Local Hazard Mitigation Plan
Orchard Dale Water District
Whittier, California

Orchard Dale Water District’s Board Adoption Date: 03-30-2018
Approved by CalOES: XX-XX-XXXX
Revised:

PRIMARY POINT OF CONTACT UNTIL FEMA APPROVAL
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Table of Contents

Section 1 Introduction

1.1 Purpose of the Plan .................................................................
1.2 Authority ...........................................................................
1.3 Community Profile ...............................................................  
1.3.1 Physical Setting ..............................................................
1.3.2 City of Whittier/Los Angeles County .................................
1.3.3 Demographics .................................................................
1.3.4 Existing Land Use .............................................................
1.3.5 Development Trends .......................................................  

Section 2 Plan Adoption

2.1 Adoption by Local Governing Body .......................................  
2.2 Promulgation Authority ........................................................
2.3 Primary Point of Contact .....................................................

Section 3 Planning Process

3.1 Preparing for the Plan ...........................................................
3.2 Planning Team ....................................................................
3.2A External Planning and review Team ......................................
3.3 Coordination with Other Jurisdictions, Agencies, and Organizations ......................................................
3.4 Public Involvement/Outreach ................................................
3.5 Assess the Hazard .................................................................
3.6 Set Mitigation Goals .............................................................
3.7 Review and Propose Mitigation Measures ............................
3.8 Draft Local Hazard Mitigation Plan ......................................
3.9 Adoption of the Plan .............................................................

Section 4 Risk Assessment

4.1 Hazard Identification ............................................................
4.1.1 Hazard Screening Criteria ...............................................  
4.1.2 Hazard Assessment Matrix ..............................................
4.1.3 Hazard Prioritization .......................................................  
4.2 Hazard Profile ....................................................................
4.2.1 Earthquake Hazard .........................................................
4.2.2 Climate Change/Drought Hazard ....................................
4.2.3 Flooding Hazard .............................................................
4.2.4 Wildfire Hazard ..............................................................
4.2.5 Terrorist Event Hazard ...................................................
4.2.6 Windstorm Hazard ........................................................
4.3 Inventory Assets ...................................................................
4.3.1 Facilities Overview ........................................................
4.3.2 Critical Facility List

4.4 Vulnerability Assessment

4.4.1 Methodology

4.4.2 Earthquake Vulnerability Analysis

4.4.3 Climate Change/Drought Vulnerability Analysis

4.4.4 Flooding Vulnerability Analysis

4.4.5 Wildfire Vulnerability Analysis

4.4.6 Terrorist Event Vulnerability Analysis

4.4.7 Windstorm Vulnerability Analysis

4.4.8 Potential Loss Estimate

Section 5 Community Capability Assessment

5.1 Agencies and People

5.2 Existing Plans

5.3 Regulations, Codes, Policies, and Ordinances

5.4 Mitigation Programs

5.5 Fiscal Resources

Section 6 Mitigation Strategies

6.1 Overview

6.2.1 Earthquakes

6.2.2 Climate Change/Drought

6.2.3 Flooding

6.2.4 Wildfire

6.2.5 Terrorist Event

6.2.6 Windstorm

6.2.7 Mitigation Priorities

6.3 Implementation Strategy

Section 7 Plan Maintenance

7.1 Monitoring, Evaluating and Updating the Plan

7.2 Implementation through Existing Programs

7.3 Continued Public Involvement
Tables
Table 1 Plans Reviewed .................................................................................................
Table 2 Financial Resources ........................................................................................
Table 3 Screening Assessment Matrix........................................................................
Table 4 Historic Southern Calif. Earthquakes ............................................................
Table 5 Flooding History ..............................................................................................
Table 6 Critical Facilities ..........................................................................................
Table 7 Economic Impacts on Critical Facilities .......................................................
Table 8 Mitigation Projects and Estimated Budget

Figures
Figure 1 Earthquake Faults with District Boundaries ..............................................
Figure 2 A & 2 B USGS Shake Map and Scenario .....................................................
Figure 3 Puente Hills Blind Thrust Fault .................................................................
Figure 4 100/500-year Flood Map ........................................................................
Figure 5 Flooding History .........................................................................................
Figure 6 A 6 B Fire with Facilities Location Map .....................................................

Attachments
Appendix A - Internal/External Meeting Agenda’s, Minutes and Sign-In Sheets
Appendix B - Board of Directors Meeting Minutes, LHMP Public Comment Period
Appendix C - Screen Shot of District Website LHMP page
Appendix D - Special District Incorporation Documentation
Appendix E – HAZUS Report
SECTION 1: INTRODUCTION

1.1 Purpose of the Plan

Emergencies and disasters can leave people injured or displaced; result in fatalities; cause significant damage to our communities, businesses, public infrastructure and our environment; and cost tremendous amounts in terms of response and recovery dollars and economic loss. Hazard mitigation reduces the risk of personal damages, loss of life, and property damages caused by emergencies and disasters.

Repairs and reconstruction after disasters are often completed to simply restore infrastructure to pre-disaster conditions. Such efforts expedite a return to normalcy; however, merely replicating pre-disaster conditions results in a cycle of damage, reconstruction, and repeated damage. Hazard mitigation attempts to break this cycle by reducing hazard vulnerability.

While we cannot prevent disasters from happening, their effects can be reduced or minimized through preparedness and mitigation. For those hazards that cannot be fully mitigated, the community must be prepared to provide efficient and effective response and recovery to emergencies. This can be accomplished through a well-organized public education and awareness effort.

The purpose of this Local Hazard Mitigation Plan (LHMP) is to identify potential hazards to Orchard Dale Water District (ODWD, the District) and formulate mitigation measures for future protection of the District’s critical infrastructure and the community’s safety with respect to the District’s facilities and services. Approval of this LHMP by the State of California Office of Emergency Services (CalOES) will also allow the District to become eligible to receive federal funding assistance under the Local Hazard Mitigation Grant program or the Pre-Disaster Mitigation program.

1.2 Authority

In 1954, Orchard Dale Water District was established pursuant to the County Water District Act (Water Code §30000 et seq.). The District members approved a $500,000 bond to purchase and improve the water supply facilities. From this point in time, ODWD has grown to its present size of approximately 25,000 population served through 4,256 service connections using approximately 2,500 acre-feet of water a year. The District’s sphere of influence is coterminous with its boundaries. The majority of the District’s boundaries lie within the sphere of influence of the City of Whittier. Customers are a mix of primarily single and multi-family residences, which include 62 commercial customers. Water service is provided to all customers for domestic, irrigation, and fire protection uses.

In the early 1950s, residential development in the area began to increase and the influx of consumers required immediate and extensive modernization of the water supply system. Because the District was neither financially able nor inclined to make these improvements, the local citizens had a series of meetings to determine and implement the best way to meet the water demand. The
local committee decided to put the formation of a County Water District to the vote of the people. The voting result was 364 in agreement to 102 disagreements.

Orchard Dale Water District is a county water district formed under the County Water District Law, Division 12, Section 30000 et seq. of the California Water Code.

A five-member Board of Directors governs Orchard Dale Water District. The members are elected-at-large by registered voters within the District. Each director serves a four-year term that is staggered between two directors and three directors and which commences in successive even-year elections.

The Board of Directors is responsible for establishing the strategic direction and policy of the District. A General Manager is appointed by the Board of Directors and oversees the day-to-day management of the District.

The regularly scheduled Board meeting dates and times are routinely posted on the website, and in front of the office. The meetings are held at the District’s offices located at 13819 E. Telegraph Road, Whittier, CA 90604.

Currently, the District has nine employees, including the General Manager who serves under the direction of the five-member Board of Directors. Voters who reside within the service area elect each Director to a four-year term.

As required by the Department of Homeland Security’s Federal Emergency Management Administration (FEMA), LHMPs must be updated, adopted, and approved every five (5) years.

1.3 Community Profile

The water service area covers part of the City of Whittier as well as a small area in the County of Los Angeles. When physical operations began in 1955, the District served a population of 4,675 residents within an area of 2.02 square miles. Approximately 94 miles of leaky, undersized, and substandard pipeline fed the 1,422-meter services. The community's water storage capacity amounted to less than 200,000 gallons.

Currently, the District pumps water from the underground aquifer and distributes water to the customer. The only available water supply is local ground water. The District serves a population of approximately 25,000 residents within a 2.02 square mile area and maintains approximately 4,256-meter services, 43.2 miles of pipeline, and 5 million gallons of water storage capacity.

1.3.1 Physical Setting

The District is located within the City of Whittier and the County of Los Angeles. The service area is mostly flat land, with high-density housing and businesses along the major routes. The neighboring cities are Hacienda Heights, La Habra Heights, La Habra and Santa Fe Springs. Average rainfall for the area is 366 inches per year. This area has a mild climate with average temperatures of a low 40 degrees in the winter and a high of 80 degrees in the summer months.
1.3.2 City of Whittier/Los Angeles County

The City of Whittier is located approximately 15 miles east of the Pacific Ocean and is bordered by Hacienda Heights to the northwest, City of Industry to the north, and several unincorporated communities in the San Gabriel Valley. Pico Rivera lies to the west, La Habra Heights to the east, La Habra to the southeast and Santa Fe Springs to the south.

Located in the southwest section of California, Los Angeles County is bordered by the San Bernardino, Ventura, Kern and Orange Counties and the Pacific Ocean on the west. With a population of more than 10 million residents, it is the most populated county in the United States, with 88 incorporated cities and many unincorporated areas. The county covers 4,083 square miles. The county is home to more than one-quarter of the California’s residents and is the most ethnically diverse county in the United States.

1.3.3 Demographics

The City of Whittier has a population of approximately 85,331 people, with a density of 5,818 people per-square mile. There are approximately 11,300 households with children under the age of 18. 7 percent of the population live in owner occupied homes and 43 percent of the population live in rented properties. The medium income is $68,522 with 12 percent living below the federal poverty line.

The 2.02 square mile area that the District specifically manages has a population of 25,000.

1.3.4 Existing Land Use

The existing land use is housing, commercial, and light industry. The City of Whittier is responsible for land use. The District does not have authority to regulate land use in the area. Incorporated areas are regulated by the City of Whittier. There is little vacant land in the City of Whittier or in the unincorporated area of the County of Los Angeles.

1.3.5 Development Trends

The City and County areas are mostly built out. There is an area in the City of Whittier where older homes have been removed to build high-density housing and apartment units. The only development in the future is redevelopment.
SECTION 2: PLAN ADOPTION

2.1 Adoption by Local Governing Body

The completed Local Hazard Mitigation Plan (LHMP) will be presented to the District’s governing body, the Board of Directors, for adoption. Upon adoption, the District’s Board of Directors meeting minutes will be included within the LHMP. The plan will then be forwarded to CalOES and then to FEMA for approval. If any sections of the plan are changed during the process, the document will be sent back to the District’s Board of Directors for final adoption.

