (CIP), grants) were also considered in determining the packaging of mitigation measures. Mitigation Projects – Opinion of Probable Construction Costs

The various mitigation projects are listed in Table 4.1 along with their estimated project costs. The projects and their cost estimates are shown by asset with the hazard(s) mitigated and mitigation objective. The projects will be reflected in the mitigation projects implementation plan which will be discussed in Section 4.4.4. Detailed cost estimates by asset can be found in Appendix G.

Costs shown in this report are Class 5 estimates in accordance with the Association for the Advancement of Cost Engineering International. A Class 5 estimate is defined as a Conceptual Level or Project Viability Estimate where engineering is from 0 to 2 percent complete. Class 5 estimates are used to prepare planning level cost scopes or evaluation of alternative schemes, long range capital outlay planning. Expected accuracy for Class 5 estimates typically ranges from -50 to +100 percent, depending on the technological complexity of the project, appropriate reference information and the inclusion of an appropriate contingency. Class 5 estimates should be reviewed periodically for accuracy and changing conditions or project scope.

Costs are planning level estimates which reflect approximate construction costs in 2023 dollars. The estimates include fees directly related to labor and materials for physical implementation of mitigation measures (including contractor overhead and profit), consultant planning, design and/or analysis fees, engineering (bidding and construction management), administration, and legal fees, as well as estimated allowances for contractor overhead and profit. Additional design and in-depth analysis work are required to fully quantify the cost associated with implementing the mitigation measures. The intent of this estimate is to provide a basis from which future work may begin.

Table 4.1 Mitigation Project Estimated Costs

Mitigation Project	Hazard(s) Mitigated	Mitigation Objective	Costs
SLA Hazard Mitigation	Seismic, Landslide, Debris Flow, Erodible Soil	Withstand a seismic event with minimal damage and return to service within 3 days	TBD
LCWTP Hazard Mitigation	Seismic, Collapsible Soils	Withstand a seismic event with minimal damage and return to service within 3 days	\$289,994,000
SCADA/PCS [REDACTED]	Natural	Withstand lightning and severe weather events with minimal damage and return to service within 1 day	\$664,000
Communications [REDACTED]	Natural	Withstand lightning, wind, and severe weather events with minimal damage and return to service within 1 day	\$830,000
Enterprise Network	Natural	Withstand lightning events with minimal damage and return to service within 1 day	\$465,000



Jordan Narrows Pump Station	Natural	Minimize exposure to landslide and wildfire events to mitigate damage and return to service within 3 days	\$5,640,000
Terminal Reservoir (48 MG)	Natural	Perform Tier 3 structural analysis to determine if any mitigation measures are required.	\$165,000
██████████	██████████	██ ██	██████████
████████████████████ ████████████████████	██████████	██ ██	██████████
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████████████████████ ████████████████████	██████████	██ ██	██████████

Items that are not in these planning level cost estimates include, but are not limited to:

1. Relocation of owner's equipment to permit construction access
2. Hazard abatement or remediation

Items that may change the estimated costs include, but are not limited to:

1. Modifications to conceptual scope of work in estimate
2. Special phasing requirements not known at this time
3. Unforeseen conditions
4. *Force Majeure* conditions (e.g., COVID-19 pandemic)

4.4.2 Benefit Cost Evaluation

A benefit cost analysis (BCA) was performed for the mitigation projects identified above which consist of physical retrofit measures. FEMA's BCA Reference Guide (2009) and What is a Benefit? (2001) documents were used as the basis of the benefit cost evaluation. The benefit cost evaluation performed is in accordance with the basics of the FEMA BCA methodology used in the federal disaster grant funding application process (now BRIC grant funding) to determine the cost-effectiveness of utility improvement measures. It should be noted, however, that the FEMA BCA modules were not run for any of the mitigation projects, and therefore benefit-cost ratios shown herein may not be equivalent to those obtained from the modules. A benefit cost analysis using the appropriate BCA modules will need to be completed when submitting a FEMA grant application in accordance with current funding program requirements.

Two categories of "Avoided Damage" were used to determine the benefits portion of the benefit cost analysis: 1) avoided physical damages and 2) avoided loss-of-function impacts (i.e., economic impact of loss of water services). Benefits for avoided casualties and injuries were not accounted for because they are considered to be relatively minor for typical utility systems compared to physical damage and loss-of-function impacts. The benefits were calculated based on the estimated system performance following a hazard event for baseline conditions and upgraded conditions.

Avoided physical damage was determined based on the expected performance of the assets and the estimated structure, pipeline, nonstructural item, and/or equipment replacement value. Based on the assessment results for each hazard event, an estimate of the damage state (e.g., severe, moderate, light) was defined for each deficient asset's baseline and upgraded condition, as described in Sections 4.3.6 to 4.3.10. The physical loss estimate was then expressed as a percent of the replacement value, which was linked to each estimated damage level. The avoided physical

damage benefit was calculated in dollars as the difference in the expected baseline damage and the anticipated damage after upgrades have been implemented.

Avoided loss-of-function impacts (i.e., economic impacts of loss of water service) were determined in accordance with the FEMA BCA standard utility loss of service values and Sections 6.3 and 6.4.2 of FEMA's What is a Benefit? document. The economic impacts of loss of water service are estimated based on three levels of loss of service: 1) complete loss of potable water service, 2) potable water service that is 'unsafe for drinking', and 3) complete loss of secondary water service. Based on the hazard assessment results, scenario damage descriptions were defined for individual assets. Using these damage descriptions, MWDSLS estimated the functional downtime of the MWDSLS water system facilities/assets (in days of complete loss of service and water service that is 'unsafe for drinking') both for the baseline condition and the upgraded condition assuming only the individual asset under consideration is damaged. MWDSLS also determined the number of customers served by each asset in terms of population. Then using the FEMA standard economic impact valued for loss of water service, the total economic impact of the loss of service was determined for the baseline and upgraded conditions. The FEMA standard value accounts for the effects of reduced regional economic activity, direct impacts on customers, and disruptions of customer's normal activities. The avoided loss-of-function benefit was calculated in dollars as the difference in the expected baseline impacts and the upgraded impacts.

The total hazard scenario benefits for each asset are the sum of the avoided damage benefit and the avoided loss-of-function benefit. To account for the differing frequency of each type of hazard, the scenario benefits are converted to "expected annual benefits" by multiplying by the annual probability of exceedance for the scenario hazard event. To account for the useful project lifetime of the mitigation work and the time value of money, the "expected annual benefits" are converted to a "present value of annual benefits" using the FEMA-mandated discount rate of 7% and a standard project useful lifetime value of 50 years for utility projects. The benefit-cost ratio is determined by dividing this "present value of annual benefits" by the estimated project mitigation cost.

