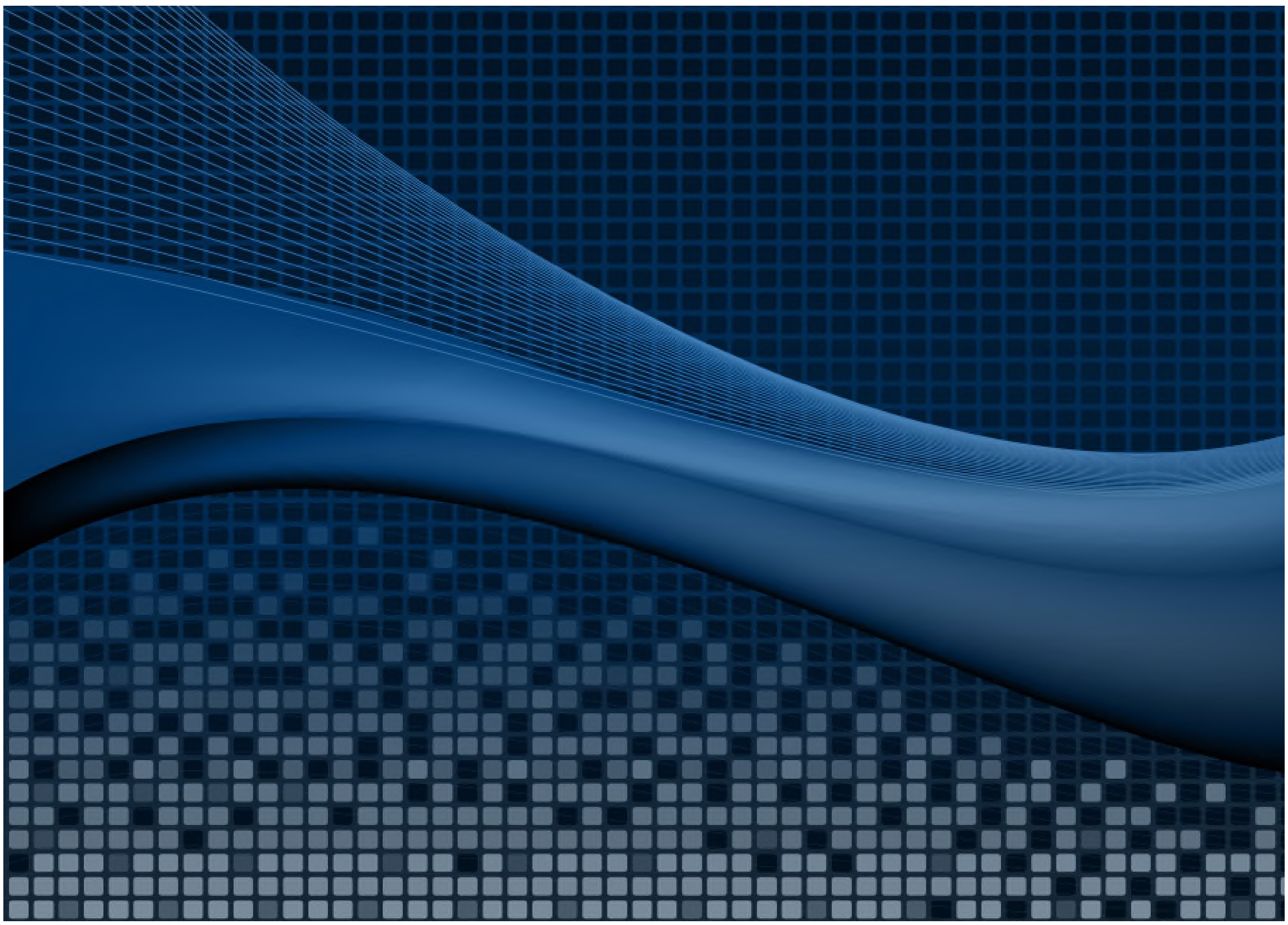
Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

Volume 1—Planning-Area-Wide Elements



TETRA TECH

April 2017

Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

Volume 1—Planning-Area-Wide Elements

April 2017

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CONTENTS

Executive Summary xix

PART 1— PLANNING PROCESS AND COMMUNITY PROFILE 23

1. Introduction to Hazard Mitigation Planning 1-1

1.1 Why Prepare This Plan? 1-1
1.1.1 The Big Picture 1-1
1.1.2 Purposes for Planning 1-1
1.2 Who Will Benefit From This Plan? 1-2
1.3 Contents of This Plan 1-2

2. Plan Update—What Has Changed 2-1

2.1 The Previous Plan 2-1
2.2 Why Update? 2-1
2.2.1 Federal Eligibility 2-1
2.2.2 Changes in Development 2-2
2.3 The Updated Plan—What Is Different? 2-2
2.3.1 Changes in Priorities 2-2

3. Plan Update Approach 3-1

3.1 Formation of the Planning Team 3-1
3.2 Defining Stakeholders 3-2
3.3 The Steering Committee 3-3
3.4 Establishment of the Planning Partnership 3-4
3.5 Defining the Planning Area 3-4
3.6 Coordination with Other Agencies 3-5
3.7 Review of Existing programs 3-6
3.8 Public Involvement 3-7
3.8.1 Strategy 3-7
3.8.2 Public Involvement Results 3-11
3.8.3 Continued Public Involvement 3-12
3.9 Plan Development Chronology/Milestones 3-12

4. Community Profile 4-1

4.1 Geographic Overview 4-1
4.2 Historical Overview 4-1
4.3 Major Past Hazard Events 4-3
4.4 Physical Setting 4-4
4.4.1 Topography and Geology 4-4
4.4.2 Hydrology 4-4
4.4.3 Climate 4-5
4.5 Development Profile 4-6
4.5.1 Land Use 4-6
4.5.2 Critical Facilities and Infrastructure 4-7
4.5.3 Future Trends in Development 4-9
4.6 Demographics 4-10
4.6.1 Population Characteristics 4-10

4.6.2 Age Distribution 4-11
4.6.3 Race, Ethnicity and Language 4-12
4.6.4 Individuals with Disabilities and Others with Access and Functional Needs 4-13
4.7 Economy 4-14
4.7.1 Income 4-14
4.7.2 Industry, Businesses and Institutions 4-15
4.7.3 Employment Trends and Occupations 4-16
4.8 Laws and Ordinances 4-18
4.8.1 Federal 4-18
4.8.2 State 4-20
4.8.3 Local 4-24

PART 2— RISK ASSESSMENT 26

5. Identified Hazards of Concern and Risk Assessment Methodology 5-1

5.1 Identified Hazards of Concern 5-1
5.2 Methodology 5-2
5.3 Risk Assessment Tools 5-2
5.3.1 Mapping 5-2
5.3.2 Dam Failure, Earthquake, and Flood—Hazus-MH 5-2
5.3.3 Sea Level Rise 5-3
5.3.4 Landslide, Severe Weather, and Wildfire 5-4
5.3.5 Drought 5-4
5.3.6 Sources of Data Used in Hazus Modeling 5-4
5.3.7 Limitations 5-4

6. Dam Failure 6-1

6.1 General Background 6-1
6.1.1 Dams 6-1
6.1.2 Causes of Dam Failure 6-2
6.1.3 Levees 6-2
6.1.4 Causes of Levee Failure 6-3
6.1.5 Regulatory Oversight 6-3
6.2 Hazard Profile 6-6
6.2.1 Past Events 6-6
6.2.2 Location 6-6
6.2.3 Frequency 6-9
6.2.4 Severity 6-9
6.2.5 Warning Time 6-10
6.3 Secondary Hazards 6-10
6.4 Exposure 6-10
6.4.1 Population 6-11
6.4.2 Property 6-11
6.4.3 Critical Facilities 6-11
6.4.4 Environment 6-11
6.5 Vulnerability 6-11
6.5.1 Population 6-11
6.5.2 Property 6-12
6.5.3 Critical Facilities 6-12
6.5.4 Environment 6-12

6.6 Future Trends in Development 6-12
6.7 Scenario 6-12
6.8 Issues 6-13

7. Drought 7-1

7.1 General Background 7-1
7.1.1 Types of Drought 7-1
7.1.2 Monitoring Drought 7-2
7.1.3 Water Supply 7-5
7.1.4 Drought Response Planning 7-11
7.2 Hazard Profile 7-14
7.2.1 Past Events 7-14
7.2.2 Location 7-16
7.2.3 Frequency 7-16
7.2.4 Severity 7-16
7.2.5 Warning Time 7-18
7.3 Secondary Hazards 7-18
7.4 Exposure 7-19
7.5 Vulnerability 7-19
7.5.1 Population 7-19
7.5.2 Property 7-20
7.5.3 Critical Facilities 7-20
7.5.4 Environment 7-20
7.5.5 Economic Impact 7-20
7.6 Future Trends in Development 7-20
7.7 Scenario 7-21
7.8 Issues 7-21

8. Earthquake 8-1

8.1 General Background 8-1
8.1.1 Earthquake Classifications 8-1
8.1.2 Ground Motion 8-3
8.1.3 Effect of Soil Types 8-4
8.2 Hazard Profile 8-5
8.2.1 Past Events 8-5
8.2.2 Location 8-7
8.2.3 Frequency 8-17
8.2.4 Severity 8-17
8.2.5 Warning Time 8-17
8.3 Secondary Hazards 8-18
8.4 Exposure 8-18
8.4.1 Population 8-18
8.4.2 Property 8-19
8.4.3 Critical Facilities and Infrastructure 8-19
8.4.4 Environment 8-19
8.5 Vulnerability 8-19
8.5.1 Population 8-19
8.5.2 Property 8-19
8.5.3 Critical Facilities and Infrastructure 8-21
8.5.4 Environment 8-23

8.6 Future Trends in Development 8-23
8.7 Scenario 8-23
8.8 Issues 8-23

9. Flood 9-1

9.1 General Background 9-1
9.1.1 General Background 9-1
9.1.1 Measuring Floods and Floodplains 9-1
9.1.2 Floodplain Ecosystems and the Effects of Human Activities 9-2
9.1.3 Federal Flood Programs 9-2
9.2 Hazard Profile 9-5
9.2.1 Types of Flooding Affecting the Planning Area 9-5
9.2.2 Past Events 9-7
9.2.3 Location 9-9
9.2.4 Frequency 9-11
9.2.5 Severity 9-13
9.2.6 Warning Time 9-13
9.3 Secondary Hazards 9-14
9.4 Exposure 9-14
9.4.1 Population 9-14
9.4.2 Property 9-14
9.4.3 Critical Facilities and Infrastructure 9-16
9.4.4 Environment 9-18
9.5 Vulnerability 9-18
9.5.1 Population 9-18
9.5.2 Property 9-18
9.5.3 Critical Facilities and Infrastructure 9-19
9.5.4 Environment 9-20
9.6 Future Trends 9-20
9.7 Scenario 9-20
9.8 Issues 9-20

10. Landslide 10-1

10.1 General Background 10-1
10.1.1 Landslide Types and Run-Out 10-2
10.1.2 Landslide Causes 10-3
10.1.3 Landslide Management 10-4
10.2 Hazard Profile 10-5
10.2.1 Past Events 10-5
10.2.2 Location 10-5
10.2.3 Frequency 10-6
10.2.4 Severity 10-8
10.2.5 Warning Time 10-8
10.3 Secondary Hazards 10-9
10.4 Exposure 10-9
10.4.1 Population 10-9
10.4.2 Property 10-9
10.4.3 Critical Facilities and Infrastructure 10-10
10.4.4 Environment 10-11
10.5 Vulnerability 10-12

10.5.1 Population 10-12
10.5.2 Property 10-12
10.5.3 Critical Facilities and Infrastructure 10-12
10.5.4 Environment 10-12
10.6 Future Trends in Development 10-12
10.7 Scenario 10-13
10.8 Issues 10-13

11. Severe Weather 11-1

11.1 General Background 11-1
11.1.1 Heavy Rains, Thunderstorms, and Lightning 11-1
11.1.2 High Winds 11-4
11.1.3 Solar Flares 11-5
11.1.4 Extreme Heat 11-6
11.1.5 Extreme Cold 11-6
11.2 Hazard Profile 11-6
11.2.1 Past Events 11-6
11.2.2 Location 11-8
11.2.3 Frequency 11-9
11.2.4 Severity 11-10
11.2.5 Warning Time 11-10
11.3 Secondary Hazards 11-10
11.4 Exposure 11-11
11.4.1 Population 11-11
11.4.2 Property 11-11
11.4.3 Critical Facilities and Infrastructure 11-11
11.4.4 Environment 11-11
11.5 Vulnerability 11-11
11.5.1 Population 11-11
11.5.2 Property 11-11
11.5.3 Critical Facilities and Infrastructure 11-12
11.5.4 Environment 11-12
11.6 Future Trends in Development 11-12
11.7 Scenario 11-12
11.8 Issues 11-13

12. Wildfire 12-1

12.1 General Background 12-1
12.1.1 Local Conditions Related to Wildfire 12-2
12.1.2 Wildland-Urban Interface and Structure Fires 12-2
12.1.3 Wildfire Protection Responsibility in California 12-3
12.2 Hazard Profile 12-4
12.2.1 Past Events 12-4
12.2.2 Location 12-5
12.2.3 Frequency 12-8
12.2.4 Severity 12-8
12.2.5 Warning Time 12-10
12.3 Secondary Hazards 12-10
12.4 Exposure 12-10
12.4.1 Population 12-10

12.4.2 Property 12-10
12.4.3 Critical Facilities and Infrastructure 12-11
12.4.4 Environment 12-12
12.5 Vulnerability 12-13
12.5.1 Population 12-13
12.5.2 Property 12-13
12.5.3 Critical Facilities and Infrastructure 12-13
12.6 Future Trends in Development 12-14
12.7 Scenario 12-14
12.8 Issues 12-14

13. Climate Change 13-1

13.1 General Background 13-1
13.1.1 What is Climate Change? 13-1
13.1.2 How Climate Change Affects Hazard Mitigation 13-1
13.1.3 Current Indicators of Climate Change 13-2
13.1.4 Projected Future Impacts 13-3
13.1.5 Responses to Climate Change 13-6
13.2 Vulnerability Assessment 13-7
13.2.1 Impacts on Hazards of Concern 13-7
13.2.2 Other Impacts (Sea Level Rise) 13-13
13.2.3 Issues 13-16

14. Human Health Hazards 14-1

14.1 General Background 14-1
14.1.1 Vector-Borne 14-1
14.1.2 Infectious Diseases 14-3
14.2 Hazard Profile 14-6
14.2.1 Past Events 14-6
14.2.2 Location 14-7
14.2.3 Frequency 14-7
14.2.4 Severity 14-7
14.3 Secondary Hazards 14-7
14.4 Exposure and Vulnerability 14-7
14.4.1 Population 14-7
14.4.2 Property 14-8
14.4.3 Critical Facilities and Infrastructure 14-8
14.4.4 Environment 14-8
14.4.5 Economy 14-8
14.5 Future Trends in Development 14-8
14.6 Scenario 14-8
14.7 Issues 14-8

15. Human-Caused Hazards 15-1

15.1 General Background 15-1
15.1.1 Intentional Hazards 15-1
15.1.2 Technological Hazards 15-11
15.2 Hazard Profile 15-13
15.2.1 Past Events 15-13
15.2.2 Location 15-16

15.2.3 Frequency ... 15-20
15.2.4 Severity ... 15-20
15.2.5 Warning Time ... 15-21
15.3 Secondary Hazards ... 15-21
15.4 Exposure ... 15-21
15.4.1 Population ... 15-22
15.4.2 Property ... 15-23
15.4.3 Critical Facilities and Infrastructure ... 15-23
15.4.4 Environment ... 15-23
15.5 Vulnerability ... 15-23
15.5.1 Population ... 15-23
15.5.2 Property ... 15-23
15.5.3 Critical Facilities and Infrastructure ... 15-23
15.5.4 Environment ... 15-23
15.5.5 Economic impacts ... 15-24
15.6 Future Trends in Development ... 15-24
15.7 Scenario ... 15-24
15.8 Issues ... 15-25

16. Risk Ranking ... 16-1

16.1 Probability of Occurrence ... 16-1
16.2 Impact ... 16-1
16.3 Risk Rating and Ranking ... 16-2

PART 3— MITIGATION STRATEGY ... 5

17. Goals and Objectives ... 17-1

17.1 Guiding Principle ... 17-1
17.2 Goals ... 17-1
17.3 Objectives ... 17-2

18. Mitigation Alternatives ... 18-1

19. Area-Wide Action Plan and Implementation ... 19-1

19.1.1 Benefit-Cost Review ... 19-1
19.1.2 Area-Wide Action Plan Prioritization ... 19-2
19.1.3 Analysis of Area-Wide Mitigation Actions ... 19-3
19.2 Plan Maintenance Strategy ... 19-3
19.2.1 Plan Monitoring and Implementation ... 19-4
19.2.2 Plan Evaluation ... 19-5
19.2.3 Midterm Progress Report ... 19-5
19.2.4 Plan Update ... 19-6
19.2.5 Grant Monitoring and Coordination ... 19-6
19.2.6 Continuing Public Involvement ... 19-7
19.2.7 Incorporation into Other Planning Mechanisms ... 19-7

References ... References-1

Glossary ... Glossary-1

Appendices

Appendix A – Public Outreach Plan and Results
Appendix B – Steering Committee Documentation
Appendix C - Progress Report Template
Appendix D – Plan Adoption Resolutions from Planning Partners

Tables

Table 2-1. Plan Changes Crosswalk 2-3
Table 3-1. Steering Committee Members 3-3
Table 3-2. Municipal Planning Partners 3-4
Table 3-3. Special District Planning Partners 3-4
Table 3-4. Summary of Public Meetings and Comments 3-12
Table 3-5. Plan Development Chronology/Milestones 3-13
Table 4-1. Presidential Disaster Declarations 4-3
Table 4-2. Normal Precipitation and Temperatures in Planning Area 4-6
Table 4-3. Present Land Use in Planning Area 4-7
Table 4-4. Planning Area Critical Facilities 4-9
Table 4-5. Annual Population Data 4-11
Table 5-1. Hazus Model Data Documentation 5-5
Table 6-1. Alameda County Dam Inspection Dates 6-4
Table 6-2. Dams with Potential to impact the Planning Area 6-8
Table 6-3. Levees in Alameda County 6-9
Table 6-4. Hazard Potential Classification 6-9
Table 6-5. Value of Property Exposed to Dam Failure 6-11
Table 6-6. Critical Facilities/Infrastructure in Dam Failure Inundation Areas in the Planning Area 6-11
Table 6-7. Loss Estimates for Dam Failure 6-12
Table 7-1. Projected Normal Year Water Supply and Demand Comparison 7-9
Table 7-2. Projected Single-Dry-Year Water Supply and Demand Comparison 7-10
Table 8-1. Mercalli Scale and Peak Ground Acceleration Comparison 8-3
Table 8-2. NEHRP Soil Classification System 8-5
Table 8-3. Recent Earthquakes Magnitude 5.0 or Larger Within 100-mile Radius of the Planning Area 8-5
Table 8-4. Earthquake Probabilities for the San Francisco Bay Area, 2014-2043 8-17
Table 8-5. Estimated Earthquake Impact on Persons and Households 8-19
Table 8-6. Age of Structures in Planning Area 8-20
Table 8-7. Loss Estimates for 100-Year Probabilistic Earthquakes 8-20
Table 8-8. Loss Estimates for Hayward Fault Scenario Earthquake 8-20
Table 8-9. Loss Estimates for Calaveras Fault Scenario Earthquake 8-21
Table 8-10. Loss Estimates for Northern San Andreas Fault Scenario Earthquake 8-21
Table 8-11. Estimated Earthquake-Caused Debris 8-21
Table 8-12. Estimated Damage to Critical Facilities from 100-Year Earthquake 8-22
Table 8-13. Estimated Damage to Critical Facilities from 7.05-M Hayward Fault Scenario 8-22
Table 8-14. Functionality of Critical Facilities for 100-Year Event 8-22
Table 8-15. Functionality of Critical Facilities Hayward Fault Scenario 8-23
Table 9-1. FEMA DR and EM Declarations for Flood Events in Alameda County 9-7

Table 9-2. Flood Events in the Union City/Newark Planning Area 9-8
Table 9-3. Area in the 1-Percent Annual Chance Flood Floodplain 9-11
Table 9-4. Probability of Future Occurrences of Flood Events 9-11
Table 9-5. Summary of Peak Discharges within the Planning Area 9-13
Table 9-6. Area and Structures in the 1-Percent Annual Chance Floodplain 9-15
Table 9-7. Area and Structures in the 0.2-Percent Annual Chance Floodplain 9-15
Table 9-8. Value of Structures in the 1-Percent Annual Chance Floodplain 9-15
Table 9-9. Value of Structures in the 0.2-Percent Annual Chance Floodplain 9-15
Table 9-10. Land Use Within the Floodplain 9-16
Table 9-11. Critical Facilities/Infrastructure in the 1-Percent Annual Chance Floodplain 9-16
Table 9-12. Critical Facilities/Infrastructure in the 0.2-Percent Annual Chance Floodplain 9-16
Table 9-13. Estimated Flood Impact on Persons and Households 9-18
Table 9-14. Loss Estimates for 1-percent annual chance Flood 9-18
Table 9-15. Flood Insurance Statistics 9-19
Table 10-1. FEMA DR and EM Declarations for Landslide Events in Alameda County 10-5
Table 10-2. Landslide Events in the Union City/Newark Planning Area 10-6
Table 10-3. Population Exposure to the Landslide Hazard 10-9
Table 10-4. Number and Value of Exposed Structures in Very High Landslide Susceptibility Zone 10-9
Table 10-5. Number and Value of Exposed Structures in High Landslide Susceptibility Zone 10-10
Table 10-6. Number and Value of Exposed Structures in Moderate Landslide Susceptibility Zone 10-10
Table 10-7. Exposure and Value of Structures in Low Landslide Susceptibility Zone 10-10
Table 10-8. Land Use in Landslide Risk Areas 10-10
Table 10-9. Critical Facilities and Infrastructure in Moderate Landslide Risk Areas 10-11
Table 10-10. Critical Facilities and Infrastructure in High Landslide Risk Areas 10-11
Table 10-11. Critical Facilities and Infrastructure in Very High Landslide Risk Areas 10-11
Table 10-12. Loss Potential for Landslide 10-12
Table 11-1. FEMA DR and EM Declarations for Severe Weather Events in Alameda County 11-6
Table 11-2. Severe Weather Events in the Union City/Newark Planning Area 11-7
Table 11-3. Loss Estimates for Severe Weather 11-12
Table 12-1. FEMA Declarations for Fire Events in Alameda County 12-5
Table 12-2. CAL FIRE Wildfire Activity Statistics for Alameda County 12-6
Table 12-3. Record of Fire Affecting Planning Area 12-8
Table 12-4. Population within Wildfire Hazard Areas 12-10
Table 12-5. Exposure and Value of Structures in Very High Wildfire Hazard Areas 12-11
Table 12-6. Exposure and Value of Structures in High Wildfire Hazard Areas 12-11
Table 12-7. Exposure and Value of Structures in Moderate Wildfire Hazard Areas 12-11
Table 12-8. Land Use Within the Wildfire Hazard Areas 12-11
Table 12-9. Critical Facilities and Infrastructure in Wildfire Hazard Areas 12-12
Table 12-10. Wildfire Loss Potential 12-13
Table 13-1. Summary of Primary and Secondary Impacts Likely to Affect the Planning Area 13-4
Table 13-2. Hydrodynamic Zones and Scenario 5 Events 13-13
Table 13-3. Estimated Population Residing in Sea Level Rise Inundation Areas 13-15
Table 13-4. Structure Type in Sea Level Rise Inundation Areas 13-15
Table 13-5. Structure and Contents Value in Sea Level Rise Inundation Areas 13-16
Table 13-6. Critical Facility Exposure to Sea Level Rise 13-16
Table 13-7. Land Use Within the 72” Mean High Water Sea Level Rise Scenario 13-16
Table 15-1. Event Profiles for Terrorism 15-3
Table 15-2. Common Mechanisms for Cyber-attacks 15-8
Table 15-3. Criticality Factors 15-22

Table 15-4. Vulnerability Criteria 15-22
Table 16-1. Probability of Hazards 16-1
Table 16-2. Impact on People from Hazards 16-3
Table 16-3. Impact on Property from Hazards 16-3
Table 16-4. Impact on Economy from Hazards 16-3
Table 16-5. Hazard Risk Rating 16-3
Table 16-6. Hazard Risk Ranking 16-4
Table 18-1. Alternatives to Mitigate the Dam Failure Hazard 18-2
Table 18-2. Alternatives to Mitigate the Drought Hazard 18-2
Table 18-3. Alternatives to Mitigate the Earthquake Hazard 18-3
Table 18-4. Alternatives to Mitigate the Flooding Hazard 18-4
Table 18-5. Alternatives to Mitigate the Landslide Hazard 18-5
Table 18-6. Alternatives to Mitigate the Severe Weather Hazard 18-6
Table 18-7. Alternatives to Mitigate the Wildfire Hazard 18-7
Table 19-1. Planning Area-wide Action Plan 19-1
Table 19-2. Prioritization of Area-Wide Mitigation Actions 19-2
Table 19-3. Analysis of Mitigation Actions 19-3
Table 19-4. Plan Maintenance Matrix 19-4

Figures

Figure 3-1. Defined Planning Area 3-5
Figure 3-6. Hazard Mitigation Plan Web Site Homepage 3-11
Figure 4-1. Main Features of Planning Area 4-2
Figure 4-2. Watersheds and Water Bodies in the Planning Area 4-5
Figure 4-3. Critical Facilities in the Planning Area 4-8
Figure 4-4. Residential Building Permit Trends, 2005 to 2015 4-9
Figure 4-5. Alameda County vs. Planning Area Population Growth 4-11
Figure 4-6. Planning Area Age Distribution 4-12
Figure 4-7. Planning Area Race Distribution 4-13
Figure 4-8. Languages Spoken in the Planning Area 4-14
Figure 4-9. 2015 SPM Poverty Thresholds: San Francisco – Oakland – Hayward MSA 4-15
Figure 4-10. Industry in the Planning Area by Population Employed 4-16
Figure 4-11. Occupations in the Planning Area 4-17
Figure 4-12. California State and Planning Area Unemployment Rate 4-17
Figure 6-4. Location of Dams that could Impact the Planning Area 6-7
Figure 7-1. Crop Moisture Index for Week Ending July 23, 2016 7-3
Figure 7-2. Palmer Z Index (June 2016) 7-3
Figure 7-3. Palmer Drought Index for Week Ending July 23, 2016 7-4
Figure 7-4. Palmer Hydrological Drought Index (June 2016) 7-4
Figure 7-5. 24-Month Standardized Precipitation Index (July 2014 – June 2016) 7-5
Figure 7-6. South Bay Aqueduct System 7-7
Figure 7-7. Water Shortage Response Based on Local Groundwater Levels 7-13
Figure 7-8. Water Shortage Contingency Plan 7-14
Figure 8-1. Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years 8-4
Figure 8-2. Recent Earthquakes Within 100-mile Radius of the Planning Area 8-6
Figure 8-3. Significant Known Faults in the Bay Area 8-8

Figure 8-4. Planning Area 100-Year Probability Earthquake Event Peak Ground Acceleration 8-10
Figure 8-5. Hayward Fault Scenario Peak Ground Acceleration 8-12
Figure 8-6. Calaveras Fault Scenario Earthquake Peak Ground Acceleration 8-13
Figure 8-7. Northern San Andreas Fault Scenario Earthquake Peak Ground Acceleration 8-14
Figure 8-8. National Earthquake Hazard Reduction Program Soil Classification 8-15
Figure 8-9. Liquefaction Susceptibility 8-16
Figure 8-10. PGA with 2-Percent Probability of Exceedance in 50 Years 8-18
Figure 9-1. CRS Communities by Class Nationwide as of May 2016 9-5
Figure 9-2. Approximate Location of Flood Hazard Zones in the City of Newark 9-10
Figure 9-3. Mapped Flood Hazard Areas in the Planning Area 9-12
Figure 10-1. Typical Debris Avalanche Scar and Track 10-2
Figure 10-2. Deep Seated Slide 10-3
Figure 10-3. Shallow Colluvial Slide 10-3
Figure 10-4. Bench Slide 10-3
Figure 10-5. Large Slide 10-3
Figure 10-6. Landslide Zones in the Union City/Newark Planning Area 10-7
Figure 11-1. The Thunderstorm Life Cycle 11-3
Figure 11-2. Space Weather Phenomena 11-5
Figure 11-3. Annual Number of Thunderstorms in the United States 11-8
Figure 11-4. Wind Zones in the United States 11-9
Figure 12-1. CAL FIRE FRAP Map for Alameda County 12-7
Figure 12-2. CAL FIRE FRAP Map for the Planning Area 12-9
Figure 13-1. Global Carbon Dioxide Concentrations over Time 13-2
Figure 13-2. Observed and Projected Average Temperatures in Alameda County 13-5
Figure 13-3. Projected Number of Extreme Heat Days by Year 13-5
Figure 13-4. Projected Changes in Fire Risk in Alameda County, Relative to 2010 13-6
Figure 13-5. Sea Level Rise Exposure in the Planning Area 13-14
Figure 14-1. 2014 Distribution of Ebola Virus Outbreaks in Humans and Animals 14-5
Figure 15-1. Pop-Up Message Indicating Ransomware Infection 15-8
Figure 15-2. Gas Transmission and Hazardous Liquide Pipeline Near the Cities of Newark and Union City .. 15-17
Figure 15-3. Kinder Morgan National Pipeline Map 15-18
Figure 15-4. Water Distribution from ACWD's Water Sources 15-19

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- Andy Block, Environmental Programs Manager, Union City
- Rob Flaner, Project Manager, Tetra Tech
- Jessica Cerutti, Lead Planner, Tetra Tech

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The Union City/Newark Hazard Mitigation Plan Steering Committee

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Hilda Hurtado	Emergency Manager	Alameda County Fire Department
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Richard Sealana	Volunteer	American Red Cross
Steve Peterson	Operations and Maintenance Manager	Alameda County Water District
Les Putnam	Senior Public Safety Specialist	Pacific Gas & Electric

Name	Title	Jurisdiction/Agency
Jason Rodgers	Maintenance and Operations Director	New Haven Unified School District
Thomas Ruark	City Engineer	City of Union City
Travis Souza	Police Officer	City of Union City Police Department
Moses Tsang	Flood Control Design	Alameda County Flood Control and Water Conservation District

EXECUTIVE SUMMARY

HAZARD MITIGATION OVERVIEW

Hazard mitigation is the use of policies, programs, projects, and other activities to alleviate the death, injury, and property damage that can result from a disaster. The Cities of Union City and Newark have developed and maintained a hazard mitigation plan (HMP) to reduce risks from natural disasters that complies with federal requirements for hazard mitigation planning. Federal regulations require periodic updates of hazard mitigation plans. An update provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. A jurisdiction covered by a plan that has expired is ineligible for certain federal natural disaster assistance funding.

Initial Regional Mitigation Planning Efforts

The Association of Bay Area Governments (ABAG) provides planning and research resources related to land use, housing, environmental and water resource protection, disaster resilience, energy efficiency, hazardous waste mitigation, risk management, financial services, and staff training to local cities, and towns. In 2004, ABAG led a regional effort to address hazard mitigation planning for jurisdictions within its area of responsibility. This regional template was used by numerous counties and cities within the ABAG planning area to meet federal hazard mitigation planning requirements. The ABAG process equipped local governments with tools to complete individual planning processes that met their needs, while pooling resources and eliminating redundant planning efforts. In 2010, ABAG conducted its second regional planning effort. Union City, Newark, and Alameda County Water District used the 2010 updated ABAG tools to meet federal hazard mitigation planning requirements.

The 2016 Union City/Newark Regional Planning Effort

In 2016, the Cities of Union City and Newark teamed together to prepare an updated multi-jurisdiction hazard mitigation plan that would best suit local needs and capabilities of the two cities and local special districts. The cities and participating districts developed a new plan from scratch, using lessons learned from the earlier ABAG planning efforts. The 2016 plan is an update for three of these planning partners and an initial plan for two others. It differs from previous plans in the following ways:

- The plan is not a subset of a larger regional effort. It focuses on the geographic region of Union City and Newark (and some special district critical facilities located in the City of Fremont) and on hazards of concern for the local jurisdictions.
- The plan includes special districts as planning partners.
- Newly available data and tools provide for a more detailed and accurate risk assessment.
- The risk assessment has been formatted to provide information on risk and vulnerability that will allow a measurement of cost-effectiveness, as required under Federal Emergency Management Agency (FEMA) mitigation grant programs.
- The update gave the planning partners an opportunity to engage local citizens and gauge their perception of risk and support for risk reduction through mitigation.

PLAN DEVELOPMENT APPROACH

Phase 1—Organize and Review

A planning team assembled for the plan update conducted outreach to invite the participation of local planning partners. A 16-member steering committee was assembled to oversee the plan update, consisting of city staff, citizens, and other stakeholders in the defined Planning Area. Coordination with other county, state, and federal agencies involved in hazard mitigation occurred throughout the plan update process. This phase included a review of the existing HMP, the California statewide hazard mitigation plan, and existing programs that may support hazard mitigation actions.

Phase 2—Update the Risk Assessment

Risk assessment is the process of measuring the potential loss of life resulting from natural hazards, as well as personal injury, economic injury and property damage, in order to determine the vulnerability of people, buildings, and infrastructure to natural hazards. For this update, risk assessment models were enhanced with new data and technologies that have become available since 2010. The Steering Committee used the risk assessment to rank risk and to gauge the potential impacts of each hazard of concern in the Planning Area. The risk assessment included the following:

- Hazard identification and profiling
- Assessment of the impact of hazards on physical, social, and economic assets
- Identification of particular areas of vulnerability
- Estimates of the cost of potential damage.

Phase 3—Engage the Public

The planning team implemented a public involvement strategy developed by the Steering Committee. The strategy included public meetings to present the risk assessment and the draft plan, a hazard mitigation survey, a project website, and multiple media releases.

Phase 4—Assemble the Updated Plan

The planning team and Steering Committee assembled a document to meet federal hazard mitigation planning requirements. A mitigation plan review crosswalk included in the HMP demonstrates its compliance with all requirements.

Phase 5—Adopt and Maintain the Plan

The final adoption phase will begin once the State of California Governor's Office of Emergency Services and FEMA Region IX have granted pre-adoption approval. The plan maintenance process includes a schedule for monitoring and evaluating the plan's progress periodically and producing a revised plan every five years. The plan maintenance strategy also includes processes for continuing public involvement and integrating with other programs that can support or enhance hazard mitigation.

MITIGATION GOALS AND OBJECTIVES

Guiding Principle

The Steering Committee selected the following guiding principle for the 2016 planning initiative, adapted from the previous ABAG goal:

> Through partnerships, maintain and enhance the disaster resistance of Union City and Newark by reducing the potential loss of life, property, damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.

Goals

The Steering Committee and the planning partners established the following goals for the plan update:

1. Protect the public's health and safety and minimize damage to essential services, structures, property, and infrastructure as a result of hazards.
2. Promote hazard mitigation as an integrated public policy and as a standard business practice.
3. Encourage the development and implementation of long-term, cost effective, and environmentally sound mitigation projects.
4. Build and support local capacity to enable the public to prepare, respond, and recover from the impact of natural hazards.
5. Provide increased safety through the provision of adequate infrastructure, public education, and outreach programs.
6. Incorporate elements of hazard mitigation into cross-functional planning and regulatory initiatives.
7. Retrofit, purchase, or relocate structures in high hazard areas, especially those known to be repetitively damaged.

Objectives

The objectives listed in Table ES-1 were identified that meet multiple goals, helping to establish priorities for recommended mitigation actions.

MITIGATION ACTION PLAN

The planning partners agreed to four planning-area-wide mitigation actions, as listed in Table ES-2. These actions represent general initiatives that will continue to provide planning partner and public involvement in the plan during the five-year performance period. In addition to the planning area-wide actions, all planning partners have identified their own specific mitigation actions that address hazard risks on a jurisdictional level. The planning partner actions are in Volume 2 of the 2016 plan.

IMPLEMENTATION

Full implementation of the recommendations of this plan will require time and resources. The measure of the plan's success will be its ability to adapt to changing conditions. All planning partners will assume responsibility for adopting the recommendations of this plan and committing resources toward implementation. The framework established by this plan commits planning partners to pursue initiatives when the benefits of a project exceed its costs. The planning partners developed this plan with extensive public input, and public support of the actions identified in this plan will help ensure its success.

Table ES-1. Objectives for 2016 Hazard Mitigation Plan

Number	Objective	Applicable Goals
1	Advance community resilience through preparation, adoption, and implementation of state, regional and local hazard mitigation plans and projects	1, 2, 3, 4, 5, 6, 7
2	Create financial and regulatory incentives to motivate stakeholders such as homeowners, private sector businesses, and nonprofit community organizations to mitigate hazards and risk	1, 3, 7
3	Incorporate risk reduction considerations in new and updated infrastructure and development plans to reduce the impacts of hazards	1, 5, 7
4	Develop and provide updated information about threats, hazards, vulnerabilities, and mitigation strategies to state, regional, and local agencies, as well as private sector groups	2, 4, 5
5	Establish and maintain partnerships among all levels of government, private sector, community groups, and institutions of higher learning that improve and implement methods to protect life and property	1, 2, 4, 5
6	Improve the quality and effectiveness of local hazard mitigation planning through effective training and guidance that strengthens linkages between the Union City/Newark hazard mitigation plan, general plan safety elements, and California's statewide hazard mitigation plan	2, 6
7	Promote and enhance outreach and education efforts by state, regional and local agencies with hazard mitigation plans and programs to actively encourage engagement of stakeholder groups such as homeowners, private sector businesses, and nonprofit community organizations	1, 2, 4, 5
8	Improve transportation conditions through infrastructure and program improvements to provide better access for response personnel and provide residents with a means of egress during a disaster	1, 4, 5
9	Support the protection of vital records, and strengthening or replacement of buildings, infrastructure, and lifelines to minimize post-disaster disruption and facilitate short-term and long-term recovery	1, 4, 5
10	Maximize the likelihood that structures are modified, as necessary, over time to meet life safety standards	1, 5, 7
11	Research, develop, and promote adoption of cost-effective building and development laws, regulations, and ordinances exceeding the minimum levels needed for life safety	2, 5
12	Incorporate considerations for future conditions and impacts of climate change into programmatic, regulatory, and development priorities	2, 3, 6, 7

Table ES-2. Planning-Area-Wide Hazard Mitigation Actions

Action Number and Description	Priority
Action PA-1—Continue to support the planning-area-wide actions identified in this plan.	High
Action PA-2—Actively participate in the plan maintenance strategy identified in this plan.	High
Action PA-3—Continue to maintain a website that will house the hazard mitigation plan, its midterm reports, and all components of the plan's maintenance strategy to provide planning partners and the public ongoing access to the plan and its implementation.	High
Action PA-4—Continue to leverage/support/enhance ongoing, regional public education and awareness programs (Community Emergency Response Team, multi-jurisdiction, etc.) as a method to educate the public on risk, risk reduction, and community resilience.	High

Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

PART 1—PLANNING PROCESS AND COMMUNITY PROFILE

1. INTRODUCTION TO HAZARD MITIGATION PLANNING

1.1 WHY PREPARE THIS PLAN?

1.1.1 The Big Picture

Hazard mitigation is defined as any action taken to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster. It involves long- and short-term actions implemented before, during and after disasters. Hazard mitigation activities include planning efforts, policy changes, programs, studies, improvement projects, and other steps to reduce the impacts of hazards.

For many years, federal disaster funding focused on relief and recovery after disasters occurred, with limited funding for hazard mitigation planning in advance. The Disaster Mitigation Act (DMA; Public Law 106-390), passed in 2000 as an amendment to the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act, shifted the federal emphasis toward planning for disasters before they occur. It was designed to improve planning for, response to, and recovery from disasters by requiring state and local entities to develop hazard mitigation plans (HMPs). Under the DMA, states, with support from local governmental agencies, must develop and update HMPs on a five-year basis to prepare for and reduce the potential impacts of natural hazards. This requirement is a condition for federal disaster grant assistance. Regulations developed to fulfill the DMA's requirements are included in Title 44 of the Code of Federal Regulations (44 CFR).

The responsibility for hazard mitigation lies with many, including private property owners, commercial interests, and local, state and federal governments. The DMA encourages cooperation among state and local authorities in pre-disaster planning. The enhanced planning network called for by the DMA helps local governments articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk-reduction projects. The Federal Emergency Management Agency (FEMA) encourages multi-jurisdictional planning under its guidance for the DMA. One benefit of multi-jurisdictional planning is the ability to pool resources and eliminate redundant activities within a Planning Area that has uniform risk exposure and vulnerabilities.

The DMA also promotes sustainability in hazard mitigation. To be sustainable, hazard mitigation needs to incorporate sound management of natural resources and address hazards and mitigation in the largest possible social and economic context.

1.1.2 Purposes for Planning

In response to the requirements of the DMA, the cities of Union City, California and Newark, California have developed this Multi-Jurisdiction Hazard Mitigation Plan (HMP).It represents an update to each city's component of the Association of Bay Area Governments (ABAG) 2010 *Multi-Jurisdictional Local Hazard Mitigation Plan for the San Francisco Bay Area*. Union City and Newark prepared annexes for the ABAG 2010 HMP that were approved and adopted in 2010.

The 2016 *Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan* fulfills the five-year plan update requirement specified in the DMA and in the 2010 ABAG HMP. It identifies resources, information, and strategies for reducing risk from natural hazards in the Union City/Newark Planning Area. Several local special districts are participating with the cities in the development of this HMP, including Newark Unified School District, Alameda County Water District (ACWD), and Union Sanitary District (USD). ACWD and USD have facilities located in Union City, Newark, and the neighboring city of Fremont. As such, the planning area is extended to those ACWD and USD facilities located not only in Union City and Newark, but in Fremont as well. Both the Alameda County and Fremont hazard mitigation plans were single jurisdiction in nature and did not provide for a partnering opportunity for ACWD or USD. Recognizing the importance of having these two vital districts covered under a mitigation plan, Union City and Newark extended an invitation to join the partnership, understanding that the risk assessment would extend into Fremont's boundaries for these two districts' Fremont-based facilities.

Components of the HMP were selected because they meet a program requirement and because they best meet the needs of the planning partners (the cities and participating special districts) and their citizens. The plan will help guide and coordinate mitigation activities throughout the Planning Area. It was developed to meet the following objectives:

- Meet or exceed requirements of the DMA.
- Enable all planning partners to continue using federal grant funding to reduce risk through mitigation.
- Meet the needs of each planning partner as well as state and federal requirements.
- Create a risk assessment that focuses on local hazards of concern.
- Coordinate existing plans and programs so that high-priority projects to mitigate possible disaster impacts are funded and implemented.

1.2 WHO WILL BENEFIT FROM THIS PLAN?

All citizens and businesses of Union City and Newark are the ultimate beneficiaries of this HMP. The HMP reduces risk for those who live in, work in, and visit the Planning Area. It provides a viable planning framework for all foreseeable natural hazards. Participation in development of the HMP by key stakeholders helped ensure that outcomes will be mutually beneficial. The resources and background information in the plan are applicable across the Planning Area, and the plan's goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships. The long-term benefits of mitigation planning include the following:

- An increased understanding of hazards faced by all planning partners
- A more sustainable and disaster-resistant community
- Financial savings through partnerships that support planning and mitigation efforts
- Focused use of limited resources on hazards that have the biggest impact on the communities
- Reduced long-term impacts and damage to human health and structures, and reduced repair costs.

1.3 CONTENTS OF THIS PLAN

This plan has been set up in two volumes so that jurisdiction-specific elements may be easily distinguished from those that apply to the whole Planning Area:

- **Volume 1**—Volume 1 includes all federally required elements of a disaster mitigation plan that apply to the entire Planning Area. This includes the description of the planning process, public involvement strategy, goals and objectives, Planning Area hazard risk assessment, Planning Area mitigation actions, and a plan maintenance strategy.
- **Volume 2**—Volume 2 includes all federally required jurisdiction-specific elements in annexes for each participating jurisdiction. It includes a description of the participation requirements established by the Steering Committee, as well as instructions and templates that the partners used to complete their

annexes. Volume 2 also includes “linkage” procedures for eligible jurisdictions that did not participate in development of this plan but wish to adopt it in the future.

Both volumes include elements required under federal guidelines. DMA compliance requirements are cited at the beginning of subsections as appropriate to illustrate compliance.

The following appendices provided at the end of Volume 1 include information or explanations to support the main content of the plan:

- Appendix A—Public Outreach Communication Plan and Survey Results
- Appendix B—Steering Committee Documentation
- Appendix C—A template for the mid-term progress report to be completed as this plan is implemented during the performance period review.
- Appendix D—Plan adoption resolutions from planning partners

All planning partners will adopt Volume 1 in its entirety, including the appendices, and at least the following parts of Volume 2: Part 1, and each partner’s jurisdiction-specific annex.

2. PLAN UPDATE—WHAT HAS CHANGED

2.1 THE PREVIOUS PLAN

In 2004, ABAG led a regional effort to address hazard mitigation planning for jurisdictions in the San Francisco Bay Area. The ABAG process equipped local governments with a template and tools to complete individual planning processes for their jurisdictions, while pooling resources and eliminating redundant planning efforts. Alameda County's first annex to the ABAG HMP was developed and adopted in 2007. In 2010, ABAG conducted its second regional planning effort. Union City and Newark participated in the 2010 planning process, along with Alameda County, 10 other cities, and the Alameda County Water District; these jurisdictions used the ABAG tools to achieve DMA compliance. The single-jurisdiction annexes in the previous hazard mitigation, developed using the ABAG template and tools, contained the following components:

- Introduction
- Description of the local planning process
- Hazards and risk assessment
- Summary of the National Flood Insurance Program and repetitive loss properties
- Mitigation goals, activities and priorities
- Regional mitigation strategies
- Incorporation of the plan into existing planning mechanisms
- Description of the plan update process
- Exhibits to illustrate the planning process.

2.2 WHY UPDATE?

In 2015, ABAG again provided tools for counties and cities in the Bay Area to revise their previous plans and annexes, but decided not to revise the regional 2010 ABAG HMP. As a result, multiple counties and cities that participated in the previous ABAG HMP needed to undertake a planning process independently, or as part of a new partnership, in order to remain eligible for federal hazard mitigation assistance. Alameda County set out to develop a stand-alone plan focusing on unincorporated areas; Union City and Newark pooled resources to develop a multi-jurisdictional hazard mitigation plan. The following factors are the basis for the Union City and Newark hazard mitigation planning effort:

- The Planning Area has significant exposure to numerous natural hazards.
- Limited local resources make it difficult to be pre-emptive in risk reduction actions. Being able to leverage federal financial assistance is paramount to successful hazard mitigation in the area.
- Union City and Newark want to be proactive in preparedness for the probable impacts of natural hazards.

2.2.1 Federal Eligibility

Title 44 of the Code of Federal Regulations (44 CFR) stipulates that hazard mitigation plans must present a schedule for monitoring, evaluating, and updating the plan. This provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. A jurisdiction covered by a plan that has expired is not able to pursue funding under the Robert T. Stafford Act that requires a current hazard mitigation plan.

2.2.2 Changes in Development

Hazard mitigation plan updates must be revised to reflect changes in development within the Planning Area during the previous performance period of the plan (44 CFR Section 201.6(d)(3)). The plan must describe changes in development in hazard-prone areas that increased or decreased vulnerability for each jurisdiction since the last plan was approved. If no changes in development impacted the jurisdiction's overall vulnerability, plan updates may validate the information in the previously approved plan. The intent of this requirement is to ensure that the mitigation strategy continues to address the risk and vulnerability of existing and potential development and takes into consideration possible future conditions that could impact vulnerability.

The Planning Area experienced a 2.51-percent increase in population between 2000 and 2010, an average annual growth rate of 0.25 percent per year (U.S. Census 2010). Between 2010 and 2015, the U.S. Census *Annual Estimates of the Resident Population for Incorporated Places* estimates that the total populations of Union City and Newark grew an additional 6.91 percent, to 119,830 (U.S. Census 2015).

This plan update assumes that some new development triggered by the increase in population occurred in hazard areas. Because all such new development would have been regulated pursuant to local programs and codes, it is assumed that vulnerability did not increase, even if exposure did. Participating planning partners have adopted general plans, strategic plans, and emergency plans that govern land-use decisions and policy-making, as well as building codes and specialty ordinances based on state and federal mandates. A detailed analysis of development patterns in the Planning Area is provided in Section 4.5 and in the individual partner annexes in Volume 2.

2.3 THE UPDATED PLAN—WHAT IS DIFFERENT?

The Cities of Union City and Newark are the primary partners in developing this hazard mitigation plan. The two jurisdictions acquired contractor support to facilitate the development of this plan. The plan is a revision of the 2010 ABAG HMP annexes for Union City, Newark, and ACWD, but it represents the initial plan for the combined Union City/Newark Planning Area and two of the planning partners (Union Sanitary District and Newark Unified School District). Additionally, the 2016 planning initiative seeks to serve as an overall functional reset for mitigation planning on a local, manageable scale instead of as part of a Bay-Area wide regional effort.

2.3.1 Changes in Priorities

During the review of the current state HMP and the previous ABAG plans, the Steering Committee identified multiple changes in priorities for the 2016 process:

- This plan has been re-structured to focus on the Union City/Newark Planning Area. The risk assessment is not a part of a larger regional effort. It addresses only the Union City/Newark Planning Area, focusing on hazards of concern specific to that Planning Area.
- The 2010 ABAG plan included the Alameda County Water District as a planning partner; this updated HMP also includes the Union Sanitary District and Newark Unified School District as planning partners.
- The risk assessment has been formatted to best support future grant applications by providing risk and vulnerability information directly supportive of the cost-effectiveness measurement required under FEMA mitigation grant programs.
- Newly available data (such as FEMA's countywide Digital Flood Insurance Rate Maps) and tools (such as FEMA's Hazus-MH computer model) provide for a more detailed and accurate risk assessment.

- The process of updating the previous plan gave Union City and Newark an opportunity to engage local citizens and gauge their perception of risk and support for risk reduction through mitigation. This plan update documents the comprehensive engagement process.
- New data developed since the previous plan regarding future impacts to climate change have been included in this HMP to develop a more comprehensive overview on mitigation in tandem with resilience.

Table 2-1 indicates the major changes between the two plans as they relate to 44 CFR planning requirements.

Table 2-1. Plan Changes Crosswalk

44 CFR Requirement	Previous Plan	Updated Plan
§201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: • **1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;** • **2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and** • **3. Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**	Appendix A of the ABAG Plan includes a description of the planning process. It includes detail of coordination with other agencies and review of the previous plan.	The plan development process deployed for this update differed significantly from that of the ABAG plan. Volume 1 Chapters 2, 3, and 5 describe the planning process for the 2016 updated plan.
§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.	Appendix C of the ABAG plan includes a risk assessment for nine hazards (earthquake, tsunami, flood, landslide, wildfire, drought, climate change, dam failure, and delta levee failure) for the nine-county regional area.	Volume 1 Part 2 presents a risk assessment of 9 hazards of concern: dam failure, drought, earthquake, flood, landslide, severe weather, wildfire, human caused hazards, and health hazards. These hazards are profiled as they impact the Union City/Newark Planning Area. Including a qualitative assessment of human caused hazards and health hazards provides a more complete picture of the hazards facing the Planning Area.
§201.6(c)(2)(i): [The risk assessment shall include a] description of the ... location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	Appendix C of the ABAG plan includes a risk assessment for nine hazards (earthquake, tsunami, flood, landslide, wildfire, drought, climate change, dam failure, and delta levee failure) for the nine-county regional area.	Volume 1 Part 2 presents a risk assessment of each hazard of concern. Each hazard chapter includes the following components: • Hazard profile, including maps of extent and location, historical occurrences, frequency, severity, and warning time • Secondary hazards • Climate change impacts • Exposure of people, property, critical facilities and environment • Vulnerability of people, property, critical facilities and environment • Future trends in development • Scenarios • Issues

44 CFR Requirement	Previous Plan	Updated Plan
§201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community	Utilizing existing studies and documents, the ABAG plan discussed vulnerability with an emphasis on exposure and land use. There was extensive discussion on the vulnerability to the earthquake hazard. The ABAG risk assessment attempts to estimate potential damage from future events. ABAG concluded that Hazus was not an adequate tool for planning purposes.	Vulnerability was assessed for all hazards of concern. The Hazus-MH computer model was used for the dam failure, earthquake, and flood hazards. These were Level 2 (user-defined) analyses using city data. Site-specific data on Steering Committee-identified critical facilities were entered into the Hazus model. Vulnerability was assessed for other hazards by applying varying damage percentages to an asset inventory extracted from Hazus-MH.
§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods	The ABAG plan includes summary information by county on identified repetitive losses. The plan includes a link to a website with more information on repetitive losses, but the site is no longer maintained. The plan provides inventories of structures in repetitive loss areas, but there is no description of the causes of repetitive flooding.	Union City and Newark have no identified Repetitive Loss or Severe Repetitive Loss structures insured through the National Flood Insurance Program.
§201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area.	The focus of the ABAG plan is on existing land use without detailed discussion on future land use. There is no consistent inventory of the number and types of structures exposed to each hazard of concern. The plan does provide an inventory of identified critical facilities.	A complete inventory of the numbers and types of buildings exposed was generated for each hazard of concern. The Steering Committee defined and identified "critical facilities" for the Planning Area, and these facilities were inventoried by exposure. Each hazard chapter provides a discussion on future development trends.
§201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) and a description of the methodology used to prepare the estimate.	The ABAG plan relied on creating regional correlations from past observed damage to create estimates of future losses from the hazards of concern. Appendix F assesses vulnerability by providing private building exposure estimates for earthquake, landslide, wildfire, dam failure, and 100-year flood.	Loss estimations in terms of dollar loss were generated for all hazards of concern. These estimates were generated by Hazus-MH for the dam failure, earthquake, and flood hazards. For the other hazards, loss estimates were generated by applying varying damage percentages to an asset inventory extracted from Hazus-MH.
§201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.	A strong component of the ABAG plan is its look at existing land use in hazard areas, especially for earthquake. Appendix E provides additional detail on existing land use, with a brief discussion of future land use (through 2030) by county.	There is a discussion on future development trends as they pertain to each hazard of concern. This discussion looks predominantly at the existing land use and the current regulatory environment that dictates this land use.

44 CFR Requirement	Previous Plan	Updated Plan
§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.	The ABAG plan identified a comprehensive list of mitigation strategies for each planning partner to consider when creating annexes to the plan. These strategies were created via a facilitated process chronicled in the plan.	The plan contains a guiding principle, goals, objectives, and actions. The actions are jurisdiction-specific and strive to meet multiple objectives. The objectives of this plan are broad, similar to the strategies identified in the ABAG plan. All objectives meet multiple goals and stand alone as components of the plan. Each planning partner was asked to complete a capability assessment that looks at its regulatory, technical and financial capabilities.
§201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	The ABAG plan has identified one overall goal and basic "commitments" for the plan.	The Steering Committee kept the ABAG goal as an overall guiding principle for the plan, and developed seven goals, and 12 objectives, as described in Chapter 17. The goals and objectives are specifically for this hazard mitigation plan and are completely new. They were identified based upon the capabilities of the Planning Partnership.
§201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.	The ABAG plan contains a discussion on the process used to generate the mitigation strategies, and includes an alternatives review.	Volume I, Part 3 includes a hazard mitigation catalog that was developed through a facilitated process. This catalog identifies actions that manipulate the hazard, reduce exposure to the hazard, reduce vulnerability, and increase mitigation capability. The catalog further segregates actions by scale of implementation. A table in the action plan chapter analyzes each action by mitigation type to illustrate the range of actions selected.
§201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with the program's requirements, as appropriate.	Strategy GOVT-c-5 deals with maintaining compliance and good standing in the National Flood Insurance Program. Strategies HSNG-h-1, LAND-c-4, and ECON-f-1 encourage participation in the CRS program.	Both Union City and Newark participate in the National Flood Insurance Program and have identified an action stating their commitment to maintain compliance and good standing under the National Flood Insurance Program. Additionally, each city reviewed their current NFIP programmatic capabilities and included the results in their jurisdictional annex.

44 CFR Requirement	Previous Plan	Updated Plan
§201.6(c)(3)(iii): [The mitigation strategy shall describe] how the actions identified in Section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.	Under the ABAG plan, priorities are organized based on the following categories: • Existing • Existing/underfunded • Very High • High • Moderate • Under study • Not applicable • Not yet considered	Each of the recommended initiatives is prioritized using a qualitative methodology that looked at the objectives the project will meet, the timeline for completion, how the project will be funded, the impact of the project, the benefits of the project and the costs of the project. This prioritization scheme is detailed in Chapter 19.
§201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.	Appendix B of the ABAG plan contains a plan maintenance and update process.	Volume I, Part 3 presents a plan maintenance strategy that contains additional detail to address deficiencies observed during the 2010 update process. This update includes a more defined role and vehicle for facilitating the mid-term review of the plan.
§201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	Appendix B of the ABAG plan contains a brief discussion on incorporation of the plan into other planning mechanisms.	Volume I, Part 3 details recommendations for incorporating the plan into other planning mechanisms, such as: • General plans • Emergency response plans • Capital improvement programs • Municipal codes Specific current and future plan and program integration activities are detailed in each participating jurisdiction's annex in Volume 2.
§201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.	The ABAG plan does not contain a process for how each jurisdiction will continue public participation in the plan maintenance process. However, some of the local government annexes contain this discussion.	Volume I, Part 3 details a comprehensive strategy for continuing public involvement.
§201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission, Tribal Council).	All agencies utilizing the ABAG tools submitted to the state and FEMA individually.	An appendix in Volume 1 contains the resolutions of all planning partners that adopted this plan.

3. PLAN UPDATE APPROACH

This chapter describes the planning process used to develop the *Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan*, including how it was prepared, who was involved, and how the public participated. The process was broadly defined by the following objectives and activities:

- Form a planning team
- Identify stakeholders
- Establish a steering committee
- Establish a planning partnership
- Define the planning area
- Coordinate with other agencies
- Review existing programs
- Engage the public.

These objectives and activities ensure that the plan meets requirements of the DMA and has the broad and effective support of the participating jurisdictions, regional and local stakeholders and the public, which are discussed in the following sections.

It is important to note that at the time of the development of this plan, the mitigation planning climate within Alameda County was very individualized. Most jurisdictions within the County developed single jurisdiction plans and those planning efforts that were multi-jurisdictional were very small scale. These factors limited the opportunities for multi-jurisdictional coordination. From the onset of the planning process, Union City and Newark determined that the scope of this plan would be limited to the assets within both cities.

3.1 FORMATION OF THE PLANNING TEAM

Project management was the joint responsibility of staff members from Union City and Newark. A contract planning consultant (Tetra Tech, Inc.) was tasked with the following:

- Assist with the identification of stakeholders to engage in the planning process
- Assist with organization of a Steering Committee and planning team
- Assist with development and implementation of a public and stakeholder outreach program
- Collect data
- Facilitate and attend meetings (Steering Committee, planning team, stakeholder, public and other)
- Review and update the hazards of concern, hazard profiles and risk assessment
- Assist with review and update of mitigation planning goals and objectives
- Assist with review of progress of past mitigation strategies
- Assist with the screening of mitigation actions and identify appropriate actions
- Assist with the prioritization of mitigation actions
- Author the draft and final HMP documents.

The Tetra Tech project manager assumed the role of the lead planner, reporting directly to the Union City/Newark project manager. In addition to the Tetra Tech project team, the main planning team consisted of the following members:

- Terrence Grindall, Assistant City Manager, Newark
- Joan Malloy, Economic and Community Development Director, Union City
- Andy Block, Environmental Manager, Union City.

3.2 DEFINING STAKEHOLDERS

For this planning process, a "stakeholder" has been defined as: *any person or public or private entity that that own or operate facilities that would benefit from the mitigation actions of this plan, and/or have an authority or capability to support mitigation actions identified by this plan*. For this process, stakeholders have been separated in to two categories defined as follows:

- **Participatory Stakeholders**—Stakeholders that actively participated in the planning process as planning partners or members of the Steering Committee.
- **Coordinating Stakeholders**—Stakeholders that were not able to commit to actively participating in the process as a participatory stakeholder, but were kept apprised of plan development milestones or were able to provide data that was utilized in the plan development.

At the onset of the planning process, the planning team identified a list of stakeholders to engage during the development of the Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan. The following stakeholders played a role in the planning process:

- **Federal Agencies**—FEMA Region IX provided updated planning guidance, provided summary and detailed data for the planning area from the National Flood Insurance Program (NFIP) (including repetitive loss information), and conducted plan review. The U.S. Geological Survey (USGS) provided ShakeMaps that were utilized to support the earthquake risk assessment.
- **State Agencies**—The California Governor's Office of Emergency Services (Cal OES) facilitated FEMA review, provided updated planning guidance, and reviewed the draft and final versions of the plan prior to FEMA review. The California Department of Forestry and Fire Protection (Cal FIRE) provided fire severity mapping that was utilized to support the wildfire risk assessment. The California Department of Water Resources provided information on NFIP compliance for the cities.
- **Regional and Local Stakeholders**—The planning team offered regional and local stakeholders the opportunity to be informed about the planning process. The following organizations received information about the planning process, invitations to provide input, and elected to participate in the planning process as full members of the Steering Committee:
  - Alameda Countywide agencies:
    - Alameda County Fire Department
    - Alameda County Flood Control District and Water Conservation District
  - Utility providers:
    - Pacific Gas & Electric
    - Union Sanitary District
    - Alameda County Water District
  - School districts:
    - Newark Unified School District
    - New Haven Unified School District.
  - American Red Cross
  - Union City and Newark Community Emergency Response Teams.

3.3 THE STEERING COMMITTEE

A Steering Committee made up of participatory stakeholders provided guidance and direction to the HMP effort and ensured that the plan will be embraced by agencies and the public within the Planning Area. During a project kickoff meeting on April 29, 2016, the planning team confirmed a list of candidates representing interests within the Planning Area that would qualify as a stakeholder as defined in Section 3.2. The planning team reached out to these candidates via email to determine their level of interest in becoming a participatory stakeholder in the planning process. Those candidates that agreed to fully participate in the process became members of the Steering Committee, while those that did not were considered to be coordinating stakeholders. The planning team confirmed a committee of 16 members by the June 10, 2016 Steering Committee meeting. Table 3-1 lists the Steering Committee members.

Table 3-1. Steering Committee Members

Name	Title	Jurisdiction/Agency
Vince Belloni	Maintenance, Operations, Transportation, Facilities Director	Newark Unified School District
Mike Berke	Volunteer	Newark Community Emergency Response Team
Robert Costa	Maintenance Superintendent	City of Newark
Terrence Grindall[a]	Assistant City Manager	City of Newark
Lee Guio	Volunteer	Union City Community Emergency Response Team
Hilda Hurtado	Emergency Manager	Alameda County Fire Department
Chomnan Loth	Police Officer	City of Newark Police Department
Joan Malloy[a]	Director	Economic and Community Development—Union City
Mike Marzano	Safety Program Manager	Union Sanitary District
Richard Sealana	Volunteer	American Red Cross
Steve Peterson	Operations and Maintenance Manager	Alameda County Water District
Les Putnam	Senior Public Safety Specialist	Pacific Gas & Electric
Jason Rodgers	Maintenance and Operations Director	New Haven Unified School District
Thomas Ruark	City Engineer	City of Union City
Travis Souza	Police Officer	City of Union City Police Department
Moses Tsang	Flood Control Design	Alameda County Flood Control and Water Conservation District

a. Co-chair

Leadership roles and ground rules were established during the Steering Committee’s meeting on July 13, 2016. The Steering Committee agreed to meet once a month as needed throughout the course of the plan’s development. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on an established work plan. The Steering Committee met six times from June 2016 through December 2016. All Steering Committee meetings were open to the public and agendas and meeting notes were posted to the hazard mitigation plan website. Meeting agendas, notes and attendance logs are available for review upon request.

The Steering Committee included key planning partner staff, citizens, and other stakeholders from within the Planning Area. Members combined expertise in preventive measures, property protection, natural resource protection, emergency services, structural flood control projects, public safety, and public information. They applied their expertise on behalf of both cities and all districts participating in the plan process.

3.4 ESTABLISHMENT OF THE PLANNING PARTNERSHIP

Hazard mitigation planning enhances collaboration among diverse parties whose interests can be affected by hazard losses. It should be noted that special purpose districts that have junior taxing authority qualify as "local governments" as defined by section 201.2, 44CFR. The planning team introduced the idea that special districts could participate as planning partners during the first Steering Committee meeting on June 10, 2016. Based on direction from the Steering Committee, it was determined that the cities would expand the coverage of the plan to include special purpose districts that own or operate critical facilities and/or infrastructure within the two cities. In June 2016 Union City and Newark notified all eligible special districts within the Planning Area of the pending planning process and invited them to formally participate. All special districts were asked to identify planning points of contact to serve as planning partners and represent the interests of their district.

A follow-up to the Steering Committee meeting was sent via email on June 17, 2016 with potential planning partners. This follow-up served to outline planning partner expectations and to seek commitment from partners. Each jurisdiction that wished to be a planning partner was asked to provide a "letter of intent to participate" that designated a point of contact for the jurisdiction and confirmed the jurisdiction's commitment to the process and understanding of expectations.

The municipal planning partners covered under this plan are shown in Table 3-2. The special district planning partners are shown in Table 3-3. Together these five jurisdictions make up the Planning Partnership for the HMP. While all participating jurisdictions authorized the Steering Committee to carry out certain activities on their behalf, all planning partners were invited to attend and participate in all aspects of the plan update process. Linkage procedures have been established (see Volume 2 of this plan) for any jurisdiction wishing to link to the *Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan* in the future.

Table 3-2. Municipal Planning Partners

Jurisdiction	Point of Contact	Title
Union City	Joan Malloy	Economic and Community Development Director
Newark	Terrence Grindall	Assistant City Manager

Table 3-3. Special District Planning Partners

Special District	Point of Contact	Title
Alameda County Water District	Jacob Reed	Emergency Manager
Newark Unified School District	Vince Belloni	Maintenance, Operations, Transportation, Facilities Director
Union Sanitary District	Mike Marzano	Safety Program Manager

3.5 DEFINING THE PLANNING AREA

The Planning Area was defined as the jurisdictional boundaries of Union City and Newark, located in Alameda County, California, as well as the jurisdictional boundaries of Alameda County Water District, Newark Unified School District and Union Sanitary District, which own and operate facilities located in the Cities of Union City and Newark and outside of these city corporate limits. The Planning Area was defined by the maximum extent of the jurisdictional authority of each planning partner participating in the process. It should be noted that general building stock assessments for the Planning Area were limited to the jurisdictional boundaries of the incorporated cities, while the critical facility assessment was expanded to include the full service area of participating special purpose districts. This distinction is shown on all mapping conducted as a part of this planning process and was pursued to accurately portray the jurisdictional authority of the planning partners within the Planning Area.

The Planning Area is bounded by the City of Hayward on the north, a regional park and wilderness area to the northeast, east, and southeast, the City of Fremont to the south, and the San Francisco Bay and salt marshes to the west. The southern half of the Planning Area is an enclave, surrounded entirely by the City of Fremont. Relevant Planning Area characteristics are described in Chapter 4. Figure 3-1 shows the defined planning area for the plan development process. It is important to note that the Newark Unified School District boundaries are contiguous with the City of Newark corporate limits.

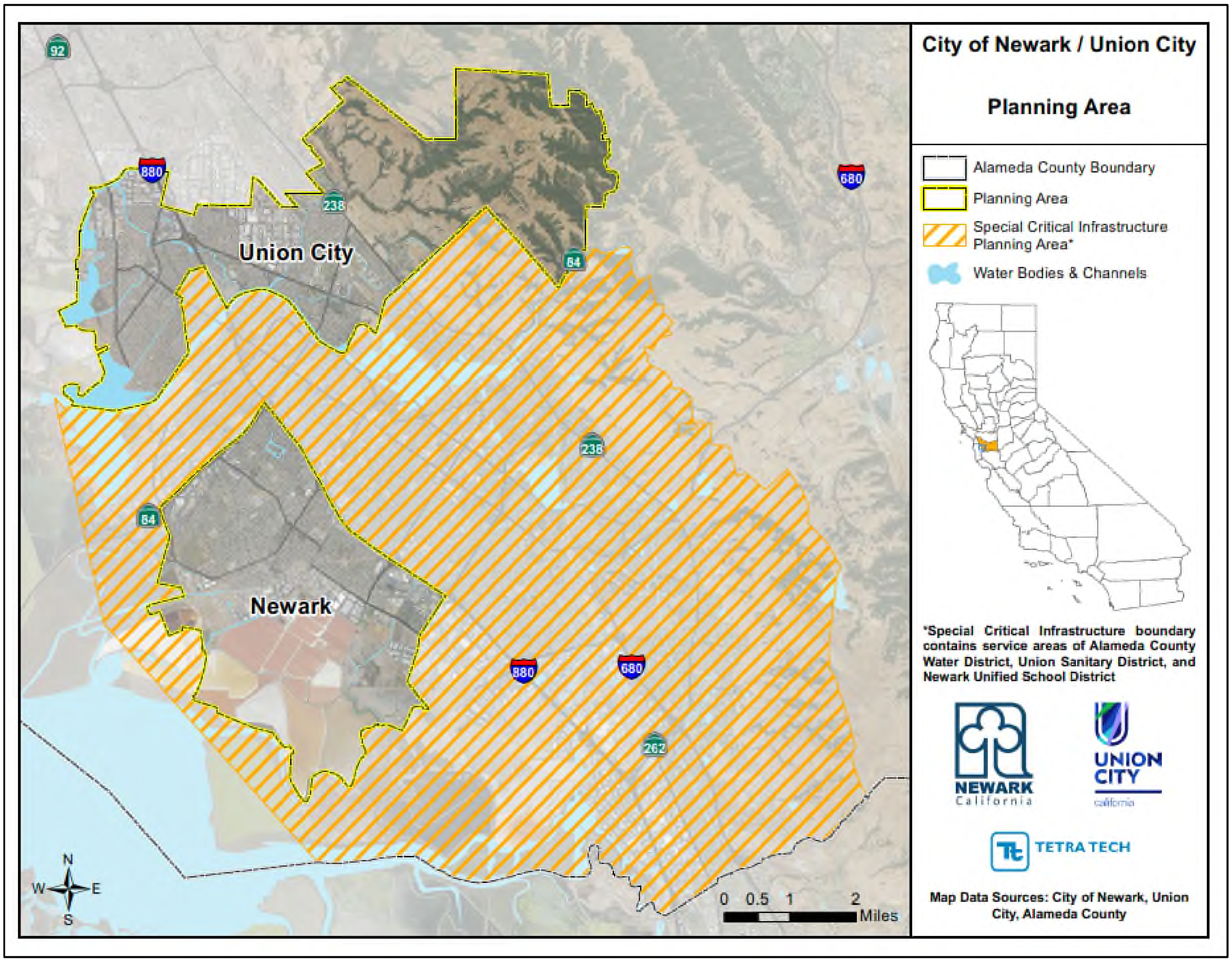


Figure 3-1. Defined Planning Area

3.6 COORDINATION WITH OTHER AGENCIES

Opportunities for involvement in the planning process must be provided to neighboring communities, local and regional agencies involved in hazard mitigation, agencies with authority to regulate development, businesses, academia, and other private and nonprofit interests (44 CFR, Section 201.6(b)(2)). The planning team accomplished this task as follows:

- **Steering Committee Involvement**—Identified participatory stakeholders were invited to participate on the Steering Committee by formal invitation from the planning team via email.
- **Agency Notification**—The following agencies and contacts were invited to participate in the plan development process from the beginning and were kept apprised of plan development milestones through

regular participation as full Steering Committee members. These were considered coordinating stakeholders as defined in Section 3.2:

- FEMA Region XI, Lead Community Planner
- Cal OES, Emergency Services Coordinator
- CA Department of Water Resources, CA State NFIP Coordinator
- Cal FIRE, Fire Resource Assessment Program
- USGS, Science Advisor
- Alameda County Fire Department, Public Information Officer
- Alameda County Flood Control and Water Conservation District, Engineering
- Alameda County Office of Emergency Services, OES Commanding Officer
- American Red Cross, Santa Clara Valley Chapter
- Newark Community Emergency Response Team, via Newark FD (Alameda Co. Fire)
- Union City Community Emergency Response Team, via Union City Fire (Alameda Co. Fire)

- **Pre-Adoption Review**—All of the agencies listed above were provided an opportunity to review and comment on this plan through Steering Committee review and the hazard mitigation plan website (see Section 3.8). Additionally, the following entities were notified of the draft plan public comment period and were invited to provide feedback:

  - The City of Hayward
  - The City of Fremont
  - Pacific Gas & Electric
  - San Francisco Bay Area Urban Area Security Initiative
  - National Weather Service.

Each agency was sent an email message informing them that draft portions of the plan were available for review. In addition, the complete draft plan was sent to Cal OES and FEMA Region IX for a pre-adoption review to ensure program compliance. Comments on the draft plan were received from FEMA staff who conducted a courtesy review and provided feedback for incorporation into the plan prior to the pre-adoption review. Comments provided by FEMA have been addressed, where appropriate. A distribution list was maintained by the planning team for this task and is available for review upon request.

3.7 REVIEW OF EXISTING PROGRAMS

Hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports and technical information (44 CFR, Section 201.6(b)(3)). Section 4.8 provides a review of laws and ordinances in effect within the Planning Area that can affect hazard mitigation actions. In addition, the following programs can affect mitigation within the Planning Area:

- California Fire Code
- 2016 California Building Code
- California State Hazard Mitigation Forum
- Five-year and biennial capital improvement programs
- Local emergency operations plans
- Local general plans
- Local strategic plans
- Housing elements
- Safety elements
- Local zoning ordinances
- Climate action plans.

An assessment of all planning partners' regulatory, technical and financial capabilities to implement hazard mitigation actions is presented in the jurisdiction-specific annexes in Volume 2.

3.8 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the Planning Area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44 CFR, Section 201.6(b)(1)). This section details the outreach to, and involvement of, the many agencies, departments, organizations, non-profit organizations, districts, authorities and other entities that have a stake in managing hazard risk and mitigation, commonly referred to as stakeholders.

3.8.1 Strategy

The strategy for involving the public in this plan emphasized the following elements:

- Include members of the public on the Steering Committee.
- Use a survey to determine if the public's perception of risk and support of hazard mitigation has changed since the initial planning process.
- Attempt to reach as many Planning Area citizens as possible using multiple media.
- Identify and involve Planning Area stakeholders.

Diligent efforts were made to ensure broad regional, county, and local representation in this planning process. Stakeholder outreach was performed early and throughout the planning process. In addition to mass media notification efforts, identified stakeholders were invited to attend meetings and provide input on draft documents. Information and input provided by these stakeholders has been included throughout this plan where appropriate.

Public Outreach

The sections below describe Steering Committee and planning team efforts toward public outreach throughout the development and review of the HMP.

Survey

A hazard mitigation plan survey (see Figure 3-) was developed for this planning process. The survey was used to gauge household preparedness for natural hazards and the level of knowledge of tools and techniques that assist in reducing risk and loss from natural hazards. This survey was designed to help identify areas vulnerable to one or more natural hazards. The responses to its 25 questions helped guide the Planning Partners in selecting mitigation strategies. The survey was made available on the hazard mitigation plan website. Over 200 surveys were completed during the course of this planning process. The complete survey and a summary of its findings can be found in Appendix A of this volume.

The results of this survey were provided to each of the planning partners in the toolkits used to support the Jurisdictional Annex Process (See volume 2, section 1.3.2). Each planning partner was able to use the survey results to help them identify actions as follows:

- Gauge the public's perception of risk and identify what citizens are concerned about
- Identify the best ways to communicate with the public
- Determine the level of public support for the different mitigation strategies
- Understand the public's willingness to invest in hazard mitigation.

Informational Booths

Informational booths were staffed on September 18, 2016 in Newark as part of the annual Newark Days Festival, and on October 8, 2016 in Union City as part of the Alvarado Historic District Arts & Wine Fest (see Figure 3-3 through Figure 3-). During these events, project team members spoke with members of the public about the project and invited them to take the survey and visit the project website. Members of the public were invited to receive a personalized risk assessment based on the project risk assessment results. A Hazus-MH workstation allowed citizens to see information on their property, including exposure and damage estimates for earthquake and flood hazard events. Participating property owners were provided printouts of this information for their properties.

Public Meetings

On October 13, 2016, a project review and status update was presented to the Newark Disaster Council and attending members of the public. The presentation outlined information on the purpose of the plan, the components of the plan, and next steps for plan completion. A flyer inviting the public to take part in the public survey was also provided at this meeting.

During the public comment period, three public meetings were held in conjunction with regularly scheduled committee or council meetings. On December 8, 2016, the completed draft plan was reviewed during a Newark Disaster Council meeting. On December 14, 2016, the draft plan was discussed during the regularly scheduled Steering Committee meeting at the Silliman Center in Newark. On December 15, 2016, the draft plan was presented to the Union City Disaster Council. All three of these events were open and advertised to the public. During each event, a flyer was provided to members of the public encouraging them to visit the project website to review the plan. The flyer included a link to a form for submitting public comments on the plan.

Press Releases

The planning team distributed press releases over the course of the plan's development as key milestones were achieved and prior to each public meeting. All planning partners were also encouraged to distribute press releases on the project. As a result, the planning effort received the following press coverage:

- August 1, 2016—Announcement of the commencement of the project and invitation to the public to take the survey and visit the project website.
- September 7, 2016—Announcement regarding the two informational booths (Newark Days in Newark and the Alvarado Historic District Arts & Wine Festival in Union City).
- December 2, 2016—Announcement of the commencement of the public review period and invitation to the public to review the draft at the project website.

Copies of these announcements may be found in Appendix A.

Internet

At the beginning of the plan development process, a website was created to keep the public posted on plan development milestones and to solicit relevant input (see Figure 3-2). The site's address (www.uc-newark-hmp.com) was publicized in all press releases, mailings, surveys and public meetings. Information on the plan development process, the Steering Committee, the survey and phased drafts of the plan was made available to the public on the site throughout the process. Union City and Newark intend to keep a website active after the plan's completion to keep the public informed about successful mitigation projects and future plan updates.

As part of this website, visitors were encouraged to sign up for project update emails. Two members of the public signed up for continued information through this mailing list. These members received notices of upcoming public meetings and scheduled changes.

Union City and Newark Multi-Jurisdiction Mitigation Plan

Hazard Mitigation Survey

The cities of Union City and Newark are developing a joint Hazard Mitigation Plan and we need your help in the planning process! Are you ready for an emergency? This survey will help us to understand our community perception of risk and steps you have taken to minimize the impacts of hazards in your neighborhood.

1. What hazards have you personally experienced? (check all that apply)

- ☐ Climate change
- ☐ Dam failure
- ☐ Drought
- ☐ Earthquake (including ground shaking and/or liquefaction)
- ☐ Flood
- ☐ Landslide
- ☐ Severe weather (including extreme heat, thunderstorms, heavy rains, high winds)
- ☐ Wildfire

Figure 3-2. Hazard Mitigation Survey

Figure 3-3. Newark Days

Figure 3-4. Alvarado Historic District Arts and Wine Fest

Figure 3-5. Residents Receive a Risk Assessment

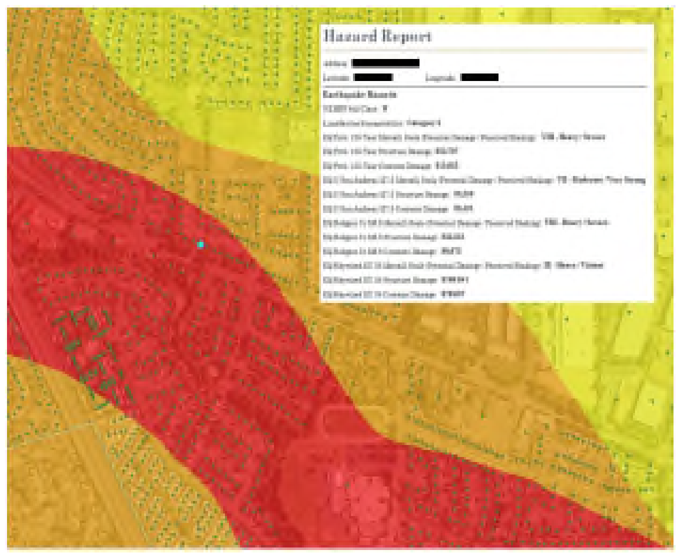


Figure 3-6. Sample Risk Assessment

Figure 3-2. Hazard Mitigation Plan Web Site Homepage

3.8.2 Public Involvement Results

The public involvement strategy used for this HMP update introduced the concept of mitigation to the public and provided the Steering Committee with feedback to use in developing the plan. All citizens of the Planning Area were provided opportunities to participate and give feedback during all phases of the planning process. Table 3-4 provides a summary of public meetings held in support of this project.

Table 3-4. Summary of Public Meetings and Comments

Date	Location	Number of Public Contacts	Number of Written Comments Received
9/18/16	Newark Days	30+	N/A
10/8/16	Arts & Wine Fest	50+	N/A
10/13/16	Newark Disaster Council	2	N/A
12/8/16	Newark Disaster Council—Public Draft	2	2[a]
12/14/16	Steering Committee Meeting—Public Draft	1	None
12/15/16	Union City Disaster Council—Public Draft	1	1[a]
12/2/16 – 12/23/16	Public Comment Survey	N/A	1
Total			**4**

a. Written comment completed via online submission form by member of public who attended public meeting

During the public comment period, the Steering Committee received five public draft comments. Copies of these comments and the planning team response is available in Appendix A. Specific revisions to the plan were made as a result of comments received during the public period:

- A brief discussion on Reverse 9-1-1 system was added to the City of Newark's annex under "Additional Comments."
- The Seven Hill neighborhood in Union City was added to "Jurisdiction-Specific Vulnerabilities" in the Union City annex.

3.8.3 Continued Public Involvement

Union City and Newark are committed to the continued involvement of the public in hazard mitigation. Therefore, the draft HMP will be made available for review on the mitigation website. After the HMP has been completed, implementation and ongoing maintenance will become a function of the Planning Partnership. The Planning Partnership will be responsible for reviewing the HMP and accepting public comment as part of a mid-term review and as part of the five-year mitigation plan update process.

3.9 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

A summary of Planning Partnership activities, including Steering Committee meetings held during development of this HMP, is included in Table 3-5. This summary table identifies only the formal meetings and milestone events held during the planning process. It does not reflect all planning activities conducted by individuals and groups throughout the entire planning process. Documentation of meetings (agendas, sign-in sheets, and meeting notes) can be found in Appendix B. In addition to these meetings, there was a great deal of communication between Steering Committee and planning team members through individual meetings, phone calls, and e-mail.

Table 3-5. Plan Development Chronology/Milestones

Date	Event	Description	Attendance
2016			
4/29	Kickoff event with Union City and Newark	Initial project review, identification of relevant stakeholders for Steering Committee and Planning Partnership, overview of planning milestones, and Q&A about the process	10 SH
6/10	Steering Committee Meeting #1	Establish Steering Committee charter, review the planning process and plan purpose, identify opportunities for public engagement	20 SH
7/1	Website Launch	Public website for project goes live	N/A
7/13	Steering Committee Meeting #2	Confirm Steering Committee members, review state and previous ABAG HMPs, confirm hazards, confirm guiding principle and goals, discuss public outreach	16 SCM, 2 SME
8/1	Project Press Release #1	Press release announcing the project and inviting public to attend Steering Committee meetings, visit the project website, and take the survey	N/A
8/10	Steering Committee Meeting #3	Planning Partner update; risk assessment update; discuss previous actions, capability assessment, and plan maintenance; confirmation of public meetings in late September and early October	13 SCM, 3 SME
9/7	Project Press Release #2	Press release announcing informational booths for Newark Days and Arts and Wine Fest events.	N/A
9/14	Steering Committee Meeting #4	Planning Partner update, confirm objectives and plan maintenance, conduct session on strengths, weaknesses, obstacles and opportunities	12 SCM, 2 SME
9/18	Newark Days—Mitigation Informational Booth	Hazard mitigation information booth as part of the annual Newark Days celebration. Earthquake and flood maps available for review, Hazus workstation established to provide personalized property risk assessments based on HMP data.	30+ MP, 3 SCM
10/5	Newark Annex Workshop	Review previous actions, review community overview and capability assessment, discuss risk ranking, action plan, and benefit-cost review/prioritization	2 PP
10/6	Union City Annex Workshop	Review previous actions, review community overview and capability assessment, discuss risk ranking, action plan, and benefit-cost review/prioritization	4 PP
10/08	Alvarado Historic District Arts and Wine Fest—Mitigation Informational Booth	Hazard mitigation information booth as part of the annual Arts and Wine Fest in Union City. Earthquake and flood maps available for review, Hazus workstation established to provide personalized property risk assessments based on HMP data.	50+ MP, 4 SCM
10/11	District Jurisdictional Workshop	Overview of the jurisdictional annex template and guidance for completion, benefit-cost analysis overview, hazard risk ranking	5 PP
10/12	Steering Committee Meeting #5	Discuss the strengths, weaknesses, obstacles and opportunities session results, mitigation best practices, risk ranking results, annex workshops, and public outreach. Provide a plan completion timeline and outline Steering Committee review responsibilities.	10 SCM, 2 SME
10/13	Newark Disaster Council Meeting	The project was reviewed for the Newark Disaster Council and for attending members of the public.	12 MP, 4 SCM
12/2	Project Press Release #3	Members of the public are invited to review and comment on the draft plan. The period opens with a press release and social media campaign.	N/A
12/2	Public Comment Period Begins	The draft plan is posted on the public website. Outside stakeholders are directed to the website to review and comment on the draft plan in conjunction with the public comment period.	N/A
12/8	Newark Public Draft Meeting	Newark Disaster Council convenes to publicly discuss the draft hazard mitigation plan.	7 PP, 2 MP, 3 SCM
12/14	Steering Committee Meeting #6	The HMP Steering Committee convenes to publicly discuss the draft hazard mitigation plan.	10 SCM, 1 MP
12/15	Union City Public Draft Meeting	Union City Disaster Council convenes to publicly discuss the draft hazard mitigation plan.	4 SCM, 1 MP
12/23	Public Comment Ends	The public comment period for the draft plan ends	N/A

Date	Event	Description	Attendance
12/29	Plan Submission	HMP submitted for pre-approval review to Cal OES and FEMA	N/A
2017			
4/17	Plan Review Comments	Plan review comments received from Cal OES	N/A
X/X	APA Designation from FEMA	FEMA approves the HMP pending local jurisdictional adoption by appropriate councils and boards	N/A

APA = Approval Pending Adoption; MP = Members of Public; PP = Planning Partners; SCM = Steering Committee; SH = Stakeholders; SME = Subject Matter Experts

4. COMMUNITY PROFILE

4.1 GEOGRAPHIC OVERVIEW

The Union City/Newark Planning Area is in the San Francisco Bay area along the central coast of California, east of San Francisco and north of San Jose. The cities of Union City and Newark are located in Alameda County along the eastern shore of the San Francisco Bay. The City of Newark is surrounded by the City of Fremont, which creates some of the southern boundary for the City of Union City. Union City is bounded to the north by the larger City of Hayward. Figure 4-1 shows the Planning Area and its municipalities.

The southern end of the San Francisco Bay lies near the western edge of Newark. Alameda Creek is a large perennial stream that runs through Union City and empties into the San Francisco Bay in the City of Hayward. State Route 84 runs northeast to southwest through Newark, and continues as the Dumbarton Bridge to cross the San Francisco Bay to reach Menlo Park. Interstate 880 serves as the eastern boundary between Newark and Fremont, and continues northwester to cross the western third of Union City (Newark 2013; Union City 2012).

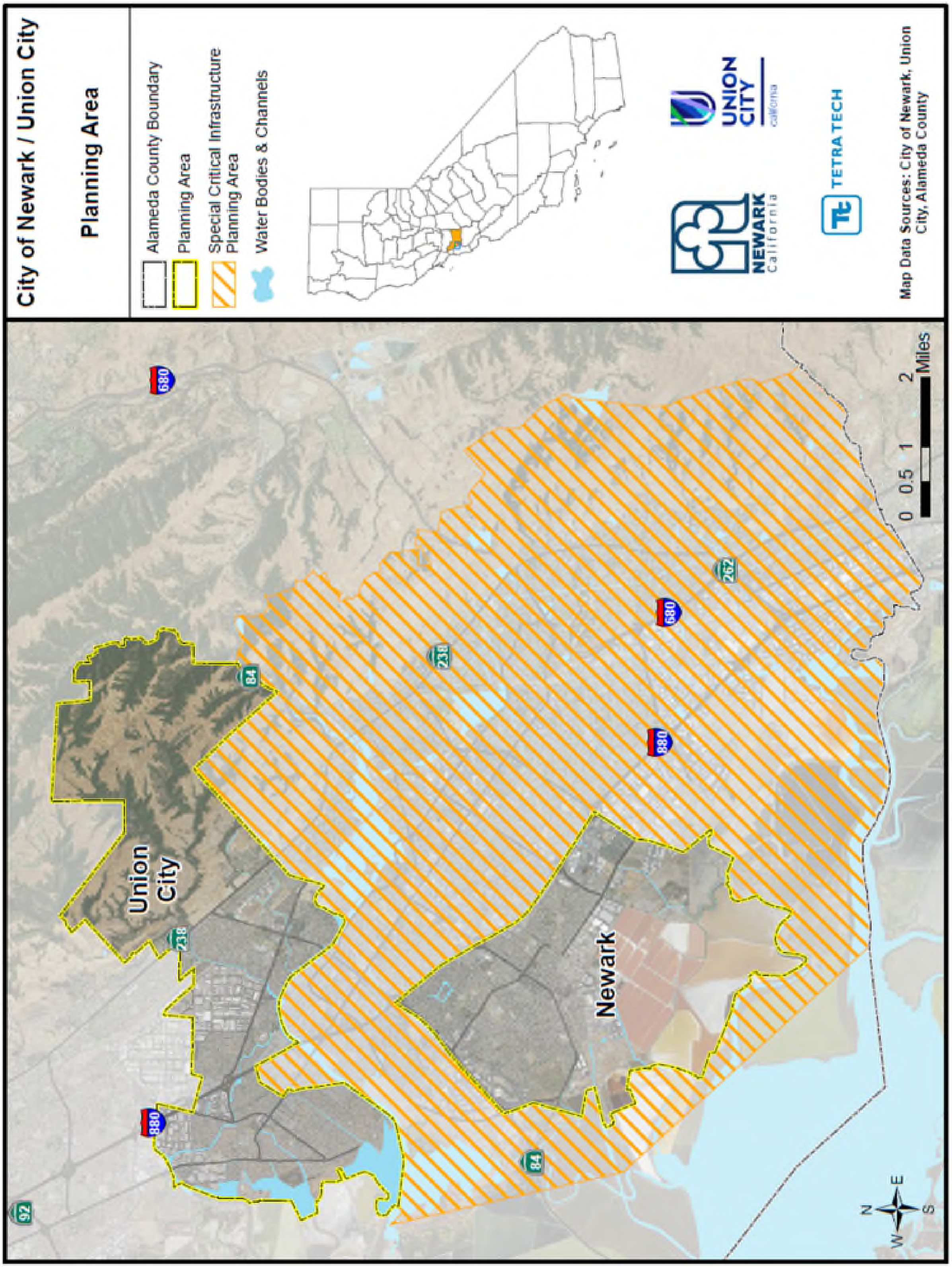
The Union City/Newark Planning Area has an area of 32.9 square miles, of which 0.02 square miles is water. The mean elevation above sea level ranges from 20 feet in the southern portion to 147 feet in the northern portion.