2.2 Promulgation Authority

This Local Hazard Mitigation Plan was reviewed and approved by the elected members of the Orchard Dale Water District Board of Directors:

Mr. Joseph Velasco III  
President  
_Description of Involvement:_ President, Orchard Dale Water District Board of Directors

Mr. Dennis Azevedo  
Vice-President  
_Description of Involvement:_ Vice-President, Orchard Dale Water District Board of Directors

Ms. Robert Noonan  
Director  
_Description of Involvement:_ Director, Orchard Dale Water District Board of Directors

Ms. Yvette Stevenson-Rodriguez  
Director  
_Description of Involvement:_ Director, Orchard Dale Water District Board of Directors

Ms. Denise Dolor  
Director  
_Description of Involvement:_ Director, Orchard Dale Water District Board of Directors

Mr. Edward Castaneda  
General Manager/Board Secretary  
_Description of Involvement:_ General Manager, Orchard Dale Water District
2.3 Primary Point of Contact
The Point of Contact for information regarding this plan is:

BEFORE FEMA APPROVAL:

Mr. Gary Sturdivan
Sturdivan Emergency Management Consulting, LLC
gsturdivan@me.com
909-658-5974
SECTION 3: PLANNING PROCESS

This section documents the planning process used to review and compile information that leads to an effective LHMP. A comprehensive description of the planning process informs citizens and other readers how the plan was developed and provides a permanent record of how decisions were reached. These decisions can be understood, reconsidered, replicated, or modified in future updates. An integral part of the planning process is documentation of how the public was engaged throughout the process.

This LHMP was completed with the coordination and involvement of the Orchard Dale Water District staff and representatives from the local community. These team members have a vested interest in the performance and resiliency of the District. Team members from the local community included Orchard Dale business owners. This team developed and implemented the planning process.

Los Angeles County Office of Emergency Services reviewed the plan for items that should be included from the County HMP. County Fire OES supplied all hazard maps that are included in this document.

This section includes a list of the Planning Team Members, a summary of the meetings held, coordination efforts with the surrounding communities and groups, and public outreach efforts.

3.1 Preparing for the Plan

The Planning Team reviewed FEMA’s “Hazard Mitigation Plan Crosswalk”, the Los Angeles County HMP, and the City of Whittier’s HMP.

The City of Whittier completed a FEMA Hazard Profile of the area. Some of the maps included in the City of Whittier’s HMP are included in the District’s LHMP. The Hazard Profile maps were used in the planning meetings to show past flood areas, earthquakes, flash floods and other disasters that have affected the area. Other written documentation of past events was also reviewed. The team discussed the different events that have happened in the community; such as flash flooding, earthquakes, windstorms, power outages and freezing events. Members of the planning team have been longtime residents of the community and have lived through many of these emergency events.

The planning process consisted of:

- Documenting past events
- Incorporating data
- Engaging the Planning Team
- Posting the meeting agendas, meeting minutes and draft LHMP onto the District’s website and asking for public input and comments on the planning process
- Sharing information at the monthly Board of Directors meetings
- Conducting public outreach
During the planning process the Planning Team utilized the following plans to gain information on the hazards facing the area and mitigation goals of the County of Los Angeles.

- City of Whittier HMP
- Los Angeles County HMP
- California HMP 2013
- Los Angeles County Flood Control
- FEMA Flood Insurance Study for Los Angeles County
- USGS Golden Guardian Shake Out 2008
- Orchard Dale Water District’s Water Master Plan

**Table 1: Plans Reviewed by Planning Team**

<table>
<thead>
<tr>
<th>Study Plan</th>
<th>Key Information</th>
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<tbody>
<tr>
<td>City of Whittier HMP</td>
<td>Layout of an LHMP for water agencies</td>
</tr>
<tr>
<td>City of Whittier, Draft HMP</td>
<td>Hazard Identification, Mitigation measures</td>
</tr>
<tr>
<td>Los Angeles County HMP</td>
<td>Mitigation measures and goals, Hazards,</td>
</tr>
<tr>
<td>USGS Golden Guardian 2008</td>
<td>Earthquakes, affects, planning</td>
</tr>
<tr>
<td>Orchard Dale Water District Water Master Plan</td>
<td>Land use for area, future projects</td>
</tr>
<tr>
<td>2013 California HMP</td>
<td>Goals for the State of California</td>
</tr>
<tr>
<td>Los Angeles County Flood Control</td>
<td>Gain information on future flood control projects</td>
</tr>
<tr>
<td>FEMA Flood Insurance Study for Los Angeles County</td>
<td>Flood history</td>
</tr>
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</table>

**Table 2: Financial Resources for Future Mitigation Projects**

<table>
<thead>
<tr>
<th>Local</th>
<th>Revenues</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>The District’s Budget and Financial Planning Documents</td>
<td>Water sales, new construction</td>
<td>Varies from year to year</td>
</tr>
<tr>
<td>FEMA Grants</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>State Revolving Funds Draft application</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Prop 84 Funding</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>FEMA Mitigation Grants</td>
<td>District has not applied for FEMA funding in the past</td>
<td>As funding and approval are obtained</td>
</tr>
<tr>
<td>Future Budget Funds Considerations</td>
<td>Water sales, meter sales, new construction</td>
<td>Varies as funding is available each year</td>
</tr>
</tbody>
</table>
3.2 Planning Team
The Planning Team compiled information and reviewed this LHMP under the authorization of the District. The Planning Team members include:

Mr. Edward Castaneda
General Manager, Orchard Dale Water District
Description of Involvement: Internal Planning Team Member and Editor
Edward Castaneda was the Assistant General Manager of Orchard Dale Water District from July 2008 to May 2013. Mr. Castaneda was promoted to General Manager in May of 2013. Mr. Castaneda received his Bachelor of Science Degree in Business Administration from California State Polytechnic University, Pomona. Mr. Castaneda also received an Associate in Science Degree in Water Technology from Citrus College and holds a California State Water Resources Control Board Water Distribution Operator Grade 3 license and Water Treatment Operator Grade 2 license.

Mr. Ronald Richard
Finance Manager
Description of Involvement: Internal Planning Team Member
Ronald Richard has been the Finance Manager of Orchard Dale Water District since December 2009. Mr. Richard received his Bachelor of Arts Degree in Business Administration from California State University, Fullerton, and is a Certified Public Accountant. Mr. Richard was the independent auditor for the District from 2000-2009.

Ms. Merissa Liskey
Administrator of District Services
Description of Involvement: Internal Planning Team Member
Merissa Liskey has been the Administrator of District Services since January 2009. Ms. Liskey plans, organizes, directs, and coordinates the office support of the District programs. Ms. Liskey is in control of District billing and customer service. Ms. Liskey also participates in District financial management and reporting functions and oversees all applications of human resources. Ms. Liskey received her Bachelor of Arts Degree in Communication Studies from California State University, Long Beach, and holds a certificate in Human Resources through the Association of California Water Agencies, Joint Powers Insurance Authority.

Mr. Randy Silvett Superintendent
Description of Involvement: Internal Planning Team Member
Randy Silvett has been the Superintendent for Orchard Dale Water District since June 2002. Mr. Silvett plans, organizes, directs, and coordinates the safety programs, and also holds the position as the District’s Chief Operator/Distribution and Treatment Officer. Mr. Silvett received a Water Technology Certification and Backflow Prevention Certification from Mt. San Antonio College. Mr. Silvett holds a California State Water Resources Control Board Water Distribution Operator Grade 4 license, and a Water Treatment Operator Grade 3 license.
Mr. David Chavez  
**Foreman**  
Description of Involvement: Internal Planning Team Member

David Chavez has been the Foreman of Orchard Dale Water District since March 2007. Mr. Chavez engages in the repair, maintenance, and daily field operations of the District. Mr. Chavez received an Associate of Science Degree in Water Technology from Citrus College and is currently completing his Bachelor of Arts Degree in Business Administration at University of La Verne. Mr. Chavez holds a California State Water Resources Control Board Water Distribution Operator Grade 4 license, and a Water Treatment Operator Grade 3 license.

Ms. Christine Van Horn  
**Customer Service Representative**  
Description of Involvement: Internal Planning Team Member

Christine Van Horn has been the Customer Service Representative of Orchard Dale Water District since August 2013. Ms. Van Horn is responsible for inputting new customer accounts, creating service orders, and processing customer payments. Ms. Van Horn received her Bachelor of Science Degree in Biology from San Diego State University. Ms. Van Horn holds a Cross-Connection Control Specialist Certification from USC and controls the District’s Backflow Prevention Program.

Mr. Gary Sturdivan  
**LHMP Consultant**  
Description of Involvement: Planning Team Lead

Mr. Sturdivan, as a consultant to the District, is the Project Team Leader for the LHMP. Mr. Sturdivan develops the agendas for each LHMP meeting, leads the discussions, compiles the meeting minutes and other information for public comment, and prepares draft text for the LHMP. Mr. Sturdivan provides informational updates to the District’s Board of Directors and incorporates the Board’s comments into the planning process and LHMP. Mr. Sturdivan has extensive knowledge of Mitigation Planning, Grant Funding, and Emergency Management. Mr. Sturdivan worked in the water industry for 25 years, with 8 years as the Director of Safety/Regulatory Affairs/Emergency Management and Grants for East Valley Water District prior to becoming a consultant in 2011.
3.2A External Review Committee:

Mr. Jeff Farber
Executive Director of the Help Line Youth Counseling-Liberty Community Center
External Planning Team Member and Plan Reviewer

Bio: Please See Attachment A for comments and Bio.

Mr. Michael Gualtieri
General Manager La Habra Heights County Water District
External Planning Team Member and Plan Reviewer

Bio: Please see Attachment A for comments and Bio.

Jimmy Chavez
Orchard Dale Water District, Water User and Rate Payer
External Planning Team Member and Plan Reviewer

Bio: Please see Attachment A for comments and bio

The General Manager first called the external reviewers and asked for their help. The General Manager hand carried the draft document to each reviewer and gave each a week to make comments.
3.3 Coordination with Other Jurisdictions, Agencies, and Organizations

The General Manager first called the reviewers and asked for their help. The General Manager took the draft document to each reviewer and gave each a week to make comments. Residents were informed and invited to participate in the meeting and come to the Board meetings once a month. The information was posted on the customer’s bill each month and listed the link to the Districts Website, where the draft HMP was posted.

The Planning Team participated in monthly meetings to coordinate efforts, provide input, and receive support for the LHMP. The support included receiving technical expertise, resource materials and tools. The District facilitated the LHMP process and provided sufficient information to follow FEMA requirements for the program. The tools, resource materials, and other project related information are maintained on a project portal on the District’s website, www.ODWD.org, which allowed access to the information by all participants and the public.

3.4 Public Involvement/Outreach

ODWD staff invited residents of the community to participate in the LHMP planning process. The County of Los Angeles OES was invited to be on the Planning Team, but they were unable to attend. The 2017/2018 Board meeting agendas, meeting minutes, and sections of the LHMP were posted on the District website as the LHMP was written. Requests for public review and comments were printed on the customer’s monthly bills, asking for customers to review the documents and direct comments or concerns to Mr. Sturdivan at gsturdivan@me.com or by calling Mr. Sturdivan at 909-658-5974. The public could also attend the Board of Directors meetings each month to voice comments or concerns. Mr. Sturdivan was at all Board meetings during the development of the LHMP. No public comments were received.

See Appendix A for the details of the public involvement process such as meetings dates, purpose, agendas, sign-in sheets, minutes and public comments.

3.5 Assess the Hazard

A critical component of the LHMP process is to assess the likely hazards that may impact the District’s facilities and operations. It is important to have a thorough understanding of these hazards without over-analyzing remote or highly unlikely hazards.

This LHMP has been developed through an extensive review of available information on hazards the District has faced in the past and most likely will face in the future. The Planning Team reviewed and discussed items that have happened in the State of California as well as disasters that have happened in the District’s service area and in Southern California. The Team reviewed documents such as engineering drawings, photographs, and available geotechnical and geologic data both from the Internet and outside sources such as FEMA Hazard Mapping, Los Angeles County hazard maps and documents.