The benefit cost ratio for each mitigation project was determined using a sum of the avoided physical damage benefits for each asset included in the project and a system-wide determination of the avoided loss-of-function benefits considering the combined contribution of each individual asset within that project (see Appendix I that includes updated costs from Annexes 1 and 2, and Appendix G). Table 4.2 provides a summary of benefit cost results for each mitigation project.

Table 4.2 Benefit Cost Summary			
Mitigation Project	Total Annualized Present Value Benefits	Total Mitigation Costs	Benefit Cost Ratio (B/C)
SLA Segments, Top 5 from HMP	\$ 1,064,629,851	\$ 172,691,000	6.16
LCWTP - Flash Mix, Flocc/Sed, Storage, Filter Building, Lab	\$ 1,817,379,250	\$289,994,000	6.74
LCWTP - Filter Building	Included with LCWTP Flash mix, flocc/sed, storage	Included with LCWTP Flash mix, flocc/sed, storage	Included with LCWTP Flash mix, flocc/sed, storage
LCWTP - Lab	Included with LCWTP Flash mix, flocc/sed, storage	Included with LCWTP Flash mix, flocc/sed, storage	Included with LCWTP Flash mix, flocc/sed, storage
SCADA/PCS	\$ 758,350	\$664,000	1.1
Communications	\$ 36,250	\$830,000	0.04
Enterprise Network	\$ 36,250	\$465,000	0.08
Jordan Narrows Pump Station	\$ 145,000	\$5,640,000	0.3



SLA Terminal Reservoir (48 MG)	N/A ¹	\$165,000	N/A ¹
████████████████████	████	████████	████
████████████████████	████	████████	████
████████████████████	████	████████	████
████████████████████	████	████████	████
████████████████████	████	████████	████
████████████████████	████	████████	████

Notes:

1. Not Applicable (N/A), no benefits and therefore no B/C ratio for planning projects/studies

4.4.3 Mitigation Project Prioritization, Funding, and Scheduling

The final step in preparing an implementation plan for the mitigation measures was to identify the priority, potential funding, and proposed implementation schedule for the mitigation projects found in Section 4.3.2. The mitigation projects were prioritized based on the criticality ranking (see Table 2.7) of the assets within each mitigation project and the results of the benefit cost analysis (see Section 4.4.3). The potential funding was determined based on discussions with District management concerning O&M funds and CIP funds and on eligibility requirements for FEMA grant funds. The results of the mitigation project prioritization, funding, and scheduling is shown in tabular form in Appendix I.

A summary of the mitigation projects found in Appendix I, Table I-1 (Natural Hazards) and programmed for the first five years is presented below. The mitigation action number corresponds to the mitigation package's priority and the order it is programmed in the implementation plan. ██████████

The summary of each mitigation action includes the hazard to be mitigated, mitigation objective, priority of the action, estimated cost, estimated implementation time frame, potential funding source(s) and agency responsible (i.e., position, office, or department).

Mitigation Action 1 - SLA FW Project Scoping

<i>Hazards:</i>	Earthquake, Ground Shaking, Landslide
<i>Objective:</i>	Alignment study, geohazard evaluation, and targeted geotechnical investigations for six miles of the FW section of the SLA for a parallel pipeline and to harden affected segments.
<i>Priority:</i>	HIGH
<i>Time Frame:</i>	Based on funding, estimated in Year 1
<i>Funding:</i>	Local and Federal
<i>Estimated Cost:</i>	\$500,000
<i>Responsible Agency:</i>	MWDSLS General Manager

Mitigation Action 2 - SLA FW Project Implementation

<i>Hazards:</i>	Earthquake, Ground Shaking, Landslide
<i>Objective:</i>	Construct six miles of the FW section of the SLA for a parallel pipeline.
<i>Priority:</i>	HIGH



Time Frame: Based on funding, estimated in Years 2-4
Funding: Local and Federal
Estimated Cost: TBD
Responsible Agency: MWDSLS General Manager

Mitigation Action 3 – LCC Replacement

Hazard: Earthquake, Ground Shaking, Landslide, Debris Flow, Erodible Soil
Objective: Alignment study, geohazard evaluation, geotechnical investigations, design, and replacement of approximately 4,000 LF of pipe.
Priority: HIGH
Time Frame: Based on funding, estimated in Years 1-2
Funding: Local and Federal
Estimated Cost: TBD
Responsible Agency: MWDSLS General Manager

Mitigation Action 4 – SLA RW Project Scoping, P-01

Hazard: Earthquake, Ground Shaking, Landslide, Debris Flow, Erodible Soil
Objective: Alignment study, geohazard evaluation, and targeted geotechnical investigations for Segments 1-12 of the RW section of the SLA for a parallel pipeline and to harden affected segments.
Priority: HIGH
Time Frame: Based on funding, estimated in Year 4
Funding: Local and Federal
Estimated Cost: \$500,000
Responsible Agency: MWDSLS General Manager

Mitigation Action 5 – SLA RW Project Scoping, P-02

Hazard: Earthquake, Ground Shaking, Landslide, Debris Flow, Erodible Soil
Objective: Alignment study, geohazard evaluation, and targeted geotechnical investigations for Segments 13-24 of the RW section of the SLA for a parallel pipeline and to harden affected segments.
Priority: HIGH
Time Frame: Based on funding, estimated in Year 5
Funding: Local and Federal
Estimated Cost: \$500,000
Responsible Agency: MWDSLS General Manager

NOTE: The District does not participate in the NFIP and has no repetitive loss structures. However, the District will review all mitigation projects to evaluate their impact to any NFIP identified regulatory floodplain prior to implementing the mitigation action. Should the project impact an identified regulatory floodplain, the District will coordinate and obtain required floodplain development permits from local floodplain administrators or discuss the potential development with the State NFIP Coordinator, in accordance with Part 60.3 of the National Flood Insurance Act of 1968 and the Disaster Mitigation Act of 2000.



Section 5

Plan Maintenance

MWDSLS intends to update this MMP once every five years, after a major disaster event, or if new conditions change risks. Updates will be done under the general direction and authority of the Board of Trustees or their delegated representative. Updates will be overseen by MWDSLS's project manager and may be performed by an outside consultant in coordination with MWDSLS. To facilitate timely implementation of plan updates, MWDSLS will establish budget and funding for the plan update within the approved budgets for the two fiscal years prior to the expiration date of the current Plan. The update will take into account any new District facilities/assets and changes to the existing facilities/assets since the date of the previous Plan. In addition, MWDSLS plans on monitoring this utility-wide MMP at least annually by correlating the Plan to MWDSLS's annual budget, five and ten year capital forecasts, supply and demand studies, and master plans.