Although the Planning Area is primarily urban with densely populated neighborhoods, it is surrounded by open lands and lies adjacent to the Eden Landing Ecological Reserve on the northwest, Dry Creek Regional Park on the northeast, Quarry Lakes Regional Recreation Area on the southeast, and Don Edwards San Francisco Bay National Wildlife Refuge on the southwest (Newark 2013; Union City 2016).

4.2 HISTORICAL OVERVIEW

For thousands of years until the arrival of Spanish settlers in the late 1700s, the Ohlone people, also referred to as Costanoans (the Spanish word for "coast"), lived in and around the Planning Area. Living in small villages, they survived on the abundance of natural resources, including acorns from oak trees and shellfish in the bay. Mission San Jose was founded on June 11, 1797, by Father Fermín Francisco de Lasuén. It was the 14th of the 21 Spanish missions in what is now the western United States. The missionaries required the Indians to move to the mission, and this disruption, as well as new diseases the Spanish brought, destroyed the Indian way of life even before the influx of gold seekers in the mid-1800s (Alameda County Library 2016).

After 1822, Mexico succeeded Spain in jurisdiction over Alta California. Beginning in 1839, the former mission lands were secularized and broken up into large ranchos as the result of grants to citizens by Mexico. California became part of the United States as a consequence of the Mexican War of 1846–1847. The territory was formally ceded in the treaty of Guadalupe Hidalgo in 1848 and was admitted as a state in 1850. Pressure from the United States was a major factor leading to the disintegration of Mexican control in California, and settlement by United States citizens began in earnest by 1841, with surges in population after gold was discovered there in 1848. The Central Pacific Railroad, the first transcontinental railroad, was completed in 1869, resulting in the establishment of more towns.



Source: City of Newark, City of Union City, Alameda County 2016

Figure 4-1. Main Features of Planning Area

Settlement increased and the big ranchos began to be broken up after 1850. Ranchos were broken up into smaller ranches, occupied by U.S. citizens. Alameda County was formed on March 25, 1853, from portions of Contra Costa County and Santa Clara County. Townships, which were eventually incorporated into cities, flourished with agriculture, viticulture, industry, and small businesses between the Gold Rush (1848–1855) and 1956. In 1909, the route of the Central Pacific Railroad (by this time known as the Southern Pacific Railroad), was joined by a parallel line, the Western Pacific Railroad.

In 1925, the section of the Lincoln Highway through the area (by 1874 known as Dublin Road) was incorporated into the U.S. Highway system as U.S. Highway 50. In 1928, it was also designated State Route 84. By 1953, U.S. Highway 50 had become a divided four-lane road; I-680 was completed in 1967. By 1973, U.S. Highway 50 had become I-580. Prior to the 1950s, small agricultural towns whose history and economy were integrated with those of the agricultural areas around them grew. Since the 1950s, urbanization of the area has grown across former agricultural land, so that the urban and suburban worlds now dominate the area (Alameda County CDC 2005).

4.3 MAJOR PAST HAZARD EVENTS

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. Some of the programs are matched by state programs. Since 1953, 15 presidential disaster declarations have been issued for Alameda County, as listed in Table 4-1.

Table 4-1. Presidential Disaster Declarations

Type of Event	FEMA Disaster Number	Declaration Date
Severe Winter Storms, Flooding, Landslides, Mud Flows	DR-1646	June 5, 2006
Severe Winter Storms, Flooding, Landslides, Mud Flows	DR-1628	February 3, 2006
Severe Winter Storms, Flooding	DR-1203	February 9, 1998
Severe Winter Storms, Flooding	DR-1155	January 4, 1997
Severe Winter Storms, Flooding, Landslides, Mud Flows	DR-1046	March 12, 1995
Severe Winter Storms, Flooding, Landslides, Mud Flows	DR-1044	January 10, 1995
Oakland Hills Fire	DR-919	October 22, 1991
Severe Freeze	DR-894	February 11, 1991
Loma Prieta Earthquake	DR-845	October 17, 1989
Severe Storms, Flooding	DR-758	February 12, 1986
Coastal Storms, Floods, Slides, Tornadoes	DR-677	January 21, 1983
Severe Storms, Flood, Mudslides, High Tide	DR-651	January 7, 1982
Drought	EM-3023	January 20, 1977
Forest, Brush Fires	DR-295	September 29, 1970
Severe Storms, Flooding	DR-283	February 16, 1970

Source: FEMA 2016

Review of these events helps identify targets for risk reduction and ways to increase a community's capability to mitigate damage from large-scale events in the future. Still, many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern.

4.4 PHYSICAL SETTING

4.4.1 Topography and Geology

Over time, the motion of major tectonic plates has shaped the San Francisco Bay region, creating the varied mountainous, valley, and fault-bound blocks seen in the area today. The Planning Area's topography is characterized by a broad, shallow, alluvial depression near the southeastern margin of San Francisco Bay.

Northern Planning Area (Union City)

The Hayward fault zone (just east of Mission Boulevard) runs northwest through the northern portion of the Planning Area and separates two distinct geologic regions. The northwestern, urbanized half of the Planning Area is characterized by low-lying, gently sloping and nearly level alluvial and estuarine landforms that surround the San Francisco Bay. The eastern open space and agricultural half lies east of the Hayward fault zone and is characterized by strong sloping and steep upland landforms of the northwest-trending East Bay Hills. Urban development on these upland areas is limited due to the steep slopes, which are highly susceptible to erosion and landsliding (Union City 2016).

West of the Hayward fault zone, alluvial soils and their physical attributes make urban development susceptible to various types of ground-failures, including settlement, differential settlement, subsidence, and earthquake-induced liquefaction. Soils with high shrink-swell potential also are thicker and more extensive on the alluvial landforms west of the Hayward fault zone. Because of these conditions, urban development in these areas are built to high seismic and other regulatory standards. Soils on the nearly level floodplains and tidal flats that occupy the westernmost portions in the northern part of the Planning Area consist of very deep, poorly-drained clays and silty clays formed from fine-grained alluvium. These soils have slow permeability and no hazard of erosion unless distributed, and are often moderately alkaline.

Southern Planning Area (Newark)

Geological conditions in the southern portion of the Planning Area have been mapped by the USGS. Most of the developed portion is built on alluvial fan deposits, consisting of sandy clay. Areas closer to the bay consist of floodplain deposits with sandy or silty clay. There is no exposed rock in the southern portion; the closest bedrock outcrops are in the Coyote Hills, about a mile to the northwest. Although there are no earthquake faults in the southern portion of the Planning Area, several faults capable of major earthquakes are nearby. The Planning Area's southern portion is comparatively flat, sloping gently from 37 feet above mean sea level to 5 feet below sea level in the marshes near the Bay shoreline. There are no significant hills, steep slopes, or landslide hazard areas within the area (Newark 2013).

The southern portion of the Planning Area has loose, saturated, fine-grained sands with shallow groundwater and subject to liquefaction. Many of the areas susceptible to liquefaction are nearest to the bay, along sloughs, or on artificial fill. The marshland areas are underlain by estuarine deposits such as Bay Mud, with a thickness that may exceed 60 feet (Union City 2016).

4.4.2 Hydrology

The most significant surface water in the Planning Area is Alameda Creek, one of the main tributaries to San Francisco Bay, draining 633 square miles of land. The Planning Area lies within watersheds in the lower drainage area of Alameda Creek—Union City is in the East Bay Cities Watershed, and Newark is in the Newark Slough Watershed. The creek forms part of the southern city boundary of Union City and enters San Francisco Bay west of Union City, in a flood control channel. Water from Alameda Creek is used for groundwater recharge in the Niles Cone groundwater basin before it discharges into San Francisco Bay (Newark 2013). Figure 4-2 shows watersheds and major water bodies in the Planning Area.

Source: City of Newark, Union City, Alameda County, Cal Fire 2016

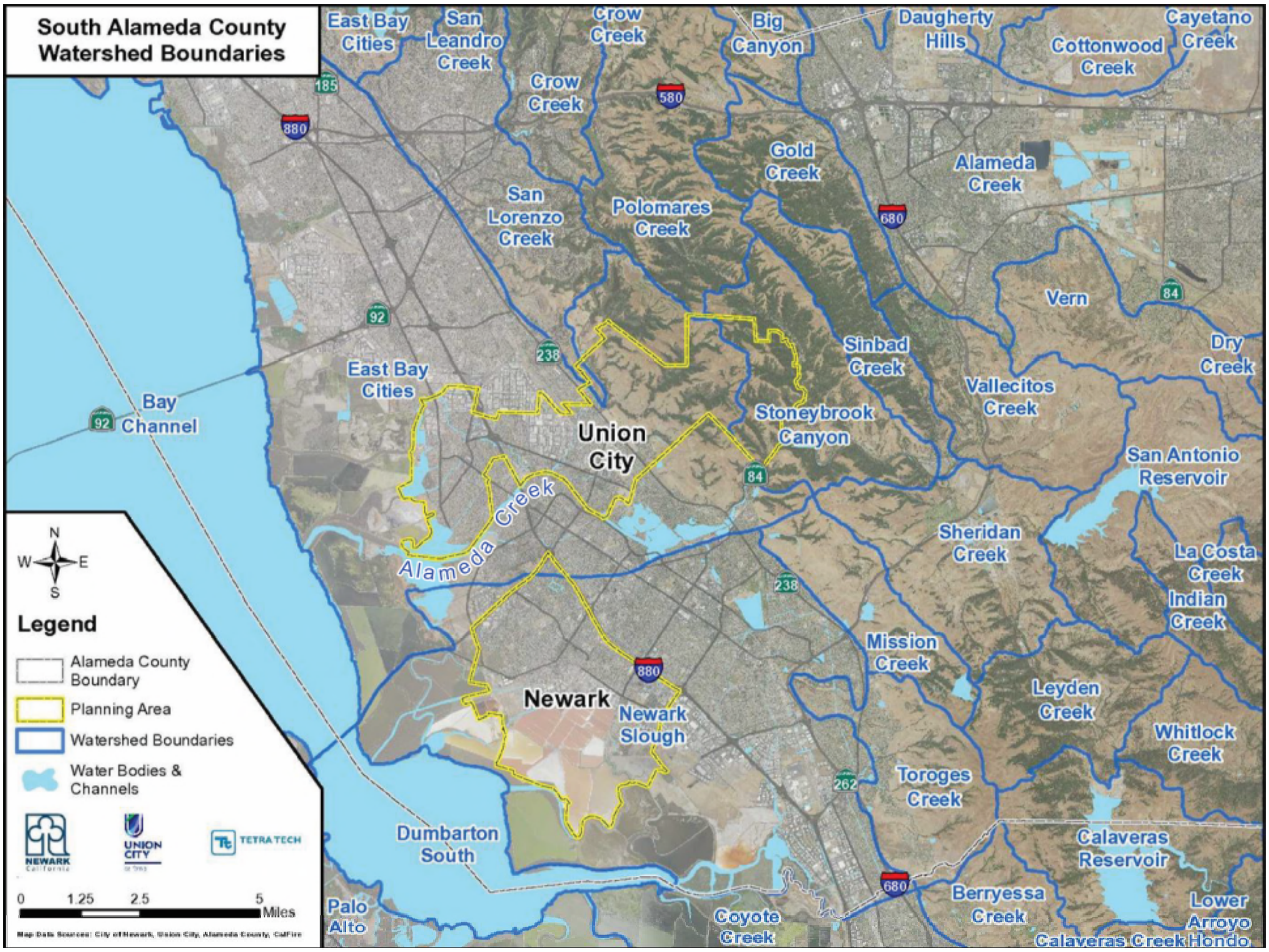


Figure 4-2. Watersheds and Water Bodies in the Planning Area

4.4.3 Climate

The climate of the Planning Area is moderated by its proximity to the San Francisco Bay, with average annual temperatures ranging from 49.9 °Fahrenheit (F) in January to 67.9 °F in August.

Climate records from the NOAA National Weather Service Forecast Office describe the region's climate as Mediterranean type. This classification is characterized by sharply contrasting wet and dry seasons, with the wet season from November through March bringing more than 80 percent of the total annual precipitation. Rainfall is sparse from May through October (NOAA 1999). Mean precipitation in June, July and August in Newark normally totals only 0.14 inches. Wet seasons are cool but mild, with mean monthly temperatures of 49.9 °F in January to 56.1 °F in March. Dry season weather is very consistent, with warm sunny days and average temperatures reaching 77 °F or higher in June, July and August (WRCC 2010). Average temperature and precipitation across the Planning Area are shown in Table 4-2.

Table 4-2. Normal Precipitation and Temperatures in Planning Area

	Precipitation (inches)	Minimum Temperature (ºF)	Maximum Temperature (ºF)
January	3.0	42	58
February	3.0	45	61
March	2.3	48	65
April	1.0	50	67
May	0.5	53	71
June	0.1	56	75
July	0.0	58	77
August	0.0	59	77
September	0.2	57	77
October	0.8	54	73
November	1.7	48	64
December	2.6	42	58
TOTAL	**15.2**		

Source: Weather.com 2016

4.5 DEVELOPMENT PROFILE

4.5.1 Land Use

The Planning Area covers 32.9 square miles across the cities of Union City and Newark in Alameda County.

Union City

Union City, in the northern portion of the Planning Area, covers 19.4 square miles or 12,413 acres, and as of 2016 accommodated 21,431 housing units. Union City is characterized by two distinct land uses. Most of the City's developed areas are in the flat coastal plain to the west; the City's eastern hillsides are devoted mainly to permanent recreational open space and agricultural activities such as grazing. Physical constraints in and around Union City include saltwater marshes, the cities of Fremont and Hayward, and the hilly eastern topography (Union City 2016).

Single-family residential development is the predominant land use in Union City, with residential subdivisions scattered throughout the City and between major activity centers. Primary commercial and activity centers in Union City include but are not limited to Union Landing, the Four Corners (International Market Place), El Mercado and The Marketplace Commercial Centers, the Station District, the Alvarado-Niles corridor, the Decoto Road corridor, the Whipple Road corridor and the Old Alvarado district. There is also a substantial industrial presence in the city—the land devoted to light industrial activities serving as employment destinations for many Union City residents (Union City 2016).

Newark

The City of Newark, in the southern portion of the Planning Area, includes 1,800 acres of residential use (20.0 percent of the city), 375 acres of commercial use (4.2 percent of the city), and 930 acres of industrial or office use (10.3 percent of the city). Another 270 acres is in public or institutional use (3.0 percent of the city) and 1,130 acres consists of roads and other rights of way (12.6 percent of the city). The sum of these areas is roughly 4,500 acres, or 50 percent of the southern part of the Planning Area. The remaining 50 percent of land area consists of undeveloped or non-urbanized land. Of this total, approximately 960 acres is vacant and designated for development. The remaining 3,535 acres includes conservation open space (280 acres), agriculture (70 acres), public parkland and other improved open space (160 acres), and approximately 3,025 acres of land used for salt harvesting, refining, and production (Newark 2013). Salt harvesting, refining, and production represent about one-third of Newark's area. These have been important economic activities in the Planning Area since the City of Newark was settled and will continue to be a major community asset in the future.

Much of the commercial and industrial growth has been directed to locations that are well served by the freeways but at the edge of the city's residential neighborhoods. This has allowed the Planning Area to capture the tax benefits of commercial development and provide convenient services to residents while at the same time minimizing the impacts of traffic and noise on its neighborhoods (Newark 2013).

Summary

Table 4-3 shows current land use across the entire Planning Area. Land use information is analyzed in this plan for each identified hazard that has a defined spatial extent and location. For hazards that lack this spatial reference, the information in Table 4-3 serves as a baseline estimate of land use and exposure for the Planning Area. The distribution of land uses within the Planning Area will change over time.

Table 4-3. Present Land Use in Planning Area

Present Use Classification	Area (acres)	% of total
Commercial	1,327.1	6.2%
Industrial	2,008.7	9.4%
Public/Open Space	12,371.9	58.1%
Residential	5,602.4	26.3%
Total	**21,310.1**	**100.0%**

4.5.2 Critical Facilities and Infrastructure

Critical facilities and infrastructure are those that are essential to the health and welfare of the population. These become especially important after a hazard event. Critical facilities typically include police and fire stations, schools and emergency operations centers. Critical infrastructure can include the roads and bridges that provide ingress and egress and allow emergency vehicles access to those in need, and the utilities that provide water, electricity and communication services to the community. Also included are "Tier II" facilities and railroads, which hold or carry significant amounts of hazardous materials with a potential to impact public health and welfare in a hazard event. For this hazard mitigation plan a critical facilities is defined as follows:

> A structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities include potential shelters, transportation facilities, potential morgue facilities, private facilities, levees, health and safety facilities, utilities, government facilities, and hazardous materials facilities.

Figure 4-3 show the location of critical facilities and infrastructure in the Planning Area. Due to the sensitivity of this information, a detailed list of facilities is not provided. Table 4-4 provides summaries of the general types of critical facilities and infrastructure. All critical facilities/infrastructure were analyzed in Hazus to help rank risk and identify mitigation actions. The risk assessment for each hazard qualitatively discusses critical facilities with regard to that hazard.

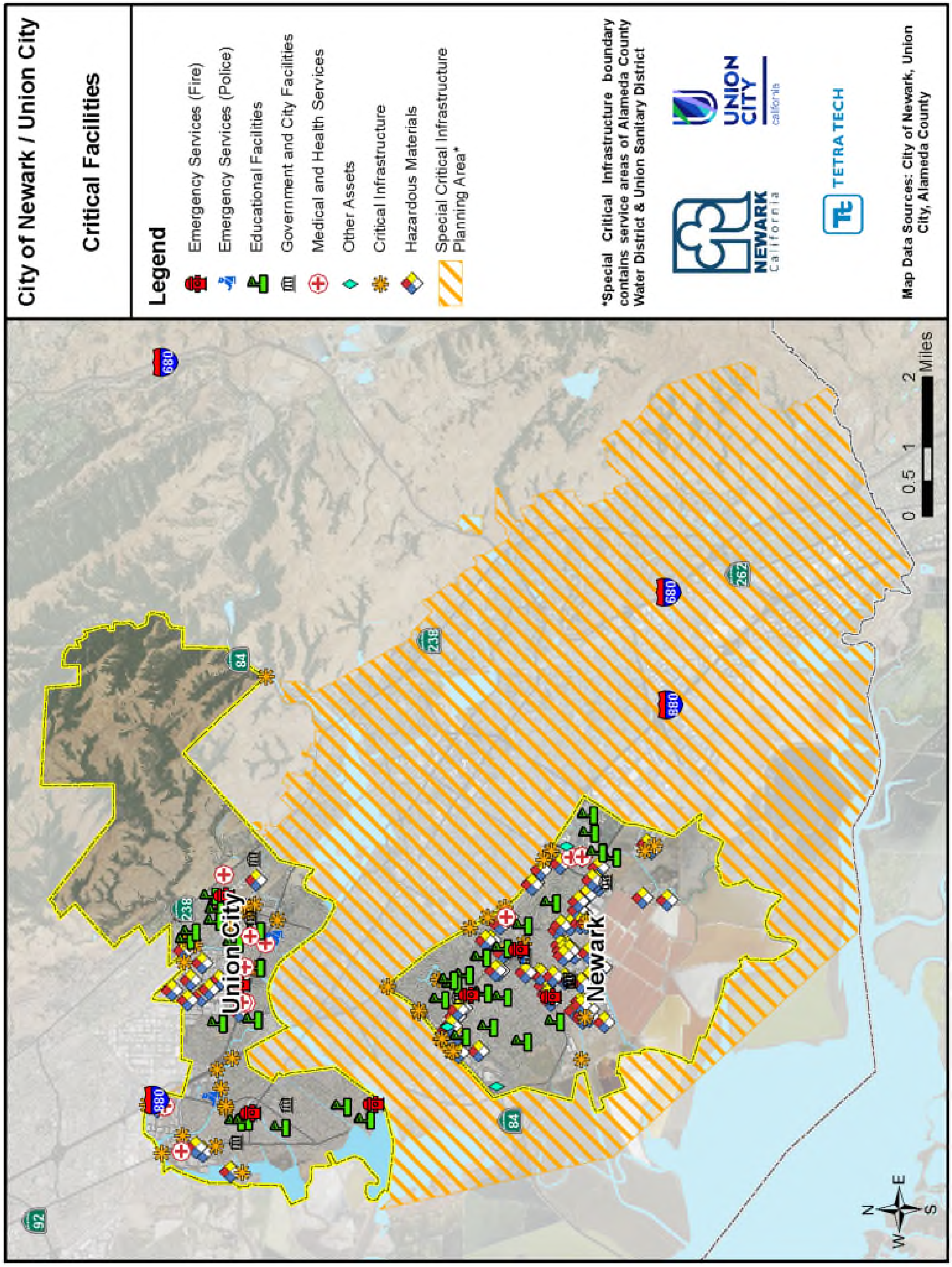


Figure 4-3. Critical Facilities in the Planning Area

Table 4-4. Planning Area Critical Facilities

	Number of Facilities								
	Medical and Health Services	Emergency Services	Educational Facilities	Government	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	3	4	19	5	13	15	65	3	**127**
Union City	9	6	15	7	12	21	16	0	**86**
Special District Facilities (Fremont)	0	0	0	0	90	0	0	0	**90**
Total	**12**	**10**	**34**	**12**	**115**	**36**	**81**	**3**	**303**

4.5.3 Future Trends in Development

The Planning Area municipal partners have adopted general and strategic plans to guide future growth, both local and area-wide, and ensure the orderly development of the community. Development forecasts and development trends assist in providing a long-term vision for the Planning Area's future and a strategy for achieving the desired vision. This plan aligns with these development programs and provides vital information on the risk associated with natural hazards in the Planning Area to support wise land use in the future.

The number of residential building permits reported in the Planning Area has fluctuated significantly from a high of 276 permits in 2006 to a low of three permits in both 2010 and 2011, then rising slowly in recent years for a total of 157 permits in 2015. In 2015, the City of Newark issued residential building permits for 109 buildings, adding 170 housing units, while the City of Union City issued 48 residential permits amounting to 290 units.

Figure 4-4 shows the trends in residential development projects in the Planning Area since 2005. Development trends specific to each city are found in Volume 2 under each appropriate jurisdictional annex.

Source: U.S. Bureau of the Census Building Permit Estimates—U.S., State, and Metropolitan Areas. http://www.census.gov/construction/bps/

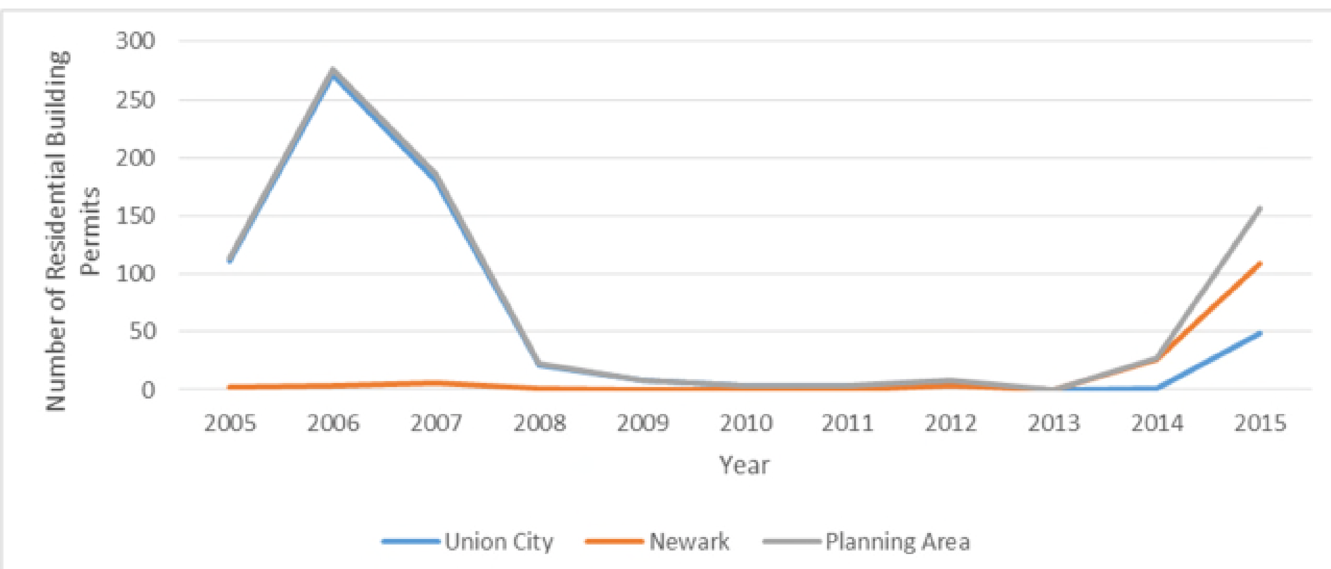


Figure 4-4. Residential Building Permit Trends, 2005 to 2015

The municipal partners will incorporate this hazard mitigation plan in their general plans by reference. This will ensure that future development trends can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this plan. Additionally, the planning partners intend to pursue the following:

- Discourage development within vulnerable areas, areas with high population density, and Special Flood Hazard Areas.
- Encourage higher regulatory standards at the local level.

Future development is expected to focus on infill as identified through current land use practices. Both Union City and Newark are largely built out, with little opportunity for new growth outside of current land use designations.

4.6 DEMOGRAPHICS

Some populations are at greater risk from hazard events because of decreased resources or physical abilities. Elderly people, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, the elderly (especially older single men), people with disabilities, women, children, ethnic minorities and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would help to extend focused public outreach and education to these most vulnerable citizens.

4.6.1 Population Characteristics

Knowledge of the composition of the population and how it has changed in the past and how it may change in the future is needed for making informed decisions about the future. Information about population is a critical part of planning because it directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation. The U.S. Census Bureau estimated the Planning Area’s population at 119,830 as of July 1, 2015.

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population signifies economic decline. Figure 4-5 shows the Planning Area and Alameda County population change from 1960 to 2015 according to the *U.S. Census of Population and Housing* and *Annual Estimates of the Resident Population for Incorporated Places*. Between 1960 and 2015, Alameda County’s population grew by 80.38 percent and the Planning Area’s population increased by 626.15 percent. However, much of the growth in the Planning Area occurred between 1960 and 1990, with very little growth occurring in the most recent two decades, when growth rates in the Planning Area were more closely aligned with that of the County as a whole. The population of the Planning Area increased by 30.8 percent from 1990 to 2015, with Union City gaining 20,732 residents, and Newark gaining 7,475 residents. Table 4-5 shows the population in the Planning Area from 2010 to 2015 (U.S. Census 2015).

Source: U.S. Census of Population and Housing. Census.gov; U.S. Census Annual Estimates of the Resident Population for Incorporated Places: April 1, 2010 to July 1, 2015.

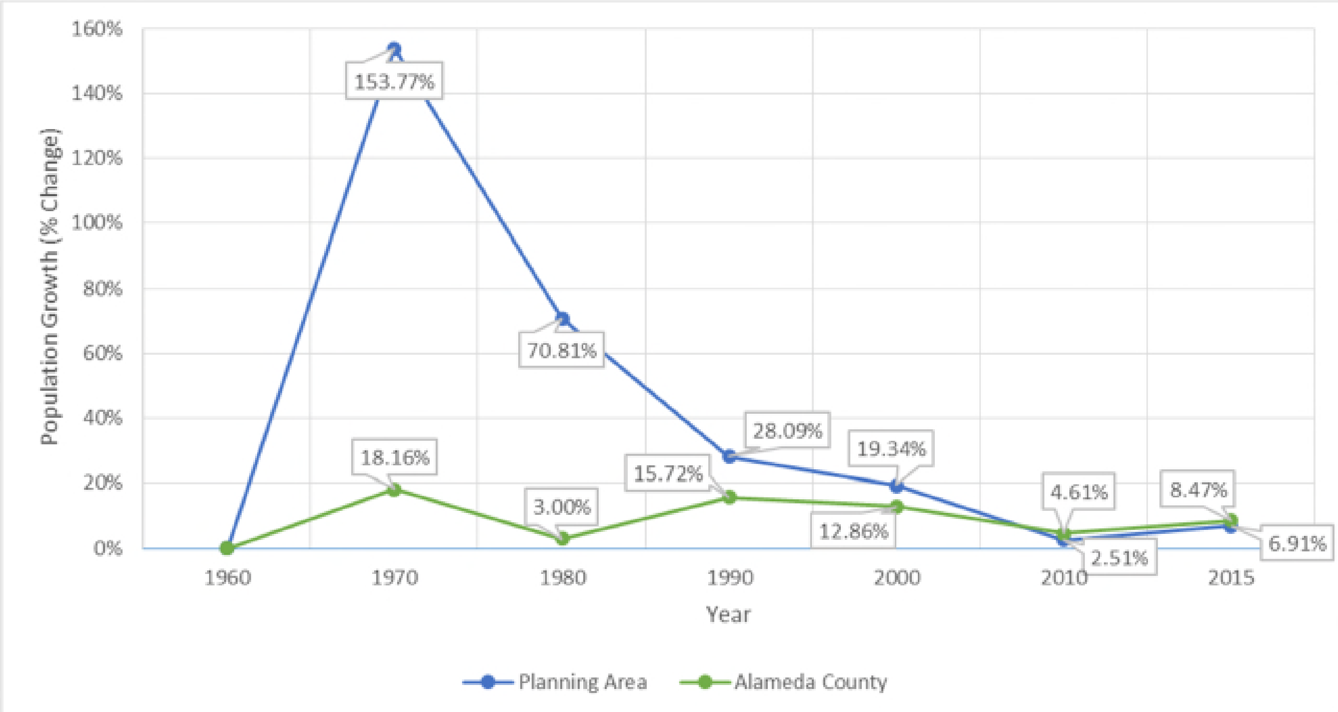


Figure 4-5. Alameda County vs. Planning Area Population Growth

Table 4-5. Annual Population Data

	Population		
	Union City	Newark	Union City/Newark Planning Area
2010	69,659	42,650	**112,309**
2011	70,691	43,080	**113,771**
2012	71,784	43,624	**115,408**
2013	72,743	44,199	**116,942**
2014	73,705	44,778	**118,483**
2015	74,494	45,336	**119,830**

Source: U.S. Census Incorporated Places and Minor Civil Divisions Datasets: Subcounty Resident Population Estimates: April 1, 2010 to July 1, 2015

4.6.2 Age Distribution

As a group, the elderly are more apt to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing, and/or mobility impaired, and more likely to experience mental impairment or dementia. Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as “critical facilities” by emergency managers because they require extra notice to implement evacuation. Elderly residents living in their own homes may have more difficulty accessing information or evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need individualized medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

The overall age distribution for the Planning Area is shown in Figure 4-6. Based on the 2010 U.S. Census data estimates, 10.85 percent of the Planning Area's population is 65 or older, compared to Alameda County's average of 11.1 percent. According to U.S. Census data, 5.55 percent of the under 65 population has disabilities of some kind and 5.6 percent have incomes below the poverty line. It is also estimated that 24.8 percent of the population is 18 or younger, compared to Alameda County's average of 22.6 percent (U.S. Census 2010).

Source: U.S. Census Bureau, 2010 Census. Summary File 1, Tables P12, P13, and PCT12

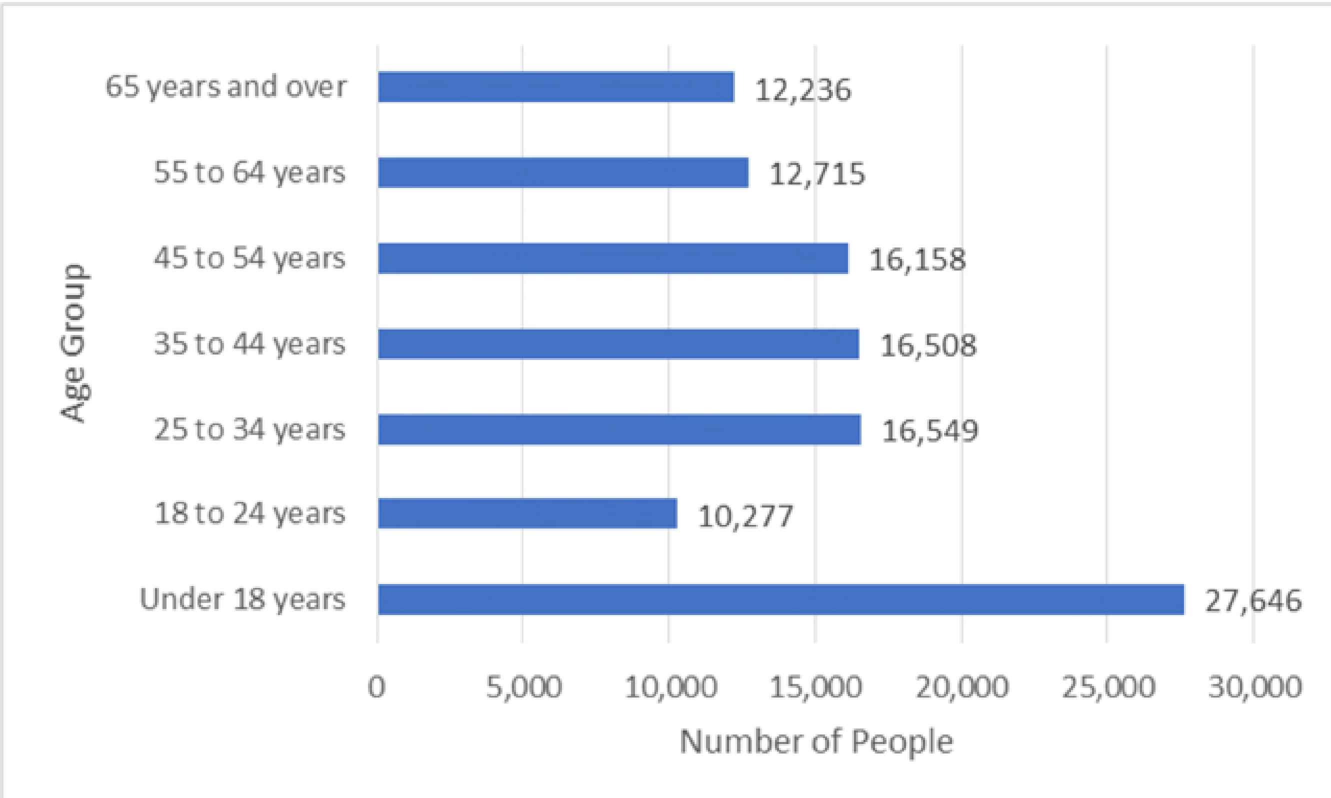


Figure 4-6. Planning Area Age Distribution

4.6.3 Race, Ethnicity and Language

Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Post-disaster recovery can be ineffective and is often characterized by cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability. According to the U.S. Census, the racial composition of the Planning Area is predominantly Asian, at 42 percent, with 30 percent White and 6 percent Black or African American. Figure 4-7 shows the racial distribution in the Planning Area. Based on the U.S. Census data, 28 percent of individuals in the Planning Area are Hispanic or Latino (of any race). U.S. Census data indicate that 41.68 percent of the Planning Area population is foreign-born.

Source: U.S. Census Bureau, 2010 Census. Summary File 1

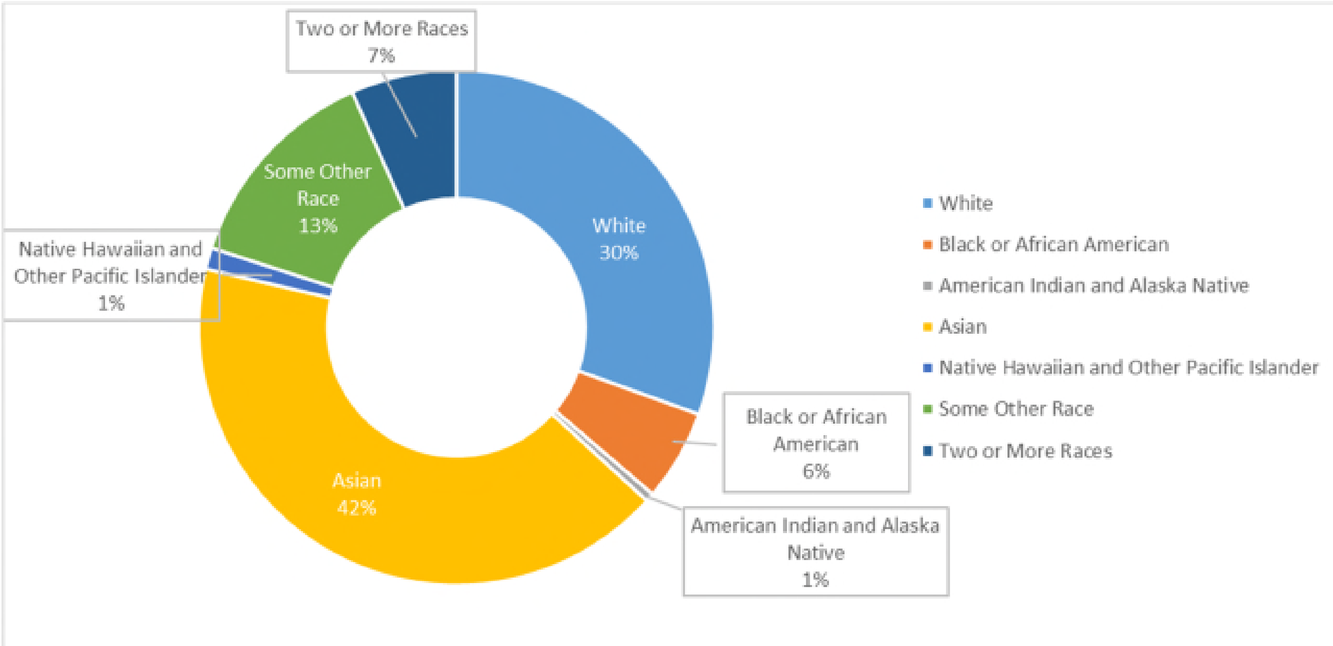


Figure 4-7. Planning Area Race Distribution

The majority of citizens in the Planning Area—58.2 percent—are speakers of a non-English language—a significantly higher share than the national average of 20.9 percent. Other than English, the most commonly spoken language in the Planning Area is Spanish, followed by Tagalog and a number of other Asian languages (see Figure 4-8). The census estimates 38.05 percent of the residents speak English "less than very well" (U.S. Census 2014).

4.6.4 Individuals with Disabilities and Others with Access and Functional Needs

The 2010 U.S. Census estimates that 54 million non-institutionalized people with disabilities and others with access and functional needs live in the U.S. This equates to about one-in-five persons. This population is more likely to have difficulty responding to a hazard event than the general population. Local government is the first level of response to assist these individuals, and coordination of efforts to meet their specific needs is paramount to life safety efforts. It is important for emergency managers to distinguish between functional and medical needs in order to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability or access and functional need will allow emergency management personnel and first responders to have personnel available who can provide services needed by this population.

According to the 2010-2014 American Community Survey (ACS) Five-Year Estimates, there are 9,766 individuals with some form of disability, access, or functional need within the Planning Area (U.S. Census 2014).

Source: U.S. Census Bureau, 2014 ACS Five-Year Estimate

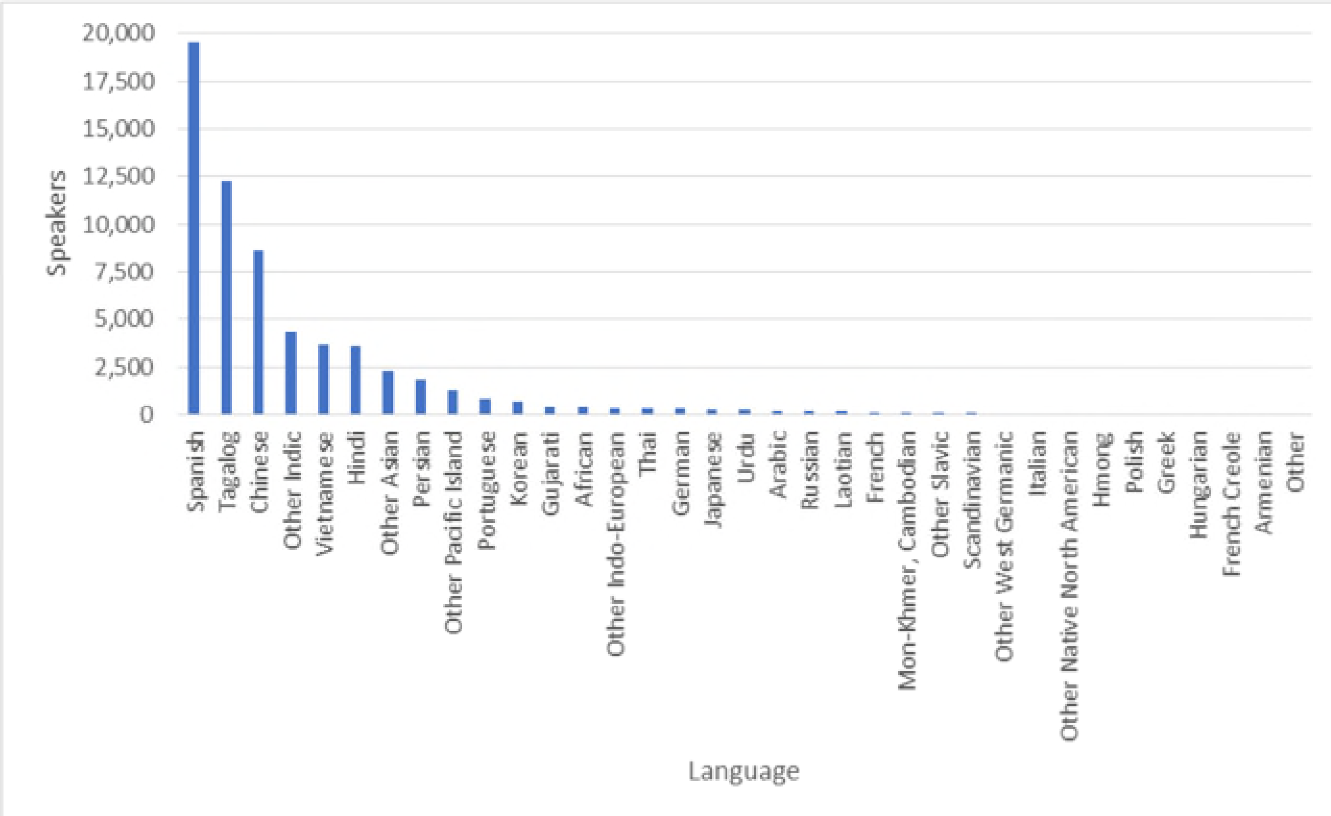


Figure 4-8. Languages Spoken in the Planning Area

4.7 ECONOMY

4.7.1 Income

In the United States, individual households are expected to use private resources to prepare for, respond to and recover from disasters to some extent. This expectation means that households living in poverty are automatically disadvantaged when confronting hazards. Additionally, the economically disadvantaged typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in earthquakes and floods than other types of housing. In urban areas, the economically disadvantaged often live in older houses and apartment complexes, which are more likely to be made of unreinforced masonry, a building type that is particularly susceptible to damage during earthquakes. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that residents below the poverty level have a great deal to lose during an event and are the least prepared to deal with potential losses. The events following Hurricane Katrina in 2005 illustrated that personal household economics significantly impact people’s decisions on evacuation. Individuals who cannot afford gas for their cars will likely decide not to evacuate.

Based on 2014 ACS Five-Year Estimates, per capita income in the Planning Area in 2014 was $30,992, the median family household income was $92,077, and the median non-family household income was $52,245.

As defined by the Office of Management and Budget and U.S. Census Bureau, the poverty threshold in 2014 was $24,008 for a household with two adults and two children, and $12,071 for one person (unrelated individual)

(U.S. Census 2014). However, in 2010 the Census Bureau and the U.S. Bureau of Labor Statistics began developing a Supplemental Poverty Measure (SPM) as an additional indicator of economic well-being. While the official poverty measure looks at a family's or an individual's cash income to estimate poverty rates, the Supplemental Poverty Measure thresholds are based on cost of food, housing, clothing and utilities compared with family size and composition as well as geographic housing costs. It also incorporates additional items such as tax payments and work expenses.

Figure 4-9 shows 2015 SPM estimates for the United States and for the San Francisco – Oakland – Hayward Metropolitan Statistical Area (MSA), the smallest area that includes the Planning Area for which data was available. The 2015 SPM threshold for a household with two adults and two children was $34,915 if the home is owned with a mortgage and $34,325 if the family is renting. Both figures are about $10,000 higher than the traditional poverty threshold number and the national SPM threshold. For one person (unrelated individual) the SPM threshold was $16,182 for a homeowner with a mortgage and $15,908 for rental housing (U.S. Census 2016).

Source: Renwick and Fox (U.S. Census Bureau) 2016

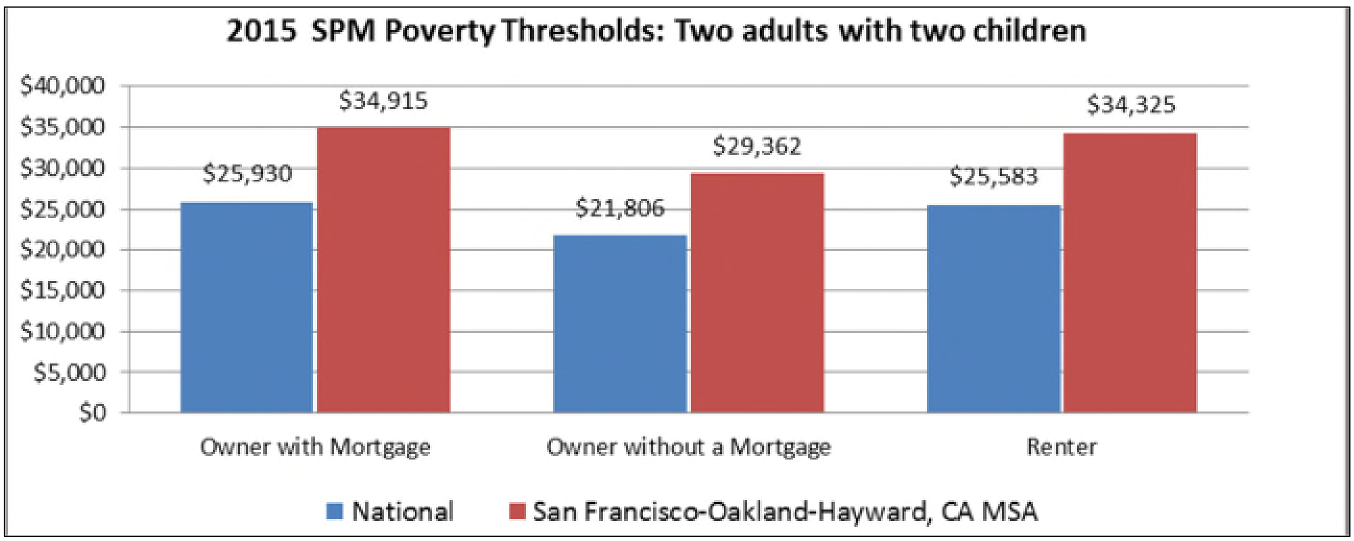


Figure 4-9. 2015 SPM Poverty Thresholds: San Francisco – Oakland – Hayward MSA

2014 ACS Five-Year Estimates showed that roughly 21.78 percent of households in the Planning Area receive an income between $100,000 and $149,999 per year and over 19.80 percent of household incomes are above $150,000 annually. About 12.10 percent of the households in the Planning Area make less than $25,000 per year. Another 6.28 percent make less than $15,000 per year.

4.7.2 Industry, Businesses and Institutions

According to the 2012 *Economic Census Survey of Business Owners*, the sectors providing the greatest numbers of jobs in the Planning Area are restaurants and other eating places (19 percent), followed by grocery and related product merchant wholesalers, and scientific research and development services (Newark). Figure 4-10 shows the Planning Area breakdown of employment by U.S. Census-defined industry types.

Source: 2010-2014 American Community Survey Five-Year Estimates, Table DP03

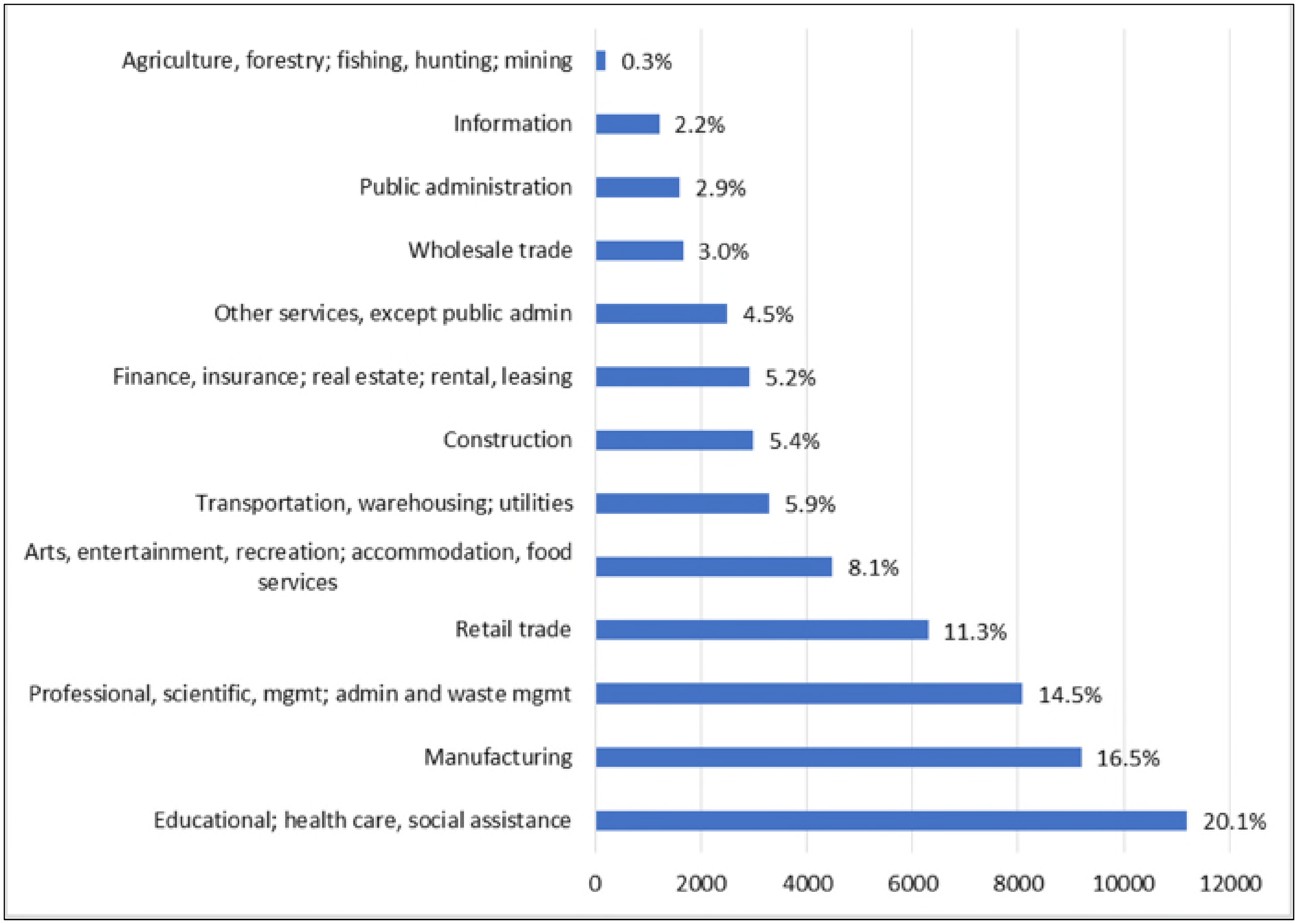


Figure 4-10. Industry in the Planning Area by Population Employed

The Planning Area benefits from a variety of business activity. Major businesses in Union City include Southern Wine & Spirits of America, Inc., the nation's largest wine and spirit distributors; Abaxis, Inc.; Ajax Custom Manufacturing, OSI, Inc.; Bloomer Chocolate, Inc.; and Kaiser Permanente. Top employers in the City of Newark include Logitech, Amazon, World Pac, and Full Bloom Baking Company.

Educational and arts institutions in the Planning Area include the New Haven Unified School District, the Union City Performing Arts Center, and the Newark Unified School District.

4.7.3 Employment Trends and Occupations

According to the American Community Survey, about 66 percent of the Planning Area's population is in the labor force. Of the working-age population group (ages 18 – 64), 58 percent of the population in the labor force are employed. Figure 4-11 shows the distribution of workers by occupation category.

Figure 4-12 compares California and Planning Are unemployment trends from 2010 through 2014. Unemployment in the Planning Area has remained lower than the state average in recent years, and was at its lowest in 2009, at 6.95 percent. Unemployment rates had been on the rise until 2013, at which point they began to decline in both the state and the Planning Area.

Source: 2010-2014 American Community Survey Five-Year Estimates, Table DP03 Selected Economic Characteristics

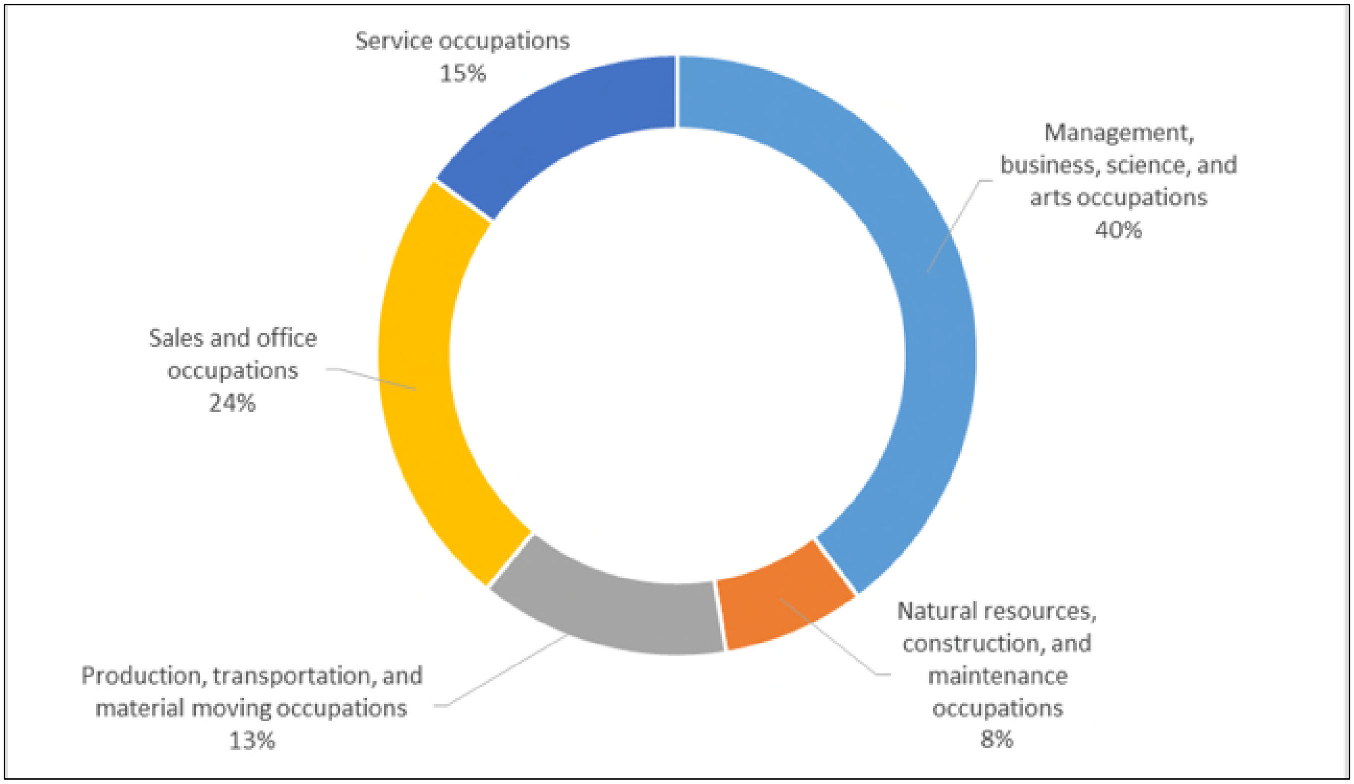


Figure 4-11. Occupations in the Planning Area

Source: 2010-2014 American Community Survey Five-Year Estimates, Table S2301 Employment Status

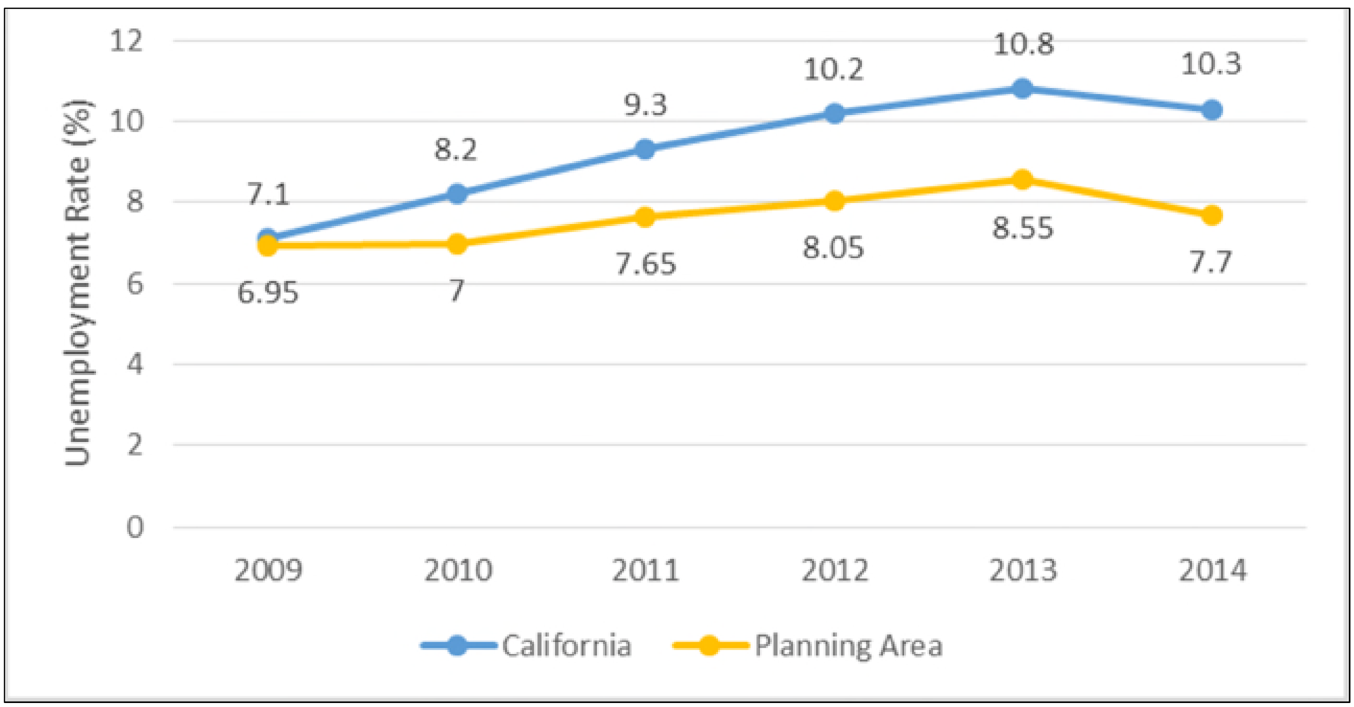


Figure 4-12. California State and Planning Area Unemployment Rate

The U.S. Census estimates that over 79 percent of the employed population 16 years and older in the Planning Area, or 43,967 individuals, commute to work. Of those, 75.4 percent drove alone (by car, truck or van) to work, and 12.3 percent carpooled (by car, truck or van). The mean travel time to work in the Planning Area is 28.8 minutes; the state average is 27.6 minutes (U.S. Census 2014).

4.8 LAWS AND ORDINANCES

Existing laws, ordinances and plans at the federal, state and local level can support or impact hazard mitigation actions identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). Pertinent federal and state laws are described below. Each planning partner has individually reviewed existing local plans, studies, reports, and technical information in its jurisdictional annex, presented in Volume 2.

4.8.1 Federal

Disaster Mitigation Act

The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur, specifically addressing planning at the local level, and requiring plans to be in place before Hazard Mitigation Grant Program funds are available to communities. This plan is designed to meet the requirements of DMA, improving eligibility for future hazard mitigation funds.

Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA’s purposes. The ESA defines three fundamental terms:

- **Endangered** means that a species of fish, animal or plant is “in danger of extinction throughout all or a significant portion of its range.” (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- **Threatened** means that a species “is likely to become endangered within the foreseeable future.” Regulations may be less restrictive for threatened species than for endangered species.
- **Critical habitat** means “specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not.”

Five sections of the ESA are of critical importance to understanding it:

- **Section 4: Listing of a Species**—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.

- **Section 7: Consultation**—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.
- **Section 9: Prohibition of Take—**It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.
- **Section 10: Permitted Take**—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a "Habitat Conservation Plan."
- **Section 11: Citizen Lawsuits**—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.

The Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. Both Union City and Newark participate in the NFIP and have adopted regulations that meet the NFIP requirements. At the time of the preparation of this plan, both jurisdictions were in good standing with NFIP requirements.

National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In other instances, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency-responder disciplines. These instances necessitate coordination across the spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity.

Americans with Disabilities Act and Amendments

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. The most recent amendments became effective in January 2009 (P.L. 110-325). Title II of the ADA deals with compliance with the act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have any necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or visual alerts. Two stand-alone technical documents have been issued for shelter operators to meet the needs of people with disabilities. These documents address physical accessibility as well as medical needs and service animals.

The ADA also intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (such as vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

4.8.2 State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was enacted in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent construction of buildings used for human occupancy on the surface trace of active faults. Before a new project is permitted, cities and counties require a geologic investigation to demonstrate that proposed buildings will not be constructed on active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards, such as liquefaction or seismically induced landslides. The law requires the State of California Geologist to establish regulatory zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy.

California General Planning Law

California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making.

The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government passed the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. Jurisdictions conduct analyses on projects to determine if there are potentially significant environmental impacts, identify mitigation measures, and propose possible project alternatives by preparing environmental reports for projects that require CEQA review. This environmental review is required before an agency takes action on any policy, program, or project.

Union City and Newark have both sought exemption from CEQA for this HMP, using different exemption sections of the CEQA guidelines:

- **Union City—Section 15061(b)(3):** "...CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA."
- **Newark—Section 15262:** "A project involving only feasibility or planning studies for possible future actions which the agency, board or commission has not approved, adopted, or funded does not require the preparation of an EIR or negative declaration but does require consideration of environmental factors. This section does not apply to the adoption of a plan that will have a legally binding effect on later activities."

AB 162: Flood Planning, Chapter 369, Statutes of 2007

This California State Assembly bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the California Department of Water Resources (DWR). Upon the next revision of the housing element on or after January 1, 2009, the conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purposes of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards including:

- Flood hazard zones
- Maps published by FEMA, DWR, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, Cal OES, etc.
- Historical data on flooding
- Existing and planned development in flood hazard zones.

The general plan must establish goals, policies and objectives to protect from unreasonable flooding risks including:

- Avoiding or minimizing the risks of flooding new development
- Evaluating whether new development should be located in flood hazard zones

- Identifying construction methods to minimize damage.

AB 162 establishes goals, policies and objectives to protect from unreasonable flooding risks. It establishes procedures for the determination of available land suitable for urban development, which may exclude lands where FEMA or DWR has determined that the flood management infrastructure is not adequate to avoid the risk of flooding.

AB 2140: General Plans: Safety Element, Chapter 739, Statutes of 2006

This bill provides that the state may allow for more than the standard 75 percent cost share for public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition this bill requires Cal OES to give federal mitigation funding preference to cities and counties that have adopted local hazard mitigation plan. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans.

AB 70: Flood Liability, Chapter 367, Statutes of 2007

This bill provides that a city or county may be required to contribute a fair and reasonable share to compensate for property damage caused by a flood to the extent that it has increased the state's exposure to liability for property damage by unreasonably approving new development in a previously undeveloped area that is protected by a state flood control project, unless the city or county meets specified requirements.

AB 32: The California Global Warming Solutions Act

This bill addresses greenhouse gas emissions. It identifies the following potential adverse impacts of global warming:

> "… the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."

AB 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels) with further reductions to follow. The law requires the state Air Resources Board to do the following:

- Establish a program to track and report greenhouse gas emissions.
- Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.
- Adopt early reduction measures to begin moving forward.
- Adopt, implement and enforce regulations—including market mechanisms such as "cap and-trade" programs—to ensure that the required reductions occur.

The Air Resources Board recently adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions.

Senate Bill 97

Senate Bill 97, enacted in 2007, amended the California Environmental Quality Act (CEQA) to clearly establish that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for CEQA analysis. It directed the Governor's Office of Planning and Research to develop draft CEQA guidelines for the mitigation of greenhouse gas emissions or their effects and directed the California Natural Resources Agency to certify and adopt the CEQA Guidelines.

Senate Bill 1241: General Plans: Safety Element—Fire Hazard Impacts

In 2012, Senate Bill 1241 passed requiring that all future general plans address fire risk in state responsibility areas and very high fire hazard severity zones in their safety element. In addition, the bill requires cities and counties to make certain findings regarding available fire protection and suppression services before approving a tentative map or parcel map.

Senate Bill 379: General Plans: Safety Element—Climate Adaptation

Senate Bill 379 builds upon the flood planning inclusions into the safety and housing elements and the hazard mitigation planning safety element inclusions in general plans outlined in AB 162 and AB 2140, respectively. SB 379 focuses on a new requirement that cities and counties include climate adaptation and resiliency strategies in the safety element of their general plans beginning January 1, 2017. In addition, this bill requires general plans to include a set of goals, policies and objectives, and specified implementation measures based on the conclusions drawn from climate adaptation research and recommendations. In anticipation of the implementation of this bill in 2017, this 2016 HMP update includes relevant information regarding climate adaptation and resiliency strategies for incorporation into the cities' General Plans once linkage is established pursuant to AB 2140.

California State Building Code

California Code of Regulations Title 24 (CCR Title 24), also known as the California Building Standards Code, is a compilation of building standards from three sources:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes adopted to address particular California concerns.

The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.

On January 1, 2014, California Building Code Accessibility Standards found in Chapter 11B incorporated the 2010 Americans with Disabilities Act (ADA) Standards as the model accessibility code for California. The purpose for this incorporation was to ensure consistency with federal guidelines. As a result of this incorporation, the California standards will fully implement and include 2010 ADA Standards within the California Building Code while maintaining enhanced levels of accessibility already provided by existing California accessibility regulations.

Standardized Emergency Management System

CCR Title 19 establishes the Standardized Emergency Management System (SEMS) to standardize the response to emergencies involving multiple jurisdictions. SEMS is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use SEMS by December 1, 1996 in order to be eligible for state funding of response-related personnel costs under CCR Title 19 (Sections 2920, 2925 and 2930). Individual agencies' roles and responsibilities contained in existing laws or the state emergency plan are not superseded by these regulations.

California Multi-Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved statewide hazard mitigation plan in order to be eligible for certain disaster assistance and mitigation funding. The intent of the *California Multi-Hazard Mitigation Plan* is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan. It identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. It required the following key actions:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies by early 2009. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

4.8.3 Local

Each planning partner has prepared a jurisdiction-specific annex to this plan (see Volume 2). In preparing these annexes, each partner completed a capability assessment that looked at its regulatory, technical and financial capability to carry out proactive hazard mitigation. Additionally, information on NFIP compliance, classifications under various community mitigation programs, and information about public education and outreach capabilities were collected in order to develop a more complete picture of overall capability throughout the Planning Area. A description of the importance of each assessed capability in hazard mitigation is provided below. Refer to the annexes for a review of regulatory codes, ordinances, plans, and programs specific to each planning partner.

Legal and Regulatory Capabilities

Jurisdictions have the ability to develop policies and programs and to implement rules and regulations to protect and serve residents. Local policies are typically identified in a variety of community plans, implemented via a local ordinance, and enforced through a governmental body.

Jurisdictions regulate land use through the adoption and enforcement of zoning, subdivision and land development ordinances, building codes, building permit ordinances, floodplain, and stormwater management ordinances. When effectively prepared and administered, these regulations can lead to hazard mitigation.

Fiscal Capabilities

Assessing a jurisdiction's fiscal capability provides local governance with an understanding of the ability to fulfill the financial needs associated with hazard mitigation projects. This assessment identifies both outside resources, such as grant-funding eligibility, and local jurisdictional authority to generate internal financial capability, such as through impact fees.

Administrative and Technical Capabilities

Legal, regulatory, and fiscal capabilities are needed to provide the backbone for successfully developing a mitigation strategy, but without appropriate personnel the strategy may not be implemented. The administrative and technical capability assessment focuses on the availability of personnel resources for implementing hazard mitigation. These personnel resources include technical experts, such as engineers and scientists, as well as capabilities that may be found in multiple departments, such as grant writers.

NFIP Compliance

Flooding is the greatest natural hazard in the United States. With the promulgation of recent federal regulation, homeowners are experiencing increasingly high flood insurance premiums. Community participation in the NFIP lowers premiums and opens up opportunity for grant funding associated specifically with flooding issues. Assessment of current NFIP status and compliance provides understanding about local flood management programs and opportunities for improvement.

Public Outreach Capability

Assessing outreach and education capability identifies the connection between government and community members, which opens a two-way dialogue and results in a more resilient community based on education and public engagement.

Other Programs

Other programs—such as the Community Rating System, Storm Ready and Firewise—enhance a jurisdiction's ability to mitigate, prepare for, and respond to natural hazards. These programs indicate a jurisdiction's desire to go beyond minimum requirements set forth by local, state, and federal regulations for the purpose of creating a more resilient community. They complement each other by focusing on communication, mitigation, and community preparedness to save lives and minimize the impact of natural hazards.

Development and Permitting Capability

Identifying previous and future development trends is achieved through a comprehensive review of permitting during the previous performance period and in anticipation of future development. Tracking previous and future growth in potential hazard areas provides an overview of increased exposure to a hazard within a community.

Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

PART 2—RISK ASSESSMENT

5. IDENTIFIED HAZARDS OF CONCERN AND RISK ASSESSMENT METHODOLOGY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the Planning Area and meets requirements of the DMA (44 CFR, Section 201.6(c)(2)).

5.1 IDENTIFIED HAZARDS OF CONCERN

For this plan, the Steering Committee considered the full range of natural hazards that could impact the Planning Area and then listed hazards that present the greatest concern. The process incorporated review of state and local hazard planning documents, as well as information on the frequency, magnitude and costs associated with hazards that have impacted or could impact the Planning Area. Anecdotal information regarding natural hazards and the perceived vulnerability of the Planning Area's assets to them was also used. Based on the review, this plan presents complete risk assessment for the following hazards of concern:

- Dam failure
- Drought
- Earthquake
- Flood
- Landslide
- Severe weather
- Wildfire.

A comprehensive discussion on climate change is included as a supplement to the identified hazards of concern. Additionally, human health hazards and human-caused hazards (e.g., terrorist acts) are addressed qualitatively in this HMP. Tsunami inundation areas in the Planning Area were researched and found to be limited to undevelopable baylands. Therefore, the Steering Committee decided to omit the tsunami hazard from this plan due to a lack of impact on the Planning Area.

During the planning process, the public commented on subsidence issues within Union City and Newark. A brief discussion on subsidence is locate in the Chapter 7 – Drought. The Steering Committee recognized that a more comprehensive discussion on the subsidence issue should be addressed upon the next plan update when regional subsidence datasets are expected to be completed.

5.2 METHODOLOGY

The risk assessments in Chapters 6 through 12 describe the risks associated with each identified hazard of concern. Each chapter describes the hazard, the Planning Area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk of each hazard:

- Identify and profile each hazard—The following information is given for each hazard:
  - ➢ Geographic areas most affected by the hazard
  - ➢ Event frequency estimates
  - ➢ Severity estimates
  - ➢ Warning time likely to be available for response.
- Determine exposure to each hazard—Exposure was determined by overlaying hazard maps with an inventory of structures, facilities, and systems to determine which of them would be exposed to each hazard.
- Assess the vulnerability of exposed facilities—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as geographic information systems (GIS) and FEMA's hazard-modeling program called Hazus-MH were used to perform this assessment for the flood, dam failure and earthquake hazards. Outputs similar to those from Hazus were generated for other hazards, using maps generated by the Hazus program.

5.3 RISK ASSESSMENT TOOLS

5.3.1 Mapping

A review of national, state and local databases was performed to locate available spatially based data relevant to this planning effort. Maps were produced using GIS software to show the spatial extent and location of identified hazards when such data was available. These maps are included in the hazard profile sections of this document.

5.3.2 Dam Failure, Earthquake, and Flood—Hazus-MH

Overview

In 1997, FEMA developed the standardized Hazards U.S., or Hazus, model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology, Hazus-MH, with new models for estimating potential losses from hurricanes and floods.

Hazus-MH is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

- Provides a consistent methodology for assessing risk across geographic and political entities.

- Provides a way to save data so that it can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates the review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

Levels of Detail for Evaluation

Hazus-MH provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the Planning Area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the Planning Area.
- **Level 2**—More accurate estimates of losses require more detailed information about the Planning Area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the Planning Area.

Application for This Plan

The following methods were used to assess specific hazards for this plan:

- **Flood—**A Level 2, user-defined analysis was performed for general building stock and for critical facilities and infrastructure in flood zones. Digital versions of current FEMA flood mapping of the Planning Area were used to delineate flood hazard areas and estimate potential losses from the 1-percent annual chance and 0.2-percent annual chance flood events. Using the FEMA floodplain boundaries and the USGS 3-meter National Elevation Dataset, flood depth grids were generated and integrated into the Hazus-MH model. To estimate damage that would result from a flood, Hazus uses pre-defined relationships between flood depth at a structure and resulting damage, with damage given as a percent of total replacement value. Curves defining these relationships have been developed for damage to structures and for damage to typical contents within a structure. By inputting flood depth data and known property replacement cost values, dollar-value estimates of damage were generated.
- **Dam Failure—**A Level 2, user-defined analysis was run for the combined inundation areas for the Calaveras, Del Valle, and Turner dams using the flood methodology described above.
- **Earthquake—**A Level 2 analysis was performed to assess earthquake risk and exposure. Earthquake shake maps and probabilistic data prepared by the USGS were used for the analysis of this hazard. National Earthquake Hazard Reduction Program soils, liquefaction susceptibility and landslide susceptibility data were also integrated into the Hazus-MH model. Three scenario events and one probabilistic event were modeled, as described in Chapter 8.

5.3.3 Sea Level Rise

There currently exists no standardized model for assessing sea level rise impacts. Different models provide different results. Additionally, most sea level rise models do not take into account factors such as storm surge and tides. Future sea level rise models may include these additional factors, however, such modeling exceeds the purpose and scope as well as modeling capabilities of this plan. The methodology this HMP used to analyze sea level rise, including a description of the data and scenario variations, is provided in Chapter 13 (Climate Change).

5.3.4 Landslide, Severe Weather, and Wildfire

Historical datasets were not adequate to model future losses for landslide, severe weather and landslide. However, areas and inventory susceptible to some of the hazards of concern were mapped by other means and exposure was evaluated. A qualitative analysis was conducted using the best available data and professional judgment.

5.3.5 Drought

The risk assessment methodologies used for this plan focus on damage to structures. Because drought does not impact structures, the risk assessment for drought was more limited and qualitative than the assessment for the other hazards of concern.

5.3.6 Sources of Data Used in Hazus Modeling

Table 5-1 provides Hazus model data documentation for this project. Replacement cost values and detailed structure information derived from Alameda County parcel and tax assessor data were loaded into Hazus-MH. When available, an updated inventory of essential facilities, transportation and utilities was used in place of the Hazus-MH defaults.

Replacement cost is the cost to replace the entire structure with one of equal quality and utility. Replacement cost is based on industry-standard cost-estimation models published in *RS Means Square Foot Costs* (RS Means, 2015). Replacement cost is calculated using the RS Means square foot cost for a structure, which is based on the Hazus occupancy class (e.g., multi-family residential, commercial retail trade), multiplied by the square footage of the structure from the tax assessor data. For single-family residential, the construction class and number of stories are also factored into determining the square foot costs.

5.3.7 Limitations

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic or economic parameter data
- The unique nature, geographic extent and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents have to prepare for a specific hazard event.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate and should be used only to understand relative risk. Over the long term, the planning partners will collect additional data to assist in estimating potential losses associated with other hazards.

Table 5-1. Hazus Model Data Documentation

Data	Source	Date	Format
Property parcel data	Alameda County parcel boundaries, downloaded from the County's GIS portal	2016	Digital (GIS) format
Building (area, occupancy, date of construction, stories, land use and foundation type)	Alameda County property data provided by City of Newark and Union City	2016	Digital (tabular) format
Building replacement cost	RS Means	2015	Paper format. Updated RS Means values imported into Hazus
Population data	U.S. Census Bureau	2010	Digital (GIS and tabular) format
Flood hazard data	FEMA	2016	Digital (GIS) format
Dam inundation areas	Association of Bay Area Governments dam inundation data provided by the City of Newark	1995	Digital (GIS) format
Earthquake Shake Maps	USGS Earthquake Hazards Program website	2012	Digital (GIS) Format
Liquefaction Susceptibility	Association of Bay Area Governments	2006	Digital (GIS) Format
National Earthquake Hazard Reduction Program Soils	California Department of Conservation	2008	Digital (GIS) Format
Susceptibility to Deep-Seated Landslides	Wills C.J., Perez, F., Gutierrez, C., California Geological Survey	2011	Digital (GIS) Format
Sea Level Rise	San Francisco Bay Conservation and Development Commission (Adapting to Rising Tides)	2016	Digital (GIS) Format
Wildfire	CAL FIRE data provided by Association of Bay Area Governments	2008	Digital (GIS) Format
Digital Elevation Model	USGS	2000-2016	Digital (GIS) Format
Critical facilities and infrastructure			
• **Police stations, fire stations, medical care, schools, other essential facilities**	City of Newark, Union City, California Healthcare Atlas	2016	Digital (GIS) format
• **Bus facilities, electric facilities, private schools**	FEMA Hazus-MH Version 3.1 Critical Facility Comprehensive Data Management System	2016	Digital (GIS) format
• **Highway, railway and light rail bridges, rail and light rail stations**	CALTRANS	2013-2015	Digital (GIS) format
• **Hazardous material facilities**	U.S. Environmental Protection Agency website Toxic Release Inventory data, City of Newark	2016	Digital (GIS) format
• **Petroleum facilities**	U.S. Environmental Protection Agency website Petroleum Facility data	2016	Digital (GIS) format
• **Potable Water Facilities**	Alameda County Water District	2016	Digital (GIS) format
• **Waste Water Facilities**	Union Sanitary District	2016	Digital (GIS) format

6. DAM FAILURE

6.1 GENERAL BACKGROUND

The failure of constructed facilities that hold back water can allow that water to inundate areas downstream. This hazard is commonly associated with dams, which are the primary focus of this risk assessment. However, the hazard also relates to levees that line waterways to control flooding. Less data has been generated for the levee failure hazard in the Planning Area, but it is assessed here based on the limited information that is available.

DEFINITIONS

Dam—Any artificial barrier, together with appurtenant works, that does or may impound or divert water, and that either (a) is 25 feet or more in height from the natural bed of the stream or watercourse at the downstream toe of the barrier (or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse) to the maximum possible water storage elevation; or (b) has an impounding capacity of 50 acre-feet or more. (CA Water Code, Division 3.)

Levee—An elongated naturally occurring ridge or artificially constructed fill or wall that regulates water levels. They are typically earthen and often run parallel to the course of a river or along low-lying coastlines.

Dam failure—An uncontrolled release of impounded water due to structural deficiencies in a dam.

Levee breach—A break in part of a levee leaving a large opening for water to flood the land protected by the levee. A breach is the most frequent type of levee failure.

Emergency action plan—A formal document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency situation. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency. (FEMA 2013a)

High hazard dam—Dams where failure or improper operation will probably cause loss of human life. (FEMA 2004)

Significant hazard dam—Dams where failure or improper operation will result in no probable loss of human life but can cause economic loss, environmental damage or disruption of lifeline facilities, or can impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure. (FEMA 2004)

6.1.1 Dams

A dam is an artificial barrier that has the ability to store water, wastewater, or liquid-borne materials for many reasons (flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control). Many dams fulfill a combination of the stated functions (Association of State Dam Safety Officials 2013). Dams provide a life-sustaining resource to people in all regions of the United States. They are an important resource in the United States.

Man-made dams can be classified according to the type of construction material used, the methods used in construction, the slope or cross-section of the dam, the way the dam resists the forces of the water pressure behind it, the means used for controlling seepage, and, occasionally, according to the purpose of the dam. The materials used for construction of dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, miscellaneous materials (plastic or rubber), and any combination of these materials (Association of State Dam Safety Officials 2013).

More than a third of the country's dams are 50 or more years old. Approximately 14,000 of those dams pose a significant hazard to life and property if failure occurs. There are also about 2,000 unsafe dams in the United States, located in almost every state.

Dam failures typically occur when spillway capacity is inadequate and excess flow overtops the dam, or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-filled waters that rush downstream damaging and/or destroying anything in its path (FEMA 1996).

6.1.2 Causes of Dam Failure

Dam failures can be catastrophic to human life and property downstream. Dam failures in the United States typically occur in one of four primary ways:

- Overtopping of the primary dam structure, which accounts for 34 percent of all dam failures, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage account for 30 percent of all dam failures.
- Piping and seepage account for 20 percent of all failures. These result from internal erosion, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.
- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10 percent of all failures.

The remaining 6 percent of dam failures are due to other miscellaneous causes. Many of the historical dam failures in the United States have been secondary results of other disasters. The prominent causes are earthquakes, landslides, extreme storms, and massive snowmelt.

The most likely causes of dam failure in the Planning Area are age of dams, earthquakes, excessive rainfall, and landslides. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

6.1.3 Levees

Levees are man-made structures, usually an earthen embankment designed and constructed to contain, control, or divert the flow of water in order to provide protection from temporary flooding. A levee is built parallel to a body of water, typically a river, to protect the lives and properties behind it. Levees typically include a series of culverts, canals, ditches, storm sewers or pump stations—called “interior drainage” systems—to channel water from the land side of the levee to the water side (FEMA 2013c). When functioning properly, levees reduce the risk of flooding for communities, though no levee provides full protection from flooding.

Currently, there are thousands of miles of levees across the United States. Most levees are owned by local communities and flood control districts that must ensure proper operation and maintenance of the levee system. The U.S. Army Corps of Engineers (USACE) operates and maintains some levees and evaluates levees to determine if they meet accreditation requirements (FEMA 2013c).

Levees require maintenance to continue to provide the level of protection they were designed and built to offer. Maintenance responsibility belongs to a variety of entities including local, state, and federal government and private landowners. Well-maintained levees may obtain certification through independent inspections. Levees may not be certified for maintaining flood protection when the levee owner does not maintain the levee or pay for an independent inspection. The impacts of an un-certified levee include higher risk of levee failure. In addition, insurance rates may increase because FEMA identifies on Flood Insurance Rate Maps that the structures are not certified to protect from a 1-percent-annual-chance flood event (FEMA 2004).

6.1.4 Causes of Levee Failure

When floodwaters exceed the height of a levee, overtopping occurs. As the water passes over the top, it can erode the levee, worsening the flooding and potentially causing an opening or breach in the levee. An unexpected levee breach or failure can be catastrophic, causing loss of life and requiring emergency evacuations, often with insufficient time to reduce property damage.

A levee breach occurs when part of a levee gives way, creating an opening through which floodwaters may pass. A breach can occur gradually or suddenly. The most dangerous breaches happen quickly during periods of high water. The resulting torrent can quickly swamp a large area behind the failed levee with little or no warning (American Society of Civil Engineers 2010).

6.1.5 Regulatory Oversight

National Dam Safety Act

Potential for catastrophic flooding due to dam failures led to passage of the National Dam Safety Act (Public Law 92-367). The National Dam Safety Program requires a periodic engineering analysis of the majority of dams in the country, with exceptions for the following:

- Dams under jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission
- Dams constructed pursuant to licenses issued under the Federal Power Act
- Dams that the Secretary of the Army determines do not pose any threat to human life or property.

The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States (FEMA 2013g).

California Division of Safety of Dams

California DWR's Division of Safety of Dams monitors dam maintenance and safety at the state level through all of the following procedures (DWR 2016):

- When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface.
- Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions.
- After approval of the application, the Division inspects all aspects of the construction to ensure that the work accords with the approved plans and specifications.
- After construction, the Division inspects each dam annually to ensure performance as intended and to identify developing problems. Roughly a third of these inspections include in-depth reviews of instrumentation.
- The Division periodically reviews stability of dams and their major appurtenances in light of improved design approaches, requirements, and new findings regarding earthquake hazards and hydrologic estimates in California.

U.S. Army Corps of Engineers Dam Safety Program

USACE is responsible for safety inspections of some federal and non-federal dams in the United States that meet size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams; surveyed each state and federal agency's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of dams; and developed guidelines for inspection and evaluation of dam safety (USACE Date Unknown). The USACE National Inventory of Dams provides the most recent inspection dates for 26 Alameda County dams, as listed in Table 6-1.

Table 6-1. Alameda County Dam Inspection Dates

Alameda County Dam	Inspection Date	Alameda County Dam	Inspection Date
Almond	January 26, 2012	**New U San Leandro**	December 20, 2011
Bethany Forebay	November 2, 2011	**Patterson**	March 8, 2012
Calaveras	January 24, 2012	**Patterson**	November 3, 2011
Central	January 26, 2012	**Piedmont**	February 9, 2012
Chabot	December 20, 2011	**Quarry Pits**	March 9, 2012
Cull Creek	August 24, 2011	**Rubber Dam 3**	March 9, 2012
Decoto Reservoir	March 8, 2012	**San Lorenzo Creek**	August 24, 2011
Del Valle	November 3, 2011	**Seneca**	January 26, 2012
Dunsmuir Reservoir	January 26, 2012	**Shinn**	March 9, 2012
Dyer	February 10, 2012	**South**	January 26, 2012
Estates	February 9, 2012	**Summit**	February 7, 2012
James H Turner	January 23, 2012	**Temescal, Lake**	March 2, 2012
Middlefield Res	March 8, 2012	**Ward Creek**	August 24, 2011

Source: USACE 2016

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. FERC cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. Approximately 3,036 dams that are part of regulated hydroelectric projects are in the FERC program. Two-thirds of these dams are more than 50 years old. As dams age, concern about their safety and integrity grows, and oversight and a regular inspection program are extremely important. FERC staff inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 32.8 feet, or with a total storage capacity of more than 2,000 acre-feet.

FERC staff monitors and evaluates seismic research in geographic areas such as California where there are concerns about possible seismic activity. This information is applied in investigating and performing structural analyses of hydroelectric projects in these areas. FERC staff also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC staff visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication *Engineering Guidelines for the Evaluation of Hydropower Projects* guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

FERC requires licensees to prepare emergency action plans, and conducts training sessions on how to develop and test these plans. The plans outline an early warning system pertaining to actual or potential sudden release of water from a dam due to failure or accident. The plans include operational procedures that may be applied, such as reducing reservoir levels and downstream flows, or notifying affected residents and agencies responsible for emergency management. Updates and tests of these plans occur frequently to ensure that everyone knows what to do in emergency situations (FERC 2016).

USACE and FEMA Regulation of Levees

USACE and FEMA have differing roles and responsibilities related to levees. USACE addresses a range of operation and maintenance, risk communication, risk management, and risk reduction issues as part of its responsibilities under the Levee Safety Program. FEMA addresses mapping and floodplain management issues related to levees, and it accredits levees as meeting requirements set forth by the National Flood Insurance Program.

Depending on the levee system, USACE and FEMA may be involved with a levee sponsor and community independently or—when a levee system overlaps both agency programs—jointly. Under both scenarios, the long-term goals are similar: to reduce risk and lessen the devastating consequences of flooding. USACE and FEMA partnering activities related to levees include the following:

- Joint meetings with levee sponsors and other stakeholders
- Integration of levee information into the National Levee Database
- State Silver Jackets teams
- Sharing of levee information
- Targeted task forces to improve program alignment.