The Planning Team completed the assessment of the various hazards in a group setting. The Team members have many years of personal experience working in the local area and many working in
a water utility. Team members know the history of past hazardous or emergency events, such as the Whittier Narrows Earthquake in 1987, a 5.9 magnitude earthquake on a blind thrust fault that was centered in Whittier. A large number of homes and businesses were impacted including roadway disruptions. Damage ranged from 213 to 358 million, with 200 injuries and three directly related deaths, and five additional fatalities.

3.6 Set Mitigation Goals

After the hazards were identified, the potential damages that could result were estimated. Mitigation goals are set based on the likelihood of and the potential damages from a hazard.

The process of identifying mitigation goals began with a review and validation of damages caused by specific hazards at similar agencies in the surrounding area. In addition, the Planning Team developed estimated damages using engineering budget estimates for anticipated response and replacement costs. The Planning Team completed an assessment of the likelihood of damages for each identified hazard and discussed whether each of the mitigation goals were valid. This discussion led to the opportunity to identify new goals and objectives for mitigation in the LHMP. From this, the Planning Team determined the best mitigation goals to avoid or reduce long-term vulnerabilities.

The Planning Team set the goals for the 2018 LHMP. The team members understand the issues facing the District with respect to the District’s Mission Statement: To serve and satisfy our customers by constantly placing a special emphasis on delivering high-quality water while improving the cost effectiveness and quality of our services.

At a planning meeting, the group brainstormed to determine appropriate mitigation goals to reduce or eliminate long-term vulnerabilities and to identify the related hazards. First, the team reviewed the past hazards that have faced the area and other water agencies in the area and discussed changes in the community that may have mitigated these events. Then the team decided whether those hazards were still viable today. Some hazards were removed, and other hazards were added to the list.

3.7 Review and Propose Mitigation Measures

Meetings were held with the Planning Team to review the identified hazards and solicit input on appropriate mitigation measures for each hazard to be identified in the LHMP. The Team identified mitigation measures for each critical piece of infrastructure. Each meeting focused on specific hazards of the District’s facilities, operations, risk assessment, and mitigation strategy.

3.8 Draft Local Hazard Mitigation Plan

The District’s consultant led the Planning Team and prepared the draft LHMP with the input from the Planning Team, Board of Directors, and the public. The Planning Team members reviewed and commented on the draft LHMP and subsequent changes were made before the LHMP was finalized and adopted by the Board of Directors. Each Board meeting was opened with a public comment period. All meeting agendas, meeting minutes, and draft documents were posted on the
District website. Notices were sent to all water customers in the service area, which stated that all LHMP documents were posted on the website. The consultant’s email address was posted on the District’s website. The public was asked for comments. The consultant addressed all comments or concerns.

The LHMP was reviewed in comparison to the FEMA-designed Crosswalk. The Crosswalk links the federal requirements and identifies the sections in the LHMP where the information can be found. This provides a rating as to the level of compliance with the federal regulations.

3.9 Adoption of the Plan

The draft LHMP was posted on the District’s website for 30 days, asking for comments from the public. The public could comment by e-mail, telephone, or in person at a District Board of Directors meeting. There were no public comments.

The LHMP was submitted to the District’s Board of Directors for adoption after incorporating any final comments. The LHMP was adopted at the District’s regularly scheduled Board of Directors meeting on 03-30-2018. The LHMP was then sent to the State of California Office of Emergency Services, before being sent to FEMA for final approval.
SECTION 4: RISK ASSESSMENT

The goal of mitigation is to reduce the future impacts of a hazard, including property damage, disruption to local and regional economies, and the amount of public and private funds spent for recovery. Mitigation decisions are based on risk assessments where the probability of an event is evaluated with respect to the anticipated damages caused by such an event.

The purpose of this section is to understand the hazards and their risks in the District’s service area. There are generally four steps in this process: 1) hazard identification 2) vulnerability analysis 3) risk analysis and 4) vulnerability assessment, including an estimation of potential losses. Technically, these are four different items, but the terms are sometimes used interchangeably.

4.1 Hazard Identification

The Planning Team discussed potential hazards and evaluated their probability of occurrence. The following subsections describe this process and the results.

4.1.1 Hazard Screening Criteria

The intent of screening the hazards is to help prioritize which hazards create the greatest concern to the District. A list of the natural hazards to consider was obtained from Federal Emergency Management District’s (FEMA) State and Local Mitigation Planning How-to Guide: Understanding Your Risks (FEMA 386-1). The Planning Team used the Stafford Act and the California Emergency Service Act and guidance from the American Water Works Association, Standards, G-440 and J-100 RAMCAP.

Each risk was ranked with a 1 – 4, with (1) being "Highly Likely" event, (2) being "Likely" (3) being "Somewhat Likely" event and (4) being "Least Likely" event. The Planning Team reviewed each hazard on the list, using their experience and historical data pertaining to each hazard and developed the following ranked list:

Hazards:

- Earthquake = 1
- Climate Change/Drought = 1
- Flooding = 2
- Wildfire = 2
- Terrorist Event = 3
- Windstorms = 3

The natural hazards, Volcanoes, Tsunami, and Freezing Events, were considered not to affect or be a risk to the District and were given a ranking well below 4.
4.1.2 Hazard Assessment Matrix

The Planning Team used a qualitative ranking system for the hazard screening process consisting of generating a high/medium/low style rating for the probability and impact of each screened hazard.

- For **Probability**, the ratings are: Highly Likely, likely or Somewhat Likely
- For **Impact**, the ratings are: Catastrophic, Critical, or Limited

The screening assessment matrix is used for the District’s hazards. The hazards have been placed in the appropriate/corresponding box/cell of the corresponding “Hazard Matrix” based on the Planning Team’s collective experience. A subset of this group of hazards is used for the prioritization of the hazards in the following section.

**Table 3: Screening Assessment Matrix**

<table>
<thead>
<tr>
<th>Probability</th>
<th>Impact</th>
<th>Catastrophic</th>
<th>Critical</th>
<th>Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly Likely (1)</td>
<td>Earthquake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(75 – 100%)</td>
<td>Climate Change/Drought</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely (2)</td>
<td>Flooding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(50-75%)</td>
<td>Wildfire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat Likely (3)</td>
<td>Windstorms</td>
<td></td>
<td></td>
<td>Terrorist Event</td>
</tr>
<tr>
<td>(50 – 75%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.1.3 Hazard Prioritization

Using the hazard screening criteria and assessment matrix, the Planning Team identified the following hazards to be the most likely to affect the District:

1. **Earthquake**: There are many faults running through the District’s service area. The 1987 Whittier Narrows Earthquake caused significant damage to the distribution system of the District’s pipelines. However, there are no records of the damage or if any recovery money was received by the District from FEMA. The local faults could potentially damage 100% of the District’s critical facilities. A major earthquake has not happened in the service area, however, it will occur, someday, as there are many earthquake fault lines running around, though, and near the service area.

2. **Climate Change/Drought**: Climate change is altering California’s water supply throughout the state. Northern California is experiencing warmer winters, less snow pack,
and longer periods between wet seasons. This affects water supply throughout the Central Valley and urban Southern California. The District relies on groundwater and the impacts from climate change are long-term. The District does utilize imported water from northern California, through a connection with the Metropolitan Water District. This connection is for potable water only and is only utilized during emergencies or planned shutdowns of other sources of water. The District does not recharge the underground aquifer, as this is done by another agency that is responsible for the local ground water replenishment in the region. The State has been in a prolonged drought; however, the winter of 2016/2017 delivered more snow and rain, which has lessened most of the State from the drought of the last seven years. Climate Change, leading to higher temperatures may increase water use and groundwater extraction, which will lower the groundwater table. Increased storm events will increase flash flood risks and will decrease groundwater recharge because the water will runoff instead of infiltrating to recharge the underground aquifer and groundwater. Over time, the District could experience increased pumping costs and water supply wells may become too shallow and must be replaced with deeper wells. Climate change could raise the ground water in the aquifer that could cause a situation of having an overabundance of water, or it may lower it. At this point in time, the drought and probability of climate change have not affected the District significantly.

3. **Flooding**: Flooding is not very common in the District’s service area; however, severe rain storms have been known to overflow the flood control channel that runs next to the District’s main office and yard. This has not affected operations; however, 100-year and 500-year flood maps show potential inundation of the offices, yard and infrastructure.

4. **Wildfire**: Wildfires are not a significant concern in the service area; however, local facility fires are a significant concern. The District’s office facilities, computer systems, SCADA system, and operating pump stations are susceptible to fire damage. The consequences include loss of life, buildings, equipment, and property damage. There have been no wildfires or brush fires in this area. The HAZUS maps show significant wildfire concerns outside of the service area.

5. **Windstorms**: Windstorms are common events in southern California. These events happen mostly during the fall and winter months when an atmospheric high pressure develops over the plains in Nevada and at the same time an atmospheric low pressure develops off the coast of California over the Pacific Ocean. This atmospheric condition causes high winds to develop. The winds funnel though the mountain passes in southern California and range from 25 to 80 miles per-hour and can do considerable damage to property.

6. **Terrorist Event**: A major terrorist event could have a negative effect on the water supply and damage the infrastructure of the District, leaving the District with no power and no water in the system due to ruptured pipelines, contamination, or other damages. Since the terrorist attack in San Bernardino, most governmental agencies have had to rethink their
precautions for buildings and infrastructure, the public, and staff. Contamination of the water system is a major concern for the District. The District has not experienced a terrorist event to date.
4.2 Hazard Profile

4.2.1 Earthquake Hazard

Probability: Highly Likely
Impact: Catastrophic

**General Definition:** An earthquake is a sudden rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. Increased movement occurs when the plates become locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet. However, some earthquakes occur in the middle of plates.

Ground shaking from earthquakes can collapse buildings and bridges, disrupt gas, electric, water utilities, and phone service, and trigger landslides, avalanches, fires, and destructive ocean waves, including tsunamis. Buildings with foundations resting on unconsolidated landfill and other unstable soil, as well as homes not tied to their foundations are at risk because they can be shaken off their mountings even during a mild earthquake. When an earthquake occurs in a populated area, it may cause deaths, injuries and extensive property damage.

Earthquakes strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night. On a yearly basis, 70 to 75 damaging earthquakes occur throughout the world. Estimates of losses from a future earthquake in the United States approach $200 billion.

There are 45 states and territories in the United States at moderate to very high risk from earthquakes, and they are in every region of the country. California experiences the most frequent damaging earthquakes; however, Alaska experiences the greatest number of large earthquakes - most located in uninhabited areas. The nearby Southern Section of the San Andreas Fault is ranked in the top 5 most likely faults to cause major damage in the U.S. by USGS (www.USGS.org).

**Description:** There are several earthquake faults located within the District’s service area. See *Figure 1A, Earthquake Fault Map Showing District Boundaries*, below. While there have been many earthquakes in and around the District’s service area, the 1987 Whittier Narrows Earthquake caused major damage in some areas; however, did not cause any major damage in the service area.

A source for the earthquake profile was a report that describes a new earthquake rupture forecast for California developed by the 2007 Working Group on California Earthquake Probabilities (WGCEP 2007). The Earthquake Working Group was organized in September 2005, by the U.S. Geological Survey (USGS), the California Geological Survey (CGS), and the Southern California Earthquake Center (SCEC) to better understand the locations of faults in California. The group produced a revised, time independent forecast for California for the National Seismic Hazard Map.
Mitigation: Projects to help mitigate damage from earthquakes range from installing seismic shut-off valves on all water reservoirs in the District to flexible pipe joints that can be installed at reservoirs, wells and booster pumps. Flexible pipe joints can also be installed in sections of water pipelines to allow the pipelines more flexibility during earth movement. Block walls can be installed around facilities to help ensure the security of critical facilities and control water that may escape from reservoirs. The District has flex couplings on all of the reservoirs, but does not have seismic shut-off valves on any reservoir.