Under the direction of the MWDSLS General Manager, staff will report on implementation strategies, plans, and actions as part of the annual budgeting process for MWDSLS. Reports will be made in publicly noticed meetings with reasonable information made available for review by the public and stakeholders. Reports will include reasonable descriptions of the effectiveness of the implemented actions to reduce risks. MWDSLS may also track changes to the MMP annually to simplify the five-year Plan update. As updates are made to the District Master Plan, CIP, O&M practices, and financing strategies, MWDSLS will review the MMP and apply risk mitigation measures to these plans and management practices. Generally, the District expects this Plan to be updated on each year ending in 3 or 8 and the master plan to be updated on years divisible by 5. The CIP will be updated annually, linking these plans.

In addition, MWDSLS plans on monitoring and evaluating the MMP in conjunction with updates made to the state plan that affect the District's water system and its hazard mitigation efforts. MWDSLS will continue to monitor federal and state legislation for impact on this Plan or District activities, all of which will be promptly addressed. The regional plans that cover the District's service/planning area and natural hazards mitigation efforts include Salt Lake County and Mountainland Association of Governments (MAG). The District is considering submitting portions of their Plan to Salt Lake County and MAG, for inclusion in those regional plans for future updates.

The District will continue to provide its stakeholders and the public with updates to the MWDSLS MMP and encompassing state/regional plans in order to solicit public involvement and comments. Public meetings held in-person or virtually, both by MWDSLS and its member cities, will also play an important role in ongoing communication with the public. These meetings will provide an opportunity for people to come together, ask questions, and share their thoughts on the plan's implementation. They can also be used to provide updates on progress and address any challenges that may arise. By holding regular public meetings, the District aims to maintain an open and transparent dialogue with the community and ensure that community voices are heard throughout the plan maintenance phase. Following are the District's proposed public engagement methods and their frequency during Plan Maintenance:

- MWDSLS will communicate on a monthly basis with its two Member Cities on hazard mitigation projects, updates and for input from their public that they represent.

- MWDSLS plans on communicating at least quarterly when implementing a mitigation action/project (starting with planning & design through the construction phase) from this MMP directly with the public by using a public relations firm and/or media outlets.
- MWDSLS will provide public engagement at Open Houses at least annually in May during water week and potentially on additional occasions (e.g., project groundbreaking).

MWDSLS continues to engage its member cities, stakeholders, public, and other impacted entities to promote regional drought resiliency and emergency management. It is MWDSLS's goal to integrate this MMP and its future updates into the process and culture of the District and its member cities, stakeholders, public, and other impacted agencies.

Water in the west is a valuable resource to promote growth and health in communities. [REDACTED]

[REDACTED] The District desires to encourage conjunctive management with other water providers (e.g., JWCD, CUWCD), local and federal politicians, and cities and communities to encourage responsible development and maintenance of water infrastructure. MWDSLS desires to support sustainable living by providing high quality water and reliable services to its customers in a safe, timely, economical, and environmentally sensitive manner. The District promotes the wise, long term and sustainable use of water resources. This Plan is the next step in helping the District fulfill its mission statement.



Appendix A: Asset Pair Wise Comparison Matrices

Asset Prioritization _Mission Criteria

Criteria 1 – Reliability

Criteria 2 – Quality

Criteria 3 – Safety

Criteria 4 – Stewardship

Summary



Appendix B: Asset Location and Hazard Maps

All Hazard Maps_2023_03_22

A1 Asset Location Map

A2 Debris Flow Hazard Map

Earthquake Hazards:

A3 Ground Shaking Hazard Map

A4 Liquefaction Potential Map

A5 Surface Fault Rupture Hazard Map

A6 Landslide Hazard Map

A7 Problem Soils Map

A8 Rockfall Hazard Map

Facilities and Assets List Map_2023_03_14

Flood Maps_2023_03_14

1. FEMA Flood Hazard Areas:
 - a. Overview
 - b. LCWTP Detail
 - c. Intake Detail (Provo River)
2. FEMA Flood Hazard Areas:
 - a. POMA Finished Water – A (Corner Canyon Creek)
 - b. POMA Finished Water – B (Willow Creek)
 - c. POMA Finished Water – C (Big Willow Creek)
 - d. POMA Finished Water – D (Dimple Dell Creek)
 - e. SLA Segment #37 Detail (Big Cottonwood Creek)
 - f. Jordan Narrows Pump Station Detail (Jordan River)

Wildfire Maps_2023_03_14

1. Fire Hazard Map – Water Supply Watersheds Overview
2. Fire Hazard Maps:
 - a. Overview – District-Wide Infrastructure (Communications, SCADA/PCS, Enterprise Network)
 - b. SLA Intake Detail
 - c. Jordan Narrows Pump Station Detail



Appendix D: Risk Screening & Selection

Utility-wide Preliminary Risk Screening Table_2022 0726

Utility-wide Final Risk Screening and Selection Table_2022 0822

MWDSLS MMP – Hazard Screening & Selection Workshop Meeting Minutes_2022 0726



Appendix E: MWDSLS Geohazards Technical Memorandum

MWDSLS 2023 Utility-wide MMP Geohazards Technical Memorandum



Appendix F: Risk Analysis & GRAT Top 5

MWD Utility-wide MMP (Natural Hazards)

Risk Analysis

Risk Chart

Risk Analysis Metrics

MWD Utility-wide MMP (Non-Natural Hazards)

Risk Analysis

Risk Chart

Risk Analysis Metrics

MWDSLS MMP - Risk Assessment Workshop Meeting Minutes_2022 1108



Appendix G: Mitigation Cost Estimates

SLA HMP Top 5, Escalated

LCWTP HMP Top 5, Escalated

Utility-wide Natural:

- SCADA-PCS

- Communications

- Enterprise Network

- Jordan Narrows Pump Station

- Terminal Reservoir

Utility-wide Non-Natural:

- Terminal Reservoir

- SCADA-PCS

- 10 MG Reservoir

- POMA

- POMWTP

SLA HMP, Additional Segments (10, 12, 14, 16, 20, 25, 28, 32, 38, 42)



Appendix H: Mitigation Benefits

Mitigation Benefits Table – 2023 Utility-wide MMP



Appendix I: Mitigation Implementation Plan

Table I-1: MWDSLS MMP Mitigation Actions Implementation Plan – Natural Hazards

Table I-2: MWDSLS MMP Mitigation Actions Implementation Plan – Non-Natural Hazards



Addendum #1 – MWDSLS Plan Adoption and FEMA Approval



Annex #1 – Salt Lake Aqueduct Hazard Mitigation Plan



Annex #2 – Little Cottonwood Water Treatment Plant Hazard Mitigation Plan



Attachment 4
October 2023 FEMA Final Approval Packet



FEMA

R8-MT

October 20, 2023

Metropolitan Water District of Salt Lake and Sandy Board of Trustees
3430 East Danish Road
Cottonwood Heights, Utah 84093

Dear Metropolitan Water District of Salt Lake and Sandy Board of Trustees,

We are pleased to announce the approval of the 2023 Metropolitan Water District of Salt Lake and Sandy Utility-Wide Multi-Hazard Mitigation Plan as meeting the requirements of the Stafford Act and Title 44 of the Code of Federal Regulations §201.6 for a local hazard mitigation plan. The plan approval extends to the Metropolitan Water District of Salt Lake and Sandy.