Coordination between USACE and FEMA with regard to levees is now standard within many of each agency's policies and practices. Over the past several years, both agencies coordinated policies where appropriate; jointly participated in meetings with stakeholders; and participated in many multiagency efforts, such as the National Committee on Levee Safety, the Federal Interagency Floodplain Management Task Force, and the Silver Jackets Program.

The Silver Jackets is a program that provides an opportunity to consistently bring together multiple state, federal, tribal, and local agencies to learn from each other and apply their knowledge to reduce risk. The Program's primary goals include the following:

- Create or supplement a mechanism to collaboratively identify, prioritize, and address risk management issues and implement solutions.
- Increase and improve risk communication through a unified interagency effort.
- Leverage information and resources and provide access to national programs (FEMA's RiskMAP and USACE's Levee Inventory and Assessment Initiative).
- Provide focused, coordinated hazard mitigation assistance in implementing high-priority actions such as those identified by state hazard mitigation plans.

- Identify gaps among agency programs and barriers to implementation, such as conflicting agency policies or authorities, and provide recommendations for addressing these issues.

National Committee on Levee Safety

Congress created the National Committee on Levee Safety to "develop recommendations for a national levee safety program, including a strategic plan for implementation of the program." The Committee adopted the vision of "an involved public and reliable levee systems working as part of an integrated approach to protect people and property from floods," and has been working toward this goal since October 2008 (National Committee on Levee Safety 2010). The Committee is made up of representatives from state, regional and local agencies, the private sector, USACE, and FEMA.

6.2 HAZARD PROFILE

6.2.1 Past Events

Even under normal operating conditions, dam failures can occur suddenly, without warning (referred to as a "sunny-day" failure). Dam failures may also occur during a large storm event. Significant rainfall can quickly inundate an area and cause floodwaters to overwhelm a reservoir. If the dam spillway cannot safely pass the resulting flows, water will begin flowing in areas not designed for such flows, and a failure may occur.

No dam failures have been recorded in the Planning Area. According to the *Alameda County Multi-Hazard Mitigation Plan*, there have been two failures in the county:

- **1918 Calaveras Dam Failure**—The San Francisco Public Utilities Commission-owned Calaveras Dam, located in Alameda County, failed during construction in 1918. A landslide damaged the upstream shell of the dam and destroyed the dam's outlet tower.
- **2015 Rubber Dam 3 Failure**—In 2015, the inflatable dam on Alameda Creek (Rubber Dam 3) failed due to vandalism, releasing nearly 50 million gallons of water from the community's water into the San Francisco Bay. The water was supposed to go into the Niles Cone Groundwater Basin where residents and businesses from the Cities of Newark, Union City and Fremont could access drinking water.

There is a possibility that the Planning Area experienced the direct or indirect impacts of these events, though no specific information on local impact is available.

6.2.2 Location

According to the USACE National Inventory of Dams, there are over 87,000 dams in the country; however, this inventory only covers dams that meet minimum height and impoundment requirements; numerous small dams are not identified. According to the California Division of Safety of Dams, as of 2014, there were 24 dams in Alameda County. Of these, the dams identified in Table 6-2 have the potential to impact the Planning Area if a failure were to occur. Of these, the Ward Creek dam poses a minimal threat and was not included in the risk assessment of this HMP due to a lack of inundation data (City of Union City 2015; City of Newark 2014). Figure 6-1 shows the location of the dams that have the potential to impact the Planning Area.

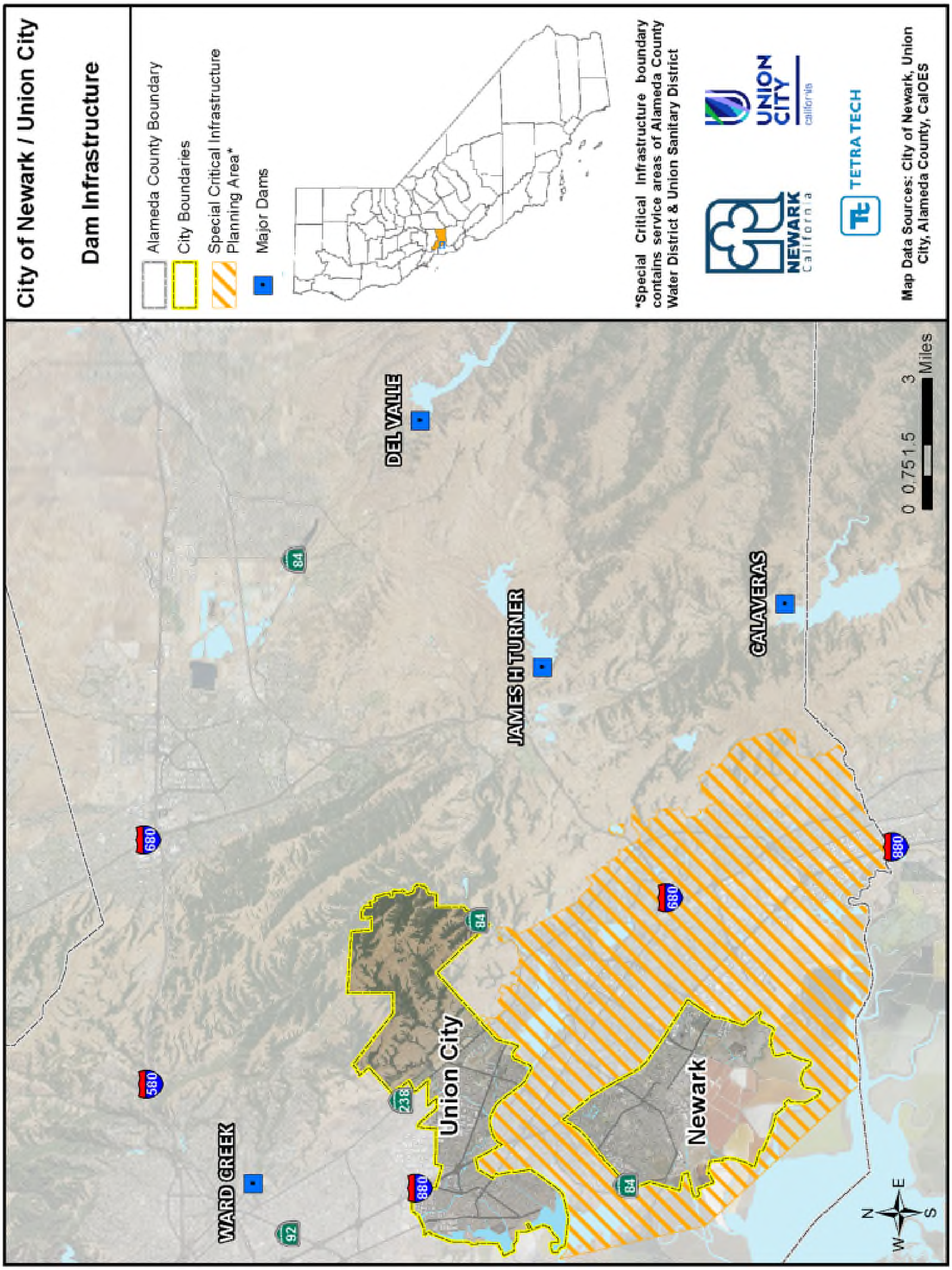


Figure 6-1. Location of Dams that could Impact the Planning Area

Table 6-2. Dams with Potential to impact the Planning Area

	Calaveras	Del Valle	James H Turner	Ward Creek
Hazard Class[a]	High	High	High	High
Water Course	Calaveras Creek	Arroyo Valle	San Antonio Creek	Ward Creek
Owner	City & County of San Francisco	California Department of Water Resources	City & County of San Francisco	Alameda County Public Works Ag
Year Built	1925	1968	1964	1963
Dam Type	Hydraulic Fill	Earth	Earth	Earth
Crest Length (feet)	775	773	486	255
Height (feet)	210	235	193	71
Storage Capacity (acre-feet)	100,000	77,100	50,500	130
Drainage area (sq. mi.)	98.4	146	39.7	1.9
Inundation Area (sq. mi.)	41.25	97.98	Not Available	1.09

a. Hazard classification as identified in the National Performance of Dams Program:
Low Hazard—Downstream hazard classification for dams in which no lives are in jeopardy and minimal economic loss would occur as a result of failure of the dam.
Significant Hazard—Downstream hazard classification for dams in which one to six lives are in jeopardy and appreciable economic loss would occur as a result of failure of the dam.
High Hazard—Downstream hazard classification for dams in which more than six lives would be in jeopardy and excessive economic loss would occur as a direct result of dam failure.

Sources: National Performance of Dams Program 2016; California Department of Water Resources 2016c; Alameda County 2016b

The Calaveras and Del Valle dams pose the largest flooding risk to the Planning Area:

- The San Francisco Public Utilities Commission is rebuilding the Calaveras Dam due to its proximity to the Calaveras fault line. Construction began in 2011 to build a new earth and rock fill dam adjacent to the existing dam. As of August 2016, the project is over three-quarters complete. The new dam will have a height of 220 feet and is designed to accommodate a maximum credible earthquake on the Calaveras fault. The total volume of the dam will be approximately 3.5 million cubic yards and will restore the original reservoir capacity of 96,850 acre-feet (31 billion gallons of water) (San Francisco Water Power Sewer 2016).
- The Del Valle dam was constructed in 1968 to create Lake Del Valle, which serves as a reservoir and provides water storage, flood control for Alameda Creek, and regulatory storage for a portion of water delivered through the South Bay Aqueduct. The dam is 235 feet in height and is the only flood control dam in the Livermore Valley. The dam typically stores 25,000 to 40,000 acre-feet of water (California Department of Water Resources 2011).

While the Del Valle and Calaveras dams pose the greatest risk to the Planning Area, the flood potential for the Turner Dam is only slightly less, due to proximity of the Turner Dam to the Planning Area.

There is no exact estimate of the total length of levees in the United States, but the total is believed to be as much as 100,000 miles. More than 85 percent are thought to be locally owned and the remaining 15 percent are overseen by USACE or other federal or state agencies. FEMA has estimated that levees are located in 22 percent of the counties in the United States, and that 43 percent of the U.S. population lives in counties with levees. The USACE National Levee Database lists seven levees in Alameda County, as shown in Table 6-3. The Cities of Union City and Newark are located in the Alameda Creek – LB and Alameda Creek – RB leveed areas.

Table 6-3. Levees in Alameda County

Levee Name	County Where System Is Located	Levee Owner	Number of Segments in System	Corps Program Levee
Alameda Creek—LB	Alameda County	Alameda Fc & Wcd	1	Yes
Alameda Creek—RB	Alameda County	Alameda Fc & Wcd	1	Yes
Industrial Levee	Alameda County	Alameda Fc & Wcd	1	Yes
San Lorenzo Creek—LB	Alameda County	Alameda Fc & Wcd	1	Yes
San Lorenzo Creek—RB	Alameda County	Alameda Fc & Wcd	1	Yes
Coyote Creek, Santa Clara—RB Bypass	Alameda County, Santa Clara County	Santa Clara Valley Wd	1	Yes
King & Lyons	Alameda County, Santa Clara County	Alameda Fc & Wcd	1	Yes

Source: USACE 2016b

6.2.3 Frequency

Dam and levee failures are infrequent and usually coincide with the events that cause them, such as earthquakes, landslides, and excessive rainfall and snowmelt. There is a “residual risk” associated with dams; residual risk is the risk that remains after safeguards have been implemented. For dams, the residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of occurrence of any type of dam failure event is considered to be low in today’s regulatory and dam safety oversight environment.

6.2.4 Severity

Dam failure can be catastrophic to all life and property downstream. The severity of a failure is accounted for in the classification of the dam. Two factors influence the potential severity of a dam failure: the amount of water impounded; and the density, type, and value of development and infrastructure downstream (City of Sacramento Development Service Department 2005). The U.S. Army Corps of Engineers developed the classification system shown in Table 6-4 for the hazard potential of dam failures.

Table 6-4. Hazard Potential Classification

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

a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss of life potential based on inundation mapping of area downstream of the project. Analyses of loss of life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Indirect threats to life caused by the interruption of lifeline services due to project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Damage to project facilities and downstream property and indirect impact due to loss of project services, such as impact due to loss of a dam and navigation pool, or impact due to loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: U.S. Army Corps of Engineers 2014

In the event of a levee failure, floodwaters may inundate the protected area landward of the levee. The extent of inundation is dependent on the flooding intensity. Failure of a levee during a 1-percent-annual-chance flood will inundate the approximate floodplain area previously protected by the levee. Residential and commercial buildings nearest the levee overtopping or breach location will suffer the most damage from the initial embankment failure flood wave. Landward buildings will be damaged by inundation (FEMA 2004).

6.2.5 Warning Time

Warning time for dam failure varies depending on the cause of the failure. In events of extreme precipitation, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, it is possible that there would be no warning time.

A dam’s structural type also affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until either the reservoir water is depleted or the breach resists further erosion. Concrete gravity dams also tend to have a partial breach as one or more monolith sections formed during dam construction are forced apart by the escaping water. The time for breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers 2011).

Alameda County and the Cities of Union City and Newark have established protocols for emergency warning and response through adopted emergency operations plans. Additionally, the California Department of Water Resources recommends that emergency action plans be prepared for dams and be updated and exercised regularly (California Department of Water Resources 2016b).

Warning time for levee failure depends on the cause of the failure. A levee failure caused by structural failure can be sudden and provide little to no warning. If heavy rains are impacting a levee system, communities in the immediate danger zone can be evacuated before a failure occurs. If the levee failure is caused by overtopping, the community may or may not be able to recognize the impending failure and evacuate. If a levee failure occurs suddenly, evacuation may not be possible.

6.3 SECONDARY HAZARDS

Dam failure can cause severe downstream flooding depending on the magnitude of the failure. Other potential secondary hazards of dam failure include landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

Levee failures can cause severe downstream flooding similar to that of dam failure, as well as landslides, bank erosion, and destruction of habitat. Levee failures can also cause environmental incidents due to hazardous materials releases when floodwaters infiltrate facilities that store these types of materials.

6.4 EXPOSURE

The flood module of Hazus-MH was used for a Level 2 assessment of dam failure in the Planning Area. Hazus-MH uses census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. Where possible, the Hazus-MH data for this risk assessment was enhanced using GIS data from county, state and federal sources. The exposure and vulnerability analyses focused on inundation data for the Del Valle, Turner, and Calaveras Dams provided by the City of Newark. The Ward reservoir was not assessed due to the lack of availability of inundation mapping for that dam.

6.4.1 Population

All populations living in a dam failure inundation zone are exposed to the risk of a dam failure. The estimated population living in the combined failure inundation area is 98,071, or 81.8 percent of the Planning Area's population.

6.4.2 Property

The Hazus-MH model estimated that there are 24,854 structures within the combined failure inundation area. The value of exposed buildings in the Planning Area was generated using Hazus-MH and is summarized in Table 6-5. This methodology estimated $19 billion worth of building-and-contents exposure to the combined failure inundation area, representing 76.9 percent of the total replacement value of the Planning Area.

Table 6-5. Value of Property Exposed to Dam Failure

	Number of Buildings Exposed	Value Exposed			% of Total Replacement Value
		Building	Contents	Total	
Newark	12,215	$5,837,648,120	$4,810,446,014	$10,648,094,134	100.0
Union City	12,639	$5,152,215,936	$3,339,289,261	$8,491,505,198	59.6
Total Planning Area	**24,854**	**$10,989,864,057**	**$8,149,735,275**	**$19,139,599,332**	**76.9**

6.4.3 Critical Facilities

GIS analysis was used to determine the number of critical facilities in the mapped dam failure inundation areas. As Table 6-6 shows, 203 of the Planning Area's critical facilities and critical infrastructure (67 percent) are in the inundation areas.

Table 6-6. Critical Facilities/Infrastructure in Dam Failure Inundation Areas in the Planning Area

	Medical & Health Services	Emergency Services	Educational Facilities	Government	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	3	4	19	5	13	15	65	3	**127**
Union City	4	4	7	3	3	12	4	0	**37**
District Planning Area (Fremont)	0	0	0	0	39	0	0	0	**39**
Total	**7**	**8**	**26**	**8**	**55**	**27**	**69**	**3**	**203**

6.4.4 Environment

The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could result in destruction of downstream habitat and could have detrimental effects on many species of animals, especially endangered species.

6.5 VULNERABILITY

6.5.1 Population

Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. This population includes the elderly and young who may be unable to get themselves out of the inundation area. The vulnerable population also includes those who would not have adequate warning from a television or radio emergency warning system. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation.

6.5.2 Property

Vulnerable properties are those closest to the dam failure inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Transportation routes are vulnerable to dam failure inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam failure inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

It is estimated that there could be up to $3.9 billion of loss from a dam failure affecting the Planning Area. This represents 20.5 percent of the total exposure within the inundation area, or 15.8 percent of the total assessed value of the Planning Area. Table 6-7 summarizes the loss estimates for dam failure.

Table 6-7. Loss Estimates for Dam Failure

	Value Exposed			% of
	Building Loss	Contents Loss	Total Loss	Total Replacement Value
Newark	$1,066,911,157	$1,892,947,178	$2,959,858,335	27.8
Union City	$532,809,854	$437,160,370	$969,970,224	6.8
Total Planning Area	**$1,599,721,011**	**$2,330,107,548**	**$3,929,828,559**	**15.8**

6.5.3 Critical Facilities

Hazus estimated that critical facilities would receive an average of 12.5 percent damage to the structure and an average 34 percent damage to the contents during a dam failure event. The estimated functional down-time to restore these facilities to 100 percent of their functionality is 501 days.

6.5.4 Environment

The environment would be vulnerable to a number of risks in the event of dam failure. The inundation could introduce foreign elements into local waterways, resulting in destruction of downstream habitat and detrimental effects on many species of animals, especially endangered species. The extent of the vulnerability of the environment is the same as the exposure of the environment.

6.6 FUTURE TRENDS IN DEVELOPMENT

All land use decision-making is guided by the goals, policies and implementation measures contained in the land use elements of Union City and Newark's general plans. The Newark general plan's environmental hazards element and the Union City general plan's safety element establish standards and plans for protecting the community from hazards. Most of the areas vulnerable to the more severe impacts from the combined failure scenario intersect the Planning Area's flood hazard areas. Flood-related policies in the general plans will help to reduce the risk associated with the dam failure hazard for all future development in the Planning Area.

6.7 SCENARIO

An earthquake within the region could lead to liquefaction of soils around the dams. This could occur without warning during any time of the day. A human-caused failure such as a terrorist attack also could trigger a catastrophic failure of a dam that impacts the Planning Area. The worst-case scenario for the dam failure hazard would be a full failure of the Del Valle Dam. Such a failure would result in virtually complete inundation of Newark and a large portion of Union City. Critical facilities located in the dam inundation area would likely experience failure, resulting in a severe disruption of essential services.

6.8 ISSUES

The most significant issue associated with dam failure involves the properties and populations in the inundation zones. Flooding as a result of a dam failure would significantly impact these areas. There is often limited warning time for dam failure. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Other important issues associated with dam failure include the following:

- Federally regulated dams have an adequate level of oversight and sophistication in the development of emergency action plans for public notification in the unlikely event of failure. However, the protocol for notification of downstream citizens of imminent failure needs to be tied to local emergency response planning.
- Mapping for federally regulated dams is already required and available; however, mapping that estimates inundation depths is needed for dams that are not federally regulated, in order to better assess the risk associated with failure of these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For dams that are not federally regulated, mapping of failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can be valuable to downstream community officials and emergency managers. This type of mapping can illustrate areas potentially impacted by more frequent events to support emergency response and preparedness actions.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.
- Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

7. DROUGHT

7.1 GENERAL BACKGROUND

Most of California's precipitation comes from storms moving across the Pacific Ocean. The path followed by the storms is determined by the position of an atmospheric high-pressure belt that normally shifts southward during the winter, allowing low pressure systems to move into the state. On average, 75 percent of California's annual precipitation occurs between November and March, with 50 percent occurring between December and February. If a persistent Pacific high-pressure zone takes hold over California mid-winter, there is a tendency for the water year to be dry.

A typical water year produces about 100 inches of rainfall over the North Coast, 50 inches of precipitation (combination of rain and snow) over the Northern Sierra, 18 inches in the Sacramento area, and 15 inches in the Los Angeles area. In extremely dry years, precipitation can be as little as a third of these amounts.

DEFINITIONS

Drought—The cumulative impacts of several dry years on water users. It can include deficiencies in surface and subsurface water supplies.

Hydrological drought— Deficiencies in surface and subsurface water supplies.

Socioeconomic drought— Drought impacts on health and quality of life.

Determination of when drought begins requires knowledge of drought impacts on water users, including supplies available to local water users and stored water available to them in surface reservoirs or groundwater basins. Different local water agencies have different criteria for defining drought conditions within their jurisdictions. Some agencies issue drought watch or drought warning announcements to their customers. Determinations of regional or statewide drought conditions are usually based on a combination of hydrologic and water supply factors (DWR 2016a). The California water code does not have a statutory definition of drought; however, analysis of text in the code indicates that legal matters most frequently focus on drought conditions during times of water shortages (CCR 2016a).

The Sierra Nevada snowpack is the primary agent for replenishing water for much of California, including the Planning Area. A reduction in spring snowpack runoff, whether due to drier winters or to increasing temperatures that lead to more rain instead of snow, can increase the risk of summer or fall water shortages throughout the region (City and County of San Francisco 2014).

7.1.1 Types of Drought

As defined by the National Weather Service (NWS), drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. If the weather pattern lasts a short time (a few weeks or a couple months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered to be a long-term drought. It is possible for a region to experience a long-term circulation pattern that produces drought, and to have short-term changes in this long-term pattern that result in short-term wet spells. Likewise, it is possible for a long-term wet circulation pattern to be interrupted by short-term weather spells that result in short-term drought. There are four ways that drought can be defined:

- Meteorological drought is a measure of departure of precipitation from normal. It is defined solely on the relative degree of dryness. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.
- Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced ground water or reservoir levels, and other parameters. It occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to water demands of plant life, primarily crops.
- Hydrological drought is associated with the effects of periods of precipitation shortfalls (including snowfall) on surface or subsurface water supply. It occurs when these water supplies are below normal. It is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Socioeconomic drought is associated with the supply and demand of an economic good with elements of meteorological, hydrological, and agricultural drought. This differs from the aforementioned types of drought because its occurrence depends on the processes of supply and demand to identify or classify droughts. The supply of many economic goods depends on weather (for example water, forage, food grains, fish, and hydroelectric power). Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply (National Drought Mitigation Center 2012).

7.1.2 Monitoring Drought

The National Oceanic and Atmospheric Administration (NOAA) has developed several indices to measure drought impacts and severity and to map their extent and locations.

- The **Palmer Crop Moisture Index** measures short-term drought on a weekly scale and is used to quantify drought's impacts on agriculture during the growing season. Figure 7-1 shows this index for the week ending July 23, 2016.
- The **Palmer Z Index** measures short-term drought on a monthly scale. Figure 7-2 shows this index for June 2016.
- The **Palmer Drought Index** measures the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during a given month is dependent on the current weather patterns plus the cumulative patterns of previous months. Weather patterns can change quickly from a long-term drought pattern to a long-term wet pattern, and the Palmer Drought Severity Index can respond fairly rapidly. Figure 7-3 shows this index for the week ending July 23, 2016.
- The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop and it takes longer to recover from them. The **Palmer Hydrological Drought Index**, another long-term index, was developed to quantify hydrological effects. The Palmer Hydrological Drought Index responds more slowly to changing conditions than the Palmer Drought Index. Figure 7-4 shows this index for June 2016.
- While the Palmer indices consider precipitation, evapotranspiration and runoff, the **Standardized Precipitation Index** considers only precipitation. In the Standardized Precipitation Index, an index of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The SPI is computed for time scales ranging from one month to 24 months. Figure 7-5 shows the 24-month SPI map for July 2014 through June 2016.

Source: Climate Prediction Center 2016

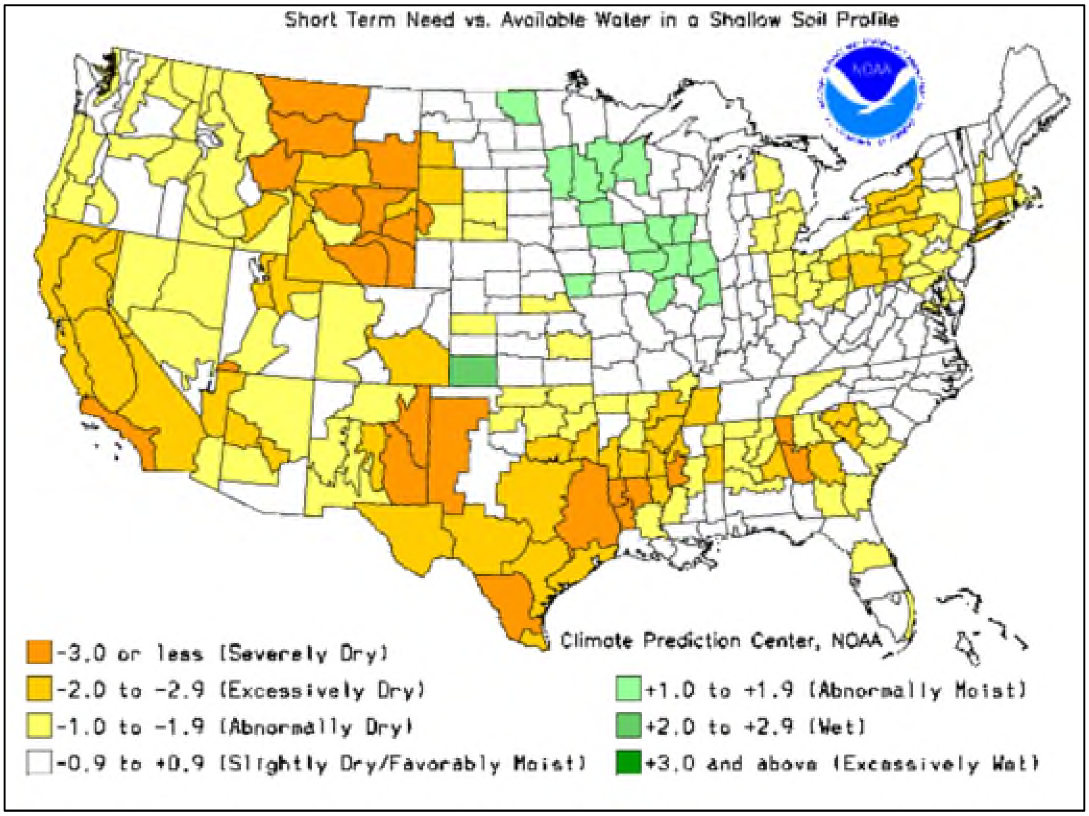


Figure 7-1. Crop Moisture Index for Week Ending July 23, 2016

Source: NOAA NCDC 2016

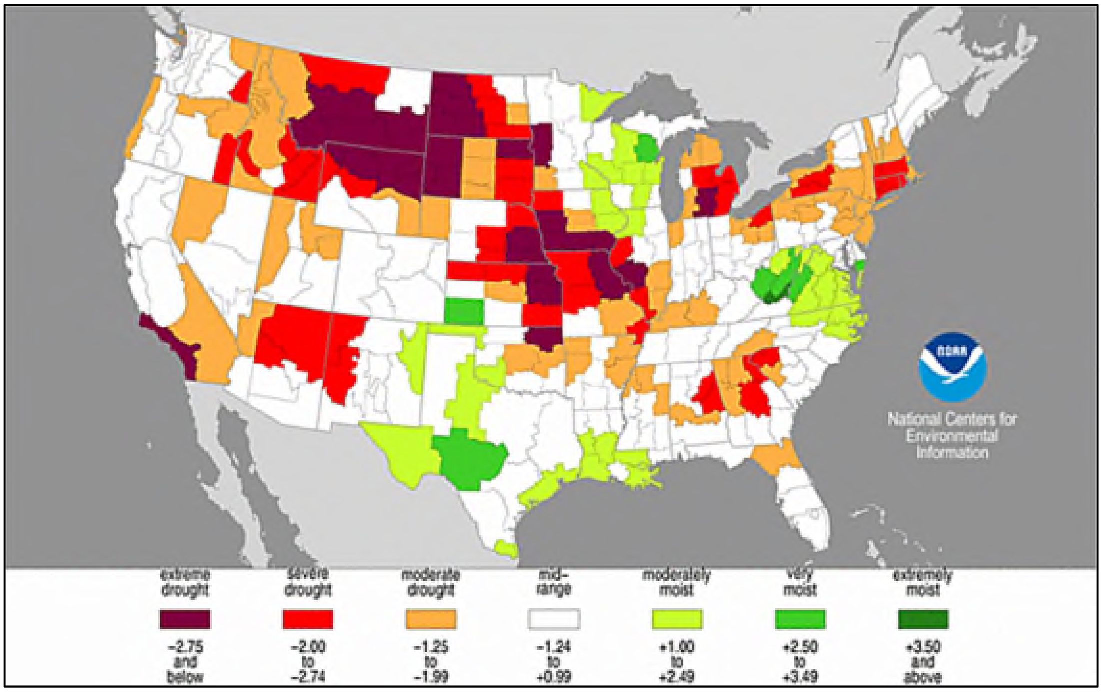


Figure 7-2. Palmer Z Index (June 2016)

Source: NOAA NCDC 2016

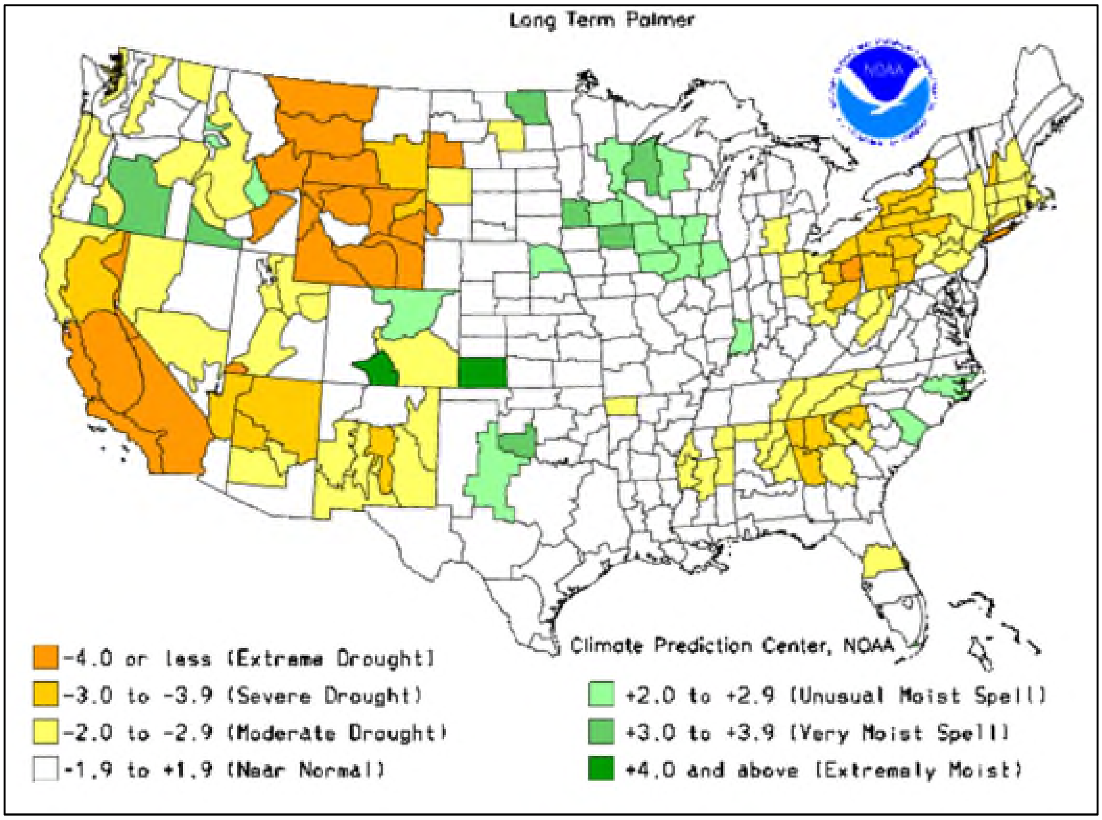


Figure 7-3. Palmer Drought Index for Week Ending July 23, 2016

Source: NOAA NCDC 2016

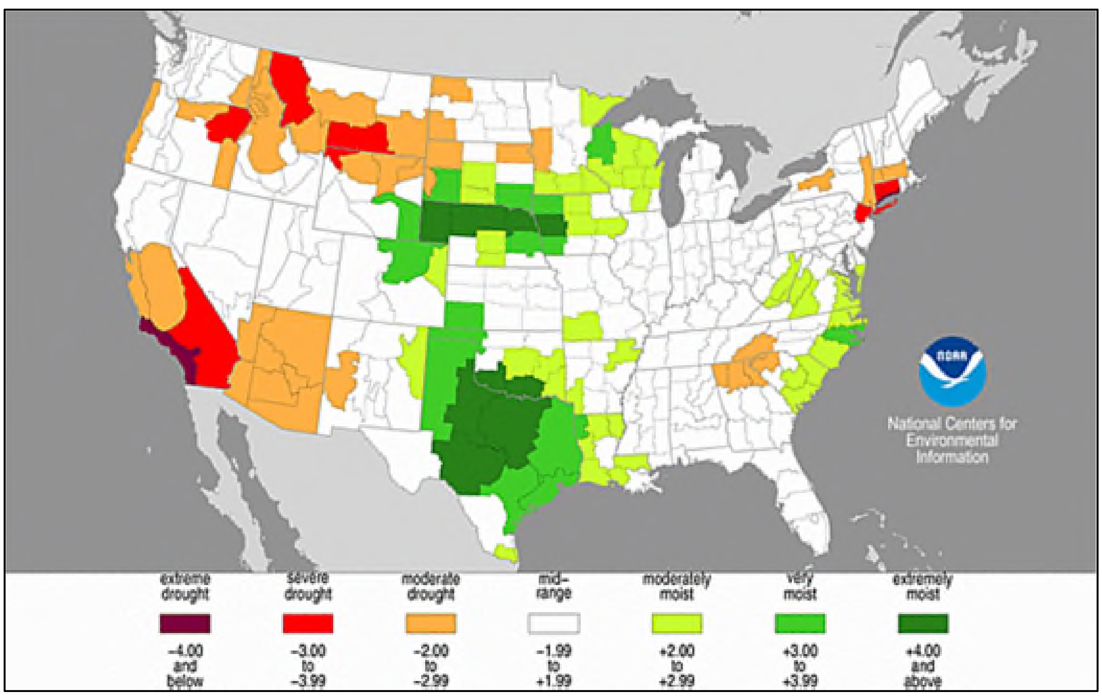


Figure 7-4. Palmer Hydrological Drought Index (June 2016)

Source: NOAA NCDC 2016

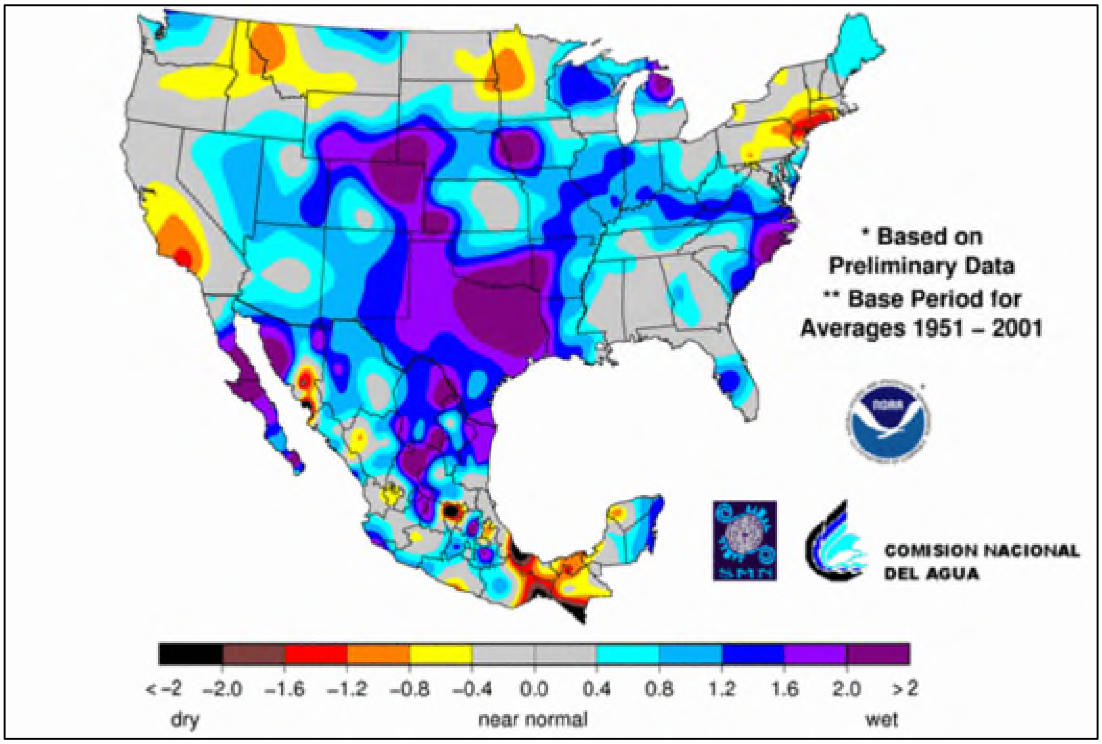


Figure 7-5. 24-Month Standardized Precipitation Index (July 2014 – June 2016)

NOAA divided the United States into 359 climate divisions for measuring these indices; the boundaries typically coincide with county boundaries, except in the western U.S., where they are based largely on drainage basins (U.S. Energy Information Administration, Date Unknown). California is divided into seven climate divisions: North Coast Drainage, Sacramento Drainage, Northeast Interior Basins, Central Coast Drainage, San Joaquin Drainage, South Coast Drainage, and Southeast Desert Basin. The Planning Area for this HMP is located in the Central Coastal Drainage Climate Division (NOAA 2016).

7.1.3 Water Supply

The Alameda County Water District (ACWD) is a retail water purveyor with a service area of approximately 100 square miles encompassing the Cities of Fremont, Newark and Union City and the southern portion of the City of Hayward. The ACWD provides water primarily to urban customers: approximately 70 percent of supplies are used by residential customers, with the balance used by commercial, industrial, institutional and large landscape customers (ACWD 2015).

Resources

The ACWD currently has three primary sources of water supply: the State Water Project, the San Francisco Regional Water System, and local supplies. The following sections describe each of the primary sources.

Local Sources

The primary local water sources for the ACWD are as follows:

- The Niles Cone Groundwater Basin is a local aquifer system and the principal local water source. The primary source of recharge for this basin is runoff from the Alameda Creek Watershed, which is recharged at the ACWD's groundwater recharge facilities. The Niles Cone has capacity to store water from year-to-year; however, its long-term storage is limited relative to annual use (ACWD 2015).

- In 2003, ACWD commissioned the Newark Desalination Facility to desalinate brackish groundwater from portions of the groundwater basin previously impacted by saltwater intrusion. In 2010, ACWD expanded the facility's capacity to 10 million gallons per day (mgd) permeate or 12 mgd total treated water production. This facility utilizes the reverse osmosis process to remove salts and other impurities from the brackish groundwater pumped at the ACWD's ARP wells. Permeate from the Newark Desalination Facility is blended with local groundwater and provides a supply for the distribution system demands (ACWD 2015).
- The ACWD and Zone 7 of the Alameda County Flood Control and Water Conservation District (also referred to as the Zone 7 Water Agency) have equal rights on Arroyo Del Valle to divert water to storage. When the California DWR constructed Del Valle Dam in the upper Alameda Creek Watershed, the rights were recognized in an agreement between the DWR, ACWD, and the Zone 7 Water Agency. DWR typically makes a total of 15,000-acre feet of storage available each year in Del Valle Reservoir for use by the ACWD and the Zone 7 Water Agency, who share this storage equally (ACWD 2015).

San Francisco's Regional Water System

The ACWD receives water from the City and County of San Francisco's Regional Water System, operated by the San Francisco Public Utilities Commission. The Regional Water System's supply is predominantly from the Tuolumne River basin in the Sierra Nevada, delivered through the Hetch Hetchy aqueducts. It also includes treated water produced from the San Francisco Public Utilities Commission's local watersheds and facilities in Alameda and San Mateo Counties. The amount of imported water available to the Regional Water System's retail and wholesale customers is constrained by hydrology, physical facilities, and institutional parameters that allocate the water supply of the Tuolumne River (ACWD 2015).

The Hetch Hetchy Water System was approved in 1913 under the Raker Act, which allowed federal lands in the Sierra Nevada Mountains to be used to build the water system. The water system was constructed by San Francisco over the next 20 years, with water first being delivered in 1934. Although the system is owned by San Francisco, it was designed from the beginning to serve as a regional water supply system (BAWSCA 2016). The Hetch Hechy Water System and the State Water Project together provide approximately 60 percent of the ACWD's water supply (ACWD 2015).

State Water Project

California's State Water Project is the largest state-built, multi-purpose water project in the United States. Its facilities include 28 dams and reservoirs, 26 pumping and generating plants, and approximately 660 miles of aqueducts. The water stored in its storage facilities originates from rainfall and snowmelt runoff in northern and central California.

The State Water Project's primary storage facility is Lake Oroville in the Feather River Watershed. Releases from Lake Oroville flow down the Feather River to the Sacramento River, which subsequently flows to the Sacramento-San Joaquin Delta. The State Water Project diverts water from the Delta through the Banks Pumping Plant, which lifts water from the Clifton Court Forebay (in the Delta) to the California Aqueduct and Bethany Reservoir. Most State Water Project water continues south from the reservoir, but a portion is pumped into the South Bay Aqueduct at the South Bay Pumping Plant on Bethany Reservoir (ACWD 2015).

The South Bay Aqueduct is a 44.7-mile conveyance system that provides water to over 2 million people in Alameda and Santa Clara Counties, including the Cities of Newark and Union City. It consists of 10.8 miles of canal, 32.1 miles of pipeline, and 1.8 miles of tunnel, as well as pumping plants and reservoirs. Most South Bay Aqueduct water originates from the Sacramento-San Joaquin Delta, although some is derived from local watersheds, primarily the Lake Del Valle watershed (ACWD 2008). Flow regulation and storage are provided by Lake Del Valle and the Del Valley Pumping Plant. Water can be pumped into Lake Del Valle and Lake Del Valle water can be released into the South Bay Aqueduct via a 60-inch common inlet/outlet. The South Bay Aqueduct ends in east San Jose at the Santa Clara Terminal Tank, an above-ground tank at the Santa Clara Valley Water District Penitencia Water Treatment Plant (ACWD 2008). Figure 7-6 shows the South Bay Aqueduct System.

Source: ACWD 2008

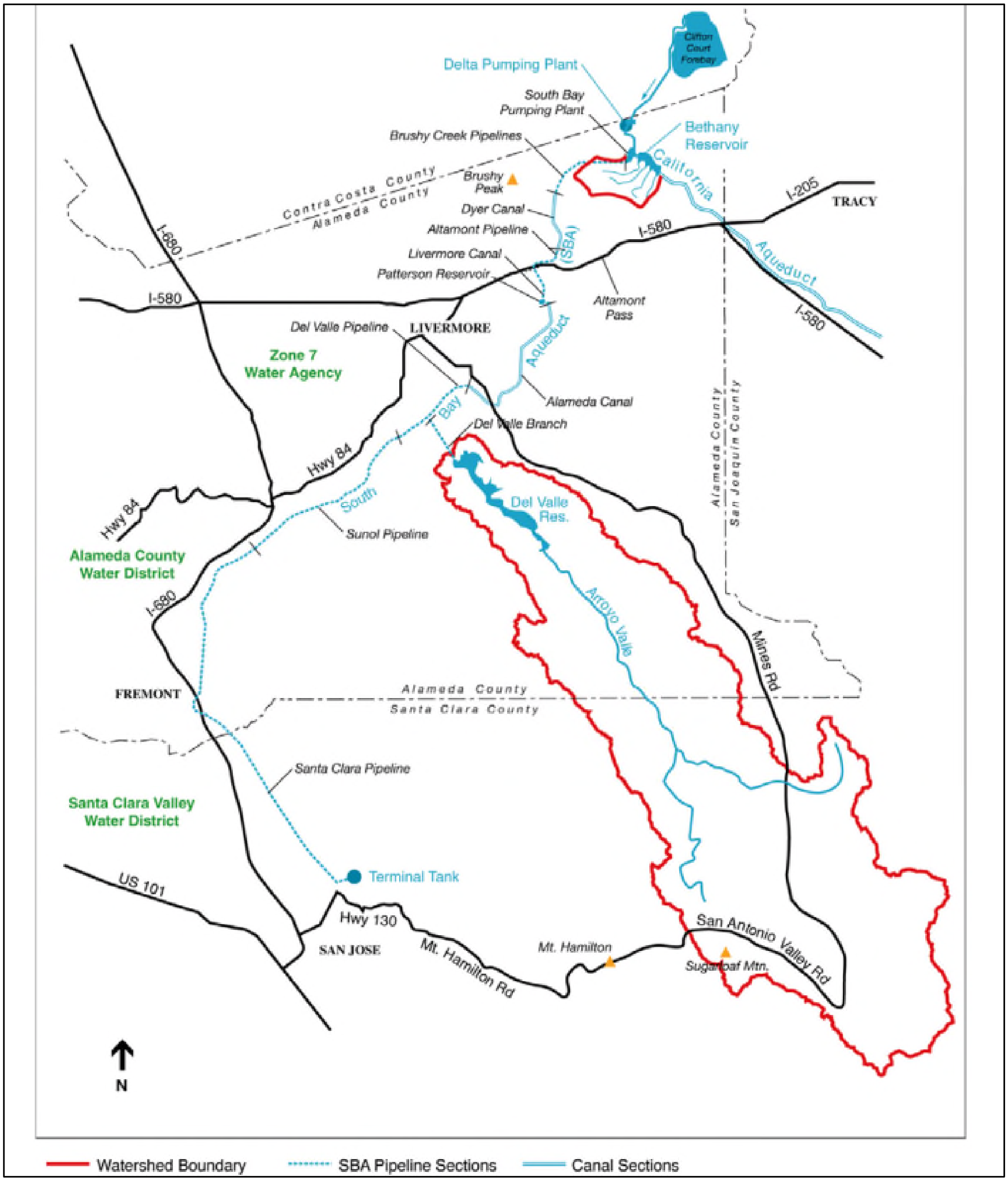


Figure 7-6. South Bay Aqueduct System

The California DWR is the owner and operator of the South Bay Aqueduct and maintains long-term water supply contracts with three water districts: ACWD, the Zone 7 Water Agency, and the Santa Clara Valley Water District (ACWD 2008). ACWD signed a contract with the California Department of Water in 1961 for a maximum annual amount of 42,000 acre-feet of water from the State Water Project.

Water Supply Infrastructure

The major infrastructure components supplying the ACWD are the State Water Project's South Bay Aqueduct, and Regional Water System's Hetch Hetchy Aqueduct, the Niles Cone Groundwater Basin, the Newark Desalination Facility, and the Del Valle Reservoir (ACWD 2015). Before water from these sources is supplied to ACWD customers via the District's potable water distribution system, it is treated to meet and surpass all state and federal drinking water standards:

- Two ACWD surface water treatment plants treat State Water Project water and local surface water from Del Valle Reservoir.
- The Newark Desalination Facility treats brackish groundwater to remove salts and other impurities.
- The ACWD Blending Facility blends Regional Water System water with relatively high hardness groundwater in order to provide a blended supply with lower overall hardness (ACWD 2015).

The ACWD's district-wide Main Replacement and Seismic Upgrade Program includes projects to upgrade and seismically retrofit water delivery pipelines and facilities. Intensive infrastructure upgrades will help improve water supply reliability for ACWD customers in the event of a major earthquake and will reduce service interruptions due to aging pipelines. One of the projects is the Appian Tank Seismic Upgrade, which will replace the existing water storage tank and several thousand feet of pipeline to improve the reliability of water storage and transmission after a large earthquake. This project is taking place in Union City and Fremont. The second current project is the Iron Horse Lane Water Main Replacement. This project includes replacement of approximately 1,000 feet of pipeline with a new, larger-diameter water main that will improve water quality, fire flow capacity, and water service reliability along and in the vicinity of Iron Horse Lane in Fremont (ACWD 2016b).

Water Supply Strategy

ACWD included a water supply strategy in its *Urban Water Management Plan* (ACWD 2015) to meet its planning objectives for water supply reliability, cost, water quality, environmental protection and risk. The ACWD evaluated a range of water supply and water conservation options and recommended a strategy that includes desalination, recycled water, conservation, groundwater management and off-site banking/transfers.

The ACWD has projected water supply and demand through 2040 for normal-year, single-dry-year, and multiple-dry-year conditions. Table 7-1 and Table 7-2 show the normal-year and single-dry-year projections. Under normal-year conditions, the ACWD will have sufficient supply to meet the projected demand and to increase groundwater storage for later use in the service area (ACWD 2015).

In the Planning Area, 1977 was the most severe single dry year. This drought year represents the minimum water supply considering all of the ACWD's water supplies. Under this scenario, the ACWD's State Water Project supplies would be cut back by approximately 90 percent and the ACWD would need to rely on local and off-site groundwater storage to help make up for the shortfall (ACWD 2015).

Projected supply availabilities under a long-term (5-year) drought were also calculated. This was done for 2016-2020, 2021-2025, 2026-2030, 2031-2035, and 2036-2040 demand conditions. This sequence was based on the supply availability under the most severe five-year period in the Planning Area (1987 and 1922). These scenarios showed that as demand rebounds after a drought and with future demand growth, the ACWD can expect to have interim year shortages of up to 10 percent (ACWD 2015).

Table 7-1. Projected Normal Year Water Supply and Demand Comparison

Supply/Demand	Supply Projections by Year (acre-feet per year)					
	2015	2020	2025	2030	2035	2040
Supply Component						
Imported Supplies						
State Water Project	28,700	27,500	27,500	27,500	27,500	27,500
Regional Water System	15,400	15,400	15,400	15,400	15,400	15,400
Total Imported Supplies	*44,100*	*42,900*	*42,900*	*42,900*	*42,900*	*42,900*
Local Supplies						
Groundwater Recharge	24,000	24,200	23,900	23,600	23,300	23,000
Groundwater Storage	N/A	N/A	N/A	N/A	N/A	N/A
Del Valle	4,700	5,000	5,000	5,000	5,000	5,000
Desalination	5,100	5,100	5,100	5,100	5,100	5,100
Recycled Water	0	0	0	0	0	0
Total Local Supplies	*33,800*	*34,300*	*34,000*	*33,700*	*33,400*	*33,100*
Banking/Transfers						
Semitropic Banking	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL SUPPLY	77,900	77,200	76,900	76,600	76,300	76,000
Demand Component						
Distribution System Demand	36,500	47,200	51,500	53,200	53,700	54,100
Groundwater System Demands	16,100	15,700	15,500	15,400	15,600	15,700
TOTAL DEMAND	52,600	62,900	67,000	68,600	69,300	69,800
Supply & Demand Comparison						
Supply Totals	77,900	77,200	76,900	76,600	76,300	76,000
Demand Totals	52,600	62,900	67,000	68,600	69,300	69,800
Difference	25,300	14,300	9,900	8,000	7,000	6,200
Difference as % of Supply	32%	19%	13%	10%	9%	8%
Difference as % of Demand	48%	23%	15%	12%	10%	9%

Table 7-2. Projected Single-Dry-Year Water Supply and Demand Comparison

Supply/Demand	Supply Projections (by year) (acre-feet per year)					
	2015	2020	2025	2030	2035	2040
Supply Component						
Imported Supplies						
State Water Project	4,500	3,400	3,400	3,400	3,400	3,400
Regional Water System	7,700	8,200	8,500	8,900	9,300	9,600
Total Imported Supplies	*12,200*	*11,600*	*11,900*	*12,300*	*12,700*	*13,000*
Local Supplies						
Groundwater Recharge	13,500	15,100	15,200	15,200	15,200	15,200
Groundwater Storage	10,000	10,000	10,000	10,000	10,000	10,000
Del Valle	0	0	0	0	0	0
Desalination	5,100	5,100	5,100	5,100	5,100	5,100
Recycled Water	0	0	0	0	0	0
Total Local Supplies	*28,600*	*30,200*	*30,300*	*30,300*	*30,300*	*30,300*
Banking/Transfers						
Semitropic Banking	13,500	13,500	13,500	13,500	13,500	13,500
TOTAL SUPPLY	54,300	55,300	55,700	56,100	56,500	56,800
Demand Component						
Distribution System Demand	36,500	47,200	51,500	53,200	53,700	54,100
Groundwater System Demands	13,500	12,300	12,400	12,600	12,700	12,900
TOTAL DEMAND	50,000	59,500	63,900	65,800	66,400	67,000
Supply & Demand Comparison						
Supply Totals	54,300	55,300	55,700	56,100	56,500	56,800
Demand Totals	50,000	59,500	63,900	65,800	66,400	67,000
Difference	4,300	-4,200	-8,200	-9,700	-9,900	-10,200
Difference as % of Supply	8%	-8%	-15%	-17%	-18%	-18%
Difference as % of Demand	9%	-7%	-13%	-15%	-15%	-15%

The ACWD regularly updates its forecast of future water demand through the following process:

- Analyze existing demand associated with current land use.
- Coordinate with city planning staff to obtain future land use plans.
- Estimate potential demand of currently undeveloped lands that are zoned for development.
- Estimate future demand resulting from approved land use changes for already developed lands.
- Estimate anticipated demand reductions from ongoing water conservation and plumbing code changes.

This approach has been proven sufficiently accurate for long-term, District-wide demand forecasting and is consistent with California Water Code requirements for urban water management planning (ACWD 2015).

7.1.4 Drought Response Planning

California Drought Contingency Plan

The *California Drought Contingency Plan* defines the following drought levels, which can serve as a reference for determining the need for response (DWR 2010):

- When the state's precipitation, snowpack, or runoff is lower than normal, or reservoir levels are below average, conservation measures should be increased voluntarily, to help manage the state's current water supply. General response types are as follows:
  - Level 1, Abnormally Dry—Actions to raise awareness of drought
  - Level 2, First-Stage Drought—Voluntary conservation, heightened awareness, increased preparation
- When reservoirs are low; precipitation, snowpack, and runoff are all well below normal and forecasted to remain so, mandatory conservation may need to be enacted in communities that do not have adequate water supplies. General response types are as follows:
  - Level 3, Severe Drought—Mandatory conservation, emergency actions
  - Level 4, Extreme Drought—Maximum mandatory conservation
- When extremely dry conditions persist across the state, water safety, supply, and quality are all at risk due to shortages, and all sectors of water usage are facing hardship as a result of inadequate supply and dry conditions, general response types are as follows:
  - Level 5, Exceptional Drought—Water supplies cut off, maximum response.

Drought recovery begins when water conditions throughout the state are at normal levels. No drastic water conservation measures are necessary in this period, although water conservation should always be practiced. The state's reservoirs are full or nearly full and runoff across the state is at normal levels.

Bay Area Water Supply and Conservation Agency Water Conservation Implementation Plan

The Bay Area Water Supply and Conservation Agency (BAWSCA) developed a *Water Conservation Implementation Plan* to identify how its member agencies could use water conservation to continue to provide reliable water supplies to customers through 2018, given a projected interim supply limitation of 184 mgd. The plan identifies the following possible roles for BAWSCA to consider during a water shortage, in response to the governor's 2009 declaration of a state of emergency drought for the entire state of California:

- Facilitate the communication and coordination between agencies and wholesalers on a regional basis, such that consistent messages to the public are forthcoming.

- Implement a coordinated regional public education campaign focused on drought actions customers can implement, including development of a coordinated, consistent, clear message for the region where possible.
- Expand coverage and financial incentives for BAWSCA regional programs to achieve a significant short-term increase in market penetrations and associated reductions in water consumption, with a focus on programs currently in effect. There may not be enough time to start a program that is new to the area and expect it to be effective during the water shortage; however, there may be other programs done by neighboring agencies that can be quickly imported.

If water supply conditions require a greater reduction in overall water use, BAWSCA and its member agencies may consider more immediate action for expanding current programs, such as the following:

- Implement regional drought awareness campaign.
- Expand bulk purchase and distribution of selected water-efficient fixtures.

ACWD Water Shortage Contingency Plan

The ACWD has a water shortage contingency plan, as required under the Urban Water Management Planning Act. The contingency plan will be enacted at the appropriate level to address a water supply shortage up to 50 percent. ACWD has sufficient water supply to meet demand in most years, but shortages can occur as a result of dry weather or an extended interruption of imported supplies. The Niles Cone Groundwater Basin provides storage capacity to protect against short-term water supply deficiencies or disruptions. ACWD can use off-site storage at the Semitropic Water Storage District's Groundwater Banking Program to help meet dry-year water supply needs.

The upper aquifer of the Niles Cone Groundwater Basin, known as the Newark Aquifer, is subject to saltwater intrusion if inland groundwater levels drop and remain below sea level for a period of time. In order to protect the Niles Cone and the freshwater supply, the District manages all of its water supplies every year to maintain target levels in the aquifer. Through this practice, the Niles cone groundwater level becomes the key indicator of water supply conditions. Depending on projected groundwater levels, ACWD will take action to protect local groundwater, including the following:

- Maximizing the import of additional water for artificial recharge of the groundwater basin
- Reducing use of local groundwater
- Maximizing use of imported supplies.

The ability of ACWD to maintain groundwater levels after the actions above have been taken will indicate the potential stage of water supply shortfall and correlated level of reductions ACWD may need to achieve. Figure 7-7 summarizes water supply conditions associated with groundwater levels and the approximate stage of water shortage and associated management measures taken. Figure 7-8 summarizes the steps the ACWD would take to implement a water shortage contingency plan in response to a water supply shortfall.

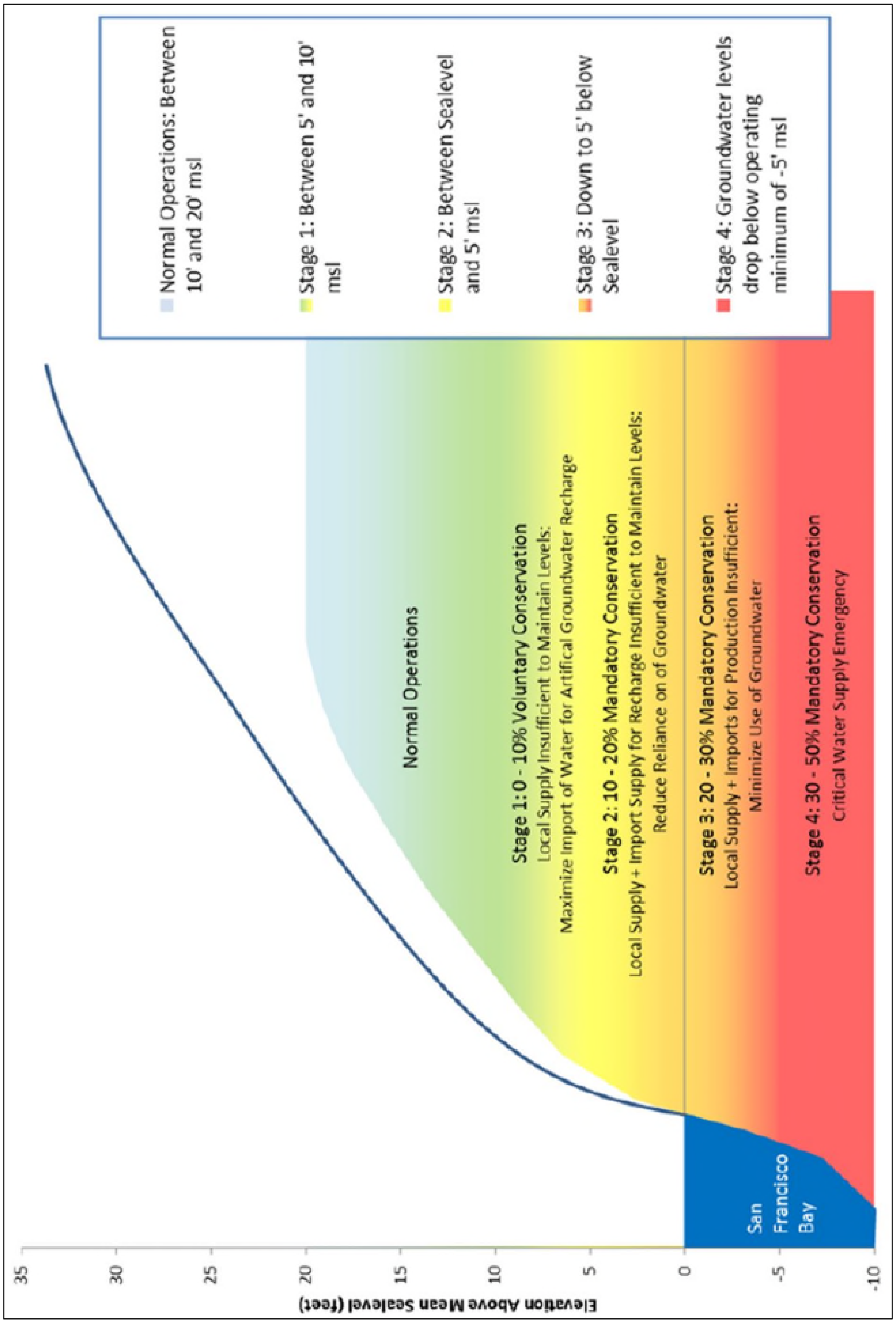


Figure 7-7. Water Shortage Response Based on Local Groundwater Levels

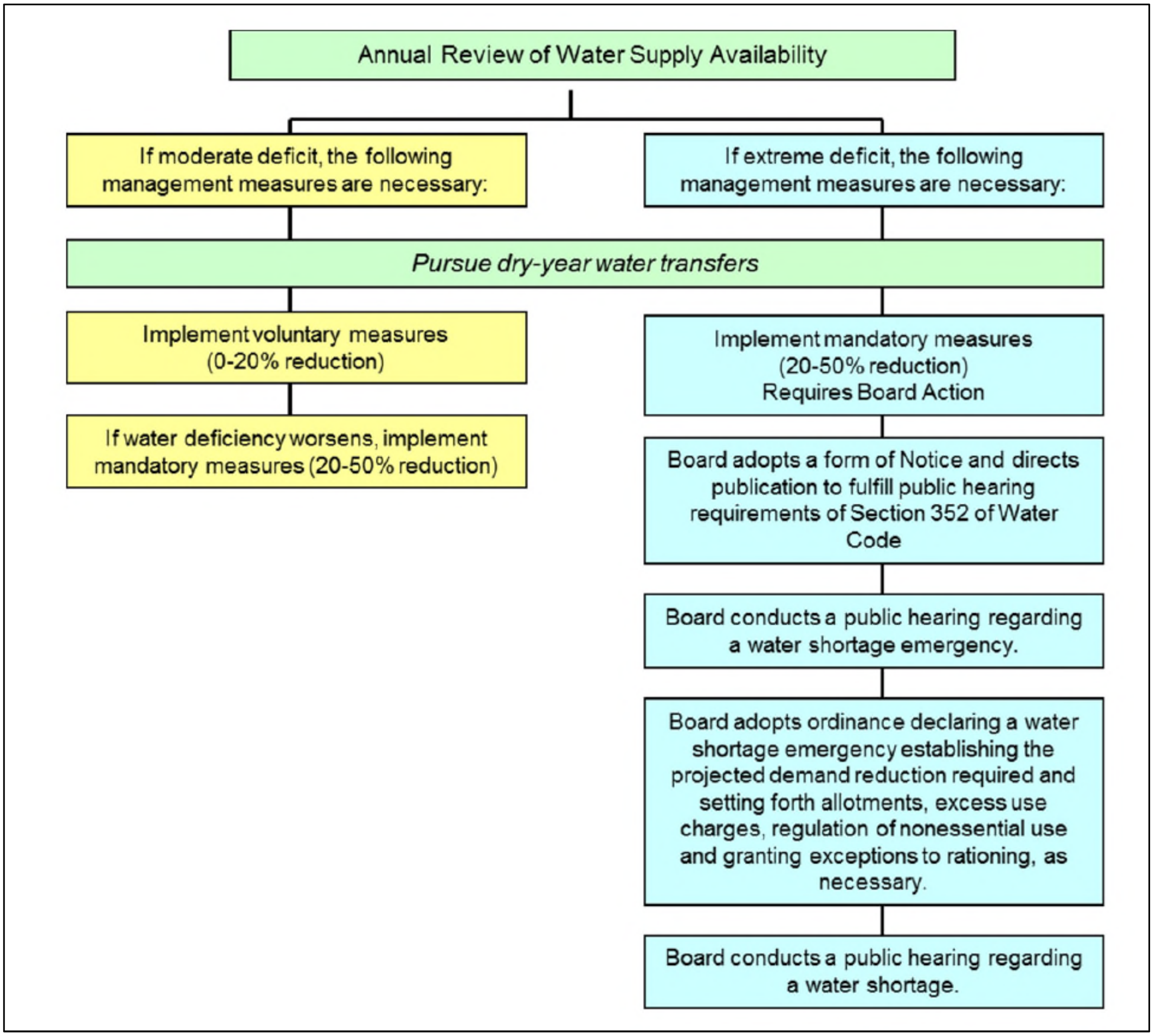


Figure 7-8. Water Shortage Contingency Plan

7.2 HAZARD PROFILE

7.2.1 Past Events

In California, droughts typically occur after two or three years of below-average rainfall for the period from November to March, when about 75 percent of the State's average annual precipitation falls. December, January, and February are when approximately 50 percent of the rainfall occurs in California.

Drought has affected nearly every county in California at one time, causing more than $2.6 million in damages. They are a cyclic part of the climate of the State and occur at any time of the year, with an average recurrence interval between three and 10 years (State of California HMP 2013; Alameda County HMP 2016). This section provides information regarding drought events that occurred in California, Alameda County, and the Union City/Newark Planning Area.

State of California

The California Department of Water Resources has state hydrologic data back to the early 1900s. The hydrologic data show multi-year droughts from 1912 to 1913, 1918 to 1920 and 1922 to 1924 (DWR 2015). Since then, four prolonged periods of drought occurred in California:

- **1929 to 1934**—The 1929 to 1934 drought established the criteria for designing the supply and yield of many large Northern California reservoirs. Sacramento Valley runoff was 55 percent of average for the time period from 1901 to 1996, with only 9.8 million acre-feet received.
- **1976 to 1977**—California had one of its most severe droughts due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California, with the previous winter recorded as the fourth driest in California's hydrological history. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the state. Only 37 percent of the average Sacramento Valley runoff was received, with just 6.6 million acre-feet recorded. Over $2.6 billion in crop damage was recorded in 31 counties. A federal disaster declaration was declared for some counties.
- **1987 to 1992**—California received precipitation well below average levels for four consecutive years. The Central Coast was most affected by the lack of rainfall and low runoff. During this drought, only 56 percent of average runoff for the Sacramento Valley was received, totaling just 10 million acre-feet. By February 1991, all 58 counties in California were suffering from drought conditions and urban areas as well as rural and agricultural areas were impacted.
- **2012 to 2016 (Ongoing)**—California's current drought has set several records for the state. From 2012 to 2014, it ranked as the driest three consecutive years for statewide precipitation. Calendar year 2014 set new climate records for statewide average temperatures and for record-low water allocations in the State Water Project. Calendar year 2013 set minimum annual precipitation records for many communities. Total impacts of the drought cannot be determined until after its conclusion (DWR 2015).

Between 1954 and 2016, the State of California experienced one FEMA-declared drought-related disaster: EM-3023 in 1977, which applied to 58 counties, including Alameda County (FEMA 2016).

Alameda County

The 2010 ABAG Local Hazard Mitigation Plan identified the following drought events that impacted Alameda County:

- **1917 to 1921**—This event affected the entire state with the exception of central Sierra Nevada and the north coast.
- **1922 to 1926**—This event affected the entire state with the exception of central Sierra Nevada.
- **1928 to 1937**—This event affected the entire state.
- **1943 to 1951**—This event affected the entire state.
- **1959 to 1962**—This event affected the entire state.
- **1976 to 1977**—This event affected the entire state with the exception of southwestern deserts. These were the two driest years in California's history. The drought was most severe in the northern two-thirds of the State. California proclaimed a statewide disaster that did not include Alameda County, but the federal disaster declaration in 1977 did include Alameda County. Damage totaled $2.664 billion ($888.5 million in 1976 and $1.775 billion in 1977).
- **1987 to 1992**—This event affected the entire state.
- **2007 to 2009**—This event affected the entire state, particularly the central coast. It was a three year drought due to below average rainfall, low snowmelt runoff, and the largest court ordered water

restriction in state history. The dry conditions damaged crops, deteriorated water quality, and caused extreme fire danger. California proclaimed a state disaster in 2008 and 2009. Damages included $300 million in agricultural revenue loss and potential $3 billion in economic losses over time.

- **2012 to 2016 (ongoing)**—This event affected the entire state. California proclaimed a statewide disaster in 2014.

Agriculture-related disasters and disaster declarations are common in the United States. The U.S. Department of Agriculture (USDA) Farm Service Agency provides assistance for natural disaster losses resulting from drought, flood, fire, freeze, tornadoes, pest infestation, and other natural disasters. The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses. Between 2012 and 2016, California has been included in 61 drought-related USDA disaster declarations and Alameda County has been included in 11:

- S3248 and S3930 in 2012
- S3547, S3558 and S3569 in 2013
- S3626, S3637, and S3743 in 2014
- S3784 and S3943 in 2015
- S3952 in 2016.

7.2.2 Location

Droughts can occur anywhere in California and are typically regional in nature. If a drought is occurring in Alameda County, then the Planning Area is most likely being impacted as well. The entire Planning Area is susceptible to droughts and impacts brought on by such events.

7.2.3 Frequency

Historical drought data for the Alameda County region indicate there have been three significant droughts in the last 40 years. As temperatures increase, the probability of future droughts will likely increase. Therefore, it is likely that droughts will occur in California, Alameda County, and the Planning Area with varied severity in the future, even after the current drought concludes.

7.2.4 Severity

General Drought Impacts

Drought can have a widespread impact on the environment and the economy, although it typically does not result in direct loss of life or damage to property, as do other natural disasters. Nationwide, the impacts of drought occur primarily in the agriculture, transportation, recreation and tourism, forestry, and energy sectors. Social and environmental impacts are also significant, although it is difficult to put a precise cost on these impacts. The National Drought Mitigation Center uses three categories to describe likely drought impacts:

- Agricultural—Drought threatens crops that rely on natural precipitation.
- Water supply—Drought threatens supplies of water for irrigated crops and for communities.
- Fire hazard—Drought increases the threat of wildfires from dry conditions in forest and rangelands.

The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. When measuring the severity of droughts, analysts typically look at economic impacts. All people could pay more for water if utilities increase their rates due to shortages. Agricultural impacts can result in loss of work for farm workers and those in related food processing jobs. Other water- or electricity-dependent industries are commonly forced to shut down all or a portion of their facilities, resulting in further layoffs. A drought can harm recreational companies that use water (e.g., swimming pools, water parks, and river rafting companies) as well as landscape and nursery businesses.

Drought generally does not affect groundwater sources as quickly as surface water supplies, but groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. Reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when steam flows are lowest. In Alameda County, groundwater supplies 51 percent of agriculture water supply (5,800 acre-feet) and 15 percent of urban use needs (35,900 acre-feet)—17 percent (41,700 acre-feet) of the County’s total water use (DWR 2013).

When groundwater supplies are significantly depleted, it can lead to the secondary hazard of subsidence. Without groundwater aquifers to support the weight of the ground, land collapses downward. The greatest cause for subsidence in California is the compaction of aquifer systems. This is typically due to groundwater pumping, and drought increases the need for groundwater pumping as freshwater sources elsewhere become unavailable. Subsidence is significant because it is typically irreversible. It may also lead to wetlands changing size and shape, migrating to lower elevations, or disappearing entirely; rivers changing course; and erosion/deposition patterns changing (California Water Science Center 2016a). Alameda County has not yet experienced land sinking due to low groundwater levels, but subsidence is a significant concern in parts of the state, most notably the San Joaquin Valley and Central Valley. Part of the Central Valley southwest of Mendota experienced over 29 feet of subsidence between 1925 and 1977 (California Water Science Center 2016b).

Local Impacts of the Current Drought

On March 14, 2014, the ACWD declared a water shortage emergency in Fremont, Newark and Union City and adopted a Water Shortage Emergency Ordinance that included mandatory water use restrictions. On July 17, 2014, the ACWD adopted drought surcharges to help offset the financial impacts of the current drought, stabilize revenues and promote conservation (ACWD 2014). On July 1, 2016, the surcharge was rescinded, based on district projections of future water supply (ACWD 2016a).

The Cities of Union City and Newark have taken steps to comply with the ACWD and protect the quantity and quality of their water resources:

- City of Newark conservation policies:
  - For turf at sports fields or other active recreation areas within parks, irrigation will be limited to not more than three days per week in the summer and two days per week for the rest of the year.
  - For all other City landscaping, irrigation will be limited to not more than two days per week in the summer and one day per week for the rest of the year.
  - The City’s automatic irrigation systems will continue to be maintained and managed for the most efficient watering. Some repairs outside of the regular watering schedule will occur.
  - Maintenance staff will use a water truck to water selective trees in areas where there is no irrigation system.
  - The water features at Byington and Birch Grove Parks will not be operational.
- City of Union City conservation measures (Union City 2016):
  - Replacement of roughly 750,000 square feet of underutilized lawn and sod throughout the City

- Use of urban forest wood chips to mulch parks, railroad corridors, back-ups and medians to improve soil and help preserve moisture
- Installation of low-volume watering systems that deliver water through dripping, spraying or streams, allowing plants and soil to be moist, but not soaked
- Use of products in all “shrub to tree” planting that have water absorbing polymers that retain up to 400 times their weight in water, providing water savings benefits for up to seven years
- Installation of over 75 smart irrigation controllers where watering needs are self-adjusted according to weather station information, even shutting off water use completely after it rains; smart irrigation controllers have alarms for broken sprinklers, mainlines and electrical issues, making it easy for City staff to make repairs
- Routine checks by City staff to ensure that irrigation systems are working properly
- Use of native and Mediterranean adaptive plants that are drought tolerant
- Use of more affordable and unprocessed water from five city-owned wells
- Use of analog soil moisture meters providing instant readings of soil moisture levels, which helps to determine if certain areas need to have their irrigation controls adjusted
- Coordination with ACWD to review and make adjustments to the City’s water conservation program
- Use of lawn aerators to create holes in lawns allowing water, air and fertilizer to penetrate to the root zone
- Using the most water (still conservatively) at parks that receive the most foot traffic, crowds of people or where sports are played; lush, thick grass is imperative to the safety of those playing on sports fields.

7.2.5 Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions.

Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation.

Scientists at this time do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades; California is currently experiencing a several-year-long drought, while other areas in the United States may experience droughts as short as one or two months. How long droughts last depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale.

7.3 SECONDARY HAZARDS

The secondary hazard most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. Millions of board feet of timber have been lost, and in many cases erosion occurred, which caused serious damage to aquatic life, irrigation, and power production by heavy silting of streams, reservoirs, and rivers.

Drought also is often accompanied by extreme heat, exposing people to the risk of sunstroke, heat cramps and heat exhaustion. Pets and livestock are also vulnerable to heat-related injuries. Crops can be vulnerable as well.

Environmental losses are the result of damage to plants, animals, wildlife habitat, and air and water quality; forest and range fires; degradation of landscape quality; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species will eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity.

Drought-induced subsidence is a potential secondary hazard, although it is not as common as wildfire or extreme heat. If subsidence does occur, it can significantly impact the local environment, floodplain/wetlands, and water supply.

7.4 EXPOSURE

All people, property and environments within the Union City/Newark Planning Area would be exposed to some degree to the impacts of moderate to extreme drought conditions.

7.5 VULNERABILITY

Drought produces a complex web of impacts that span many sectors of the economy and reach well beyond the area experiencing physical drought. This complexity exists because water is integral to the ability to produce goods and provide services. Drought can affect a wide range of economic, environmental and social activities. The vulnerability of an activity to the effects of drought usually depends on its water demand, how the demand is met, and what water supplies are available to meet the demand.

California's 2005 Water Plan and subsequent updates indicate that water demand in the state will increase through 2030. Although the Department of Water Resources predicts a modest decrease in agricultural water use, the agency anticipates that urban water use will increase by 1.5 to 5.8 million acre-feet per year (DWR 2005). The 2013 update to the Water Plan explores measures, benchmarks, and successes in increasing agricultural and urban water use efficiency. Between 1996 and 2005, the average amount of water use in the San Francisco Bay area (including the Planning Area for this HMP) was 155 gallons per capita per day (gpcd); the statewide average was 198 gpcd. The state established a 20-percent water use reduction goal to be achieved by 2020. Although regional estimates were not available, the state average for water use reduction by 2010 was 16 percent (or 166 gpcd) (DWR 2013).

7.5.1 Population

The entire population of the Planning Area is vulnerable to drought events. Drought conditions can affect people's health and safety, including health problems related to low water flows and poor water quality, and health problems related to dust. Droughts can also lead to the loss of human life (NDMC 2014). Other possible impacts on health from drought include increased recreational risks; effects on air quality; diminished living conditions related to energy, air quality, and sanitation and hygiene; compromised food and nutrition; and increased incidence of illness and disease. Health implications of drought—both short-term and long-term—are numerous (CDC 2012). Drought conditions can cause shortages of water for human consumption. Droughts can also lead to reduced local firefighting capabilities.

Alameda County, the Cities of Union City and Newark, ACWD, regional water purveyors, and other regional stakeholders have spent considerable effort to protect life, safety, and health during times of consecutive dry years, such as the current drought. Provisions and measures have been taken to analyze and account for anticipated water shortages. With the actions implemented by the Cities of Union City and Newark and the coordination with Alameda County, the Planning Area has the ability to minimize and reduce impacts on residents and water consumers in the Planning Area. No significant life or health impacts as a result of drought are anticipated in the Planning Area.

7.5.2 Property

No structures will be directly affected by drought conditions in the Cities of Union City and Newark Planning Area, though some structures may become vulnerable to wildfires, which are more likely following years of drought. Risk to life and property is greatest in the wildland-urban interface, where forested areas adjoin urbanized areas (high density residential, commercial and industrial). All assets in and adjacent to the wildland-urban interface zone, including population, structures, critical facilities, lifelines, and businesses are considered vulnerable to wildfire. Specific vulnerability regarding wildfire is described in Chapter 12.

7.5.3 Critical Facilities

Critical facilities as defined for this plan will continue to be operational during a drought. The risk to the County's critical facilities inventory will be largely aesthetic. For example, when water conservation measures are in place, landscaped areas will not be watered and may die. These aesthetic impacts are not considered significant. Where possible, both cities' public works departments have implemented actions to help with water conservation, such as updating or maintaining city irrigation systems and working with ACWD to adjust water conservation programs (Union City 2016; Newark 2016).

7.5.4 Environment

Environmental losses from drought are associated with damage to plants, animals, wildlife habitat, and air and water quality; forest and range fires; degradation of landscape quality; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes and vegetation. However, many species will eventually recover from this temporary condition. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity. Environmental losses are difficult to quantify, but growing public awareness and concern for environmental quality have forced public officials to focus greater attention on these effects.

7.5.5 Economic Impact

A prolonged drought can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages and higher costs for these resources. Industries that rely on water for business may be impacted the most (e.g., landscaping businesses). Although most businesses will still be operational, they may be impacted aesthetically. These aesthetic impacts are most significant within the recreation and tourism industry. Moreover, droughts in another area could impact the food supply/price of food for residents of the Planning Area.

7.6 FUTURE TRENDS IN DEVELOPMENT

Land use planning is directed by general plans adopted under California's General Planning Law. Municipal planning partners are encouraged to establish General Plans with policies directing land use and dealing with issues of water supply and the protection of water resources. These plans provide the capability at the local municipal level to protect future development from the impacts of drought. Union City and Newark reviewed their general plans under the capability assessments performed for this effort. Deficiencies identified by these reviews can be identified as mitigation actions to increase the capability to deal with future trends in development.

7.7 SCENARIO

The continuation or exacerbation of the current drought across California—an extreme, multiyear drought with record-breaking rates of low precipitation and high temperatures—is the worst-case scenario for the Planning Area. Low precipitation and high temperatures intensify the possibility of wildfires throughout the Planning Area, increasing the need for water, when water is already in limited supply. Surrounding regions, also in drought conditions, could increase their demand for the water supplies also relied upon in the Planning Area, causing social and political conflicts. The high-density population of the Bay Area increases the likelihood of such conflicts, despite the existence of the Bay Area Water Supply and Conservation Agency *Water Conservation Implementation Plan*. The longer drought conditions last in the Planning Area, the more impacted the local economy becomes; water-dependent industries especially will experience setbacks.

7.8 ISSUES

The planning team has identified the following drought-related issues:

- Identification and development of alternative water supplies
- Monitoring of the implementation and benefits of the long-term reliable water supply strategy projects, Bay Area Water Supply and Conservation Agency *Water Conservation Implementation Plan* projects, and water system upgrades
- Use of alternative techniques (groundwater recharge, water recycle, local capture and reuse, desalination, and transfer) to stabilize and offset supply shortfalls
- The probability of increased drought frequencies and durations due to climate change
- The promotion of active water conservation even during non-drought periods.

8. EARTHQUAKE

8.1 GENERAL BACKGROUND

An earthquake is the vibration of the earth's surface that follows a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of segments of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocations of the crust. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. Vibrations called "seismic waves" are generated in the process of breaking. These waves travel outward from the source of the earthquake along the surface and through the earth at varying speeds, depending on the material they move through.

California is seismically active because of movement of the North American Plate, on which everything east of the San Andreas Fault sits, and the Pacific Plate, which includes coast communities west of the fault. The movement of the tectonic plates creates stress released as energy that moves through the earth as waves called earthquakes.

DEFINITIONS

Earthquake—The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth or a contact zone between tectonic plates.

Epicenter—The point on the earth's surface directly above the hypocenter of an earthquake. The location of an earthquake is commonly described by the geographic position of its epicenter and by its focal depth.

Fault—A fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other.

Hypocenter—The region underground where an earthquake's energy originates

Liquefaction—Loosely packed, water-logged sediments losing their strength in response to strong shaking, causing major damage during earthquakes.

8.1.1 Earthquake Classifications

Earthquakes are typically classified in one of two ways: by the amount of energy released, measured as magnitude; or by the impact on people and structures, measured as intensity:

- Magnitude represents the amount of seismic energy released at the hypocenter of the earthquake. It is based on the amplitude of the earthquake waves recorded on instruments. Magnitude is thus represented by a single, instrumentally determined value.
- Intensity represents the observed effects of ground shaking at any specified location. The intensity of earthquake shaking lessens with distance from the earthquake epicenter. Tabulated peak ground accelerations for a listed "maximum credible earthquakes" are a measure of how a site will be affected by seismic events on distant faults.

Magnitude

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. It is commonly expressed by ratings on either of two scales (Michigan Tech University 2016):

- The Richter scale measures magnitude of earthquakes based on the amplitude of the largest energy wave released by the earthquake. Richter scale readings are suitable for smaller earthquakes; however, because it is a logarithmic scale, the scale does not distinguish clearly the magnitude of large earthquakes above a certain level. Richter scale magnitudes and corresponding earthquake effects are as follows:

- 2.5 or less—Usually not felt, but can be recorded by seismograph
- 2.5 to 5.4—Often felt, but causes only minor damage
- 5.5 to 6.0—Slight damage to buildings and other structures
- 6.1 to 6.—May cause a lot of damage in very populated areas
- 7.0 to 7.9—Major earthquake; serious damage
- 8.0 or greater—Great earthquake; can totally destroy communities near the epicenter

- A more commonly used magnitude scale today is the moment magnitude (M_W) scale. The moment magnitude scale is based on the total moment release of the earthquake (the product of the distance a fault moved and the force required to move it). Moment magnitude roughly matches the Richter scale but provides more accuracy for larger magnitude earthquakes. The scale is as follows:
    - Great—$M_W \geq 8$
    - Major—$M_W = 7.0 - 7.9$
    - Strong—$M_W = 6.0 - 6.9$
    - Moderate—$M_W = 5.0 - 5.9$
    - Light—$M_W = 4.0 - 4.9$
    - Minor—$M_W = 3.0 - 3.9$
    - Micro—$M_W < 3$

Intensity

Currently the most commonly used intensity scale is the modified Mercalli intensity scale, with ratings defined as follows (USGS, 2014):

- I (Not Felt). Not felt except by a very few under especially favorable conditions
- II (Weak). Felt only by a few persons at rest, especially on upper floors of buildings.
- III (Weak). Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it is an earthquake. Standing cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
- IV (Light). Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like a heavy truck striking building. Standing cars rocked noticeably.
- V (Moderate). Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
- VI (Strong). Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
- VII (Very Strong). Damage negligible in buildings of good design and construction; slight in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken.
- VIII (Severe). Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
- IX (Violent). Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
- X (Extremet). Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

8.1.2 Ground Motion

Earthquake hazard assessment is also based on expected ground motion. During an earthquake when the ground is shaking, it also experiences acceleration. The peak acceleration is the largest increase in velocity recorded by a particular station during an earthquake. Estimates are developed of the annual probability that certain ground motion accelerations will be exceeded; the annual probabilities can then be summed over a time period of interest.

The most commonly mapped ground motion parameters are the horizontal and vertical peak ground accelerations (PGA) for a given soil or rock type. PGA is a measure of how hard the earth shakes, or accelerates, in a given geographic area. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. PGA is measured in g (the acceleration due to gravity) or expressed as a percent acceleration force of gravity (%g). These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage “short period structures” (e.g. single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges). Table 8-1 lists damage potential and perceived shaking by PGA factors, compared to the Mercalli scale.

Table 8-1. Mercalli Scale and Peak Ground Acceleration Comparison

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage		Estimated PGA[a] (%g)
		Resistant Buildings	Vulnerable Buildings	
I	Not Felt	None	None	<0.17%
II-III	Weak	None	None	0.17% – 1.4%
IV	Light	None	None	1.4% – 3.9%
V	Moderate	Very Light	Light	3.9% – 9.2%
VI	Strong	Light	Moderate	9.2% – 18%
VII	Very Strong	Moderate	Moderate/Heavy	18% – 34%
VIII	Severe	Moderate/Heavy	Heavy	34% – 65%
IX	Violent	Heavy	Very Heavy	65% – 124%
X – XII	Extreme	Very Heavy	Very Heavy	>124%

a. PGA measured in percent of g, where g is the acceleration of gravity
Sources: USGS, 2008; USGS, 2010

National maps of earthquake shaking hazards have been produced since 1948. They provide information essential to creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning used in the U.S. Scientists frequently revise these maps to reflect new information and knowledge. Buildings, bridges, highways and utilities built to meet modern seismic design requirements are typically able to withstand earthquakes better, with less damage and disruption. After thorough review of the studies, professional organizations of engineers update the seismic-risk maps and seismic design requirements contained in building codes (Brown et al., 2001).

The USGS updated its National Seismic Hazard Map in 2014, incorporating the best available seismic, geologic, and geodetic information on earthquake rates and associated ground shaking. Figure 8-1 shows the peak ground acceleration with 10 percent probability of exceedance in 50 years. For Union City and Newark, this PGA is 0.4 or greater.

Source: USGS 2014

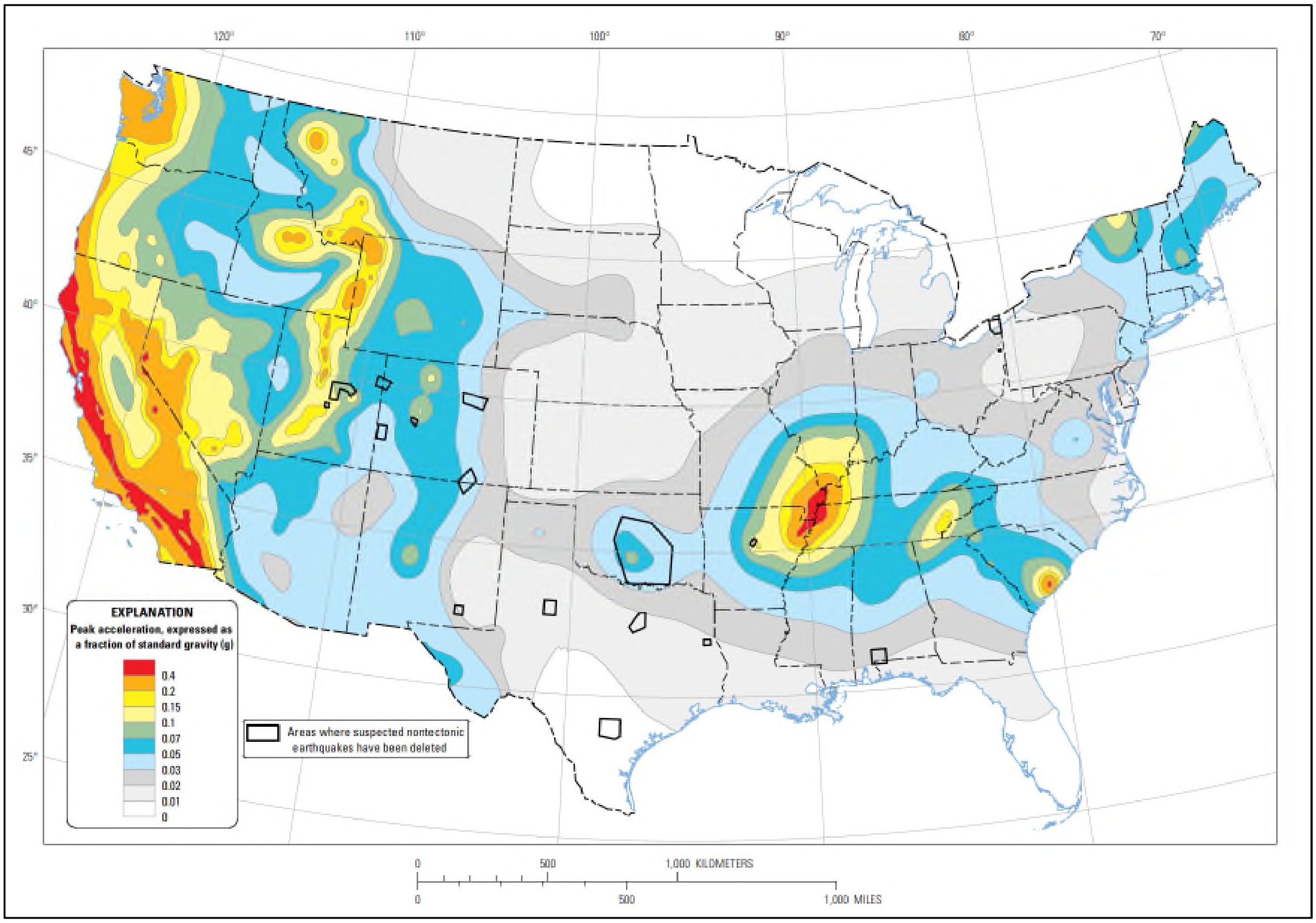


Figure 8-1. Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years

8.1.3 Effect of Soil Types

The impact of an earthquake on structures and infrastructure is largely a function of ground shaking, distance from the source of the quake, and liquefaction, a secondary effect of an earthquake in which soils lose their shear strength and flow or behave as liquid, thereby damaging structures that derive their support from the soil. Liquefaction generally occurs in soft, unconsolidated sedimentary soils. A program called the National Earthquake Hazard Reduction Program (NEHRP) creates maps based on soil characteristics to help identify locations subject to liquefaction. Table 8-2 summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. In general, these areas are also most susceptible to liquefaction.