Figure 1: Earthquake Fault Map showing District Boundaries
<table>
<thead>
<tr>
<th>Date</th>
<th>Area</th>
<th>Location</th>
<th>Mag</th>
<th>MI</th>
<th>Total damage / notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/28/2014</td>
<td>Los Angeles Area</td>
<td></td>
<td>5.1 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VI</td>
<td>$10.8 million</td>
</tr>
<tr>
<td>5/13/2013</td>
<td>Eastern</td>
<td>Canyon dam Earthquake</td>
<td>5.7 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VIII</td>
<td>Damage at Canyon dam</td>
</tr>
<tr>
<td>7/29/2008</td>
<td>Los Angeles Area</td>
<td>Chino Hills Earthquake</td>
<td>5.5 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VI</td>
<td>Limited</td>
</tr>
<tr>
<td>10/16/1999</td>
<td>Eastern</td>
<td>Hector Mine Earthquake</td>
<td>7.1 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VII</td>
<td>Limited</td>
</tr>
<tr>
<td>1/17/1994</td>
<td>Los Angeles Area</td>
<td>Northridge Earthquake</td>
<td>6.7 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>IX</td>
<td>$13–$40 billion</td>
</tr>
<tr>
<td>6/28/1992</td>
<td>Inland Empire</td>
<td>Big Bear Earthquake</td>
<td>6.5 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VIII</td>
<td>Moderate/Triggered</td>
</tr>
<tr>
<td>6/28/1992</td>
<td>Inland Empire</td>
<td>Landers Earthquake</td>
<td>7.3 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>IX</td>
<td>$92 million</td>
</tr>
<tr>
<td>4/22/1992</td>
<td>Inland Empire</td>
<td></td>
<td>6.3 M&lt;sub&gt;s&lt;/sub&gt;</td>
<td>VII</td>
<td>Light–moderate</td>
</tr>
<tr>
<td>6/28/1991</td>
<td>Los Angeles Area</td>
<td>Sierra Madre Earthquake</td>
<td>5.6 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VII</td>
<td>$33.5–40 million</td>
</tr>
<tr>
<td>2/28/1990</td>
<td>Los Angeles Area</td>
<td>Upland Earthquake</td>
<td>5.7 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VII</td>
<td>$12.7 million</td>
</tr>
<tr>
<td>11/24/1987</td>
<td>Imperial Valley</td>
<td></td>
<td>6.5 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VII</td>
<td>Triggered</td>
</tr>
<tr>
<td>11/23/1987</td>
<td>Imperial Valley</td>
<td></td>
<td>6.1 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VI</td>
<td>$3 million</td>
</tr>
<tr>
<td>10/1/1987</td>
<td>Los Angeles Area</td>
<td>Whittier Narrows Earthquake</td>
<td>5.9 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VIII</td>
<td>$213–358 million</td>
</tr>
<tr>
<td>7/21/1986</td>
<td>Eastern</td>
<td>Chalfant Valley Earthquake</td>
<td>6.2 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VI</td>
<td>$2.7 million / sequence</td>
</tr>
<tr>
<td>7/13/1986</td>
<td>South Coast</td>
<td></td>
<td>5.8 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VI</td>
<td>$700,000</td>
</tr>
<tr>
<td>7/8/1986</td>
<td>Inland Empire</td>
<td>North Palm Springs Earthquake</td>
<td>6.0 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VII</td>
<td>$4.5–6 million</td>
</tr>
<tr>
<td>4/26/1981</td>
<td>Imperial Valley</td>
<td></td>
<td>5.9 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VII</td>
<td>$1–3 million</td>
</tr>
<tr>
<td>5/25/1980</td>
<td>Eastern</td>
<td></td>
<td>6.2 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>VII</td>
<td>$1.5 million/Swarm</td>
</tr>
<tr>
<td>10/15/1979</td>
<td>Imperial Valley</td>
<td>Imperial Valley Earthquake</td>
<td>6.4 M&lt;sub&gt;W&lt;/sub&gt;</td>
<td>IX</td>
<td>$30 million</td>
</tr>
<tr>
<td>Date</td>
<td>Location</td>
<td>Event Description</td>
<td>Magnitude</td>
<td>Intensity</td>
<td>Damage / Additional Details</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>------------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>2/21/1973</td>
<td>South Coast</td>
<td>Point Magu Earthquake</td>
<td>5.8 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VII</td>
<td>$1 million</td>
</tr>
<tr>
<td>2/9/1971</td>
<td>Los Angeles Area</td>
<td>San Fernando Earthquake</td>
<td>6.5–6.7 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>XI</td>
<td>$505–553 million</td>
</tr>
<tr>
<td>4/8/1968</td>
<td>Imperial Valley</td>
<td>Desert Hotsprings Earthquake</td>
<td>6.5 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VII</td>
<td>Damage / rockslides</td>
</tr>
<tr>
<td>12/4/1948</td>
<td>Inland Empire</td>
<td>Desert Hotsprings Earthquake</td>
<td>6.4 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VII</td>
<td>Minor</td>
</tr>
<tr>
<td>11/14/1941</td>
<td>Los Angeles Area</td>
<td>Desert Hotsprings Earthquake</td>
<td>5.4 M&lt;sub&gt;s&lt;/sub&gt;</td>
<td>VIII</td>
<td>$1.1 million</td>
</tr>
<tr>
<td>6/30/1941</td>
<td>Central Coast</td>
<td>Central Coast Earthquake</td>
<td>5.9 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VIII</td>
<td>$100,000</td>
</tr>
<tr>
<td>5/18/1940</td>
<td>Imperial Valley</td>
<td>El Centro Earthquake</td>
<td>6.9 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>X</td>
<td>$6 million</td>
</tr>
<tr>
<td>3/10/1933</td>
<td>South Coast</td>
<td>Long Beach Earthquake</td>
<td>6.4 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VIII</td>
<td>$40 million</td>
</tr>
<tr>
<td>6/21/1920</td>
<td>Los Angeles Area</td>
<td>Long Beach Earthquake</td>
<td>4.9 M&lt;sub&gt;L&lt;/sub&gt;</td>
<td>VIII</td>
<td>More than $100,000</td>
</tr>
<tr>
<td>4/21/1918</td>
<td>Inland Empire</td>
<td>San Jacinto Earthquake</td>
<td>6.7 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>IX</td>
<td>$200,000</td>
</tr>
<tr>
<td>6/22/1915</td>
<td>Imperial Valley</td>
<td>Imperial Valley Earthquake</td>
<td>5.5 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VIII</td>
<td>Additional damage / doublet</td>
</tr>
<tr>
<td>6/22/1915</td>
<td>Imperial Valley</td>
<td>Imperial Valley Earthquake</td>
<td>5.5 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VIII</td>
<td>$900,000 / doublet</td>
</tr>
<tr>
<td>4/18/1906</td>
<td>Imperial Valley</td>
<td>Imperial Valley Earthquake</td>
<td>6.3 M&lt;sub&gt;w&lt;/sub&gt;</td>
<td>VIII</td>
<td>Damage / triggered</td>
</tr>
</tbody>
</table>
As shown in Figure 2 above, the table presents the earthquake profile findings for the District’s service area. The ground motion findings indicate the peak ground acceleration within the District’s service area could exceed 65 percent. Typically, any acceleration over 30 percent is considered Strong to Severe. Also, the USGS reports there is a 97 percent probability that Southern California will have a 7.6 scale earthquake within the next 30 years.

The following USGS ShakeMap: Whittier Narrows and photographs of related damages demonstrate the potential for earthquake damage to the District’s facilities.
Figure 3: Whittier Narrows Earthquake Map
Bridge Collapse, Whittier Narrows Earthquake
Bridge Collapse, Whittier Narrows Earthquake

Debris Damage, Whittier Narrows Earthquake
Earthquake Damage to Water Reservoir, 1992 Landers Earthquake
Earthquake, Ground Fracture and Pipeline Failure Above and Below, Landers Earthquake
Earthquake, Ground Fracture and Pipeline Failure, Landers Earthquake
**Earthquake Scenario**

Hyman uses the following set of information to define the earthquake parameters used for the earthquake loss estimates provided in this report:

<table>
<thead>
<tr>
<th>Scenario Name</th>
<th>Type of Earthquake</th>
<th>Fault Name</th>
<th>Historical Epcenter ID #</th>
<th>Probabilistic Return Period</th>
<th>Longitude of Epcenter</th>
<th>Latitude of Epcenter</th>
<th>Earthquake Magnitude</th>
<th>Depth (km)</th>
<th>Rupture Length (km)</th>
<th>Rupture Orientation (degrees)</th>
<th>Attenuation Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puebla Hills Thrust</td>
<td>Source</td>
<td>Puebla Hills thrust (new)</td>
<td>637</td>
<td>NA</td>
<td>118.22</td>
<td>34.33</td>
<td>7.49</td>
<td>5.03</td>
<td>63.39</td>
<td>0.00</td>
<td>West US, Scenario 2018 - Reverse</td>
</tr>
</tbody>
</table>

Figure 3, FEMA, HAZUS, 2017
4.2.2 Climate Change/Drought

Climate Change

Probability: Highly Likely
Impact: Catastrophic

General Definition: Climate Change is a change in the statistical distribution of weather patterns when that change lasts for an extended period (i.e., decades to millions of years). Climate change may refer to a change in average weather conditions, or in the time variation of weather around longer-term average conditions (i.e., more or fewer extreme weather events). Climate change is caused by factors such as biotic processes, variations in solar radiation received by Earth, plate tectonics, and volcanic eruptions. Certain human activities have also been identified as significant causes of recent climate change, often referred to as global warming.

Description: Climate Change could increase water demands while lowering the groundwater table. This would result in increased pumping costs and may require installing deeper water supply wells. Extreme weather events will increase runoff and flash flooding while reducing the groundwater recharge.

Mitigation: Monitor groundwater levels and evaluate long-term trends. Study the long-term viability of the groundwater aquifer. Evaluate and possibly implement obtaining water from the State Water Projects. The District’s Water Master Plan contains other options to supply more water to the area.

Drought

Probability: Highly Likely
Impact: Catastrophic

General Definition: California has a long history of droughts. Droughts occur when there are long periods of no rainfall in the State. The cycle of droughts and wet periods are in terms of El Nino and La Nina. A drought is a period of below-average precipitation in a given region, resulting in prolonged shortages in water supply, weather and atmospheric conditions all feed into a drought period.

This is a growing concern in California, as the State has been in a drought for the last 7 years. Northern California experienced some relief in the winter of 2016, although the El Nino effect that was expected to relieve the drought statewide did not materialize in Southern California. The lack of rain and most importantly the lack of snowfall in the Sierra Nevada mountain range have severally impacted the residents of California. The previous droughts have not affected the District, as the District uses only ground water and does not import water from other sources.

Description: The Los Angeles basin is highly affected by droughts because of the population numbers in the basin. With 25,000 people living in the District’s 2.06 square mile service area, there is a lot of water demand. Ground water is at a premium and in high demand. When the basin has several years of drought the water table in the aquifer falls rapidly, which puts more strain on imported water from Northern California’s Delta water. These communities and water purveyors are dependent on underground water aquifers. The District has a connection to the Metropolitan
Water District, but this water is very expensive, therefore the District only uses the connection when there is a higher demand for water than can be normally supplied or when the aquifer is in extreme overdraft.