The jurisdiction is hereby eligible for FEMA Hazard Mitigation Assistance grant programs. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular programs under which the application is submitted. Approved mitigation plans may be eligible for points under the National Flood Insurance Program Community Rating System.

This plan is approved through October 19, 2028. A local jurisdiction must revise its plan and resubmit it for approval within five years to continue to be eligible for mitigation project grant funding. We have provided recommendations for the next plan update on the enclosed Plan Review Tool.

We wish to thank all jurisdictions that participated in the planning process and commend your continued commitment to reducing future disaster losses. Please contact Kathy Holder, State Hazard Mitigation Officer, with the Utah Department of Public Safety, Division of Emergency Management, at kcholder@utah.gov or (801) 538-3332 with any questions on the plan approval or mitigation grant programs.

Sincerely,

Nicole M. Aimone
Acting Mitigation Division Director

Enclosure

cc: Kathy Holder, State Hazard Mitigation Officer, UT Division of Emergency Management

Local Mitigation Plan Review Tool

Cover Page

The Local Mitigation Plan Review Tool (PRT) demonstrates how the local mitigation plan meets the regulation in 44 CFR § 201.6 and offers states and FEMA Mitigation Planners an opportunity to provide feedback to the local governments, including special districts.

1. The Multi-Jurisdictional Summary Sheet is a worksheet that is used to document how each jurisdiction met the requirements of the plan elements (Planning Process; Risk Assessment; Mitigation Strategy; Plan Maintenance; Plan Update; and Plan Adoption).
2. The Plan Review Checklist summarizes FEMA’s evaluation of whether the plan has addressed all requirements.

For greater clarification of the elements in the Plan Review Checklist, please see Section 4 of this guide. Definitions of the terms and phrases used in the PRT can be found in Appendix E of this guide.

Plan Information	
Jurisdiction(s)	Metropolitan Water District of Salt Lake & Sandy (MWDSLS)
Title of Plan	FINAL DRAFT MWDSLS Utility-Wide Multi-Hazard Mitigation Plan (MMP)
New Plan or Update	New
Single- or Multi-Jurisdiction	Single-jurisdiction
Date of Plan	5/30/2023
Local Point of Contact	
Title	Wayne Winsor, Assistant General Manager
Agency	MWDSLS
Address	3430 East, Danish Road, Cottonwood Heights, UT 84093
Phone Number	801.942.9631
Email	winsor@mwdsls.org

Additional Point of Contact	
Title	Ammon Allen, Engineering Supervisor
Agency	MWDSLS
Address	3430 East Danish Road, Cottonwood Heights, UT 84093
Phone Number	801.942.9687
Email	allen@mwdsls.org

Review Information	
State Review	
State Reviewer(s) and Title	Maranda Miller, Post-Disaster Mitigation Coordinator and Mitigation Planning Lead Eric Martineau, Pre-Disaster Mitigation Coordinator Alexandrea Greer, Mitigation Program Support Specialist
State Review Date	6/1/2023
FEMA Review	
FEMA Reviewer(s) and Title	Melissa Ryder, Community Planner, IR Rob Pressly, Community Planner, QC
Date Received in FEMA Region	6/1/2023
Plan Not Approved	6/23/2023
Plan Approvable Pending Adoption	9/20/2023
Plan Approved	10/20/2023

Multi-Jurisdictional Summary Sheet

#	Jurisdiction Name	Requirements Met (Y/N)						
		A. Planning Process	B. Risk Assessment	C. Mitigation Strategy	D. Plan Maintenance	E. Plan Update	F. Plan Adoption	G. State Requirements
1	Metropolitan Water District of Salt Lake & Sandy (MWDSLS)	Y	Y	Y	Y	N/A	Y	N/A
2								
3								
4								
5								
6								
7								
8								
9								
10								

Plan Review Checklist

The Plan Review Checklist is completed by FEMA. States and local governments are encouraged, but not required, to use the PRT as a checklist to ensure all requirements have been met prior to submitting the plan for review and approval. The purpose of the checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been “met” or “not met.” FEMA completes the “required revisions” summary at the bottom of each element to clearly explain the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is “not met.” Sub-elements in each summary should be referenced using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each element and sub-element are described in detail in Section 4: Local Plan Requirements of this guide.

Plan updates must include information from the current planning process.

If some elements of the plan do not require an update, due to minimal or no changes between updates, the plan must document the reasons for that.

Multi-jurisdictional elements must cover information unique to all participating jurisdictions.

Element A: Planning Process

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1))		
A1-a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan’s development, as well as who was involved?	Sections 1, 1.1, 1.2, 1.3 and Appendix C	Met
A1-b. Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?	Sections 1, 1.1, 1.2, 1.3, 1.4, and Appendix C	Met
A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process? (Requirement 44 CFR § 201.6(b)(2))		
A2-a. Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity?	Sections 1, 1.2, and Appendix C	Met

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1))		
A3-a. Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?	Sections 1, 1.2, 1.3, 1.4, and Appendix C	Met
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))		
A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?	Introduction, Sections 1, 2.1, 2.2, 2.4, 2.5, 4, 4.3.1, 4.3.2, 4.4.3, 5, Appendix B, Appendix G, and Appendix I, and Annexes 1 & 2.	Met
ELEMENT A REQUIRED REVISIONS		
Required Revision:		

Element B: Risk Assessment

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i))		
B1-a. Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?	Sections 2.1, 2.1.1, 2.2, 2.3, 2.5, 3, 3.1, Appendix B, and Appendix D	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-b. Does the plan include information on the location of each identified hazard?	Introduction, Section 2.2, Appendix B, Appendix E, Annexes 1 & 2	Met
B1-c. Does the plan describe the extent for each identified hazard?	Introduction, Section 2.1.1, 2.3, Appendix B, and Appendix E	Met
B1-d. Does the plan include the history of previous hazard events for each identified hazard?	Section 2.2, Annexes 1 & 2	Met
B1-e. Does the plan include the probability of future events for each identified hazard? Does the plan describe the effects of future conditions, including climate change (e.g., long-term weather patterns, average temperature and sea levels), on the type, location and range of anticipated intensities of identified hazards?	Introduction, Sections 2.1, 2.1.1, and 2.3	Met
B1-f. For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area?	N/A	Choose an item.
B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))		
B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?	Sections 2.1, 2.3, 2.5, 3.1, 3.2, 3.3, Appendix D, Appendix F, and Annexes 1 & 2.	Met
B2-b. For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?	Sections 2.1, 2.3, 2.5, 3.2, 3.3, 4.3, 4.4, Appendix D, Appendix E, Appendix F and Appendix H.	Met