The USGS has created a soil type map for the San Francisco Bay area that provides rough estimates of site effects based on surface geology. NEHRP soil types were assigned to a geologic unit based on the average velocity of that unit; USGS notes that this approach can lead to some inaccuracy. For instance, a widespread unit consisting of Quaternary sand, gravel, silt, and mud has been assigned as Class C soil types; however, some of the slower soil types in this unit fall under Class D. USGS does not have any way of differentiating units for slower-velocity soils in its digital geologic dataset (USGS 2016e).

Table 8-2. NEHRP Soil Classification System

NEHRP Soil Type	Description	Mean Shear Velocity to 30 m (m/s)
A	Hard Rock	1,500
B	Firm to Hard Rock	760-1,500
C	Dense Soil/Soft Rock	360-760
D	Stiff Soil	180-360
E	Soft Clays	< 180
F	Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 m thick)	

8.2 HAZARD PROFILE

California is seismically active because it sits on the boundary between two of the earth's tectonic plates. Most of the state—everything east of the San Andreas Fault—is on the North American Plate. Coastal cities from Monterey to San Diego are on the Pacific Plate, which is constantly moving northwest past the North American Plate. The relative rate of movement is about 2 inches (50 millimeters) per year (Cal OES 2013). Earthquakes in the San Francisco Bay region result from strain energy constantly accumulating across the region because of the northwestward motion of the Pacific Plate relative to the North American Plate.

8.2.1 Past Events

The last significant (> 6.0 M) seismic event in the Union City/Newark vicinity was the 2014 Magnitude-6.0 earthquake that originated 6 miles southwest of Napa. The previous large event was the 1989 M-7.1 Loma Prieta Earthquake that originated 10 miles northeast of Santa Cruz. No significant seismic events in the Planning Area vicinity have been recorded since these two events. Other significant earthquakes in California include the 1906 earthquake in San Francisco, the 1971 San Fernando Earthquake, and the 1994 Northridge earthquake. Recent earthquakes of magnitude of 5.0 or greater within a 100-mile radius of the Planning Area are listed in Table 8-3 and their locations are shown on Figure 8-2.

Table 8-3. Recent Earthquakes Magnitude 5.0 or Larger Within 100-mile Radius of the Planning Area

Date	Magnitude	Epicenter Location
8/24/2014	6.0	South Napa Earthquake
10/31/2007	5.6	San Francisco Bay area, California
5/14/2002	5	Northern California
9/3/2000	5	Northern California
4/18/1990	5.4	Northern California
10/18/1989 (4:25 p.m.)	5.0	Northern California
10/18/1989 (8:15 p.m.)	7.2	Northern California
6/13/1988	5	San Francisco Bay area, California
3/31/1986	5.6	Northern California
1/26/1986	5.4	Central California
1/14/1986	5	Central California

The State of California has been included in 12 FEMA major disaster (DR) or emergency (EM) declarations for earthquake events; however, Alameda County was included in only one: DR-845 for the October 17, 1989 Loma Prieta Earthquake; this declaration applied to the Counties of Alameda, Contra Costa, Marin, Monterey, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, and Solano (FEMA 2016).

Source: USGS 2016d

Figure 8-2. Recent Earthquakes Within 100-mile Radius of the Planning Area

Although the 1906 earthquake is most commonly associated with the City of San Francisco, surrounding areas, including Alameda County, were also greatly affected. In 1980, the USGS researched these impacts to use a standard for scenario impacts on the region. Damage is noted by jurisdiction and includes landslides, ground deformation, infrastructure damage (to roadways, electric car rail lines, and similar infrastructure), house and building collapse, house shifts, foundation cracks, fires, injuries, ground cracks, and more (USGS 1982).

8.2.2 Location

Faults

Geologists have found that earthquakes tend to reoccur along faults, which are zones of weakness in the earth's crust. Even if a fault zone has recently experienced an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake could still occur. In fact, relieving stress along one part of a fault may increase it in another part.

Active faults have experienced displacement in historical time. Inactive faults, where no such displacements have been recorded, also have the potential to reactivate or experience displacement along a branch sometime in the future. The State Division of Mines and Geology indicates that increased earthquake activity throughout California may cause tectonic movement along currently inactive fault systems. An example of a fault zone that has been reactivated is the Foothills Fault Zone in the Sierra Nevada, which was considered inactive until evidence was found near Spenceville, California, of an earthquake 1.6 million years ago. Then, in 1975, an earthquake occurred on another branch of the zone near Oroville, California.

A direct relationship exists between a fault's length and location and its ability to generate damaging ground motion at a given site. Small, local faults produce lower magnitude quakes, but ground shaking can be strong and damage can be significant in areas close to the fault. In contrast, large regional faults can generate earthquakes of great magnitudes but, because of their distance and depth, they may result in only moderate shaking in an area.

The Cities of Union City and Newark are located in one of the most historically seismically active regions in the United States, with exposure to major regional faults: Hayward, Calaveras, and San Andreas. The primary seismic hazard for the Planning Area is potential ground shaking from these three large faults. Figure 8-3 shows the location of these fault lines and the probability of a major earthquake on each.

Hayward Fault

The Hayward Fault is a 45-mile-long, right lateral slip fault that runs parallel to the San Andreas Fault through densely populated areas on the East Bay. The Hayward Fault is increasingly becoming a hazard priority in the Bay Area because of its increased chance for activity and its proximity to critical infrastructure and multiple highly populated areas. The probability of a M-6.7 or greater earthquake along the Hayward Fault within the next 30 years is 33 percent. The Planning Area is very close to the Hayward Fault and would therefore experience significant impacts from an earthquake along this fault.

Calaveras Fault

The Calaveras Fault is a major branch of the San Andreas Fault in the San Francisco Bay area. It is east of the Hayward Fault and extends 76 miles from the San Andreas Fault near Hollister to Danville at its northern end. The Calaveras Fault is one of the most geologically active and complex faults in the San Francisco Bay Area (USGS 2003). The probability of a M-6.7 or greater earthquake along the Calaveras Fault within the next 30 years is 26 percent.

Source: USGS 2016f

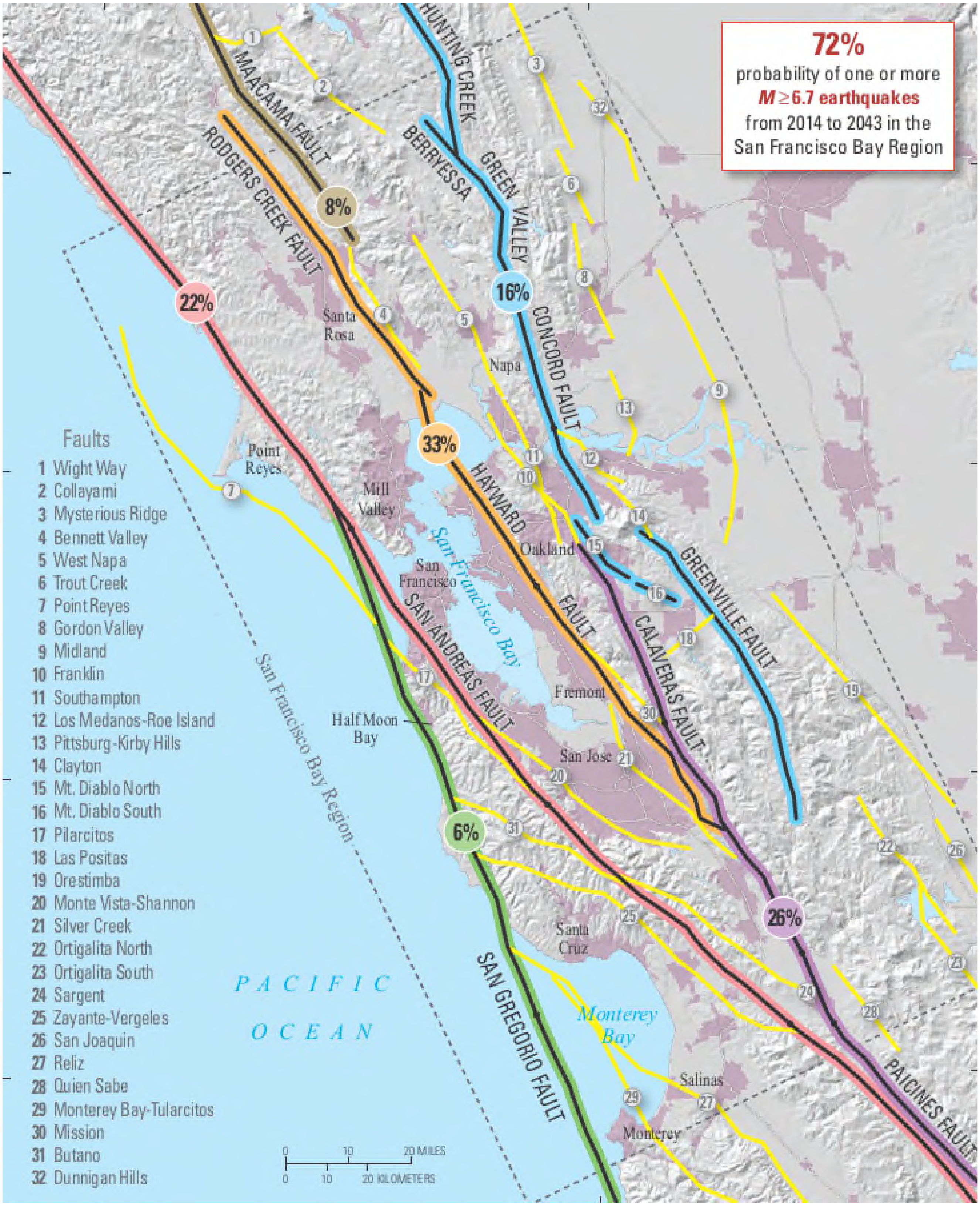


Figure 8-3. Significant Known Faults in the Bay Area

San Andreas Fault

The San Andreas Fault extends 810 miles from the East Pacific rise in the Gulf of California through the Mendocino fracture zone off the shore of northern California. The fault is estimated to be 28 million years old. It is an example of a transform boundary exposed on a continent. The fault forms the tectonic boundary between the Pacific Plate and the North American Plate, and its motion is right-lateral strike-slip.

The San Andreas Fault is typically referenced in three segments. The southern segment extends from its origin at the East Pacific Rise to Parkfield, California, in Monterey County. The central segment extends from Parkfield to Hollister, California. The northern segment extends northwest from Hollister, through the Bay Area, to its ultimate junction with the Mendocino fracture zone and the Cascadia subduction zone in the Pacific Ocean. The probability of a M-6.7 or greater earthquake along the San Andreas Fault within the next 30 years is 22 percent.

Maps of Earthquake Impact in the Planning Area

Identifying the extent and location of an earthquake is not as simple as it is for other hazards such as flood, landslide or wildfire. The impact of an earthquake is largely a function of the following components:

- Ground shaking (ground motion accelerations)
- Liquefaction (soil instability)
- Distance from the source (both horizontally and vertically).

Mapping that shows the impacts of these components was used to assess the risk of earthquakes in the Planning Area. While the impacts from each of these components can build upon each other during an earthquake event, the mapping looks at each component individually. The mapping used in this assessment is described below.

Shake Maps

A shake map is a representation of ground shaking produced by an earthquake. The information it presents is different from the earthquake magnitude and epicenter that are released after an earthquake because shake maps focus on the ground shaking resulting from the earthquake, rather than the parameters describing the earthquake source. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth’s crust. A shake map shows the extent and variation of ground shaking in a region immediately following significant earthquakes.

Ground motion and intensity maps are derived from peak ground motion amplitudes recorded on seismic sensors (accelerometers), with interpolation based on estimated amplitudes where data are lacking, and site amplification corrections. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity. Two types of shake map are typically generated from the data: probabilistic seismic hazard maps and earthquake scenario maps.

A probabilistic seismic hazard map shows the hazard from earthquakes that geologists and seismologists agree could occur. The maps are expressed in terms of probability of exceeding a certain ground motion, such as the 10-percent probability of exceedance in 50 years. This level of ground shaking has been used for designing buildings in high seismic areas. Figure 8-4 shows the estimated ground motion for the 100-year probabilistic earthquake in the Planning Area.

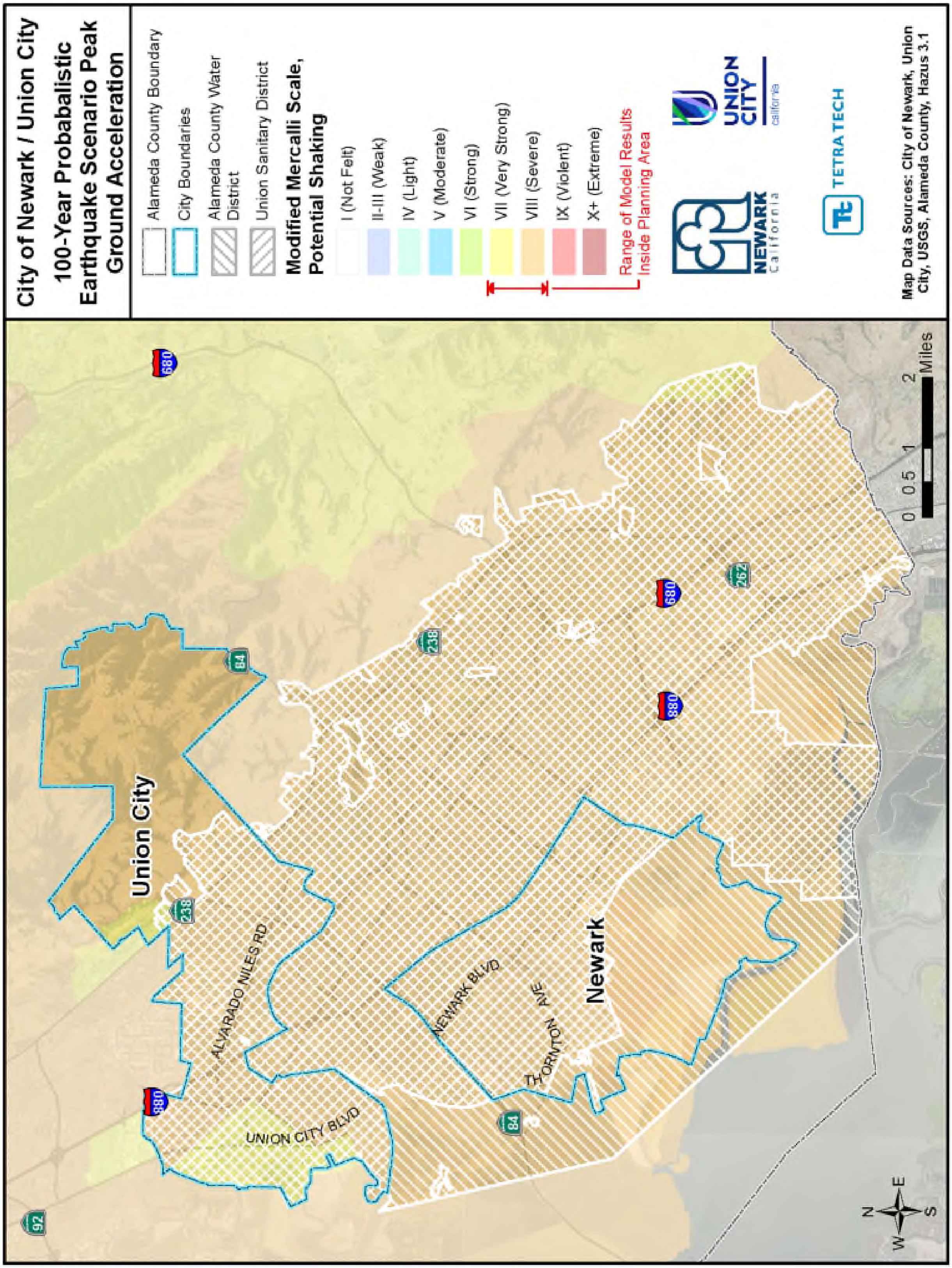


Figure 8-4. Planning Area 100-Year Probability Earthquake Event Peak Ground Acceleration

Earthquake scenario maps describe the expected ground motions and effects of hypothetical large earthquakes for a region. Maps of these scenarios can be used to support all phases of emergency management. Three scenarios were chosen by the Steering Committee for this plan (see Figure 8-5, Figure 8-6, and Figure 8-7):

- A Magnitude-7.05 event on the Hayward Fault with an epicenter 16 miles north-northwest of Union City; this scenario was developed for use in the USGS 2015 “Haywired” project, which provided a detailed assessment of the impacts of this scenario on 16 counties around San Francisco Bay.
- A Magnitude-7.0 event on the Calaveras Fault with an epicenter 11.5 miles north-northeast of Union City.
- A Magnitude-7.8 event on the Northern San Andreas Fault with an epicenter 145 miles northwest of Union City.

NEHRP Soil Maps

NEHRP soil types define the locations that will be significantly impacted by an earthquake. NEHRP Soils B and C typically can sustain low-magnitude ground shaking without much effect. The areas that are most commonly affected by ground shaking have NEHRP Soils D, E and F. Figure 8-8 shows NEHRP soil classifications in the Planning Area.

Liquefaction Maps

Liquefaction involves loose sandy soil with a high water content that undermines the ground’s ability to solidly support building structures during an earthquake. Foundations supported on liquefiable soils can lose their ability to support load and can experience settlement on the order of several inches or more. Differential settlement can cause significant damage to buildings, lifelines, and transportation structures, with partial or total collapse.

Soil liquefaction maps are useful tools to assess potential damage from earthquakes. When the ground liquefies, sandy or silty materials saturated with water behave like a liquid, causing pipes to leak, roads and airport runways to buckle, and building foundations to be damaged. In general, areas with NEHRP Soils D, E and F are also susceptible to liquefaction. If there is a dry soil crust, excess water will sometimes come to the surface through cracks in the confining layer, bringing liquefied sand with it, creating sand boils. Figure 8-9 shows the liquefaction susceptibility in the Planning Area.

Alquist-Priolo Zone Maps

The sudden sliding of one part of the earth’s crust past another releases the vast store of elastic energy in the rocks as an earthquake. The resulting fracture is a fault, and the sliding movement of earth on either side of a fault is called fault rupture. Fault rupture begins below the ground surface at the earthquake hypocenter, typically between 3 and 10 miles below the ground surface in California. If an earthquake is large enough, the fault rupture will travel to the ground surface, potentially destroying structures built across its path (Cal OES 2013).

Alquist-Priolo (AP) Zone Maps provide regulatory zones for potential surface fault rupture where fault lines intersect with future development and populated areas. The purpose of these maps is to assist in the geologic investigation before construction begins to ensure that the resulting structure will not be located on an active fault. Union City is located in a designated AP Zone for the Hayward Fault (California DOC 2010).

AP Maps were referenced, but not specifically used, in the risk assessment for this HMP as a result of the existence of current extensive studies and regulations and ongoing monitoring and update of AP Zones by the State of California. This plan assumes that the studies conducted and information provided by the State of California are the best available data for surface rupture risk and could not be improved through a separate assessment for this plan. AP Maps are available to the public at http://www.conservation.ca.gov/cgs/rghm/ap.

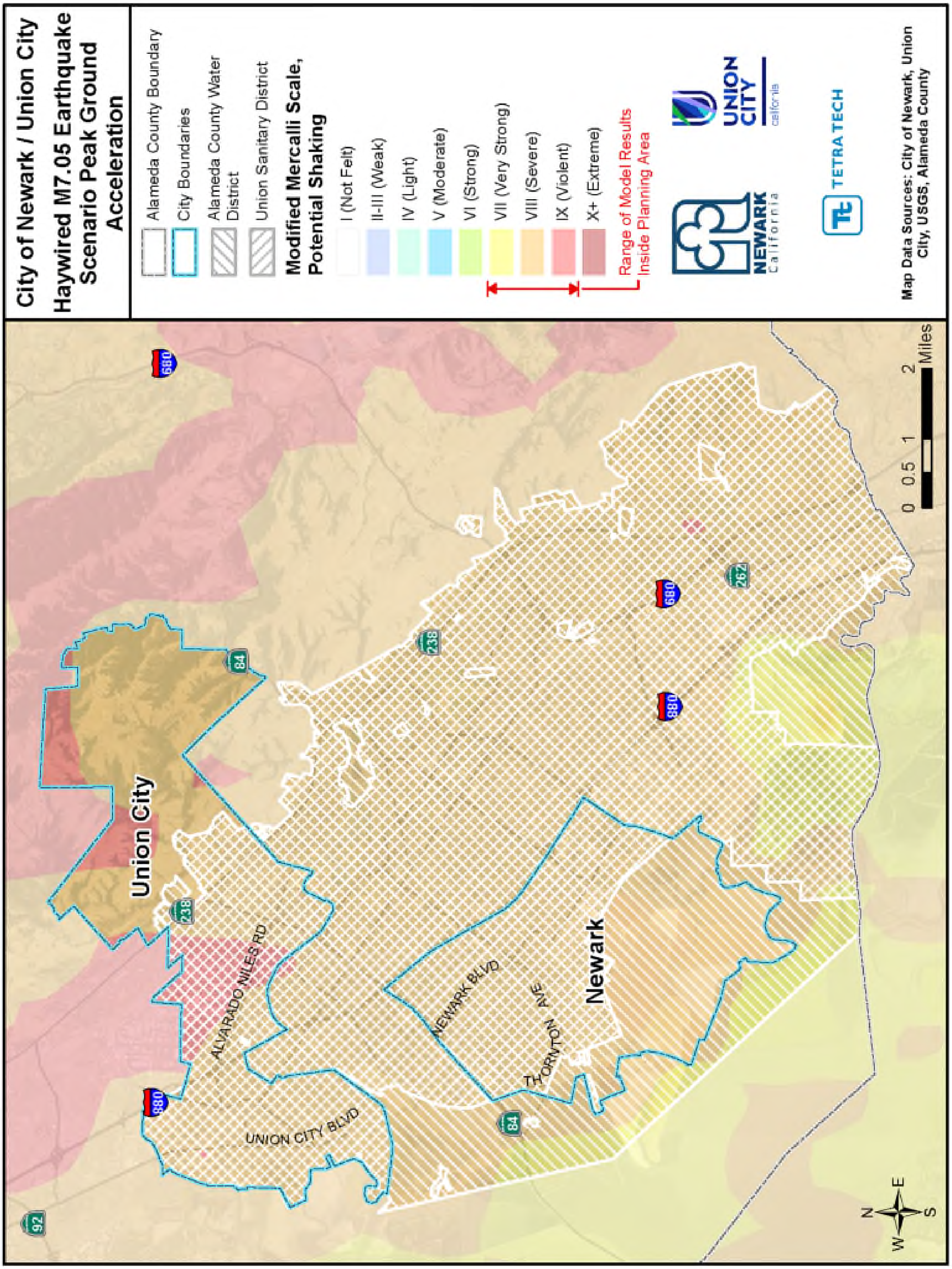


Figure 8-5. Hayward Fault Scenario Peak Ground Acceleration

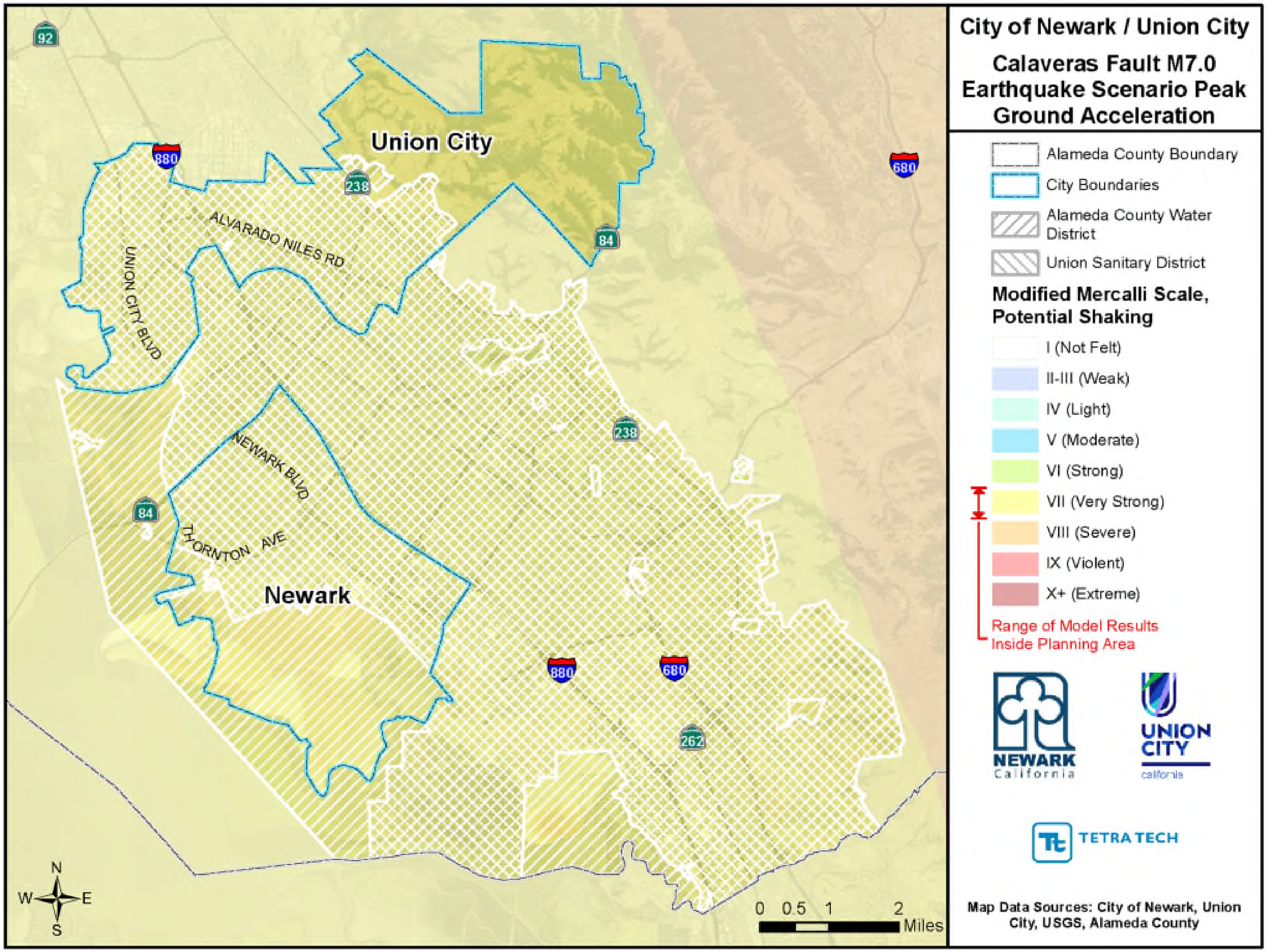


Figure 8-6. Calaveras Fault Scenario Earthquake Peak Ground Acceleration

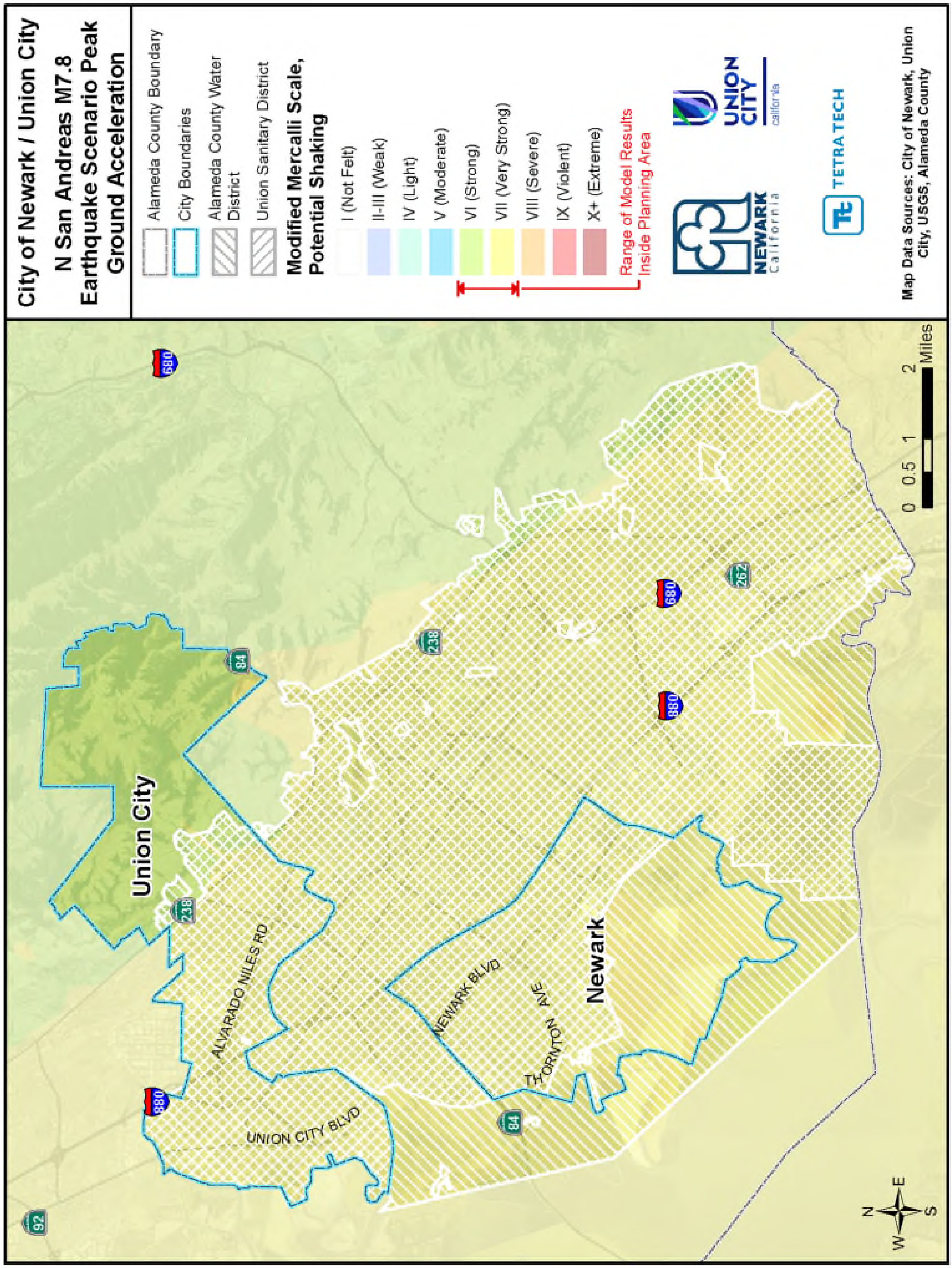


Figure 8-7. Northern San Andreas Fault Scenario Earthquake Peak Ground Acceleration

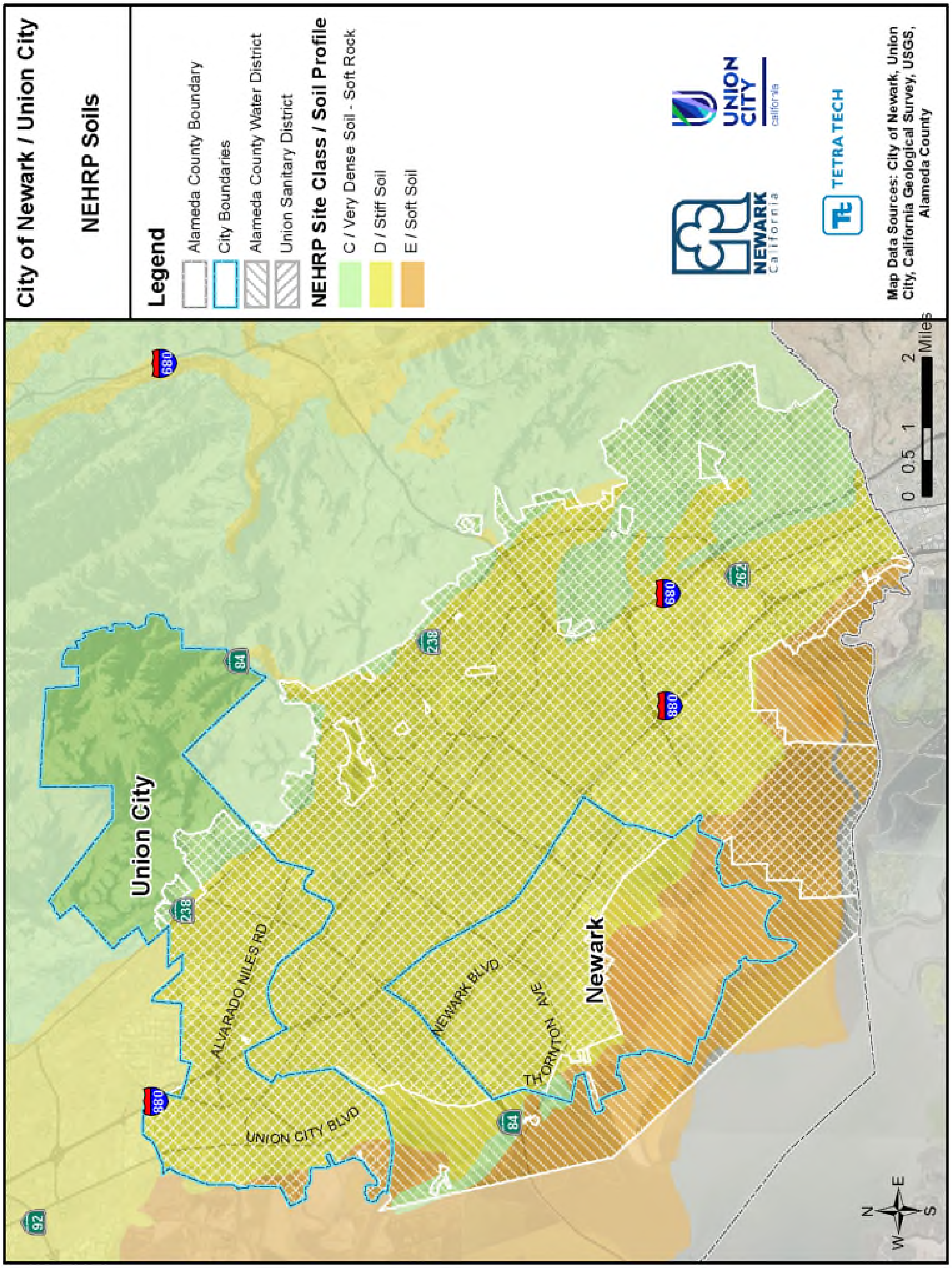


Figure 8-8. National Earthquake Hazard Reduction Program Soil Classification

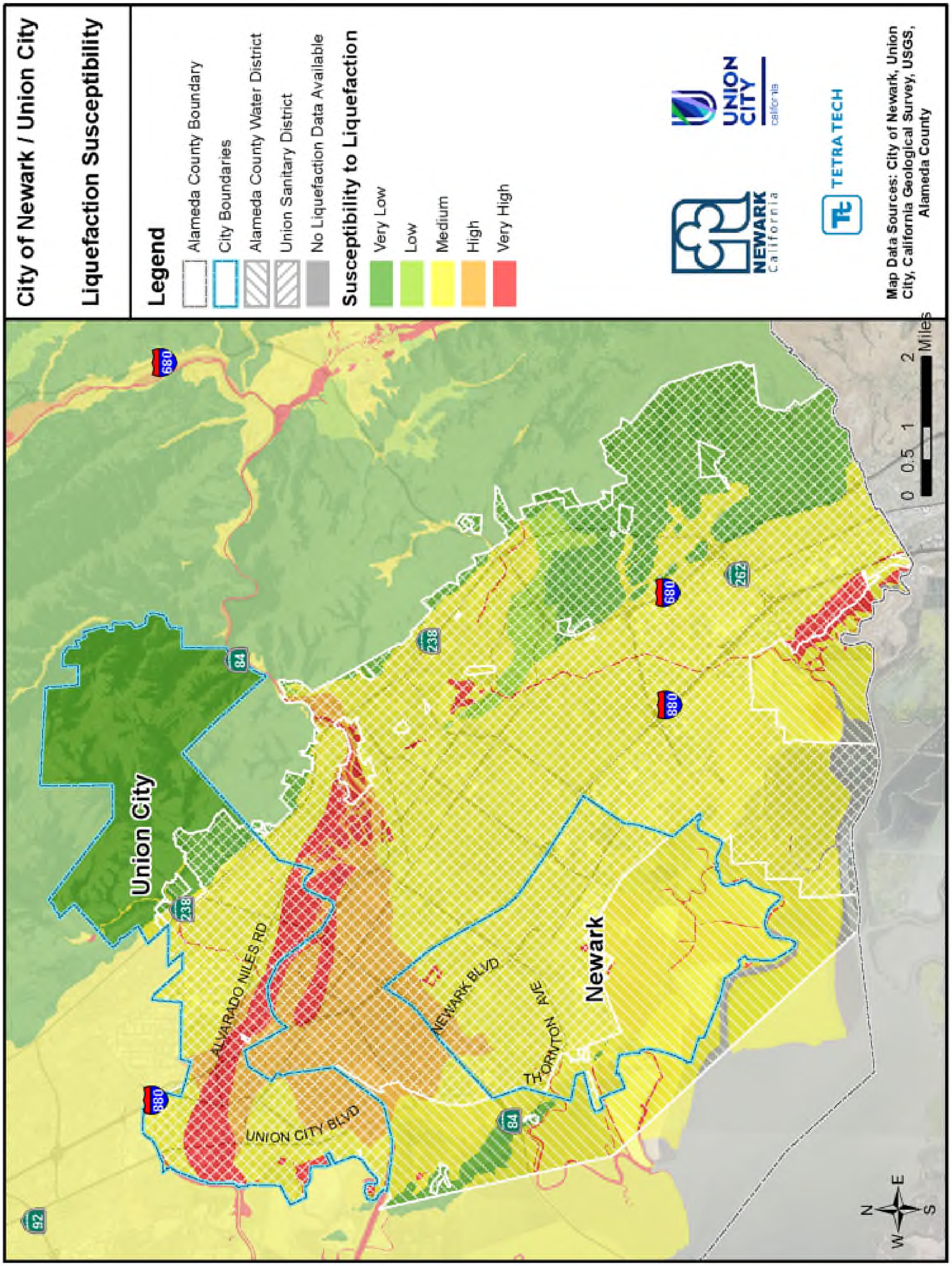


Figure 8-9. Liquefaction Susceptibility

8.2.3 Frequency

California experiences hundreds of earthquakes each year, most with minimal damage and magnitudes below 3.0. Earthquakes that cause moderate damage to structures occur several times a year. According to the USGS, a strong earthquake measuring greater than 5.0 occurs every 2 to 3 years and major earthquakes of more than 7.0 occur once a decade. Both the San Andreas and the Hayward Faults have the potential for major to great events. The USGS estimated in 2016 that there is a 72 percent probability of at least one 6.7 or greater magnitude earthquake before 2043 that could cause widespread damage in the San Francisco Bay area (USGS 2015). California's statewide hazard mitigation plan cites projections that there is more than a 99-percent probability of a Magnitude-6.7 earthquake in California in the next 30 years and a 94-percent probability of a Magnitude-7.0 earthquake in California in the next 30 years.

Probabilities for earthquakes on major fault lines in the San Francisco Bay Area were estimated by the USGS in a 2016 report, as summarized in Table 8-4.

Table 8-4. Earthquake Probabilities for the San Francisco Bay Area, 2014-2043

Fault	Probability of One or More ≥6.7 Quake, 2014-2043	Fault	Probability of One or More ≥6.7 Quake, 2014-2043
Hunting Creek	16%	**Maacama**	8%
Green Valley	16%	**Rodgers Creek Fault**	33%
Concord	16%	**Hayward**	33%
Greenville	16%	**San Andreas**	22%
Berryessa	16%	**San Gregorio**	6%
Calaveras	26%		

Source: USGS 2015

8.2.4 Severity

Earthquakes can last from a few seconds to over five minutes; they may also occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris, because the shocks shake, damage or demolish buildings and other structures. Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides or releases of hazardous material, compounding their disastrous effects.

The USGS has created ground motion maps based on current information about several fault zones. These maps show the PGA that has a certain probability (2 percent or 10 percent) of being exceeded in a 50-year period. The PGA is measured in numbers of g's (the acceleration associated with gravity). Figure 8-10 shows the PGAs with a 2-percent exceedance chance in 50 years in the Planning Area. The Planning Area is located within a high risk area.

8.2.5 Warning Time

There is no current reliable way to predict the day or month that an earthquake will occur at any given location. Research is being done with warning systems that use the low energy waves that precede major earthquakes. These potential warning systems would give approximately 40 seconds notice that a major earthquake is about to occur. The warning time is very short, but it could allow for someone to get under a desk, step away from a hazardous material, or shut down a computer system.

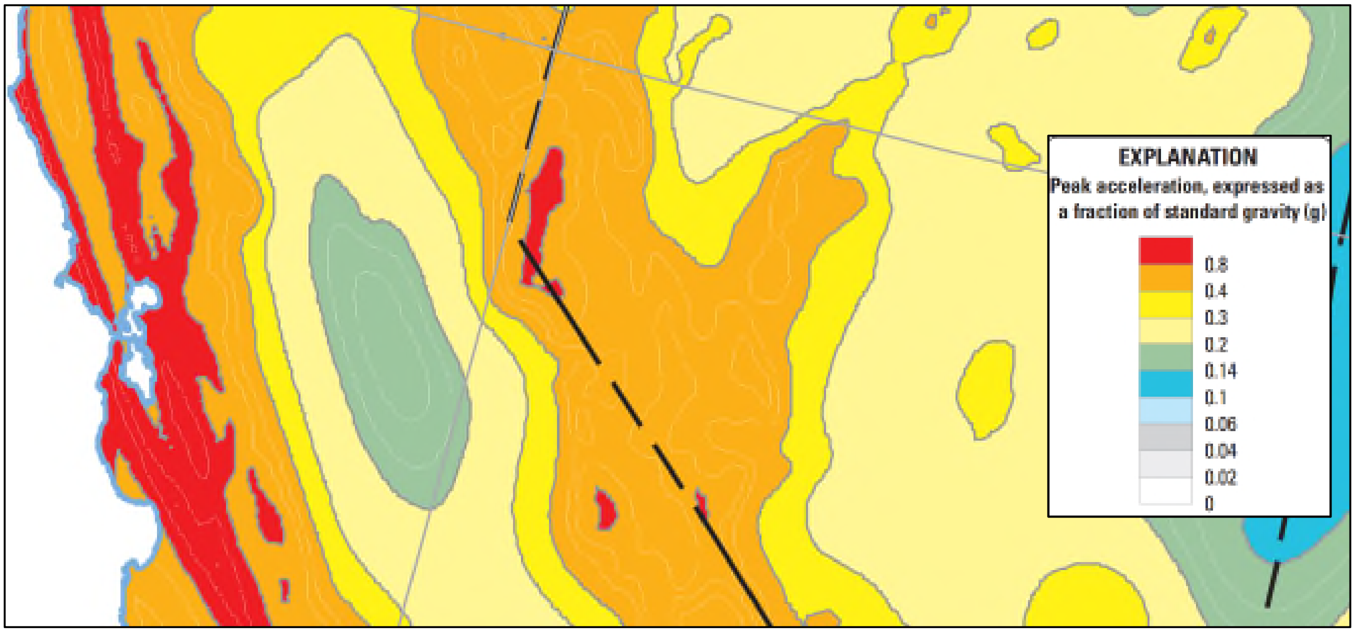


Figure 8-10. PGA with 2-Percent Probability of Exceedance in 50 Years

8.3 SECONDARY HAZARDS

Earthquakes can cause large and sometimes disastrous landslides and mudslides. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction occurs when water-saturated sands, silts, or gravelly soils are shaken so violently that the individual grains lose contact with one another and "float" freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink quicksand-like into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people.

Earthen dams and levees are highly susceptible to seismic events, and the impacts of their eventual failures can be considered secondary hazards of earthquakes. Depending on the location, earthquakes can also trigger tsunamis. Additionally, fires can result from gas lines or power lines that are broken or downed during the earthquake. It may be difficult to control a fire, particularly if the water lines feeding fire hydrants are also broken. After the 1906 earthquake in San Francisco, for example, a fire burned for three days, destroying much of the city and leaving 250,000 people homeless (Michigan Tech University n.d.).

8.4 EXPOSURE

8.4.1 Population

The entire population of the Planning Area is potentially exposed to direct and indirect impacts from earthquakes. The degree of exposure is dependent on many factors, including the age and construction type of the structures people live in, the soil type their homes are constructed on, their proximity to fault location, etc. Whether directly impacted or indirectly impact, the entire population will have to deal with the consequences of earthquakes to some degree. Business interruption could keep people from working, road closures could isolate populations, and loss of functions of utilities could impact populations that suffered no direct damage from an event itself.

8.4.2 Property

According to Alameda County Assessor records, there are 29,673 buildings in the Planning Area, with a total replacement value of $24.9 billion. Since all structures in the Planning Area are susceptible to earthquake impacts to varying degrees, this total represents the property exposure to seismic events. Most of the buildings (97 percent) are residential.

8.4.3 Critical Facilities and Infrastructure

All critical facilities and infrastructure in the Planning Area are exposed to the earthquake hazard. Hazardous materials releases can occur during an earthquake from fixed facilities or transportation-related incidents. Transportation corridors can be disrupted during an earthquake, leading to the release of materials to the surrounding environment. Facilities holding hazardous materials are of particular concern because of possible isolation of neighborhoods surrounding them. During an earthquake, structures storing these materials could rupture and leak into the surrounding area or an adjacent waterway, having a disastrous effect on the environment.

8.4.4 Environment

Environmental problems as a result of an earthquake can be numerous. Secondary hazards will likely have some of the most damaging effects on the environment. Earthquake-induced landslides in landslide-prone areas can significantly damage surrounding habitat. It is also possible for streams to be rerouted after an earthquake. Rerouting can change the water quality, possibly damaging habitat and feeding areas. There is a possibility that streams fed by groundwater wells will dry up because of changes in underlying geology.

8.5 VULNERABILITY

Earthquake vulnerability data was generated using a Level 2 Hazus-MH analysis. Once the location and size of a hypothetical earthquake are identified, Hazus-MH estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up.

8.5.1 Population

Impacts on persons and households in the Planning Area were estimated for the 100-year earthquake and the three scenario events through the Level 2 Hazus-MH analysis. Table 8-5 summarizes the results.

Table 8-5. Estimated Earthquake Impact on Persons and Households

	Number of Displaced Households	Number of Persons Requiring Short-Term Shelter
100-Year Earthquake	897	608
Calaveras	232	150
Hayward	1,406	952
Northern San Andreas	168	121

8.5.2 Property

Building Age

Table 8-6 identifies significant milestones in building and seismic code requirements that directly affect the structural integrity of development. Using these time periods, the planning team used Hazus to identify the number of structures in the Planning Area by date of construction.

Table 8-6. Age of Structures in Planning Area

Time Period	Number of Current Planning Area Structures Built in Period	Significance of Time Frame
Pre-1933	414	Before 1933, there were no explicit earthquake requirements in building codes. State law did not require local governments to have building officials or issue building permits.
1933-1940	124	In 1940, the first strong motion recording was made.
1941-1960	2,352	In 1960, the Structural Engineers Association of California published guidelines on recommended earthquake provisions.
1961-1975	11,276	In 1975, significant improvements were made to lateral force requirements.
1976-1994	10,557	In 1994, the Uniform Building Code was amended to include provisions for seismic safety.
1994 – present	4,950	Seismic code is currently enforced.
Total	**29,673**	

The number of structures does not reflect the number of total housing units, as many multi-family units and attached housing units are reported as one structure. Approximately 15 percent of the Planning Area's structures were constructed after the Building Code was amended in 1994 to include seismic safety provisions. Approximately 1.7 percent were built before 1933 when there were no building permits, inspections, or seismic standards.

Loss Potential

Property losses were estimated through the Level 2 Hazus-MH analysis for the 100-year earthquakes and the three scenario events. Table 8-7 through Table 8-10 show the results for two types of property loss:

- Structural loss, representing damage to building structures
- Non-structural loss, representing the value of lost contents and inventory, relocation, income loss, rental loss, and wage loss.

Table 8-7. Loss Estimates for 100-Year Probabilistic Earthquakes

	Estimated Loss Associated with Earthquake			% of Total Replacement Value
	Structure	Contents	Total	
Newark	$1,010,365,656	$363,990,875	$1,374,356,531	12.9
Union City	$1,084,553,435	$332,898,692	$1,417,452,127	10.0
Total Planning Area	**$2,094,919,091**	**$696,889,567**	**$2,791,808,658**	**11.2**

Table 8-8. Loss Estimates for Hayward Fault Scenario Earthquake

	Estimated Loss Associated with Earthquake			% of Total Replacement Value
	Structure	Contents	Total	
Newark	$1,139,590,236	$375,690,604	$1,515,280,840	14.2
Union City	$3,094,230,473	$1,111,453,223	$4,205,683,696	29.5
Total Planning Area	**$4,233,820,709**	**$1,487,143,827**	**$5,720,964,536**	**23.0**

Table 8-9. Loss Estimates for Calaveras Fault Scenario Earthquake

	Estimated Loss Associated with Earthquake			% of Total Replacement Value
	Structure	Contents	Total	
Newark	$283,270,640	$80,708,726	$363,979,366	3.4
Union City	$337,811,121	$94,220,401	$432,031,522	3.0
Total Planning Area	**$621,081,761**	**$174,929,127**	**$796,010,888**	**3.2**

Table 8-10. Loss Estimates for Northern San Andreas Fault Scenario Earthquake

	Estimated Loss Associated with Earthquake			% of Total Replacement Value
	Structure	Contents	Total	
Newark	$193,239,052	$66,972,791	$260,211,843	2.4
Union City	$171,143,794	$62,732,825	$233,876,619	1.6
Total Planning Area	**$364,382,846**	**$129,705,616**	**$494,088,462**	**2.0**

A summary of the property-related losses is as follows:

- For a 100-year probabilistic earthquake, the estimated damage potential is $2.79 billion, or 11.2 percent of the total replacement value for the Planning Area.
- For a 7.05-magnitude event on the Hayward Fault, the estimated damage potential is $5.72 billion, or 23 percent of the total replacement value for the Planning Area.
- For a 7.0-magnitude event on the Calaveras Fault, the estimated damage potential is $796 million, or 3.2 percent of the total replacement value for the Planning Area.
- For a 7.8-magnitude event on the Northern San Andreas Fault, the estimated damage potential is $494 million, or 2 percent of the total replacement value for the Planning Area.

The Hazus-MH analysis also estimated the amount of earthquake-caused debris in the Planning Area for the 100-year earthquake and the three scenario events, as summarized in Table 8-11.

Table 8-11. Estimated Earthquake-Caused Debris

	Debris to Be Removed (tons)
100-Year Earthquake	1,192.81
Calaveras	367.05
Hayward	2,225.12
Northern San Andreas	182.21

8.5.3 Critical Facilities and Infrastructure

Level of Damage

Hazus-MH classifies the vulnerability of critical facilities to earthquake damage in five categories: no damage, slight damage, moderate damage, extensive damage, or complete damage. The model was used to assign a vulnerability category to each critical facility in the Planning Area except hazmat facilities and “other infrastructure” facilities, for which there are no established damage functions. The analysis was performed for the 100-year event and for the Hayward Fault Scenario, which have the highest probability of occurrence and the largest potential impact on the Planning Area. Table 8-12 and Table 8-13 summarize the results.

Table 8-12. Estimated Damage to Critical Facilities from 100-Year Earthquake

Category[a]	Percent of Facilities Experiencing Defined Damage Level				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Medical and Health Services	53.92%	32.51%	11.62%	1.79%	0.14%
Emergency Services	50.45%	35.43%	13.04%	0.82%	0.24%
Educational Facilities	50.41%	35.45%	13.07%	0.83%	0.23%
Government	12.87%	16.22%	35.64%	26.87%	8.37%
Utilities	11.57%	13.22%	31.44%	32.48%	11.26%
Transportation Infrastructure	83.85%	6.41%	4.97%	3.55%	1.20%
Hazardous Materials	14.50%	12.99%	38.86%	23.53%	10.09%
Other Assets	17.37%	25.52%	38.21%	15.30%	3.59%
Overall	**36.9%**	**22.2%**	**23.4%**	**13.1%**	**4.4%**

Table 8-13. Estimated Damage to Critical Facilities from 7.05-M Hayward Fault Scenario

Category	Percent of Facilities Experiencing Defined Damage Level				
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Medical and Health Services	20.00%	52.58%	25.51%	1.86%	0.03%
Emergency Services	24.23%	54.93%	20.39%	0.42%	0.01%
Educational Facilities	22.35%	54.14%	22.76%	0.70%	0.02%
Government	0.25%	2.27%	24.19%	46.19%	27.08%
Utilities	0.59%	3.17%	22.89%	49.37%	23.96%
Transportation Infrastructure	47.31%	11.73%	8.79%	14.07%	18.08%
Hazardous Materials	0.32%	1.79%	26.21%	44.43%	27.23%
Other Assets	0.46%	8.66%	54.79%	31.63%	4.44%
Overall	**14.4%**	**23.7%**	**25.7%**	**23.6%**	**12.6%**

Time to Return to Functionality

Hazus-MH estimates the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, Hazus-MH may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90. The analysis was performed for the 100-year event and for the Hayward Fault Scenario. Table 8-14 and Table 8-15 summarize the results.

Table 8-14. Functionality of Critical Facilities for 100-Year Event

Planning Unit	# of Critical Facilities	Probability of Being Fully Functional (%)					
		at Day 1	at Day 3	at Day 7	at Day 14	at Day 30	at Day 90
Medical and Health Services	12	53.9	55.1	86.0	86.4	98.0	99.8
Emergency Services	10	50.4	51.2	85.0	85.8	98.9	99.3
Educational Facilities	34	50.3	51.2	85.0	85.8	98.9	99.3
Government	12	12.8	13.6	29.0	29.0	64.7	91.6
Utilities	115	11.5	12.1	24.7	24.7	56.2	88.7
Transportation Infrastructure	36	88.9	91.1	93.0	93.2	95.6	97.9
Hazardous Materials	81	14.5	15.1	27.4	27.4	66.3	89.8
Other Assets	3	17.3	18.5	42.8	42.8	81.0	96.3
Overall	**303**	**37.5**	**38.5**	**59.1**	**59.4**	**82.4**	**95.3**

Table 8-15. Functionality of Critical Facilities Hayward Fault Scenario

Planning Unit	# of Critical Facilities	Probability of Being Fully Functional (%)					
		at Day 1	at Day 3	at Day 7	at Day 14	at Day 30	at Day 90
Medical and Health Services	12	20.0	21.8	71.8	72.5	98.0	99.9
Emergency Services	10	24.2	25.4	77.9	79.1	99.5	99.7
Educational Facilities	34	22.3	23.5	75.2	76.5	99.2	99.6
Government	12	0.2	0.3	2.5	2.5	26.7	72.9
Utilities	115	0.6	0.7	3.7	3.7	26.6	76.0
Transportation Infrastructure	36	59.3	64.9	68.3	69.1	70.1	78.4
Hazardous Materials	81	0.3	0.4	2.0	2.1	28.3	72.7
Other Assets	3	0.4	0.8	9.0	9.1	63.9	95.5
Overall	**303**	**15.9**	**17.2**	**38.8**	**39.3**	**64.0**	**86.8**

8.5.4 Environment

The environment vulnerable to earthquake hazard is the same as the environment exposed to the hazard.

8.6 FUTURE TRENDS IN DEVELOPMENT

Land use in the Planning Area will be directed by general plans adopted under California's General Planning Law. The safety elements of the general plans establish standards and plans for the protection of the cities from hazards. The information in this plan provides a tool to ensure that there is no increase in exposure in areas of high seismic risk. Development in the Planning Area will be regulated through building standards and performance measures so that the degree of risk will be reduced. The geologic hazard portions of the Planning Area are heavily regulated under California's General Planning Law. The International Building Code establishes provisions to address seismic risk.

8.7 SCENARIO

With the abundance of fault exposure in the Bay Area, the potential scenarios for earthquake activity are many. An earthquake does not have to occur within the Planning Area to have a significant impact on the people, property and economy of the Planning Area.

Any seismic activity of 6.0 or greater on faults within the Planning Area would have significant impacts throughout the Planning Area. Potential warning systems could give approximately 40 seconds notice that a major earthquake is about to occur. This would not provide adequate time for preparation. Earthquakes of this magnitude or higher would lead to massive structural failure of property on NEHRP C, D, E, and F soils. Levees and revetments built on these poor soils would likely fail, representing a loss of critical infrastructure. These events could cause secondary hazards, including landslides and mudslides that would further damage structures. Soil liquefaction would occur in water-saturated sands, silts or gravelly soils.

8.8 ISSUES

Important issues associated with an earthquake include the following:

- More information is needed on the exposure and performance of soft-story construction within the Planning Area.
- Based on the modeling of critical facility performance performed for this plan, a high number of facilities in the Planning Area are expected to have complete or extensive damage from scenario events. These facilities are prime targets for structural retrofits.

- Critical facility owner should be encouraged to create or enhance continuity of operations plans using the information on risk and vulnerability contained in this plan.
- Geotechnical standards should be established that take into account the probable impacts from earthquakes in the design and construction of new or enhanced facilities.
- There are a multiple dams that could affect the Planning Area. Dam failure warning and evacuation plans and procedures should be reviewed and updated to reflect the dams’ risk potential associated with earthquake activity in the region.
- Earthquakes could trigger other natural hazard events such as dam failures and landslides, which could severely impact the Planning Area.
- A worst-case scenario would be the occurrence of a large seismic event during a flood or high-water event. Levee failures would happen at multiple locations, increasing the impacts of the individual events.

9. FLOOD

9.1 GENERAL BACKGROUND

DEFINITIONS

Flood—The inundation of normally dry land resulting from the rising and overflowing of a body of water.

Floodplain—The land area along the sides of a river that becomes inundated with water during a flood.

1-percent annual chance floodplain—The area flooded by the flood that has a 1-percent chance of being equaled or exceeded each year. The 1-percent annual chance flood is the standard used by most federal and state agencies.

Floods are one of the most common natural hazards in the U.S. They can develop slowly over a period of days or develop quickly, with disastrous effects that can be local (impacting a neighborhood or community) or regional (affecting entire river basins, coastlines and multiple counties or states).

9.1.1 General Background

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon.

When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain unconsolidated sediments (accumulations of sand, gravel, loam, silt, and/or clay), often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce and residential development.

Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

9.1.1 Measuring Floods and Floodplains

The frequency and severity of flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) level will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for the different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1-percent chance of being equaled or exceeded in any given year. The “annual flood” is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The same flood can have different recurrence intervals at different points on a river.

A 100-year floodplain is not defined as a flood that will occur exactly once every 100 years; rather it is a flood that has a 1-percent chance of being equaled or exceeded each year. The 100-year flood could occur more than once in a relatively short period of time. To avoid confusion of this meaning, FEMA refers to the 100-year flood as the 1-percent annual chance flood. This is the standard terminology used by most federal and state agencies and by the NFIP (FEMA 2002).

The extent of flooding associated with a 1-percent annual change flood (also called the base flood) is used as a regulatory boundary by many agencies. The area flooded by the base flood is called the special flood hazard area (SFHA). Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating flood damage.

9.1.2 Floodplain Ecosystems and the Effects of Human Activities

Floodplains can support ecosystems that are rich in plant and animal species. A floodplain can contain 100 or even 1,000 times as many species as a river. Wetting of the floodplain soil releases an immediate surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive and larger species enter a rapid breeding cycle. Opportunistic feeders (particularly birds) move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick-growing compared to non-riparian trees.

Because they border water bodies, floodplains have historically been popular sites to establish settlements. Human activities tend to concentrate in floodplains for a number of reasons: water is readily available; land is fertile and suitable for farming; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream’s capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities’ adverse impacts on floodplain functions.

9.1.3 Federal Flood Programs

National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. For most participating communities, FEMA has prepared a detailed Flood Insurance Study (FIS). The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 1-percent annual chance and 0.2-percent annual chance floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principle tool for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

The Cities of Newark and Union City both entered the NFIP on December 1, 1978. As participants in the NFIP, the cities must, at a minimum, regulate development in their floodplain areas in accordance with NFIP criteria. Before a permit to build in a floodplain area is issued, the cities must ensure that two basic criteria are met:

- All new construction, substantial improvements, and repairs of substantial damage will be protected from damage by the base flood.

- New floodplain development will not aggravate existing flood problems or increase damage to other properties (FEMA 2013b).

In participating communities, structures permitted or built in the Planning Area before NFIP and related building code regulations went into effect are called "pre-FIRM" structures, and structures built afterwards are called "post-FIRM." The insurance rate is different for the two types of structures. Communities participating in the NFIP may adopt regulations that are more stringent than those contained in 44 CFR 60.3, but not less stringent.

Properties constructed after a FIRM has been adopted are eligible for reduced flood insurance rates. Such structures are less vulnerable to flooding since they were constructed after regulations and codes were adopted to decrease vulnerability. Properties built before the FIRM was adopted may be more vulnerable to flooding and related damage because they do not meet code or are located in hazardous areas. The first FIRMs in the Planning Area were available in late 1978. The date of the current effective FIRM for both cities is August 3, 2009. FEMA has developed a preliminary new FIRM for both cities dated April 16, 2015. Although the preliminary data is the most recent data available, until is it officially approved and adopted, it can only be used for review and guidance purposes. Preliminary data is subject to change until that point, and as such, it is not used to rate flood insurance policies or enforce the federal mandatory purchase requirement.

The Cities of Newark and Union City are both in good standing with the NFIP. In California, the Department of Water Resources is the coordinating agency for floodplain management. DWR works with FEMA and local governments by providing grants and technical assistance, evaluating community floodplain management programs, reviewing local floodplain ordinances, participating in statewide flood hazard mitigation planning, and facilitating annual statewide workshops. Compliance is monitored by FEMA regional staff and by DWR. Maintaining compliance under the NFIP is an important component of flood risk reduction.

FEMA Regulatory Flood Zones

FEMA flood hazard areas are areas that are shown on a map to be inundated by a flood of a given magnitude. The 1-percent annual chance flood is a regulatory standard used by federal agencies and most states to administer floodplain management programs. It is used by the NFIP as the basis for insurance requirements nationwide. The 1-percent annual chance flood is also referred to as the base flood.

Special flood hazard areas are determined using statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. FIRMs delineate both the SFHAs and the risk premium zones applicable to a community. They show base flood elevations (1-percent annual chance); flood magnitudes; undeveloped coastal barriers where flood insurance is not available; and regulatory floodways and floodplain boundaries (1-percent and 0.2-percent annual chance).

The land area on a FIRM covered by the floodwaters of the base flood is the SFHA. It is the area where NFIP floodplain management regulations must be enforced and where mandatory purchase of flood insurance applies. Many communities have maps showing the extent of the base flood and likely depths that will be experienced. The base flood elevation is the water elevation that will result from a given discharge level, which is one of the most important factors used in estimating potential flood damage.

FIRMS depict the following SFHAs (areas subject to inundation from the 1-percent annual chance):

- **Zones A1-30 and AE—**SFHAs that are subject to inundation by the base flood, determined using detailed hydraulic analysis. Base flood elevations are shown within these zones. There are mandatory flood insurance purchase requirements, and floodplain management standards apply.

- **Zone A (also known as Unnumbered A-zones)—**SFHAs where no base flood elevations or depths are shown because detailed hydraulic analyses have not been performed. There are mandatory flood insurance purchase requirements, and floodplain management standards apply.
- **Zone AH—**Areas subject to inundation by the base flood (shallow flooding), usually areas of ponding, where average depths are between 1 and 3 feet. Base flood elevations derived from detailed hydraulic analyses are shown in this zone. There are mandatory flood insurance purchase requirements, and floodplain management standards apply.
- **Zone AO—**SFHAs subject to inundation by types of shallow flooding (usually sheet flow or sloping terrain) where average depths are between 1 and 3 feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. There are mandatory flood insurance purchase requirements, and floodplain management standards apply.
- **Zone VE, V1-30—**Areas subject to inundation by the base flood event, with additional hazards due to storm-induced velocity wave action. Base flood elevations derived from detailed hydraulic analyses are shown. There are mandatory flood insurance purchase requirements, and floodplain management standards apply.
- **Zone V—**SFHAs along the coast that are subject to inundation by the base flood event with additional hazards associated with storm-induced waves. No base flood elevations or flood depths are shown because detailed hydraulic analyses have not been performed. There are mandatory flood insurance purchase requirements, and floodplain management standards apply.
- **Zone B and X (shaded)—**Areas of moderate flood hazard and areas between the limits of the base flood and 0.2 percent annual change flood. These zones are not SFHAs.
- **Zones C and X (unshaded)—**Areas of minimal flood hazard located outside the SFHA and higher than the elevation of the 0.2-percent annual chance flood.

On the current FIRM for the City of Union City, most of the city is shown as Zone X (unshaded). There are small areas of Zone X (shaded), Zone AH, and Zone AE. The areas within Zones AE and AH are associated with the Alameda Creek and Dry Creek. On the current FIRM for the City of Newark, there are large portions of Zone X (unshaded) and Zone AE. The areas in Zone AE are associated with the San Francisco Bay.

The Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

Figure 9-1 shows the nationwide number of CRS communities by class as of May 2016, when there were 1,391 communities receiving flood insurance premium discounts under the CRS program (NFIP 2016a; NFIP 2016b).

Source: NFIP 2016b

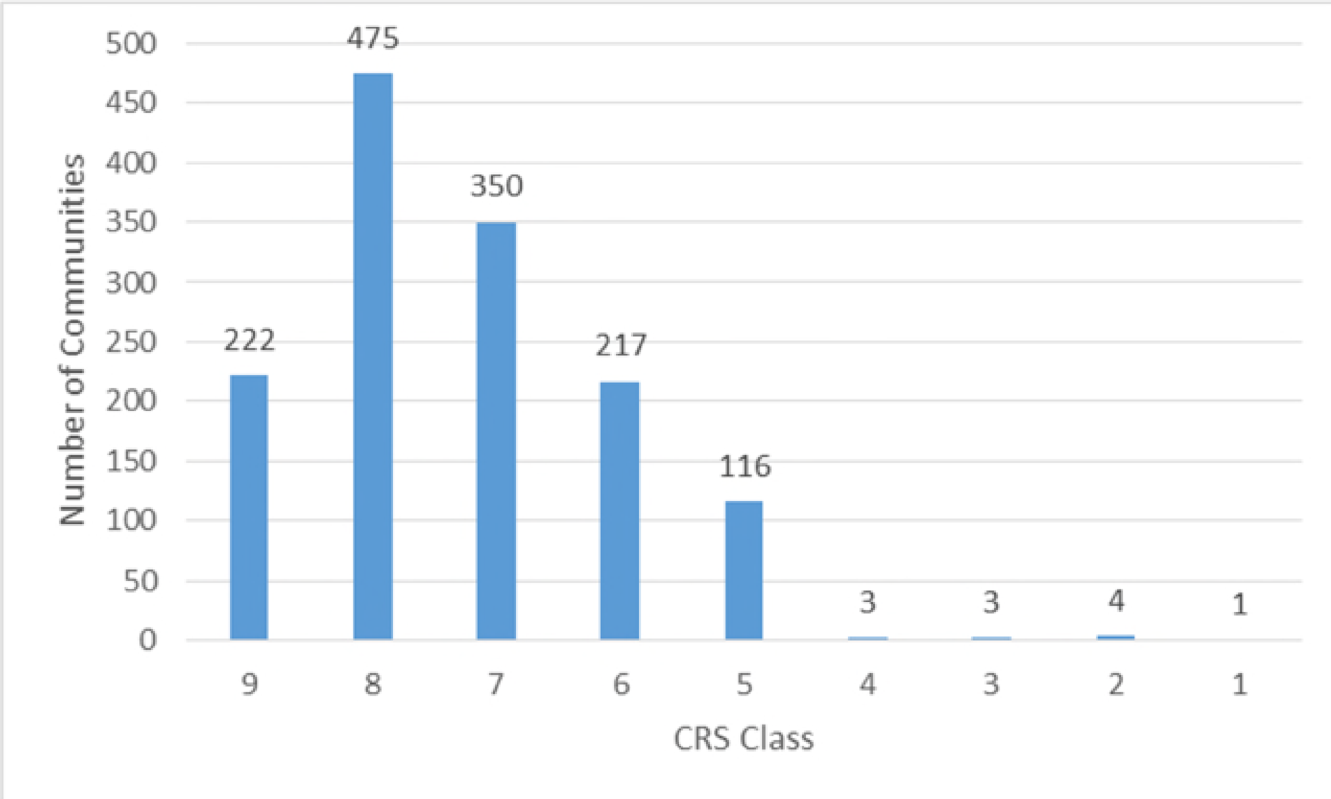


Figure 9-1. CRS Communities by Class Nationwide as of May 2016

Although insurance premiums are one benefit of participation in the CRS, more important benefits result from activities that save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk, as evidenced by the fact that over 68 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks.

Neither community in the Planning Area participates in the CRS program.

9.2 HAZARD PROFILE

9.2.1 Types of Flooding Affecting the Planning Area

Flooding in the Planning Area typically occurs during the rainy season, between November and April. Four types of flooding primarily affect the Planning Area: stormwater, riverine, flash floods, and coastal (tidal) flooding.

Stormwater Flooding

Stormwater flooding is a result of local drainage issues and high groundwater levels. Locally, heavy precipitation, especially during high tide events, may produce flooding in areas other than delineated floodplains or along recognizable channels, due to storm system outfalls that are inadequate to provide gravity drainage into an adjacent body of water. If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding. Flooding of this nature generally occurs in areas with flat gradients and generally increases with urbanization, which increases the accumulation of floodwaters because of impervious areas. Shallow street flooding can occur unless channels have been improved to account for increased flows (FEMA 1997). Numerous areas in the Planning Area experience stormwater flooding and contribute to street and structure inundation.

Urban drainage flooding is caused by increased water runoff due to urban development and drainage systems. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. These systems make use of a closed conveyance system that channels water away from an urban area to surrounding streams and bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in those streams can occur more quickly and reach greater depths than prior to development in that area (FEMA 2008).

Riverine Flooding

Riverine flooding is the overbank flooding of rivers and streams. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems typically results from large-scale weather systems that generate prolonged rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into major rivers. Shallow area flooding is a special type of riverine flooding. FEMA defines shallow flood hazards as areas that are inundated by the 1-percent annual chance flood with flood depths of only 1 to 3 feet. These areas are generally flooded by low velocity sheet flows of water. Two types of flood hazards are generally associated with riverine flooding:

- **Inundation**—Inundation occurs when there is floodwater and debris flowing through an area that is not normally covered by water. Such events cause minor to severe damage, depending on the velocity and depth of flows, the duration of the flood event, the quantity of logs and other debris carried by the flows, and the amount and type of development and personal property along the floodwater’s path.
- **Channel Migration**—Channel migration is erosion that results from the wearing away of banks and soils due to flowing water. This erosion, combined with sediment deposition, causes the migration or lateral movement of a river channel across a floodplain. A channel can also move by abrupt change in location, called avulsion, which can shift the channel location a large distance in as short a time as one flood event.

Flash Flooding

The National Weather Service defines flash flooding as follows (NWS 2009):

> “[A] rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within 6 hours of the causative event (e.g., intense rainfall, dam failure). However, the actual time threshold may vary in different parts of the country. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.”

Flash floods are capable of tearing out trees, undermining buildings and bridges, and scouring new channels. In urban areas, flash flooding is an increasingly serious problem due to the removal of vegetation and replacement of ground cover with impermeable surfaces such as roads, driveways, and parking lots. The greatest risk from flash floods is that they occur with little to no warning. The major factors in predicting potential damage are the intensity and duration of rainfall and watershed and stream steepness.

Coastal Flooding

Coastal floods are characterized by inundation of normally dry lands by ocean waters. This flooding is often caused by storm surge resulting from severe storms, tsunamis, or extreme high tide events that produce shallow flooding of low-lying coastal areas. Storm surge floods typically result in coastal erosion, salinization of freshwater sources, and contamination of water supplies. These floods are also responsible for significant agricultural losses, loss of life and damage to public and private structures and infrastructure. The San Francisco Bay is the most likely source of coastal flooding for the Planning Area (specifically in the City of Newark).

9.2.2 Past Events

Sources that provide historical information regarding previous occurrences and losses associated with flooding events in Alameda County and the Planning Area include FEMA, NWS, and NOAA. Between 1954 and 2016, FEMA issued disaster (DR) or emergency (EM) declarations for the State of California for 45 flood hazard-related events, classified as one or a combination of the following: winter storms, debris and mud flows, severe winter storms, severe storms, mudslides, landslides, levee break, soil erosion, fire, coastal storms, heavy rains, tropical storm, and high tides. Alameda County was included in 10 of the declarations, as listed in Table 9-1. Little recorded information is available regarding previous flooding occurrences in the Cities of Union City and Newark. Table 9-2 lists known flood events that impacted the Planning Area between 1970 and 2016.

Table 9-1. FEMA DR and EM Declarations for Flood Events in Alameda County

FEMA Declaration Number	Event Date	Event Type	Location
DR-283	February 16, 1970	Severe Storms & Flooding	17 counties including Alameda County
DR-651	December 19, 1981 – January 8, 1983	Severe Storms, Flood, Mudslides & High Tide	10 counties including Alameda County
DR-677	January 21 – March 30, 1983	Coastal Storms, Floods, Slides & Tornadoes	40 counties including Alameda County
DR-758	February 12-March 10, 1986	Severe Storms & Flooding	39 counties including Alameda County
DR-1044	January 3 – February 10, 1995	Severe Winter Storms, Flooding, Landslides, Mud Flows	42 counties including Alameda County
DR-1046	February 13 – April 19, 1995	Severe Winter Storms, Flooding, Landslides, Mud Flows	57 counties including Alameda County
DR-1155	December 28, 1996 – April 1, 1997	Severe Storms, Flooding, Mud and Landslides	48 counties including Alameda County
DR-1203	February 2 – April 30, 1998	Severe Winter Storms and Flooding	41 counties including Alameda County
DR-1628	December 17 – January 3, 2006	Severe Storms, Flooding, Mudslides, and Landslides	31 counties including Alameda County
DR-1646	March 29 – April 16, 2006	Severe Storms, Flooding, Landslides, and Mudslides	17 counties including Alameda County

Source: FEMA 2016

Table 9-2. Flood Events in the Union City/Newark Planning Area

Event Date	Event Type	FEMA Declaration Number	Location	Description
February 10, 1970	Severe Storms & Flooding	DR-283	Bay Area including Alameda County	Heavy winds, storms and flooding impacted the Bay Area, including Alameda County. Impacted areas had over $27 million in damage.
January 3 – 5, 1982	Landslides, Floods, and Marine Effects	DR-651	Bay Area including Alameda County	A major storm caused widespread and catastrophic landslide damage throughout the Bay Area, resulting in numerous deaths and over $60 million in direct costs. In Alameda County, damage was concentrated in Oakland, Piedmont, and Berkeley. The County had approximately $3.5 million in damage.
January 21 – March 30, 1983	Coastal Storms, Floods, Slides & Tornadoes	DR-677	40 counties including Alameda County	The state had over $500 million in damage from this event due to heavy rains, high winds, flooding, and levee breaks.
February 12 – March 10, 1986	Severe Storms & Flooding	DR-758	Bay Area including Alameda County	The event damaged over 12,000 homes, destroyed over 1,300 homes, and caused 13 deaths and 67 injuries in California. Damage totaled over $407.5 million.
January 3 – February 10, 1995	Severe Winter Storms, Flooding, Landslides, Mud Flows	DR-1044	42 counties including Alameda County	Severe winter storms, flooding, landslides and mudslides impacted a large portion of California. Most of the storms hit the Sacramento River Basin, which resulted in small stream flooding due to drainage system failures. Over 100 stations recorded their greatest one-day rainfall in history. Overall, there were 11 deaths, damage to homes, and over $741 million in damage.
February 13 – April 19, 1995	Severe Winter Storms, Flooding, Landslides, Mud Flows	DR-1046	41 counties including Alameda County	Severe winter storms, flooding, landslides and mudslides impacted a large portion of California. Most of the storms hit the Sacramento River Basin, which resulted in small stream flooding due to drainage system failures. Over 100 stations recorded their greatest one-day rainfall in history. Overall, there were 17 deaths, damage to homes and over $1 billion in damage.
December 28, 1996 – April 1, 1997	Severe Storms, Flooding, Mud and Landslides	DR-1155	48 counties including Alameda County	300 square miles were flooded, including the Yosemite Valley. Over 12,000 people were evacuated in northern California. Several levee breaks were reported across the Sacramento and San Joaquin Valleys. Over 23,000 homes and business, agricultural lands, bridges, and roads were damaged. Eight deaths resulted from this event. Overall, the state had $1.8 billion in damage.
December 17, 2005 – January 12, 2006	Winter Storms (Severe Storms, Flood, Mudslides, Landslides)	DR-1628	Bay Area including Alameda County	Damage estimates for the region were over $100 million. Storms were blamed for two deaths from falling trees, around 50 businesses were declared damaged, and three homes were nearly wiped out by mudslides. The event included severe storms, flooding, mudslides, and landslides.
March 29 – April 16, 2006	Severe Storms, Flooding, Landslides, and Mudslides	DR-1646	Countywide	Strong storms in April brought heavy rain to most of Alameda County. Landslides, eroding hillsides and cracked pavement resulted from the heavy rains. Oversaturated earth also caused landslide and/or erosion problems to private properties, which spilled over onto county rights-of-way. The County had approximately $11 million in damage from this event.

Event Date	Event Type	FEMA Declaration Number	Location	Description
November 30, 2012	Heavy Rain and Flooding	N/A	Bay Area including Newark	A series of significant winter storms impacted the area between November and December. The storms brought gusty winds, heavy rain, high surf and flooding. During the November 30 event, 13,800 customers experienced power outages in the Bay Area. In Newark, Highway 84 was flooded between Decoto Road and Newark Boulevard and between Mission Boulevard and Main Street.
December 11, 2014	Heavy Rain and Flooding	N/A	Bay Area	Heavy rain and gusty winds impacted the Bay Area. Rainfall rates of 1.5 to 2 inches per hour were reported. Many locations around the Bay Area had flooding, including urban flooding of streets and highways and flooding of creeks and rivers. Alameda County had approximately $45,000 in damage.
February 6, 2015	Heavy Rain and Flooding	N/A	Countywide	A strong winter storm brought heavy rain, gusty winds, and damage to trees and power lines. Minor flooding also occurred in urban areas. Rainfall totals ranged from 1 to 3.5 inches in lower elevations and urban areas and up to 10 inches in the mountains. Winds gusted at 50 to 70 mph. Several small mudslides were reported in the Santa Cruz Mountains.
January 6, 2016	Heavy Rain and Flooding	N/A	San Francisco Bay and Monterey Bay Areas	A strong Pacific storm produced heavy rain, minor flooding, damaging winds, a funnel cloud, and one confirmed tornado.

Sources: NOAA NCDC 2016; SPC 2016; ABAG Regional Hazard Mitigation Plan 2011; California State HMP 2013

9.2.3 Location

Primary Flood Sources

The San Francisco Bay hydrologic region along the north central coast encompasses most Bay Area counties. It reaches just north of Ukiah in Mendocino County, south to the Coyote Creek watershed in Santa Clara County, and inland just east of the Sacramento-San Joaquin Delta. The area around San Francisco Bay is heavily populated, and the entire region is marked by hills, river valleys such as those along the Russian River, and marshlands. The region is most vulnerable to classic stream flooding, landslides, and some urban flooding. Flooding along the coastal and bay shorelines can be severe when winter storms coincide with high tides (California State HMP 2013).

City of Union City

According to the effective 2009 FEMA Flood Insurance Study for Alameda County, the principal flooding problems in the City are caused by sheet flow and interior drainage. Prior to the construction of the Alameda Creek Flood Control Project, the relatively flat, western portion of the City was highly susceptible to flooding.

According to the City of Union City's annex in the 2010 ABAG Local Hazard Mitigation Plan, Alameda Creek, a major flood control facility in the City, includes several upstream dams that could cause flooding in the City if one or more of the dams were to fail. Other smaller creeks traverse the City and have flooded the area during significant storm events (ABAG 2011).

City of Newark

According to the effective 2009 FEMA Flood Insurance Study for Alameda County, the channels that flow through the City of Newark are affected at their outlets by the variation of tidal elevations in the San Francisco Bay. Thornton Avenue and the Southern Pacific Railroad embankments act as dikes to protect the City from high tides. The areas on the bay side of these dikes are subject to tidal flooding. The channels that flow under Thornton Avenue are cut off from the effects of tidal flooding by flap-gated culverts. These culverts are a major cause of flooding in the City of Newark at times of high water elevations of the Bay.

According to the City of Newark's annex in the 2010 ABAG Local Hazard Mitigation Plan, prior to the 1950s, the City experienced recurring flooding during heavy rains. In the 1950s, the community participated in the creation of a flood control district and improvements were made to the City's drainage systems. As a result of these improvements, the City has not had damaging flooding since the 1960s. Even though the City has not experienced damaging floods since the 1960s, there are areas within the 1-percent annual chance flood zone and in other flood-prone areas, including rail lines and pipelines. Additionally, the Hetch Hetchy pipelines run through the City. In the mid-1980s, a leak occurred in one of the pipeline valves and caused localized shallow flooding. A rupture in one of the pipes could cause significant flooding in the City (ABAG 2011).

The City of Newark's Building Inspection Division has identified areas within the City that are prone to flooding and have been designated as flood hazard areas by the NFIP. Figure 9-2 shows these areas as prepared by the City's Building Inspection Division. Most flood hazard zones shown are related to the San Francisco Bay, Newark Slough, and Plummer Creek.

Source: City of Newark Building Inspection Division 2010

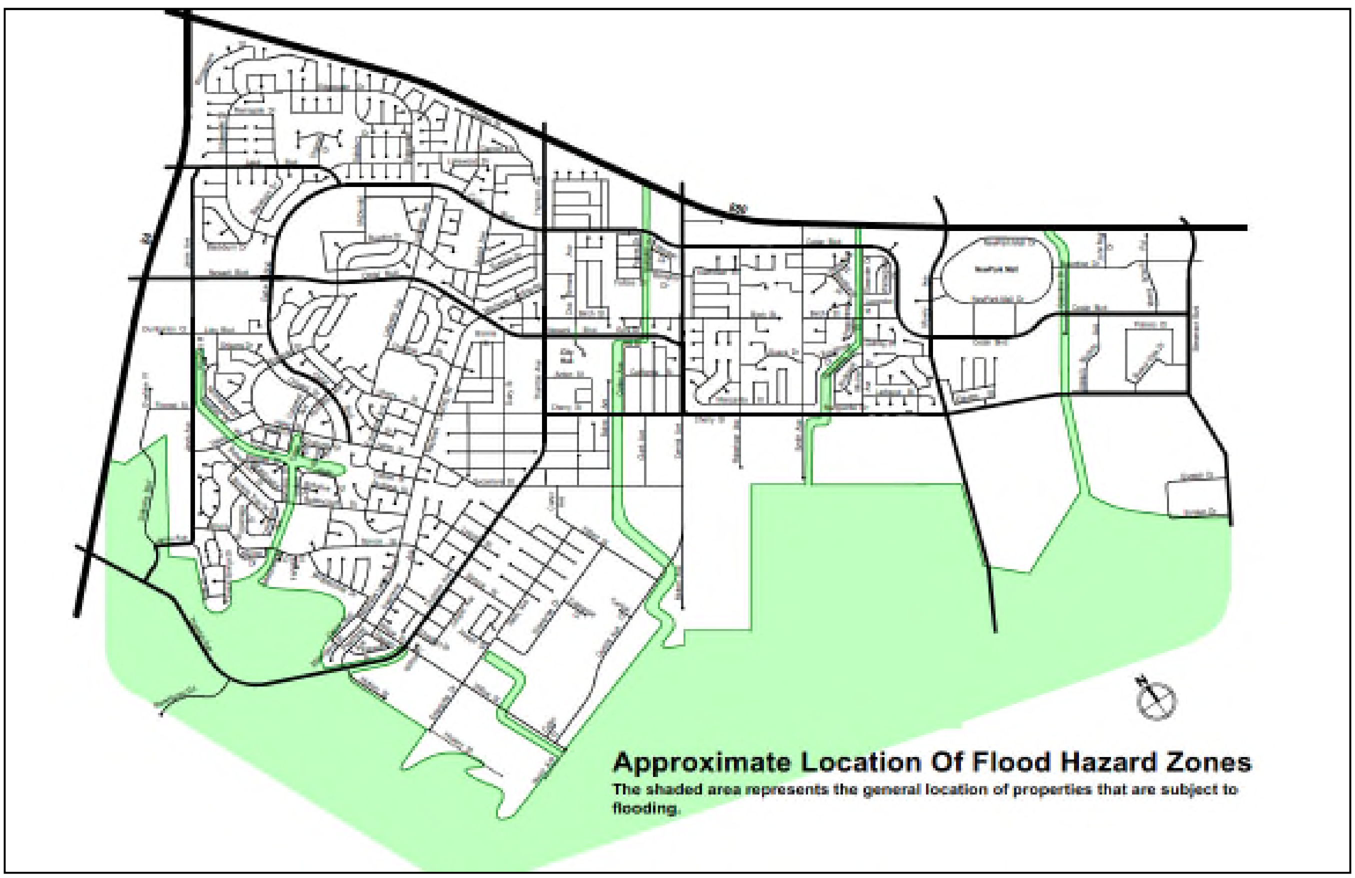


Figure 9-2. Approximate Location of Flood Hazard Zones in the City of Newark

Regulatory Floodplain

Flooding in the Planning Area has been documented by gage records, high water marks, damage surveys, and personal accounts. This documentation was the basis for the FEMA's Alameda County FIRM. Approximately 25 percent of the Planning Area is within the FIRM's mapped 1-percent annual chance floodplain, as listed in Table 9-3 and shown on Figure 9-3. All principal flooding sources are incorporated in the currently effective FIRMs. The FIRMs are the most detailed and consistent data source available for determining flood extent. The effective 2009 Flood Insurance Study was used in this risk assessment to map the extent and location of the flood hazard, along with map revisions prepared through July 2016

Table 9-3. Area in the 1-Percent Annual Chance Flood Floodplain

	1-Percent Annual Chance Floodplain	
	Area (acres)	% of total acreage
Union City	4,175	33.9
Newark	1,092	12.1
Total	**5,267**	**24.7**

9.2.4 Frequency

According to the NOAA National Climate Data Center (NCDC), Alameda County has experienced 36 flood events since 1950, most of which have been flash floods. Table 9-4 shows these statistics, as well as the annual average number of events and the percent chance of each flood hazard occurring in Alameda County in future years (NOAA NCDC 2016).

Smaller floods may occur on a more frequent basis and be categorized under a different hazard event type, most typically severe weather or severe storms. It is estimated that the Planning Area will experience the direct and indirect impacts of flooding each year, including urban flooding and smaller floods in identified flood-prone areas. These events may induce secondary hazards such as erosion, infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, and transportation delays, accidents and inconveniences.

Statistically, a structure within a 1-percent annual chance flood area has a 26-percent chance of suffering flood damage during the term of a 30-year mortgage.