**Mitigation:** Construct more water storage capacity. Drill more wells. Develop ways to capture rainwater from the higher mountains during flash flooding events and divert these waters to percolation ponds to recharge the underground aquifers. Seek alternative water supplies by setting up agreements and constructing pipelines to purchase State of California aqueduct water, and water from other agencies.
4.2.3 Flooding Hazard

Probability: Likely
Impact: Catastrophic

General Definition: An unusually heavy rain in a concentrated area, over a short or long period that collects on the ground in low areas of the land. Flooding occurs when there are large amounts of rainfall in areas where the water runs off to lower elevations and then collects. Typically, flooding can happen in the summer or winter month. There are atmospheric events known as La Nina and tropical storms that can inundate Southern California. These storms can bring high winds and large amounts of rainfall. Flooding occurs when the land is saturated with rain and the starts to pool in low-lying areas. When the flood control collection systems cannot handle or move water out of the area fast enough, flooding occurs. Floods also occur after large fires in the higher mountainous areas, allowing water to run off the burned hills bringing ash and debris into the valleys, causing major debris flows.

Description: Modern flood control infrastructure cannot handle the large amounts of rainfall in a short amount of time. Although there has been no flooding damages in the District to date, the FEMA 100/500-year Flood Map in Figure 4 below shows that the District’s main office, yard and facilities are all in the 100 and 500-year flood plain. Figure 5: Orchard Dale Storm Track Map demonstrates the typical storm path. Table 5: Flooding History demonstrates the number and severity of storm damage in the area. Additionally, two Tropical Storms, Norman 1978 and Long Beach 1939, as described in FEMA HAZUS are shown below.

Mitigation: Install flood control walls and a lock system to keep floodwater out of the facility. Install all electrical equipment and pumps on raised concrete pads above the flood plain level. Move the office and yard to a new location outside of the flood plain.
Figure 4: FEMA 100/500-year Flood Map, FEMA, HASUS 2017
Figure 5: Orchard Dale Storm Track Map, FEM, HASUZ 2018
<table>
<thead>
<tr>
<th>Date of event</th>
<th>Type of Damage</th>
<th>Amount of Damage</th>
<th>Statewide or Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec-55</td>
<td>74 deaths</td>
<td>$200 M</td>
<td>State wide</td>
</tr>
<tr>
<td>Apr-58</td>
<td>13 deaths, several injuries</td>
<td>$20 M, plus $4 M agricultural</td>
<td>State wide</td>
</tr>
<tr>
<td>Fall 1965</td>
<td>Abnormally heavy and continuous rainfall.</td>
<td>Public- $5.8 M; private $16.0 M; Total $21.8 M</td>
<td>Riverside, San Bernardino, Ventura, San Diego Counties</td>
</tr>
<tr>
<td>Winter 1966</td>
<td>Abnormally heavy and continuous rainfall.</td>
<td>Public- $14.6 M; private $14 M; Total $28.7 M</td>
<td>Various</td>
</tr>
<tr>
<td>Sep-76</td>
<td>High winds, heavy rains, and flooding</td>
<td>Public-$65.7 M; private-$54.3 M; Total-$120 M</td>
<td>Imperial, Riverside, San Bernardino, San Diego Counties</td>
</tr>
<tr>
<td>Winter 1978</td>
<td>14 dead, at least 21 injured</td>
<td>Public-$73 M; private-$44 M; M; Total -$117 M; 2,538 homes destroyed</td>
<td>Various</td>
</tr>
<tr>
<td>Jul-79</td>
<td>No Deaths</td>
<td>Public-$3.0 M; private-$22.9 M; Total - $25.9 M</td>
<td>Riverside</td>
</tr>
<tr>
<td>Feb-80</td>
<td>Rain, wind, mud slides, and flooding</td>
<td>18M to 20M</td>
<td>Various</td>
</tr>
<tr>
<td>Winter 82-83</td>
<td>Heavy rains, high winds, flooding, levee breaks</td>
<td>Public-$151 M; private-$159 M; agricultural-$214 M; Total-$524 M</td>
<td>Various</td>
</tr>
<tr>
<td>Aug-83</td>
<td>High winds, storms, and flooding; 3 deaths</td>
<td>Public $10 M, private $15 M, agricultural $10 M; TOTAL-$35 M</td>
<td>Inyo, Riverside, San Bernardino Counties</td>
</tr>
<tr>
<td>Feb-92</td>
<td>Flash Flooding, rainstorms, mud slides; 5 deaths</td>
<td>Public-$95 M; private-$18.5 M; business-$8.5 M, agricultural-$1.5 M; TOTAL-$123 M</td>
<td>Los Angeles, Ventura, Kern, Orange, San Bernardino Counties</td>
</tr>
<tr>
<td>Dec-92</td>
<td>Snow, rain, and high winds, 20 deaths, 10 injuries</td>
<td>Total - $600 M</td>
<td>Various</td>
</tr>
<tr>
<td>Jan-95</td>
<td>11 deaths</td>
<td>Public-$299.6 M; individual-$128.4 M; businesses $58.4 M; highways-$158 M; ag-$97 M; TOTAL-$741.4 M; damage to homes: major-1,883; minor-4, 179; destroyed-370.</td>
<td>Various</td>
</tr>
<tr>
<td>Date of event</td>
<td>Type of Damage</td>
<td>Amount of Damage</td>
<td>Statewide or Local</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Feb-95</td>
<td>17 deaths</td>
<td>Public property-$190.6 M; individual-$122.4 M; business-$46.9 M; highways-$79 M; ag-$651.6 M; TOTAL-approximately $1.1 billion; damage to homes: major-1,322; minor-2,299; destroyed-267</td>
<td>57 counties (all except Del Norte)</td>
</tr>
<tr>
<td>Feb-98</td>
<td>17 deaths</td>
<td>$550 M</td>
<td>Various</td>
</tr>
<tr>
<td>Dec. - 03</td>
<td>15 deaths</td>
<td>$30 M</td>
<td>San Bernardino, Waterman Canyon, Lytle Creek</td>
</tr>
<tr>
<td>Jan. 04</td>
<td>None</td>
<td>$20,000 public property</td>
<td>San Bernardino County High Desert</td>
</tr>
<tr>
<td>October 2010</td>
<td>None</td>
<td>$2.5 M</td>
<td>Flash flooding San Bernardino County High Desert</td>
</tr>
<tr>
<td>Dec. 2010</td>
<td>None</td>
<td>$18 M San Bernardino/HIGHLAND, High Desert, San Bernardino Mountains, Forest Falls</td>
<td>Various location in San Bernardino County</td>
</tr>
<tr>
<td>Jan. 2011</td>
<td>None</td>
<td></td>
<td></td>
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<tr>
<td>May 2012</td>
<td>None</td>
<td>$50,000</td>
<td>S.B. County High Desert</td>
</tr>
<tr>
<td>March 2014</td>
<td>None</td>
<td></td>
<td>Various</td>
</tr>
</tbody>
</table>

**Tropical Storm Norman, August – September 1978**

A flash flood watch was issued for the mountainous terrain and the desert region from Kern County to the California-Mexico border by the US National Weather Service.

A large amount of rain was produced, with over 7.01 in. (178 mm) of rain occurred in the Sierra Nevada range at Lodgepole in Sequoia National Park. Rainfall was most intense on September 5 and September 6, with amounts exceeding 3 in (76 mm) in the mountains of southern California. In addition, Norman produced waves up to 15 feet (4.6 m) high.

The extra tropical remains of Hurricane Norman also moved into Nevada produced very significant amounts of rainfall in the extreme central to northern portion of the state. Power lines were knocked down, and caused a brie power failure from Santa Barbara to San Diego, reported by the Los Angeles Department of Water and Power, the Southern California Edison and the San Diego Gas and Electric. The high winds tossed about ships in local harbors and damaging agricultural crops in Southern California, such as raisin crops, and damage to raisins were extensive throughout Kern, Tulare, and Stanislaus Counties. The rainfall also damaged grapes and other varieties of grapes. Over 1,500 people had to be rescued due to high waves. A 25-foot (7.6 m), US$15,000 cruiser was smashed and destroyed when a surf came ashore 150 feet (46 m) at Dana Point.
The storm also produced surging tides at the Los Angeles Harbor, and swept a 10,000-ton tanker from it moorings. The tropical cyclone had managed to cause US$300 million (1978 USD) in damages.

**Tropical Storm 1939 Long Beach tropical storm, El Cordonazo, The Lash of St. Francis, September 1939**

The storm dropped heavy rain on California, with 5.66 inches (144 mm) falling in Los Angeles (5.24 inches in 24 hours) and 11.60 inches (295 mm) recorded at Mount Wilson, both September records. Over three-hour, one thunderstorm dropped nearly 7 inches (180 mm) of rain on Indio. 9.65 inches fell on Raywood Flat, and 1.51 inches (38 mm) on Palm Springs. 4.83 inches fell on Pasadena, a September record at the time. At the Citrus Belt near Anaheim, at least 4.63 inches of rain fell. The 11.60 inches (295 mm) at Mount Wilson is one of California’s highest rainfall amounts from a tropical cyclone, although at least one system has a higher point maximum. The rains caused flood 2 to 4 feet (1.2 m) deep in the Coachella Valley, although some of this may be attributable to a rainstorm dropping 6.45 inches (164 mm) the day before the storm hit. The Los Angeles River, which is usually low during September, became a raging torrent.

The flooding killed 45 in Southern California, although some of these may be attributable to the rain immediately before the tropical storm. At sea, 48 were killed. The National Hurricane Center only attributes 45 deaths to this system. Six people caught on beaches drowned during the storm. Most other deaths were at sea. Twenty-four died aboard a vessel called the Spray as it attempted to dock at Point Mugu. The two survivors, a man and a woman, swam ashore and then walked five miles (8 km) to Oxnard. Fifteen people from Ventura drowned aboard a fishing boat called the *Lur*. Many other vessels were sunk, capsized, or blown ashore.

Many low-lying areas were flooded. The Hamilton Bowl overflowed, flooding the Signal Hill area. Along the shore from Malibu to Huntington Beach houses were flooded. Throughout the area, thousands of people were stranded in their homes. Streets in Los Angeles proper were covered with water, flooding buildings and stalling cars. Flooding in Inglewood and Los Angeles reached a depth of 2 to 3 feet. The flooding stopped construction on a clod control project in the Los Angeles River’s channel by the Army Corps of Engineers. In Long Beach windows throughout the city were smashed by the wind. At Belmont Shore, waves undermined ten homes before washing them away. Debris was scattered throughout the coast. Agriculture was disrupted. Crop damage in the Coachella Valley reached 75%.

Rains washed away a 150-foot (46 m) section of the Southern Pacific Railroad near Indio, and a stretch of the Santa Fe main line near Needles. Waters backing up from a storm drain under construction in the Santa Monica Valley blocked U.S. Route 6 in California. The pier at Point Mugu was washed away. In Pasadena, 5000 people were left without electricity and 2000 telephones lost service. Communications throughout the affected area was disrupted or rendered impossible. The total amount of damage was $2 million (1939 USD, 26.2 million 2005 USD).
The tropical storm was credited with at least one beneficial effect: it ended a vicious heat wave that had lasted for over a week and killed at least 90 people.

People were caught unprepared by the storm, which was described as “sudden”. Some people were still on the beach at Long Beach when the wind reached 40 miles per hour, at which time lifeguards closed the beach. Schools were closed there. At sea, the Coast Guard and Navy conducted rescue operations, saving dozens of people. In response to Californians’ unpreparedness, the Weather Bureau established a forecast office for southern California, which began operations in February 1940.