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?	Sections 2.2 (see paragraph above Table 2.3), and 4.4.4 (see Note at end of section)	Met
ELEMENT B REQUIRED REVISIONS		
Required Revision:		

Element C: Mitigation Strategy

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C1. Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3))		
C1-a. Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations?	Section 4.1, 4.2	Met
C1-b. Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?	Section 4.1, 4.2	Met
C2. Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C2-a. Does the plan contain a narrative description or a table/list of their participation activities?	Sections 2.2 (see paragraph above Table 2.3), and 4.4.4 (see Note at end of section)	Met

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i))		
C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan?	Section 4.2	Met
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C4-a. Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?	Sections 4.3, 4.4, Appendix G, Appendix H, Appendix I, and Annexes 1 & 2	Met
C4-b. Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?	Sections 4.3, 4.4, Appendix G, Appendix H, Appendix I, and Annexes 1 & 2	Met
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))		
C5-a. Does the plan describe the criteria used for prioritizing actions?	Sections 4.3, 4.4, Appendix G, Appendix H, Appendix I	Met
C5-b. Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?	Sections 1.1, 4.1, 4.4.4, 5, Appendix I, and Annexes 1 & 2	Met
ELEMENT C REQUIRED REVISIONS		
Required Revision:		

Element D: Plan Maintenance

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))		
D1-a. Does the plan describe how communities will continue to seek future public participation after the plan has been approved?	Section 5	Met
D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i))		
D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?	Section 5	Met
D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.	Section 5	Met
D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?	Section 5	Met
D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii))		
D3-a. Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?	Section 5	Met
D3-b. Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?	Section 5	Met
D3-c. For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?	N/A	Choose an item.

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
ELEMENT D REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element E: Plan Update

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))		
E1-a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?	Introduction	Choose an item.
E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))		
E2-a. Does the plan describe how it was revised due to changes in community priorities?	Introduction	Choose an item.
E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?	Sections 4.3, 4.4, Appendix G, Appendix I, and Annexes 1 & 2	Choose an item.
E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?	Section 5	Choose an item.
ELEMENT E REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element F: Plan Adoption

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F1-a. Does the participant include documentation of adoption?	Section 1.4, and Addendum 1	Met
F2. For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F2-a. Did each participant adopt the plan and provide documentation of that adoption?	N/A	Choose an item.
ELEMENT F REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element G: High Hazard Potential Dams (Optional)

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD1. Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?		
HHPD1-a. Does the plan describe how the local government worked with local dam owners and/or the state dam safety agency?	N/A	Choose an item.
HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners?	N/A	Choose an item.
HHPD2. Did the plan address HHPDs in the risk assessment?		
HHPD2-a. Does the plan describe the risks and vulnerabilities to and from HHPDs?	N/A	Choose an item.

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?	N/A	Choose an item.
HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?		
HHPD3-a. Does the plan address how to reduce vulnerabilities to and from HHPDs as part of its own goals or with other long-term strategies?	N/A	Choose an item.
HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals?	N/A	Choose an item.
HHPD4-a. Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?		
HHPD4-a. Does the plan describe specific actions to address HHPDs?	N/A	Choose an item.
HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs?	N/A	Choose an item.
HHPD4-c. Does the plan identify the position, office, department or agency responsible for implementing and administering the action to mitigate hazards to or from HHPDs?	N/A	Choose an item.
HHPD Required Revisions		
Required Revision: Click or tap here to enter text.		

Element H: Additional State Requirements (Optional)

Element H Requirements	Location in Plan (section and/or page number)	Met / Not Met
This space is for the State to include additional requirements		
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.

Plan Assessment

These comments can be used to help guide your annual/regularly scheduled updates and the next plan update.

Element A. Planning Process

Strengths

State

- The planning process section is well organized and easy to read. Tables 1.3 and 1.4 were very helpful in showing the participating agencies and meeting timeline. Inclusion of participation documentation in the appendices was helpful to trace involvement.
- Appendix C is robust and does a great job documenting the stakeholder participation. The questionnaire/comment sheet is a great way to get feedback, participation, and invite conversations during the stakeholder meeting.

FEMA

- Documentation throughout the planning process was excellent. The narrative in the base plan is comprehensive and the included attachments of social media posts, meeting minutes, and email correspondence demonstrate the significant work the planning team put into this hazard mitigation plan with their partners.
- MWDSLS developed an excellent approach seeking stakeholder and public engagement. It is clear the MWDSLS team followed through on this approach. Building relationships with the offices that serve vulnerable populations for the jurisdictions the district operates in is especially commendable. The development of an easy-to-read one-pager to share through their local government partners' social media and in the local news is fantastic. We also appreciate the posting of a redacted version of the hazard mitigation plan on the District's website. It is clear that the MWDSLS team took the feedback seriously and greatly improved their planning process to include required stakeholders and the public. We look forward to future plan updates that share how the annual open house for Water Week goes for the District.

Opportunities for Improvement

State

- The plan explains that on April 17, 2023, the District announced the Draft Plan Public Review and Comment Period and it would be held from April 17, 2023 – May 18, 2023. The local jurisdictions were notified on April 19, 2023 for outreach assistance. The plan writes how there was a low response from the jurisdictions in assistance and comments from the public. Low response rates can happen, we suggest giving your planning team more time to reach out to communities for outreach assistance. Having an outreach plan or established contacts during the planning process can help the jurisdiction and public response rate.
- To avoid confusion, the information regarding stakeholders and the public could be separated. For example, in section 1.2, stakeholder and public involvement can be two separate sections. And as mentioned above, the larger contribution to public outreach will strengthen the plan.
- Local floodplain administrators do not appear to have played a key role in developing this plan. Given that flooding is one of the prominent hazards profiled in the plan it would be beneficial to future planning processes to ensure all key stakeholders are involved.

FEMA

- In future updates, consider integrating plan information from local jurisdictions that the District operates in. These could include comprehensive plans, water conservation plans, or other relevant plans from Salt Lake City and Sandy. This can further strengthen the understanding of future development in addition to opportunities for collaboration on hazard mitigation initiatives.
- In future updates, it is recommended to include local government staff on the planning team beyond those that work in the water utility sector. These could include planners, floodplain administrators, building code officials, for example, fully meet the “agencies that regulate development” aspect of Element A2-a.