Table 9-4. Probability of Future Occurrences of Flood Events

Hazard Type	Number of Occurrences Between 1950 and 2016	Rate of Occurrence	Recurrence Interval (in years)	% Chance of Occurrence in Any Given Year
Flash Flood	21	0.32	3.19	31.34
Flood	15	0.23	4.47	22.39
TOTAL	**36**	**0.55**	**1.86**	**53.73**

Source: NOAA-NCDC Storm Database 2016

Source: City of Newark, City of Union City, FEMA 2016

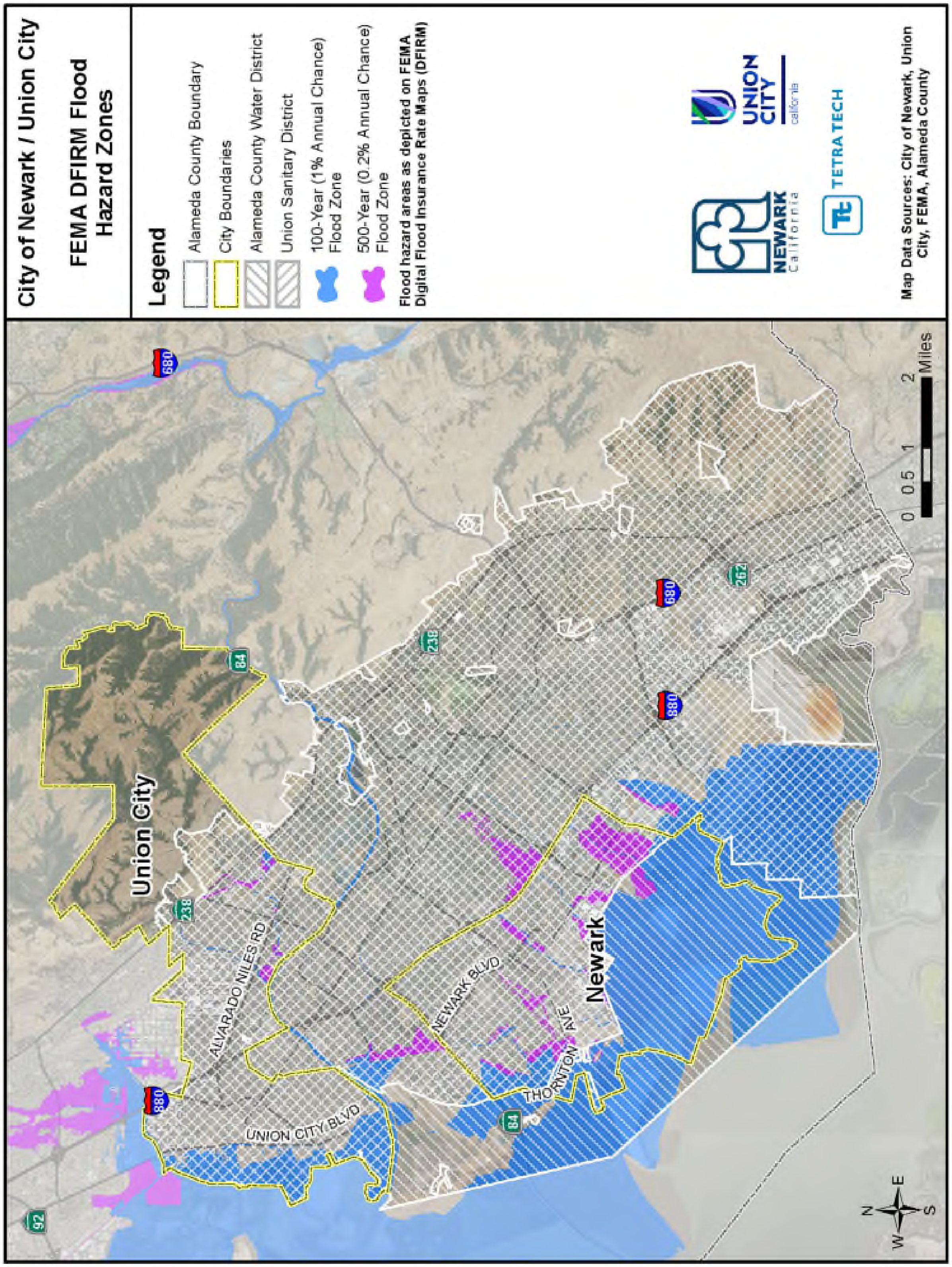


Figure 9-3. Mapped Flood Hazard Areas in the Planning Area

9.2.5 Severity

The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment. Flood severity is often evaluated by examining peak flow; Table 9-5 lists peak flows used by FEMA to map the floodplains of the Planning Area.

Table 9-5. Summary of Peak Discharges within the Planning Area

Source/Location	Peak Flow (cubic feet/second)			
	10-Percent Annual Chance	2-Percent Annual Chance	1-Percent Annual Chance	0.2-Percent Annual Chance
Alameda Creek Line A at Interstate 880	Not Available	Not Available	3,700 [a]	4,800 [a]
Alameda Creek Line A at Control Channel	Not Available	Not Available	2,815 [a]	2,885 [a]
Alameda Creek at Mouth	12,500	25,000	32,000	51,000

a. Decrease in flow with increase in area is result of spill
Source: FEMA 2015

In the 1950s and 1960s, Alameda Creek was channelized along its lower reaches and impoundments were constructed to reduce flooding. The design capacities of the 12-mile Alameda Creek Project are 51,000 cubic feet per second (cfs) from the mouth of Niles Canyon downstream to Dry Creek and 52,000 cfs from Dry Creek to the San Francisco Bay (FEMA 2015).

In April 1965, the USACE began construction on the Alameda Creek Flood Control Project in the City of Union City. The work is now essentially complete. The flood control works provide protection from flow in excess of the 1-percent annual chance event, probably up to the 0.2-percent annual chance event. The project diverts potential flood flow from Alameda Creek southwestward from a point east of the Nimitz Freeway to San Francisco Bay. The original Alameda Creek channel traverses the community from southeast to northwest and now serves as a local drainage channel (FEMA 2015).

In the City of Newark, flood protection is provided by Zone 5 of the Alameda County Flood Control and Water Conservation District. The flood protection facilities include flood control channels, storm sewers in the City of Newark, bay dikes, and the Alameda Creek Flood Control Project. Some open channels and most storm sewers are not designed to pass the 1-percent annual chance flood (FEMA 2015).

9.2.6 Warning Time

The potential warning time a community has to respond to a flooding threat is a function of the time between the first measurable rainfall and the first occurrence of flooding. The time it takes to recognize a flooding threat reduces the potential warning time for a community that has to take actions to protect lives and property. Another element that characterizes a community’s flood threat is the length of time floodwaters remain above flood stage.

Due to the sequential pattern of weather conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Warning times for floods can be between 24 and 48 hours. Flash flooding can be less predictable, but potential hazard areas can be warned in advanced of potential flash flooding danger. The NWS issues watches and warnings when forecasts indicate rivers may approach bank-full levels. The flood extent or severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat:

- **Minor Flooding**—Minimal or no property damage, but possibly some public threat or inconvenience.
- **Moderate Flooding**—Some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- **Major Flooding**—Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations (NWS 2011).

9.3 SECONDARY HAZARDS

The most problematic secondary hazard for flooding is bank erosion, which in some cases can be more harmful than actual flooding. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers or storm sewers.

9.4 EXPOSURE

The Level 2 Hazus-MH protocol was used to assess the risk and vulnerability to flooding in the Planning Area. The model used census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. Where possible, the Hazus-MH default data was enhanced using local GIS data from local, state and federal sources.

9.4.1 Population

Population counts of those living in the floodplain in the Planning Area were generated by analyzing census blocks that intersect with the 1-percent annual chance and 0.2-percent annual chance floodplains identified on FIRMs. Census blocks do not follow the boundaries of the floodplain. Therefore, the methodology used to generate these estimates counted census block groups whose centers are in the floodplain or where the majority of the population most likely lives in or near the floodplain. Hazus-MH calculated the number of buildings within the floodplain, and then estimated the total population by multiplying the number of residential structures by the average population per residential structure (3.8 for Newark, 4.3 for Union City), based on 2016 California Department of Finance data. Using this approach, it was estimated that the exposed population for the entire planning area is 2,602 within the 1-percent annual chance floodplain (2.2 percent of the total planning area population) and 10,320 within the 0.2-percent annual chance floodplain (8.6 percent of the total).

9.4.2 Property

Structures in the Floodplain

Table 9-6 and Table 9-7 summarize the total area and number of structures in the floodplain. The Hazus-MH model determined that there are 685 structures within the 1-percent annual chance floodplain and 2,718 structures within the 0.2-percent annual chance floodplain. In the 1-percent annual chance floodplain, about 90 percent are residential, and 9.6 percent are commercial, industrial or religious institutions.

Table 9-6. Area and Structures in the 1-Percent Annual Chance Floodplain

	Area in Floodplain (acres)	Number of Structures in Floodplain[a]							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Newark	4,175	92	10	19	1	5	1	1	**129**
Union City	1,092	523	25	5	0	2	0	1	**556**
Total	**5,267**	**615**	**35**	**24**	**1**	**7**	**1**	**2**	**685**

a. Values based on Alameda County tax assessor data received July 2016.

Table 9-7. Area and Structures in the 0.2-Percent Annual Chance Floodplain

	Area in Floodplain (acres)	Number of Structures in Floodplain[a]							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Newark	4,855	1,779	26	36	1	12	1	5	**1,860**
Union City	1,176	818	30	5	0	4	0	1	**858**
Total	**6,031**	**2,597**	**56**	**41**	**1**	**16**	**1**	**6**	**2,718**

a. Values based on Alameda County tax assessor data received July 2016.

Exposed Value

Table 9-8 and Table 9-9 summarize the estimated value of exposed buildings in the Planning Area. This methodology estimated $1.82 billion worth of building-and-contents exposure to the 1-percent annual chance flood, representing 7.3 percent of the total replacement value of the Planning Area, and $3.87 billion worth of building-and-contents exposure to the 0.2-percent annual chance flood, representing 15.5 percent of the total.

Table 9-8. Value of Structures in the 1-Percent Annual Chance Floodplain

	Estimated Value within the Floodplain[a]			% of Total Replacement Value
	Structure	Contents	Total	
Newark	$360,741,501	$438,937,943	$799,679,444	7.5%
Union City	$531,616,295	$486,504,937	$1,018,121,232	7.1%
Total	**$892,357,796**	**$925,442,880**	**$1,817,800,676**	**7.3%**

a. Values based on Alameda County tax assessor data received July 2016.

Table 9-9. Value of Structures in the 0.2-Percent Annual Chance Floodplain

	Estimated Value within the Floodplain[a]			% of Total Replacement Value
	Structure	Contents	Total	
Newark	$1,313,594,916	$1,325,858,473	$2,639,453,389	24.8%
Union City	$663,127,832	$566,764,639	$1,229,892,471	8.6%
Total	**$1,976,722,748**	**$1,892,623,112**	**$3,869,345,861**	**15.5%**

a. Values based on Alameda County tax assessor data received July 2016.

Land Use in the Floodplain

Some land uses are more vulnerable to flooding, such as single-family homes, while others are less vulnerable, such as agricultural land or parks. Table 9-10 shows the existing land use of all parcels in the 1-percent annual chance and 0.2-percent annual chance floodplain, including those in public/open space uses, broken down for the unincorporated portion of the Planning Area. About 79 percent of the parcels in the 1-percent annual chance floodplain are zoned for open space or public use. These are favorable, lower-risk uses for the floodplain. The amount of the floodplain that contains vacant, developable land is not known. This would be valuable information for gauging the future development potential of the floodplain.

Table 9-10. Land Use Within the Floodplain

	1-Percent Annual Chance Floodplain		0.2-Percent Annual Chance Floodplain	
	Area (acres)	% of total	Area (acres)	% of total
Residential	643.6	12.2	963.1	15.9
Commercial	81.9	1.5	113.8	1.9
Industrial	404.9	7.6	727.2	12.1
Public / Open Space	4146.6	78.7	4226.9	70.1
Total	**5,267**	**100%**	**6,031**	**100%**

9.4.3 Critical Facilities and Infrastructure

Table 9-11 and Table 9-12 summarize the critical facilities and infrastructure in the 1-percent annual chance and 0.2-percent annual chance floodplains of the Planning Area. Details are provided in the following sections.

Table 9-11. Critical Facilities/Infrastructure in the 1-Percent Annual Chance Floodplain

	Medical and Health Services	Emergency Services	Educational Facilities	Government / City Facilities	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	0	0	0	0	3	0	3	1	**7**
Union City	0	0	1	0	3	5	1	0	**10**
District Planning Area (Fremont)	0	0	0	0	7	0	0	0	**7**
Total	**0**	**0**	**1**	**0**	**13**	**5**	**4**	**1**	**24**

Table 9-12. Critical Facilities/Infrastructure in the 0.2-Percent Annual Chance Floodplain

	Medical and Health Services	Emergency Services	Educational Facilities	Government / City Facilities	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	0	0	4	0	4	0	7	1	**16**
Union City	1	0	2	0	3	5	1	0	**12**
District Planning Area (Fremont)	0	0	0	0	8	0	0	0	**8**
Total	**1**	**0**	**6**	**0**	**15**	**5**	**8**	**1**	**36**

Toxic Release Inventory Facilities

Toxic Release Inventory facilities are those that use or store materials that can harm the environment if damaged by a flood. Four businesses in the 1-percent annual chance floodplain and eight businesses in the 0.2-percent annual chance floodplain report having Toxic Release Inventory hazardous materials. During a flood event, containers holding these materials can rupture and leak into the surrounding area, having a disastrous effect on the environment as well as residents.

Utilities and Infrastructure

It is important to determine who may be at risk if infrastructure is damaged by flooding. Roads or railroads that are blocked or damaged can isolate residents and can prevent access throughout the Planning Area, including for emergency service providers needing to get to vulnerable populations or to make repairs. Bridges washed out or blocked by floods or debris also can cause isolation. Water and sewer systems can be flooded or backed up, causing health problems. Underground utilities can be damaged. Dikes can fail or be overtopped, inundating the land that they protect. The following sections describe specific types of critical infrastructure.

Roads

The following major roads in the Planning Area pass through the 1-percent annual chance floodplain and thus are exposed to flooding:

- State Route 84
- Interstate 880
- Thornton Avenue
- Union City Boulevard
- Alvarado Nile Road
- Mission Boulevard.

Some of these roads are built above the flood level, and others function as levees to prevent flooding. Still, in severe flood events these roads can be blocked or damaged, preventing access to some areas.

Bridges

Flooding events can significantly impact road bridges. These are important because often they provide the only ingress and egress to some neighborhoods. An analysis showed that there are five bridges that are in or cross over the 1-percent annual chance and 0.2-percent annual chance floodplain.

Water and Sewer Infrastructure

Water and sewer systems can be affected by flooding. Floodwaters can back up drainage systems, causing localized flooding. Culverts can be blocked by debris from flood events, also causing localized urban flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing wastewater to spill into homes, neighborhoods, rivers and streams.

Levees

Levees have historically been used to control flooding in bay-front portions of the Planning Area. Many are older earthen levees built under earlier flood management goals. Many of these older levees are exposed to scouring and failure due to age and construction methods. Chapter 6 provides additional information on levee failure.

9.4.4 Environment

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, flooding can impact the environment in negative ways. Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape. Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development such as bridge abutments and levees, and logjams from timber harvesting can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses.

9.5 VULNERABILITY

Many of the areas exposed to flooding may not experience serious flooding or flood damage. This section describes vulnerabilities in terms of population, property, infrastructure and environment.

9.5.1 Population

Impacts on persons and households in the Planning Area were estimated for the 1-percent annual chance and 0.2-percent annual chance flood events through a Level 2 Hazus-MH analysis. Table 9-13 summarizes the results.

Table 9-13. Estimated Flood Impact on Persons and Households

	Displaced Population[a]	People Requiring Short-Term Shelter[a]
1-Percent Annual Chance Flood	443	390
0.2-Percent Annual Chance Flood	3,099	2,865

a. Calculated using a Census-block level, general building stock analysis in Hazus, adjusted to reflect the estimated population.

9.5.2 Property

Hazus-MH calculates losses to structures from flooding by looking at depth of flooding and type of structure. Using historical flood insurance claim data, Hazus-MH estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. For this analysis, local data on facilities was used instead of the default inventory data provided with Hazus-MH.

The analysis is summarized in Table 9-14 for the 1-percent annual chance flood event. It is estimated that there would be $30.6 million of flood loss from a 1-percent annual chance flood event in the Planning Area. This represents 1.7-percent of the total exposure to the 1-percent annual chance flood and 0.1 percent of the total replacement value for the Planning Area. It is estimated that there would be $384 million of flood loss from a 0.2-percent annual chance flood event, representing 9.91 percent of the total exposure to a 0.2-percent annual chance flood event and 1.5 percent of the total Planning Area replacement value.

Table 9-14. Loss Estimates for 1-percent annual chance Flood

	Buildings Impacted[a]	Estimated Loss Associated with Flood[a]			% of Total Replacement Value
		Structure	Contents	Structure and Contents	
Newark	61	$3,306,041	$11,025,920	$14,331,961	0.1%
Union City	142	$4,669,184	$11,628,254	$16,297,438	0.1%
Total	**203**	**$7,975,225**	**$22,654,174**	**$30,629,399**	**0.1%**

a. Calculated with a user-defined analysis in Hazus.

National Flood Insurance Program

Table 9-15 lists flood insurance statistics that help identify vulnerability in the Planning Area. Both Union City and Newark participate in the NFIP, with a combined 333 flood insurance policies providing $102.8 million in insurance coverage. According to FEMA statistics, 25 flood insurance claims were paid between January 1, 1978 and August 31, 2016, for a total of $499 thousand, an average of $20,000 per claim. Additionally, one claim in Newark was closed without payment.

Table 9-15. Flood Insurance Statistics

	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 8/31/2016	Insurance In Force	Total Annual Premium	Claims, 11/1978 to 8/31/2016	
					Number	Value
Newark	12/01/1978	151	$47,892,400	$95,501	1	$0[a]
Union City	12/01/1978	182	$54,941,700	$151,750	25	$499,244.59
Total		**333**	**$102,834,100**	**$247,251**	**26**	**$499,244.59**

a. Closed without payment

Repetitive Loss

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced any of the following since 1978, regardless of any changes in ownership:

- Four or more paid losses in excess of $1,000
- Two paid losses in excess of $1,000 within any rolling 10-year period
- Three or more paid losses that equal or exceed the current value of the insured property.

Repetitive loss properties make up only 1 to 2 percent of flood insurance policies in force nationally, yet they account for 40 percent of the nation's flood insurance claim payments. In 1998, FEMA reported that the NFIP's 75,000 repetitive loss structures have already cost $2.8 billion in flood insurance payments and that numerous other flood-prone structures remain in the floodplain at high risk. The government has instituted programs encouraging communities to identify and mitigate the causes of repetitive losses. A recent report on repetitive losses by the National Wildlife Federation found that 20 percent of these properties are outside any mapped 1-percent annual chance floodplain. The key identifiers for repetitive loss properties are the existence of flood insurance policies and claims paid by the policies.

FEMA-sponsored programs, such as the CRS, require participating communities to identify repetitive loss areas. A repetitive loss area is the portion of a floodplain holding structures that FEMA has identified as meeting the definition of repetitive loss. Identifying repetitive loss areas helps to identify structures that are at risk but are not on FEMA's list of repetitive loss structures because no flood insurance policy was in force at the time of loss.

As of November 2016, neither Union City nor Newark have any repetitive loss structures within city limits, as confirmed by FEMA Region IX.

9.5.3 Critical Facilities and Infrastructure

Hazus-MH was used to estimate the flood loss potential to critical facilities exposed to the flood risk. Using depth/damage function curves to estimate the percent of damage to the building and contents of critical facilities, Hazus-MH correlates these estimates into an estimate of functional down-time (the estimated time it will take to restore a facility to 100 percent of its functionality). This helps to gauge how long the Planning Area could have limited usage of facilities deemed critical to flood response and recovery. The Hazus critical facility results are as follows:

- **1-percent annual chance flood event**—On average, critical facilities would receive 6.2-percent damage to the structure and 24.49-percent damage to the contents during a 1-percent annual chance flood event. The estimated time to restore these facilities to 100 percent of their functionality would be 480 days.
- **0.2-percent annual chance flood event**—A 0.2-percent annual chance flood event would damage the structures an average of 3.57 percent and the contents an average 10.36 percent. The estimated time to restore these facilities to 100 percent of their functionality would be 480 days.

9.5.4 Environment

The environment vulnerable to flood hazard is the same as the environment exposed to the hazard. Loss estimation platforms such as Hazus-MH are not currently equipped to measure environmental impacts of flood hazards. The best gauge of vulnerability of the environment would be a review of damage from past flood events. Loss data that segregates damage to the environment was not available at the time of this plan. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates.

9.6 FUTURE TRENDS

The planning partners are equipped to handle future growth within flood hazard areas. Both cities have general plans that address frequently flooded areas in their safety elements and have committed to linking their general plans to this hazard mitigation plan. This will create an opportunity for wise land use decisions as future growth impacts flood hazard areas. Additionally, both cities are participants in the NFIP and have adopted flood damage prevention ordinances in response to its requirements. Both cities have committed to maintaining their good standing under the NFIP through actions identified in this plan.

9.7 SCENARIO

The primary water courses in the Planning Area have the potential to flood at irregular intervals, generally in response to a succession of intense winter rainstorms. Storm patterns of warm, moist air usually occur between early November and late March. A series of such weather events can cause severe flooding in the Planning Area. The worst-case scenario is a series of storms that flood numerous drainage basins in a short time. This could overwhelm the response and floodplain management capability within the Planning Area. Major roads could be blocked, preventing critical access for many residents and critical functions. High in-channel flows could cause water courses to scour, possibly washing out roads and creating more isolation problems.

9.8 ISSUES

The planning team has identified the following flood-related issues relevant to the Planning Area:

- Future conditions and impacts from sea level rise have the potential to impact both cities adversely as related to future flooding conditions.
- The accuracy of the existing flood hazard mapping produced by FEMA in reflecting the true flood risk within the Planning Area is questionable. This is most prevalent in areas protected by privately owned levees and levees not accredited by the FEMA mapping process.
- The extent of the flood-protection currently provided by flood control facilities (dams, dikes and levees) is not known due to the lack of an established national policy on flood protection standards.
- Older levees are subject to failure or do not meet current building practices for flood protection.
- The risk associated with the flood hazard overlaps the risk associated with other hazards such as earthquake, landslide and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.
- More information is needed on flood risk to support the concept of risk-based analysis of capital projects.

- There needs to be a sustained effort to gather historical damage data, such as high water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.
- Ongoing flood hazard mitigation will require funding from multiple sources.
- There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards in within and outside of the Planning Area.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- The concept of residual risk should be considered in the design of future capital flood control projects and should be communicated with residents living in the floodplain.
- The promotion of flood insurance as a means of protecting private property owners from the economic impacts of frequent flood events should continue.
- Existing floodplain-compatible uses such as agricultural and open space need to be maintained. There is constant pressure to convert these existing uses to more intense uses within the Planning Area during times of moderate to high growth.
- Flooding issues may increase as climate change and sea-level rise affect low-lying, bay adjacent areas of the Planning Area.

10. LANDSLIDE

10.1 GENERAL BACKGROUND

Landslides and mudslides can be initiated by storms, earthquakes, fires, volcanic eruptions or human modification of the land. They can move rapidly down slopes or through channels, and can strike with little or no warning at avalanche speeds.

According to the USGS, the term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there are other contributing factors (NJGWS 2013). Landslide hazard areas exist where characteristics such as the following indicate a risk of downhill movement of material:

- A slope greater than 33 percent
- A history of landslide activity during the last 10,000 years
- Stream or wave activity that has caused erosion or cut into a bank to cause the surrounding land to be unstable
- The presence or potential for snow avalanches
- The presence of an alluvial fan, which indicates vulnerability to the flow of debris or sediments
- The presence of impermeable soils, such as silt or clay, mixed with granular soils such as sand and gravel.

DEFINITIONS

Landslide—The movement of masses of loosened rock and soil down a hillside or slope. Slope failures occur when the strength of the soils forming the slope is exceeded by the pressure, such as weight or saturation, acting upon them.

Mass movement—A collective term for landslides, debris flows, falls and sinkholes.

Mudslide (or debris flow)—A river of rock, earth, organic matter and other materials saturated with water. Mudslides develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt. Water pressure in the pore spaces of the material increases to the point that the internal strength of the soil is drastically weakened. The soil's reduced resistance can then easily be overcome by gravity, changing the earth into a flowing river of mud or "slurry."

USGS scientists also monitor stream flow, noting changes in sediment load in rivers and streams that may result from landslides. All of these types of landslides are considered aggregately in USGS landslide mapping.

Mudslides (or debris flows) are rivers of rock, earth, organic matter and other soil materials saturated with water. They develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt. Water pressure in the pore spaces of the material increases to the point that the internal strength of the soil is drastically weakened. The soil's reduced resistance can then easily be overcome by gravity, changing the earth into a flowing river of mud. A mudslide can move rapidly down slopes or through channels and can strike with little or no warning. The material can travel miles from its source, growing as it descends, picking up trees, boulders, cars and anything else in its path. Although these slides behave as fluids, they pack many times the hydraulic force of water due to the mass of material included in them.

A debris avalanche (Figure 10-1) is a fast-moving debris flow that travels faster than about 10 miles per hour (mph). Speeds in excess of 20 mph are not uncommon, and speeds in excess of 100 mph, although rare, can occur. Debris avalanches are like mudslides in that they can travel many miles from their source, picking up large objects in their path and that they can have many times the hydraulic force of water due to the mass of material included in them. They can be among the most destructive events in nature.

Source: California Department of Conservation 2016a

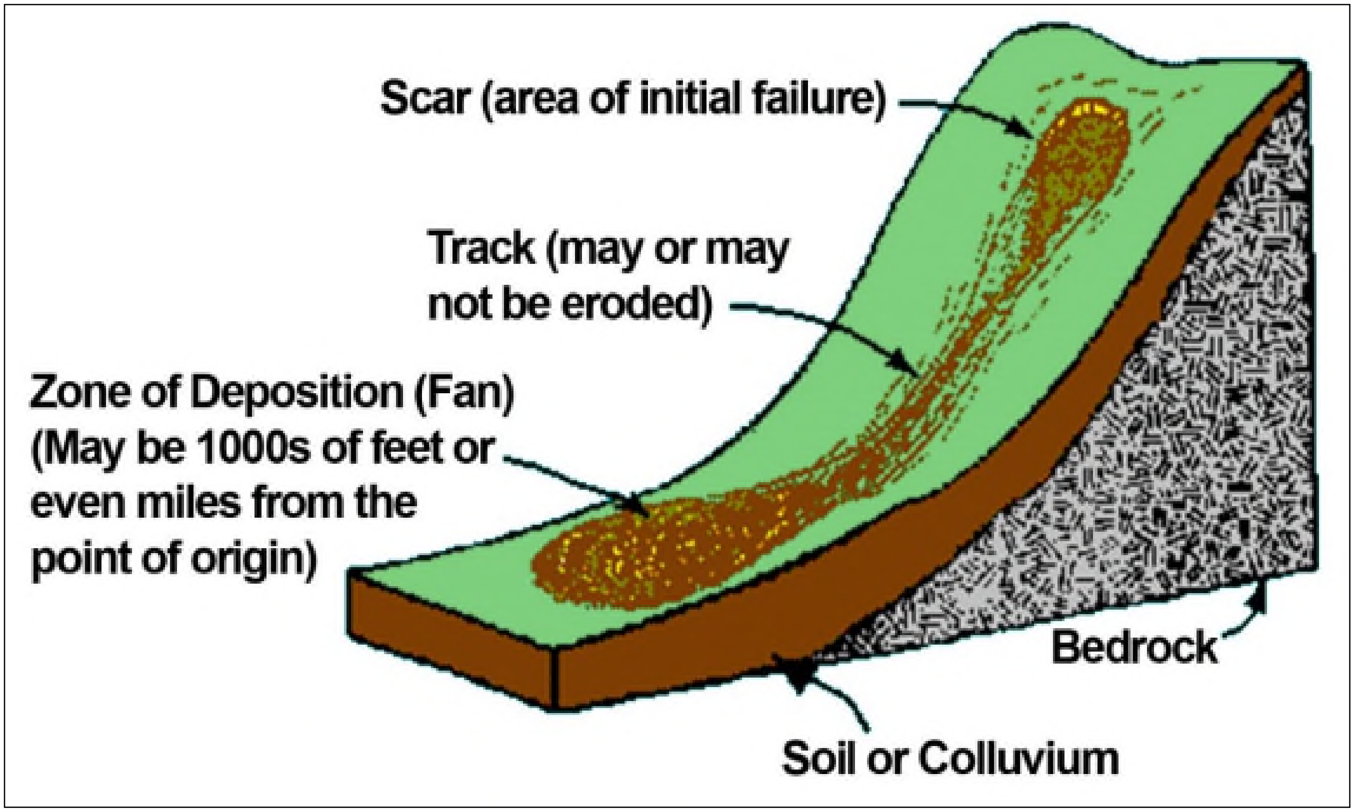


Figure 10-1. Typical Debris Avalanche Scar and Track

10.1.1 Landslide Types and Run-Out

Two characteristics are essential to conducting an accurate risk assessment of the landslide hazard:

- The type of initial ground failure that occurs
- The post-failure movement of the loosened material ("run-out"), including travel distance and velocity.

Figure 10-2 through Figure 10-5 show common types of slides based on type of initial ground failure (Ecology 2014). The most common is the shallow colluvial slide, occurring particularly in response to intense, short-duration storms. The largest and most destructive are deep-seated slides, although they are less common.

Run-out modeling is complicated because the movement of materials may change over the course of a landslide event, depending on the initial composition, the extent of saturation by water, the ground shape of the path traveled and whether there is additional material incorporated during the event (Savage and Hutter 1991; Rickenmann 2000; Iverson et al. 2004). All current landslide models—those in practical applications and those more recently developed—use simplified hypothetical descriptions of mass movement to simulate the complex behavior of actual flow. The models attempt to reproduce the general features of the moving mass of material through measurable factors, such as base shear, that define a system and determine its behavior. Due to the lack of experimental data and the limited current knowledge about the behavior of the moving flows, landslide models use simplified parameters to account for complex aspects that may not be defined. These simplified parameters are not related to specific physical processes that can be directly measured, and there is a great deal of uncertainty in their definition. Some, but not all, models provide estimates of the level of uncertainty associated with the modeling approach.

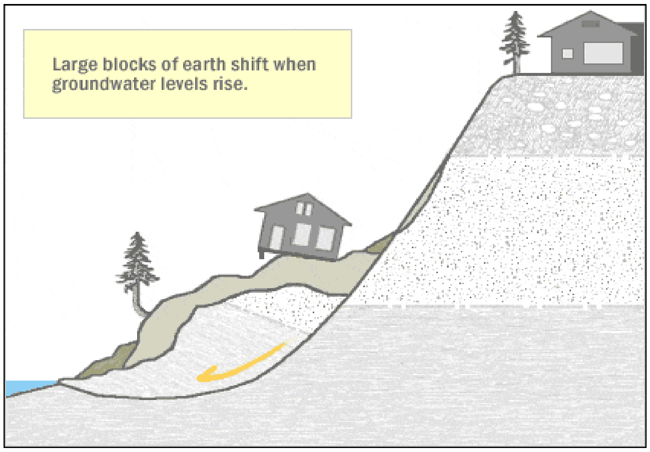


Figure 10-2. Deep Seated Slide

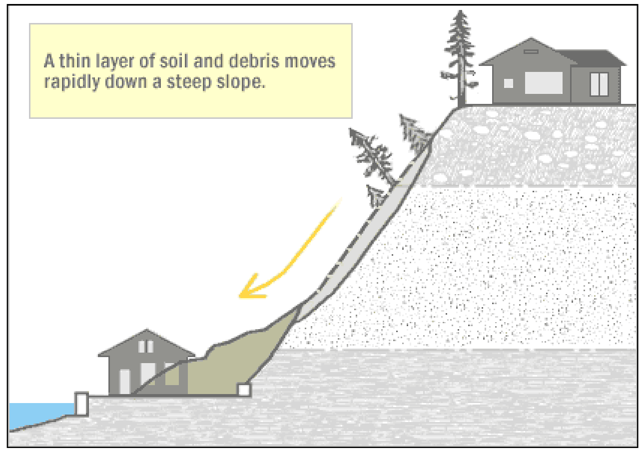


Figure 10-3. Shallow Colluvial Slide

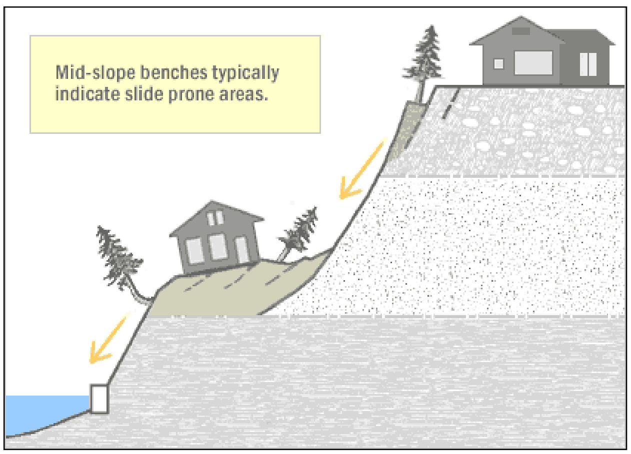


Figure 10-4. Bench Slide

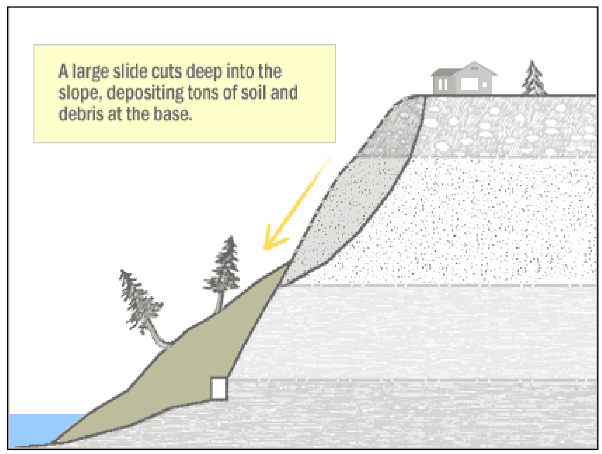


Figure 10-5. Large Slide

10.1.2 Landslide Causes

Mass movements are caused by a combination of geological and climate conditions, as well as the encroaching influence of urbanization. Vulnerable natural conditions are affected by human residential, agricultural, commercial and industrial development and the infrastructure that supports it. The following factors can contribute to landslide: change in slope of the terrain, increased load on the land, shocks and vibrations, change in water content, groundwater movement, frost action, weathering of rocks, and removing or changing the type of vegetation covering slopes.

Excavation and Grading

Slope excavation is common in the development of home sites or roads on sloping terrain. Grading can result in some slopes that are steeper than the pre-existing natural slopes. Since slope steepness is a major factor in landslides, these steeper slopes can be at an increased risk for landslides. The added weight of fill placed on slopes can also result in an increased landslide hazard. Small landslides can be fairly common along roads, in either the road cut or the road fill. Landslides occurring below new construction sites are indicators of the potential impacts stemming from excavation.

Drainage and Groundwater Alterations

Water flowing through or above ground is often the trigger for landslides. Any activity that increases the amount of water flowing into landslide-prone slopes can increase landslide hazards. Broken or leaking water or sewer lines can be especially problematic, as can water retention facilities that direct water onto slopes. However, even lawn irrigation and minor alterations to small streams in landslide prone locations can result in damaging landslides. Ineffective stormwater management and excess runoff can also cause erosion and increase the risk of landslide hazards. Drainage can be affected naturally by the geology and topography of an area. Development that results in an increase in impervious surface impairs the ability of the land to absorb water and may redirect water to other areas. Channels, streams, flooding, and erosion on slopes all indicate potential slope problems.

Road and driveway drains, gutters, downspouts, and other constructed drainage facilities can concentrate and accelerate flow. Ground saturation and concentrated velocity flow are major causes of slope problems and may trigger landslides.

Changes in Vegetation

Removing vegetation from very steep slopes can increase landslide hazards. A study by the Oregon Department of Forestry found that landslide hazards in three out of four steeply sloped areas were highest for a period of roughly 10 years after timber harvesting (Oregon Department of Forestry, 1999). Areas that have experienced wildfire and land clearing for development may have long periods of increased landslide hazard. In addition, woody debris in stream channels (both natural and man-made from logging) may cause the impacts from debris flows to be more severe.

10.1.3 Landslide Management

While small landslides are often a result of human activity, the largest landslides are often naturally occurring phenomena with little or no human contribution. The sites of large landslides are typically areas of previous landslide movement that are periodically reactivated by significant precipitation or seismic events. Such naturally occurring landslides can disrupt roadways and other infrastructure lifelines, destroy private property, and cause flooding, stream bank erosion and rapid stream channel migration.

Landslides can create immediate, critical threats to public safety. Engineering solutions to protect structures on or adjacent to large active landslides are often extremely or prohibitively expensive. In spite of their destructive potential, landslides can serve beneficial functions to the natural environment. They supply sediment and large wood to stream channel networks and can contribute to stream complexity and dynamic channel behavior critical for aquatic and riparian ecological diversity. Effective landslide management should include the following elements:

- Continuing investigation to identify natural landslides, understand their mechanics, assess their risk to public health and welfare, and understand their role in ecological systems
- Regulation of development in or near existing landslides or areas of natural instability through the cities' codes and ordinances and Alameda County code.
- Preparation for emergency response to landslides to facilitate rapid, coordinated action among Alameda County, the Planning Area, and state and federal agencies, and to provide emergency assistance to affected or at-risk citizens
- Evaluation of options including landslide stabilization or structure relocation where landslides are identified as a threat to critical public structures or infrastructure

10.2 HAZARD PROFILE

10.2.1 Past Events

Landslides in the Bay Area typically occur either as a result of an earthquake or during heavy and sustained rainfall events. Urbanized areas, like the Cities of Union City and Newark, and especially hilly areas of Alameda County, have sustained damage from landslides caused by storms dating back to 1972. Between 1954 and 2016, FEMA issued disaster (DR) emergency (EM) declarations for the State of California for 18 landslide hazard-related events, classified as one or a combination of the following events: winter storms, flooding, debris flow, mud flows, landslides, mudslides, fires, soil erosion, snow storm, heavy rain, high winds, coastal storms, high tide, and winds. Alameda County was included in seven of the declarations, as listed in Table 10-1.

Table 10-1. FEMA DR and EM Declarations for Landslide Events in Alameda County

FEMA Declaration	Event Date	Event Type	Location
DR-651	December 19, 1981 – January 8, 1983	Severe Storms, Flood, Mudslides & High Tide	10 counties including Alameda County
DR-677	January 21 – March 30, 1983	Coastal Storms, Floods, Slides & Tornadoes	40 counties including Alameda County
DR-1044	January 3 – February 10, 1995	Severe Winter Storms, Flooding, Landslides, Mudslides	42 counties including Alameda County
DR-1046	February 13 – April 19, 1995	Severe Winter Storms, Flooding, Landslides, Mudslides	57 counties including Alameda County
DR-1155	December 28, 1996 – April 1, 1997	Severe Storms, Flooding, Mud and Landslides	48 counties including Alameda County
DR-1628	December 17 – January 3, 2006	Severe Storms, Flooding, Mudslides, and Landslides	31 counties including Alameda County
DR-1646	March 29 – April 16, 2006	Severe Storms, Flooding, Landslides, and Mudslides	17 counties including Alameda County

Source: FEMA 2016

Table 10-2 lists known landslide events that have impacted the Planning Area between 1980 and 2016. Please note that little recorded information is available regarding previous landslide occurrences in the Cities of Union City and Newark. As shown in the above table, Alameda County has been included in six FEMA declarations for landslide events; however, impacts on the Planning Area were not identified in the available sources reviewed.

10.2.2 Location

The entire United States experiences landslides, with 36 states having moderate to severe landslide hazard risk. Expansion of urban and recreational developments into hillside areas exposes more people to the threat of landslides each year. According to the USGS, the Planning Area has a high to very high landslide potential (USGS 2005).

The California Landslide Hazard Identification Act directs the State Geologist to identify and map hazardous landslide areas for use by municipalities in planning and decision-making on grading and building permits. Factors that characterize landslide hazard areas include significant slope, weak rocks, and heavy rains. This program focuses on urban areas and growth areas that exhibit these characteristics. The California Geological Survey (CGS) provides access to many of these maps through its California Landslide Inventory; however, maps for the full extent of the Planning Area are not available (DOC 2016b).

Table 10-2. Landslide Events in the Union City/Newark Planning Area

Event Date	Event Type	FEMA Declaration Number	Location	Description
January 3-5, 1982	Landslides, Floods, and Marine Effects	DR-651	Bay Area including Alameda County	A major storm caused widespread and catastrophic landslide damage throughout the Bay Area, resulting in numerous deaths and over $60 million in direct costs. In Alameda County, damage was concentrated in Oakland, Piedmont, and Berkeley. The County had approximately $3.5 million in damage.
February 1995	Late Winter Storms (Severe Winter Storms, Flood, Landslide, Mudflows)	DR-1046	Statewide	All 57 counties except Del Norte were included in this declaration, where over 100 stations recorded their greatest ever 1-day rainfall total. In total, the State recorded 17 deaths; $190.6 million in public property damage, $122.4 million in individual damage, $46.9 million in business damage, $79 million in highway damage, and $651.6 million in agricultural damage; and significant damage to homes, with 1,322 recording major damage, 267 listed as destroyed, and 2,299 recording minor damage.
February 1998	Shallow Landslides	N/A	Union City	Shallow landslides turned into debris flows on many of the hillslopes near Union City in the East Bay Hills.
December 17, 2005 – January 12, 2006	Winter Storms (Severe Storms, Flood, Mudslides, Landslides)	DR-1628	Bay Area including Alameda County	Damage estimates for the region are over $100 million. Storms were blamed for two deaths from falling trees, around 50 businesses declared damaged, and three homes were nearly wiped out by mudslides. Event included severe storms, flooding, mudslides, and landslides.
April 6-20, 2006	Heavy Rain and Debris Flows	DR-1646	Alameda County	Strong storms brought heavy rain to most of Alameda County. Landslides, eroding hillsides and cracked pavement was the result of persistent rainfall. Oversaturated earth also caused landslide or erosion problems on private properties which spilled over onto county rights-of-way. Overall, the County had approximately $10 million in damage to county roadways.

Sources: NOAA-NCDC 2016; FEMA 2016; Alameda County Local Hazard Mitigation Plan 2016; USGS 1988; ABAG Local Hazard Mitigation Plan 2012

Figure 10-6 shows susceptibility to deep-seated landslides in the Planning Area. The relative likelihood of deep landsliding is based on regional estimates of rock strength and steepness of slopes. Most of the Planning Area is shown as having low susceptibility. Portions of Union City are shown as having moderate to high susceptibility.

10.2.3 Frequency

Landslides are often triggered by other natural hazards such as earthquakes, heavy rain, floods or wildfires, so landslide frequency is often related to the frequency of these other hazards. In the Planning Area, landslides typically occur during and after major storms, so the potential for landslides largely coincides with the potential for sequential severe storms that saturate steep, vulnerable soils. As shown in Figure 10-6, the City of Newark and the western portion of the City of Union City have a low susceptibility to deep-seated landslides; therefore, the frequency of landslide events in these areas is considered low. The eastern portion of Union City has a moderate to high susceptibility to deep-seated landslides; therefore having a moderate to high frequency of landslide occurrence.

Source: City of Newark, City of Union City, California Geological Society, USGS 2016

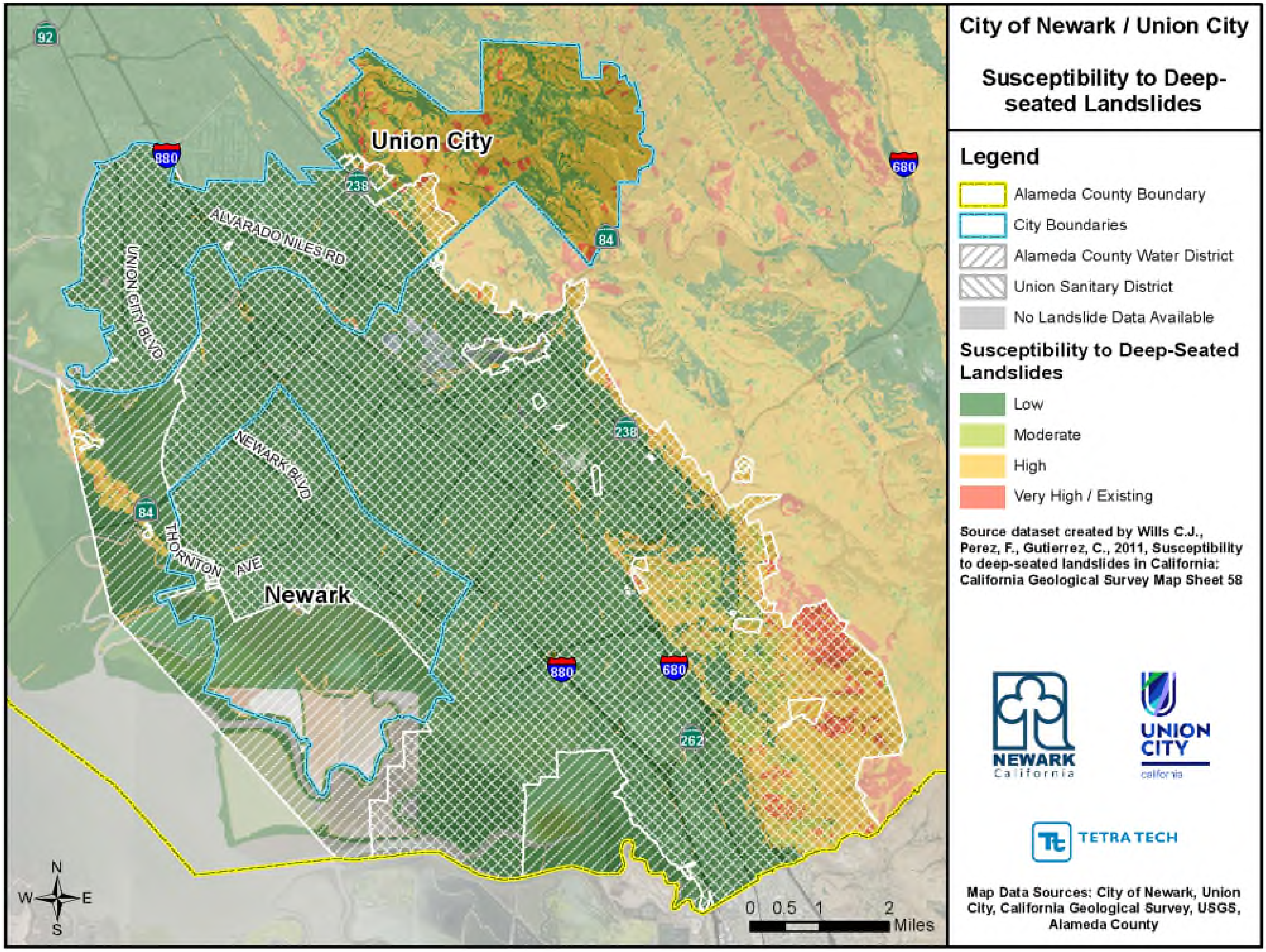


Figure 10-6. Landslide Zones in the Union City/Newark Planning Area

10.2.4 Severity

Landslides destroy property and infrastructure and can take human lives. Slope failures in the United States result in an average of 25 lives lost per year and an annual cost of about $1.5 billion. Landslides can also create travel delays and other side effects. To determine the magnitude or extent of a landslide hazard, the affected areas need to be identified and the probability of the landslide occurring within some time period needs to be assessed. Natural variables that contribute to the overall extent of potential landslide activity in any particular area include soil properties, topographic position and slope, and historical incidence. Predicting a landslide is difficult, even under ideal conditions and with reliable information. As a result, the landslide hazard is often represented by landslide incidence and/or susceptibility, as follows:

- Landslide **incidence** is the number of landslides that have occurred in a given geographic area. High incidence means greater than 15 percent of a given area has been involved in landsliding; medium incidence means that 1.5 to 15 percent of an area has been involved; and low incidence means that less than 1.5 percent of an area has been involved (State of Alabama Date Unknown).
- Landslide **susceptibility** is defined as the probable degree of response of geologic formations to natural or artificial cutting, to loading of slopes, or to unusually high precipitation. It can be assumed that unusually high precipitation or changes in existing conditions can initiate landslide movement in areas where rocks and soils have experienced numerous landslides in the past. Landslide susceptibility depends on slope angle and the geologic material underlying the slope. Landslide susceptibility only identifies areas potentially affected; it does not imply a timeframe when a landslide might occur. High, medium, and low susceptibility are delimited by the same percentages used for classifying the incidence of landsliding (State of Alabama Date Unknown).

10.2.5 Warning Time

Mass movements can occur suddenly or slowly. The velocity of movement may range from a slow creep of inches per year to many feet per second, depending on slope angle, material and water content. Generally accepted warning signs for landslide activity include the following:

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements or sidewalks
- Soil moving away from foundations
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house
- Tilting or cracking of concrete floors and foundations
- Broken water lines and other underground utilities
- Leaning telephone poles, trees, retaining walls or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content)
- Sudden decrease in creek water levels though rain is still falling or just recently stopped
- Sticking doors and windows, and visible open spaces indicating frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together.

Some methods used to monitor mass movements can provide an idea of the type of movement and the amount of time prior to failure. Assessing the geology, vegetation and amount of predicted precipitation for an area can help in predictions of what areas are at risk during general time periods. Currently, there is no practical warning system for individual landslides. The standard operating procedure is to monitor situations on a case-by-case basis and respond after an event has occurred.

10.3 SECONDARY HAZARDS

Landslides can cause several types of secondary effects, such as blocking access to roads, which can isolate residents and businesses and delay commercial, public and private transportation. This could result in economic losses for businesses. Other potential problems resulting from landslides are power and communication failures. Vegetation or poles on slopes can be knocked over, resulting in possible losses to power and communication lines. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. They also can damage rivers or streams, potentially harming water quality, fisheries and spawning habitat.

10.4 EXPOSURE

10.4.1 Population

Population could not be examined by landslide hazard area because census block group areas do not coincide with the hazard areas. Population was estimated using the number of buildings in each landslide hazard zone and the average of 3.8 persons per household for Newark and 4.3 persons per household for Union City. Using this approach, the estimated population living in each landslide susceptibility zone is as shown in Table 10-3.

Table 10-3. Population Exposure to the Landslide Hazard

	Low Landslide Susceptibility Zone[a]		Moderate Landslide Susceptibility Zone[b]		High Landslide Susceptibility Zone[c]		Very High Landslide Susceptibility Zone[d]	
	Population	% of Total	Population	% of Total	Population	% of Total	Population	% of Total
Newark	44,523	99.5%	0	0.0%	241	0.5%	0	0.0%
Union City	71,536	98.1%	297	0.4%	994	1.4%	155	0.2%
Total	**116,059**	**98.6%**	**297**	**0.3%**	**1,235**	**1.0%**	**155**	**0.1%**

a. Categories 0 and III zones.
b. Categories V and VI zones.
c. Categories VII, VIII and IX zones.
d. Category X zone; includes existing landslides.
Source: Susceptibility to deep-seated landslides data published May 2011, received from California Geological Survey August 2016.

10.4.2 Property

Table 10-4 through Table 10-7 shows the number and assessed value of structures exposed to the landslide risk, based on the California Geological Survey (CGS) definitions of landslide susceptibility. Table 10-8 shows the general land use of Planning Area parcels exposed to landslides.

Table 10-4. Number and Value of Exposed Structures in Very High Landslide Susceptibility Zone

	Buildings Exposed	Estimated Value within the Very High Landslide Risk Area[a]			% of Total Value
		Structure	Contents	Structure & Contents	
Newark	0	$0	$0	$0	0.0%
Union City	36	$10,937,155	$5,468,577	$16,405,732	0.1%
Total	**36**	**$10,937,154**	**$5,468,577**	**$16,405,732**	**0.1%**

a. Category X zone; includes existing landslides.
Sources: Susceptibility to deep-seated landslides data published May 2011, received from California Geological Survey August 2016; Alameda County tax assessor data received July 2016

Table 10-5. Number and Value of Exposed Structures in High Landslide Susceptibility Zone

	Buildings Exposed	Estimated Value within the High Landslide Risk Area[a]			% of Total Value
		Structure	Contents	Structure & Contents	
Newark	65	$19,664,942	$13,307,163	$32,972,105	0.3%
Union City	234	$94,700,049	$51,111,919	$145,811,968	1.0%
Total	**299**	**$114,364,991**	**$64,419,081**	**$178,784,073**	**0.7%**

a. Categories VII, VIII and IX zones.

Sources: Susceptibility to deep-seated landslides data published May 2011, received from California Geological Survey August 2016; Alameda County tax assessor data received July 2016

Table 10-6. Number and Value of Exposed Structures in Moderate Landslide Susceptibility Zone

	Buildings Exposed	Estimated Value within the Moderate Landslide Risk Area[a]			% of Total Value
		Structure	Contents	Structure & Contents	
Newark	0	$0	$0	$0	0.0%
Union City	69	$106,296,843	$53,148,421	$159,445,264	1.1%
Total	**69**	**$106,296,842**	**$53,148,421**	**$159,445,264**	**0.6%**

a. Categories V and VI zones.

Sources: Susceptibility to deep-seated landslides data published May 2011, received from California Geological Survey August 2016; Alameda County tax assessor data received July 2016

Table 10-7. Exposure and Value of Structures in Low Landslide Susceptibility Zone

	Buildings Exposed	Estimated Value within the Low Landslide Risk Area[a, b]			% of Total Value
		Structure	Contents	Structure & Contents	
Newark	12,158	$5,817,983,178	$4,797,138,851	$10,615,122,029	99.7%
Union City	17,126	$8,077,379,191	$5,840,921,788	$13,918,300,979	97.7%
Total	**29,284**	**$13,895,362,368**	**$10,638,060,639**	**$24,533,423,008**	**98.6%**

a. Categories 0 and III zones.

Sources: Susceptibility to deep-seated landslides data published May 2011, received from California Geological Survey August 2016; Alameda County tax assessor data received July 2016

Table 10-8. Land Use in Landslide Risk Areas

Land Use	Area in Landslide Risk Area (acres)	% of total
Commercial	9.7	0.2%
Industrial	18.6	0.4%
Public/Open Space	4,439.5	94.4%
Residential	237.2	5.0%
Total	**4,705.1**	**100.0%**

Note: Land use in landslide risk area includes cumulative amounts for Very High, High, and Moderate categories.

10.4.3 Critical Facilities and Infrastructure

Critical facilities exposed to the landslide hazard are summarized in Table 10-9 through Table 10-11. A significant amount of infrastructure can be exposed to mass movements:

- **Roads**—Access to major roads is crucial to life-safety after a disaster event and to response and recovery operations. Landslides can block roads, causing isolation for neighborhoods, traffic problems and delays for public and private transportation. This can result in economic losses for businesses.
- **Bridges**—Landslides can significantly impact road bridges. Mass movements can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use.
- **Power Lines**—Power lines are generally elevated above steep slopes; but the towers supporting them can be subject to landslides. A landslide could trigger failure of the soil underneath a tower, causing it to collapse and ripping down the lines. Power and communication failures due to landslides can create problems for vulnerable populations and businesses.

Table 10-9. Critical Facilities and Infrastructure in Moderate Landslide Risk Areas

Jurisdiction	Medical and Health Services	Emergency Services	Educational Facilities	Government / City Facilities	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	0	0	0	0	0	0	0	0	0
Union City	0	0	0	0	0	0	0	0	0
District Planning Area (Fremont)	0	0	0	0	10	0	0	0	10
Total	0	0	0	0	10	0	0	0	10

Table 10-10. Critical Facilities and Infrastructure in High Landslide Risk Areas

Jurisdiction	Medical and Health Services	Emergency Services	Educational Facilities	Government / City Facilities	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	0	0	0	0	0	2	0	0	2
Union City	0	0	1	0	4	2	0	0	7
District Planning Area (Fremont)	0	0	0	0	20	0	0	0	20
Total	0	0	1	0	24	4	0	0	29

Table 10-11. Critical Facilities and Infrastructure in Very High Landslide Risk Areas

Jurisdiction	Medical and Health Services	Emergency Services	Educational Facilities	Government / City Facilities	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	0	0	0	0	0	2	0	0	2
Union City	0	0	0	0	0	0	0	0	0
District Planning Area (Fremont)	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	2	0	0	2

10.4.4 Environment

Environmental problems as a result of mass movements can be numerous. Landslides that fall into streams may significantly impact fish and wildlife habitat and affect water quality. Hillsides that provide wildlife habitat can be lost for prolonged periods of time due to landslides.

10.5 VULNERABILITY

10.5.1 Population

Due to the nature of census block group data, it is difficult to determine demographics of populations vulnerable to mass movements. In general, all of the estimated 155 persons exposed to very high risk landslide areas are considered to be vulnerable. Increasing population and the fact that many homes are built on view property atop or below bluffs and on steep slopes subject to mass movement, increases the number of lives endangered by this hazard.

10.5.2 Property

Loss estimations for the landslide hazard are not based on damage functions, because none have been generated. Instead, estimates of potential loss were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impacts based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 10-12 shows the general building stock loss estimates in landslide risk areas.

Table 10-12. Loss Potential for Landslide

		Estimated Loss Potential from Landslide[a]		
	Exposed Value[b]	10% Damage	30% Damage	50% Damage
Newark	$10,648,094,134	$1,064,809,413	$3,194,428,240	$5,324,047,067
Union City	$14,239,963,943	$1,423,996,394	$4,271,989,183	$7,119,981,972
Total	**$24,888,058,078**	**$2,488,805,808**	**$7,466,417,423**	**$12,444,029,039**

a. Values based on Alameda County tax assessor data received July 2016.
b. Exposed value based on cumulative of exposed total value in low, medium, high, and very high susceptibility

10.5.3 Critical Facilities and Infrastructure

There are 41 critical facilities exposed to the landslide hazard to some degree. A more in-depth analysis of the mitigation measures taken by these facilities to prevent damage from mass movements should be done to determine if they could withstand impacts of a mass movement.

Several types of infrastructure are exposed to mass movements, including transportation, water and sewer and power infrastructure. Highly susceptible areas of the Planning Area include mountain and coastal roads and transportation infrastructure. At this time all infrastructure and transportation corridors identified as exposed to the landslide hazard are considered vulnerable until more information becomes available.

10.5.4 Environment

The environment vulnerable to landslide hazard is the same as the environment exposed to the hazard.

10.6 FUTURE TRENDS IN DEVELOPMENT

The planning partners are equipped to handle future growth within landslide hazard areas. Landslide risk areas are addressed in the safety elements of local general plans. Both cities have committed to linking their general plans to this hazard mitigation plan. This will create an opportunity for wise land use decisions as future growth impacts landslide hazard areas.

Additionally, the State of California has adopted the International Building Code (IBC) by reference in its California Building Standards Code. The IBC includes provisions for geotechnical analyses in steep slope areas that have soil types considered susceptible to landslide hazards. These provisions assure that new construction is built to standards that reduce the vulnerability to landslide risk.

Newark's minimal exposure to the landslide hazard due to its flatland location indicates that current standards are sufficient for development need. In Union City, the areas noted as "Mostly Landslide" are hillside area in the eastern part of the city. Hillside development in Union City is highly regulated and any proposed development must be initially approved by popular vote.

10.7 SCENARIO

Major landslides in the Planning Area occur as a result of soil conditions that have been affected by severe storms, groundwater or human development. The worst-case scenario for landslide hazards in the Planning Area would generally correspond to a severe storm that had heavy rain and caused flooding. Landslides are most likely during late winter when the water table is high. After heavy rains from November to December, soils become saturated with water. As water seeps downward through upper soils that may consist of permeable sands and gravels and accumulates on impermeable silt, it will cause weakness and destabilization in the slope. A short intense storm could cause saturated soil to move, resulting in landslides. As rains continue, the groundwater table rises, adding to the weakening of the slope. Gravity, poor drainage, a rising groundwater table and poor soil exacerbate hazardous conditions.

10.8 ISSUES

Important issues associated with landslides in the Planning Area include the following:

- Future development could lead to more homes in landslide risk areas.
- Mapping and assessment of landslide hazards are constantly evolving. As new data and science become available, assessments of landslide risk should be reevaluated.
- The impact of climate change on landslides is uncertain. If climate change impacts atmospheric conditions, then exposure to landslide risks is likely to increase.
- Landslides may cause negative environmental consequences, including water quality degradation.
- The risk associated with the landslide hazard overlaps the risk associated with other hazards such as earthquake, flood and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.

11. SEVERE WEATHER

11.1 GENERAL BACKGROUND

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. It includes thunderstorms, downbursts, tornadoes, waterspouts, snowstorms, ice storms, and dust storms.

Severe weather can be categorized into two groups: systems that form over wide geographic areas are classified as general severe weather; those with a more limited geographic area are classified as localized severe weather. Severe weather, technically, is not the same as extreme weather, which refers to unusual weather events at the extremes of the historical distribution for a given area.

The most common severe weather events that impact the Planning Area are heavy rains, thunderstorms, high wind, solar flares, and extreme heat. In northern parts of California, winter weather (i.e., snowstorms, ice, and extreme cold) can be included in this category; however, winter weather does not notably impact the Planning Area.

11.1.1 Heavy Rains, Thunderstorms, and Lightning

Most severe storms in the Planning Area consist of heavy rains or thunderstorms. The amount of precipitation needed to qualify an event as heavy rain varies by location and season. Heavy rain is distinct from climate change analyses on increasing precipitation. It does not mean that the long-term total amount of precipitation at a location has increased, just that the rain is occurring in a more intense event. More frequent heavy rain events, however, can serve as indicators of changing precipitation levels. Heavy rain is most frequently measured by tracking the frequency of events and measuring the amount of precipitation in a certain period (most typically inches of rain falling within a 24-hour period) (EPA 2015).

A relatively common weather pattern that brings southwest winds and heavy rain to the Pacific Northwest and California is often referred to as the Pineapple Express. These patterns

DEFINITIONS

Freezing rain—The result of rain occurring when the temperature is below the freezing point. The rain freezes on impact, resulting in a layer of glaze ice up to an inch thick. In a severe ice storm, an evergreen tree 60 feet high and 30 feet wide can be burdened with up to 6 tons of ice, creating a threat to power and telephone lines and transportation routes.

Severe local storm—Small atmospheric systems, including tornadoes, thunderstorms, windstorms, ice storms and snowstorms. Typically, major impacts from a severe storm are on transportation infrastructure and utilities. These storms may cause a great deal of destruction and even death, but their impact is confined to a small area.

Thunderstorm—Typically 15 miles in diameter and lasting about 30 minutes, thunderstorms are underrated hazards. Lightning, which occurs with all thunderstorms, is a serious threat to human life. Heavy rains over a small area in a short time can lead to flash flooding. Strong winds, hail and tornadoes are also dangers associated with thunderstorms.

Tornado—Funnel clouds of varying sizes that generate winds more than 300 miles per hour. A tornado is formed by the turbulent mixing of layers of air with contrasting temperature, moisture, density and wind flow. Tornadoes can affect an area up to a mile wide, with a path of varying length. They can come from lines of cumulonimbus clouds or from a single storm cloud. They are measured using the Fujita Scale ranging from F0 to F6.

Windstorm—A storm featuring violent winds. Windstorms tend to damage ridgelines that face into the winds.

Winter storm—The National Weather Service defines a winter storm as having significant snowfall, ice, and/or freezing rain; the quantity of precipitation varies by elevation. Heavy snowfall is 4 inches or more in a 12-hour period, or 6 inches or more in a 24-hour period in non-mountainous areas; and 12 inches or more in a 12-hour period or 18 inches or more in a 24-hour period in mountainous areas.

are characterized by a strong and persistent flow of atmospheric moisture from the area of the Hawaiian Islands to the Pacific coast of North America. This weather event can produce days of heavy rain that can result in extensive flooding. The warm air can also lead to snow melt in the mountains, which further impacts flooding (Palmer 2011; Coburn 2016).

A thunderstorm is a rain event that includes thunder and lightning. A thunderstorm is classified as "severe" when it contains one or more of the following: hail with a diameter of three-quarter inch or greater, winds gusting in excess of 50 knots (57.5 mph), or a tornado. Approximately 10 percent of the 100,000 thunderstorms that occur nationally every year are classified as severe (NOAA 2014).

Three factors cause thunderstorms to form: moisture, rising unstable air (air that keeps rising when disturbed), and a lifting mechanism to provide the disturbance. The sun heats the surface of the earth, which warms the air above it. If this warm surface air is forced to rise (hills or mountains can cause rising motion, as can the interaction of warm air and cold air or wet air and dry air) it will continue to rise as long as it weighs less and stays warmer than the air around it. As the air rises, it transfers heat from the surface of the earth to the upper levels of the atmosphere (the process of convection). The water vapor it contains begins to cool and it condenses into a cloud. The cloud eventually grows upward into areas where the temperature is below freezing. Some of the water vapor turns to ice and some of it turns into water droplets. Both have electrical charges. Ice particles usually have positive charges, and rain droplets usually have negative charges. When the charges build up enough, they are discharged in a bolt of lightning, which causes the sound waves we hear as thunder. Thunderstorms have three stages (see Figure 11-1):

- The developing stage of a thunderstorm is marked by a cumulus cloud that is being pushed upward by a rising column of air (updraft). The cumulus cloud soon looks like a tower (called towering cumulus) as the updraft continues to develop. There is little to no rain during this stage but occasional lightning. The developing stage lasts about 10 minutes.
- The thunderstorm enters the mature stage when the updraft continues to feed the storm, but precipitation begins to fall out of the storm, and a downdraft begins (a column of air pushing downward). When the downdraft and rain-cooled air spread out along the ground, they form a gust front, or a line of gusty winds. The mature stage is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes. The storm occasionally has a black or dark green appearance.
- Eventually, a large amount of precipitation is produced and the updraft is overcome by the downdraft beginning the dissipating stage. At the ground, the gust front moves out a long distance from the storm and cuts off the warm moist air that was feeding the thunderstorm. Rainfall decreases in intensity, but lightning remains a danger.

There are four types of thunderstorms:

- **Single-Cell Thunderstorms**—Single-cell thunderstorms usually last 20 to 30 minutes. A true single-cell storm is rare, because the gust front of one cell often triggers the growth of another. Most single-cell storms are not usually severe, but a single-cell storm can produce a brief severe weather event. When this happens, it is called a pulse severe storm.
- **Multi-Cell Cluster Storm**—A multi-cell cluster is the most common type of thunderstorm. The multi-cell cluster consists of a group of cells, moving as one unit, with each cell in a different phase of the thunderstorm life cycle. Mature cells are usually found at the center of the cluster and dissipating cells at the downwind edge. Multi-cell cluster storms can produce moderate-size hail, flash floods, and weak tornadoes. Each cell in a multi-cell cluster lasts only about 20 minutes; the multi-cell cluster itself may persist for several hours. This type of storm is usually more intense than a single cell storm.

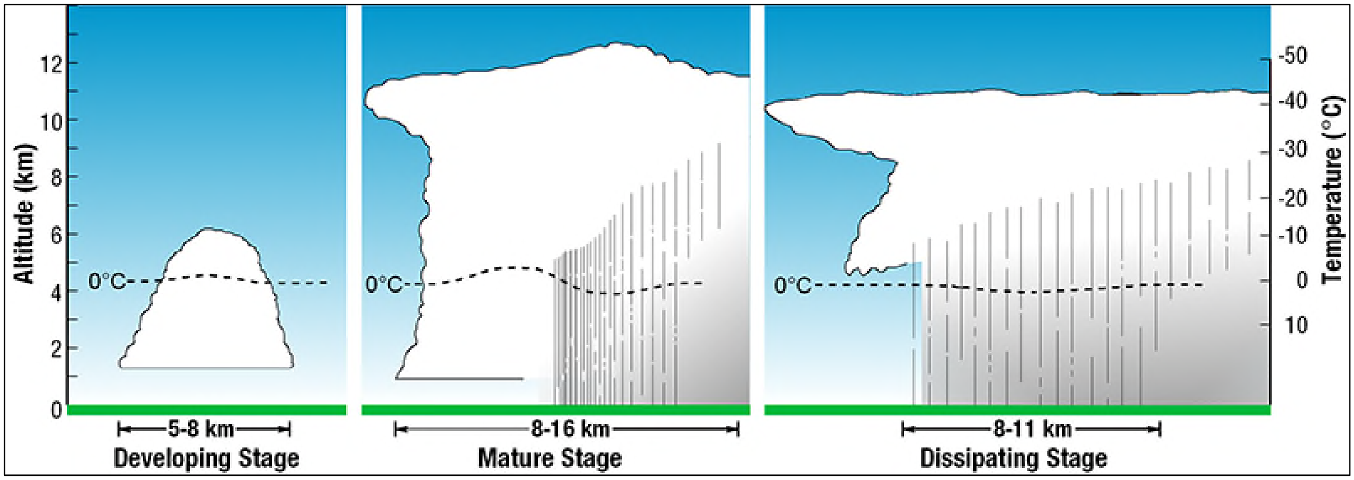


Figure 11-1. The Thunderstorm Life Cycle

- **Multi-Cell Squall Line**—A multi-cell line storm, or squall line, consists of a long line of storms with a continuous well-developed gust front at the leading edge. The line of storms can be solid, or there can be gaps and breaks in the line. Squall lines can produce hail up to golf-ball size, heavy rainfall, and weak tornadoes, but they are best known as the producers of strong downdrafts. Occasionally, a strong downburst will accelerate a portion of the squall line ahead of the rest of the line. This produces what is called a bow echo. Bow echoes can develop with isolated cells as well as squall lines. Bow echoes are easily detected on radar but are difficult to observe visually.
- **Super-Cell Storm**—A super-cell is a highly organized thunderstorm that poses a high threat to life and property. It is similar to a single-cell storm in that it has one main updraft, but the updraft is extremely strong, reaching speeds of 150 to 175 miles per hour. Super-cells are rare. The main characteristic that sets them apart from other thunderstorms is the presence of rotation. The rotating updraft of a super-cell (called a mesocyclone when visible on radar) helps the super-cell to produce extreme weather events, such as giant hail (more than 2 inches in diameter), strong downbursts of 80 miles an hour or more, and strong to violent tornadoes.

NOAA classifies a thunderstorm as a storm with lightning and thunder produced by cumulonimbus clouds, usually producing gusty winds, heavy rain, and sometimes hail. Thunderstorms are usually short in duration (seldom more than two hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry season. According to the American Meteorological Society *Glossary of Meteorology*, thunderstorms are reported as light, medium, or heavy according to the following characteristics:

- Nature of the lightning and thunder
- Type and intensity of the precipitation, if any
- Speed and gustiness of the wind
- Appearance of the clouds
- Effect on surface temperature.

Lightning occurs in all thunderstorms. There are two main types of lightning: intra-cloud lightning and cloud-to-ground lightning (NWS 2014). Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a “bolt.” This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches temperatures approaching 50,000 ºF instantaneously. The rapid heating and cooling of air near the lightning causes thunder. Lightning is a major threat during a thunderstorm. In the United States, between 75 and 100 Americans are struck and killed by lightning each year. Lightning also causes forest and brush fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States each year. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be in excess of $6 billion per year. Impacts can be direct or indirect (National Lightning Safety Institute 2016).

11.1.2 High Winds

Windstorms are generally short-duration events involving straight-line winds or gusts of over 50 mph, strong enough to cause property damage. Damage from such winds accounts for half of all severe weather reports in the lower 48 states. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles. There are seven types of damaging winds (National Severe Storm Laboratory 2016):

- Straight-line winds—Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- Downdrafts—A small-scale column of air that rapidly sinks toward the ground.
- Downbursts—A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- Microbursts—A small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- Gust front—A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- Derecho—A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word “derecho” is of Spanish origin and means “straight ahead.” Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- Bow Echo—A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights and parks, and other damage. Wind speeds as low as 32 mph can cause structural damage, and winds of 100 mph can destroy wood-frame structures (Seattle Office of Emergency Management 2014). They can also cause direct losses to buildings, people, and vital equipment. There are direct consequences to the local economy resulting from windstorms and the associated physical damage and interrupted services.

Wind pressure can create a direct assault on a structure, pushing walls, doors, and windows inward. Conversely, passing winds can create lift and suction forces that act to pull building components and surfaces outward. As positive and negative forces impact a building’s doors, windows and walls, the result can be roof or building component failures and considerable structural damage. The effects of winds are magnified in the upper levels of multi-story structures.

Debris carried along by extreme winds can contribute directly to loss of life and indirectly to the failure of protective building envelopes. Falling trees and branches can damage buildings, power lines, and other property and infrastructure. Tree limbs breaking in winds of only 45 mph can be thrown over 75 feet, so overhead power lines can be damaged even in relatively minor windstorm events. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds. Utility lines brought down by summer thunderstorms have also been known to cause fires, which start in dry roadside vegetation. Electric power lines falling to the pavement create the possibility of lethal electric shock.

Downed trees and power lines and damaged property also can be major hindrances to emergency response and disaster recovery. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures.

11.1.3 Solar Flares

Space weather refers to variations in the space environment between the sun and earth. It includes phenomena that impact systems and technologies in orbit and on earth. Space weather can occur anywhere from the surface of the sun to the surface of the earth. As a space weather storm leaves the sun, it passes through the sun's corona and into the solar wind. When it reaches earth, it energizes earth's magnetosphere and accelerates electrons and protons down to earth's magnetic field lines where they collide with the atmosphere and ionosphere, particularly at high latitudes. Each component of space weather impacts a different technology (NOAA SWPC 2016b). Figure 11-2 illustrates several types of space weather phenomena. For the purpose of this HMP, only solar flares will be discussed further.

Source: NOAA SWPC 2016b

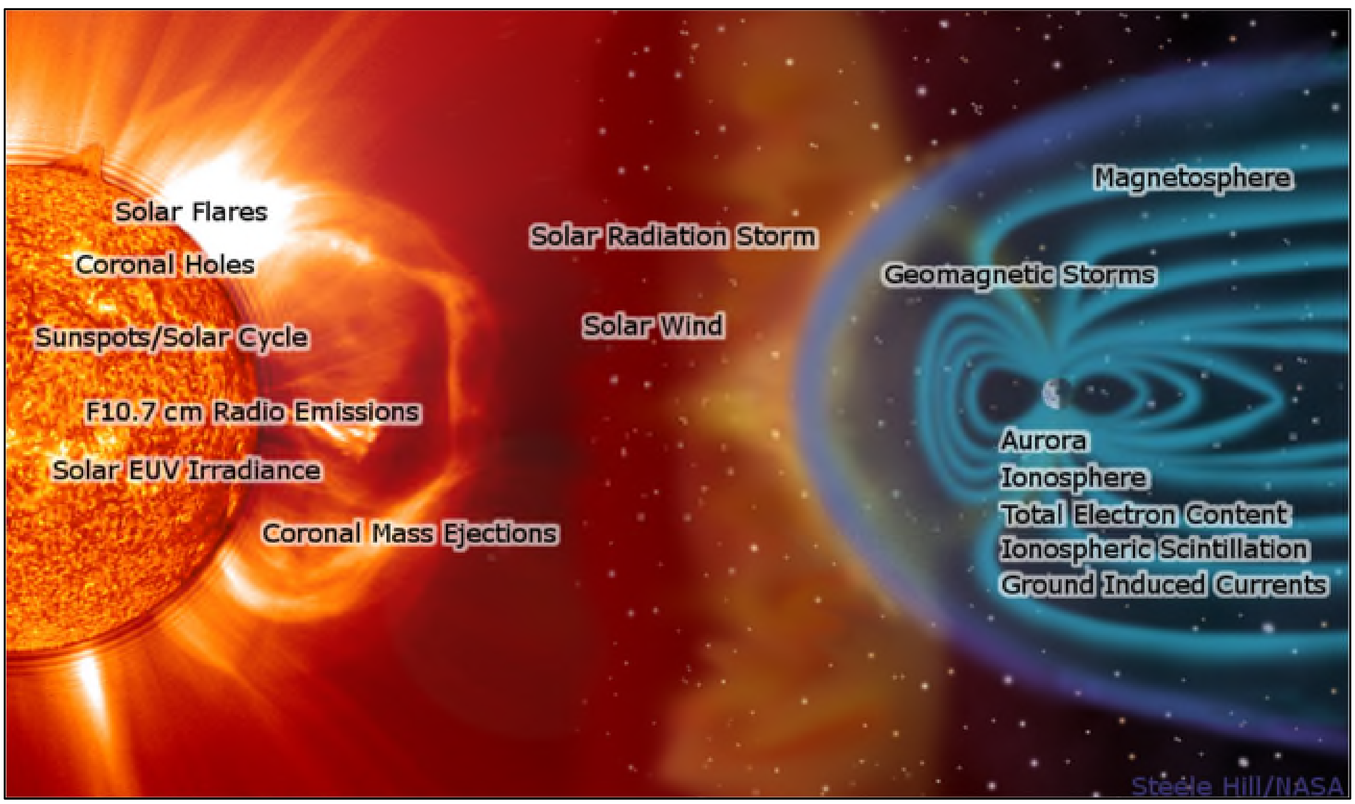


Figure 11-2. Space Weather Phenomena

A solar flare occurs when magnetic energy that has built up in the solar atmosphere is suddenly released. The flare ejects clouds of electrons, ions, and atoms through the corona of the sun into space. These clouds typically reach earth a day or two after the event. Solar flares last from minutes to hours. Radiation is emitted across virtually the entire electromagnetic spectrum, from radio waves at the long wavelength end, through optical emission to X-rays and gamma rays at the short wavelength end (NOAA SWPC 2016a; NASA 2016b). Solar flares only impact the earth when they occur on the side of the sun that faces the earth (NASA 2016a). If the energy from a solar flare reaches the earth, it has the potential to affect global positioning system (GPS) signals, television and radio transmissions, and telecommunications.

11.1.4 Extreme Heat

Conditions of extreme heat are defined as summertime temperatures that are substantially hotter or more humid than average for a location at that time of year (CDC 2009). An period of extreme heat of three or more consecutive days is typically called a heat wave and is often accompanied by high humidity (NWS 2005). The term heat wave is applied both to routine weather variations and to extraordinary spells of heat that may occur only once a century (Meehl and Tebaldi 2004).

11.1.5 Extreme Cold

Although no specific definition exists for extreme cold, temperatures are characterized as at or below freezing for an extended period of time. Note that extreme cold events are usually part of winter storm events but can occur during anytime of the year and have devastating effects on California agricultural production.

11.2 HAZARD PROFILE

11.2.1 Past Events

Sources that provide historical information regarding previous occurrences and losses associated with severe weather events in Alameda County and the Planning Area include FEMA, NWS, and NOAA. Between 1954 and 2016, FEMA issued disaster (DR) emergency (EM) declarations for the State of California for 27 severe weather hazard-related events, classified as one or a combination of the following: severe storms, flooding, landslides, mudslides, debris flows, high winds, high tides, torrential rain, winds, and heavy rainstorms. Alameda County was included in six of the declarations, as listed in Table 11-1; impacts on the Planning Area were not identified in the sources reviewed. Table 11-2 lists known severe weather events that impacted the Planning Area between 1970 and 2016, along with solar flare events that occurred in North America.

Table 11-1. FEMA DR and EM Declarations for Severe Weather Events in Alameda County

FEMA Declaration	Event Date	Event Type	Location
DR-283	February 16, 1970	Severe Storms & Flooding	17 counties including Alameda County
DR-651	December 19, 1981 – January 8, 1983	Severe Storms, Flood, Mudslides & High Tide	10 counties including Alameda County
DR-758	February 12-March 10, 1986	Severe Storms & Flooding	39 counties including Alameda County
DR-1155	December 28, 1996 – April 1, 1997	Severe Storms, Flooding, Mud and Landslides	48 counties including Alameda County
DR-1628	December 17 – January 3, 2006	Severe Storms, Flooding, Mudslides, and Landslides	31 counties including Alameda County
DR-1646	March 29 – April 16, 2006	Severe Storms, Flooding, Landslides, and Mudslides	17 counties including Alameda County

Source: FEMA 2016

Table 11-2. Severe Weather Events in the Union City/Newark Planning Area

Event Date	Event Type	FEMA Declaration	Location	Description
February 10, 1970	Severe Storms & Flooding	DR-283	Bay Area including Alameda County	Heavy winds, storms and flooding impacted the Bay Area, including Alameda County. Impacted areas had over $27 million in damage.
January 3 – 5, 1982	Landslides, Floods, and Marine Effects	DR-651	Bay Area including Alameda County	A major storm caused widespread and catastrophic landslide damage throughout the Bay Area, resulting in numerous deaths and over $60 million in direct costs. In Alameda County, damage was concentrated in Oakland, Piedmont, and Berkeley. The County had approximately $3.5 million in damage.
February 12 – March 10, 1986	Severe Storms & Flooding	DR-758	Bay Area including Alameda County	This event damaged over 12,000 homes, destroyed over 1,300 homes, and caused 13 deaths and 67 injuries in California. Damage totaled over $407.5 million.
March 13, 1989	Space Weather Storm	N/A	Quebec, Canada	A space weather storm disrupted the hydroelectric power grid in Quebec, Canada. This system-wide outage lasted for 9 hours and left 6 million people without power.
December 28, 1996 – April 1, 1997	Severe Storms, Flooding, Mud and Landslides	DR-1155	48 counties including Alameda County	300 square miles in California were flooded, including the Yosemite Valley. Over 12,000 people were evacuated in northern California. Several levee breaks were reported across the Sacramento and San Joaquin Valleys. Over 23,000 homes and business, agricultural lands, bridges, and roads were damaged. Eight deaths resulted from this event. Overall, the state had $1.8 billion in damage.
October 2003	Space Weather (“Halloween Storms of 2003”)	N/A	Parts of the Europe and the United States	This series of solar flares impacted satellite-based systems and communications. A one-hour-long power outage occurred in Sweden as a result of the solar activity. Aurorae were observed as far south as Texas and the Mediterranean countries of Europe.
December 17, 2005 – January 12, 2006	Winter Storms (Severe Storms, Flood, Mudslides, Landslides)	DR-1628	Bay Area including Alameda County	Damage estimates for the region were over $100 million. Storms were blamed for two deaths from falling trees, around 50 businesses declared damage, and three homes were nearly wiped out by mudslides.
April 6-20, 2006	Heavy Rain and Debris Flows	DR-1646	Alameda County	Strong storms brought heavy rain to most of Alameda County. Landslides, eroding hillsides and cracked pavement resulted from persistent rainfall. Oversaturated earth caused landslide or erosion problems on private properties, which spilled over onto county rights-of-way. Overall, the County had approximately $10 million in damage to county roadways.
December 2006	Geomagnetic Storms and Solar Flares	N/A	United States	This event disabled GPS signal acquisition over the United States.
December 10 – 11, 2014	Heavy Rains and High Winds	N/A	Bay Area including the Planning Area	Heavy rains and gusty winds impacted the Bay Area for several days. Rainfall rates of 1.5 to 2 inches an hour were reported. A flash flood warning was issued for many municipalities, including the Cities of Union City and Newark. Many areas around the Bay Area experienced flooding of streets, highways and creeks. In addition to the heavy rain, strong wind gusts were recorded, with some reaching 83 mph. Rainfall totals ranged from 5.78 to 7.24 inches. This event led to power outages throughout the Bay Area. Total rainfall in Union City was 3.28 inches.

Source: FEMA 2016, NASA 2009, NASA 2008, Love, J. et al. 2013, CBS 2014

11.2.2 Location

Severe weather events have the potential to happen anywhere in the Planning Area. Communities in low-lying areas next to streams or lakes are more susceptible to flooding. Wind events are most damaging to areas that are heavily wooded.

Heavy Rains, Thunderstorms and Lightning

Thunderstorms affect relatively small areas compared to winter storms and hurricane events. Thunderstorms can strike in all regions of the United States; however, they are most common in the central and southern states. The atmospheric conditions in these regions of the country are ideal for generating these powerful storms. It is estimated that there are as many as 40,000 thunderstorms each day worldwide. The most thunderstorms are seen in the southeast United States, with Florida having the highest incidences (80 to over 100 thunderstorm days each year). Figure 11-3 shows the annual number of thunderstorms that impact the United States. According to this figure, the Planning Area can experience around five thunderstorms each year (NWS 2016).

Source: NWS 2016a

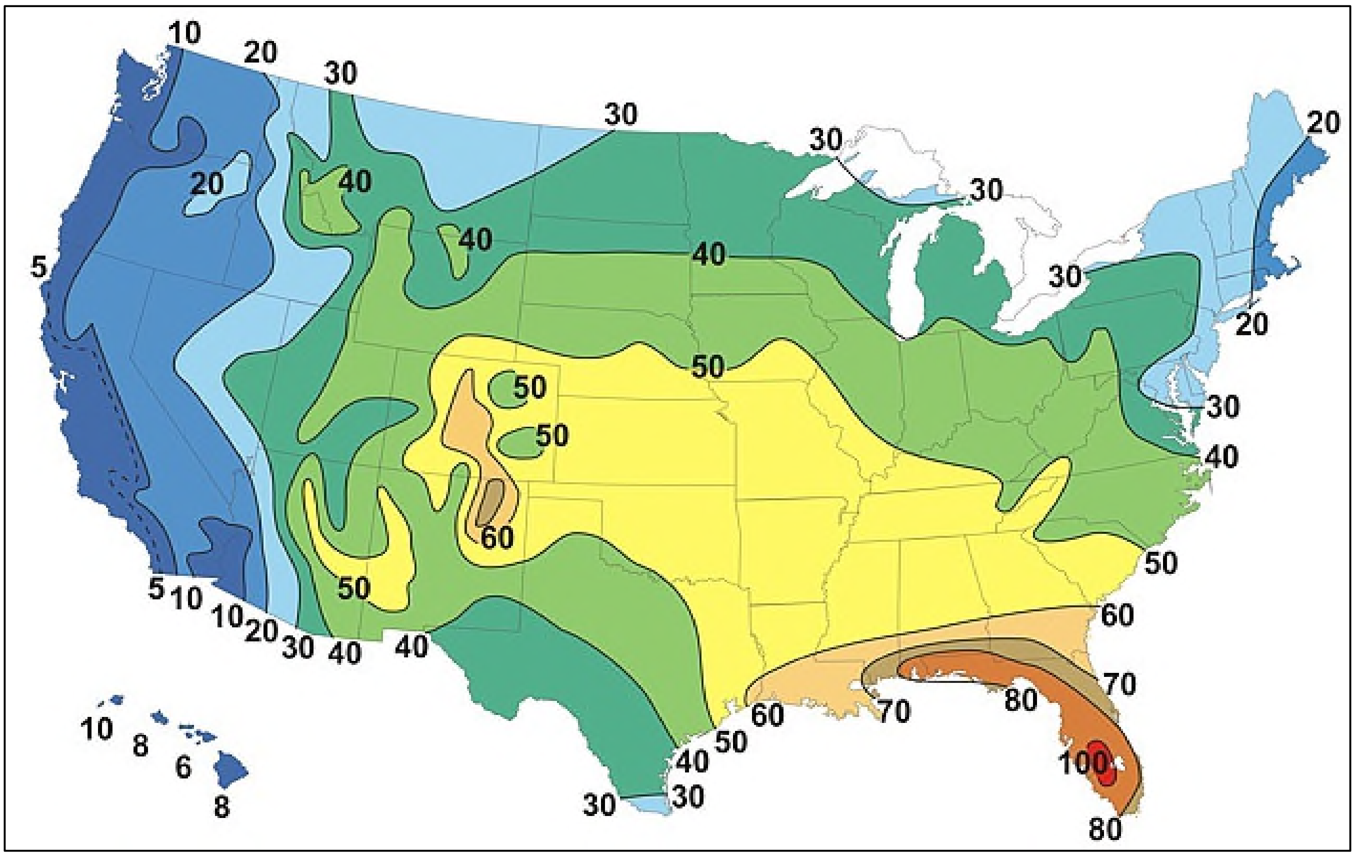


Figure 11-3. Annual Number of Thunderstorms in the United States

High Winds

The entire Planning Area is subject to high winds from thunderstorms, tornadoes, and other severe weather events. According to the FEMA *Winds Zones of the United States* map, the Planning Area is in Wind Zone I, where wind speeds can reach up to 130 mph. Figure 11-4 indicates the frequency and strength of windstorms in the United States and the general location of the most wind activity. This figure is based on 40 years of tornado data and 100 years of hurricane data collected by FEMA.