4.2.4 Wildfire Hazard

Probability: Likely
Impact: Critical

**General Definition:** California is very susceptible to wildfires, especially during the fall and summer months. Southern California’s Santa Ana winds develop mostly in the late summer and fall. These winds are known for their high speeds and drying affect, which turn the natural grasses brown and dry and are also capable of blowing down power lines that are known to start fires in the mountains and hills. The fires are driven by the high winds and the fires become large events that destroy large areas within cities and towns causing millions of dollars in damage to property and loss of life.

**Description:** The District is shown on the Fire Map in Figure 6 below. Wildfires are not expected to affect the water infrastructure system, as most of the infrastructure is underground and constructed of non-flammable materials. However, the District’s office facilities, computer systems, SCADA system and operating pump stations are susceptible to fire damage. There are, some issues from wildfires that can affect the District. During large wildfires, firefighting personnel may draw large amounts of water and strain the water supply system. Fires may burn through electrical power lines and the District can lose power in critical areas. Without power the District cannot pump groundwater from the aquifer or pump additional water to needed areas.

**Mitigation:** More water storage and backup generators are needed. Improved communication between the local water agencies and the District, the public, firefighting personnel, the City, and County Offices of Emergency Services should be fostered through meetings and distribution of maps and other documents. Wildfires have not caused any significate damages to the district in the past.
Figure 6: Fire Map showing Service Area in Orange
4.2.5 Terrorist Event Hazard

Probability: Somewhat Likely
Impact: Catastrophic

General Definition: When a person or group of people strike mayhem within a population by threatening the trust of a population. To kill or injure people to make a point to the terrorist cause and to cause fear with the population to further their cause.

Description: In the case of a public water system, to make the water non-drinkable by polluting the water or rendering the water in the system or the system infrastructure useless to serve water to the public.

Mitigation: This document will not discuss the mitigation measures determined by the Project Team due to the sensitive nature of this information, as this LHMP is a public document.
4.2.6 Windstorm Hazard

Probability:  **Somewhat Likely**  
Impact:  **Critical**  

**General Definition:** Santa Ana winds are strong, extremely dry downslope winds that originate inland and affect coastal Southern California and northern Baja California. They originate from cool dry high-pressure air masses in the Great Basin of Utah. Santa Ana winds are known for the hot dry weather they bring in the fall, which is often the hottest time of the year, but they can arise at other times of the year. These winds often bring the lowest relative humidities of the year to the coastal area. The low humidity, combined with the warm compressional-heated air masses, plus high wind speeds, create critical fire weather conditions, known as “devil winds.” The Santa Ana winds are infamous for fanning regional fires and loss of power throughout Southern California.

**Description:** High winds can range from 25 MPH to prolonged gusts up to 120 MPH in some locations downing trees and power lines, and ripping roofs off of businesses and homes. The Santa Ana winds can cause major damage in the District and interrupt the water supply.

**Mitigation:** Ensure trees around and near facilities are healthy and trimmed each year. Remove trees that are not healthy or are too close to water system facilities. Purchase more generators that will power all facilities, pumps and booster pumps. Install automatic generator start ups and generator switching devices at all facilities to ensure there is enough water in the system at all times for drinking and fire fighting. Windstorms have not caused any significant damage in the past.

4.3 **Inventory of Assets**

This section provides an overview of the assets in the District and the hazards to which these facilities are susceptible.

4.3.1 **Facilities Overview**

The District operates and maintains the following facilities:

- 2 Pressure zones
- 5 Reservoirs with a total storage capacity of 4.5 million gallons
- Approximately 43.5 miles of distribution and transmission mains (pipe sizes of 4 inch to 14 inches in diameter).

Figure X is a map of the District’s facilities. This figure illustrates how the facilities are arranged to provide potable drinking water to the residents of the service area. Water demands in the service area vary throughout the year with maximum daily summer demands estimated at 110-acre feet a day in July. The District relies entirely on groundwater for their raw water supply.
4.3.2 Critical Facility List

This section provides a listing of the most critical District facilities as developed by the Planning Team. The facilities are numbered from one (1) to five (5); One (1) being the most critical and five (5) being the least critical. There are two number two (2) facilities, as both are equally critical to daily operations.

Table 6 Critical Facilities

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>Site Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Main Office, Warehouse and Yard</td>
<td>District Office&lt;br&gt;Draper Reservoir 1 million gallon&lt;br&gt;Electrical Pump House&lt;br&gt;Pump House Number 6&lt;br&gt;Warehouse</td>
</tr>
<tr>
<td>(2) Colima Reservoir</td>
<td>Three reservoirs (1) .633 MG (2) .633 MG (3) .75 MG of storage&lt;br&gt;One Pump house</td>
</tr>
<tr>
<td>(2) Miller Reservoir</td>
<td>1.5 Million Gallon Reservoir</td>
</tr>
<tr>
<td>(3) Metropolitan Connection CENB17</td>
<td>Metropolitan Water District Connection</td>
</tr>
<tr>
<td>(5) Mills Site</td>
<td>Sodium Hypochlorite Injection</td>
</tr>
</tbody>
</table>

4.4 Vulnerability Assessment

The team reviewed pictures of each of the District’s facilities as well as a map of the area to convey the location within the system and the site-specific characteristics of the facility. The team members each have a long history in the area and knowledge of the potential disasters and emergencies that can occur in and around the community. The internal team members have the knowledge to assess the system and give valuable input into the assessment and vulnerabilities to the system.

4.4.1 Methodology

The team reviewed the District’s facilities and applied their local and operational knowledge to evaluate how vulnerable each facility is to a potential hazard. The team ranked the facilities by their importance to the District’s production and delivery of drinking water, and then using this ranking the team developed an estimate of potential economic impact that could be caused by the five high priority hazards. A percentage based on ranking was applied to the District’s projected 2016-2017 annual water revenue of $4.6 million to obtain the annual economic impact for each facility.

4.4.2 Earthquake Vulnerability Analysis
**Population:** Approximately 100% of District’s population is vulnerable.

**Critical Facilities:** Approximately 100% of District’s critical facilities are vulnerable.

All facilities are vulnerable in the event of a major earthquake within the District’s boundaries. There are many nearby faults that could affect the District’s facilities: Whittier Fault and San Andreas Fault are the two faults that have the potential to cause the most damage to the water system and infrastructure.

**Estimated Losses:** The economic loss resulting from this hazard is approximately $8 million. The loss from damage to structures and pipelines from this hazard is approximately $25 million.

**Losses are estimated assuming:**

- All the District’s critical facilities are at risk, including 80% of the District’s pipelines
- Without the critical facilities, no revenue can be generated for the District
- Time to restore the system to full function is 24 months
- Lost revenue from water sales for 12 months based on the 2016/2017 projected Orchard Dale Water District revenue

4.4.3 Long Term Climate Change/Drought Vulnerability Analysis

**Climate Change**

**Population:** 100% of the District’s population is vulnerable to climate change.

**Critical Facilities:** The groundwater aquifer is the most vulnerable component of the District’s critical facilities (or resources). As the District has no wells, all of the system’s water comes from other systems. If these wells that are owned by other systems were to run dry, or be inundated with seawater, the community would be left without any water.

As climate change results in more extreme weather patterns, the District would need to become more resilient in the management of groundwater resources. Planning for lower groundwater tables may include monitoring and studying the aquifer in greater detail, as well as installing deeper water supply wells. Enhanced groundwater recharge opportunities may also be explored and implemented.

**Estimated Losses:**

**Drought**

**Population:** Approximately 100% of the District’s population is vulnerable.

**Critical Facilities:** Approximately 100% of District’s critical facilities are vulnerable.

The wells are critical to drought because they supply groundwater for the District. During a long-term drought, the groundwater levels become lower. During the current drought, the decreased water level has not been significant, although pumping costs increased due to the greater lift.
required. It is also possible that wells and pumps may be too shallow if the groundwater level drops significantly. In these instances, the pump shaft and bowls may need to be lowered deeper in the well. In extreme cases, a new and deeper well may be required.

The District adopted Resolution 14-12 and 15-7, on August 27, 2014 and May 27, 2015 respectively, which established the policy and conservation measures needed during drought conditions.

**Estimated Losses:** The economic loss resulting from this hazard is approximately $250,000 a month.

The loss or damage to structures from this hazard is approximately $4.5 million due to collapsed pipelines, booster pumps, and contamination to the system.
4.4.4 Flooding Vulnerability Analysis

**Population:** Approximately 50% of the District’s population is vulnerable.

**Critical Facilities:** Approximately 50% of the District’s critical facilities are vulnerable. Flooding only happens when heavy and concentrated rains occur in steep basin areas where runoff is channeled through limited areas. The District is in the foothills of the valley floor, where water runs off from higher hilly areas on its way to flood control channels and concrete lined channels. There is a large concrete channel that runs northeast to southwest next to the District’s main office and yard and this facility is in the 100 and 500-year flood plain.

The District has not utilized the NFIP and there has not been any repeated District infrastructure damage from flooding in the past.

**Estimated Losses:** The economic loss resulting from this hazard is approximately $8 million. The loss from damage to structures and pipelines from this hazard is approximately $25 million.

4.4.5 Wildfire Vulnerability Analysis

**Description:** Local facility fires are a significant concern. The District’s office facilities, computer systems, SCADA system, and operating pump stations are susceptible to fire damage. The consequences include loss of life, buildings, equipment, and property damage.

**Population:** Approximately 65% of the infrastructure could be affected by a wildfire in the service area, most likely accompanied with a Santa Ana windstorm.

**Estimated Losses:** The economic loss resulting from this event is approximately 2 million. The losses from damage to structure and pipelines are approximately 15 million.

4.4.6 Terrorist Event Vulnerability Analysis

**Population:** 100% of the District’s population is vulnerable.

**Critical Facilities:** 75% of the District’s facilities are vulnerably to terrorist activity due to the fact that most of the reservoirs are in confined spaces. Currently there are no alarm systems on the gates or reservoir hatches. This is a major concern and potential entry point for contamination to the potable water system.

**Estimated Losses:** Losses to the system are difficult to determine as the source and type of contamination to the system will determine what damage is done to the system. However, the team estimated the damage to the system at the highest cost possible, which would include the worst case of contamination to the system. This estimate is $25 million.

4.4.7 Windstorm Vulnerability Analysis
**Population:** 100% of the District’s population is vulnerable.

**Critical Facilities:** 50% of the District’s facilities are vulnerable to windstorm damage.

**Estimated Losses:** The economic loss resulting from a windstorm event is approximately $1 million. The losses from damage to facilities are approximately $2 million.

### 4.4.8 Potential Loss Estimate

Replacement costs listed in this section were arrived by utilizing the District’s insurance documentation. The Joint Powers Insurance Authority (JPIA) has listed the replacement cost value for each facility. The team has communicated with the JPIA on the values listed below and was assured that the estimated costs are accurate. Table 7 summarizes the economic impacts on the critical facilities within the District.