Element B. Risk Assessment

Strengths

State

- The Risk Assessment portion of the plan is thorough. The plan does a great job breaking down the impacts of each hazard for the District’s assets. The hazard maps are well done and informative.
- The note under table 2.1 explains that additional natural hazards were included that were not listed in the FEMA guidance, but pose a threat to MWDSLS critical assets. This extra step and information strengthen the plan and the hazard identification section.
- The tables in Appendix D are well done and provide excellent detail on the risk screening of the various hazards.

FEMA

- The MWDSLS integrated several aspects in the risk assessment that provides a complete picture of the hazards, risks, and vulnerabilities present for the District itself and the communities it serves. The hazard profiles capture the vulnerability and potential impacts of the identified hazards on the infrastructure the District maintains, but also the communities they serve with the vital resource of water. The maps included in Appendix J demonstrate vulnerable populations due to clean water and infrastructure which directly relates to MWDSLS' mission. Overlaying these maps with hazard mapping in future updates could be a useful approach to further understanding these communities' relationship with risk.
- Using information from reputable tools and reports like the NOAA State Climate Summaries and the State of Utah Hazard Mitigation Plan, the District included helpful information about the future conditions of hazard events facing their operations and infrastructure.

Opportunities for Improvement

State

- Even though this is a water district plan, which has no jurisdiction over communities, for future plan updates, consider ways to further and better incorporate surrounding communities and vulnerable populations into the risk assessment.
- The sections under 2.1.1 are a great location to include more information on extent. Here you can add two-three sentences further explain the extent of each hazard. UT DEM can provide a PDF on how to complete this section.

FEMA

- The visuals displaying hazard location are generally isolated to Appendix B. It is recommended to incorporate map products into the hazard identification and risk assessment to increase readability and to provide important context in the base plan.
- Section 2.1 Hazard Identification notes that natural hazards that present potential risk to the water district were identified from FEMA's Local Mitigation Planning Handbook. For the next plan update, reviewing the State's Hazard Mitigation Plan can also give more localized insight into the hazards that may pose potential risk.

Element C. Mitigation Strategy

Strengths

State

- Section 4.1 describes the district's current authorities that could help to build hazard mitigation and provides a nice overview of district authorities.
- The mitigation strategy portion contains really good specific actions and some good overall mitigation goals.
- Appendix I does a great job of providing forty-five different projects for the district, in addition to another 13 non-natural hazard projects.

FEMA

- The discussion of the future development in the communities the District serves as well as the impacts to the District (pgs. 15-16) is comprehensive.
- Despite not being a local government, the use of the capability assessment worksheet from Local Mitigation Planning Handbook is used to its full effect to describe the capabilities the District has internally, their partnerships with the local jurisdictions they serve, and mutual aid networks. This section is incredibly comprehensive to understand the District's "tools in their toolbox" to work toward mitigating identified hazards. Especially commendable is the plan to expand their capabilities through cross-training employees to develop grant writing skills, increasing partnerships with local governments, applying for funding to implement identified projects, and building relationships with social service organizations.
- The plan also includes a comprehensive range of mitigation project types. The inclusion of all-hazard education and awareness projects like expanding the annual Water Week conservation event to include hazard awareness information is exemplary.

Opportunities for Improvement

State

- As part of the next plan update explore more ideas for how the capabilities can be expanded or improved upon.
- The plan has goals listed throughout but could be added in section 4.2 as table or a list to make the Districts' goals clearer.
- An information discussion on existing building codes and land use and development ordinances or regulations could be added to this section (4.1) or made its own section in this part of the plan. Greater detail on these topics will further develop the plan.

FEMA

- The mitigation strategy section can be simplified in future updates to one use consolidated table of mitigation actions. It is helpful to include some of the narrative describing the projects in the table itself. If possible, using a consolidated table for all mitigation actions (general or otherwise) would increase the readability of this section of the plan in future updates.

Element D. Plan Maintenance

Strengths

State

- Tying the plan maintenance cycle to the annual budget is a good way to ensure that the plan is updated and maintained.

FEMA

- “The District is considering submitting portions of their Plan to Salt Lake County and MAG, for inclusion in those regional plans for future updates.” This is a great idea and would increase alignment between the District and its close governmental partners in hazard mitigation.

Opportunities for Improvement

State

- The plan should include more information regarding the obstacles to implementation and keeping the plan current over the planning cycle. For the next plan update, consider incorporating the plan into other external planning mechanisms outside of the District.

FEMA

- In Section 5, the plan states, ““It is MWDSLS’s goal to integrate this MMP and its future updates into the process and culture of the District and its member cities, stakeholders, public, and other impacted agencies.” We recommend augmenting with more discussion of the specific planning mechanisms these government partners use and how MWDSLS may be involved. Planning mechanisms refers to the governance structures used to manage local land use development and community decision-making, such as budgets, comprehensive plans, capital improvement plans, economic development strategies, climate action plans or other long-range plans.

Element E. Plan Update

Strengths

- [insert comments]

Opportunities for Improvement

FEMA

- Element E is not applicable to this plan as it is not an update. However, to meet this requirement in future plan updates, be sure to identify trends recent development in the jurisdictions MWDSLS serves. How do these trends increase or decrease the vulnerability of the jurisdiction since the previous plan was approved? How do changes in population impact risk to hazards like drought? This can also include changes in local policies, standards, codes, regulations, land use regulations and other conditions.

Element G. HHPD Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element H. Additional State Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Resources for Implementing Your Approved Plan

FEMA FUNDING SOURCES

Hazard Mitigation Grant Program (HMGP). The HMGP is a post-disaster mitigation program. It is made available to states by FEMA after each Federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures. The HMGP can be used to fund cost-effective projects that will protect public or private property in an area covered by a federal disaster declaration or that will reduce the likely damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard prone areas, flood-proofing or elevation to reduce future damage, minor structural improvements and development of state or local standards. Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to your state and placed in rank order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available. More information: <https://www.fema.gov/hazard-mitigation-grant-program>

Building Resilient Infrastructure and Communities (BRIC) Grant Program. The BRIC program supports states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency: <https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities>

Rehabilitation of High Hazard Potential Dams (HHPD) Grant Program. This program provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. For more information, please visit: <https://www.fema.gov/emergency-managers/risk-management/dam-safety/grants#hhpd>

Flood Mitigation Assistance (FMA) Grant Program. FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is 75 percent. At least 25 percent of the total eligible costs must be provided by a non-federal source. Of this 25 percent, no more than half can be provided as in-kind contributions from third parties. FMA funds are distributed

from FEMA to the state. More information: <https://www.fema.gov/flood-mitigation-assistance-grant-program>

Fire Management Assistance Grant (FMAG) Program. The FMAG program provides grants to states, tribal governments and local governments for the mitigation, management and control of any fire burning on publicly (non-federal) or privately owned forest or grassland that threatens such destruction as would constitute a major disaster. The grants are made in the form of cost sharing with the federal share being 75 percent of total eligible costs. Grant approvals are made within 1 to 72 hours from time of request. More information: <http://www.fema.gov/fire-management-assistance-grant-program>