Source: FEMA 2010

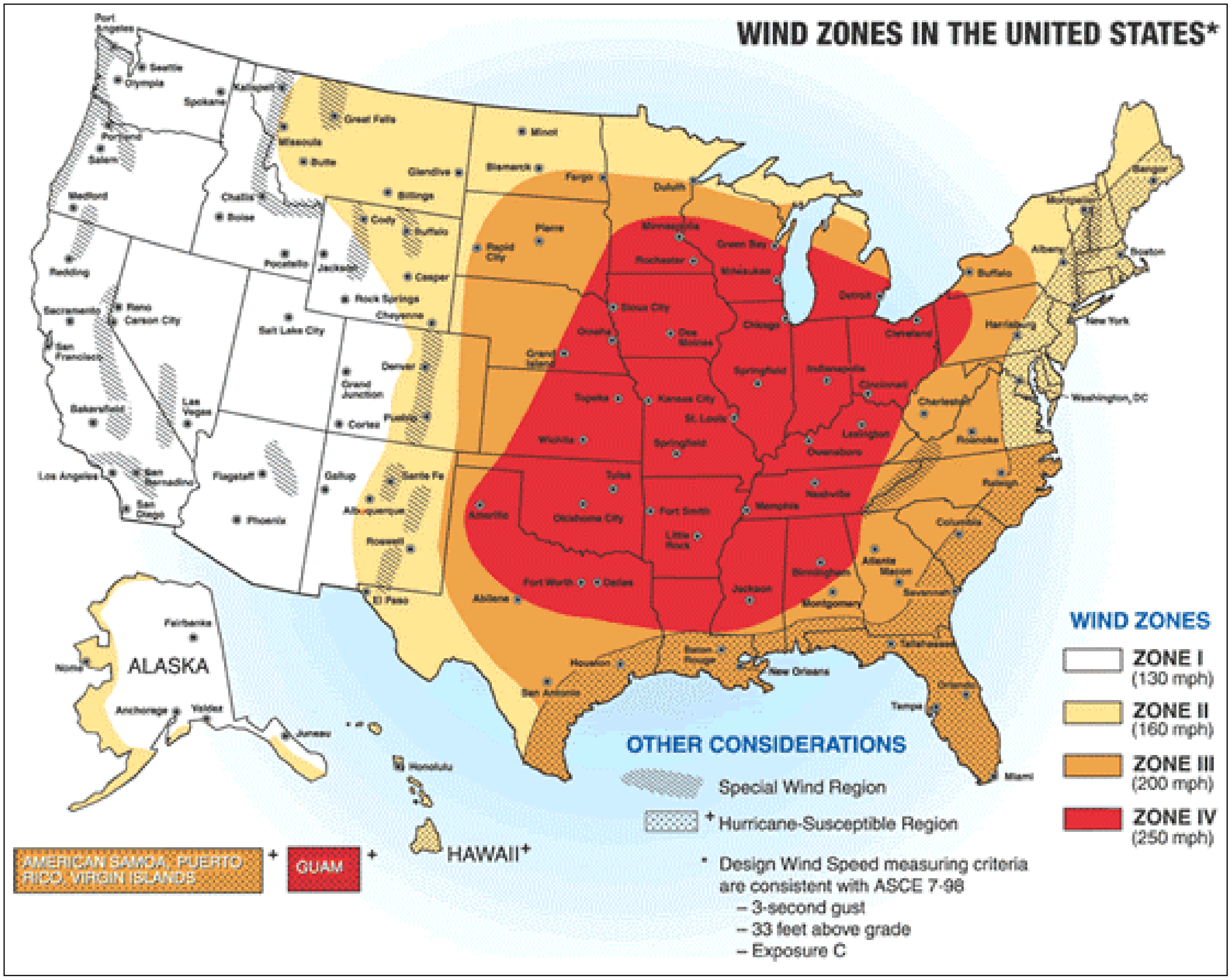


Figure 11-4. Wind Zones in the United States

Solar Flares

A solar flare can disrupt the power grid anywhere in the world (Global Resilience Network 2016; NASA 2016b).

Extreme Heat and Cold

Extreme heat and cold can occur anywhere in the Planning Area.

11.2.3 Frequency

The Planning Area can expect to experience exposure to some type of severe weather event at least annually. The frequency of solar flares is difficult to estimate, and prediction of a specific future event is nearly impossible (Riley 2012).

11.2.4 Severity

The most common problems associated with severe storms are immobility and loss of utilities. Fatalities are uncommon, but can occur. Roads may become impassable due to flooding, downed trees, or a landslide. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power. Lightning can cause severe damage and injury. Physical damage to homes and facilities can be caused by wind or flooding.

Heavy precipitation, which in the Planning Area almost always takes the form of rain, can have significant impacts, including crop damage, soil erosion, and increased risk of flood. Stormwater runoff from heavy rains can also impair water quality by washing pollutants into water bodies (EPA 2015). Thunderstorms carry the same risks as heavy precipitation events, and depending on the type of storm, they can also result in tornados, lightning, and heavy winds, increasing risk of injury and property damage (Keller 2008).

Lightning severity is typically investigated for both property damage and life safety (injuries and fatalities). The number of reported injuries from lightning is likely to be low, but Planning Area infrastructure losses can be up to thousands of dollars each year. The relationship of lighting to wildfire ignitions in the Planning Area increases the potential severity of this hazard.

Windstorms can be a frequent problem in the Planning Area and have been known to cause damage to utilities. The predicted wind speed given in wind warnings issued by the NWS is for a one-minute average; gusts may be 25 to 30 percent higher.

Solar flares can lead to long-term power grid outages. Moderate solar storms have affected transformers as they are not very resilient to long electromagnetic pulses (Global Resilience Network 2016). Recent events impacting the United States have disrupted the power grid, shut down satellites and air traffic precision navigation, and disabled GPS signals. Power outages induced by space weather can be life-threatening to those dependent on electricity for life support.

Extreme heat is the primary weather-related cause of death in the U.S. In a 10-year record of weather fatalities across the nation from (2006-2015), excessive heat claimed more lives each year than floods, lightning, tornadoes, and hurricanes. In 2015, heat claimed 25 lives, though none of them were in California (NWS 2016b). Extreme heat events do not typically impact buildings; however, losses may be associated with the overheating of HVAC systems. The agricultural industry is most at risk of damage from extreme heat events. These events can lead to drought, impact water supplies, and lead to an increase in heat-related illnesses.

11.2.5 Warning Time

Meteorologists can often predict the likelihood of a severe storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time.

Space weather prediction in the United States is provided primarily by the Space Weather Prediction Center and the U.S. Air Force’s Weather Agency. The Space Weather Prediction Center draws on a variety of data sources, both space- and ground-based, to provide forecasts, watches, warnings, alerts, and summaries to civilian and commercial users (Ready.gov 2016c).

11.3 SECONDARY HAZARDS

The most significant secondary hazards associated with severe local storms are floods, falling and downed trees, landslides and downed power lines. Rapidly melting snow combined with heavy rain can overwhelm both natural and man-made drainage systems, causing overflow and property destruction. Landslides occur when the soil on slopes becomes oversaturated and fails.

11.4 EXPOSURE

11.4.1 Population

A lack of data separating severe weather damage from flooding and landslide damage prevented a detailed analysis for exposure and vulnerability. However, it can be assumed that the entire planning area is exposed to some extent to severe weather events. Certain areas are more exposed due to geographic location and local weather patterns. Populations living at higher elevations with large stands of trees or power lines may be more susceptible to wind damage and black out, while populations in low-lying areas are at risk for possible flooding.

11.4.2 Property

Severe weather events affect regions and do not stop at jurisdictional borders. As such, all property within the Planning Area is exposed to the severe weather hazard.

11.4.3 Critical Facilities and Infrastructure

All critical facilities exposed to flooding (Section 9.4.3) are also likely exposed to severe weather. Additional facilities on higher ground may also be exposed to wind damage or damage from falling trees. The most common problems associated with severe weather are loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water and sewer systems may not function. Roads may become impassable from secondary hazards such as downed trees and landslides.

11.4.4 Environment

The environment is highly exposed to severe weather events. Natural habitats such as streams and trees are exposed to the elements during a severe storm and risk major damage and destruction. Prolonged rains can saturate soils and lead to slope failure. Flooding events caused by severe weather or snowmelt can produce river channel migration or damage riparian habitat. Storm surges can erode beachfront bluffs and redistribute sediment loads.

11.5 VULNERABILITY

11.5.1 Population

Vulnerable populations are the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure during severe weather events and could suffer more secondary effects of the hazard.

11.5.2 Property

All property is vulnerable during severe weather events, but properties in poor condition or in particularly vulnerable locations may risk the most damage. Those in higher elevations and on ridges may be more prone to wind damage. Those that are located under or near overhead lines or near large trees may be vulnerable to falling ice or may be damaged in the event of a collapse.

Loss estimations for the severe weather hazard are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 11-3 lists the loss estimates.

Table 11-3. Loss Estimates for Severe Weather

		Estimated Loss Potential from Severe Weather		
	Exposed Value (Structure and Contents)[a]	10% Damage	30% Damage	50% Damage
Newark	$10,648,094,134	$1,064,809,413	$3,194,428,240	$5,324,047,067
Union City	$14,239,963,943	$1,423,996,394	$4,271,989,183	$7,119,981,972
Total	**$24,888,058,077**	**$2,488,805,808**	**$7,466,417,423**	**$12,444,029,039**

a. Values based on Alameda County tax assessor data received July 2016.

11.5.3 Critical Facilities and Infrastructure

Incapacity and loss of roads are the primary transportation failures resulting from severe weather, mostly associated with secondary hazards. Landslides caused by heavy prolonged rains can block roads. High winds can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating populations, and disrupting ingress and egress. Snowstorms in higher elevations can significantly impact the transportation system and the availability of public safety services. Of particular concern are roads providing access to isolated areas and to the elderly.

Prolonged obstruction of major routes due to landslides, snow, debris or floodwaters can disrupt the shipment of goods and other commerce. Large, prolonged storms can have negative economic impacts for an entire region.

Severe windstorms, downed trees, and ice can create serious impacts on power and above-ground communication lines. Freezing of power and communication lines can cause them to break, disrupting electricity and communication. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

11.5.4 Environment

The vulnerability of the environment to severe weather is the same as the exposure.

11.6 FUTURE TRENDS IN DEVELOPMENT

All future development will be affected by severe storms. The ability to withstand impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction. The planning partners have adopted the International Building Code in response to California mandates. This code is equipped to deal with the impacts of severe weather events. Land use policies identified in general plans within the Planning Area also address many of the secondary impacts (flood and landslide) of the severe weather hazard. With these tools, the planning partners are well equipped to deal with future growth and the associated impacts of severe weather.

11.7 SCENARIO

Although severe local storms are infrequent, impacts can be significant, particularly when secondary hazards occur. A worst-case event would involve prolonged high winds during a winter storm accompanied by thunderstorms. Such an event would have both short-term and longer-term effects. Initially, schools and roads would be closed due to power outages caused by high winds and downed tree obstructions. Prolonged rain could produce flooding, overtopped culverts with ponded water on roads. Flooding and debris could further obstruct roads and bridges, further isolating residents.

11.8 ISSUES

Important issues associated with a severe weather in the Planning Area include the following:

- Older building stock in the Planning Area is built to low code standards. These structures could be highly vulnerable to severe weather events such as windstorms.
- Cities may need to open cooling/warming stations during extreme temperature events.
- Redundancy of power supply and communications equipment must be evaluated.
- The capacity for backup power generation is limited.
- Dead or dying trees as a result of drought conditions are more susceptible to falling during severe storm events.
- Extreme weather events are likely to increase as a result of climate change impacts, including the potential for extreme heat.

12. WILDFIRE

12.1 GENERAL BACKGROUND

A wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires can be ignited by lightning or by human activity such as smoking, campfires, equipment use, and arson. The potential for wildfire is primarily influenced by the following factors:

- Fuel, which may include living and dead vegetation on the ground, along the surface as brush and small trees, and above the ground in tree canopies.
- Topography, which includes both slope and elevation.
- Air conditions, including temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount and duration, and the stability of the atmosphere.

DEFINITIONS

Wildfire—Fires that result in uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas. Because of their distance from firefighting resources, they can be difficult to contain and can cause a great deal of destruction.

Wildland urban interface area—An area susceptible to wildfires and where wildland vegetation and urban or suburban development occur together. An example would be smaller urban areas and dispersed rural housing in forested areas.

How a fire behaves primarily depends on the following:

- Fuel—Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite. Trees killed or defoliated by forest insects and diseases are more susceptible to wildfire.
- Weather—Strong, dry winds produce extreme fire conditions. Such winds generally reach peak velocities during the night and early morning hours.
- Thunderstorm activity—The thunderstorm season typically begins in June with wet storms, and turns dry with little or no precipitation reaching the ground as the season progresses into July and August. In the Planning Area, thunderstorms are most likely during late summer and develop within the frontal rain bands of winter storms.
- Terrain—Topography influences the amount and moisture of fuel; the impact of air temperature and wind; and the ability of a fire to spread (highways and lakes are barriers to fire, and fire spreads more easily uphill than downhill).
- Time of Day—A fire's peak burning period generally is between 1 p.m. and 6 p.m.

Fire hazards present a considerable risk to vegetation and wildlife habitats. Short-term loss caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Vulnerability to flooding increases due to the destruction of watersheds. The potential for significant damage to life and property exists in areas designated as "wildland urban interface (WUI) areas," where development is adjacent to densely vegetated areas.

12.1.1 Local Conditions Related to Wildfire

Because natural vegetation and dry-farmed grain areas are extremely flammable during late summer and fall, wildfire is a serious hazard in undeveloped areas and on large lot home sites with extensive areas of un-irrigated vegetation. Grassland fires are easily ignited, particularly in dry seasons. These fires are relatively easily controlled if they can be reached by fire equipment; the burned slopes, however, are highly subject to erosion and gullying.

While brush-lands are naturally adapted to frequent light fires, fire protection in recent decades has resulted in heavy fuel accumulation on the ground. Brush fires, particularly near the end of the dry season, tend to burn fast and very hot, threatening homes and leading to serious destruction of vegetative cover. A brush fire that spreads to a woodland can generate a destructive hot crown fire. No suitable management technique of moderate cost has been devised to reduce the risk of brush fires.

Peat fires represent a special hazard in that, once ignited, they are extremely difficult to extinguish. In some instances, islands have been flooded to extinguish peat fires. Any area lying landward of the mean high water line may be peaty because of the marshy origin of the soil.

12.1.2 Wildland-Urban Interface and Structure Fires

WUI fires occur where combustible vegetation meets combustible structures, combining the hazards associated with wildfires and structure fires. These types of fires have increased dramatically in the last two decades as more and more people move to rural areas. Between 1970 and 1980, the rural population of the United States increased 23.4 percent, more than twice the gain of 11.4 percent for the nation as a whole. The hazard is bi-directional: wildfires can burn homes, and home fires can burn into wildlands, making this type of fire an important consideration in wildfire management.

WUI fires are increasing as more vacation homes are built and improved transportation systems allow more people to live outside city centers. The longer response times for these out-of-the-way locations gives the fire more time to burn out of control, making these fires difficult to fight. Most firefighters are trained to fight either wildfires or structure fires. WUI fires require both skills, and it is difficult to balance the two. When a WUI fire breaks out, the threat of extreme property and casualty losses often forces firefighters to focus their efforts on protecting homes and structures, sometimes at the expense of protecting wildland resources or working to slow the fire itself.

Structure fires are not typically considered an emergency, except when the fire can spread to adjoining structures. Older structures are often more vulnerable to fire (both where the structure fire starts first and where it is a secondary hazard event tied to a wildfire), because the older structures do not conform to modern building and fire codes and do not contain fire detection devices. These structures are also prone to faulty electrical, heating, and other utility systems because of their age and lack of proper maintenance. Many of these older structures were constructed close together, enabling fire to spread rapidly from one to another. These existing vulnerabilities can facilitate the spread of a wildfire to structures, or vice versa, as the structures are already more likely to catch fire. Often, other defensive measures such as fire-resistant vegetation and defensible space are not in place, increasing the probability that structural fires in older buildings will spread to local vegetation and surrounding wildlands.

Newer residential structures are not as vulnerable to fire as are older structures. These structures include fire-resistant features that conform to modern fire and building codes, as well as fire detection or extinguishing systems. The likelihood that a major structural fire will expand into a wildland fire before it can be brought under control is therefore significantly reduced. Similarly, wildfires are less able to burn these buildings because of the preventative measures in place.

The storage and use of hazardous materials by commercial and industrial occupancies increase the risk of fire and pose a threat to firefighters and the community if they should become involved in a fire. Certain materials have been designated by the National Fire Protection Academy as flammable and combustible, such as propane or petroleum; if a wildfire ignites a building or container with these materials, it greatly exacerbates the severity and damage associated with the fire. Toxic chemicals could present public health hazards if a wildfire reaches an industrial sector or building, releasing toxic fumes as clouds of smoke. In addition to the health concerns and impact on the community, hazardous materials-associated fires (whether initiated by a wildfire or as a structural fire that has spread into the wildland) can introduce toxins that damage the local environment, destroying or altering important habitats.

Property owners of structures within the WUI can take preventive measures to reduce the risk of a wildfire creating a secondary structural fire. Using fire-resistant plants, maintaining 100 feet of defensible space, and providing property hardening are among the protective measures recommended by the California Department of Forestry and Fire Protection (CAL FIRE) (CAL FIRE 2016).

12.1.3 Wildfire Protection Responsibility in California

Hundreds of agencies have fire protection responsibility for wildland and WUI fires in California, and primary legal (and financial) responsibility for wildfire protection is divided by local, state, tribal, and federal organizations. In many instances, two fire organizations have dual primary responsibility on the same parcel of land—one for wildfire protection, and the other for structural or "improvement" fire protection. According to the *2013 California Multi-Hazard Mitigation Plan*, this layering of responsibility and resulting dual policies, rules, practices, and legal ordinances can cause conflict or confusion. To address wildfire jurisdictional responsibilities, the California state legislature in 1981 adopted Public Resource Code Section 4291.5 and Health and Safety Code Section 13108.5 establishing the following responsibility areas:

- **Federal Responsibility Areas (FRAs)**—FRAs are fire-prone wildland areas that are owned or managed by a federal agency such as the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, or U.S. Department of Defense. Primary financial and rule-making jurisdictional authority rests with the federal land agency. In many instances, FRAs are interspersed with private land ownership or leases. Fire protection for developed private property is usually not the responsibility of the federal land management agency; structural protection responsibility is that of a local government agency.
- **State Responsibility Areas (SRAs)**—SRAs are lands in California where CAL FIRE has legal and financial responsibility for wildfire protection and where CAL FIRE administers fire hazard classifications and building standard regulations. SRAs are defined as lands that meet the following criteria:
    - Are county unincorporated areas
    - Are not federally owned
    - Have wildland vegetation cover rather than agricultural or ornamental plants
    - Have watershed or range/forage value
    - Have housing densities not exceeding three units per acre.

  Where SRAs contain built environment or development, the responsibility for fire protection of those improvements (non-wildland) is that of a local government agency.

- **Local Responsibility Areas (LRAs)**—LRAs include land in cities, cultivated agriculture lands, non-flammable areas in unincorporated areas, and lands that do not meet the criteria for SRA or FRA. LRA fire protection is typically provided by city fire departments, fire protection districts, and counties, or by CAL FIRE under contract to local governments. The Cities of Newark and Union City are located in incorporated LRAs. LRAs may include flammable vegetation and WUI areas where the financial and jurisdictional responsibility for improvement and wildfire protection is that of a local government agency.

SRAs were originally mapped in 1985, and LRAs were originally mapped in 1996. During that time, many local governments made similar designations under their own authority. CAL FIRE recognized the need to remap both SRAs and LRAs with more recent data and technology to create more accurate zone designations. Updated SRA maps were released in May 2011 and again in August 2012. SRA and LRA maps released in 2007 and 2008 are available at the county level for Alameda County on CAL FIRE's Fire and Resource Assessment Program (FRAP) website (CAL FIRE 2008).

FRAP not only contains maps showing high hazard fire zones in SRAs and LRAs, it also offers a multitude of fire management prevention and planning tools. Other maps and GIS data include bioregions, fire management environments, fire perimeters, fire threat, fuel rank, surface fuels, land cover, watersheds, historical and anticipated development, and more. FRAP also conducts a periodic assessment on state forests and rangelands to determine the amount and extent of these resources, analyze their conditions, and identify alternative management and policy guidelines. The assessment enhances inter-agency collaboration between state and federal agencies on forest and rangeland resources. The 2015 assessment is still in production; the 2010 and 2003 assessments can be accessed through the FRAP website: http://frap.fire.ca.gov/assessment/.

California's SB 1241 (adopted in 2012) requires local governments to update the safety elements in their general plans to recognize wildfire risks in SRAs and "Very High Fire Hazard Severity Zones" (based on consistent statewide criteria and the severity of fire hazard that is expected to prevail in those areas). SB 1241 correlates strongly with AB 2140, which requires local jurisdictions to adopt a federally approved hazard mitigation plan through reference in the safety elements of their general plans. This bill also notes the requirement for the safety element to include information and policies on unreasonable risk from potential hazards, including fire. These bills are both designed to encourage integration within and between jurisdictions to enhance mitigation and prevention efforts. Information from a local general plan safety element should be considered with the development of an HMP, response procedures, evacuation planning, and long-term development.

12.2 HAZARD PROFILE

The 2013 *California Multi-Hazard Mitigation Plan* describes wildfire hazard and risk as follows:

> "The diversity of WUI settings and disagreement about alternative mitigation strategies has led to confusion and different methods of defining and mapping WUI areas. One major disagreement has been caused by terms such as "hazard" and "risk" being used interchangeably. Hazard is the physical condition that can lead to damage to a particular asset or resource. The term "fire hazard" is related to those physical conditions related to fire and its ability to cause damage, specifically how often a fire burns a given locale and what the fire is like when it burns (its fire behavior). Thus, fire hazard only refers to the potential characteristics of the fire itself.
>
> Risk is the likelihood of a fire occurring at a given site (burn probability) and the associated mechanisms of fire behavior that cause damage to assets and resources (fire behavior). This includes the impact of fire brands (embers) that may be blown some distance igniting fires well away from the main fire" (California 2013)."

12.2.1 Past Events

Fire is a normal part of most forest and range ecosystems in temperate regions of the world. Fires historically burn on a fairly regular cycle, recycling carbon and nutrients stored in the ecosystem and strongly affecting the species within the ecosystem. Annual acreage consumed by wildfires in the lower 48 states dropped from about 45 million acres per year in the 1930s to under 5 million acres by 1970. A western Washington State study estimated that modern wildfires consume only about a tenth of the biomass each year that prehistoric fires burned.

According to the 2016 Alameda County Local Hazard Mitigation Plan, wildfires are common in the Bay Area, with large historic wildfires recorded in 1961, 1962, 1964, 1965, 1970, 1981, 1985, 1988, and 1991. However, none of these fires occurred in the Planning Area. Between 1954 and 2016, FEMA issued major disaster (DR), emergency (EM) and fire management assistance declarations for 187 fire hazard-related events in California. Alameda County was included in two of these, as listed in Table 12-1; impacts on the Planning Area were not identified in the available sources reviewed.

Table 12-1. FEMA Declarations for Fire Events in Alameda County

FEMA Declaration (Name)	Event Date	Event Type	Location	Damage
DR-295 (Buckingham/ Norfolk Fire)	September 29, 1970	Forest & Brush Fires	Six counties including Alameda County	37 homes destroyed, 21 homes damaged, 204 acres burned
DR-919 (Oakland Hills Fire)	October 20-29, 1991	Oakland Hills Fire	Alameda County	$1.7 billion in losses. Burned 1,520 acres, destroyed 3,354 homes and 456 apartments, injured 150 people and took the lives of 25 people

Source: FEMA 2016

CAL FIRE maintains statistics on historical wildfire activity through its annual reports (Redbooks). Details include state and county information, cause and size, acres burned, and dollar damage. Table 12-2 shows the identified causes of wildfires in Alameda County between 2000 and 2014, the most recent annual report available. CAL FIRE has Redbooks available for every year since 1942. Statewide fire statistics are available for 2015, but a breakdown at the county level is not yet available.

12.2.2 Location

State

CAL FIRE estimated fire risk in WUI areas based on a variety of factors affecting fire frequency and behavior. The results are combined into a single assessment called fire threat. A significant fire threat is found throughout California, with 48 percent of the state's wildland area ranked as high, very high or extremely high. About 37 percent of the state has a moderate fire threat. Large areas of high threat are found in Southern California, the central coast, the lower elevations of the Sierra Nevada and much of the interior of northern California. Much of the fire threat is near densely populated areas and new development.

Regional

Wildfire risk in Alameda County is primarily in the wildland-urban interface areas. Most of Alameda County is deemed to be moderate, high or very high fire threat risk based on analysis by CAL FIRE (CAL FIRE 2005). These are high-density areas in the mountainous and hillside areas of eastern Berkeley and Oakland, central Union City, and some portions of the southeastern corner of Alameda County (CAL FIRE 2007).

CAL FIRE's FRAP website includes maps of the communities most at risk for wildfire that are within 1.5 miles of a high or very high wildfire threat on federal or non-federal lands. The threat is based on the FRAP fuels and hazard data. The map identifies 11 communities in Alameda County not adjacent to federal lands that are at risk for wildfire, including the City of Union City (CAL FIRE 2012; California Office of the State Fire Marshal 2013). Figure 12-1 shows the fire hazard severity zone (FHSZ) map for Alameda County.

Table 12-2. CAL FIRE Wildfire Activity Statistics for Alameda County

Year	Arson	Campfire	Debris Burning	Electric Power	Equipment Use	Lightning	Miscellaneous	Powerline	Playing With Fire	Railroad	Smoking	Undetermined	Vehicle	**Total**
2014	0	1	0	6	5	0	1	N/A	0	0	1	13	6	**33**
2013	1	0	1	7	8	0	1	N/A	0	0	1	15	12	**46**
2012	0	0	0	0	0	0	3	5	0	0	0	7	0	**15**
2011	1	0	0	N/A	9	0	16	5	0	0	0	14	4	**49**
2010	0	0	1	N/A	8	0	12	0	1	0	0	21	2	**45**
2009	0	0	2	N/A	8	0	12	0	1	0	0	25	2	**50**
2008	1	0	2	N/A	7	0	20	0	0	0	0	19	4	**53**
2007	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
2006	0	0	2	N/A	12	0	2	2	0	0	0	19	4	**41**
2005	6	0	0	N/A	18	0	5	5	0	6	0	22	12	**74**
2004	7	0	2	N/A	19	0	3	0	0	0	1	18	13	**63**
2003	2	1	0	N/A	30	2	2	1	0	0	1	29	9	**77**
2002	2	3	1	N/A	22	0	7	2	0	0	0	27	11	**75**
2001	5	2	0	N/A	25	3	9	4	2	0	0	25	16	**91**
2000	6	1	1	N/A	20	0	8	3	0	0	0	28	6	**73**

Note: Wildfire causes tracked by CAL FIRE include natural, human, and technological. More detailed information is available in each applicable Redbook. For instance, power line-caused fires may be a result of animals or vegetation disrupting or connecting with a power line, sparking a fire. They may also be the result of a technological issue or line down (causes not listed but could include storm events).

Source: CAL FIRE 2014

Source: CAL FIR 2007 (http://www.fire.ca.gov/fire_prevention/fhsz_maps_alameda)

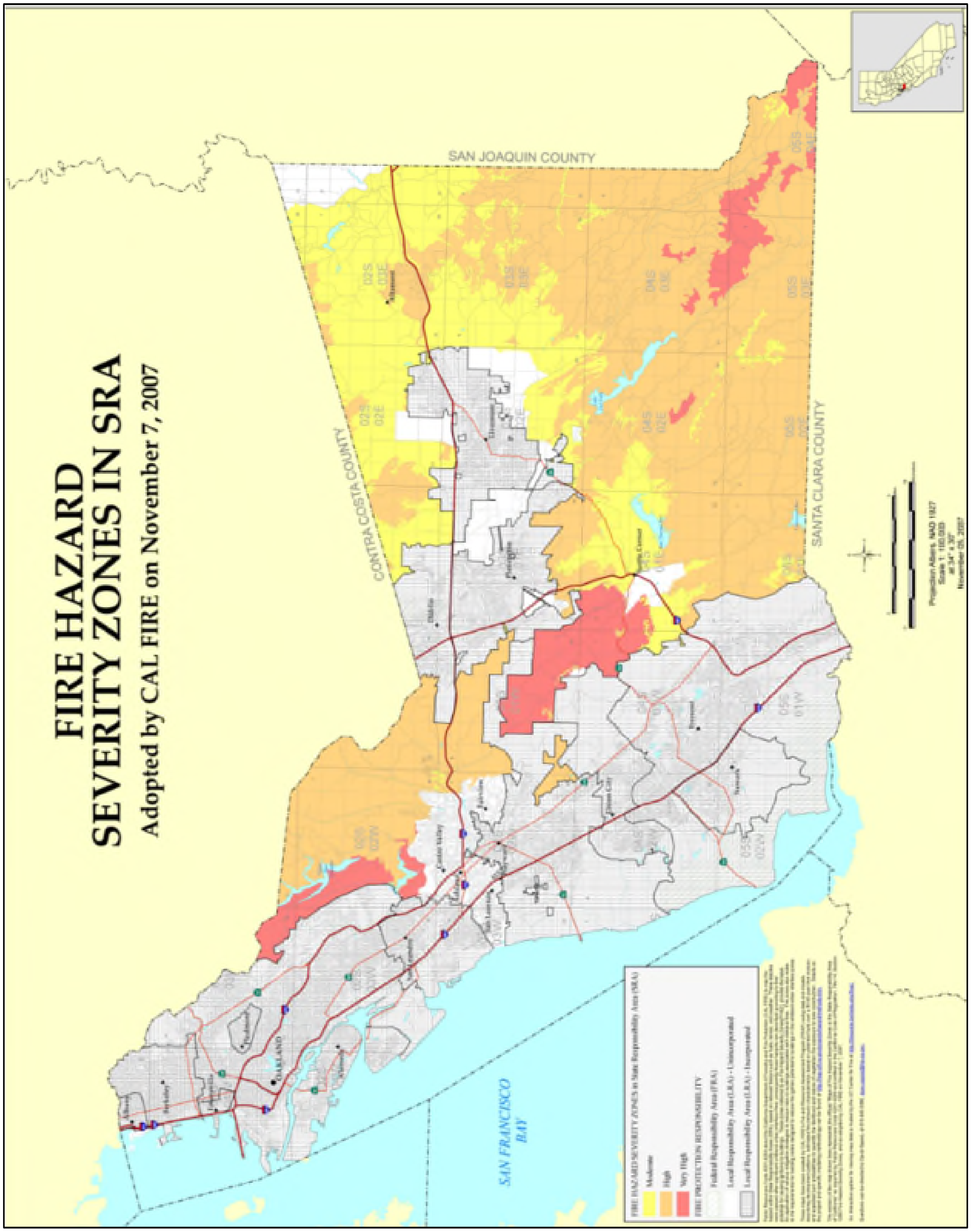


Figure 12-1. CAL FIRE FRAP Map for Alameda County

Local

The Planning Area contains 7,916.9 acres within the WUI; however, the Planning Area is not in a fire hazard severity zone. Newark and Union City are LRAs. In Union City, wildfire poses a threat due to approximately 5,000 acres of open hillsides to the east and open bay lands to the west. In Newark, only 5 acres of land is exposed to wildfire threats (ABAG HMP 2010). Figure 12-2 shows wildfire severity zones in the Planning Area.

12.2.3 Frequency

Wildfires will continue to present a risk to Alameda County and the Planning Area. It is difficult to estimate the number of wildfires that will occur in the Planning Area because of the number of factors that impact the potential for a fire and because some conditions exert increasing pressure on the WUI zone (e.g., ongoing land use development). An analysis of the frequency of past occurrences can give a rough guide as to how many events may occur each year if current trends continue. The Association of Bay Area Governments (ABAG) has evaluated wildfire frequency in the Bay Area using the California Fire Alliance map of past wildfires and the FHSZ maps. Table 12-3 shows the record of fires over the past 130 years (1878 to 2008). In that time, only 0.24 percent of areas mapped in an extreme FHSZ have burned, 22.8 percent of those mapped as very high, and 18.5 percent of those mapped as high. In addition, 4.5 percent of the WUI areas have burned.

Table 12-3. Record of Fire Affecting Planning Area

FHSZ Category	Total Area in Zone (acres)	Area Burned, 1878 – 2008	
		Acres	Percent of Total
Moderate	1,300,662	41,651	3.2%
High	1,183,899	218,947	18.49%
Very High	1,344,664	306,264	22.78
Extreme	2,272	5	0.24%

Source: ABAG 2011

12.2.4 Severity

Potential losses from wildfire include human life, structures and other improvements, and natural resources. Given the immediate response times to reported fires, the likelihood of injuries and casualties is minimal. Smoke and air pollution from wildfires can be a health hazard, especially for children, the elderly and those with respiratory and cardiovascular diseases. First responders are exposed to dangers from the initial incident and after-effects from smoke inhalation and heat stroke. In addition, wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding due to the impacts of silt in local watersheds.

The largest WUI fire in the Bay Area, and one of the worst wildland fires in the United States, occurred in 1991 in the Oakland Hills of Alameda County. The fire resulted in $1.7 billion in losses and received a FEMA disaster declaration. The fire spread across 1,520 acres, destroyed 3,354 homes and 456 apartments, injured 150 people and took the lives of 25 people (Alameda County 2016). There are no recorded incidents of loss of life from wildfires in the Planning Area.

CAL FIRE's mapped fire hazard severity zones define the application of mitigation strategies to reduce risk associated with wildfires. Figure 12-2 shows fire hazard severity zones for the Union City/Newark Planning Area. Additionally, California has identified communities at high risk of damage from wildfire. These high risk communities in the WUI were published in the Federal Register in 2001. Union City was identified as one of these high risk communities (CAL FIRE 2016; California Office of the State Fire Marshal 2013).

Source: City of Newark, City of Union City, CAL FIRE 2016

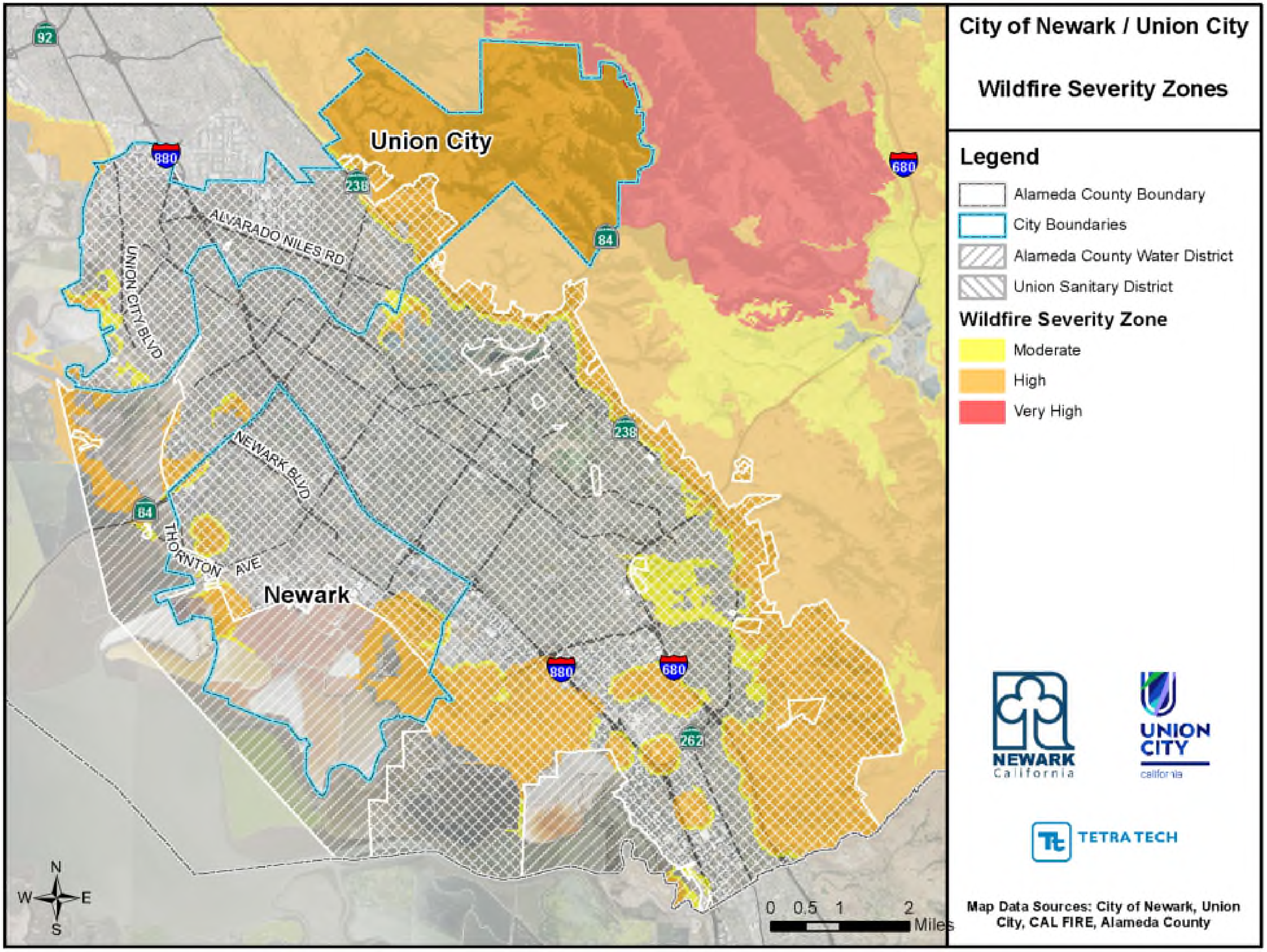


Figure 12-2. CAL FIRE FRAP Map for the Planning Area

12.2.5 Warning Time

Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Since fireworks often cause brush fires, extra diligence is warranted around the Fourth of July when the use of fireworks is highest. Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildfires. Severe weather can be predicted, so special attention can be paid during weather events that may include lightning. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

If a fire does break out and spread rapidly, residents may need to evacuate within days or hours. A fire's peak burning period generally is between 1 p.m. and 6 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications in recent years has further contributed to a significant improvement in warning time.

12.3 SECONDARY HAZARDS

Wildfires can in some cases generate secondary effects that cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildfires can contaminate reservoirs, destroy transmission lines and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff, which can weaken soils and cause slope failures. Major landslides can occur several years after a wildfire. Most wildfires burn hot and for long durations that can bake soils, especially those high in clay content, thus increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding.

12.4 EXPOSURE

12.4.1 Population

Population could not be examined by WUI area because those areas do not coincide with census block group areas. However, population was estimated using the structure count of buildings in the WUI area and applying the household population averages of 3.8 persons per residence for Newark and 4.3 persons per residence for Union City. for the Planning Area. Results are shown in Table 12-4.

Table 12-4. Population within Wildfire Hazard Areas

	Moderate FHSZ		High FHSZ		Very High FHSZ	
	Population Exposed[a]	% of Total Population Exposed	Population Exposed[a]	% of Total Population Exposed	Population Exposed[a]	% of Total Population Exposed
Newark	1,238	2.8%	2,007	4.5%	0	0.0%
Union City	2,500	3.4%	2,578	3.5%	0	0.0%
Total	**3,739**	**3.2%**	**4,584**	**3.9%**	**0**	**0.0%**

a. Exposed population calculated as percent of residential buildings exposed multiplied by estimated population on January 1, 2016, from California Department of Finance.

Source: CAL FIRE website, May 2016.

12.4.2 Property

Property damage from wildfires can be severe and can significantly alter entire communities. The number of homes in the various wildfire hazard zones within the Planning Area and their values are summarized in Table 12-5 through Table 12-7. Table 12-8 shows the general land use of parcels exposed to the wildfire hazard in the Planning Area.

Table 12-5. Exposure and Value of Structures in Very High Wildfire Hazard Areas

	Buildings Exposed	Value Exposed			% of Total Replacement Value
		Structure	Contents	Total	
Newark	0	$0	$0	$0	0.0%
Union City	0	$0	$0	$0	0.0%
Total	**0**	**$0**	**$0**	**$0**	**0.0%**

Exposed building values based on Alameda County tax assessor data received July 2016.
Fire hazard severity data downloaded from CAL FIRE website in May 2016.

Table 12-6. Exposure and Value of Structures in High Wildfire Hazard Areas

	Buildings Exposed	Value Exposed			% of Total Replacement Value
		Structure	Contents	Total	
Newark	557	$371,677,973	$411,808,187	$783,486,160	7.4%
Union City	611	$353,651,760	$195,570,050	$549,221,810	3.9%
Total	**1,168**	**$725,329,732**	**$607,378,236**	**$1,332,707,970**	**5.4%**

Exposed building values based on Alameda County tax assessor data received July 2016.
Fire hazard severity data downloaded from CAL FIRE website in May 2016.

Table 12-7. Exposure and Value of Structures in Moderate Wildfire Hazard Areas

	Buildings Exposed	Value Exposed			% of Total Replacement Value
		Structure	Contents	Total	
Newark	332	$194,171,596	$191,485,536	$385,657,132	3.6%
Union City	585	$165,099,479	$84,954,348	$250,053,827	1.8%
Total	**917**	**$359,271,074**	**$276,439,883**	**$635,710,959**	**2.6%**

Exposed building values based on Alameda County tax assessor data received July 2016.
Fire hazard severity data downloaded from CAL FIRE website in May 2016.

Table 12-8. Land Use Within the Wildfire Hazard Areas

	Moderate FHSZ		High FHSZ		Very High FHSZ	
Land Use	Area (acres)	% of total	Area (acres)	% of total	Area (acres)	% of total
Residential	126.1	25.7	869.1	11.7	0	0
Commercial	0.8	0.2	4.2	0.1	0	0
Industrial	72.5	14.8	504.9	6.8	0	0
Public / Open Space	291.4	59.4	6,022.3	81.4	25.6	100
Total	**490.8**	**100%**	**7400.5**	**100%**	**25.6**	**100%**

12.4.3 Critical Facilities and Infrastructure

Table 12-9 identifies critical facilities exposed to the wildfire hazard in the Planning Area. Currently there are six registered Toxic Release Inventory hazardous material containment sites in wildfire risk zones. During a wildfire event, these materials could rupture due to excessive heat and act as fuel for the fire, causing rapid spreading and escalating the fire to unmanageable levels. In addition they could leak into surrounding areas, saturating soils and seeping into surface waters, and have a disastrous effect on the environment.

Table 12-9. Critical Facilities and Infrastructure in Wildfire Hazard Areas

	Number of Critical Facilities in Hazard Zone					
	Moderate		High		Very High	
	Newark	Union City	Newark	Union City	Newark	Union City
Medical and Health Services	0	0	0	0	0	0
Emergency Services	0	0	0	0	0	0
Educational Facilities	0	0	0	1	0	0
Government	0	0	0	0	0	0
Utilities	0	0	2	0	0	0
Transportation Infrastructure	0	1	0	1	0	0
Hazardous Materials	1	0	5	0	0	0
Other Assets	0	0	0	0	0	0
Total	**1**	**1**	**7**	**2**	**0**	**0**

In the event of wildfire, there would likely be little damage to the majority of infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk to wildfire because most are made of wood and susceptible to burning. In the event of a wildfire, pipelines could provide a source of fuel and lead to a catastrophic explosion.

12.4.4 Environment

Fire is a natural and critical ecosystem process in most terrestrial ecosystems, dictating in part the types, structure, and spatial extent of native vegetation. However, wildfires can cause severe environmental impacts:

- Damaged Fisheries—Critical fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality.
- Soil Erosion—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.
- Spread of Invasive Plant Species—Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control.
- Disease and Insect Infestations—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- Destroyed Endangered Species Habitat—Catastrophic fires can have devastating consequences for endangered species.
- Soil Sterilization—Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost. It can take decades or even centuries for ecosystems to recover from a fire. Some fires burn so hot that they can sterilize the soil.

Many ecosystems are adapted to historical patterns of fire occurrence. These patterns, called “fire regimes,” include temporal attributes (e.g., frequency and seasonality), spatial attributes (e.g., size and spatial complexity), and magnitude attributes (e.g., intensity and severity), each of which have ranges of natural variability. Ecosystem stability is threatened when any of the attributes for a given fire regime diverge from its range of natural variability.

12.5 VULNERABILITY

Structures, above-ground infrastructure, critical facilities and natural environments are all vulnerable to the wildfire hazard. There is currently no validated damage function available to support wildfire mitigation planning. Except as discussed in this section, vulnerable populations, property, infrastructure and environment are assumed to be the same as described in the section on exposure.

12.5.1 Population

There are no recorded incidents of loss of life from wildfires within the Planning Area. Given the immediate response times to reported fires, the likelihood of injuries and casualties is minimal; therefore, injuries and casualties were not estimated for the wildfire hazard.

Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather. Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility.

Wildfire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

12.5.2 Property

Loss estimations for the wildfire hazard are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 12-10 lists the loss estimates for the general building stock for jurisdictions that have an exposure to a fire hazard severity zone.

Table 12-10. Wildfire Loss Potential

		Loss Potential from Wildfire		
	Exposed Value (Structure and contents)[a]	10% Damage	30% Damage	50% Damage
Newark	$10,648,094,134	$1,064,809,413	$3,194,428,240	$5,324,047,067
Union City	$14,239,963,943	$1,423,996,394	$4,271,989,183	$7,119,981,972
Total	$24,888,058,077	$2,488,805,807	$7,466,417,423	$12,444,029,039

a. Values based on Alameda County tax assessor data received July 2016.

12.5.3 Critical Facilities and Infrastructure

Critical facilities of wood frame construction are especially vulnerable during wildfire events. In the event of wildfire, there would likely be little damage to most infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk from wildfire because most poles are made of wood and susceptible to burning. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Wildfire typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and in some cases to isolated neighborhoods.

12.6 FUTURE TRENDS IN DEVELOPMENT

The highly urbanized portions of the Planning Area have little or no wildfire risk exposure. Urbanization tends to alter the natural fire regime, and can create the potential for the expansion of urbanized areas into wildland areas. The expansion of the wildland urban interface can be managed with strong land use and building codes. The Planning Area is well equipped with these tools and this planning process has assessed capabilities with regards to the tools. As the Planning Area experiences future growth, it is anticipated that the exposure to this hazard will remain as assessed or even decrease over time due to these capabilities.

12.7 SCENARIO

A major wildfire in the Planning Area might begin with a wet spring, adding to fuels already present on the forest floor. Flashy fuels would build throughout the spring. A dry summer could follow the wet spring, exacerbated by dry hot winds. Carelessness with combustible materials or a tossed lit cigarette, or a sudden lighting storm could trigger a multitude of small isolated fires.

The embers from these smaller fires could be carried miles by hot, dry winds. The deposition zone for these embers would be deep in the forests and interface zones. Fires that start in flat areas move slower, but wind still pushes them. It is not unusual for a wildfire pushed by wind to burn the ground fuel and later climb into the crown and reverse its track. This is one of many ways that fires can escape containment, typically during periods when response capabilities are overwhelmed. These new small fires would most likely merge. Suppression resources would be redirected from protecting the natural resources to saving more remote subdivisions.

While local fire districts would be extremely useful in the urban interface areas, they have limited wildfire capabilities or experience, and they would have a difficult time responding to the ignition zones. Even though the existence and spread of the fire is known, it may not be possible to respond to it adequately, so an initially manageable fire can become out of control before resources are dispatched.

12.8 ISSUES

The major issues for wildfire are the following:

- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.
- Wildfires could cause multiple secondary natural hazards.
- Climate change could affect the wildfire hazard.
- Future growth into interface areas should continue to be managed, particularly in the hillside area of Union City.
- Area fire districts need to continue to train on wildland-urban interface events.
- Vegetation management activities. This would include enhancement through expansion of the target areas as well as additional resources.
- Regional consistency of higher building code standards such as residential sprinkler requirements and prohibitive combustible roof standards.

13. CLIMATE CHANGE

13.1 GENERAL BACKGROUND

13.1.1 What is Climate Change?

Climate, consisting of patterns of temperature, precipitation, humidity, wind and seasons, plays a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. “Climate change” refers to changes over a long period of time. Worldwide, average temperatures have increased 1.7ºF since 1880 (NASA 2016c). Although this change may seem small, it can lead to large changes in climate and weather.

The warming trend and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases in the earth’s atmosphere. Greenhouse gases are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most commonly known greenhouse gas, but methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of these gases come from a variety of sources, such as the combustion of fossil fuels, agricultural production, changes in land use and volcanic eruptions. According to the U.S. Environmental Protection Agency (EPA), carbon dioxide concentration measured about 280 parts per million (ppm) before the industrial era began in the late 1700s and has risen 43 percent since then, reaching 401 ppm in 2015 (EPA 2016a) (see Figure 13-1). In addition, the concentration of methane has almost doubled, and nitrous oxide is being measured at a record high of 328 parts per billion (ppb) (EPA 2016a). In the United States, electricity generation is the largest source of these emissions, followed by transportation (EPA 2016b).

Scientists are able to place this rise in carbon dioxide in a longer historical context through the measurement of carbon dioxide in ice cores. According to these records, carbon dioxide concentrations in the atmosphere are the highest that they have been in 650,000 years (NASA 2016c). According to NASA, this trend is of particular significance “because most of it is very likely human-induced and [it is] proceeding at a rate that is unprecedented in the past 1,300 years” (NASA 2016c). There is broad scientific consensus (97 percent of scientists) that climate-warming trends are very likely due to human activities (NASA 2016c). Unless emissions of greenhouse gases are substantially reduced, this warming trend and its associated impacts are expected to continue.

Climate change will affect the people, property, economy and ecosystems of the Planning Area in a variety of ways. Climate change impacts are most frequently associated with negative consequences, such as increased flood vulnerability or increased heat-related illnesses/public health concerns; however, other changes may present opportunities. The most important effect for the development of this plan is that climate change will have a measurable impact on the occurrence and severity of natural hazards.

13.1.2 How Climate Change Affects Hazard Mitigation

An essential aspect of hazard mitigation is predicting the likelihood of hazard events in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of hazard events remains essentially unchanged over time. Thus, averages based on the past frequencies of, for example, floods are used to estimate future frequencies: if a river has flooded an average of once every 5 years for the past 100 years, then it can be expected to continue to flood an average of once every 5 years.

Source: EPA, April 2016a

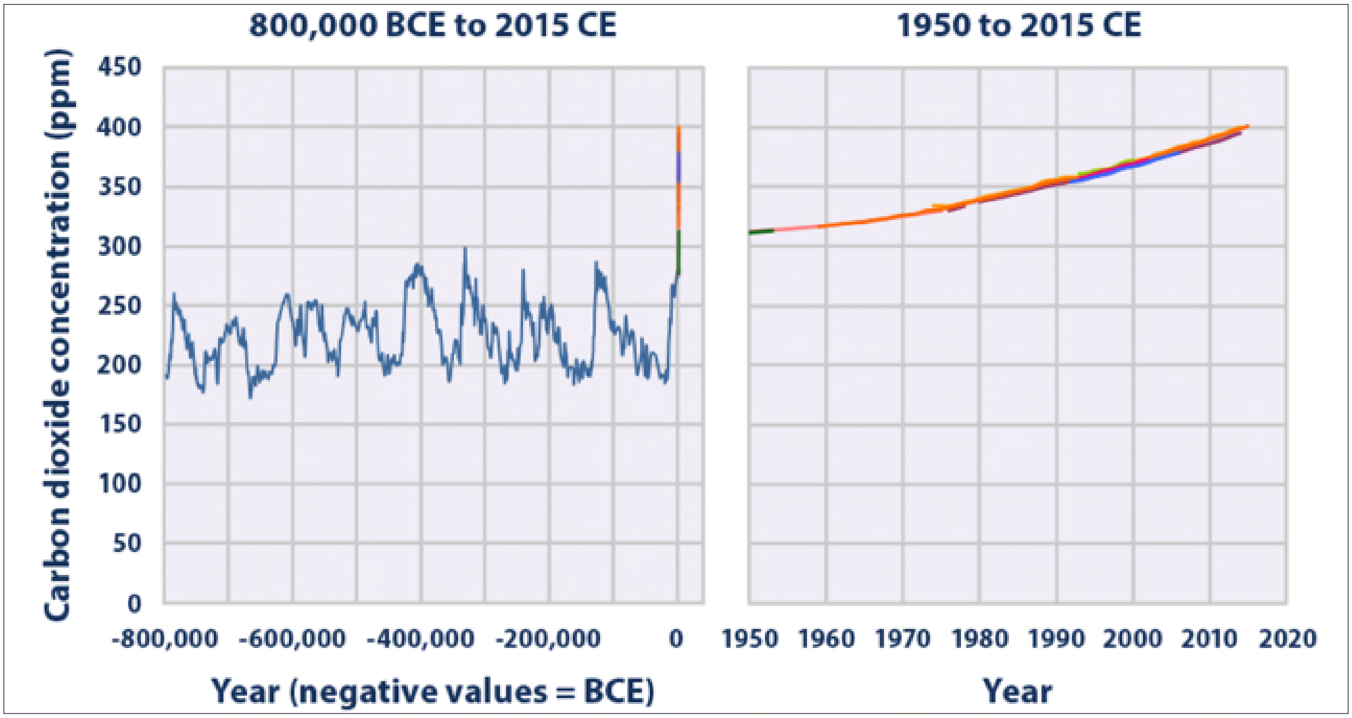


Figure 13-1. Global Carbon Dioxide Concentrations over Time

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, for example, the frequency of flooding will not remain constant if broad precipitation patterns change over time. Specifically, as hydrology changes, storms currently considered to be a 1-percent-annual-chance event might strike more often, leaving many communities at greater risk. The risks of, landslide, severe storms, extreme heat and wildfire are all affected by climate patterns as well. For this reason, an understanding of climate change is pertinent to efforts to mitigate natural hazards. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis. This chapter summarizes current understandings about climate change in order to provide a context for the recommendation and implementation of hazard mitigation measures.

13.1.3 Current Indicators of Climate Change

The major scientific agencies of the United States and the world—including the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA) and the Intergovernmental Panel on Climate Change (IPCC)—agree that climate change is occurring. Multiple temperature records from all over the world have shown a warming trend, and the IPCC has stated that the warming of the climate system is unequivocal (IPCC 2014). Of the 10 warmest years in the 134-year record, all but one (1998) occurred since 2000, and 2015 was the warmest year on record (NASA 2016c). Worldwide, average temperatures have increased 1.7 ºF since 1880 (NASA 2016c).

Rising global temperatures have been accompanied by other changes in weather and climate. Many places have experienced changes in rainfall resulting in more intense rain, as well as more frequent and severe heat waves (IPCC 2014). The planet's oceans and glaciers have also experienced changes: oceans are warming and becoming more acidic, ice caps are melting, and sea levels are rising (NASA 2016c). Global sea level has risen approximately 6.7 inches, on average, in the last 100 years (NASA 2016c). This has already put some coastal homes, beaches, roads, bridges, and wildlife at risk (USGCRP 2009).

NASA currently maintains information on the vital signs of the planet. At the time of the development of this plan, the following trends and status of these signs are as follows (NASA 2016):

- Carbon Dioxide—Increasing trend, currently at 404.207 parts per million
- Global Temperature—Increasing trend, increase of 1.7 ºF since 1880
- Arctic Ice Minimum—Decreasing trend, 13.4 percent per decade
- Land Ice—Decreasing trend, 281.0 gigatonnes per year
- Sea Level—Increasing trend, 3.4 millimeters (0.04 inches) per year.

13.1.4 Projected Future Impacts

The Third National Climate Assessment Report for the United States indicates that impacts resulting from climate change will continue through the 21st century and beyond. Although not all changes are understood at this time and the impacts of those changes will depend on global emissions of greenhouse gases and sensitivity in human and natural systems, the following impacts are expected in the United States (NASA, 2016c):

- Temperatures will continue to rise
- Growing seasons will lengthen
- Precipitation patterns will change
- Droughts and heat waves will increase
- Hurricanes will become stronger and more intense
- Sea level will rise 1-4 feet by 2100
- The Arctic may become ice free.

The California Climate Adaptation Planning Guide outlines the following climate change impact concerns for the Bay Area communities (Cal EMA et al. 2012):

- Increased temperature
- Reduced precipitation
- Sea level rise—coastal inundation and erosion
- Public health—heat and air pollution
- Reduced agricultural productivity
- Inland flooding
- Reduced tourism.

Some of these changes are direct or primary climatic changes, such as increased temperature, while others are indirect climatic changes or secondary impacts, such as heat wave frequency, resulting from these direct changes. Some direct changes may interact with one another to create unique secondary impacts. These primary and secondary impacts may then result in impacts on human and natural systems. The primary and secondary impacts likely to effect the Planning Area are summarized in Table 13-1.

Cal-Adapt, a publicly available resource for information on how climate change might impact local communities, presents visualization tools that present the most current data available whenever possible. Best available data is being used, but climate change projections contain inherent uncertainty. This uncertainty is largely derived from the fact that climate projections are dependent on future greenhouse gas emission scenarios and that different climate change models result in differing outcomes or impacts.

Table 13-1. Summary of Primary and Secondary Impacts Likely to Affect the Planning Area

Primary Impact	Secondary Impact	Example Human and Natural System Impacts
Increased temperature	Heat wave	• Increased frequency of illness and death • Increased stress on mechanical systems, such as HVAC systems
Increased temperature and changes in precipitation	Changed seasonal patterns	• Reduced agricultural productivity • Reduced tourism
Increased temperature and/or reduced precipitation	Drought	• Reduced agricultural productivity • Decreased water supply
	Reduced Snowpack	• Decreased water supply • Reduced tourism
Sea level rise	Permanent inundation of previously dry land	• Loss of assets and tax base • Loss of coastal habitat
	Larger area impacted by extreme high tide	• More people and structures impacted by storms
	Increased coastal erosion	• Loss of assets and tax base
	Saltwater intrusion into freshwater systems	• Decreased water supply • Ecosystem disruption
Changes in wind patterns	Increased extreme events, including severe storms and fires	• More frequent disruption to systems resulting from severe storms
Ocean acidification		• Decreased biodiversity in marine ecosystems

Adapted and expanded from *California Adaptation Planning Guide: Planning for Adaptive Communities*

The uncertainty in greenhouse gas emissions is addressed by evaluating multiple possible futures—low-emissions or high-emissions scenarios—and averaging the range of results. In low-emissions scenarios, greenhouse gas emissions are reduced substantially from current levels. In high-emissions scenarios, greenhouse gas emissions generally increase or continue at current levels. Despite their uncertainty, climate change projections present valuable information to help guide decision-making for possible future conditions. Cal-Adapt provides the following information for the Planning Area:

- **Temperature—**The historical average (1961-1990) temperature in Alameda County is 58.7 ºF. The average temperature in the County is expected to increase above this baseline in the low- and high-emissions scenarios by 3.3 ºF and 5.8 ºF, respectively by 2090, as shown in Figure 13-2.
- **Extreme Heat—**The extreme heat day temperature threshold for the Planning Area is 86 °F. The historical average number of extreme heat days per year is four. The average annual number of extreme heat days is expected to increase over the next century (see Figure 13-3), as are the number of warm nights (59 °F threshold), the number of heat waves and the duration of heat waves.
- **Precipitation—**Precipitation projections for California remain uncertain. Models show differing impacts from slightly wetter winters to slightly drier winters with the potential for a 10- to 20-percent decrease in total annual precipitation. Changes in precipitation patterns coupled with warmer temperatures may lead to significant changes in hydrology. In high-emissions scenarios, more precipitation may fall as rain rather than snow, and snow may melt earlier in the season, thus impacting the timing of changes in stream flows and flooding (Cal-Adapt 2016).
- **Snowpack—**While there are no snow-water equivalency measurements for the Planning Area, some parts of California should expect snowpack levels to be reduced by up to 25 inches from the baseline (1961 – 1990) by 2090.
- **Wildfire—**Wildfire risk is expected to change in the coming decades. Under both low- and high-emissions scenarios, the fire risk in Alameda County may decrease by two thirds to one half the current risk by 2085, as shown on Figure 13-4.

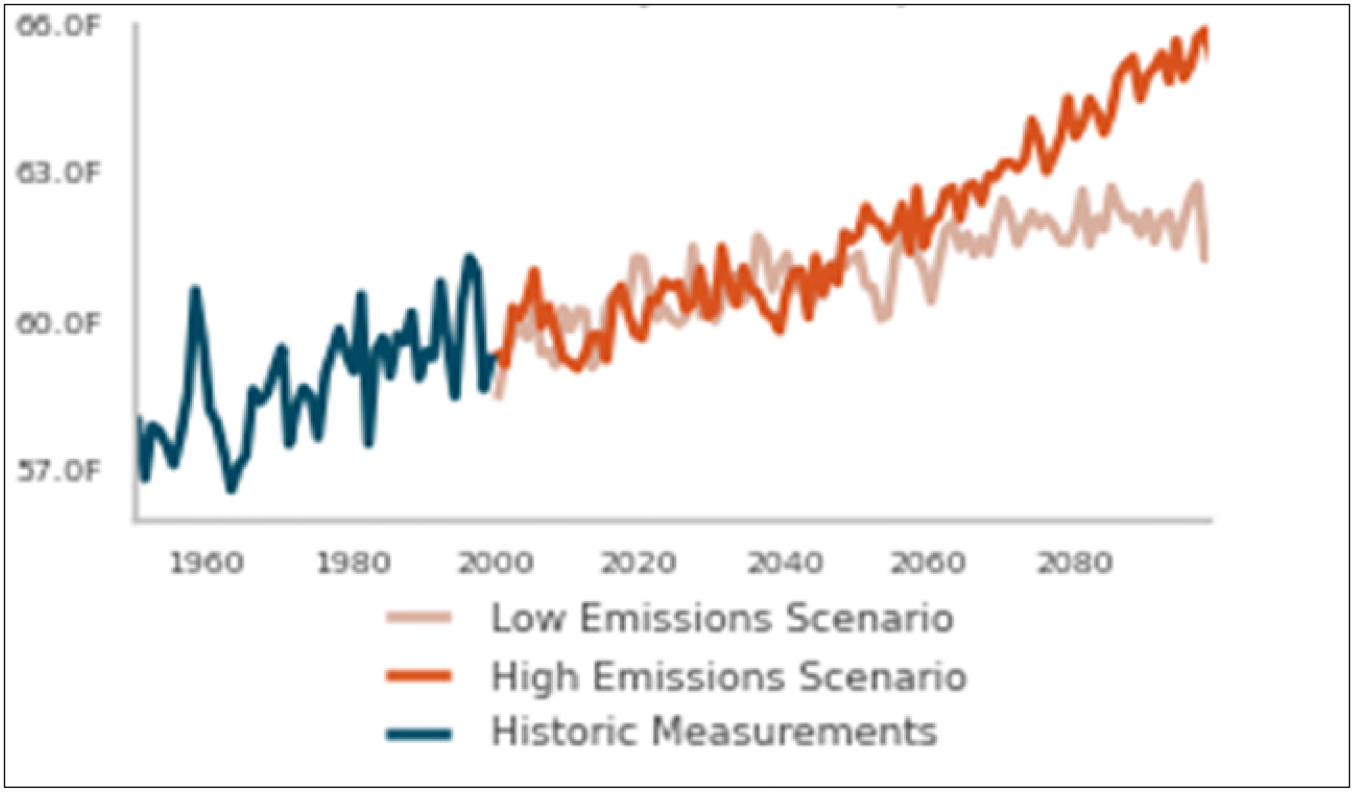


Figure 13-2. Observed and Projected Average Temperatures in Alameda County

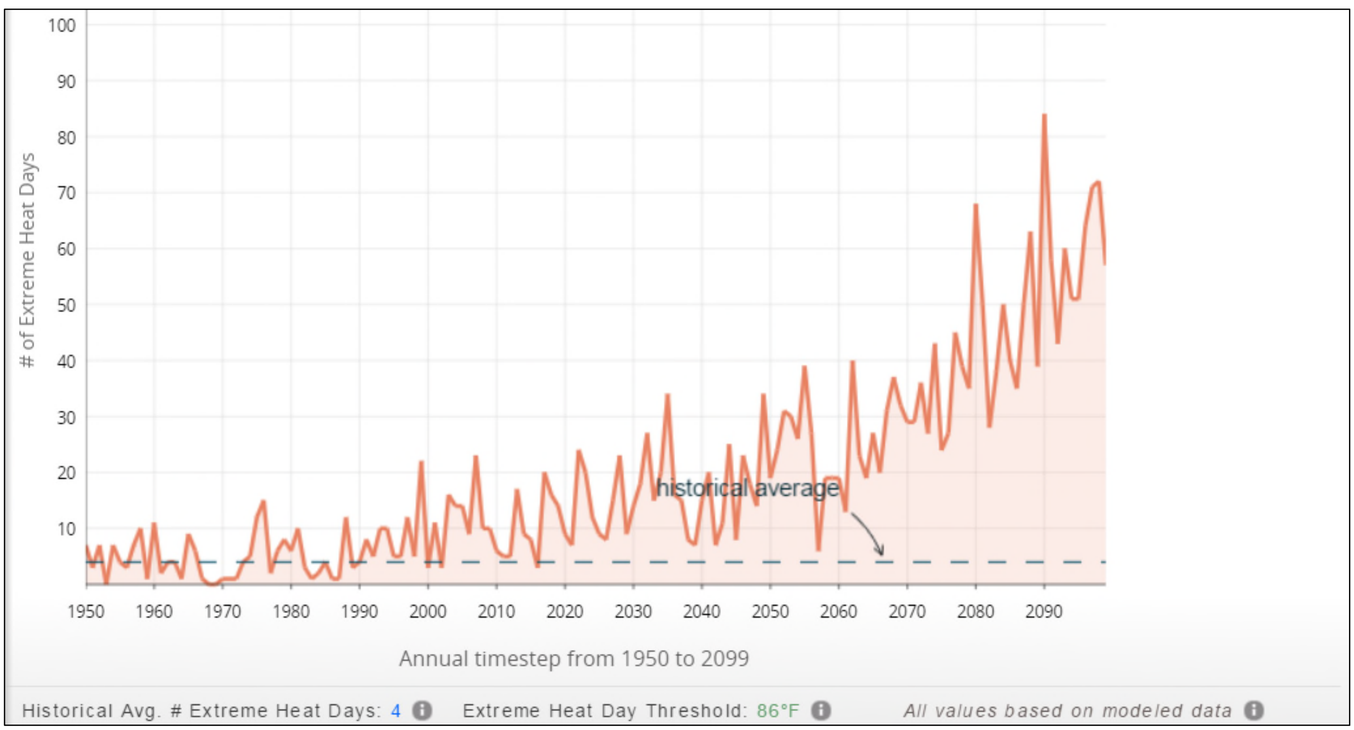


Figure 13-3. Projected Number of Extreme Heat Days by Year

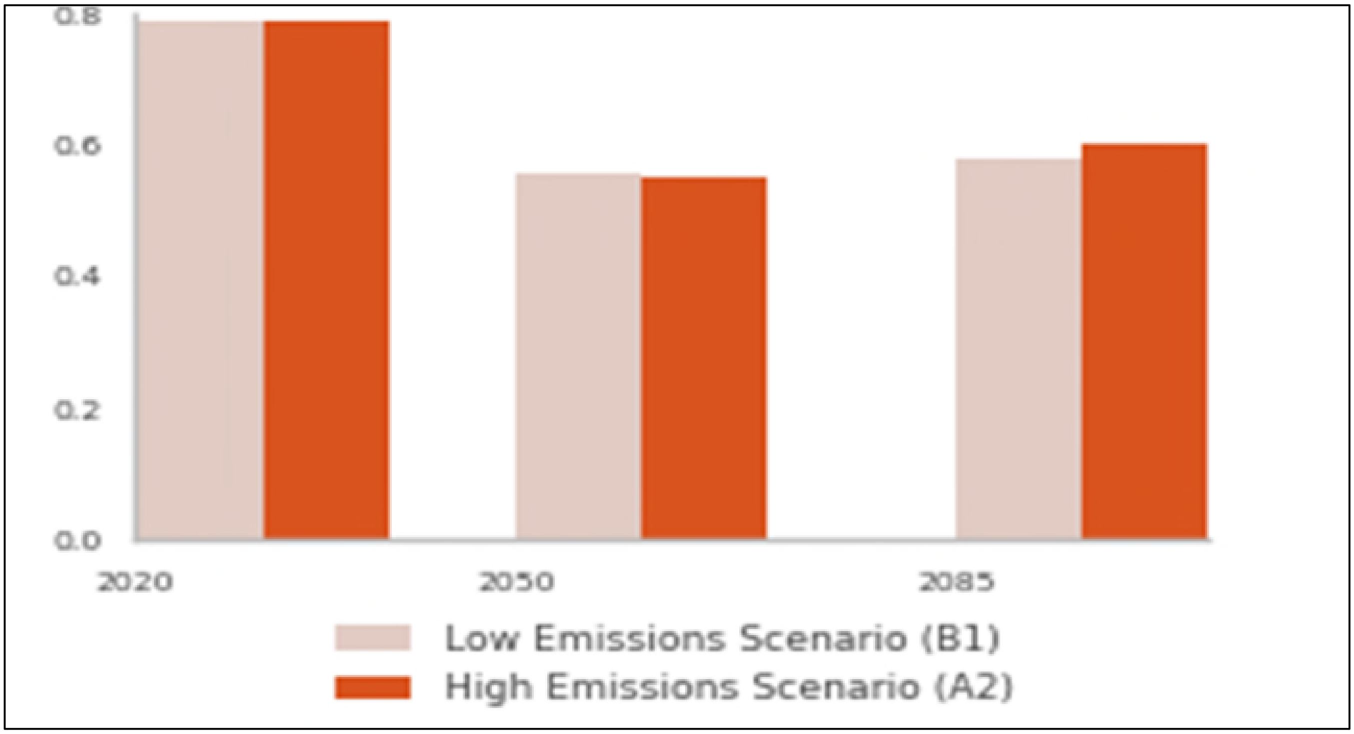


Figure 13-4. Projected Changes in Fire Risk in Alameda County, Relative to 2010

13.1.5 Responses to Climate Change

Communities and governments worldwide are working to address, evaluate and prepare for climate changes that are likely to impact communities in coming decades. Generally, climate change discussions encompass two separate but inter-related considerations: mitigation and adaptation. The term "mitigation" can be confusing, because it's meaning changes across disciplines:

- Mitigation in restoration ecology and related fields generally refers to policies, programs or actions that are intended to reduce or to offset the negative impacts of human activities on natural systems. Generally, mitigation can be understood as avoiding, minimizing, rectifying, reducing or eliminating, or compensating for known impacts (CEQ 1978).
- Mitigation in climate change discussions is defined as "a human intervention to reduce the impact on the climate system." It includes strategies to reduce greenhouse gas sources and emissions and enhance greenhouse gas sinks (EPA 2013).
- Mitigation in emergency management is typically defined as the effort to reduce loss of life and property by lessening the impact of disasters (FEMA 2016b).

In this chapter, mitigation is used as defined by the climate change community. In the other chapters of this HMP, mitigation is primarily used in an emergency management context.

Mitigation and adaptation are related, as the world's ability to reduce greenhouse gas emissions will affect the degree of adaptation that will be necessary. Adaptation is defined by the IPCC as "the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities, In some natural systems, human intervention may facilitate adjustment to expected climate and its effects" (IPCC 2014). Some initiatives and actions can both reduce greenhouse gas emissions and support adaptation to likely future conditions. The current ability to successfully adapt to changing conditions is often referred to as adaptive capacity, which is "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences" (IPCC 2014).

Societies across the world are facing the need to adapt to changing conditions and to identify ways to increase their adaptive capacity. Some efforts are already underway. Farmers are altering crops and agricultural methods to deal with changing rainfall and rising temperature; architects and engineers are redesigning buildings; planners are looking at managing water supplies to deal with droughts or flooding.

Adaptive capacity goes beyond human systems, as some ecosystems show a remarkable ability to adapt to change and to buffer surrounding areas from the impacts of change. Forests can bind soils and hold large volumes of water during times of plenty, releasing it through the year; floodplains can absorb vast volumes of water during peak flows; coastal ecosystems can hold out against storms, attenuating waves and reducing erosion. Such beneficial functions of natural systems are called "ecosystem services." Other ecosystem services—such as food provision, timber, materials, medicines and recreation—can provide a buffer to societies in the face of changing conditions. Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. This includes the sustainable management, conservation and restoration of specific ecosystems that provide key services.

The planning partners participating in this planning effort have assessed their current efforts and adaptive capacity in their annexes in Volume 2.

13.2 VULNERABILITY ASSESSMENT

13.2.1 Impacts on Hazards of Concern

The following sections provide information on how each natural hazard of concern for this planning process may be impacted by climate change and how these impacts may alter current exposure and vulnerability for the people, property, critical facilities and the environment in the Planning Area to these hazards. Chapters 6 through 12 provide detailed hazard profiles and risk assessment information on each natural hazard of concern.

Dam Failure

Impacts on Hazard

On average, changes in California's annual precipitation levels are not expected to be dramatic; however, small changes may have significant impacts for water resource systems, including dams. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

According to the California Department of Water Resources, since the 1950s flood flows on many California rivers have been record setting. This means that water infrastructure, such as dams, have been forced to manage flows for which they were not designed (DWR 2007). The California Division of Safety of Dams has indicated that climate change may result in the need for increased safety precautions to address higher winter runoff, frequent fluctuations of water levels, and increased potential for sedimentation and debris accumulation from changing erosion patterns and increases in wildfires. Furthermore, they indicate that climate change "will impact the ability of dam operators to estimate extreme flood events" (DWR 2008).

Dams are constructed with safety features called spillways. Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as “design failures,” result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

Exposure, Sensitivity and Vulnerability

The dam failure hazard exposure, sensitivity and vulnerability can be affected as follows by climate change:

- **Population—**Population exposure and vulnerability to the dam failure hazard are unlikely to change as a result of climate change.
- **Property—**Property exposure and vulnerability to the dam failure hazard are unlikely to change as a result of climate change.
- **Critical facilities—**The exposure and vulnerability of critical facilities are unlikely to change as result of climate change. Dam owners and operators are sensitive to the risk and may need to alter maintenance and operations to account for changes in the hydrograph and increased sedimentation.
- **Environment—**The exposure and vulnerability of the environment to dam failure are unlikely to change as a result of climate change. Ecosystem services may be used to mitigate some of the factors that may increase the risk of design failures, such as increasing the natural water storage capacity in watersheds above dams.
- **Economy—**Changes in the dam failure hazard related to climate change are unlikely to affect the local economy.
- **Future Development—**Climate change will likely not impact risk to future development from the dam failure hazard. Areas currently in dam inundation zones will continue to be located in such zones.

Drought

Impacts on Hazard

The long-term effects of climate change on regional water resources are unknown, but global water resources are already experiencing the following stresses without climate change:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft
- Aging urban water infrastructure.

With a warmer climate, droughts could become more frequent, more severe, and longer-lasting. According to the National Climate Assessment, “higher surface temperatures brought about by global warming increase the potential for drought. Evaporation and the higher rate at which plants lose moisture through their leaves both increase with temperature. Unless higher evapotranspiration rates are matched by increases in precipitation, environments will tend to dry, promoting drought conditions” (NOAA 2016).

Because future changes in precipitation patterns are still uncertain, the potential impacts and likelihood of drought are uncertain. That being said, DWR has already noted the impact of climate change on statewide water resources by charting changes in snowpack, sea level, and river flow. As temperatures rise and more precipitation comes in the form of rain instead of snow, these changes will likely continue or grow even more significant. DWR estimates that the Sierra Nevada snowpack, which provides a large amount of the water supply for the Planning

Area and other parts of the state, will experience a 48- to 65-percent reduction from historic April 1 averages by the end of the century (DWR 2016e). Increasing temperatures may also increase net evaporation from reservoirs by 15 to 37 percent (DWR 2013). The Planning Area's water supply is also derived from groundwater resources. Increased incidence of drought may cause a drawdown in these resources without allowing opportunity for aquifer recharge.

Exposure, Sensitivity and Vulnerability

The drought hazard exposure, sensitivity and vulnerability can be affected as follows by climate change:

- **Population—**Population exposure and vulnerability to drought are unlikely to increase as a result of climate change. While greater numbers of people may need to engage in behavior change, such as water saving efforts, significant life or health impacts are unlikely.
- **Property—**Property exposure and vulnerability may increase as a result of increased drought resulting from climate change, although this would most likely occur in non-structural property such as crops and landscaping. It is unlikely that structure exposure and vulnerability would increase as a direct result of drought, although secondary impacts of drought, such as wildfire, may increase and threaten structures.
- **Critical facilities—**Critical facility exposure and vulnerability are unlikely to increase as a result of increased drought resulting from climate change; however, critical facility operators may need to alter standard management practices and actively manage resources, particularly in water-related service sectors.
- **Environment—**The vulnerability of the environment may increase as a result of increased drought resulting from climate change. Ecosystems and biodiversity in the Bay Area are already under stress from development and water diversion activities. Prolonged or more frequent drought resulting from climate change may further stress ecosystems in the region, which include many special status species.
- **Economy—**Increased incidence of drought could increase the potential for impacts on the local economy. Increased drought may impact the wine industry and related tourism activities.
- **Future Development—**An increased incidence of drought may limit the ability of future development in the area to adequate secure water supplies.

Earthquake

Impacts on Hazard

The impacts of global climate change on earthquake probability are unknown. Some scientists say that melting glaciers could induce tectonic activity. As ice melts and water runs off, tremendous amounts of weight are shifted on the earth's crust. As newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity, according to research into prehistoric earthquakes and volcanic activity. NASA and USGS scientists found that retreating glaciers in southern Alaska may be opening the way for future earthquakes (NASA 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms or heavy precipitation could experience liquefaction or an increased propensity for slides during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events.

Exposure, Sensitivity and Vulnerability

Because impacts on the earthquake hazard are not well understood, increases in exposure and vulnerability of the local resources are not able to be determined.

Flood

Impacts on Hazard

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness and emergency response.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain areas, such as the Sierra Nevada watersheds, to contribute to peak storm runoff (see the Drought section for how snowpack changes are impacting water supply). High frequency flood events (e.g. 10-year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

As hydrology changes, what is currently considered a 1-percent-annual-chance flood may strike more often, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, bypass channels and levees, as well as the design of local sewers and storm drains.

Exposure, Sensitivity and Vulnerability

The flood hazard exposure, sensitivity and vulnerability can be affected as follows by climate change:

- **Population and Property—**Population and property exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change, resulting in flooding in areas where it has not previously occurred.
- **Critical Facilities—**Critical facility exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change, resulting in risk to facilities that have not historically been at risk from flooding. Additionally, changes in the management and design of flood protection critical facilities may be needed as additional stress is placed on these systems.
- **Environment—**The exposure and vulnerability of the environment may increase as a result of climate change impacts on the flood hazard. Changes in the timing and frequency of flood events may have broader ecosystem impacts that alter the ability of already stressed species to survive.

- **Economy—**If flooding becomes more frequent, there may be impacts on the local economy. More resources may need to be directed to response and recovery efforts, and businesses may need to close more frequently due to loss of service or access during flood events.
- **Future Development—**Communities may need to rethink development patterns in order to address changes in flood risk. Changes in precipitation and runoff patterns may result in flood risk in areas that have not historically experienced flood problems and therefore do not have development and building codes designed to address this risk.

Landslide

Impacts on Hazard

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Increase in global temperature is likely to affect the snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All of these factors would increase the probability for landslide occurrences.

Exposure, Sensitivity and Vulnerability

The landslide hazard exposure, sensitivity and vulnerability can be affected as follows by climate change:

- **Population and Property—**Population and property exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the landslide hazard. Landslide events may occur more frequently, but the extent and location should be contained within mapped hazard areas or recently burned areas.
- **Critical facilities—**Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the landslide hazard; however, critical facility owners and operators may experience more frequent disruption to service provision as a result of landslide hazards. For example, transportation systems may experience more frequent delays if slides blocking these systems occur more frequently. In addition, increased sedimentation resulting from landslides may negatively impact flood control facilities, such as dams.
- **Environment—**Exposure and vulnerability of the environment would be unlikely to increase as a result of climate change, but more frequent slides in riverine systems may impact water quality and have negative impacts on already stressed species.
- **Economy—**Changes to the landslide hazard resulting from climate change are unlikely to result in impacts on the local economy.
- **Future Development—**Changes to the landslide hazard resulting from climate change are unlikely to result in impacts on future development.

Severe Weather

Impacts on Hazard

Climate change presents a challenge for risk management associated with severe weather. The number of weather-related disasters during the 1990s was four times that of the 1950s, and cost 14 times as much in economic losses. The science for linking the severity of specific severe weather events to climate change is still evolving; however, a number of trends have been recorded that indicate how climate change may be impacting these events. According to the U.S. National Climate Change Assessment (2014), there were more than twice as many high temperature records as low temperatures records broken between 2001 and 2012, and heavy rainfall events are becoming more frequent and more severe.

The increase in average surface temperatures can also lead to more intense heat waves that can be exacerbated in urbanized areas by what is known as urban heat island effect. The evidence suggests that heat waves are already increasing, especially in western states. According to information on Cal-Adapt provided above, extreme heat days are likely to increase in the Planning Area.

Climate change impacts on other severe weather events, such as thunderstorms and fog, are still not well understood.

Exposure, Sensitivity and Vulnerability

The severe weather hazard exposure, sensitivity and vulnerability can be affected as follows by climate change:

- **Population and Property—**Population and property exposure and vulnerability would be unlikely to increase as a direct result of climate change impacts on the severe weather hazard. Severe weather events may occur more frequently, but exposure and vulnerability will remain the same. Secondary impacts, such as the extent of localized flooding may increase thus impacting greater numbers of people and structures.
- **Critical Facilities—**Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the severe weather hazard; however, critical facility owners and operators may experience more frequent disruption to service provision. For example, more frequent and intense storms may cause more frequent disruptions in power service.
- **Environment—**Exposure and vulnerability of the environment would be unlikely to increase; however, more frequent storms and heat events and more intense rainfall may place additional stress on already stressed systems.
- **Economy—**Climate change impacts on the severe weather hazard may impact the local economy through more frequent disruption of services, such as power outages.
- **Future Development—**Future development may be impacted by the severe weather hazard if the strength and intensity of severe weather events increase. For example, local building codes may need to be updated to account for stronger wind speeds or stormwater conveyance systems may need to increase in size to account for more precipitation falling in a single event.

Wildfire

Impacts on Hazard

Wildfire is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. Additionally, changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Exposure, Sensitivity and Vulnerability

The wildfire hazard exposure, sensitivity and vulnerability can be affected as follows by climate change:

- **Population—**According to the Cal-Adapt projections provided earlier in this chapter, wildfire risk in the areas surrounding the Planning Area may actually decrease over the next century. Other areas of California and the western United States are expected to have increased risk of wildfire, with increases in annual acres burned. Although planning area residents may not experience increased risk of wildfire directly, secondary impacts, such as poor air quality may increase.

- **Property and Critical Facilities—**If wildfire risk in the area decreases, the exposure and vulnerability of property and critical facilities in the Planning Area would remain the same.
- **Environment—**It is possible that the exposure and vulnerability of the environment will be impacted by impacts on wildfire risk from climate change, as natural fire regimes may change, resulting in more or less frequent or higher intensity burns. These impacts may alter the composition of the ecosystems in the areas in and surrounding the Planning Area.
- **Economy and Future Development—**Because the risk from the wildfire hazard is currently projected to decrease, impacts on the economy and future development would not be likely.

13.2.2 Other Impacts (Sea Level Rise)

Impacts on Hazard

Sea level rise will result in areas that are currently dry being permanently inundated, and changes in temporary inundation will result from extreme tide events and storm surge. Unlike many other impacts resulting from climate change, sea level rise will have a defined extent and location. Although the extent and timing of sea level rise is still uncertain, conducting an assessment of potential areas at risk provides information appropriate for planning purposes. An assessment was conducted using Alameda County data developed by *Adapting to Rising Tides*. The Planning Area is located in two hydrodynamic zones assessed during the study:

- Zone 3—Oakland International Airport to the Alameda County Flood Control Channel
- Zone 4—Alameda County Flood Control Channel to Coyote Creek.

Scenario 5 was chosen for this assessment, which represents a variety of potential scenarios as shown in Table 13-2. Figure 13-5 illustrates the impacts of Scenario 5 on the Planning Area. The results of this assessment assume sea level rise impacts occur in present-day development patterns.

Table 13-2. Hydrodynamic Zones and Scenario 5 Events

	Hydrodynamic Zone 3	Hydrodynamic Zone 4
Sea Level Rise[a]	72 inches	
Extreme Tide or Storm Surge	None	
Sea Level Rise	60 inches	
Extreme Tide or Storm Surge	King Tide (100 percent annual chance; 75 inches)	
Sea Level Rise	42 inches	
Extreme Tide or Storm Surge	10 year (10 percent annual chance; 70 inches)	
Sea Level Rise	30 inches	24 inches
Extreme Tide or Storm Surge	100 year (1 percent annual chance; 71 inches)	100 year (1 percent annual chance; 69 inches)

a. Permanent inundation of 72 inches is unlikely to occur before 2100. The currently accepted most likely sea level rise scenario projects 12 inches of rise by 2050 and 36 inches by 2100.

Source: Adapting to Rising Tides, 2015

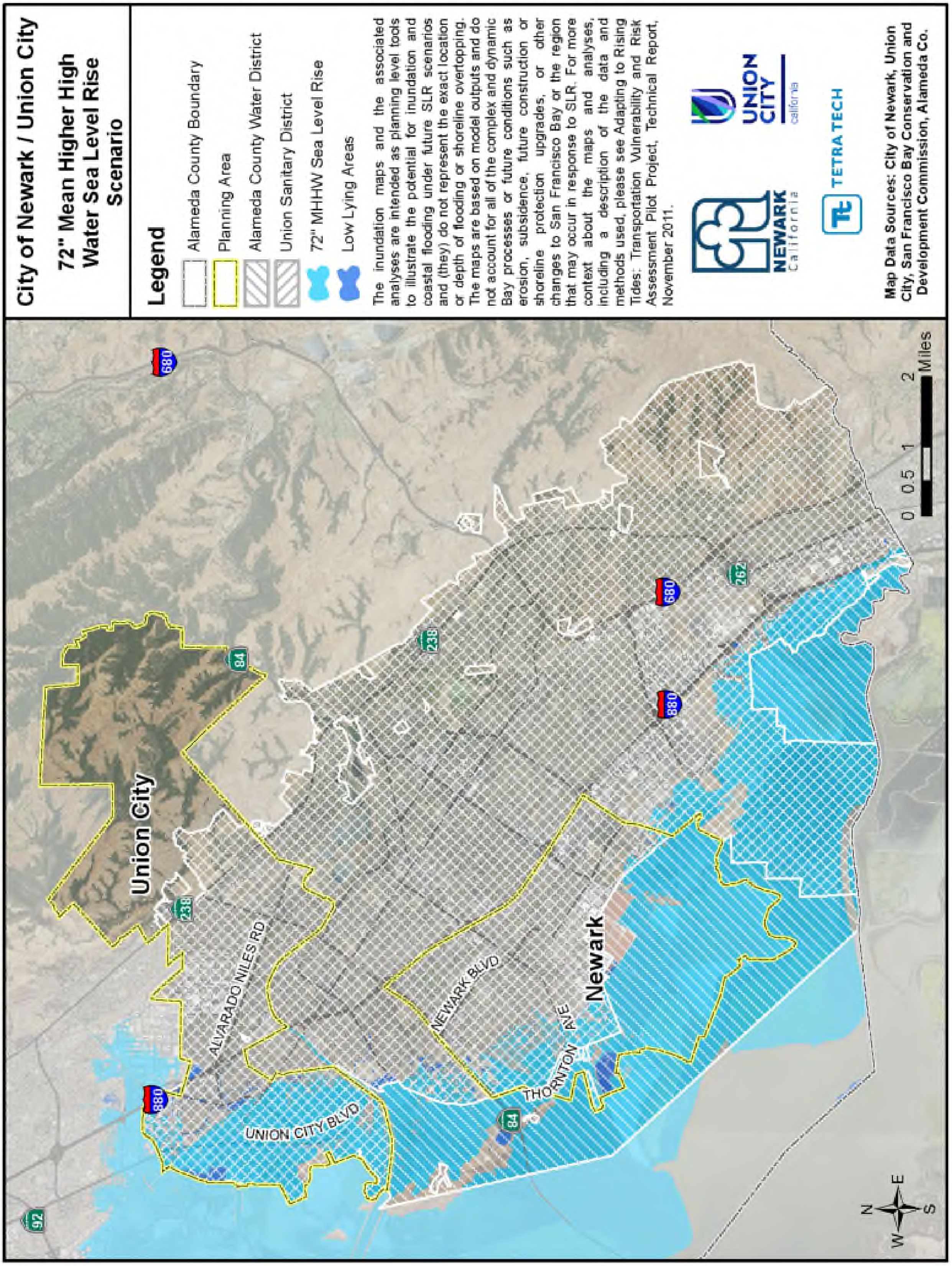


Figure 13-5. Sea Level Rise Exposure in the Planning Area

Exposure, Sensitivity and Vulnerability

Exposure, sensitivity and vulnerability associated with sea level rise can be affected as follows by climate change:

- **Population—**Sea level rise will increase the population exposed to both permanent and temporary inundation. Currently, approximately 21 percent of the Planning Area population is estimated to reside in areas subject to sea level rise impacts. Most of these individuals reside in Union City. Table 13-3 shows the exposed population by jurisdiction.
- **Property—**A total of 5,898 structures are within the sea level rise inundation areas delineated in Scenario 5. Most of these structures (97 percent) are believed to be residential. This accounts for approximately 18 percent of the Planning Area's total replacement value. Most of these assets are in Union City. Table 13-4 shows the distribution of structure types exposed and Table 13-5 shows the estimated replacement value of exposed structures.
- **Critical Facilities—**Twenty-four critical facilities in the Planning Area (8 percent) are located in areas subject to impacts from sea level rise, as listed in Table 13-6.
- **Environment—**All areas located in sea level rise inundation areas are exposed and vulnerable to impacts. Important coastal habitat may be lost as sea level rise permanently inundates areas or it may be damaged due to extreme tide and storm surge events. Saltwater intrusion into freshwater resources may occur, further altering habitat and ecosystems. In addition, protective ecosystem services may be lost as land area and wetlands are permanently inundated.
- **Economy—**Sea level rise will impact the local economy. The tourism industry may be impacted as historic coastal properties are inundated. Critical facilities and other important assets may be damaged by temporary inundation, resulting in loss of services such as power or wastewater treatment. Coastal businesses may relocate to other areas rather than face high costs from increased risk to storm surge and costs associated with managed retreat. Local tax revenue may decline as areas that were previously occupied by houses and businesses are permanently inundated.
- **Future Development—**The land area of the Planning Area will be reduced as sea level rise permanently inundates areas. This will have significant impacts on land use and planning in local communities. Table 13-7 shows the land use designations and areas of land likely to be permanently or temporarily inundated as a result of sea level rise. This table is representative of current land use trends with no anticipated change in designation as a result of Planning Area buildout.