#### Table 7 Economic Impacts on Critical Facilities

**Main Office, Warehouse and Yard**
Facility Replacement Cost: $20 million
Estimated Economic Impact: $100,000 a month in lost revenue
Description of Economic Impact: loss of water sales, loss of SCADA Control System, loss of productivity, loss of main reservoir and main inlet of water into system

**Metropolitan Connection**
Facility Replacement Cost: Replacement would be a cost to Metropolitan Water District
Estimated Economic Impact: $20,000 a month in lost revenue
Description of Economic Impact: loss of productivity, back up water supplies and lost sales

**Colima Reservoir Site**
Facility Replacement Cost: $5 million
Estimated Economic Impact: $1 million a month in lost revenue
Description of Economic Impact: loss of water sales

**Miller Reservoir**
Facility Replacement Cost: $5 million
Estimated Economic Impact: $1 million a month in lost revenue
Description of Economic Impact: Loss of water sales

**Mills Site**
Facility Replacement Cost: $50,000
Estimated Economic Impact: $2,000 a month in lost revenue
Description of Economic Impact: Loss of chlorination site
CHAPTER 5: COMMUNITY CAPABILITY ASSESSMENT

5.1 Agencies and People

The District is in the southeastern section of Los Angeles County. The District serves the unincorporated section of Whittier and some small sections of two cities in the area. The District serves approximately 25,000 people.

To help mitigate the potential impacts of disasters, the District is a member of the California Water/Wastewater Response Network (CalWARN). This organization focuses on mutual aid throughout the State of California. District staff attends yearly meetings at the American Water Works Association with CalWARN and Arizona WARN members. Staff attends the yearly Board of Directors budget workshops to include mitigation goals and objects that can be utilized in the next fiscal budget. The District participates in the annual CalWARN exercises with a focus on improving mitigation.

The District employs 9 people. With the capabilities of CalWARN, the District has the potential of having hundreds of mutual aid workers at its disposal within hours of an emergency.

5.2 Existing Plans

The following emergency related plans apply as appropriate:

- CalWARN Emergency Operations Plan
- The District's Illness Injury Prevention Plan (IIPP)
- The District's Urban Water Master Plan
- The District’s Emergency Response Plan

In addition, the District has mutual aid agreements within Los Angeles County and within the State of California. As a government entity (Special District, within California Law), the District can access the Emergency Managers Mutual Aid (EMMA) and the Emergency Management Assistance Compact (EMAC) for national mutual aid and the National WARN System through the American Water Works Association. District staff attends meetings with other water districts and agencies to review current and future opportunities for improvement with the intention of incorporating into existing plans. The District’s Urban Water Master Plan, is revised very five years, and is developed in conjunction with surrounding water utilities in Los Angeles County and can be used to ensure conservation of water and coordination of mitigating goals for the protection of surrounding communities and facilities.

5.3 Regulations, Codes, Policies, and Ordinances

The Urban Water Management and Planning Act was passed in 2017 and requires water suppliers to estimate water demands and available water supplies. The District’s updated Urban Water Management Plan (UWMP) was completed in January 2017. UWMPs are required to evaluate
the adequacy of water supplies including projections of 5, 10, and 20 years. These plans are also required to include water shortage contingency planning for dealing with water shortages, including a catastrophic supply interruption.

UWMPs are intended to be integrated with other urban planning requirements and management plans. Some of these plans include city and county General Plans, Water Master Plans, Recycled Water Master Plans, Integrated Resource Plans, Integrated Regional Water Management Plans, Groundwater Management Plans, Emergency Response Plans, and others. The District participates with other local area water agencies in preparing Water Master Plans that benefit all of the regional water agencies. The Water Master Plan can also include mitigation goals that can benefit all of the water agencies in the basin and can protect the agencies against drought.

The District has an Emergency Response Plan that details how the District will respond to various emergencies and disasters. The District must be prepared to respond to a variety of threats that require emergency actions, including:

- Operational incidents, such as power failure or bacteriological contamination of water associated with the District’s facilities
- Outside or inside malevolent acts, such as threatened or intentional contamination of water, intentional damage/destruction of facilities, detection of an intruder or intruder alarm, bomb threat, or suspicious mail
- Natural disasters, such as earthquakes, floods, wildfires, and windstorms
- Water Conservation regulations

The District is also required to follow Standard Emergency Management System (SEMS), the National Incident Management System (NIMS) and the Incident Command System (ICS) when responding to emergencies.

5.4 Mitigation Programs

The District has completed some mitigation projects. The California Department of Water Resources required the District to raise well pump motors and other wellhead assemblies above the 500-year flood plain elevation. This was accomplished by installing the motors and wellheads on elevated concrete foundations. The District is always looking for mitigation ideas and new techniques and attends workshops conducted by the County of Los Angeles County OES, the American Water Works Association, vendor fairs and meetings with other water organizations.

5.5 Fiscal Resources

Fiscal resources for the District include the following:

- Revenue from water sales
- Monthly Service Charge fees
- Water Availability Assessment (On Property Taxes)
- Meter Installation Fees
If necessary, local bond measures and increases to property taxes
Through the California Department of Water Resources, local grants and/or loans are available for water conservation, groundwater management, studies, and activities to enhance local water supply quality and reliability. Project eligibility depends on the type of organization applying and participating in the project, and the specific type of project. More than one grant or loan may be appropriate for a proposed activity. Completing the LHMP will facilitate obtaining grant funding in the future. The District can then apply for FEMA mitigation funding.

**Any of the above funding’s can be utilized for accomplishing mitigation goals and objectives.**
SECTION 6: MITIGATION STRATEGIES

6.1 Overview
The purpose of this analysis is to identify projects (actions) that help the District meet the goals and objectives for each priority hazard. The District has identified hazards in the community, assessed those hazards that pose the most significant risk, and identified projects to help reduce and/or eliminate those risks.

6.2 Mitigation Goals, Objectives, and Projects

As discussed in Section 3.5, the process of identifying goals began with a review and validation of the goals and objectives in the District and the Los Angeles County’s 2010 Operational Area LHMP. Using the County’s 2010 LHMP, the District’s Planning Team completed an assessment/discussion of whether each of the goals was valid.

Overall, the primary objective is to protect lives and prevent damages to infrastructure that disrupts water services. Global measures that apply across all hazards include:

- Continually improve the community’s understanding of potential impacts due to hazards and the measures needed to protect lives and critical infrastructure;
- The District’s Communications/Conservation Officer, should provide public outreach to inform the public of the hazards identified to the drinking water system in emergencies, - how to conserve water in the event of a disaster and how to obtain drinking water when water may not be available;
- Continually provide State and Local Agencies with updated information about hazards, vulnerabilities, and mitigation measures at the District;
- Review local codes and standards to verify that they protect human life and the District’s facilities;
- Review and verify that the District’s owned and operated infrastructure meet minimum standards for safety;
- Review the District facilities and developments in high-risk areas to verify that these areas are appropriately protected for potential hazards;
- Identify and mitigate imminent threats to life safety and facility damage.

The District’s priority and focus for the mitigation projects will be the six high profile hazards: earthquake, climate change/drought, flooding, wildfire, terrorist events, and windstorm.

6.2.1 Earthquakes

Description:

The goal is to avoid injury, loss of life, and damages to property. The District agrees that strengthening of buildings and fire codes are critical to the protection of property, life and the reduction of seismic-caused damages. These codes help water utilities design and construct
reservoirs, pump stations, groundwater wells, and pipelines to resist the forces of nature.

**Objectives:**

- Design new facilities and upgrade existing facilities to withstand an 8.0 earthquake. The District is located in a high-risk earthquake area with many geologic fault zones.
- Encourage property protection measures for structures located in the area.
- Adopt cost-effective codes and standards to protect life properties and critical infrastructure.
- Establish partnerships with other levels of government and the business community to improve and implement methods to protect property.

**Mitigation Projects:**

- Flexible pipe joints at wellheads, pump stations, and reservoirs
- Seismic shut-off valves
- Bolt down reservoirs
- Tie down equipment
- Generator hook-up

### 6.2.2 Climate Change/Drought

**Description:** Due to Global Warming, there are more extremes in the weather, which mean the summers can be hotter, the winters colder, periods of rain can become less wet or more wet causing flooding. Address expected greater fluctuations in weather patterns, including prolonged dry periods and the drought hazard, through mitigation over the long-term. The objectives listed below have been taken from the declaration of a Drought, State of Emergency for California, signed by Governor Jerry Brown in May of 2015. The California Drought has not affected the District at this point, since the area is always in a drought.

**Objectives:**

- Increase water supply - creating innovative ways to generate new supplies
- Improve operational efficiency
- Reduce water demand - water conservation has become a viable long-term supply option because it saves considerable capital and operating cost for the District

**Mitigation Projects:**

- Increase public awareness of water conservation
- Monitor groundwater elevations and evaluate trends
- Increase water pumping capabilities
- Increase groundwater supplies
- Study system interties with other water systems in the area
6.2.3 Flooding

Description:
A sudden, localized flood of great volume and short duration, typically caused by unusually heavy rain in a semiarid area. Flash floods can reach its peak volume in a matter of a few minutes and often carry large loads of mud and rock fragments. Flash flooding is common in the arid desert areas of California, Arizona, Nevada and New Mexico.

Objective:

- Prevent damage to water distribution facilities
- Protect loss of critical facilities
- Mitigate cost of damages during and after a flash flood

Mitigation Projects:

- Install block or concrete diversion walls
- Deepen pipelines
- Install concrete protection of pipelines at critical locations

6.2.4 Wildfires

Description:

Fires start in the Southern California hills and mountain area’s and are driven into the valleys by the Santa Ana winds. These fires are fast moving and feed on the wild vegetation in the hills and mountains in the fall, winter months. As the winds dry the vegetation out and fires erupt the winds push the fire into the valleys below and destroy everything in the fires path.

Objective:

- Prevent damage to the District’s critical infrastructure
- Ensure fire fighters have enough water in the system to preserve life and property
- Keep trees and bush away from reservoirs

Mitigation Projects

- Replace the Miller Reservoir to increase water storage
- Obtain generators to ensure power needs are met
- Obtain portable booster pumps to move water around the system
6.2.5 Terrorist Events

Description:

A person or group of persons willingly causes damage to people or property to forward their goals through intimidation or coercion of a civilian population, to influence the policy of a government either large or small, and to affect a government entity.

Objective:

- Prevent damage to critical water facilities
- Educate the public on terrorism
- Enhance safety within the region

Mitigation Projects:

- Train the public in “if you see something, say something.”
- Improved SCADA controls
- Install video cameras at critical facilities
- Increase security measures at critical facilities
- Build block walls around critical facilities for additional security
- Generator hook-up

6.2.6 Windstorm

Description:

The Santa Ana winds are strong, extremely dry downslope winds that originate inland and affect coastal Southern California and north Baja California. They originate from cool dry high-pressure air masses in the great basin, in Utah.

Objective:

- Ensure repetitive communication systems in case of long-term power failure
- Protect the potable water
- Ensure there is water for the protection of life and property

Mitigation Projects:

- Purchase redundant two-way radio system
- Purchase redundant SCADA controls
- Purchase generators
- Develop an Emergency Operations Center
6.2.7 Mitigation Priorities

Mitigation measures are identified for District’s critical facilities. The planning team reviewed all of the mitigation projects and defined which projects were feasible from social, technical, legal, economic and environmental reviews. Then the committee considered which ones the District’s Board of Directors would approve from a political and budget point of view. The External committee reviewed the decisions of the Internal committee and agreed with the Internal committee’s findings. Each measure is presented with an estimated budget.