Hazard Mitigation Grant Program (HMGP) Post Fire Grant Program. FEMA's Hazard Mitigation Grant Program (HMGP) has Post Fire assistance available to help communities implement hazard mitigation measures after wildfire disasters. States, federally-recognized tribes and territories affected by fires resulting in an [Fire Management Assistance Grant \(FMAG\)](#) declaration on or after October 5, 2018, are eligible to apply. More information: <https://www.fema.gov/grants/mitigation/post-fire>

Fire Prevention and Safety (FP&S) Grants. FP&S Grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death. Eligibility includes fire departments, national, regional, state, and local organizations, Native American tribal organizations, and/or community organizations recognized for their experience and expertise in fire prevention and safety programs and activities. Private non-profit and public organizations are also eligible. Interested applicants are advised to check the website periodically for announcements of grant availability: <https://www.fema.gov/welcome-assistance-firefighters-grant-program>

OTHER MITIGATION FUNDING SOURCES

Grant funding is available from a variety of federal and state agencies for training, equipment, and hazard mitigation activities. Several of these programs are described below.

Program 15.228: Wildland Urban Interface Community and Rural Fire Assistance. [This program](#) is designed to implement the National Fire Plan and assist communities at risk from catastrophic wildland fires. The program provides grants, technical assistance, and training for community programs that develop local capability, including: Assessment and planning, mitigation activities, and community and homeowner education and action; hazardous fuels reduction activities, including the training, monitoring or maintenance associated with such hazardous fuels reduction activities, on federal land, or on adjacent nonfederal land for activities that mitigate the threat of catastrophic fire to communities and natural resources in high risk areas; and, enhancement of knowledge and fire protection capability of rural fire districts through assistance in education and training, protective clothing and equipment purchase, and mitigation methods on a cost share basis.

Secure Rural Schools and Community Self-Determination Act - Title III- County Funds. The Self-Determination Act has recently been reauthorized and now includes specific language regarding the Firewise Communities program. Counties seeking funding under Title III must use the funds to perform work under the Firewise Communities program. Counties applying for Title III funds to implement Firewise activities can assist in all aspects of a community's recognition process, including conducting or assisting with community assessments, helping the community create an action plan, assisting with an annual Firewise Day, assisting with local wildfire mitigation projects, and communicating with the state liaison and the national program to ensure a smooth application process. Counties that previously used Title III funds for other wildfire preparation activities such as the Fire Safe Councils or similar would be able to carry out many of the same activities as they had before. However, with the new language, counties would be required to show that funds used for these activities were carried out under the Firewise Communities program. For more information, [click here](#).

Community Planning Assistance for Wildfire. Established in 2015 by Headwaters Economics and Wildfire Planning International, Community Planning Assistance for Wildfire (CPAW) works with communities to reduce wildfire risks through improved land use planning. CPAW is a grant-funded program providing communities with professional assistance from foresters, planners, economists and wildfire risk modelers to integrate wildfire mitigation into the development planning process. All services and recommendations are site-specific and come at no cost to the community. More information: <http://planningforwildfire.org/what-we-do/>

Urban and Community Forestry (UCF) Program. A cooperative program of the U.S. Forest Service that focuses on the stewardship of urban natural resources. With 80 percent of the nation's population in urban areas, there are strong environmental, social, and economic cases to be made for the conservation of green spaces to guide growth and revitalize city centers and older suburbs. UCF responds to the needs of urban areas by maintaining, restoring, and improving urban forest ecosystems on more than 70 million acres. Through these efforts the program encourages and promotes the creation of healthier, more livable urban environments across the nation. These grant programs are focused on issues and landscapes of national importance and prioritized through state and regional assessments. Information: <http://www.fs.fed.us/managing-land/urban-forests/ucf>

Western Wildland Urban Interface Grants. The National Fire Plan (NFP) is a long-term strategy for reducing the effects of catastrophic wildfires throughout the nation. The Division of Forestry's NFP Program is implemented within the Division's Fire and Aviation Program through the existing USDA Forest Service, State & Private Forestry, State Fire Assistance Program.

Congress has provided increased funding assistance to states through the U.S. Forest Service State and Private Forestry programs since 2001. The focus of much of this additional funding was mitigating risk in WUI areas. In the West, the State Fire Assistance funding is available and awarded through a competitive process with emphasis on hazard fuel reduction, information and education, and community and homeowner action. This portion of the National Fire Plan was developed to assist interface communities manage the unique hazards they find around them. Long-term solutions to interface challenges require informing and educating people who live in these areas about what they and their local organizations can do to mitigate these hazards.

The 10-Year Comprehensive Strategy focuses on assisting people and communities in the WUI to moderate the threat of catastrophic fire through the four broad goals of improving prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance. The Western States Wildland Urban Interface Grant may be used to apply for financial assistance towards hazardous fuels and educational projects within the four goals of: improved prevention, reduction of hazardous fuels, and restoration of fire-adapted ecosystems and promotion of community assistance. More information: <https://www.westernforesters.org/wui-grants>

U.S. Fish & Wildlife Service, Rural Fire Assistance Grants. Each year, the U.S. Fish & Wildlife Service (FWS) provides Rural Fire Assistance (RFA) grants to neighboring community fire departments to enhance local wildfire protection, purchase equipment, and train volunteer firefighters. Service fire staff also assist directly with community projects. These efforts reduce the risk to human life and better permit FWS firefighters to interact and work with community fire organizations when fighting wildfires. The Department of the Interior (DOI) receives an appropriated budget each year for an RFA grant program. The maximum award per grant is \$20,000. The DOI assistance program targets rural and volunteer fire departments that routinely help fight fire on or near DOI lands. More information: http://www.fws.gov/fire/living_with_fire/rural_fire_assistance.shtml

U.S. Bureau of Land Management, Community Assistance Program. BLM provides funds to communities through assistance agreements to complete mitigation projects, education and planning within the WUI. More information: <https://www.blm.gov/services/financial-assistance-and-grants>

NOAA Office of Education Grants. The Office of Education supports formal, informal and non-formal education projects and programs through competitively awarded grants and cooperative agreements to a variety of educational institutions and organizations in the United States. More information: <http://www.noaa.gov/office-education/grants>

NRCS Environmental Quality Incentives Program (EQIP). The Environmental Quality Incentives Program, administered through the NRCS, is a cost-share program that provides financial and technical assistance to agricultural producers to plan and implement conservation practices that improve soil, water, plant, animal, air and related natural resources on agricultural land and non-industrial private forestland. Owners of land in agricultural or forest production or persons who are engaged in livestock, agricultural or forest production on eligible land and that have a natural resource concern on that land may apply to participate in EQIP. Eligible land includes cropland, rangeland, pastureland, non-industrial private forestland and other farm or ranch lands. EQUIP is another funding mechanism for landowner fuel reduction projects. More information: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>