Table 13-3. Estimated Population Residing in Sea Level Rise Inundation Areas

Jurisdiction	Estimated Population	Estimated Population Exposed	% of Population Exposed
Newark	44,733	233	0.5%
Union City	72,952	24,459	33.5%
Total	**117,685**	**24,693**	**21.0%**

Table 13-4. Structure Type in Sea Level Rise Inundation Areas

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Religious	Government	Education	Total
Newark	61	13	25	0	2	0	0	**101**
Union City	5,684	86	12	0	9	1	5	**5,797**
Total	**5,745**	**99**	**37**	**0**	**11**	**1**	**5**	**5,898**

Table 13-5. Structure and Contents Value in Sea Level Rise Inundation Areas

Jurisdiction	Estimated Value of Exposed Structures	Estimated Value of Exposed Contents	Estimated Total Value	% of Total Replacement Value
Newark	$404,909,554	$509,632,558	$914,542,112	8.6%
Union City	$2,123,816,048	$1,457,873,717	$3,581,689,765	25.2%
Total	**$2,528,725,602**	**$1,967,506,275**	**$4,496,231,877**	**18.1%**

Table 13-6. Critical Facility Exposure to Sea Level Rise

Jurisdiction	Medical and Health Services	Emergency Services	Educational Facilities	Government	Utilities	Transportation Infrastructure	Hazardous Materials	Other Assets	Total
Newark	0	0	0	0	1	0	2	1	**4**
Union City	1	0	4	0	3	5	4	0	**17**
Special District Planning Area (Fremont)	0	0	0	0	3	0	0	0	**3**
Total	**1**	**0**	**4**	**0**	**7**	**5**	**6**	**1**	**24**

Table 13-7. Land Use Within the 72” Mean High Water Sea Level Rise Scenario

Land Use	72” MHHW Plus Low-Lying Areas	
	Area (acres)	% of total
Residential	1302.6	30.6
Commercial	172.5	4.0
Industrial	608.1	14.3
Public / Open Space	2179.6	51.1
Total	**4262.8**	**100%**

13.2.3 Issues

The major issues for climate change are the following:

- Planning for climate change related impacts can be difficult due to the inherent uncertainty in projected future impacts.
- Average temperatures are expected to continue to increase in the Planning Area, which may lead to a host of primary and secondary impacts, such as an increased incidence of heat waves.
- Expected changes in precipitation patterns are poorly understood and could have significant impacts on the water supply and flooding in the Planning Area.
- Some impacts of climate change are poorly understood, such as potential impacts on the frequency and severity of earthquakes and thunderstorms.
- Heavy rain events may result in inland stormwater flooding after stormwater management systems are overwhelmed.
- Permanent and temporary inundation resulting from sea level rise has the potential to impact a significant portion of the population and assets in the Planning Area.

14. HUMAN HEALTH HAZARDS

14.1 GENERAL BACKGROUND

An outbreak or an epidemic exists when there are more cases of a particular disease than expected in a given area, or among a specific group of people, over a particular period of time. In an outbreak or epidemic, it is presumed that the cases are related to one another or that they have a common cause (CDC 2011). This chapter describes commonly recognized human health hazards that are a concern to the Planning Area.

DEFINITIONS

Epidemic—The spread of an infectious disease beyond a local population, reaching people in a wider geographical area. Several factors determine whether an outbreak will become an epidemic: the ease with which the disease spreads from vectors, such as animals, to people and the ease with which it spreads from person to person.

Influenza—A viral infection that attacks the respiratory system; commonly called flu.

Infectious diseases—Diseases caused by pathogenic microorganisms, such as bacteria, viruses, parasites or fungi, that can be spread, directly or indirectly, from one person to another.

Pandemic—A worldwide epidemic.

Vector—An organism (such as an insect or rodent) that transmits pathogens that cause disease

Vector-borne illness—Diseases transmitted to people from insects and other animals. These include, but are not limited to, Hanta Virus, Plague, Tularemia, Lyme Disease, West Nile Virus and the Zika Virus.

Zoonotic diseases—Infectious diseases of animals that can cause disease when transmitted to humans.

14.1.1 Vector-Borne

Tick-Borne Illnesses

Ticks are small, insect-like creatures most often found in naturally vegetated areas. They feed by attaching to animals and humans, sticking their mouthparts into the skin, and sucking blood for up to several days. Ticks do not fall from trees, jump or fly. Most species are found on wild grasses and low plants. Adult ticks wait at the ends of grass or other foliage for a host to brush by so they may attach. Sometimes ticks carry bacteria or viruses that can be transmitted to a person while the tick is attached and feeding. There are 47 species of ticks in California, but only eight are known to commonly bite humans:

- Western blacklegged tick (*Ixodes pacificus*)
- American dog tick (*Dermacentor variabilis*)
- Pacific Coast tick (*Dermacentor occidentalis*)
- Wood tick (*Dermacentor andersoni*)
- Brown dog tick (*Rhipicephalus sanguineus*)
- *Ornithodoros hermsi*
- *Ornithodoros parkeri*
- *Ornithodoros coriaceus.*

Lyme Disease

Lyme disease, named after the city in Connecticut where it was first identified in 1975, is a tick-borne disease caused by the bacterium *Borrelia burgdorferi,* which normally lives in mice, squirrels and other small animals. It is transmitted among these animals and to humans through the bites of certain species of ticks. In the northeastern and north-central United States, the black-legged tick (or deer tick, *Ixodes scapularis*) transmits Lyme disease. In the Pacific coastal United States, the disease is spread by the western black-legged tick (*Ixodes pacificus*). Other major tick species found in the United States have not been shown to transmit the disease.

Typical symptoms include fever, headache, fatigue, and a skin rash. If left untreated, infection can spread to joints, the heart, and the nervous system. Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash), and the possibility of exposure to infected ticks. Laboratory testing is helpful in later stages of the disease. Most cases of Lyme disease can be treated successfully with a few weeks of antibiotics. Steps to prevent Lyme disease include using insect repellent, removing ticks promptly, landscaping, and integrated pest management. The ticks that transmit Lyme disease can occasionally transmit other tick-borne diseases as well.

Mosquito-Borne Illnesses

Mosquito-borne diseases are diseases that are spread through the bite of an infected female mosquito. There are approximately 48 species of mosquitos in California that can carry disease. West Nile Virus and Zika Virus are a concern for the Planning Area and described below.

West Nile Virus

West Nile virus (WNV) is a potentially serious mosquito-borne disease that may affect residents in the Planning Area. Experts believe WNV is established as a seasonal epidemic in North America that flares up in the summer and continues into the fall. As of January 2016, human-infection cases of the virus had been reported in all states of the continental U.S. except West Virginia, New Hampshire and Vermont, and those states had reported non-human infections.

According to the Centers for Disease Control and Prevention (CDC), about 80 percent of people infected with WNV show no symptoms. The remainder have symptoms such as fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms can last for as short as a few days, though even healthy people have become sick for several weeks. About 1 percent of people infected with WNV will develop severe illness, with symptoms that can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may become permanent. There is no specific treatment for WNV infection. In more severe cases, people may need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

WNV is a recent disease to affect California. Mosquitoes transmit the virus to birds, livestock and humans. WNV season is between June and November in Alameda County. During WNV season, Alameda County’s mosquito abatement program works to limit risks to residents by monitoring ponds and other possible mosquito breeding sites; trapping to detect high numbers of mosquitoes; treating sewer catch-basins to prevent breeding; collecting birds for testing; and educating residents and owners about removing standing water from private property to limit mosquito breeding and mosquito bites (Alameda County Public Health Department 2016).

Zika Virus

Zika is a mosquito-borne disease transmitted by yellow fever mosquito (*Aedes aegypti)* and the Asian tiger mosquito *(Aedes albopictus)*. An *Aedes* mosquito can only transmit Zika virus after it bites a person who has this virus in their blood. The most common symptoms of Zika are fever, rash, joint pain, and conjunctivitis (red eyes). The illness is usually mild, with symptoms lasting for several days to a week after being bitten by an infected mosquito. People usually do not get sick enough to go to the hospital, and they rarely die of Zika. For this reason, many people might not realize they have been infected. However, Zika virus infection during pregnancy can cause a serious birth defect called microcephaly(abnormally small head and brain), as well as other severe fetal brain defects. Once a person has been infected, he or she is likely to be protected from future infections. Zika virus is not spread through casual contact, but can be spread by infected men to their sexual partners. There is a growing association between Zika and Guillain-Barré Syndrome, a disease affecting the nervous system.

The mosquitos that carry Zika are not native to California, but infestations have been reported in multiple counties in California, including Alameda County in the City of Hayward (CDPH 2016a). Thus far in California, Zika virus infections have been documented only in people who were infected while traveling outside the United States or through sexual contact with an infected traveler. From 2015 to the publishing of this document there has been no local mosquito-borne transmission of Zika virus in California.

14.1.2 Infectious Diseases

Influenza

Influenza, commonly called flu, is a viral infection that attacks the respiratory system. This disease is capable of claiming thousands of lives and adversely affecting critical infrastructure and key resources. An influenza pandemic has the ability to reduce the health, safety, and welfare of the essential services workforce; immobilize core infrastructure; and induce fiscal instability. The risk of a global influenza pandemic has increased over the last several years.

Pandemic influenza is different from seasonal influenza (or “the flu”) because outbreaks of seasonal flu are caused by viruses that are already among people. Pandemic influenza is caused by an influenza virus that is new to people and is likely to affect many more people than seasonal influenza. In addition, seasonal flu occurs every year, usually during the winter season, while the timing of an influenza pandemic is difficult to predict. Pandemic influenza is likely to affect more people than the seasonal flu, including young adults. A severe pandemic could change daily life for a time, including limitations on travel and public gatherings (Barry-Eaton District Health Department 2015).

The CDC’s Influenza Division of the Centers for Disease Control and Prevention supports the World Health Organization’s global network of National Influenza Centers (NIC). The Influenza Division also conducts epidemiologic research, including vaccine studies and serologic assays and provides international outbreak investigation assistance (CDC 2011).

Seasonal Influenza

Seasonal epidemics of the flu typically occur in the fall and winter. The CDC estimates that the 2014-2015 flu season for California was moderately severe, with high levels of outpatient illness and influenza-associated hospitalizations, particularly among adults 65 and older. Laboratory-confirmed influenza-associated deaths among patients under 65 have been reportable in California since the 2009 influenza pandemic. For the 2014-2015 flu season, there were 78 fatal cases of influenza-related illness statewide among those under 65, well below the 404 fatal cases during the 2013-2014 influenza season (CDPH 2015a).

Swine Flu (H1N1)

In April 2009, the World Health Organization (WHO) issued a health advisory on an outbreak of influenza-like illness caused by a new subtype of influenza A (A/H1N1) in Mexico and the United States. The disease spread rapidly, with the number of confirmed cases rising to 2,099 by May 7, despite aggressive measures taken against the disease by the Mexican government. On June 11, the WHO declared an H1N1 pandemic, marking the first global pandemic since the 1968 Hong Kong flu. On October 25, the U.S. declared H1N1 a national emergency. On August 10, 2010, the WHO declared an end to the 2009 H1N1 pandemic globally. The pandemic was mild compared to the Spanish Flu pandemic of 1918, which caused 100 million deaths worldwide—a total of 3 percent of the world’s total population.

H1N1 viruses and seasonal influenza viruses are co-circulating in many parts of the world. It is likely that the 2009 H1N1 virus will continue to spread for years to come, like a regular seasonal influenza virus.

Avian Flu (H5N1/H7N9)

The highly pathogenic H5N1 avian influenza virus is an influenza A subtype that occurs mainly in birds, causing high mortality among birds and domestic poultry. Outbreaks of highly pathogenic H5N1 among poultry and wild birds are ongoing in a number of countries.

H5N1 virus infections of humans are rare and most cases have been associated with direct poultry contact during poultry outbreaks. Rare cases of limited human-to-human spread of H5N1 virus may have occurred, but there is no evidence of sustained human-to-human transmission. Nonetheless, because all influenza viruses have the ability to change and mutate, scientists are concerned that H5N1 viruses one day could be able to infect humans more easily and spread more easily from one person to another, potentially causing another pandemic.

While the H5N1 virus does not now infect people easily, infection in humans is much more serious when it occurs than is infection with H1N1. More than half of people reported infected with H5N1 have died.

Infections in humans and poultry by a new avian influenza A virus (H7N9) continue to be reported in China. While mild illness in human cases has been seen, most patients have had severe respiratory illness and some have died. The only case identified outside of China was recently reported in Malaysia. Source investigation by Chinese authorities is ongoing. Many of the people infected with H7N9 are reported to have had contact with poultry. However some cases reportedly have not had such contact. Close contacts of confirmed H7N9 patients are being followed to determine whether any human-to-human spread of H7N9 is occurring. No sustained person-to-person spread of the H7N9 virus has been found at this time. However, based on previous experience with avian flu viruses, some limited human-to-human spread of this the virus would not be surprising.

Viral Hemorrhagic Fevers

Viral hemorrhagic fevers (VHFs) are a group of illnesses caused by four families of viruses (Ebola, Marburg, Lassa fever, and yellow fever). VHF describes a multisystem syndrome (multiple systems in the body are affected). Characteristically, the overall vascular system is damaged and the body’s ability to regulate itself is impaired. These symptoms are often accompanied by hemorrhage (bleeding); however, the bleeding itself is rarely life-threatening. While some types of hemorrhagic fever viruses can cause relatively mild illnesses, many cause severe, life-threatening disease.

The viruses that cause VHFs are distributed over much of the globe. However, because each virus is associated with one or more particular host species, the virus and the disease it causes are usually seen only where the host species live. Some hosts, such as the rodent species carrying several of the New World arenaviruses, live in geographically restricted areas. Therefore, the risk of getting VHFs caused by these viruses is restricted to those areas. Other hosts range over continents, such as the rodents that carry viruses that cause the hantavirus pulmonary syndrome in North and South America, or the rodents that carry viruses that cause hemorrhagic fever with renal syndrome in Europe and Asia.

The only VHF discussed in detail for this HMP is Ebola.

Ebola

The 2014 Ebola virus outbreak was unprecedented in geographical reach and impact on health care systems across the globe. This was the largest and deadliest Ebola virus outbreak ever recorded. It was the first time the West African countries of Guinea, Liberia, Sierra Leone, Nigeria, Mali, and Senegal saw the virus. Ebola is more common in Central African countries, such as the Democratic Republic of Congo and Sudan, where it was first discovered in 1976. It was also the first time that Ebola made it to the United States and Europe, prompting world-wide preparedness and response efforts. Figure 14-1 shows areas that ultimately were affected. The outbreak was closely monitored and traveler screenings were developed for those returning from West Africa.

Source: World Health Organization 2014

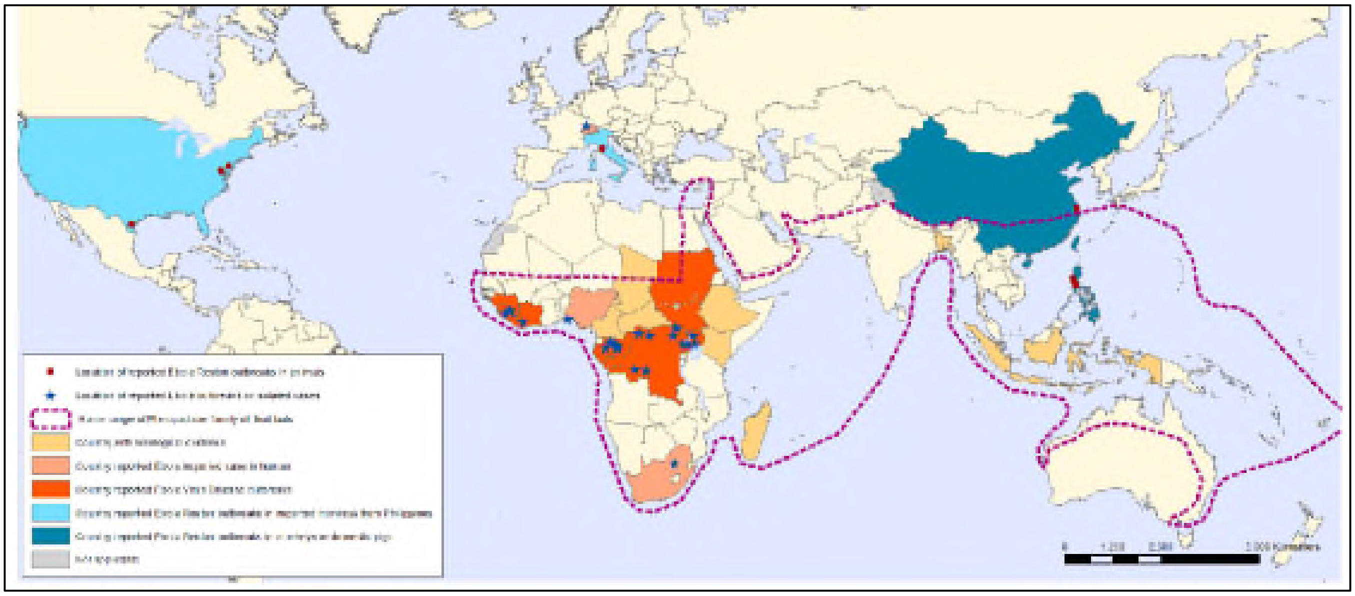


Figure 14-1. 2014 Distribution of Ebola Virus Outbreaks in Humans and Animals

In August 2014, two U.S. healthcare workers returned to the United States for treatment for Ebola. The case that most impacted the health care system in the United States was a patient diagnosed with Ebola in Dallas, Texas who died due to Ebola in October 2014. The nurse who provided care for him later tested positive for Ebola. This caused responses across the country from hospitals, emergency medical teams, fire departments and public health agencies to enhance isolation precautions, develop emergency policies, train with personal protective equipment and conduct multi-agency emergency exercises in case the spread of Ebola became a pandemic.

Before the 2014 outbreak, only 2,200 cases of Ebola had been recorded and 68 percent were fatal. Twenty percent of new Ebola infections were linked to burial traditions in which family and community members wash and touch dead bodies before burial. In Guinea, 60 percent of Ebola infections were linked to traditional burial practices. As of the date of this plan, there have been no reported Ebola cases in California.

Enterovirus

Non-polio enteroviruses are very common. There are more than 100 non-polio enteroviruses. One of the more common types is Enterovirus D68 (EV-D68). First identified in California in 1962 (CDC 2016b), it causes about 10 to 15 million infections and tens of thousands of hospitalizations each year in the United States. Most people who get infected with this virus do not get sick or they only have mild illness, like the common cold (CDC 2016c). This virus spreads from person-to-person when an infected person coughs, sneezes, or touches a surface that is then touched by others (CDC 2016b).

In the summer and fall of 2014, the United States experienced a nationwide outbreak of EV-D68 associated with severe respiratory illness. From mid-August 2014 to January 15, 2015, 1,153 people in 49 states and the District of Columbia were diagnosed with respiratory illness caused by EV-D68. Almost all of the confirmed cases were among children, many of whom had asthma or a history of wheezing. There likely were many thousands of mild EV-D68 infections for which people did not seek medical treatment/or get tested (CDC 2016b).

Norovirus

Norovirus is a highly contagious virus that causes acute gastroenteritis (inflammation of the stomach and intestines). It can spread quickly in closed and crowded environments such as hospitals, nursing homes, daycare centers, schools and cruise ships. Norovirus is the most common cause of acute gastroenteritis in the United States. Every year, it causes an estimated 19 to 21 million cases of acute gastroenteritis. While it is possible to become infected with norovirus year-round, norovirus infection happens most often from November to April. There can be a higher incidence of norovirus illnesses in years when a new strain of the virus is going around (CDPH 2016b).

Norovirus is found in the feces and vomit of infected people and can spread easily from person to person. People can become infected in several ways, including:

- Having direct contact with another person who is infected (for example, caring for or sharing foods or eating utensils with someone who is ill)
- Eating food or drinking liquids contaminated with norovirus, such as food touched by an ill food handler or undercooked seafood that has been harvested from contaminated waters
- Touching contaminated surfaces or objects and then touching the mouth before hand washing.

The CDPH and local health departments monitor norovirus outbreaks. Although healthcare providers are not required to report individual cases of norovirus to the local health department, outbreaks are reportable. When outbreaks are reported, CDPH and local health departments investigate to confirm and identify the strain of norovirus, find the cause of the outbreak, prevent further infections, and educate the public (CDPH 2016b).

14.2 HAZARD PROFILE

The severity of human health hazards is dependent upon the hazard and the population exposed to it. As the population increases, so does the risk of exposure to hazards. The key to reducing the disease hazard is isolation so that the exposed population does not continue to spread the hazard to the uninfected population. For disease and weather-related human health hazards, promoting education and personal preparedness will help to mitigate and reduce the severity of the hazard.

14.2.1 Past Events

Vector-Borne

The following is a summary of recent vector-borne disease outbreak events:

- In Alameda County, between 2010 and 2014, there have been nine reported cases of Lyme disease (CDPH 2014).
- As of September 9, 2016, California reported 1,186 dead birds and 3,105 mosquito pools that tested positive for the West Nile virus in 36 counties, and 155 human cases in 23 counties. Alameda County reported 10 dead birds and two mosquito pools (Alameda County Public Health Department 2016).

Infectious Diseases

- In the United States during the 2009 H1N1 influenza pandemic, there were 60 million confirmed cases of the disease, 270,000 people hospitalized due to the illness and 12,000 deaths. In California, there were 4,134 people hospitalized due to the illness and 596 deaths. In Alameda County, there were 243 confirmed cases, with 29 deaths (CDPH 2011).
- The most recent data for influenza in the State of California is for the 2014-2015 flu season. The CDPH received 42,812 reports of cases tested positive for influenza.

- California was impacted by the Enterovirus D68 outbreak in 2014. By October 2014, there were 32 reported cases in the state. Two of those cases were reported in Alameda County (Seipel 2014).
- In 2015, California experienced a norovirus outbreak. Between October and December, there were 32 confirmed cases of norovirus (CDPH 2015b).

14.2.2 Location

All of the Planning Area is susceptible to the human health hazards discussed in this chapter. While some hazards, such as the West Nile Virus and Lyme disease, can have a geographic presence within the Planning Area, other diseases can cause exposure to the Planning Area from outside the local region. Planning Area residents who travel can become exposed to diseases while abroad and bring the diseases back with them, potentially placing the region at risk for exposure. Extreme weather poses an equal human health hazard across the Planning Area.

14.2.3 Frequency

Predicting the future occurrences of disease outbreaks is difficult; however, based on the history of past occurrences, it is likely that the Planning Area will be impacted in the future. An increase in population and population density in the Planning Area have the potential to increase residents' exposure and susceptibility to outbreaks. Infected mosquitos and ticks will continue to inhabit and impact the Planning Area.

14.2.4 Severity

The severity of the human health hazard varies from individual to individual. Typically, young children and older adults are more susceptible to acquiring communicable diseases due to developing or diminishing immune systems. These populations often experience the most severe of symptoms, as their immune systems are not capable of fighting off infection or efficiently regulating temperature. In general, severity varies depending on the pathology of the disease, the health of the infected, and the availability of treatments for alleviating symptoms or curing the disease.

14.3 SECONDARY HAZARDS

The largest secondary impact caused by human health hazards is economic. Large outbreaks of any human health hazard could reduce the work force significantly, causing businesses and agencies to close or be greatly impacted.

Another secondary impact is stigmatization. The fear of the human health hazard and fear of the unknown can lead to isolation, violence and self-inflicted injury. Hospitals and health care providers can be overwhelmed with the "worried well" seeking care and comfort. Providing key and critical information can reduce and mitigate this secondary risk.

14.4 EXPOSURE AND VULNERABILITY

14.4.1 Population

All citizens in the Planning Area could be susceptible to the human health hazards discussed in this chapter. A large outbreak or epidemic, a pandemic or a use of biological agents as a weapon of mass destruction could have devastating effects on the population of the cities of Newark and Union City. The young and the elderly, those with compromised immune systems, and those with specialized medical needs are considered the most vulnerable.

14.4.2 Property

None of the health hazards discussed in this chapter would have significant measurable impact on the structural environment or property of the Planning Area.

14.4.3 Critical Facilities and Infrastructure

None of the health hazards discussed in this chapter would have significant measurable impact on the critical facilities or infrastructure of the Planning Area.

14.4.4 Environment

None of the health hazards discussed in this chapter would have significant measurable impact on the environment of the Planning Area. While many of the vectors of the health hazards discussed in this chapter rely on local or regional environments for their survival, the human health hazard that they carry or potentially transmit would have no significant measurable impact on the environment.

14.4.5 Economy

The economic impact of a human health hazard could be localized to a single region or population, or could be widespread. The impact could be significant, depending on the hazard, number of cases and the availability of resources to care for those affected by the hazard. Other financial impacts could be absorbed or managed by the organization affected.

14.5 FUTURE TRENDS IN DEVELOPMENT

The potential for communicable diseases, vector-borne diseases or extreme weather in the Planning Area is not likely to lessen or prohibit growth or development.

14.6 SCENARIO

A worst-case human health scenario for the Planning Area would be an epidemic or large-scale incident of any of the human health hazards discussed in this chapter. Medical treatment facilities in the Planning Area would be overwhelmed and taxed beyond their capabilities as the numbers of patients escalates. Impacts on the work force could have acute and long-term economic impacts on the Planning Area's primary employers. First responders would be exposed to the human health hazards, which could deplete the medical work force and could have profound impact on the potential escalation of the scenario.

14.7 ISSUES

Important issues associated with the human health hazards include but are not limited to the following:

- Prevention through vaccination and personal emergency and disaster preparation will help to reduce the impacts of human health hazards.
- Medical and response personnel need to be integrated in a unified command to provide care when needed in response to human health hazards.
- Medical and response personnel must be adequately trained and supplied.
- Up-to-date and functional all-hazard contingency planning should be carried out.
- A system needs to be in place to inform the public with a unified message about the human health hazard.
- Health agencies and facilities require surge capacity management and adaptation to the rising number and needs of the region.

15. HUMAN-CAUSED HAZARDS

15.1 GENERAL BACKGROUND

DEFINITIONS

Acts of terrorism—The unlawful use or threatened use of force or violence against people or property with the intention of intimidating or coercing societies or governments. Terrorism is either foreign or domestic, depending on the origin, base, and objectives of the terrorist or organization.

Technological hazards—Hazards from accidents associated with human activities such as the manufacture, transportation, storage and use of hazardous materials.

Weapons of mass destruction—Chemical, biological, radiological, nuclear, and explosive weapons associated with terrorism.

Hazardous material—A substance or combination of substances that, because of quantity, concentration, physical, chemical, or infectious characteristics, may cause or contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or pose a present or potential hazard to human life, property, or the environment.

Although the DMA does not require an assessment of human-caused hazards, this plan includes human-caused hazards for the following reasons:

- The Planning Area takes a proactive approach to disaster preparedness in order to protect the public safety of all citizens.
- Preparation for and response to a human-caused disaster will involve much of the same staff training, critical decision-making, and commitment of resources as for a natural hazard.
- The hazard mitigation planning effort is an opportunity to inform the public about all hazards, including human-caused hazards.
- The likelihood of a human-caused hazard in the Planning Area is greater than several of the identified natural hazards in this plan.

Human-caused hazards fall into the following categories:

- Intentional, criminal, malicious acts, including acts of terrorism, cyber threats, civil unrest, and active threats.
- Technological incidents that arise accidentally from human activities such as the manufacture, transportation, storage and use of hazardous materials; pipeline failure and release; and transportation.

15.1.1 Intentional Hazards

In dealing with intentional human-caused hazards, the unpredictability of human beings must be considered. People with a desire to perform criminal acts may seek out targets of opportunity that may not fall into established lists of critical areas or facilities. First responders train not only to respond to organized terrorism events, but also to respond to random acts by individuals who, for a variety of reasons ranging from fear to emotional trauma to mental instability, may choose to harm others and destroy property.

While education, heightened awareness, and early warning of unusual circumstances may deter crime and terrorism, intentional acts that harm people and property are possible at any time. Public safety entities must react to the incident, locate, isolate and neutralize further damage, and conduct investigate to bring criminals to justice.

Terrorism

The Federal Bureau of Investigation (FBI) categorizes terrorism in the United States as one of two types:

- Domestic terrorism involves groups or individuals acting without foreign direction against the government or population, such as the 1995 bombing of the Alfred P. Murrah federal building in Oklahoma City. The FBI is the primary response agency for domestic terrorism. The FBI coordinates domestic preparedness activities of the United States to limit acts posed by terrorists.
- International terrorism involves groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside the United States, or whose activities transcend national boundaries. Examples include the 1997 bombing of Mobil Oil's headquarters, the 1983 bombing of the U.S. Capitol, the 1993 bombing of the World Trade Center, and the September 11, 2001 attacks at the World Trade Center and the Pentagon.

The three key elements to defining a terrorist event are as follows:

- Actions involve the use of illegal force.
- Actions are intended to intimidate or coerce.
- Actions are committed in support of political or social objectives.

Terrorism evokes strong emotional reactions, ranging from anxiety to fear to anger to depression. Those involved with terrorism response are trained to deal with the public's emotional reaction swiftly as response to the event occurs. The area of the event must be clearly identified in all emergency alert messages to prevent those not affected by the incident from overwhelming local emergency rooms and response resources, thereby reducing service to those actually affected. The public will be informed clearly and frequently about what government agencies are doing to mitigate the impacts of the event. The public will also be given clear directions on how to protect the health of individuals and families.

Terrorism involves the use of weapons of mass destruction, including biological, chemical, nuclear and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; agro-terrorism; and cyberterrorism (FEMA 386-7). In the case of chemical, biological and radioactive agents, their presence may not be immediately obvious, making it difficult to determine when and where they may have been released, who has been exposed, and what danger is present for first responders and emergency medical technicians. The following are potential methods used by terrorists that could affect the Alameda County and the Planning Area as a direct target or collaterally:

- Conventional bomb
- Biological agent
- Chemical agent
- Nuclear bomb
- Radiological agent
- Arson/incendiary attack
- Armed attack
- Cyber-terrorism
- Agro-terrorism
- Intentional hazardous material release.

Table 15-1 provides a hazard profile summary for terrorism-related hazards. Most terrorist events in the United States have been bombing attacks, involving detonated or undetonated explosive devices, tear gas, pipe bombs, and firebombs.

The effects of terrorism can vary from loss of life and injuries to property damage and disruptions in services such as electricity, water supplies, transportation, or communications. Terrorist acts may have an immediate effect or a delayed effect. Terrorists often choose targets that offer limited danger to themselves and areas with relatively easy public access. Foreign terrorists look for visible targets where they can avoid detection before and after an attack such as international airports, large cities, major special events, and high-profile landmarks.

Table 15-1. Event Profiles for Terrorism

Hazard	Application Mode	Hazard Duration	Static/Dynamic Characteristics	Mitigating and Exacerbating Conditions
Conventional Bomb	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile.	Instantaneous; additional secondary devices, or diversionary activities may be used, lengthening the duration of the hazard until the attack site is clear.	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Over-pressure at a given location is inversely proportional to the cube of the distance from the blast; thus, each extra length of distance provides progressively more protection. Terrain, forestation, structures, etc. can absorb and/or deflect energy and debris. Exacerbating conditions include ease of access to target; lack of barriers and shielding; poor construction; and ease of concealment of device.
Chemical Agent	Liquid/aerosol contaminants dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/ containers; or munitions.	Hours to weeks, depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water, and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.
Arson/ Incendiary Attack	Initiation of fire or explosion on or near target via direct contact or remotely via projectile.	Generally minutes to hours.	Extent of damage is determined by type and quantity of device, accelerant, and materials present at or near target. Effects generally static other than incremental structural failure, etc.	Mitigation includes fire detection and protection systems and fire-resistive construction. Inadequate security can allow easy access to target, easy concealment of an incendiary device, and undetected initiation of a fire. Non-compliance with fire and building codes or failure to maintain fire protection systems can increase the effectiveness of a fire weapon.
Armed Attack	Tactical assault or sniping from remote location, or random attack in response to fear, emotion or mental instability.	Generally minutes to days.	Varies based on the perpetrators' intent and capabilities.	Inadequate security can allow easy access to target, easy concealment of weapons, and undetected initiation of an attack.
Radiological Agent	Radioactive contaminants dispersed using sprayers/ aerosol generators, or by point or line sources such as munitions.	Seconds to years, depending on material used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic.	Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation.
Biological Agent	Liquid or solid contaminants dispersed with sprayers or by point or line sources such as munitions, covert deposits, and moving sprayers.	Hours to years, depending on the agent and the conditions in which it exists.	Contamination can be spread via wind and water, depending on the agent used and the effectiveness with which it is deployed. Infection can spread via humans or animals.	Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate wind will disperse agents but higher winds can break up aerosol clouds; the micro-meteorological effects of buildings and terrain can influence aerosolization and travel of agents.

Hazard	Application Mode	Hazard Duration	Static/Dynamic Characteristics	Mitigating and Exacerbating Conditions
Agro-terrorism	Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock.	Days to months.	Varies by type of incident. Food contamination events may be limited to specific distribution sites, whereas pests and diseases may spread widely. Generally no effects on built environment.	Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock.
Nuclear Bomb	Detonation of nuclear device underground, at the surface, in the air, or at high altitude.	Light/heat flash and shock wave last for seconds; radiation and fallout can last for years. Electromagnetic pulse from a high-altitude detonation lasts for seconds and affects only unprotected electronic systems.	Initial light, heat, and blast effects of a subsurface, ground or air burst are static and determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic, depending on meteorological conditions.	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat, and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting radiation and radioactive contaminants.
Intentional Hazardous Material Release (fixed facility or transportation)	Solid, liquid, and/or gaseous contaminants released from fixed or mobile containers	Hours to days.	Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water and wind.	Weather conditions directly affect how the hazard develops. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection and containment features, can substantially increase the damage from a hazardous materials release.

Application Mode—The human acts or unintended events necessary to cause the hazard to occur.

Duration—The length of time the hazard is present. For example, the duration of a tornado may be just minutes, but a chemical warfare agent such as mustard gas, if un-remediated, can persist for hours or weeks under the right conditions.

Dynamic or Static Characteristics—The tendency of a hazard or its effects to expand, contract, or remain confined in time, magnitude, and space. For example, the physical destruction caused by an earthquake is generally confined to the place in which it occurs, and it does not usually get worse unless aftershocks or other cascading failures occur; in contrast, a cloud of chlorine gas leaking from a storage tank can change location by drifting with the wind and can diminish in danger by dissipating over time.

Mitigating and Exacerbating Conditions—Mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard. For example, earthen berms can provide protection from bombs; exposure to sunlight can render some biological agents ineffective; and effective perimeter lighting and surveillance can minimize the likelihood of someone approaching a target unseen. In contrast, exacerbating conditions are characteristics that can enhance or magnify the effects of a hazard. For example, depressions or low areas in terrain can trap heavy vapors, and a proliferation of street furniture (trash receptacles, newspaper vending machines, mail boxes, etc.) can provide hiding places for explosive devices.

Source: FEMA 2002

Active Threats

Active threats may include active shootings, secondary explosives, and/or chemical or biological threats.

Active Shooter

Active shooter attacks are typically motivated by the desire to maximize human casualties. They are differentiated from other attack types by the indiscriminate nature of the victim's targets of opportunity rather than actions directed toward a specific target. Active shooter attacks have evolved over the last decade ranging from "lone wolf" shooters who act alone and without any organizational affiliation to organized groups acting in concert to achieve a specific objective. Current active shooter threat force tactics commonly employ a blend of lone shooters and multi-person teams as part of a larger assault.

Active shooters may use small arms, light weapons, or a combination of the two depending on the type of attack. Small arms refers to revolvers, automatic pistols, rifles, shotguns, assault rifles, light machine guns, etc. Light weapons refer to medium caliber and explosive ordinance, grenade launchers, rocket propelled grenades, etc. With additional planning and preparation, attackers can increase their likelihood of success in also including a wider array of weapons, to include improvised explosive devices.

Biological Threats

Biological hazards include disease-causing microorganisms and pathogens, such as bacteria and viruses. The distinguishing characteristic of these substances is their ability to multiply within a host and cause an infection. Some bacteria and viruses can spread from one individual to another. Infections typically occur as a result of airborne exposure, skin contact, or ingestion. In general, exposure to bacteria and viruses can occur through inhalation (as is the case with airborne *B. anthracis* spores, which cause anthrax), ingestion of contaminated food or water (the case with *E. coli*, which causes gastrointestinal infection), contact with infected individuals, or contact with contaminated surfaces (which may be harboring, for example, viruses that cause influenza). As a result, domestic and transnational threat groups have considered targeting heating, ventilation, and air conditioning systems of large commercial buildings.

Anthrax has been used as a weapon for nearly 100 years and is one of the most likely agents to be used in a biological threat. Its spores are easily found in nature, can be produced in a lab, and can last for a long time. It can be released quietly and without anyone knowing. Microscopic spores can be put into powders, sprays, food, and water. Due to their size, one may not be able to see, smell or taste them (CDC 2016). Terrorists may release anthrax spores in public places. In 2001, letters containing powdered anthrax spores were sent through the U.S. mail, causing skin and lung anthrax in 22 people. Five people died, all due to lung anthrax (San Francisco Department of Health 2016).

If a biological attack were to occur within the Planning Area, a large number of personnel could be impacted. Buildings in the impacted area and transportation infrastructure might be closed for investigation and cleanup. These areas would not be accessible until cleanup is completed, which would impact the businesses. Hospitals could become overwhelmed with people coming in fearing contamination. Residents and businesses may need to shelter in place in the area of the attack.

Chemical Threats

Chemical weapons are often classified according to their effect on the body, based on the primary organ system affected by exposure. They are poisonous vapors, aerosols, liquids, and solids that have toxic effects on humans, animals, and plants. Exposure pathways include inhalation, skin contact, ingestion or injection. Depending on the severity of exposure, impacts may include temporary illness or injury, permanent medical conditions, or death. An attack using chemical threats can come without warning. Signs of a chemical release include difficulty breathing;

eye irritation; losing coordination; nausea; or a burning sensation in the nose, throat and lungs (Ready.gov 2016b). Harmful chemicals that could be used in an attack include the following:

- Chemical weapons developed for military use (warfare agents)
- Toxic industrial and commercial chemicals that are produced, transported, and stored in the making of petroleum, textiles, plastics, fertilizers, paper, foods, pesticides, household cleaners, and other products
- Chemical toxins of biological origin such as ricin (U.S. Department of Homeland Security 2004).

Recently, there have been reports of chlorine found in explosive devices, mortars, rockets, and missiles. Chlorine has been used in the past, mainly in blunt, terrorist-style attacks. Some experts believe that groups are trying to advance their technology for deploying the chemical in combat operations (Tilghman 2015). Chlorine is an acutely toxic industrial compound that can cause severe coughing, pulmonary, eye and skin irritation, and even death at higher concentrations (USACHPPM 2015).

A chemical release in the Planning Area could lead to closed down streets and major transportation routes (including bridges) for extended periods of time, causing transportation delays and traffic. Many homes and businesses would also be impacted as they would need to be evacuated for an extended period of time. There could also be impact on the environment and/or natural resources that would require cleanup. Hazardous material response teams and fire-rescue would be needed to respond to the incident and coordinate cleanup efforts.

Explosive Devices

Improvised explosive device (IED) attacks are the favored method of terrorist groups around the world. The evolution in explosive materials, firing devices, and their ease of concealment and delivery has increased the effectiveness of this hazard. IED attacks are typically motivated by the desire to maximize human casualties. Explosive incidents account for 70 percent of all terrorist attacks worldwide. These types of attacks range from small-scale letter bombs to large- scale attacks on specific buildings. According to the FBI, 172 improvised explosive devices were reported in the United States between October 2012 and April 2013.

IEDs generally consist of TNT equivalent explosives (e.g. black or smokeless powder) in a container (e.g. galvanized pipe, paint can, etc.). These propellants are easily purchased on the commercial market. IEDs may also contain added shrapnel to induce greater casualties or shaped charges that direct the force of the explosive towards the target. Devices may be hidden in everyday objects such as briefcases, flowerpots or garbage cans, or on the person of the attacker in the case of suicide bombers. The most commonly used container is galvanized pipe, followed by PVC pipe. When shrapnel is added to the device, the type of shrapnel varies; BBs and other small pieces of hardware are common, as is glass or gravel.

An attack using IEDs or other explosive devices within the Planning Area has potential large-scale consequences that may require multi-agency and multi-jurisdictional coordination. Depending on the location of the attack, businesses and other venues may be closed for investigation and due to damage. If the attack occurred in or near residences, evacuations and/or sheltering may occur.

Fire as a Weapon

The use of fire for criminal, gang, and terrorist activities, as well as targeting first responders, is not new. The World Health Organization estimates that 195,000 people die each year from fire, while according to the Global Terrorism Database an average of 7,258 people die annually from terrorism, and that includes deaths in conflict zones such as Afghanistan and Iraq (Stewart 2013).

Cyber Threats

A cyber threat is an intentional and malicious crime that compromises the digital infrastructure of a person or organization, often for financial or terror-related reasons. Such attacks vary in nature and are perpetrated using digital mediums or sometimes social engineering to target human operators. Generally, attacks last minutes to days, but large-scale events and their impacts can last much longer. As information technology continues to grow in capability and interconnectivity, cyber threats become increasingly frequent and destructive. In 2014, internet security teams at Symantec and Verizon indicated that nearly 1 million new pieces of malware—malicious code designed to steal or destroy information—were created every day (Harrison 2015).

Cyber threats differ by motive, attack type and perpetrator profile. Motives range from the pursuit of financial gain to political or social aims. Cyber threats are difficult to identify and comprehend. Types of threats include using viruses to erase entire systems, breaking into systems and altering files, using someone's personal computer to attack others, or stealing confidential information. The spectrum of cyber risks is limitless, with threats having a wide-range of effects on the individual, community, organization, and nation (FEMA 2013f).

The Union City/Newark Steering Committee identified two separate types of cyber threats that may occur within the Planning Area: cyber-attacks and cyberterrorism. The terms often are used interchangeably, though they are not the same. While all cyberterrorism is a form of cyber-attack, not all cyber-attacks are cyberterrorism.

Cyber-Attacks

Public and private computer systems are likely to experience a variety of cyber-attacks, from blanket malware infection to targeted attacks on system capabilities. Cyber-attacks specifically seek to breach computer security measures designed to protect an individual or organization. The initial attack is followed by more severe attacks for the purpose of causing harm, stealing data, or financial gain. Organizations are prone to different types of attacks that can be either automated or targeted in nature. Table 15-2 describes the most common cyber-attack mechanisms faced by organizations today.

With millions of threats created each day, the importance of protection against cyber-attacks becomes a necessary function of everyday operations for individuals, government facilities, and businesses. The increasing dependency on technology for vital information storage and the often automated method of infection means higher stakes for the success of measurable protection and education. Cyber-attacks may lead to widespread business interruptions and likely considerable repair and response costs. A cyber-attack could cause sewage pump stations to fail, which could result in contaminated beaches, unsanitary conditions and/or potentially unsafe water supply.

Since 2013, a new type of cyber-attack is becoming increasingly common against individuals and small- and medium-sized organizations. This attack is called cyber ransom. Cyber ransom occurs when an individual downloads ransom malware, or ransomware, often through phishing or drive-by download, and the subsequent execution of code results in encryption of all data and personal files stored on the system. The victim then receives a message that demands a fee in the form of electronic currency or cryptocurrency, such as Bitcoin, for the decryption code (Figure 15-1). In October 2015, the FBI said that commonly used ransomware is so difficult to override, that victims should pay the ransom to retrieve their data (Danielson 2015).

If an attack were to occur that impacted the Planning Area, multi-jurisdictional response would need to be coordinated, in accordance with local and county emergency operations plans. To reduce the Planning Area's vulnerability, cyber security should be improved by providing network defense intelligence and conducting regular evaluations of network security posture and readiness. Additionally, the Planning Area should provide education on cyber threats and cyber-attack measurements.

Table 15-2. Common Mechanisms for Cyber-attacks

Type	Description
Socially Engineered Trojans	Programs designed to mimic legitimate processes (e.g. updating software, running antivirus software). When the victim runs the fake process, the Trojan is installed on the system.
Unpatched Software	Nearly all software has weak points that may be exploited by malware. Most common software exploitations occur with Java, Adobe Reader, and Adobe Flash. These vulnerabilities are often exploited as small amounts of malicious code are often downloaded via drive-by download.
Phishing	Malicious email messages that ask users to click a link or download a program. Phishing attacks may appear as legitimate emails from trusted third parties.
Password Attacks	Third party attempts to crack a user's password and gain access to a system. Password attacks do not typically require malware, but rather stem from software applications on the attacker's system. These applications may use a variety of methods to gain access, including generating large numbers of generated guesses, or dictionary attacks, in which passwords are systematically tested against all of the words in a dictionary.
Drive-by Downloads	Malware is downloaded unknowingly by the victims when they visit an infected site.
Denial of Service Attacks	Attacks that focus on disrupting service to a network in which attackers send high volumes of data until the network becomes overloaded and can no longer function.
Man in the Middle	Man-in-the-Middle attacks mirror victims and endpoints for online information exchange. In this type of attack, the attacker communicates with the victims, who believe they are interacting with a legitimate endpoint website. The attacker is also communicating with the actual endpoint website by impersonating the victim. As the process goes through, the attacker obtains entered and received information from both the victim and endpoint.
Malvertising	Malware downloaded to a system when the victim clicks on an affected ad.
Advanced Persistent Threat	An attack in which the attacker gains access to a network and remains undetected. Advanced Persistent Threat attacks are designed to steal data instead of cause damage.

Source: Danielson 2015

Source: Danielson 2015

Figure 15-1. Pop-Up Message Indicating Ransomware Infection

Cyberterrorism

Cyberterrorism is the use of computers and information, particularly over the Internet, to recruit others to an organization's cause, cause physical or financial harm, or cause a severe disruption of infrastructure service. Such disruptions can be driven by religious, political, or other motives. Like traditional terrorism tactics, cyberterrorism seeks to evoke very strong emotional reactions, but it does so through information technology rather than a physically violent or disruptive action. Cyberterrorism has three main types of objectives (Kostadinov 2012):

- **Organizational**—Cyberterrorism with an organizational objective includes specific functions outside of or in addition to a typical cyber-attack. Terrorist groups today use the internet on a daily basis. This daily use may include recruitment, training, fundraising, communication, or planning. Organizational cyberterrorism can use platforms such as social media as a tool to spread a message beyond country borders and instigate physical forms of terrorism. Additionally, organizational goals may use systematic attacks as a tool for training new members of a faction in cyber warfare.
- **Undermining**—Cyberterrorism with undermining as an objective seeks to hinder the normal functioning of computer systems, services, or websites. Such methods include defacing, denying, and exposing information. While undermining tactics are typically used due to high dependence on online structures to support vital operational functions, they typically do not result in grave consequences unless undertaken as part of a larger attack. Undermining attacks on computers include the following (Waldron 2011):
    - Directing conventional kinetic weapons against computer equipment, a computer facility, or transmission lines to create a physical attack that disrupts the reliability of equipment.
    - Using electromagnetic energy, most commonly in the form of an electromagnetic pulse, to create an electronic attack against computer equipment or data transmissions. By overheating circuitry or jamming communications, an electronic attack disrupts the reliability of equipment and the integrity of data.
    - Using malicious code directed against computer processing code, instruction logic, or data. The code can generate a stream of malicious network packets that disrupt data or logic by exploiting vulnerability in computer software, or a weakness in computer security practices. This type of cyber-attack can disrupt the reliability of equipment, the integrity of data, and the confidentiality of communications (Wilson 2008)
- **Destructive**—The destructive objective for cyberterrorism is what organizations fear most. Through the use of computer technology and the Internet, the terrorists seek to inflict destruction or damage on tangible property or assets, and even death or injury to individuals.

Civil Unrest

Civil disturbance refers to groups of people purposely choosing not to observe a law, regulation or rule, usually in order to bring attention to their cause, concern or agenda. Disturbances may take the form of small gatherings or large groups blocking or impeding access to Planning Area municipality facilities or businesses to actions directed at intimidating staff, visitors, and causing property damage. Civil disturbances can arise from a number of causes for a variety of reasons. Protests intended to be a peaceful demonstration to the public and the government can escalate into general chaos.

The circumstances surrounding civil disturbance may be spontaneous or may result from escalating tensions within a community or the larger society. This was the case in Ferguson, MO and other recent national examples, where local police activities resulted in a massive community response that began as protest but evolved into less controlled, potentially violent response from community members. Civil disorder can erupt anywhere, but the most likely locations are areas with large population groupings or gatherings. Civil disorder can also occur near locations where a "trigger event" occurred, as was the case in Ferguson.

The following types of large gatherings are typically associated with civil disturbances:

- **Crowds**:
  - A casual crowd is identified as individuals or small groups with nothing in common to bind them together. If they have an agenda, it is their own. Casual crowds are made up of individuals or small groups occupying the same common place.
  - Sighting crowds are people gathering for an event. People migrating to sporting events, gathering to observe a fire or accident, and those that attend music concerts are all types of sighting crowds. Individuals or small groups gather at these events for the same purpose. It is the event and/or one's curiosity that compels a crowd to come together.
  - Agitated crowds have responses based on the elements (people, space, and event). Individuals with strong emotional feelings within a crowd can quickly spread and influence the rest of the crowd. As more people within the crowd become emotionally involved, a sense of unity may develop, causing changes in the overall demeanor of the crowd. Yelling, screaming, and name-calling are all associated with an agitated crowd.

- **Mobs—**Mobs have all the elements found in the crowd types described above, but also display aggressive, physical, and sometimes violent actions. Under these conditions, individuals within a crowd will often say or do things they usually would not do. Extreme acts of violence and property damage are often part of mob activities. They consist of, or involve, the elements of people and groups being mixed together and becoming fluid (U.S. Army 2005). Mobs are usually emotional, loud, tumultuous, violent, and lawless. There are different levels of mobs (Alvarez and Bachman 2007):
  - An aggressive mob is one that attacks, riots, and terrorizes. The object of violence may be a person, property, or both. An aggressive mob is distinguished from an aggressive crowd only by lawless activity. Examples of aggressive mobs are the inmate mobs in prisons and jails, mobs that act out their frustrations after political defeat, or violent mobs at political protests or rallies.
  - An escape mob is attempting to flee from something such as a fire, bomb, flood, or other catastrophe. Members of escape mobs are generally difficult to control and can be characterized by unreasoning terror.
  - An acquisitive mob is one motivated by a desire to acquire something. Riots caused by other factors often turn into looting sprees. This mob exploits an authority's lack of control in safeguarding property.
  - An expressive mob is one that expresses fervor or revelry following some sporting event, religious activity, or celebration. Members experience a release of pent up emotions in highly charged situations.
  - A flash mob is a large group of people who gather in some predetermined location, perform some brief action, and then quickly disperse. Youth flash mobs in Boston, Philadelphia, Brooklyn, New York, Kansas City, Missouri, Orange, New Jersey, and elsewhere in the United States have resulted in violence, vandalism, injuries, and arrests.

Civil disorders can result in numerous secondary hazards. Depending on the size and scope of the incident, civil disturbance may lead to widespread urban fire, utility failure, transportation interruption, and environmental hazards. Civil disorders can be a secondary hazard after a severely destructive disaster. This may include looting, blocking of roadways, which may impact emergency response vehicles, and demonstrations.

15.1.2 Technological Hazards

Technological hazards are associated with human activities such as the manufacture, transportation, storage and the use of hazardous materials. Incidents related to these hazards are assumed to be accidental, with unintended consequences. Technological hazards in the Planning Area can be categorized as follows:

- Hazardous materials incidents
- Pipeline and utility failure
- Transportation accidents.

Hazardous Materials Incidents

Hazardous materials are substances that are considered severely harmful to human health and the environment, as defined by the U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Many hazardous materials are commonly used substances that are harmless in their normal uses but dangerous if released. The EPA designates more than 800 substances as hazardous and identifies many more as potentially hazardous due to their characteristics and the circumstances of their release (EPA 2013).

If released or misused, hazardous substances can cause death, serious injury, long-lasting health effects, and damage to structures, other properties, and the environment. Many products containing hazardous substances are used and stored in homes, and these products are shipped daily on highways, railroads, waterways, and pipelines. The following are the most common type of hazardous material incidents:

- **Fixed-Facility Hazardous Materials Incident**—This is the uncontrolled release of materials from a fixed site capable of posing a risk to health, safety and property. It is possible to identify and prepare for a fixed-site incident because federal and state laws require those facilities to notify state and local authorities about what is being used or produced at the site.
- **Hazardous Materials Transportation Incident**—A hazardous materials transportation incident is any event resulting in uncontrolled release of materials during transport that can pose a risk to health, safety, and property. Transportation incidents are difficult to prepare for because there is little if any notice about what materials could be involved should an accident happen. Hazardous materials transportation incidents can occur anywhere, although most occur on major federal or state highways or major rail lines. In addition to materials such as chlorine that are shipped throughout the country by rail, thousands of shipments of radiological materials, mostly medical materials and low-level radioactive waste, travel by ground transportation across the United States. Many incidents occur in sparsely populated areas and affect very few people. There are occasions, however, of accidents in areas with much higher population densities, such as the January 6, 2005 train accident in Graniteville, South Carolina, that released chlorine gas killing nine, injuring 500, and causing the evacuation of 5,400 residents.

CERCLA, the Emergency Planning and Community Right-to-Know Act, and California law require responsible parties to report hazardous material releases if certain criteria is met. CERCLA requires that all releases of hazardous substances (including radionuclides) exceeding reportable quantities be reported by the responsible party to the National Response Center. If an accidental chemical release exceeds the Right-to-Know Act applicable minimal reportable quantity, the facility must notify state emergency response commissions and local emergency planning committees for any area likely to be affected by the release, and provide a detailed written follow-up as soon as practicable. Information about accidental chemical releases must be made available to the public.

Pipeline and Utility Failure

Transmission and Distributions Pipelines

Transmission and distribution pipelines provide two differing services. Transmission pipelines transport raw material for further refinement. These pipes are large and far reaching, operating under high pressure. Distribution pipelines provide processed materials to end users. These are smaller in diameter, some as small as a half an inch, and operate under lower pressure.

Although pipelines are the safest and most reliable way to transport natural gas, crude oil, liquid petroleum products, and chemical products, there is still an inherent risk due to the nature of the hazardous materials. Pipelines are regulated by the Office of the State Fire Marshal Pipeline Safety Division. Pipelines are also monitored by system control and data acquisition (SCADA) systems that measuring flow rate, temperature and pressure. The SCADA system transfers real-time data via satellite from the pipelines to a control center where the valves, pumps, and motors are remotely operated. If tampering with the pipeline occurs, an alarm sounds. The ensuing valve reaction is instantaneous, with the alarm system isolating any rupture and setting off a chain reaction that shuts down pipeline pumps and alerts pipeline operators within seconds.

Failures of distribution and transmission pipelines can occur when pipes corrode, are damaged during excavation, are incorrectly operated, or are damaged by other forces. More serious accidents occur on distribution pipelines than on any other type due to their number, intricate networking, and location in highly populated areas.

Water

Water or wastewater disruption is a secondary impact from a natural disaster or intentional act. In the Cities of Newark and Union City, water service is provided by the Alameda County Water District and sewer is provided by Union Sanitary District. A breach in the pipelines that carry water through the Planning Area would have significant temporary impacts on the cities until alternative water sources are pumped and treated. Long-term disruption would have significant impacts on residences and businesses in the Planning Area if demand exceeds secondary supplies and water conservation measures do not provide enough relief to reduce demand to equal the secondary supplies.

Wastewater

Disruption of the Planning Area’s wastewater collection and wastewater treatment plants would have significant citywide and regional impacts. Such disruption could result if the system were to be overwhelmed by a significant storm or discharge of materials in such quantities that the treatment plant could not adequately treat the waste. Natural hazards such as earthquake or flood, major power outages, or terrorism directed at the facilities and systems could disrupt the process of collecting and treating millions of gallons of sewage. Wastewater treatment plants may also have emergencies internal to the plant such as oxygen deficiencies that render them incapable of treating waste. The disruption of service may also have significant environmental impacts on the waterways adjacent to the treatment plants.

Transportation Accidents

Transportation accidents are incidents involving air, road or rail travelers resulting in death or serious injury. The potential for transportation accidents that block ingress, egress, and movement through the Planning Area is significant, as is the likelihood of hazardous material incidents resulting from a traffic or rail accident.

The region has a number of airports, including the San Francisco International Airport, Oakland International Airport, and San Jose International Airport, as well as several smaller municipal and private airports, that enhance the potential for an air disaster.

Major transportation routes in the Planning Area include Interstate 880 (Nimitz Freeway) and State Route 84 (Dumbarton Freeway). Additionally, the Planning Area is a major corridor to South Bay and Silicon Valley and is located near the Dumbarton Bridge. Daily commuter traffic is very high in the Planning Area due to its proximity to these two areas.

Two rail lines owned by Union Pacific Railroad traverse the City of Newark. The Union Pacific Railroad routes 142 freight trains a week through the City and includes two subdivisions: Coast and Niles. Both of these subdivisions run a moderate amount of passenger rail service; however, none service the City. The Capital Corridor, Altamont Commuter Express, and Amtrak all provide commuter rail services to the City. In Union City, there are three rail lines that run through the city and provide service to industrial customers (Union City General Plan 2002; Newark General Plan 2013).

15.2 HAZARD PROFILE

15.2.1 Past Events

State of California

Intentional Hazards

According to the Governor's Office of Emergency Services Terrorism Response Plan, California has had a long history of defending the public against domestic and foreign terrorists. Domestic terrorist groups in California have been focused on political or social issues, while the limited internationally based incidents have targeted the state's immigrant communities due to foreign disputes. Advanced technologies and communication have allowed these groups to become more sophisticated and better organized, with remote members linked electronically.

Technological Hazards

No comprehensive source exists for technological hazard incidents in California. Given the complex system of transportation networks, the large population, and the number of businesses in California, incidents occur on a regular basis throughout the state, as reported by the news media.

Regional

Intentional Hazards

Terrorism Events

The Bay Area has not experienced a regional terrorism event. However, the 2016 hosting of the Super Bowl in Santa Clara County increased mainstream exposure of the Bay Area for potential future terrorist events.

The 2012 Alameda County Emergency Operations Plan (EOP) identifies two incidents in the county:

- August 8, 2003—Two bombings at the Chiron Corp in Emeryville were attributed to a faction of the Animal Liberation Front (Alameda County EOP 2012).
- September 9, 2003—A bombing at Shaklee Corp in Pleasanton was attributed to a faction of the Animal Liberation Front (Alameda County EOP 2012).

Cyber Threats

On December 1, 2014, a global cyber-attack shut down web access to agenda, minutes, and video for many Bay Area government agencies, including Alameda County. The San Francisco-based company Granicus, which provides web services for government agencies nationwide, reported the outage (Johnson 2014).

In December 2015, University of California at Berkeley experienced a massive cyber-attack that left upwards of 80,000 people exposed to cyber-crime. The university is one of the largest employers in the Bay Area, and this cyber-attack reached beyond jurisdictional and county lines to affect the entire Bay Area (Bay City News, 2015).

Civil Unrest

The 2012 Alameda County EOP and other resources identify the following civil unrest incidents:

- January 7, 2009—This was the most notorious civil disturbance in Alameda County and occurred as a response to shooting by a Bay Area Rapid Transit police officer. It began as a peaceful protest but turned into a destructive riot resulting in trash can fires, multiple cars set on fire, broken storefront windows, and looting of stores (Alameda County EOP 2012).
- October 20, 2011— Occupy Oakland protesters took to the streets in Oakland over economic inequality, corporate excess, and homelessness. Hundreds of participants set up tents in Frank Ogawa Plaza. Some arrests were made for disruptive behavior; however, for the most part, the protest remained peaceful (Alameda County EOP 2012).
- November 24 – December 10, 2014—After the a grand jury decision in the Michael Brown case in Ferguson, MO, there was a 17-day revolt in Oakland that resulted in marches, blocked roadways, looting of businesses, destruction of property, and arrests (CrimethInc 2014).

Technological Hazards

Hazardous Materials

Alameda County and its incorporated cities have experienced many accidental hazardous materials incidents. On November 7, 2007, a container ship struck a pier bumper at the western span of the Bay Bridge, which caused 58,000 gallons of bunker fuel to be released into the water. Oil slicks, oil globs, and oiled and dead wildlife were reported around the Bay and Pacific coastline. Beaches, marines and other shoreline areas were closed for cleanup in Alameda County and surrounding areas. In 2009, an oil tanker, located south of the Bay Bridge, was being fueled when human errors caused the tanks to overflow. This released 400 gallons of fuel into the bay and led to birds being oiled and approximately 6 miles of East Bay being oiled, specifically Bay Farm Island and Alameda Island (Alameda County EOP 2012).

Pipeline Incidents

Accidents involving underground pipelines in Alameda County have caused injury, fatalities and property damage. Recent events have involved natural gas lines in Oakland, Union City, Berkeley, and Livermore. There have been incidents involving hazardous liquids as well, including an event on May 20, 2016 involving crude oil in Tracy (PHSMA 2016).

Transportation Accidents

According to the 2012 Alameda County EOP, the County has not experienced an incident of a commercial flight or large plane. However, a number of general aviation aircraft incidents have occurred. These types of incidents are typically localized and somewhat contained.

Alameda County has experienced train derailments in the past. Recent events have been small, with minimal damage. In August 2004, a non-hazmat car derailed and two tank cars carrying methanol were damaged. Material release was not reported. In July 2005, a train derailed near a Kinder Morgan pipeline, which had to be shut down in case of any release (Alameda County EOP 2012).

Local

Intentional Hazards

The Planning Area has not directly experienced intentional threats. However, the Planning Area may have experienced the indirect impacts of events identified in the state and regional incidents identified above.

Technological Hazards

Hazardous Materials

Although hazardous material incidents can happen almost anywhere, certain areas are at higher risk. Jurisdictions near roadways that are frequently used for transporting hazardous materials and jurisdictions with industrial facilities that use, store, or dispose of such materials all have an increasing potential for major incidents, as do jurisdictions crossed by certain railways, waterways, airways and pipelines. Hazardous materials are transported through the Planning Area via highways and pipelines. The Planning Area's level of exposure to hazardous materials can be understood by examining the type of businesses, commercial traffic routes, and highway exposure.

California Governor's Office of Emergency Services (Cal OES) Spill Release Archive Files contain spreadsheet files that list all spills reported to the Cal OES Warning Center for a specific year. In 2015, there were eight reportable hazardous materials releases within the Planning Area (Newark and Union City). This year, through August 8, 2016, there have been 13 reportable hazardous materials releases so far, meeting the criteria that exceed reportable quantities.

Pipeline Incidents

According to data from the Pipeline and Hazardous Materials Safety Administration (PHSMA), between 1970 and 2016 there were 11 reported natural gas pipeline incidents in the Planning Area. Details regarding the incidents are limited. The most recent event occurred on June 18, 2015 in Union City, when Pacific Gas & Electric was notified of a structure fire that melted a meter manifold and regulator, causing an unintentional release of gas, which ignited. The gas was shut off, an apartment complex was damaged from the fire, and two nearby buildings were evacuated. One fatality was reported as a result of this incident. Damage exceeded $50,000 (PHSMA 2016a).

Transportation Accidents

Between 1970 and 2016, there have been seven aviation incidents and no highway incidents in Newark and Union City, as reported by the National Transportation Safety Board. The following is information regarding recent incidents in the Planning Area (NTSB 2016):

- July 30, 1993, Newark—A homebuilt airplane collided with barbed wire fencing while executing an emergency landing to an open field in the City of Newark. Severe vibration of the aircraft, a partial loss of a propeller blade, and loss of engine power led to this emergency landing. The aircraft was destroyed; the pilot sustained minor injuries. The flight originated at Cameron Airpark in Cameron Park, California.
- December 2, 1997, Union City—A Cessna T210N was substantially damaged during a forced landing at Union City. The aircraft was cleared for landing at Hayward Air Terminal; however, the pilot declared an emergency landing in a residential area. The pilot received minor injuries.

- November 24, 2002, Union City—Approximately 3 miles north of Union City, a Beech B36TC airplane cruised into upsloping mountainous terrain. The airplane was approaching the Palo Alto Airport, 12 nautical miles south of the crash site. Impact forces and post-crash ground fire destroyed the airplane. The pilot was fatally injured.
- February 26, 2011, Newark—A Cessna 140A nosed over during a forced landing following a loss of engine power near the City of Newark. The plane departed Palo Alto Airport in Palo Alto, California.

15.2.2 Location

Intentional Hazards

Terrorism, Civil Unrest, and Active Threats

The State of California and Office of Homeland Security have identified numerous high-profile targets for potential terrorists in California. Large population centers, high-visibility tourist attractions, and critical infrastructure accessible to the public present security challenges of an ongoing nature in California. The network of highways, railways, ports, and airports used to transport significant amounts of hazardous materials poses a significant technological hazards threat. Multiple incidents may happen simultaneously, and all typically require a multi-agency, multi-jurisdictional response.

Cyber Threats

Both public and private operations in the Cities of Newark and Union City are threatened on a near-daily basis by the millions of currently engineered cyber-attacks developed to automatically seek technological vulnerabilities. Possible cyberterrorist targets include the banking industry, power plants, air traffic control centers, and water systems; especially facilities that rely on computers, computer systems, and programs for their operations.

Technological Hazards

Hazardous Materials Release

Hazardous materials are stored before and after they are transported to their intended use. This may include service stations that store gasoline and diesel fuel in underground storage tanks; hospitals that store radioactive materials, flammable materials and other hazardous substances; or manufacturers, processors, distributors, and recycling plants for chemical industries that store a variety of chemicals on site (FEMA 2013e). For the purpose of this plan, fixed sites include buildings or property where hazardous materials are manufactured or stored, and are regulated under various programs by the EPA.

The Toxic Substances Control Act of 1976 (TSCA) provides the EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from TSCA, including food, drugs, cosmetics, and pesticides. TSCA addresses the production, importation, use, and disposal of specific chemicals, including polychlorinated biphenyls (PCBs), asbestos, radon, and lead-based paint. According to TSCA, there are two TSCA facilities located in Union City.

Facilities identified in the Resource Conservation and Recovery Act Information databases (RCRA Info) were also reviewed for this plan. Hazardous waste information is contained in RCRA Info, a national program management and inventory system about hazardous waste handlers. In general, entities that generate, transport, treat, store, and dispose of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies pass on the information to regional and national EPA offices. This regulation is governed by the RCRA, as amended by the Hazardous and Solid Waste Amendments of 1984. There are 77 RCRA facilities in Union City and 101 facilities in Newark.

Pipelines and Utilities

Distribution pipelines run through highly populated areas providing refined materials for public use and consumption. Large gas distribution lines, called “mains,” along with much smaller service lines that travel to homes and businesses, account for the vast majority of underground pipeline system.

Approximately 300,000 miles of gas transmission pipelines and 170,000 miles of hazardous liquid pipelines move their products throughout the United States every day. Transmission pipelines connect urban areas, and only occasionally traverse highly populated areas. Nearly all distribution pipelines, however, are concentrated in highly populated areas. Distribution pipelines serve homes and businesses and thus are located where people work and live (O’Neill 2015). Because of the extensive reach of the distribution system, incidents have the potential to be far-reaching. For example, a pipeline leak may release material into a migration pathway, such as a sewer line, and reach an ignition source far from the location of the actual leak. In the City of Newark, there are 131 miles of under-road pipelines. This includes two large Pacific Gas & Electric owned and operated high pressure gas lines and the Hetch Hetchy pipelines (ABAG HMP 2010).

Figure 15-2 shows gas transmission and hazardous liquid pipelines in or near the Planning Area. The primary operator of the gas transmission pipelines is Pacific Gas & Electric. The primary operator for the hazardous liquid pipeline is Shell Pipeline Company (PHMSA 2016b).

Source: PHMSA National Pipeline Mapping System 2016

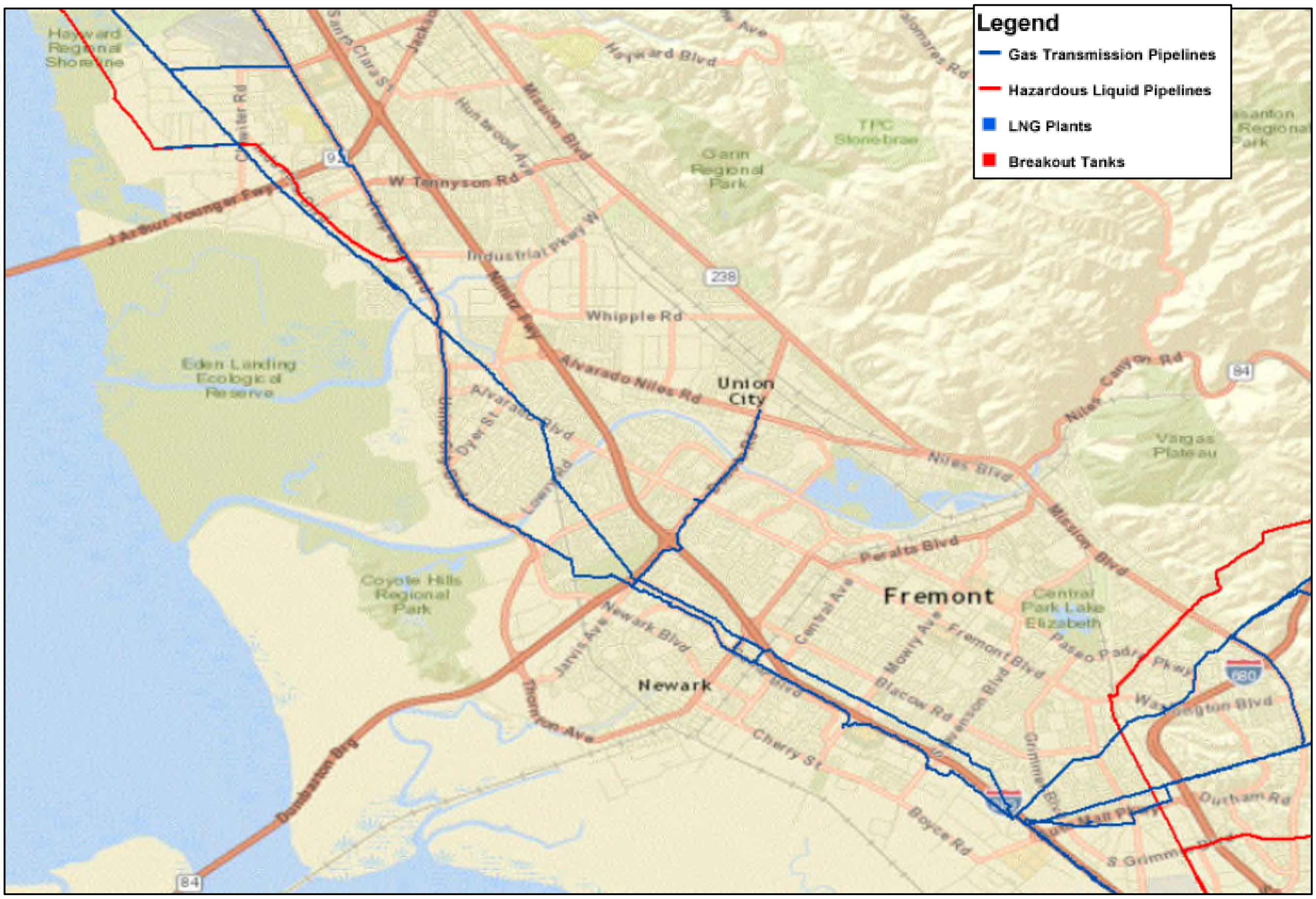


Figure 15-2. Gas Transmission and Hazardous Liquide Pipeline Near the Cities of Newark and Union City

Kinder Morgan is the largest independent transporter of petroleum products in North America, transporting approximately 2.1 million barrels per day. The company's Product Pipelines business moves gasoline, jet fuel, diesel, natural gas liquids and condensate through about 9,000 miles of pipeline, as shown on Figure 15-3. Kinder Morgan's system through the Bay Area includes the North Line, which consists of 864 miles of trunk pipeline in five segments transporting products from Richmond and Concord in California to Brisbane, Sacramento, Chico, Fresno, Stockton and San Jose in California, and Reno, Nevada. The products delivered through the North Line come from refineries in the San Francisco Bay Area and from various pipeline and marine terminals.

Source: Kinder Morgan 2015

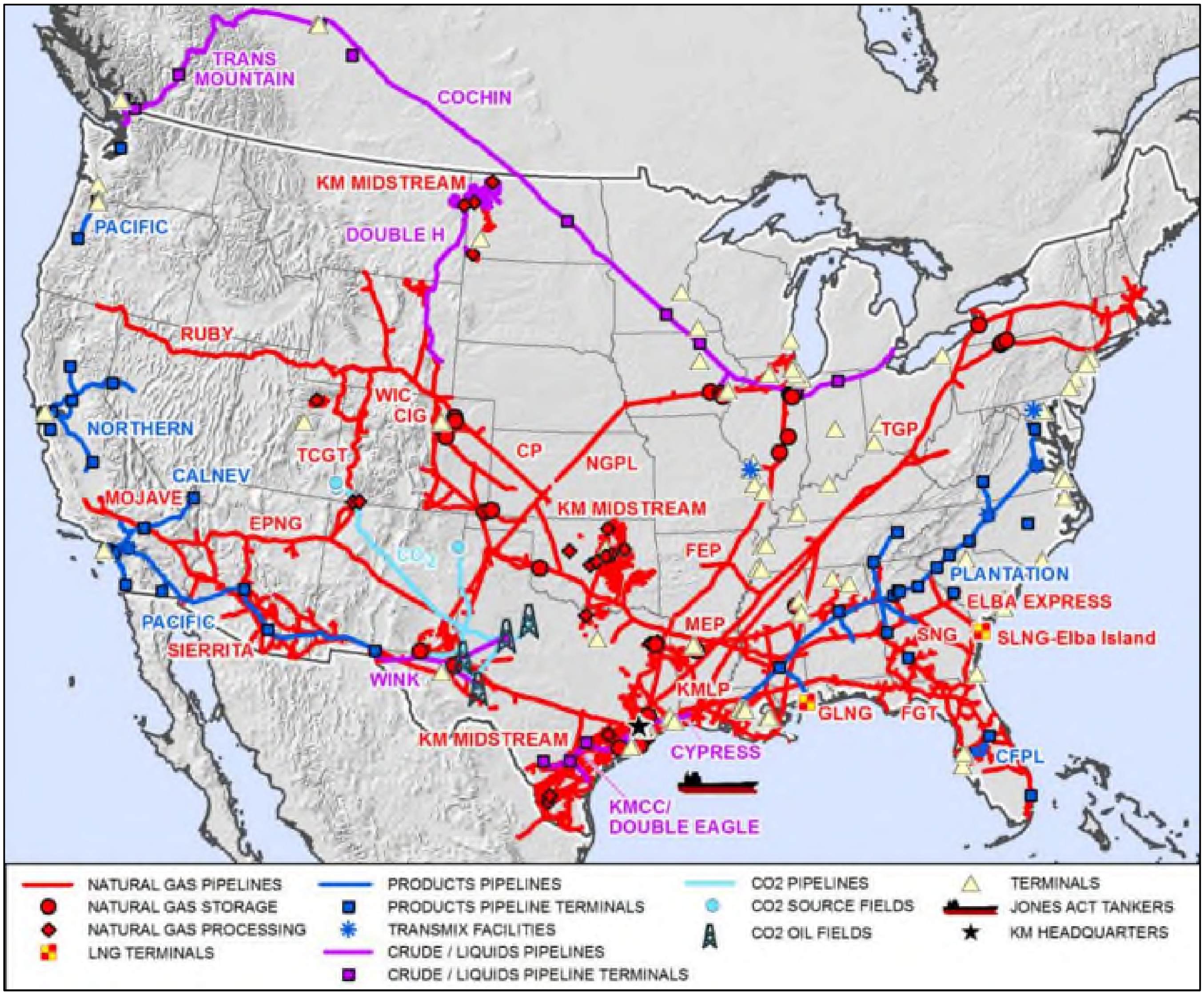


Figure 15-3. Kinder Morgan National Pipeline Map

ACWD has three primary sources of water: the State Water Project, San Francisco's Regional Water System and local supplies. The State Water Project and Regional Water System supplies are imported into the District service area through the South Bay Aqueduct and Hetch Hetchy Aqueduct. Local supplies include fresh groundwater from the Niles Cone Groundwater Basin (underlying the District service area), desalinated brackish groundwater from portions of the groundwater basin previously impacted by seawater intrusion, and surface water from the Del Valle Reservoir. Figure 15-4 illustrates the water distribution for ACWD.

Source: ACWD 2016c

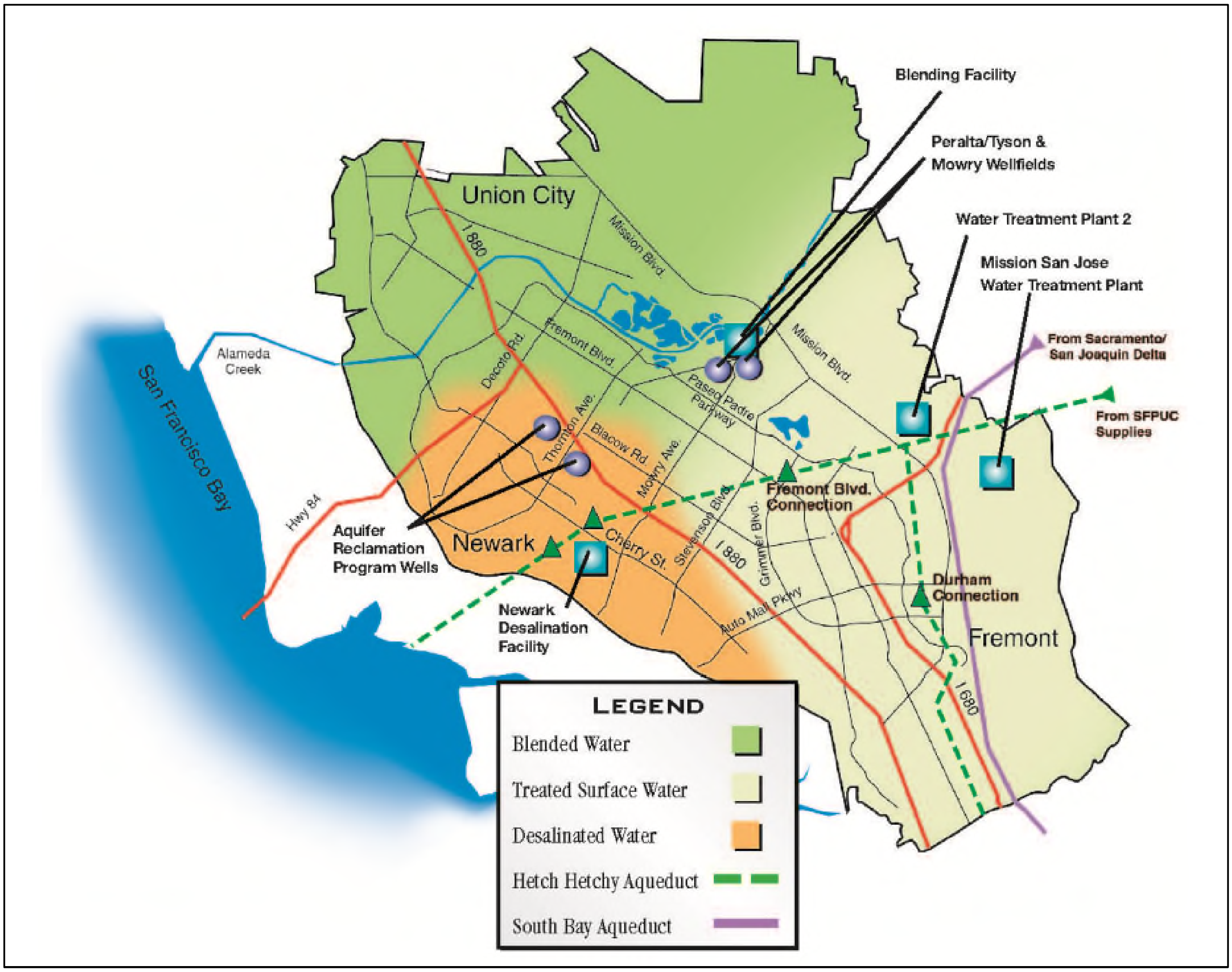


Figure 15-4. Water Distribution from ACWD's Water Sources

The Union Sanitary District (USD) operates a 33 million gallon per day wastewater treatment facility in Union City and provides collection, treatment and disposal services to over 347,000 people in the cities of Fremont, Newark and Union City. The USD maintains over 800 miles of underground pipeline in its service area (USD 2016).

Vulnerabilities have been identified for both ACWD and USD. Their annexes in Volume 2 provide details.

Transportation Incidents

Incidents involving hazardous materials in transit or incidents occurring on roads and rail can occur through a variety of vehicles in and around the Newark/Union City Planning Area. In the City of Newark, there are 153 miles of road, 8 miles of commuter rails, and 10 miles of transportation rails. In the City of Union City, there are 188 miles of roadway and 17 miles of rail (ABAG HMP 2010).

15.2.3 Frequency

Intentional Hazards

Terrorism, Civil Unrest, and Active Threats

As of 2015, California's economy was the largest of any state in the United States. The Planning Area's proximity to San Francisco and Silicon Valley presents unique conditions for terrorist attacks. The transportation, energy, and communications systems that cross the Planning Area have impacts on the local, regional, and even national economy. In general, the risks of a terrorist event involving a WMD are as follows:

- **Chemical**—The risk of a chemical event is present in the Cities of Newark and Union City. The agricultural community in Alameda County uses and stores significant amounts of chemicals for peaceful and productive means that could be used in destructive ways.
- **Explosives**—Pipe bomb and suspicious package events have occurred in Alameda County in the past. While none of the events has been specifically identified as a WMD-related attack, the elements necessary to construct a WMD are readily available. Additionally, the agricultural communities maintain sufficient products and quantities for use in explosive events.
- **Radiological/Nuclear**—The major transportation arteries for vehicles or rail that cross through the Planning Area contribute to the risk of a radiological event. Such products can unknowingly pass through any one of the regional transportation corridors.
- **Biological**—Anthrax incidents that occurred in the United States in October 2001 demonstrate the potential for spreading terror through biological WMDs. The introduction of Newcastle disease in the United States demonstrates how an agent can be introduced to livestock, causing harm to public health and the economy.
- **Combined Hazards—**WMD agents can be combined to have a greater total effect. When combined, the impacts of the event can be immediate and longer-term. Casualties will likely suffer from both immediate and long-term burns and contamination. Given the risks associated with chemical agents in Alameda County, the possibility exists for such a combined event to occur.

Cyber Threats

Cyber-attacks are experienced on a daily basis, often without being noticed. Up-to-date virus protection software used in both public and private sectors prevent most cyber-attacks from becoming successful. Programs that promote public education to that end are also an effective way in which to mitigate cyber threats.

Cyberterrorism is much less common than cyber-attacks, and the frequency is unknown.

Technological Hazards

Hazardous material incidents may occur at any time in the Cities of Newark and Union City, given the presence of transportation routes bisecting the Planning Area, the location of businesses and industry that use hazardous materials, the presence of scattered illegitimate businesses such as clandestine drug laboratories at any given time, and the improper disposal of hazardous waste.

15.2.4 Severity

The severity of human-caused hazards could range from a minor transportation accident or power outage to a full-scale terrorist attack.

The term mass casualty incident (MCI) is often applied to transportation accidents involving air and rail travel, as well as multi-vehicle highway accidents. However, MCIs may also result from hazardous materials incidents or acts of violence, such as shootings or hostage situations. Effects may include serious injuries, loss of life, and associated property damage. Because large numbers of patients may be involved, significant MCIs may tax local emergency medical and hospital resources, and therefore require a regional response. MCIs may occur throughout the Planning Area, day or night, at any time of the year: Interstate 880 (Nimitz Freeway) and State Route 84 (Dumbarton Freeway) offer the potential for MCIs because of the heavy volume of traffic, although no highway or surface street in the City is exempt from this hazard.

The railroad tracks traversing Alameda County, carrying Amtrak passengers as well as freight, also face the risk of an MCI, as do the air corridors above the county. Adverse weather may play a role in roadway, air, or rail accidents. MCIs may also result from acts of violence or terrorism, which could include a chemical, biological or radiological incident, contaminating persons and requiring mass decontamination.

15.2.5 Warning Time

Very few terrorism incidents are preceded by a warning. Technological accidents occur without predictability under circumstances that give responders little time to prepare.

15.3 SECONDARY HAZARDS

The largest secondary impact caused by human-caused hazards would be economic, and could be significant:

- The cost of a terrorist act would be felt in terms of loss of life and property, disruption of business activity and long-term emotional impacts. Recovery would take significant resources and expense at the local level.
- The economic impact of computer security breaches associated with data and telecommunications losses can be staggering.
- Pipeline and tank failure impacts can include both the cost of community recovery for the area surrounding the failure site and the cost of disruption of services for the transported material.
- A large aircraft accident could have compounding effects on the economy, from recovery needs if an aircraft accident occurred in a residential neighborhood, to revenue lost from cancelled incoming flights.
- Hazardous materials releases have the potential to cause major disruptions to local businesses that house hazardous materials. Additionally, a hazardous materials release could cause businesses to close if they are located in the path of the hazardous materials flow.

15.4 EXPOSURE

The risk assessment for this hazard is based on a facility’s criticality and physical vulnerability:

- Criticality is a measure of the potential consequence of an accidental or terrorist event as well as the attractiveness of the facility to a potential adversary or threat. The criticality for each critical facility is based on the factors shown in Table 15-3.
- Vulnerability is a measure of the physical opportunity for an accident or an adversarial attack. This assessment takes into consideration physical design, existing countermeasures, and site layout. The vulnerability for each critical facility is based on the criteria shown in Table 15-4.

Table 15-3. Criticality Factors

Criterion	Low Criticality	Medium Criticality	High Criticality
Awareness[a]	Not known/Neighborhood	City/Region/County	State/National
Hazardous Materials[b]	None / limited and secure	Moderate to large and secure	Large, minimum or no security
Collateral Damage Potential[c]	None or low	Moderate/immediate area or within 1 mile radius	High/immediate area or within 1 mile radius
Site Population[d]	0 – 300	301 – 1,000	1,001 or greater
Public/ Emergency Function[e]	No emergency function, or could be used for emergency function in the future	Support emergency function—redundant site	Emergency function—critical service with or without redundancy

a. Awareness—How aware is the public of the existence of the facility, site, system, or location?
b. Hazardous Materials—Are flammable, explosive, biological, chemical and/or radiological materials present on site?
c. Collateral Damage Potential—What are the potential consequences for the surrounding area if the asset is attacked or damaged?
d. Site Population—What is the potential for mass causalities, based on the capacity of the facility.
e. Public or Emergency Functions—Does the facility perform a function during an emergency? Is this facility or function capable of being replicated elsewhere?

Table 15-4. Vulnerability Criteria

Criterion	Low Vulnerability	Medium Vulnerability	High Vulnerability
Accessibility[a]	Remote location, secure perimeter, tightly controlled access	Controlled access, protected or unprotected entry	Open access, unrestricted, patrolling security, sign restrictions
Automobile Proximity[b]	Not within 75' – 100'	Not within 25' – 50'	Adjacent or not within 10'
Asset Mobility[c]	Moves or is relocated frequently	Moves or is relocated occasionally	Permanent/Fixed
Proximity to other Critical Facilities[d]	Greater than 1.5 – 2 miles	Greater than 3/4 – 1 mile	Within 1/2 – 3/4 mile
Secure Design[e]	No areas for concealment of packages, air intakes are on roof, access ways are not under the structure.	Area of concealment present, greater than 25' from the structure; Air intakes located at least 10' above ground, may have under structure access drives.	Areas of concealment within 25', air intakes at ground level, under structure access drives.

a. Accessibility—How accessible is the facility or site to the public?
b. Automobile Proximity—How close can an automobile get to the facility? How vulnerable is the facility to a car bomb attack?
c. Asset Mobility—Is the facility or asset's location fixed or mobile? If mobile, how often is it moved, relocated, or repositioned?
d. Proximity to other critical facilities—If the facility is close to other critical facilities then there could be an increased probability of the facility receiving collateral damage.
e. Secure design—General evaluation of areas of obstruction, air intake locations, parking lot and road design and locations and other site design aspects.

15.4.1 Population

A human-caused hazard event could range from an isolated accident to a coordinated attack by multiple agents upon multiple targets. Large-scale incidents have the potential to kill or injure many citizens in the immediate vicinity, and may also affect people a relative distance from the initial event. Variables affecting exposure for a WMD attack and a hazardous material accident include the physical and chemical properties of the WMD, the ambient temperature, wind speed, wind direction, barometric pressure, and humidity.

Computer models can provide general data to first responders to advise evacuations or sheltering in place. With so many variables to determine "toxic endpoints" as defined by the California Environmental Protection Agency, distances are difficult to forecast. In general, those close to transportation corridors or businesses with acutely hazardous materials are more at risk for some sort of effect. Each chemical incident will be different and the scenarios are too numerous to describe in this plan.

Hazardous materials pose a significant risk to emergency response personnel. All potential first responders and follow-on emergency personnel must be properly trained to the level of emergency response actions required of their individual position at the response scene. Hazardous materials also pose a serious long-term threat to public health and safety, property and the environment.

15.4.2 Property

The Planning Area is located in Alameda County, among the fastest growing counties in California, making it a higher profile target for terrorism. Additionally, the Planning Area's proximity to San Francisco and Silicon Valley make it vulnerable to secondary and cascading effects of a possible terrorist threat.

15.4.3 Critical Facilities and Infrastructure

There are no high profile federal or state buildings in the Planning Area. Critical facilities are limited to City facilities, Alameda County facilities, and other government facilities such as the U.S. Post Office, private utility infrastructure and administrative offices, and medical facilities.

15.4.4 Environment

The risk of human-caused hazards to the environment is considerable. Hazardous materials spilled along roads or railways could easily pollute rivers, streams, wetlands, riparian areas and adjoining fields. Other hazardous materials released into the air could severely impact plant and animal species. Reducing the risk exposure to the built environment can also mitigate potential losses to the natural environment.