Timelines for the projects listed below are as follows:

- Generator switching panels: 6 months to 1 year
- SCADA systems: 6 months to 1 year
- All flex couplings: 6 months to 10 months per site
- Purchase generators, switching panels: 6 months to 1½ to 2 years
- Conservation and public programs: 1 year to put in place, ongoing
- Purchase two-way radio system: 6 months to 1 year
- Security windows and doors at Customer Service and entrance: 1 to 3 years
- Replace roof w/fire and wind resistant materials: 1 to 2 years
- Clear brush and trim trees: 6 month to 1 year
- Move facility to higher ground: 3 to 5 years
- Dig new wells: 1 to 2 years
- Block walls around facilities: 1 to 3 years
- Block diversion walls: 1 to 3 years per site
- Increase pumping capabilities: 2 to 3 years
- Replace the Miller Reservoir: 2 to 3 years
- Flood walls with a lock system: 2 to 3 years
- Find new water sources: 3 to 5 years

Table 8 Mitigation Projects and Estimated Budget

<table>
<thead>
<tr>
<th>Mitigation Project</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Office/ Maintenance Yard</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Earthquake</strong></td>
<td></td>
</tr>
<tr>
<td>Block Wall around facility</td>
<td>$300,000</td>
</tr>
<tr>
<td>Redundant SCADA system</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
<tr>
<td>Develop an Emergency Operations Center</td>
<td>$80,000</td>
</tr>
<tr>
<td><strong>Flooding</strong></td>
<td></td>
</tr>
<tr>
<td>Block Wall around facility</td>
<td>$300,000</td>
</tr>
<tr>
<td>Block Diversion Wall at front west side</td>
<td>$75,000</td>
</tr>
<tr>
<td>Redundant SCADA system</td>
<td>$40,000</td>
</tr>
<tr>
<td>Project</td>
<td>Cost</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Flood Walls with a lock system</td>
<td>$4 million</td>
</tr>
<tr>
<td>Move facility to higher ground</td>
<td>$10 million</td>
</tr>
<tr>
<td>Develop an Emergency Operations Center</td>
<td>$80,000</td>
</tr>
</tbody>
</table>

**Climate Change/Drought**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase public awareness of water conservation</td>
<td>$30,000</td>
</tr>
<tr>
<td>Drill water wells</td>
<td>$1 million</td>
</tr>
<tr>
<td>Increase water pumping capabilities</td>
<td>$1 million</td>
</tr>
<tr>
<td>Increase groundwater supplies</td>
<td>$1 million</td>
</tr>
</tbody>
</table>

**Terrorist Events**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security windows and door on front and sides of Main Office</td>
<td>$50,000</td>
</tr>
<tr>
<td>Redundant SCADA system</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

**Wildfires**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
<tr>
<td>Redundant SCADA system</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Replace roof with fire and wind resistant materials</td>
<td>$50,000</td>
</tr>
</tbody>
</table>

**Colima Reservoirs (3 reservoirs)**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block Wall around facility</td>
<td>$400,000</td>
</tr>
<tr>
<td>Redundant SCADA System</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Flex couplings (3)</td>
<td>$300,000</td>
</tr>
<tr>
<td>Generator, switching panel and flex couplings</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

**Earthquake**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block Wall around facility</td>
<td>$400,000</td>
</tr>
<tr>
<td>Redundant SCADA System</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Generator, switching panel and flex couplings</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

**Flooding**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block Wall around facility</td>
<td>$400,000</td>
</tr>
<tr>
<td>Block Diversion Wall at front west side</td>
<td>$75,000</td>
</tr>
<tr>
<td>Redundant SCADA System</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

**Climate Change/Drought**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase public awareness of water conservation</td>
<td>$30,000</td>
</tr>
<tr>
<td>Monitor groundwater elevations and evaluate trends</td>
<td>$100,000</td>
</tr>
<tr>
<td>Drill well into underground aquifer</td>
<td>$1 million</td>
</tr>
<tr>
<td>Study system interties with other water systems in the area</td>
<td>$100,000</td>
</tr>
<tr>
<td>Generator, switching panel and flex couplings</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

**Terrorist Events**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redundant SCADA system</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

**Windstorms**

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace roof with fire and wind resistant materials</td>
<td>$50,000</td>
</tr>
<tr>
<td>Clear brush and trim trees</td>
<td>$50,000</td>
</tr>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
<tr>
<td>Wildfires</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
<tr>
<td>Redundant SCADA system</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Replace roof with fire and wind resistant materials</td>
<td>$50,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Miller Reservoir</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake</td>
<td></td>
</tr>
<tr>
<td>Replace concrete reservoir with steel reservoir</td>
<td>$5 million</td>
</tr>
<tr>
<td>Block Wall around facility</td>
<td>$400,000</td>
</tr>
<tr>
<td>Redundant SCADA System</td>
<td>$40,000</td>
</tr>
<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Flex couplings (1)</td>
<td>$100,000</td>
</tr>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
</tbody>
</table>

| Flooding                              |         |
| Replace concrete reservoir with steel reservoir | $5 million |
| Block Wall around facility            | $300,000|
| Redundant SCADA System                | $40,000 |
| Redundant Two-Way Radio System        | $10,000 |

| Climate Change/Drought                |         |
| Replace concrete reservoir            | $5 million|

| Terrorist Events                      |         |
| Replace concrete reservoir with steel reservoir | $5 million |
| Replace SCADA System                  | $40,000 |
| Redundant Two-Way Radio System        | $10,000 |

| Windstorms                            |         |
| Generator, switching panel            | $240,000|
| Clear brush and trim trees            | $50,000 |

<table>
<thead>
<tr>
<th>Wildfires</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator, switching panel</td>
<td>$240,000</td>
</tr>
<tr>
<td>Redundant SCADA system</td>
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<tr>
<td>Redundant Two-Way Radio System</td>
<td>$10,000</td>
</tr>
<tr>
<td>Replace roof with fire and wind resistant materials</td>
<td>$50,000</td>
</tr>
</tbody>
</table>

### 6.3 Implementation Strategy

The implementation strategy is intended to successfully mitigate the hazards identified in this plan within a reasonable amount of time. The District is currently operating within its annual budget and has been fortunate that the recession of the past 10 years did not cause major issues with the budget or revenue. The District’s revenues have remained strong throughout the recession. Capital improvement projects have remained a priority. The District staff will review the Mitigation Plan each year before obtaining the next year’s Fiscal Budget. The plan will also be reviewed by the Board of Directors for items to be included in the new fiscal budget. District staff will also look
for ways to obtain Hazard Mitigation Grants each year to offset the impacts to the fiscal budget and to show some relief for the residents of a disadvantaged community.

**Mitigation Projects Funding Source**
There is currently no mitigation money in the District’s budget. The District will include mitigation into the budgeting process when funding becomes available and look at what mitigation projects could be funded in future budget cycles. Once the Hazard Mitigation Plan obtains approval, the District will actively pursue grant funding from FEMA and other sources as they become available.

**Timeframe**
Over the next five years, the District will incorporate mitigation into all capital improvement projects that the District undertakes. The District has a Capital Improvement Program. When money is available for the CIP, the District replaces outdated pipelines, reservoirs, wells, and buildings.

The District will apply for mitigation grants as the opportunities become available in the State of California, County of Los Angeles each year. The District will consider all mitigation items during the annual budget workshops, conducted each spring.
SECTION 7: PLAN MAINTENANCE

7.1 Monitoring, Evaluating, and Updating the Plan

The LHMP will be monitored and evaluated by staff during the year and progress will be reported as part of the annual budget workshop in the spring of each year. Annually, staff and the Board of Directors will review funding and determine the capital improvement projects to be included in the next fiscal year’s budget.

The Board Secretary will include the LHMP in all budget workshops and grant planning meetings. This will allow open discussion, evaluation, and assessment of the plan at achieving goals, allowing addition and removal of mitigated items.

The General Manager or his/her appointee will verify that the LHMP is updated and rewritten on a 5-year cycle. A full review of the plan will be performed at 5-year intervals by staff in the same manner as the initial LHMP. The District will start the update process at the three and a half years mark, before the expiration date on this document. Progress in reaching mitigation goals, assessment of new and existing hazards, development of new mitigation strategies and goals will be tackled by a planning team that will include District staff and the community served by the District. The public will be asked to participate in the update process. The District’s budget is a public document and is reviewed by the public before the Board of Directors adopts the updated LMHP. The District’s General Manager or his/her appointee will be responsible for the implementation of the LHMP and ensuring the LHMP recommended goals and objectives are met. The General Manager or his/her appointee will be responsible to place the LHMP on the District’s website and incorporating the LHMP into the annual budget workshops.

7.2 Implementation through Existing Programs

Once the State of California OES and FEMA approve the LHMP, the District will incorporate the LHMP identified mitigation goals as described in Section 6.2.7 into capital improvement projects, the capital replacement program, building design and any updates or repairs to the water distribution system. The District will submit Notice of Intents to the State of California to help facilitate funding opportunities in obtaining FEMA and State funding to mitigate hazards within the service area.

The District’s General Manager or his/her appointee will be responsible for the implementation of the LHMP and ensuring the LHMP recommended goals and objectives are met. The General Manager or his/her appointee will be responsible to place the LHMP on District’s website and incorporate the LHMP into the annual budget workshops. The General Manager or his/her appointee will verify that the LHMP is updated and rewritten on a 5-year cycle. The District will start the update process at the three and a half years, before the expiration date on this document.

7.3 Continued Public Involvement
The approved LHMP will be posted on the District’s website with contact information. In the spring of each year at the District’s Board of Directors budget workshop, public comments will be taken in regard to the LHMP and projects will be considered that could possibly be included in the next year’s budget. As new facilities are incorporated into the District, the LHMP will be updated to include new facilities, as well as new hazards, if warranted. When the LHMP is rewritten and updated, a public committee will be utilized to review and concur on the changes in the document.

Appendix A - Internal/External Meeting Agenda’s, Minutes and Sign-In Sheets
Appendix B - Board of Directors Meeting Minutes, LHMP Public Comment Period
Appendix C - Screen Shot of District Website LHMP page

Shows under “Resources” for the “Hazard Mitigation Plan”
www.ODWD.org
Appendix D - Special District Incorporation Documentation
Our History

The first cooperative effort to supply water to the ODWD service area started when local wells stopped producing agricultural irrigation water due to over pumping. Later on, the farmers drilled deep wells on the banks of the San Gabriel River on the north side of Washington Boulevard. Groundwater from deep wells was pumped through large pipelines (some of the pipelines were made of redwood) to a tank at the intersection of Telegraph Road and Mills Avenue, and water was distributed to the users from this point. The first water company was called Hillside Distribution Company. Carl J. Kriesant purchased this company in 1947 and renamed it Orchard Dale Service Company.

In the early 1950s, residential development in the area began to increase and the influx of consumers required immediate and extensive modernization of the water supply system. Because the Orchard Dale Service Company was neither financially able nor inclined to make these improvements, the local citizens had a series of meetings to determine and implement the best way to meet the water demand. The local committee decided to put the formation of a County Water District to the vote of the people; the voting result was 364 in agreement to 102 disagreements.

In 1954, Orchard Dale Water District was established pursuant to the County Water District Act (Water Code §30000 et seq.). The District members approved a $500,000 bond to purchase and improve the water supply facilities. From this point in time, ODWD has grown to it’s present size of approximately 20,013 served population through 4,165 service connections using approximately 2,500 acre-feet of water a year. The District’s sphere of influence is coterminous with its boundaries. The majority of the District’s boundaries lie within the sphere of influence of the City of Whittier. Customers are a mix of primarily single and multi-family
residences in addition to eight institutional customers. Water service is provided to all customers for domestic, irrigation, and fire protection uses. Currently, ODWD has nine employees, including the General Manager who serves under the direction of the five-member Board of Directors. Each Director is elected to a four-year term by voters who reside within the service area.

Appendix E – HAZUS Report