U.S. Department of Agriculture, Community Facilities Loans and Grants. Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required. More information: http://www.usda.gov/wps/portal/usda/usdahome?navid=GRANTS_LOANS

General Services Administration, Sale of Federal Surplus Personal Property. This program sells property no longer needed by the federal government. The program provides individuals, businesses

and organizations the opportunity to enter competitive bids for purchase of a wide variety of personal property and equipment. Normally, there are no restrictions on the property purchased. More information: <http://www.gsa.gov/portal/category/21045>

Hazardous Materials Emergency Preparedness Grants. Grant funds are passed through to local emergency management offices and HazMat teams having functional and active LEPC groups. More information: <http://www.phmsa.dot.gov/hazmat/grants>

U.S. Department of Homeland Security. Enhances the ability of states, local and tribal jurisdictions, and other regional authorities in the preparation, prevention, and response to terrorist attacks and other disasters, by distributing grant funds. Localities can use grants for planning, equipment, training and exercise needs. These grants include, but are not limited to areas of Critical Infrastructure Protection Equipment and Training for First Responders, and [Homeland Security Grants](#).

Community Development Block Grants (CDBG). The U.S. Department of Commerce administers the CDBG program which are intended to provide low and moderate-income households with viable communities, including decent housing, as suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during the times of “urgent need” (e.g. post disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. CDBG funds can be used to match FEMA grants. More Information:

https://www.hud.gov/program_offices/comm_planning/cdbg

Building Blocks for Sustainable Communities. The EPA Office of Sustainable Communities sometimes offers grants to support activities that improve the quality of development and protect human health and the environment. When these grants are offered, they will always be announced on www.grants.gov. More information: <https://www.epa.gov/smartgrowth/building-blocks-sustainable-communities#2016>

PUBLICLY AVAILABLE TOOLS

FEMA Community Engagement Prioritization Tool (CEPT).

<https://www.fema.gov/floodplain-management/manage-risk/community-engagement-prioritization-tool>

FEMA National Risk Index for Natural Hazards (NRI).

<https://hazards.geoplatform.gov/portal/apps/MapSeries/index.html?appid=ddf915a24fb24dc8863eed96bc3345f8>

FEMA Resilience Analysis and Planning Tool (RAPT).

<https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool>

FEMA Flood Assessment Structure Tool (FAST).

https://www.fema.gov/sites/default/files/2020-09/hazus_fast-factsheet.pdf

FEMA HAZUS

<https://www.fema.gov/flood-maps/products-tools/hazus>

Decision Support System for Water Infrastructure Security (DSS-WISE):

<https://dsswiseweb.ncche.olemiss.edu/>

CDC/ASTDR Social Vulnerability Index (SVI).

<https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>

U.S. Census Bureau Community Resilience Estimates

[Community Resilience Estimates \(census.gov\)](https://www.census.gov/commerce/eresilience/)

OTHER RESOURCES

FEMA: Region 8 Mitigation Technical Assistance: FEMA Region 8's BRIC technical assistance team (BRIC TAT) is available to provide hands-on support to State, Local, and Tribal entities interested in implementing long term mitigation actions. In coordination with the State and FEMA HQ, the Region 8 BRIC TAT can provide wide ranging support moving mitigation projects forward. This team helps coordinate the BRIC Direct Technical Assistance Program [BRIC Direct Technical Assistance | FEMA.gov](#) as well as other technical assistance needs that arise.

For additional questions on the Direct Technical Assistance program or other technical assistance needs, please reach out to the team at fema-r8-mit-technical-assistance@fema.dhs.gov to learn more about how they can support you in your efforts to implement your mitigation plan.

FEMA: Grant Application Training. Each year, FEMA partners with the State on training courses designed to help communities be more successful in their applications for grants. Contact your State Hazard Mitigation Officer for course offering schedules. Example Courses:

- Unified Hazard Mitigation Grant Assistance Application Development Course
- [Benefit Cost Analysis \(BCA\)](#) Course

FEMA: Community Assistance Visit. It may be appropriate to set up a Community Assistance Visit with FEMA to provide technical assistance to communities in the review and/or updating of their

floodplain ordinances to meet the new model ordinance. Consider contacting your State NFIP Coordinator for more information.

FEMA: Building Science. The Building Science branch develops and produces multi-hazard mitigation publications, guidance materials, tools, technical bulletins, and recovery advisories that incorporate the most up-to-date building codes, floodproofing requirements, seismic design standards, and wind design requirements for new construction and the repair of existing buildings. To learn more, visit: <https://www.fema.gov/building-science>

NOAA/NIDIS: U.S. Drought Portal. NOAA's National Integrated Drought Information System's [Drought Portal](#) provides resources for communities to understand their drought conditions, vulnerability, and impacts. The Portal includes data and maps down by city, county, state, zip code, and at watershed global scales. Communities can use this information to inform their hazard mitigation plans with update-to-date data regarding drought conditions, vulnerability, and impacts for sectors such as agriculture, water utilities, energy, and recreation.

EPA: Smart Growth in Small Towns and Rural Communities. EPA has consolidated resources just for small towns and rural communities to help them achieve their goals for growth and development while maintaining their distinctive rural character. To learn more, visit:

<https://www.epa.gov/smartgrowth/smart-growth-small-towns-and-rural-communities>

EPA: Hazard Mitigation for Natural Disasters: A Starter Guide for Water and Wastewater Utilities. The EPA released guidance on how to mitigate natural disasters specifically for water and wastewater utilities. For more information, visit: <https://www.epa.gov/waterutilityresponse/hazard-mitigation-natural-disasters>

National Integrated Drought Information System. The National Drought Resilience Partnership may provide some additional resources and ideas to mitigate drought hazards and increase awareness of droughts. Visit: <https://www.drought.gov/drought/what-nidis/national-drought-resilience-partnership>.

STAR Community Rating System. Consider measuring your mitigation success by participating in the STAR Community Rating System. Local leaders can use the STAR Community Rating System to assess how sustainable they are, set goals for moving ahead and measure progress along the way. To get started, go to <http://www.starcommunities.org/get-started>

Flood Economics. The Economist Intelligence Unit analyzed case studies and state-level mitigation data in order to gain a better understanding of the economic imperatives for investment in flood mitigation. To learn more, visit: <http://floodeconomics.com/>

Headwaters Economics. Headwaters Economics is an independent, nonprofit research group that works to improve community development and land management decisions in the West. To learn more, visit: <https://headwaterseconomics.org/>