15.5 VULNERABILITY

15.5.1 Population

Although human-caused hazards have not resulted in a large number of deaths in this area, this type of hazard can be deadly and widespread. Injuries and casualties were not estimated for this hazard. Any individuals exposed to human-caused hazards are considered to be at risk, particularly those working as first responder professionals.

15.5.2 Property

All structures in the Planning Area are physically vulnerable to a human-caused hazard. The emphasis on accessibility, the opportunity for roof access, driveways underneath some structures, unmonitored areas, the proximity of many structures to transportation corridors and underground pipelines, and the potential for a terrorist to strike any structure randomly all have an impact on the vulnerability of structures.

15.5.3 Critical Facilities and Infrastructure

Most critical facilities and infrastructure in the Planning Area would be vulnerable to human-caused hazards, including utilities, data and telecommunications systems, and transportation facilities.

15.5.4 Environment

The environment vulnerable to a human-caused hazard is the same as the environment exposed to the hazard. While human-caused disasters have caused significant damage to the environment, estimating damage can be difficult. Loss estimation platforms such as Hazus-MH are not equipped to measure environmental impacts of these types of hazards. The best gauge of vulnerability of the environment would be a review of damage from past human-caused hazard events. Loss data for damage to the environment were not available at the time of this plan update. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates.

15.5.5 Economic impacts

Economic impacts from human-caused hazards could be significant. The cost of a terrorist act would be felt in terms of loss of life and property, disruption of business activity and long-term emotional impacts. Recovery would take significant resources at the local level.

Utility losses could cause a reduction in employment, wholesale and retail sales, utility repairs, and increased medical risks. The Planning Area may lose sales tax and property taxes, and the finances of private utility companies and the businesses that rely on them would be disrupted.

The economic impact of data and telecommunications losses can be great, as computer security breaches, crime conducted via the world wide web such as identify theft, and many more forms of human-caused economic losses occur daily. Millions of dollars are lost each year as criminals and cyberterrorists steal sensitive information and funds from individuals and organizations.

The economic impacts would be significant if a transportation facility were rendered impassable. The loss of a roadway or railway would have serious effects on the Planning Area's economy and ability to provide services. Loss of travel routes on Interstate 880 would result in loss of commerce, and may impact the Planning Area's ability to provide emergency services to its citizens by delaying response times or limiting routes for egress to critical healthcare facilities or ingress of equipment such as fire apparatus, police vehicles, and ambulances. Fuel deliveries would also be impacted. The effects of re-routed traffic could also have a serious impact on local roadways. Heavy traffic on routes through the Planning Area already occur at peak commute times when Interstate 880 and the Dumbarton Bridge are congested.

15.6 FUTURE TRENDS IN DEVELOPMENT

The potential for human-caused hazards is not likely to lessen or prohibit development in the Planning Area. The threat of human-caused hazards and the availability of Homeland Security Funds will influence future development of critical facilities.

15.7 SCENARIO

Two human-caused hazard scenarios could have a significant impact on the Planning Area:

- The first scenario would involve hazardous materials being transported via rail, pipeline, or highway (Interstate 880) across the Planning Area. The release of hazardous materials via intentional or unintentional means could impact large population centers within the Planning Area. Advance knowledge of these shipments and their contents would play a role in preparedness for this scenario, thus reducing its potential impact. The biggest issue in response to hazardous material is material identification and containment.
- The second scenario would be a large-scale cyber-attack on multiple county and local governments throughout the Bay Area. Such an attack would require the Planning Area governments to revert to non-network based operations and put a strain on daily operations. If such an attack would last for an extended period of time, fiscal operations may be impacted.

15.8 ISSUES

Future actions needed at the local level to address human-caused hazards include but are not limited to the following:

- Continue all facets of emergency preparedness training for police, fire, public works, and city manager/public information staff in order to respond quickly in the event of a human-caused disaster. Enhance awareness training for all employees to recognize threats or suspicious activity in order to prevent an incident from occurring.
- Utilize Crime Prevention Through Environmental Design (CPTED) in future planning efforts as well as enhancing existing infrastructure and buildings to prevent or mitigate human-cause incidents. CPTED is an urban planning design process that integrates crime prevention with neighborhood design and community development. CPTED is based on the theory that the proper design and effective use of the built environment can reduce crime and the fear of crime and improve the quality of life. CPTED creates an environment where the physical characteristics, building layout, and site planning allow inhabitants to become key agents in ensuring their own security.
- Work with the private sector to enhance and create business continuity plans in the event of an emergency.

Future actions needed at the regional level to address human-caused hazards include but are not limited to the following:

- Participate in regional, state and federal efforts to gather terrorism information at all levels and keep public safety officials briefed at all times regarding any local threats. Staff will then further develop response capabilities based on emerging threats.
- Participate in the Cal OES Disaster Resistant California annual conference and other training sessions sponsored by regional, state and federal agencies.
- Participate in regional training exercises per the requirements of Homeland Security Presidential Directive #8 in support of national preparedness. These training exercises, sponsored by the Sacramento Regional Office of Homeland Security, will test and evaluate the ability to coordinate the activities of city, county and state government first responders, volunteer organizations and the private sector in responding to terrorism and technological hazards. The trainings will enhance interagency coordination, provide training to staff, test response and recovery capabilities, and activate the National Incident Management System and the mutual aid system.
- Review existing automatic/mutual aid agreements with other public safety agencies to identify opportunities for enhancement.

16. RISK RANKING

A risk ranking was performed for the hazards of concern described in this plan. This risk ranking assesses the probability of each hazard's occurrence as well as its likely impact on the people, property, and economy of the Planning Area. The risk ranking was conducted via facilitated brainstorming sessions with the Steering Committee. Estimates of risk were generated with data from Hazus-MH using methodologies promoted by FEMA. The results are used in establishing mitigation priorities.

16.1 PROBABILITY OF OCCURRENCE

The probability of occurrence of a hazard is indicated by a probability factor based on likelihood of annual occurrence:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor =2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor =1)
- No exposure—There is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. Table 16-1 summarizes the probability assessment for each hazard of concern for this plan.

Table 16-1. Probability of Hazards

Hazard Event	Probability (high, medium, low)	Probability Factor
Dam Failure	Low	1
Drought	High	3
Earthquake	High	3
Flooding	High	3
Landslide	Medium	2
Severe Weather	High	3
Wildfire	High	3

16.2 IMPACT

Hazard impacts were assessed in three categories: impacts on people, impacts on property and impacts on the local economy. Numerical impact factors were assigned as follows:

- **People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows:
  - High—50 percent or more of the population is exposed to a hazard (Impact Factor = 3)

- Medium—25 percent to 49 percent of the population is exposed to a hazard (Impact Factor = 2)
- Low—25 percent or less of the population is exposed to the hazard (Impact Factor = 1)
- No impact—None of the population is exposed to a hazard (Impact Factor = 0)

- **Property**—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event:
  - High—30 percent or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
  - Medium—15 percent to 29 percent of the total assessed property value is exposed to a hazard (Impact Factor = 2)
  - Low—14 percent or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)

- **Economy**—Values were assigned based on the percentage of the total ***property value vulnerable*** to the hazard event. Values represent estimates of the loss from a major event of each hazard in comparison to the total assessed value of the property exposed to the hazard. For some hazards, such as wildfire, landslide and severe weather, vulnerability was considered to be the same as exposure due to the lack of loss estimation tools specific to those hazards. Loss estimates separate from the exposure estimates were generated for the earthquake and flood hazards using Hazus-MH.
  - High—Estimated loss from the hazard is 20 percent or more of the total exposed property value (Impact Factor = 3)
  - Medium—Estimated loss from the hazard is 10 percent to 19 percent of the total exposed property value (Impact Factor = 2)
  - Low—Estimated loss from the hazard is 9 percent or less of the total exposed property value (Impact Factor = 1)
  - No impact—No loss is estimated from the hazard (Impact Factor = 0)

The impacts of each hazard category were assigned a weighting factor to reflect the significance of the impact. These weighting factors are consistent with those typically used for measuring the benefits of hazard mitigation actions: impact on people was given a weighting factor of 3; impact on property was given a weighting factor of 2; and impact on the economy was given a weighting factor of 1.

Table 16-2, Table 16-3 and Table 16-4 summarize the impacts for each hazard.

16.3 RISK RATING AND RANKING

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors for people, property and operations, as summarized in Table 16-5.

Based on these ratings, a priority of high, medium or low was assigned to each hazard. The hazard ranked as being of highest concern is earthquake. Hazards ranked as being of medium concern are severe weather, dam failure, flood and wildfire. The hazards ranked as being of lowest concern are drought and landslide. Table 16-6 shows the hazard risk ranking.

Table 16-2. Impact on People from Hazards

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (3)
Dam Failure	High	3	3x3=9
Drought	None	0	0x3=0
Earthquake	High	3	3x3=9
Flooding	Low	1	1x3=3
Landslide	Low	1	1x3=3
Severe Weather	High	3	3x3=9
Wildfire	Low	1	1x3=3

Table 16-3. Impact on Property from Hazards

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (2)
Dam Failure	High	3	3x2=6
Drought	None	0	0x2=0
Earthquake	High	3	3x2=6
Flooding	Low	1	1x2=2
Landslide	Low	1	1x2=2
Severe Weather	None	0	0x2=0
Wildfire	Low	1	1x2=2

Table 16-4. Impact on Economy from Hazards

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (1)
Dam Failure	High	3	3x1=3
Drought	Low	1	1x1=1
Earthquake	High	3	3x1=3
Flooding	Low	1	1x1=1
Landslide	Low	1	1x1=1
Severe Weather	Medium	2	2x1=2
Wildfire	Low	1	1x1=1

Table 16-5. Hazard Risk Rating

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Dam Failure	1	18	1x18=18
Drought	3	1	3x1=3
Earthquake	3	18	3x18=54
Flooding	3	6	3x6=18
Landslide	2	6	2x6=12
Severe Weather	3	11	3x11=33
Wildfire	3	6	3x6=18

Table 16-6. Hazard Risk Ranking

Hazard	Rating Number	Category
Earthquake	54	High
Severe Weather	33	Medium
Flood	18	Medium
Wildfire	18	Medium
Dam Failure	18	Medium
Landslide	12	Low
Drought	3	Low

Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

PART 3—MITIGATION STRATEGY

17. GOALS AND OBJECTIVES

Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44 CFR Section 201.6(c)(3)(i)). The Steering Committee established a guiding principle, a set of goals and measurable objectives for this plan, based on data from the preliminary risk assessment and the results of the public involvement strategy. The guiding principle, goals, objectives and actions in this plan all support each other. Goals were selected to support the guiding principle. Objectives were selected that met multiple goals. Actions were prioritized based on the action meeting multiple objectives.

17.1 GUIDING PRINCIPLE

A guiding principle focuses the range of objectives and actions to be considered. This is not a goal because it does not describe a hazard mitigation outcome, and it is broader than a hazard-specific objective. The Steering Committee recognized that the goal defined in the previous ABAG plan better served as a guiding principle. As a result, they elected to slightly revise the ABAG goal as a local guiding principle for the Planning Area:

> Through partnerships, maintain and enhance the disaster resistance of Union City and Newark by reducing the potential loss of life, property, damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.

17.2 GOALS

The following are the seven mitigation goals for this plan:

1. Protect the public's health and safety and minimize damage to essential services, structures, property, and infrastructure as a result of hazards.
2. Promote hazard mitigation as an integrated public policy and as a standard business practice.
3. Encourage the development and implementation of long-term, cost effective, and environmentally sound mitigation projects.
4. Build and support local capacity to enable the public to prepare, respond, and recover from the impact of natural hazards.
5. Provide increased safety through the provision of adequate infrastructure, public education, and outreach programs.
6. Incorporate elements of hazard mitigation into cross-functional planning and regulatory initiatives.
7. Retrofit, purchase, or relocate structures in high hazard areas, especially those known to be repetitively damaged.

The effectiveness of a mitigation strategy is assessed by determining how well these goals are achieved.

17.3 OBJECTIVES

Each selected objective meets multiple goals, serving as a stand-alone measurement of the effectiveness of a mitigation action, rather than as a subset of a goal. The objectives also are used to help establish priorities. The objectives are as follows:

1. Advance community resilience through preparation, adoption, and implementation of state, regional and local hazard mitigation plans and projects.
2. Create financial and regulatory incentives to motivate stakeholders such as homeowners, private sector businesses, and nonprofit community organizations to mitigate hazards and risk.
3. Incorporate risk reduction considerations in new and updated infrastructure and development plans to reduce the impacts of hazards.
4. Develop and provide updated information about threats, hazards, vulnerabilities, and mitigation strategies to state, regional, and local agencies, as well as private sector groups.
5. Establish and maintain partnerships among all levels of government, private sector, community groups, and institutions of higher learning that improve and implement methods to protect life and property.
6. Improve the quality and effectiveness of local hazard mitigation planning through effective training and guidance that strengthens linkages between the Union City/Newark hazard mitigation plan, general plan safety elements, and California's statewide hazard mitigation plan.
7. Promote and enhance outreach and education efforts by state, regional and local agencies with hazard mitigation plans and programs to actively encourage engagement of stakeholder groups such as homeowners, private sector businesses, and nonprofit community organizations.
8. Improve transportation conditions through infrastructure and program improvements to provide better access for response personnel and provide residents with a means of egress during a disaster.
9. Support the protection of vital records, and strengthening or replacement of buildings, infrastructure, and lifelines to minimize post-disaster disruption and facilitate short-term and long-term recovery.
10. Maximize the likelihood that structures are modified, as necessary, over time to meet life safety standards.
11. Research, develop, and promote adoption of cost-effective building and development laws, regulations, and ordinances exceeding the minimum levels needed for life safety.
12. Incorporate considerations for future conditions and impacts of climate change into programmatic, regulatory, and development priorities.

18. MITIGATION ALTERNATIVES

Catalogs of hazard mitigation alternatives were developed that present a broad range of alternatives to be considered for use in the Planning Area, in compliance with 44 CFR (Section 201.6(c)(3)(ii)). One catalog was developed for each hazard of concern evaluated in this plan. The catalogs present alternatives that are categorized in two ways:

- By who would have responsibility for implementation:
  - Individuals (personal scale)
  - Businesses (corporate scale)
  - Government (government scale).
- By what the alternative would do:
  - Manipulate the hazard
  - Reduce exposure to the hazard
  - Reduce vulnerability to the hazard
  - Increase the ability to respond to or be prepared for the hazard.

Hazard mitigation actions recommended in this plan were selected from among the alternatives presented in the catalogs. The catalogs provide a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are within the capabilities of the planning partners to implement. Some of these actions may not be feasible based on the selection criteria identified for this plan. The purpose of the catalog was to provide a list of what could be considered to reduce risk of the flood hazard within the Planning Area. Actions in the catalog that are not included for the partnership's action plan were not selected for one or more of the following reasons:

- The action is not feasible.
- The action is already being implemented.
- There is an apparently more cost-effective alternative.
- The action does not have public or political support.

The catalogs for each hazard are presented in Table 18-1 through Table 18-7.

Table 18-1. Alternatives to Mitigate the Dam Failure Hazard

Personal-Scale	Corporate-Scale	Government-Scale
• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ Relocate out of dam failure inundation areas. • **Reduce vulnerability to the hazard:** ❖ Elevate home to appropriate levels. • **Increase the ability to respond to or be prepared for the hazard:** ❖ Learn about risk reduction for the dam failure hazard. ❖ Learn the evacuation routes for a dam failure event. ❖ Educate yourself on early warning systems and the dissemination of warnings.	• **Manipulate the hazard:** ❖ Remove dams. ❖ Remove levees. ❖ Harden dams. • **Reduce exposure to the hazard:** ❖ Replace earthen dams with hardened structures. • **Reduce vulnerability to the hazard:** ❖ Flood-proof facilities within dam failure inundation areas. • **Increase the ability to respond to or be prepared for the hazard:** ❖ Educate employees on the probable impacts of a dam failure. ❖ Develop a continuity of operations plan.	• **Manipulate the hazard:** ❖ Remove dams. ❖ Remove levees. ❖ Harden dams. • **Reduce exposure to the hazard:** ❖ Replace earthen dams with hardened structures ❖ Relocate critical facilities out of dam failure inundation areas. ❖ Consider open space land use in designated dam failure inundation areas. • **Reduce vulnerability to the hazard:** ❖ Adopt higher regulatory floodplain standards in mapped dam failure inundation areas. ❖ Retrofit critical facilities within dam failure inundation areas. • **Increase the ability to respond to or be prepared for the hazard:** ❖ Map dam failure inundation areas. ❖ Enhance emergency operations plan to include a dam failure component. ❖ Institute monthly communications checks with dam operators. ❖ Inform the public on risk reduction techniques ❖ Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas. ❖ Consider the probable impacts of climate in assessing the risk associated with the dam failure hazard. ❖ Establish early warning capability downstream of listed high hazard dams. ❖ Consider the residual risk associated with protection provided by dams in future land use decisions.

Table 18-2. Alternatives to Mitigate the Drought Hazard

Personal-Scale	Corporate-Scale	Government-Scale
• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Drought-resistant landscapes ❖ Reduce water system losses ❖ Modify plumbing systems (through water saving kits) • **Increase the ability to respond to or be prepared for the hazard:** ❖ Practice active water conservation	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Drought-resistant landscapes ❖ Reduce private water system losses • **Increase the ability to respond to or be prepared for the hazard:** ❖ Practice active water conservation	• **Manipulate the hazard:** ❖ Groundwater recharge through stormwater management • **Reduce exposure to the hazard:** ❖ Identify and create groundwater backup sources • **Reduce vulnerability to the hazard:** ❖ Reduce water system losses ❖ Distribute water saving kits ❖ Increase use of recycled water ❖ Diversify water supply diversion points ❖ Develop recycled water projects • **Increase the ability to respond to or be prepared for the hazard:** ❖ Public education on drought resistance ❖ Identify alternative water supplies for times of drought; mutual aid agreements with alternative suppliers ❖ Implement drought contingency plan ❖ Develop criteria "triggers" for drought-related actions ❖ Improve accuracy of water supply forecasts ❖ Prioritize groundwater projects for competitive funding

Table 18-3. Alternatives to Mitigate the Earthquake Hazard

Personal-Scale	Corporate-Scale	Government-Scale
• **Manipulate the hazard:** ❖ **None** • **Reduce exposure to the hazard:** ❖ **Locate outside of hazard area (off soft soils)** • **Reduce vulnerability to the hazard:** ❖ **Retrofit structure (anchor house structure to foundation)** ❖ **Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances)** ❖ **Build to higher design** • **Increase the ability to respond to or be prepared for the hazard:** ❖ **Practice "drop, cover, and hold"** ❖ **Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event** ❖ **Keep cash reserves for reconstruction** ❖ **Become informed on the hazard and risk reduction alternatives available.** ❖ **Develop a post-disaster action plan for your household**	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ Locate or relocate mission-critical functions outside hazard area where possible • **Reduce vulnerability to the hazard:** ❖ Build redundancy for critical functions and facilities ❖ Retrofit critical buildings and areas housing mission-critical functions • **Increase the ability to respond to or be prepared for the hazard:** ❖ Adopt higher standard for new construction; consider "performance-based design" when building new structures ❖ Keep cash reserves for reconstruction ❖ Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility. ❖ Develop a continuity of operations plan	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ Locate critical facilities or functions outside hazard area where possible • **Reduce vulnerability to the hazard:** ❖ Harden infrastructure ❖ Provide redundancy for critical functions ❖ Adopt higher regulatory standards ❖ Identify projects that limit transportation downtime • **Increase the ability to respond to or be prepared for the hazard:** ❖ Provide better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas (e.g., tax incentives, information) ❖ Include retrofitting and replacement of critical system elements in capital improvement plan ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components such as pipe, power line, and road repair materials ❖ Develop and adopt a continuity of operations plan ❖ Initiate triggers guiding improvements (such as <50% substantial damage or improvements) ❖ Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities. ❖ Develop a post-disaster action plan that includes grant funding and debris removal components. ❖ Identify food security strategies, including distribution priorities

Table 18-4. Alternatives to Mitigate the Flooding Hazard

Personal-Scale	Corporate-Scale	Government-Scale
• **Manipulate the hazard:** ❖ **Clear storm drains and culverts** ❖ **Use low-impact development techniques** • **Reduce exposure to the hazard:** ❖ **Locate outside of hazard area** ❖ **Elevate utilities above base flood elevation** ❖ **Use low-impact development techniques** • **Reduce vulnerability to the hazard:** ❖ **Raise structures above base flood elevation** ❖ **Elevate items within house above base flood elevation** ❖ **Build new homes above base flood elevation** ❖ **Flood-proof structures** • **Increase the ability to respond to or be prepared for the hazard:** ❖ **Buy flood insurance** ❖ **Develop household plan, such as retrofit savings, communication with outside, 72-hour self-sufficiency during and after an event**	• **Manipulate the hazard:** ❖ Clear storm drains and culverts ❖ Use low-impact development techniques • **Reduce exposure to the hazard:** ❖ Locate critical facilities or functions outside hazard area ❖ Use low-impact development techniques • **Reduce vulnerability to the hazard:** ❖ Build redundancy for critical functions or retrofit critical buildings ❖ Provide flood-proofing when new critical infrastructure must be located in floodplains • **Increase the ability to respond to or be prepared for the hazard:** ❖ Keep cash reserves for reconstruction ❖ Support and implement hazard disclosure for sale of property in risk zones. ❖ Solicit cost-sharing through partnerships with others on projects with multiple benefits.	• **Manipulate the hazard:** ❖ Maintain drainage system ❖ Institute low-impact development techniques on property ❖ Dredging, levee construction, and providing regional retention areas ❖ Structural flood control, levees, channelization, or revetments. ❖ Stormwater management regulations and master planning ❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff • **Reduce exposure to the hazard:** ❖ Locate or relocate critical facilities outside of hazard area ❖ Acquire or relocate identified repetitive loss properties ❖ Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. ❖ Adopt land development criteria such as planned unit developments, density transfers, clustering ❖ Institute low impact development techniques on property ❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff • **Reduce vulnerability to the hazard:** ❖ Harden infrastructure, bridge replacement program ❖ Provide redundancy for critical functions and infrastructure ❖ Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions. ❖ Stormwater management regulations and master planning. ❖ Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities. ❖ Preserve natural spaces that serve as buffers against flood • **Increase the ability to respond to or be prepared for the hazard:** ❖ Produce better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information) ❖ Incorporate retrofitting or replacement of critical system elements in capital improvement plan ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components ❖ Develop and adopt a continuity of operations plan ❖ Consider participation in the Community Rating System ❖ Maintain and collect data to define risks and vulnerability ❖ Train emergency responders ❖ Create an elevation inventory of structures in the floodplain ❖ Develop and implement a public information strategy ❖ Charge a hazard mitigation fee ❖ Integrate floodplain management policies into other planning mechanisms within the Planning Area. ❖ Consider the probable impacts of climate change on the risk associated with the flood hazard ❖ Consider the residual risk associated with structural flood control in future land use decisions ❖ Enforce National Flood Insurance Program ❖ Adopt a Stormwater Management Master Plan

Table 18-5. Alternatives to Mitigate the Landslide Hazard

Personal-Scale	Corporate-Scale	Government-Scale
• **Manipulate the hazard:** ❖ **Stabilize slope (dewater, armor toe)** ❖ **Reduce weight on top of slope** ❖ **Minimize vegetation removal and the addition of impervious surfaces.** • **Reduce exposure to the hazard:** ❖ **Locate structures outside of hazard area (off unstable land and away from slide-run out area)** • **Reduce vulnerability to the hazard:** ❖ **Retrofit home** • **Increase the ability to respond to or be prepared for the hazard:** ❖ **Institute warning system, and develop evacuation plan** ❖ **Keep cash reserves for reconstruction** ❖ **Educate yourself on risk reduction techniques for landslide hazards**	• **Manipulate the hazard:** ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope • **Reduce exposure to the hazard:** ❖ Locate structures outside of hazard area (off unstable land and away from slide-run out area) • **Reduce vulnerability to the hazard:** ❖ Retrofit at-risk facilities • **Increase the ability to respond to or be prepared for the hazard:** ❖ Institute warning system, and develop evacuation plan ❖ Keep cash reserves for reconstruction ❖ Develop a continuity of operations plan ❖ Educate employees on the potential exposure to landslide hazards and emergency response protocol.	• **Manipulate the hazard:** ❖ Stabilize slope (dewater, armor toe) ❖ Reduce weight on top of slope • **Reduce exposure to the hazard:** ❖ Acquire properties in high-risk landslide areas. ❖ Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas. • **Reduce vulnerability to the hazard:** ❖ Adopt higher regulatory standards for new development within unstable slope areas. ❖ Armor/retrofit critical infrastructure against the impact of landslides. • **Increase the ability to respond to or be prepared for the hazard:** ❖ Produce better hazard maps ❖ Provide technical information and guidance ❖ Enact tools to help manage development in hazard areas: better land controls, tax incentives, information ❖ Develop strategy to take advantage of post-disaster opportunities ❖ Warehouse critical infrastructure components ❖ Develop and adopt a continuity of operations plan ❖ Educate the public on the landslide hazard and appropriate risk reduction alternatives.

Table 18-6. Alternatives to Mitigate the Severe Weather Hazard

Personal-Scale	Corporate-Scale	Government-Scale
• **Manipulate the hazard:** ❖ **None** • **Reduce exposure to the hazard:** ❖ **None** • **Reduce vulnerability to the hazard:** ❖ **Insulate house** ❖ **Provide redundant heat and power** ❖ **Insulate structure** ❖ **Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program)** • **Increase the ability to respond to or be prepared for the hazard:** ❖ **Trim or remove trees that could affect power lines** ❖ **Promote 72-hour self-sufficiency** ❖ **Obtain a NOAA weather radio.** ❖ **Obtain an emergency generator.**	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Relocate critical infrastructure (such as power lines) underground ❖ Reinforce or relocate critical infrastructure such as power lines to meet performance expectations ❖ Install tree wire • **Increase the ability to respond to or be prepared for the hazard:** ❖ Trim or remove trees that could affect power lines ❖ Create redundancy ❖ Equip facilities with a NOAA weather radio ❖ Equip vital facilities with emergency power sources. ❖ Prioritize utility recovery based on safety and critical infrastructure needs	• **Manipulate the hazard:** ❖ None • **Reduce exposure to the hazard:** ❖ None • **Reduce vulnerability to the hazard:** ❖ Harden infrastructure such as locating utilities underground ❖ Trim trees back from power lines ❖ Designate snow routes and strengthen critical road sections and bridges • **Increase the ability to respond to or be prepared for the hazard:** ❖ Support programs such as "Tree Watch" that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc. ❖ Establish and enforce building codes that require all roofs to withstand snow loads ❖ Increase communication alternatives ❖ Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors. ❖ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines ❖ Provide NOAA weather radios to the public

Table 18-7. Alternatives to Mitigate the Wildfire Hazard

<table>
<tr><th>Personal-Scale</th><th>Corporate-Scale</th><th>Government-Scale</th></tr>
<tr>
<td>• Manipulate the hazard:
❖ Clear potential fuels on property such as dry overgrown underbrush and diseased trees
• Reduce exposure to the hazard:
❖ Create and maintain defensible space around structures
❖ Locate outside of hazard area
❖ Mow regularly
• Reduce vulnerability to the hazard:
❖ Create and maintain defensible space around structures and provide water on site
❖ Use fire-retardant building materials
❖ Create defensible spaces around home
• Increase the ability to respond to or be prepared for the hazard:
❖ Employ techniques from the National Fire Protection Association’s Firewise Communities program to safeguard home
❖ Identify alternative water supplies for fire fighting
❖ Install/replace roofing material with non-combustible roofing materials.</td>
<td>• Manipulate the hazard:
❖ Clear potential fuels on property such as dry underbrush and diseased trees
• Reduce exposure to the hazard:
❖ Create and maintain defensible space around structures and infrastructure
❖ Locate outside of hazard area
• Reduce vulnerability to the hazard:
❖ Create and maintain defensible space around structures and infrastructure and provide water on site
❖ Use fire-retardant building materials
❖ Use fire-resistant plantings in buffer areas of high wildfire threat.
• Increase the ability to respond to or be prepared for the hazard:
❖ Support Firewise community initiatives.
❖ Create /establish stored water supplies to be utilized for firefighting.</td>
<td>• Manipulate the hazard:
❖ Clear potential fuels on property such as dry underbrush and diseased trees
❖ Implement best management practices on public lands.
• Reduce exposure to the hazard:
❖ Create and maintain defensible space around structures and infrastructure
❖ Locate outside of hazard area
❖ Enhance building code to include use of fire resistant materials in high hazard area.
• Reduce vulnerability to the hazard:
❖ Create and maintain defensible space around structures and infrastructure
❖ Use fire-retardant building materials
❖ Use fire-resistant plantings in buffer areas of high wildfire threat.
❖ Consider higher regulatory standards (such as Class A roofing)
❖ Establish biomass reclamation initiatives
• Increase the ability to respond to or be prepared for the hazard:
❖ More public outreach and education efforts, including an active Firewise program
❖ Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas
❖ Identify fire response and alternative evacuation routes
❖ Seek alternative water supplies
❖ Become a Firewise community
❖ Use academia to study impacts/solutions to wildfire risk
❖ Establish/maintain mutual aid agreements between fire service agencies.
❖ Create/implement fire plans
❖ Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions</td>
</tr>
</table>

19. AREA-WIDE ACTION PLAN AND IMPLEMENTATION

The Steering Committee reviewed the catalogs of hazard mitigation alternatives and selected area-wide actions to be included in a hazard mitigation action plan. The selection of area-wide actions was based on the risk assessment of identified hazards of concern and the defined hazard mitigation goals and objectives. Table 19-1 lists the recommended hazard mitigation actions that make up the action plan for the overall Planning Area. The timeframe indicated in the table is defined as follows:

- Short Term = to be completed in 1 to 5 years
- Long Term = to be completed in greater than 5 years
- Ongoing = currently being funded and implemented under existing programs.

Jurisdiction-specific actions are found the jurisdictional annexes located in Volume 2. The actions identified below represent those joint actions undertaken by all Planning Partners.

Table 19-1. Planning Area-wide Action Plan

Applies to New or Existing Assets	Hazards Mitigated	Objectives Met	Lead Agencies	Estimated Cost	Sources of Funding	Timeline[a]
Action PA-1—Continue to support the planning-area-wide actions identified in this plan.						
New and existing	All	All	Planning Partnership	Low	General Fund	Short- and long-term
Action PA-2—Actively participate in the plan maintenance strategy identified in this plan.						
New and existing	All	All	Planning Partnership	Low	General Fund	Short-term
Action PA-3—Continue to maintain a website that will house the hazard mitigation plan, its midterm reports and all components of the plan's maintenance strategy to provide planning partners and the public ongoing access to the plan and its implementation.						
N/A	All	All	Planning Partnership	Low	Operating Budgets	Ongoing
Action PA-4—Continue to leverage/support/enhance ongoing, regional public education and awareness programs (Community Emergency Response Team, multi-jurisdiction, etc.) as a method to educate the public on risk, risk reduction, and community resilience.						
N/A	All	5, 7	Planning Partnership	Low	Operating Budgets	Ongoing

a. Ongoing indicates continuation of an action that is already in place. Short-term indicates implementation within five years. Long-term indicates implementation after five years.

19.1.1 Benefit-Cost Review

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was performed. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, financial assistance may be available through the HMGP or PDM programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, “benefits” can be defined according to parameters that meet the goals and objectives of this plan.

19.1.2 Area-Wide Action Plan Prioritization

Table 19-2 lists the priority of each area-wide action. A qualitative benefit-cost review was performed for each of these actions. The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives (i.e., multiple hazards), has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for the HMGP or PDM grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium Priority**—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, PDM or other grant programs. Project can be completed in the short term, once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low Priority**—A project that will mitigate the risk of a hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or PDM grant funding, and for which the time line for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

Table 19-2. Prioritization of Area-Wide Mitigation Actions

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is project Grant Eligible?	Can Project be Funded under Existing Programs/ Budgets?	Priority (High, Med., Low)
PA-1	12	Medium	Low	Yes	No	Yes	High

PA-2	12	Medium	Low	Yes	No	Yes	High
PA-3	12	Medium	Low	Yes	No	Yes	High
PA-4	2	Medium	Low	Yes	No	Yes	High

19.1.3 Analysis of Area-Wide Mitigation Actions

Each recommended action was classified based on the hazard it addresses and the type of mitigation it involves. Table 19-3 shows the classification based on this analysis. Mitigation types used for this categorization are as follows:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform citizens and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.

Table 19-3. Analysis of Mitigation Actions

	Planning Area Actions That Address the Hazard, by Mitigation Type[a]					
Hazard	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects
Dam Failure	1, 2	N/A	3,4	N/A	4	N/A
Drought	1, 2	N/A	3,4	N/A	4	N/A
Earthquake	1, 2	N/A	3,4	N/A	4	N/A
Flooding	1, 2	N/A	3,4	N/A	4	N/A
Landslide	1, 2	N/A	3,4	N/A	4	N/A
Severe Weather	1, 2	N/A	3,4	N/A	4	N/A
Wildfire	1, 2	N/A	3,4	N/A	4	N/A

19.2 PLAN MAINTENANCE STRATEGY

A hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6(c)(4)):

- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan over a five-year cycle
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as general or capital improvement plans, when appropriate
- A discussion on how the community will continue public participation in the plan maintenance process.

This section details the formal process that will ensure that the Union City/Newark Hazard Mitigation Plan remains an active and relevant document and that the planning partners maintain their eligibility for applicable funding sources. The plan maintenance process includes a process for monitoring and evaluating the plan and producing an updated plan every five years. This chapter also describes how public participation will be integrated throughout the plan maintenance and implementation process. It also explains how the mitigation strategies outlined in this plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The Plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

Pursuant to 44CFR 201.6(c)(4)(i), the plan maintenance matrix shown in Table 19-4 provides a synopsis of responsibilities for plan monitoring, evaluation, and update, which are discussed in further detail in the sections below.

Table 19-4. Plan Maintenance Matrix

<table>
<tr><th>Task</th><th>Approach</th><th>Timeline</th><th colspan="2">Lead Responsibility [a]</th><th>Support Responsibility</th></tr>
<tr><td rowspan="5">Monitoring</td><td rowspan="5">Preparation of status updates and action implementation tracking as part of submission for Midterm Progress Report.</td><td rowspan="5">August to October 2019 or upon comprehensive update to General Plan or major disaster</td><td>Union City</td><td>City Manager</td><td rowspan="5">Jurisdictional Points of Contact Identified in Volume 2 annexes</td></tr>
<tr><td>Newark</td><td>City Manager</td></tr>
<tr><td>ACWD</td><td>General Manager</td></tr>
<tr><td>USD</td><td>General Manager</td></tr>
<tr><td>NUSD [b]</td><td>Director of Maintenance, Operations, and Transportation</td></tr>
<tr><td>Evaluation</td><td>Review the status of previous actions as submitted by the monitoring task lead and support to assess the effectiveness of the plan; compile the Midterm Progress Report; assess appropriate action for preparing 2021/2022 HMP Update.</td><td>November 2019 or upon comprehensive update to General Plan or major disaster</td><td colspan="2">Union City Economic and Community Development
Newark Community Development</td><td>Jurisdictional Points of Contacts identified in Volume 2 Annexes</td></tr>
<tr><td>Update [c]</td><td>Union City and Newark will reconvene the planning partners, at a minimum, every 5 years to guide a comprehensive update to review and revise the Plan.</td><td>Every 5 years or upon comprehensive update to General Plan or major disaster</td><td colspan="2">Union City Economic and Community Development
Newark Community Development</td><td>Jurisdictional Point of Contacts identified in Volume 2 Annexes</td></tr>
</table>

a. Responsible lead party may designate an alternate
b. Lead Responsible Party and Plan Jurisdictional Point of Contact are the same party. Secondary Point of Contact identified in the Jurisdictional Annex serves support responsibility role.
c. Plan update approach assumes the decision for planning partners to follow the process taken during the 2016 Plan. Approach regarding specific plan update process may change depending on Partnership decisions made during Evaluation Phase and completion of the Midterm Progress Report as described in Section 19.2.3 and Section 19.2.4.

19.2.1 Plan Monitoring and Implementation

The effectiveness of the hazard mitigation plan depends on its monitoring, implementation, and incorporation of its action items into partner jurisdictions' existing plans, policies and programs. Together, the action items in the plan provide a framework for activities that the Planning Partnership can implement over the next 5 years. The planning team and the Steering Committee have established goals and objectives and have prioritized mitigation actions that will be implemented through existing plans, policies, and programs.

The planning partners will have individual responsibility for overseeing the plan monitoring and implementation strategy, with primary responsibility identified in each jurisdictional annex plans (see planning partner annexes in Volume 2) and summarized in the plan maintenance matrix above.

At a minimum, the planning partners will track and report the status of the jurisdiction-specific hazard mitigation actions for inclusion into the Midterm Progress Report, described in Section 19.2.2.

19.2.2 Plan Evaluation

Evaluating how well a plan achieves intended goals and objectives ensures that the Planning Partnership remains cognizant of the continued short- to long-term efforts to reduce hazard impacts. Establishing a schedule for monitoring ensures that the HMP will remain a living document that provides benchmarks for building more resilient communities. Plan evaluation will be achieved through the assessment of the status of actions as submitted by planning partners for the development of the Midterm Progress Report described in Section 19.2.3.

The City of Union City Economic and Community Development Department and the City of Newark Community Development Department take lead responsibility for plan evaluation, inclusive of assessing the effectiveness of the plan at achieving its stated purpose and goals.

19.2.3 Midterm Progress Report

The Steering Committee determined that completion of a Midterm Progress Report would be an effective tool to position the planning partners for future updates. This tool will provide planning partners with a streamlined approach for fulfilling update requirements delineated in 44 CFR 201.6(d)(3) during the next plan update initiative. Any trigger of a comprehensive update to the *Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan* as described in section 19.2.4 will require completion of a performance period progress report.

The minimum task of each planning partner as part of plan monitoring procedures will be the evaluation of the progress of its individual action plan during the midterm of the performance period of this plan. This progress report will be completed in August through October, 2019, or upon initiation of an accelerated plan update as described under Section 19.2.4, whichever occurs first. The review will include the following:

- Summary of any hazard events that occurred during the performance period and the impact these events had on the Planning Area
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives that involve hazard mitigation.

The Steering Committee has created a template to guide the planning partners in preparing a progress report. The planning partners will then prepare a formal report on the progress of the plan. This report should be used as follows:

- Posted on the hazard mitigation website dedicated to the hazard mitigation plan
- Provided to the local media through a press release
- Presented to planning partner governing bodies to inform them of the progress of actions implemented during the reporting period

The progress report template may be used as a tool for annual progress reporting at the discretion of the planning partners and based on available jurisdictional resources. Progress reporting is not a requirement specified under 44 CFR. However, it may enhance the Planning Partnership's opportunities for funding. While failure to implement this component of the plan maintenance strategy will not jeopardize a planning partner's compliance under the DMA, it may jeopardize its opportunity to partner and leverage funding opportunities with the other partners. Each planning partner was informed of these protocols at the beginning of this planning process (in the "Planning Partner Expectations" package provided at the start of the process), and each partner acknowledged these expectations with submittal of a letter of intent to participate in this process. This template can be found in Appendix C to this volume.

19.2.4 Plan Update

Local hazard mitigation plans must be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits under the DMA (44 CFR, Section 201.6(d)(3)). The planning partners intend to update the HMP on a five-year cycle from the date of initial plan adoption. This cycle may be accelerated to less than five years based on the following triggers:

- A presidential disaster declaration that impacts the Planning Area
- A hazard event that causes loss of life
- A comprehensive update of Union City or Newark's general plan.

It will not be the intent of future updates to develop a complete new hazard mitigation plan for the Planning Area. The update will, at a minimum, include the following elements:

- The update process will be convened through a steering committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plans will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new policies identified under other planning mechanisms (such as the comprehensive plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- Planning partner governing bodies will adopt the updated plan.

The current format of the Union City/Newark Multi-jurisdiction Hazard Mitigation Plan may not fulfill future local needs for planning and implementation. As a result, during the Midterm Progress Report development process, jurisdictional partners will evaluate the appropriate course of action for conducting a plan update. This evaluation will provide a recommended planning process for updating the plan based on available resources, regional initiatives, and overall timing. Options for updating this plan include the following:

- Development of an updated plan similar in format to this 2016 multi-jurisdiction plan
- Development of single jurisdictional plans
- Participation as jurisdictional planning partners as part of an operational area initiative led by Alameda County Department of Homeland Security and Emergency Services.

19.2.5 Grant Monitoring and Coordination

Through the planning process, the Steering Committee identified participation in the Alameda County Emergency Managers' Association (ALCO EMA) as an opportunity to maintain awareness of current and future grant opportunities. Currently, Union City and Newark participate in ALCO EMA through the Alameda County Fire

Department's contracted emergency management services. District planning partners have identified membership in ALCO EMA as a priority during this 2016 process.

19.2.6 Continuing Public Involvement

The public will continue to be apprised of the plan's progress through the mitigation website and by providing copies of midterm progress report to the media. Each planning partner has agreed to provide links to the hazard mitigation plan website on their individual jurisdictional websites to increase avenues of public access to the plan. Union City has agreed to maintain the hazard mitigation plan website. This site will not only house the final plan, it will become the one-stop shop for information regarding the plan, the partnership and plan implementation.. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new steering committee. This strategy will be based on the needs and capabilities of the Planning Partnership at the time of the update.

During the development of the 2016 Union City/Newark HMP, the Steering Committee, under the guidance of the Union City Communications and Marketing Manager, developed a public outreach plan. This plan, located in Appendix A, provides the framework that initially served as the basis for public engagement through the planning process. The Steering Committee recognized the value of this plan and decided to adapt the plan for continued public outreach through the plan performance period through continued social media messaging and other coordinated outreach initiatives.

19.2.7 Incorporation into Other Planning Mechanisms

The information on hazard, risk, vulnerability, and mitigation contained in this plan is based on the best science and technology available at the time this plan was prepared. The comprehensive plans of the planning partners are considered to be integral parts of this plan. The planning partners, through adoption of comprehensive plans and zoning ordinances, have planned for the impact of natural hazards. The plan development process provided them with the opportunity to review and expand on policies contained within these planning mechanisms. The planning partners used their comprehensive plans and the hazard mitigation plan as complementary documents that work together to achieve the goal of reducing risk exposure to the citizens of the Planning Area. An update to a comprehensive plan may trigger an update to the hazard mitigation plan.

All municipal planning partners are committed to creating a linkage between the hazard mitigation plan and their individual comprehensive plans by identifying a mitigation action as such and giving that action a high priority. Other planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan include the following:

- Emergency response plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Master fire protection plans.

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.

Specific activities identified for incorporating mitigation into other planning mechanisms can be found in each jurisdictional annex located in Volume 2 of this HMP.

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GLOSSARY

ACRONYMS

CFR—Code of Federal Regulations
cfs—cubic feet per second
CIP—Capital Improvement Plan
CRS—Community Rating System
DFIRM—Digital Flood Insurance Rate Maps
DHS—Department of Homeland Security
DMA —Disaster Mitigation Act
EPA—U.S. Environmental Protection Agency
ESA—Endangered Species Act
FEMA—Federal Emergency Management Agency
FERC—Federal Energy Regulatory Commission
FIRM—Flood Insurance Rate Map
FIS—Flood Insurance Study
GIS—Geographic Information System
Hazus-MH—Hazards, United States-Multi Hazard
HMGP—Hazard Mitigation Grant Program
IBC—International Building Code
IRC—International Residential Code
MM—Modified Mercalli Scale
NEHRP—National Earthquake Hazards Reduction Program
NFIP—National Flood Insurance Program
NOAA—National Oceanic and Atmospheric Administration
NWS—National Weather Service
PDM—Pre-Disaster Mitigation Grant Program
PDI—Palmer Drought Index
PGA—Peak Ground Acceleration
PHDI—Palmer Hydrological Drought Index
SFHA—Special Flood Hazard Area
SHELDUS—Special Hazard Events and Losses Database for the US
SPI—Standardized Precipitation Index
USGS—U.S. Geological Survey

DEFINITIONS

100-Year Flood: The term "100-year flood" can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Acre-Foot: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Asset: An asset is any man-made or natural feature that has value, including people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the "100-year" or "1% chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program (NFIP) are protected to the same degree against flooding.

Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds" and "drainage basins."

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Community Rating System (CRS): The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Critical Area: An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility: Facilities and infrastructure that are critical to the health and welfare of the population. These become especially important after any hazard event occurs. For the purposes of this plan, critical facilities include:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic and/or water reactive materials;
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for disaster response before, during, and after hazard events, and
- Public and private utilities, facilities and infrastructure that are vital to maintaining or restoring normal services to areas damaged by hazard events.
- Government facilities.

Cubic Feet per Second (cfs): Discharge or river flow is commonly measured in cfs. One cubic foot is about 7.5 gallons of liquid.

Dam: Any artificial barrier or controlling mechanism that can or does impound 10 acre-feet or more of water.

Dam Failure: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Debris Avalanche: Volcanoes are prone to debris and mountain rock avalanches that can approach speeds of 100 mph.

Debris Flow: Dense mixtures of water-saturated debris that move down-valley; looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

Debris Slide: Debris slides consist of unconsolidated rock or soil that has moved rapidly down slope. They occur on slopes greater than 65 percent.

Disaster Mitigation Act of 2000 (DMA); The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

Drainage Basin: A basin is the area within which all surface water- whether from rainfall, snowmelt, springs or other sources- flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Drought: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. A hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, wellbeing, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

Earthquake: An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes, and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent: The extent is the size of an area affected by a hazard.

Fire Behavior: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

Flash Flood: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance Rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area (SFHA).

Floodway: Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Floodway Fringe: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Freeboard: Freeboard is the margin of safety added to the base flood elevation.

Frequency: For the purposes of this plan, frequency refers to how often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Geographic Information System (GIS): GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A hazard is a source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

Hazards U.S. Multi-Hazard (Hazus-MH) Loss Estimation Program: Hazus-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The Hazus-MH software program assesses risk in a quantitative manner to estimate damage and losses associated with natural hazards. Hazus-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. Hazus-MH has also been used to assess vulnerability (exposure) for other hazards.

Hydraulics: Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Landslide: Landslides can be described as the sliding movement of masses of loosened rock and soil down a hillside or slope. Fundamentally, slope failures occur when the strength of the soils forming the slope exceeds the pressure, such as weight or saturation, acting upon them.

Lightning: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000ºF. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year (see http://www.fema.gov/hazard/thunderstorms/thunder.shtm).

Liquefaction: Liquefaction is the complete failure of soils, occurring when soils lose shear strength and flow horizontally. It is most likely to occur in fine grain sands and silts, which behave like viscous fluids when liquefaction occurs. This situation is extremely hazardous to development on the soils that liquefy, and generally results in extreme property damage and threats to life and safety.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude: Magnitude is the measure of the strength of an earthquake, and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Mass movement: A collective term for landslides, debris flows, sinkholes and lahars.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Peak Ground Acceleration: Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of $1000.00; or
- Two paid flood losses in excess of $1000.00 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Risk: Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Risk Ranking: This ranking serves two purposes, first to describe the probability that a hazard will occur, and second to describe the impact a hazard will have on people, property, and the economy. Risk estimates are based on the methodology used to prepare the risk assessment for this plan. The following equation shows the risk ranking calculation:

Risk Ranking = Probability + Impact (people + property + economy)

Robert T. Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 100-107) was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974 (Public Law 93-288). The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Sinkhole: A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder: Any person or public or private entity that that own or operate facilities that would benefit from the mitigation actions of this plan, and/or have an authority or capability to support mitigation actions identified by this plan.

Stream Bank Erosion: Stream bank erosion is common along rivers, streams and drains where banks have been eroded, sloughed or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are "bad" and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

Sustainable Hazard Mitigation: This concept includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context.

Thunderstorm: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Tornado: A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

Vulnerability: Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damage, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Watershed: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Wildfire: These terms refer to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography, and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. Topography includes both slope and elevation. Air mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use, and arson.

Windstorm: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

Appendix A – Public Outreach Plan and Results

PUBLIC OUTREACH PLAN AND RESULTS

Hazard Mitigation Plan Public Outreach Plan

PROGRAM DESCRIPTION

Union City and Newark are preparing for the impacts of natural disasters in the area through the development of the LHMP. Responding to federal mandates in the Disaster Mitigation Act of 2000 (Public Law 106-390), the cities pooled resources and created a uniform hazard mitigation strategy that can be consistently applied to the defined planning area. This planning process is being led by Union City and Newark with support from local districts, volunteer groups, and a technical consultant. The planning process will take approximately 6 months to complete.

GOAL OF COMMUNICATION

During this process, citizens will be asked to contribute by sharing local knowledge of an area's vulnerability to hazards based on past occurrences. Public involvement will be solicited via a multi-media campaign that will include public meetings, web-based information, questionnaires, and updates on the plans progress via the news and social media. The overall goal of communication is to inform the public about this process and to seek input.

Messaging should cover the following topics:

- Advertisement of the website
- Advertisement of the survey
- Advertisement of public events
- Advertisement of the public comment period opening and closing

LOCAL PUBLIC INFORMATION OFFICERS

Union City – Communications & Marketing Manager Lauren Sugayan

Newark – Assistant City Manager Terrence Grindall

USD – Communications & Intergovernmental Relations Coordinator Michelle Powell

ACWD – Public Information Officer Sharene Gonzales

COMMUNICATIONS CHANNELS

For Union City -

- GovDelivery (8,000+ email subscribers)
  - ✓ In the Know
- All Social Media
  - ✓ City Nextdoor (2800+ followers)
  - ✓ City Instagram (500+ followers)
  - ✓ City Facebook (2800+ followers)
  - ✓ Police Facebook (1700+)
  - ✓ City Reddit Profile
  - ✓ City Twitter (1475+ followers)

For Newark-

- Newark PD Facebook (2470 followers)
- Planning Newark, CA (27 followers)
- Newark PD Nixle

For USD-

- Facebook (91 followers)
- Twitter (114 followers)

For ACWD-

- Twitter (386 followers)
- Facebook (230 followers)

Regional Print News-

- TriCity Voice (regional reach)
- Bay Area News Group (regional reach)
  - ✓ San Jose Mercury News
  - ✓ The Argus
  - ✓ The Daily Review

Messages

Newsletter/News Media Blurb

Union City and Newark are working together on a hazard mitigation initiative and we want to hear from YOU! So what is hazard mitigation?

Hazard mitigation is any action that protects you, your family, and your belongings by lessening the impact of a disaster on you. Every community needs to have a hazard mitigation plan approved by FEMA and adopted in order to be eligible for certain types of pre- and post-disaster grant funding. Without the plan, we don't get the funding. Without the funding, we can't recover from disasters.

The contents of the plan will have a direct effect on you and how you recover from disaster. As a result, we want to partner with you in developing this plan. We want to hear about what concerns you the most and what impact disasters have had on you and your family. We want your feedback through your participation in public meetings. We want your edits and suggestions to the plan as drafts become available for review.

Information about upcoming events will be shared here. In the meantime, please jumpstart your involvement by taking the Public Survey linked below.

https://www.surveymonkey.com/r/UCNewarkhazards

Twitter Messaging

Survey advertisements:

Every city has to have a FEMA-approved emergency plan to be eligible for disaster funding. Help us make our plan: **www.surveymonkey.com/r/UCNewarkhazards**

What natural hazards are you most worried about affecting your home? Tell us and help us prepare for disasters: **www.surveymonkey.com/r/UCNewarkhazards**

We want to reduce the impacts of hazards on our community. What projects do you think we should focus on? **www.surveymonkey.com/r/UCNewarkhazards**

Hazard mitigation plans are crucial for cities. Learn what it is and share your thoughts to help write ours: **www.surveymonkey.com/r/UCNewarkhazards**

Hazard Mitigation Website advertisement:

Your local hazard mitigation plan affects how you will recover from a disaster. Learn about Union City's plan here: **www.uc-newark-hmp.com**
("Newark" can be substituted for "Union City")

We're working on a plan to become less vulnerable to earthquakes, floods, and other disasters. You can contribute: **www.uc-newark-hmp.com**

Learn about Union City's hazard mitigation plan, read the drafts, and share feedback. **www.uc-newark-hmp.com** (after draft is available)

Disaster preparedness messaging:

You've probably experienced small earthquakes, but what happens when the big one hits? Get prepared: **www.fema.gov/earthquake-safety-home**

Public Meeting/Community Event Messaging

For Arts and Wine Fest (October 8th from 11AM – 6PM in the Alvarado Historic District) :

Is your wine cellar safe from natural disasters? Come visit the Hazard Mitigation Booth at the Alvarado Historic District Arts & Wine Fest to find out!

Join us to learn about the 2016 Union City/Newark Hazard Mitigation Plan, pick up some pamphlets on preparedness, and receive your very own property risk assessment (no wine cellar required).

For Newark Days (September 18th from 12PM – 4PM in the Newark Community Center Park):

Is your home safe from a natural disaster? Come visit the Hazard Mitigation Booth at our annual Newark Days event! Join us to learn about the 2016 Union City/Newark Hazard Mitigation Plan, pick up some pamphlets on preparedness, and receive your very own property risk assessment.

Draft Plan – Public Comment Messaging

We've had our share of severe weather this year – from El Nino to extreme heat.

Do you know what else talks about severe weather? The 2016 Union City/Newark Hazard Mitigation Plan!

There's still time to tell us about your experiences with disasters and provide us with valuable feedback on the plan! If you haven't already, head over to https://www.surveymonkey.com/r/UCNewarkhazards to take the Public Survey, or read the draft plan at www.uc-newark-hmp.com!

Continued Public Involvement during Performance Period

In order to continue public involvement throughout the plan performance period, this Public Information Plan will remain in effect as the primary source for mitigation outreach. Messaging above may be revised to reflect appropriate messaging based on the future outreach needs. These needs include but are not limited to:

- *Messaging announcing the Midterm Progress Reporting period and posting on the plan website*
- *Regular release of mitigation-related messages depending on seasonal hazards*
- *Joint mitigation and preparedness outreach providing the public information on hazards of concern*
- *Announcements of any mitigation-related training open and available to the public*
- *Periodic release of "Do-It-Yourself" recommendations for at-home mitigation*

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August 9, 2016 > Plan to prepare for impacts of natural hazards

EMAIL PRINT

Plan to prepare for impacts of natural hazards

Submitted By Lauren Sugayan

The cities of Union City and Newark are embarking on a planning process to prepare for impacts of natural disasters. Responding to federal mandates in the Disaster Mitigation Act of 2000 (Public Law 106-390), the cities pooled resources and created a uniform hazard mitigation strategy that can be consistently applied to the defined planning area. This planning process is being led by Union City and Newark with support from local districts, volunteer groups, and a technical consultant. The planning process will take approximately six months to complete.

During this process, citizens will be asked to contribute by sharing local knowledge of an areaÕs vulnerability to hazards based on past occurrences. Public involvement will be solicited via a multimedia campaign that will include public meetings, web-based information, questionnaires, and updates on the plans progress via the news and social media. This process will be overseen by a Steering Committee made up of stakeholders from within the planning area. This Steering Committee will meet as needed on the second Wednesday of every month at alternating Union City and Newark locations. These meetings are open to the public.

An informational website on the plan and purposes for planning has been established at www.uc-newark-hmp.com. This website will serve as the primary means for the public to gain information on the plan and ways that they can participate in the planning process as well as updates on upcoming meetings and events. The public is highly encouraged to provide input on all phases of this planÕs development. Any questions or comments regarding this process are encouraged and should be emailed to steeringcommittee@uc-newark-hmp.com.

Impacts of Natural Hazards Plan Steering Committee Meeting
Wednesday, Aug 10
9 a.m. Ð 11 a.m.
Union City City Hall
City Council Conference Room
34009 Alvarado-Niles Rd, Union City
steeringcommittee@uc-newark-hmp.com
www.uc-newark-hmp.com

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September 13, 2016 > Public engagement sought on Hazard Mitigation Plan

EMAIL PRINT

Public engagement sought on Hazard Mitigation Plan

Submitted By Lauren Sugayan

The Cities of Union City and Newark, in addition to several partnering special districts, are working together on a Multi-jurisdiction Hazard Mitigation Plan (HMP) and are seeking public engagement at two upcoming events where Union City and Newark residents can learn about the plan, the process, and obtain a customized property risk assessment on hazards such as earthquake and flood.

Please stop by our Hazard Mitigation Booths at these upcoming community events:

61st Annual Newark Days
Sunday, Sept 18
12 p.m. to 4 p.m.
Community Information Faire Ð Newark Community Center Park
35501 Cedar Blvd, Newark

Alvarado Historic District Arts and Wine Festival
Saturday, Oct 8
11 a.m. Ð 6 p.m.
3871 Smith St, Union City

Residents, local officials, industry representatives, educators and others are encouraged to attend.

Communities are federally mandated by the Disaster Mitigation Act of 2000 to create a detailed plan to prepare for and respond to local natural disasters in order to be eligible for certain pre- and post-disaster federal grant opportunities.

The community event booths are opportunities for the public to learn about the planning process and ask questions of staff about hazards like earthquakes and floods. Attendees can also take home personal preparedness materials, including a customized property risk assessment.

This planning process for encouraging sustainable and resilient communities is being managed by Union City and Newark with support from a technical consultant.

Along with the upcoming events, the public engagement process includes posting information at www.uc-newark-hmp.com and asking residents to complete a survey about their concerns and the impact of natural disasters on them and their loved ones. The survey remains open at http://www.surveymonkey.com/r/ucnewarkhazards

For more information, please email: steeringcommittee@uc-newark-hmp.com

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December 13, 2016 > Community Input Sought on Union City/Newark Hazard Mitigation Plan

EMAIL PRINT

Community Input Sought on Union City/Newark Hazard Mitigation Plan

Submitted By Lauren Sugayan

A 21-day public comment period on draft plan began December 2, 2016. The Union City/Newark Hazard Mitigation Plan (HMP) Steering Committee invites all residents, commuters, and visitors to review and comment on the final draft of the 2016 Union City/Newark Multi-Jurisdictional HMP.

The participating jurisdictions are federally mandated by the Disaster Mitigation Act of 2000 to create a detailed plan to prepare for and respond to local natural and human-caused disasters that could affect some or all of the countyÕs residents. Jurisdictions with a plan approved by the Federal Emergency Management Agency (FEMA) may apply for mitigation funding for projects like seismic retrofits of critical facilities and local flood control.

The draft plan presented by the HMP Steering Committee is available for download at www.uc-newark-hmp.com and will be open for public comment December 2, 2016 through December 23, 2016.

The Union City/Newark Steering Committee will be hosting three public meetings to review the public draft. The Steering Committee encourages members of the public to attend these meetings to learn more about the plan:

Thursday, December 8th Ð 6:00 pm; Newark Disaster Council Meeting; 6800 Mowry Ave, Newark

Wednesday, December 14th Ð 9:00 am; Steering Committee Meeting; 6800 Mowry Ave, Newark

Thursday, December 15th Ð 9:00 am, Union City Disaster Council Meeting; Charles F. Kennedy Community Center, 1333 Decoto Road, Union City

At the conclusion of the public comment period, the plan will be reviewed by the California Office of Emergency Services and the Federal Emergency Management Agency (FEMA) Region IX office. Comments can be provided through https://www.surveymonkey.com/r/UCNewarkDraft or sent by email to steeringcommittee@uc-newark-hmp.com.

When providing input, please provide your community, your affiliation (if applicable), and reference the plan within the email subject line.
For inquires, contact Lauren Sugayan at laurens@unioncity.org.

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Union City and Newark Multi-Jurisdiction Mitigation Plan

Hazard Mitigation Survey

The cities of Union City and Newark are developing a joint Hazard Mitigation Plan and we need your help in the planning process! Are you ready for an emergency? This survey will help us to understand our community perception of risk and steps you have taken to minimize the impacts of hazards in your neighborhood.

1. What hazards have you personally experienced? (check all that apply)

- [ ] Climate change
- [ ] Dam failure
- [ ] Drought
- [ ] Earthquake (including ground shaking and/or liquefaction)
- [ ] Flood
- [ ] Landslide
- [ ] Severe weather (including extreme heat, thunderstorms, heavy rains, high winds)
- [ ] Wildfire
- [ ] Other (please specify)

2. What natural hazards are you most concerned about in our community? Pick your top 3.

- [ ] Climate change
- [ ] Dam failure
- [ ] Earthquake (including ground shaking and/or liquefaction)
- [ ] Flood
- [ ] Landslide
- [ ] Severe weather
- [ ] Wildfire
- [ ] Drought
- [ ] Other (please specify)

3. What non-natural hazards are you most concerned about in our community? Pick your top 3.

- [ ] Terrorism
- [ ] Cyber threats (cyber terrorism and cyber-attacks)
- [ ] Hazardous Materials Release
- [ ] Pipeline Failure
- [ ] Transportation Incidents
- [ ] Health Hazards (influenza, West Nile, Zika)
- [ ] Civil Unrest
- [ ] Active Threat
- [ ] Other (please specify)

4. Are you aware that Union City and Newark each have a Local Hazard Mitigation Plan — a plan that is written to guide how our community will lower its risk and exposure to disasters?

- ○ Yes
- ○ No

5. In what ways have you or someone in your household or business prepared for an emergency? (Check all that apply)

- [ ] Attended meetings or received written information on natural disasters or emergency preparedness
- [ ] Talked with family members about what to do in case of a disaster or emergency
- [ ] Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster
- [ ] Practiced a Household/Family Emergency Plan, such as doing a fire drill or evacuation
- [ ] Prepared a "Disaster Supply Kit" (extra food, water, medications, batteries, first aid items and other emergency supplies)
- [ ] Someone in your household has been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR - within the last year)

Other (please specify)

6. Is your home or business located in or near a Federal Emergency Management Agency (FEMA) designated flood zone?

For more information please visit the Federal Emergency Management Agency’s flood hazard website (http://msc.fema.gov/portal) and the National Flood Insurance Program website (https://www.floodsmart.gov/floodsmart/).

- ◯ Yes
- ◯ No
- ◯ Don't know

7. Do you carry flood insurance (for your home or your business)?

- ◯ Yes
- ◯ No
- ◯ Don't know

8. Do you carry earthquake insurance (for your home or business)?

- ◯ Yes
- ◯ No
- ◯ Don't know

9. What modification or construction practice, if any, do you find most important or a top priority when it comes to mitigating earthquake risks to your home or business? Choose one.

- ◯ Anchor bookcases and cabinets to wall
- ◯ Secure water heater to wall
- ◯ Fit gas appliances with flexible connections
- ◯ Secure home to foundation
- ◯ Brace inside of cripple wall with sheathing
- ◯ Brace reinforced chimney
- ◯ Brace reinforced masonry, concrete walls & foundations

Other (please specify)

10. What modifications, if any, do you consider the most important in reducing your water usage due to the drought, in either your home or business? (Check one)

- ○ Install a low-flow showerhead
- ○ Reduce the length of your shower
- ○ Replace ornamental landscaping with drought resistant plants
- ○ Water early in the morning or the evening
- ○ Water your favorite plants by hand instead of using sprinklers
- ○ Turn off the faucet while brushing your teeth
- ○ Use a reusable water bottle (rather than buying bottled water)
- ○ Run dishwasher only when full
- ○ Use a light wash setting on the dishwasher
- ○ Skip car washes
- ○ Replaced old toilets with newer, more water efficient toilets
- ○ Install faucet aerators

Other (please specify)

____

11. What types of projects should the cities of Union City and Newark focus on to reduce hazard impacts?

- ○ Structure/Infrastructure Improvements
- ○ Critical Facility Upgrades
- ○ Public Education and Outreach
- ○ Environmental Protection of Natural Buffers (for example, open space in a floodplain)
- ○ New Development/Regulatory Standards and Strategic Plans
- ○ Other (please specify)

____

12. What development restrictions, if any, should be made in hazard areas?

- ○ Development should be prohibited in hazard areas
- ○ Development should be restricted in hazard areas
- ○ Development should be restricted only in severe hazard areas
- ○ Development should not be restricted in hazard areas
- ○ I don't know

13. What is the most effective way for you to receive information about how to protect your family and prepare your home for hazard events?

- ○ Television
- ○ Radio
- ○ Websites
- ○ Mail
- ○ Email
- ○ Public Meetings/workshops
- ○ Social Media
- ○ Website

Other (please specify)

14. How willing would you be to volunteer during a disaster event?

- ○ Very willing
- ○ Somewhat willing
- ○ Not interested

15. You know better than anyone else what your home, neighborhood, and community hazards are and as your local government, we want to do our best to help. What else do you think we should know?

16. Are you a resident of Union City?

- ○ Yes
- ○ No

17. Are you a resident of Newark?

- ○ Yes
- ○ No

18. If "yes" to question 14, how many years have you lived in Union City?

- ○ 0-1 years
- ○ 2-5 years
- ○ 6-10 years
- ○ 11 or more years

19. If "yes" to question 15, how many years have you lived in Newark?

- ○ 0-1 years
- ○ 2-5 years
- ○ 6-10 years
- ○ 11 or more years

20. Do you work in Union City or Newark?

- ○ Yes
- ○ No

21. If you do not work in Union City or Newark, how far is your daily commute from your home?

- ○ 0-10 miles
- ○ 11-20 miles
- ○ 21-30 miles
- ○ Over 30 miles

22. Do you rent or own the home you currently live in?

- ○ Rent
- ○ Own

23. Do you own a business in Union City or Newark?

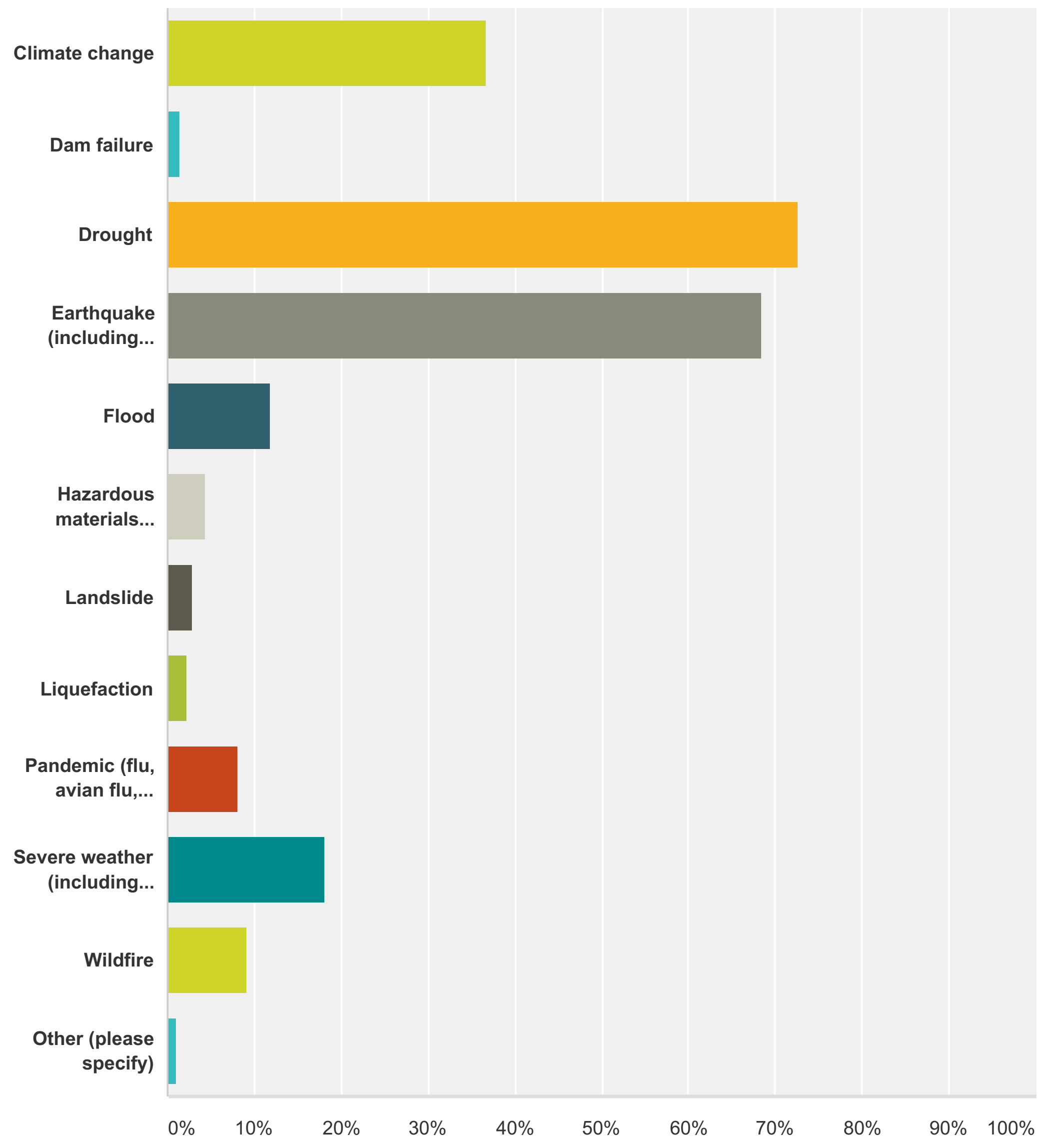
- ○ Yes
- ○ No

24. Do you want to be notified of upcoming mitigation public events? If so, please leave your contact information.

25. Do you have any additional comments?

Q1 What hazards have you personally experienced? (check all that apply)

Answered: 209 Skipped: 19



Answer Choices	Responses	
Climate change	**36.84%**	77
Dam failure	**1.44%**	3
Drought	**72.73%**	152
Earthquake (including ground shaking and/or liquefaction)	**68.42%**	143
Flood	**11.96%**	25
Hazardous materials accident	**4.31%**	9
Landslide	**2.87%**	6

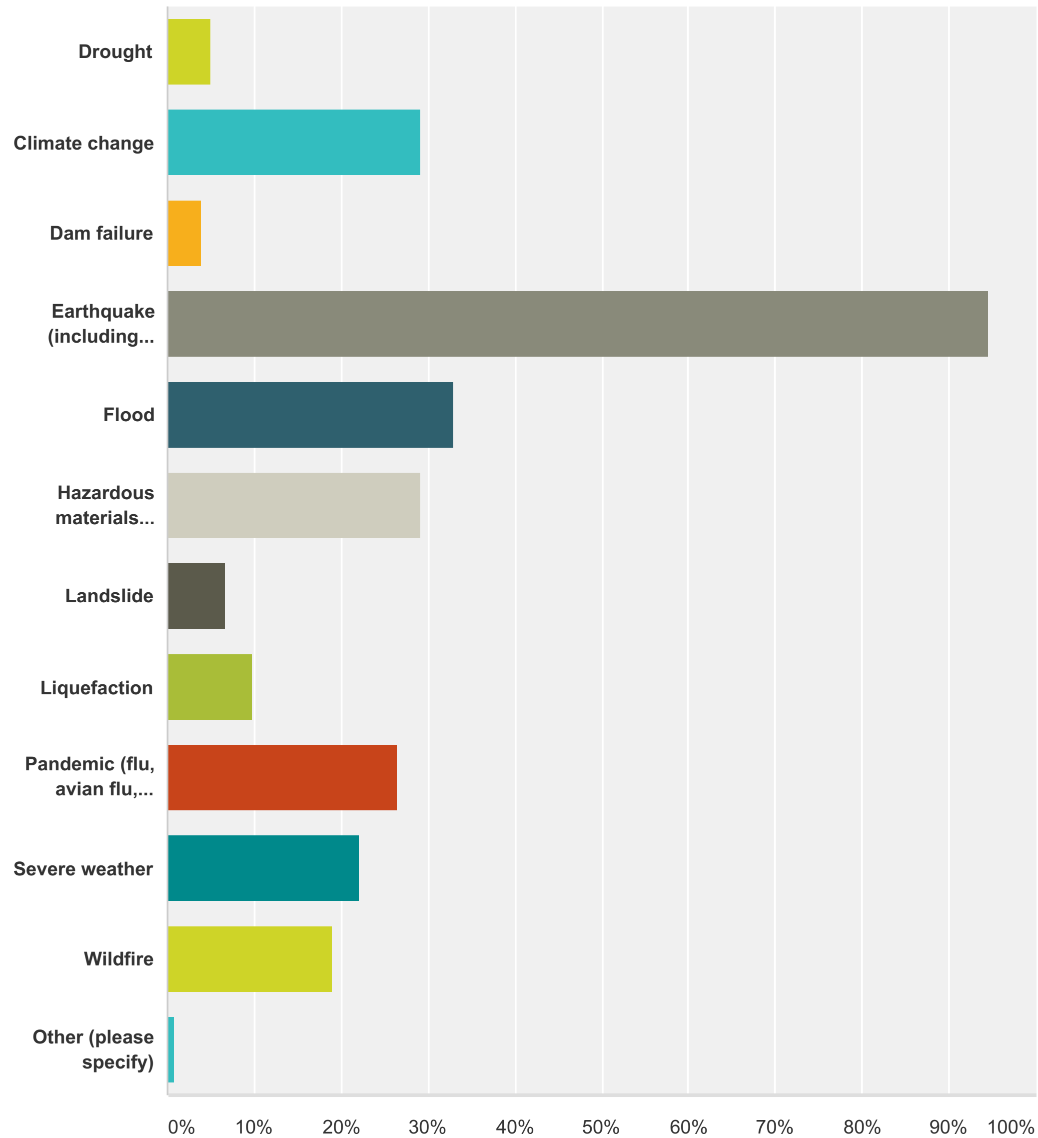
Liquefaction	**2.39%**	5
Pandemic (flu, avian flu, H1N1, West Nile Virus)	**8.13%**	17
Severe weather (including extreme heat, thunderstorms, heavy rains, high winds)	**18.18%**	38
Wildfire	**9.09%**	19
Other (please specify)	**0.96%**	2
Total Respondents: 209		

#	Other (please specify)	Date
1	Tornando; white outs	12/8/2016 7:37 AM
2	terrorism, Bomb threats	8/11/2016 2:53 PM

Q2 What natural hazards are you most concerned about in our community? Pick your top 3.

Answered: 222 Skipped: 6

Union City and Newark Multi-Jurisdiction Mitigation Plan



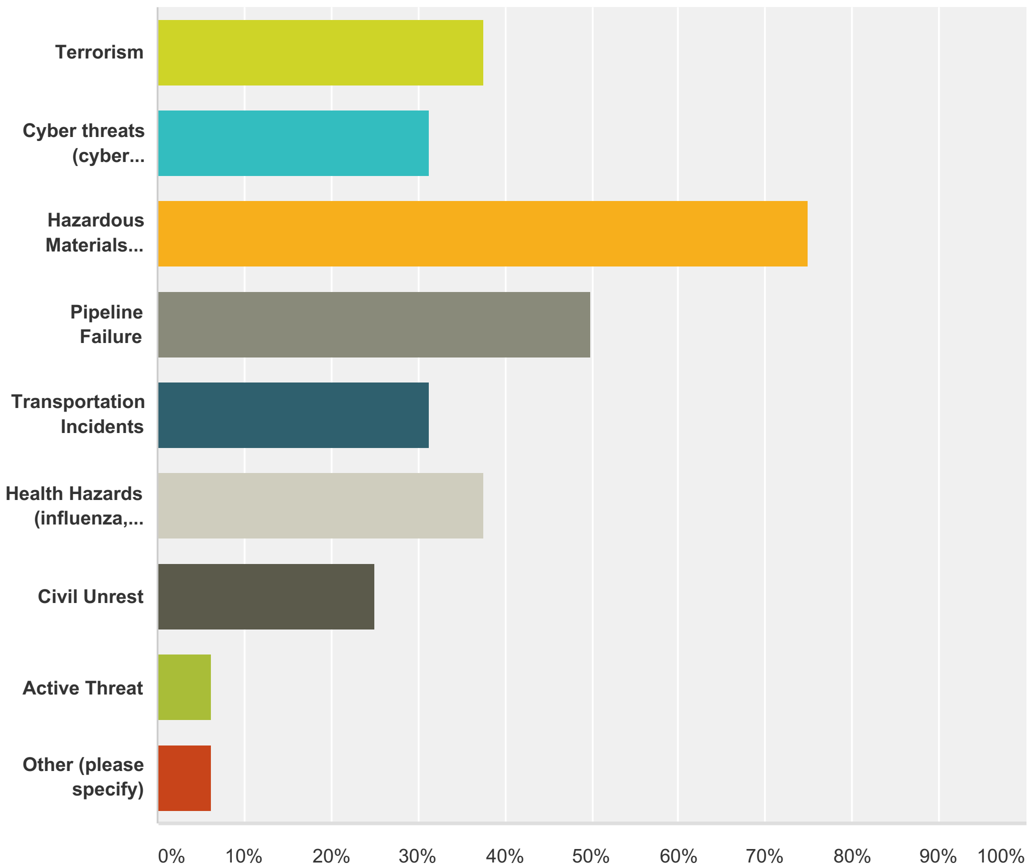
Answer Choices	Responses	
Drought	**4.95%**	11
Climate change	**29.28%**	65
Dam failure	**4.05%**	9
Earthquake (including ground shaking and/or liquefaction)	**94.59%**	210
Flood	**32.88%**	73
Hazardous materials accident	**29.28%**	65
Landslide	**6.76%**	15
Liquefaction	**9.91%**	22
Pandemic (flu, avian flu, H1N1, West Nile Virus)	**26.58%**	59
Severe weather	**22.07%**	49
Wildfire	**18.92%**	42

Other (please specify)	**0.90%**	2
Total Respondents: 222		

#	Other (please specify)	Date
1	Isolation as a result of some of the above	10/19/2016 9:50 PM
2	rising seas	10/10/2016 12:31 PM

Q3 What non-natural hazards are you most concerned about in our community? Pick your top 3.

Answered: 16 Skipped: 212



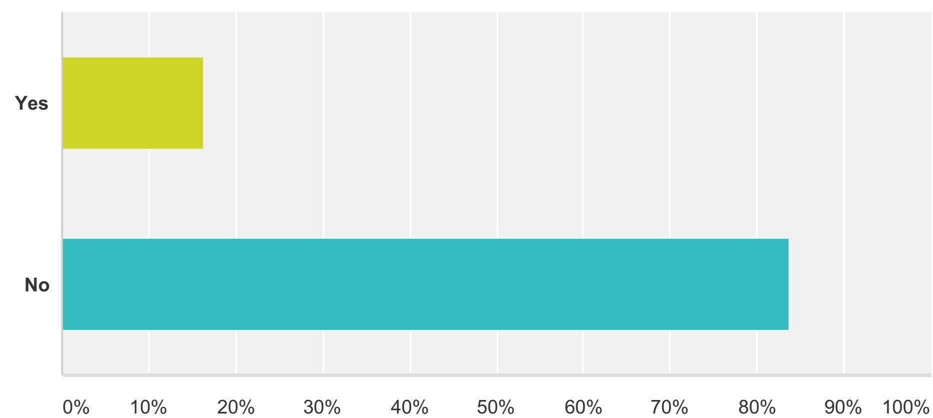
Answer Choices	Responses	
Terrorism	**37.50%**	6
Cyber threats (cyber terrorism and cyber-attacks)	**31.25%**	5
Hazardous Materials Release	**75.00%**	12
Pipeline Failure	**50.00%**	8
Transportation Incidents	**31.25%**	5
Health Hazards (influenza, West Nile, Zika)	**37.50%**	6

Civil Unrest	**25.00%**	4
Active Threat	**6.25%**	1
Other (please specify)	**6.25%**	1
Total Respondents: 16		

#	Other (please specify)	Date
1	toxic water supply	9/16/2016 9:48 PM

Q4 Are you aware that Union City and Newark each have a Local Hazard Mitigation Plan — a plan that is written to guide how our community will lower its risk and exposure to disasters?

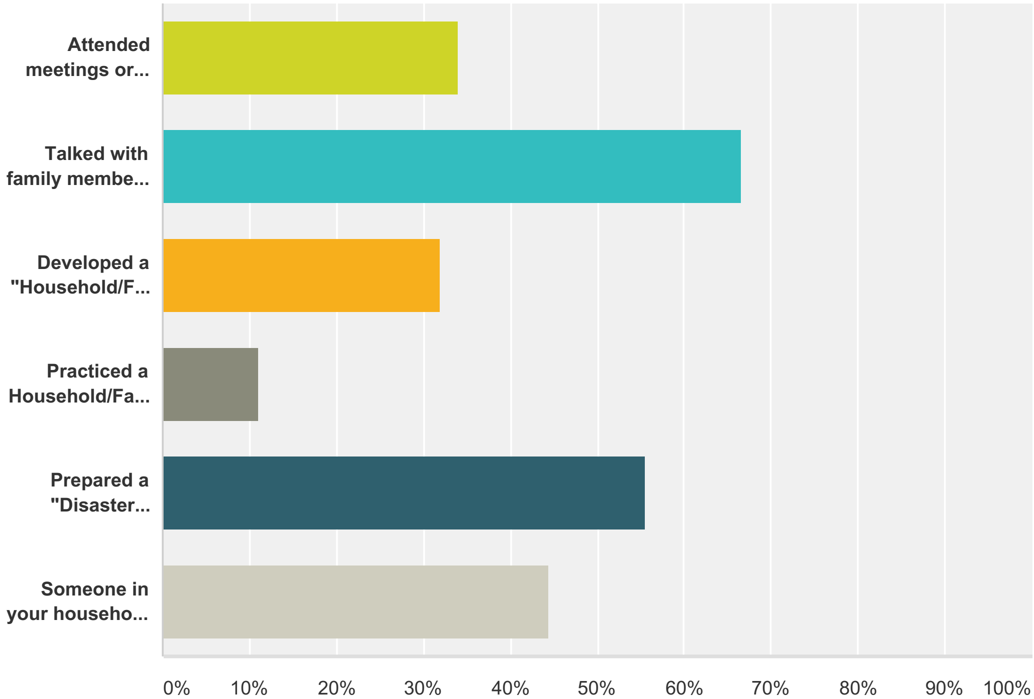
Answered: 227 Skipped: 1



Answer Choices	Responses	
Yes	**16.30%**	37
No	**83.70%**	190
Total		**227**

Q5 In what ways have you or someone in your household or business prepared for an emergency?(Check all that apply)

Answered: 200 Skipped: 28



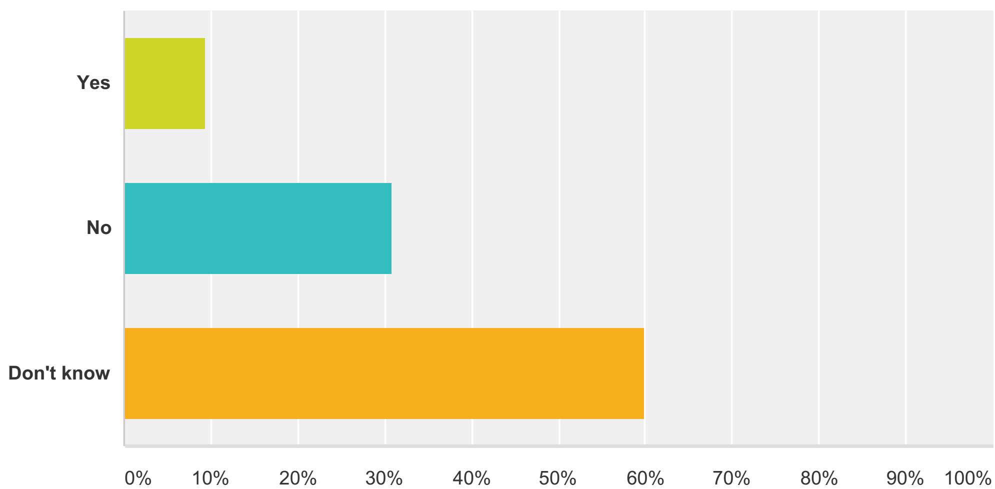
Answer Choices	Responses	
Attended meetings or received written information on natural disasters or emergency preparedness	**34.00%**	68
Talked with family members about what to do in case of a disaster or emergency	**66.50%**	133
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster	**32.00%**	64
Practiced a Household/Family Emergency Plan, such as doing a fire drill or evacuation	**11.00%**	22
Prepared a "Disaster Supply Kit" (extra food, water, medications, batteries, first aid items and other emergency supplies)	**55.50%**	111
Someone in your household has been trained in First Aid or Cardio-Pulmonary Resuscitation(CPR - within the last year)	**44.50%**	89
Total Respondents: 200		

#	Other (please specify)	Date
1	CERT certified	12/8/2016 7:37 AM
2	None	12/2/2016 9:09 AM
3	Active CERT member	10/19/2016 9:50 PM
4	member of CERT	3/3/2016 7:48 PM
5	none	2/21/2016 6:26 AM
6	joined Union City CERT	2/18/2016 6:13 PM
7	Have some supplies "inside the house" which might ot be accessible in emergency. Need to put them in a sealed container outside.	2/18/2016 10:08 AM
8	Packed Bug-Out bags with important documents, cash, food, first aid supplies in case of emergency evacuation	2/12/2016 6:09 PM
9	I work for another local municipality and am very aware of hazard mitigation and disaster preparedness	2/12/2016 6:59 AM
10	Become a CERT member	2/11/2016 1:31 PM
11	CERT PROGRAM	2/10/2016 4:37 PM
12	1 active Union City CERT member in household	2/10/2016 3:59 PM

13	fmaily amemeber trained in CERT	2/10/2016 1:46 PM
14	NONE	2/10/2016 11:32 AM
15	Designated a person out of state to communicate.	1/26/2016 6:31 PM
16	None	1/24/2016 7:38 PM
17	None of the above	1/24/2016 2:08 PM
18	neighborhood disaster commitee	1/23/2016 7:33 AM
19	None of the above	1/22/2016 4:45 PM
20	I had worked in emergency preparedness for hospitals and school districts.	1/16/2016 2:49 PM
21	Attended fire department PEP and CPR.	1/16/2016 12:39 PM

Q6 Is your home or business located in or near a Federal Emergency Management Agency (FEMA) designated flood zone?For more information please visit the Federal Emergency Management Agency’s flood hazard website (http://msc.fema.gov/portal) and the National Flood Insurance Program website (https://www.floodsmart.gov/floodsmart/).

Answered: 224   Skipped: 4

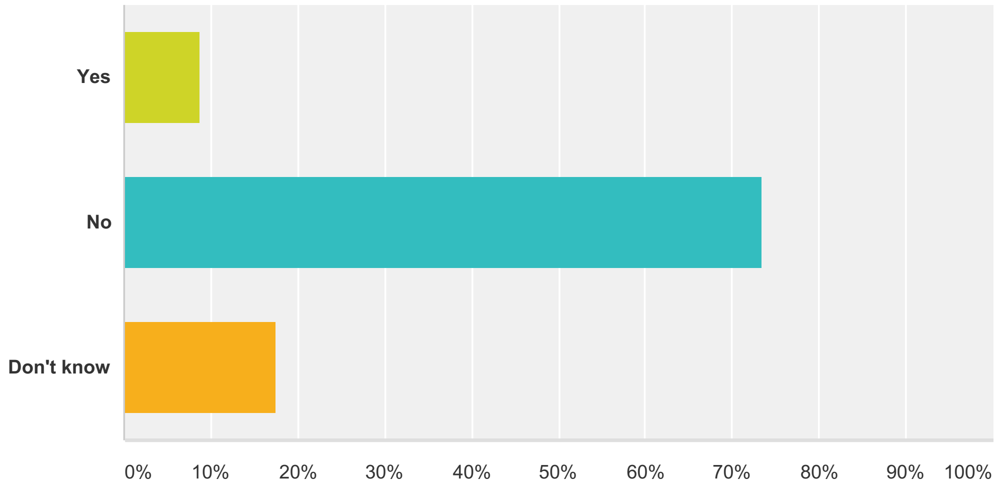


Answer Choices	Responses	
Yes	**9.38%**	21
No	**30.80%**	69
Don't know	**59.82%**	134
Total		**224**

Q7 Do you carry flood insurance (for your

home or your business)?

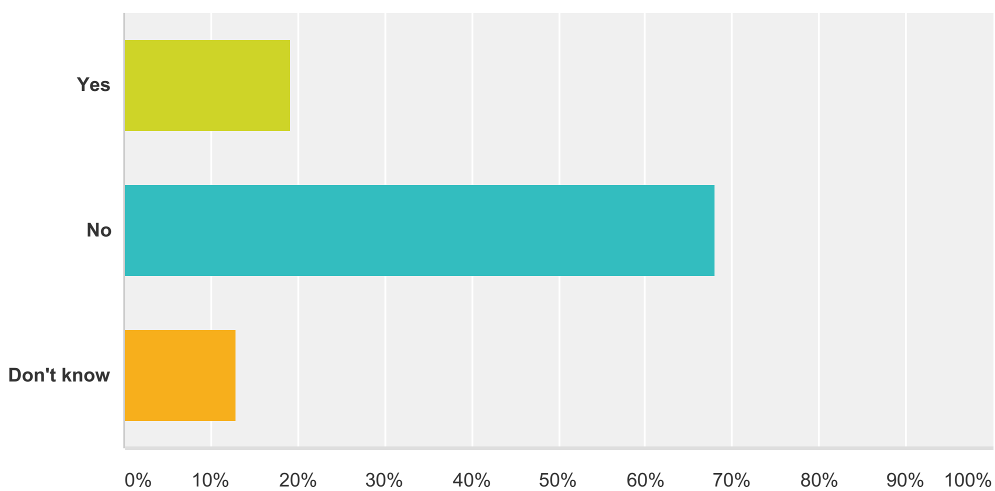
Answered: 227 Skipped: 1



Answer Choices	Responses	
Yes	**8.81%**	20
No	**73.57%**	167
Don't know	**17.62%**	40
Total		**227**

Q8 Do you carry earthquake insurance (for your home or business)?

Answered: 225 Skipped: 3

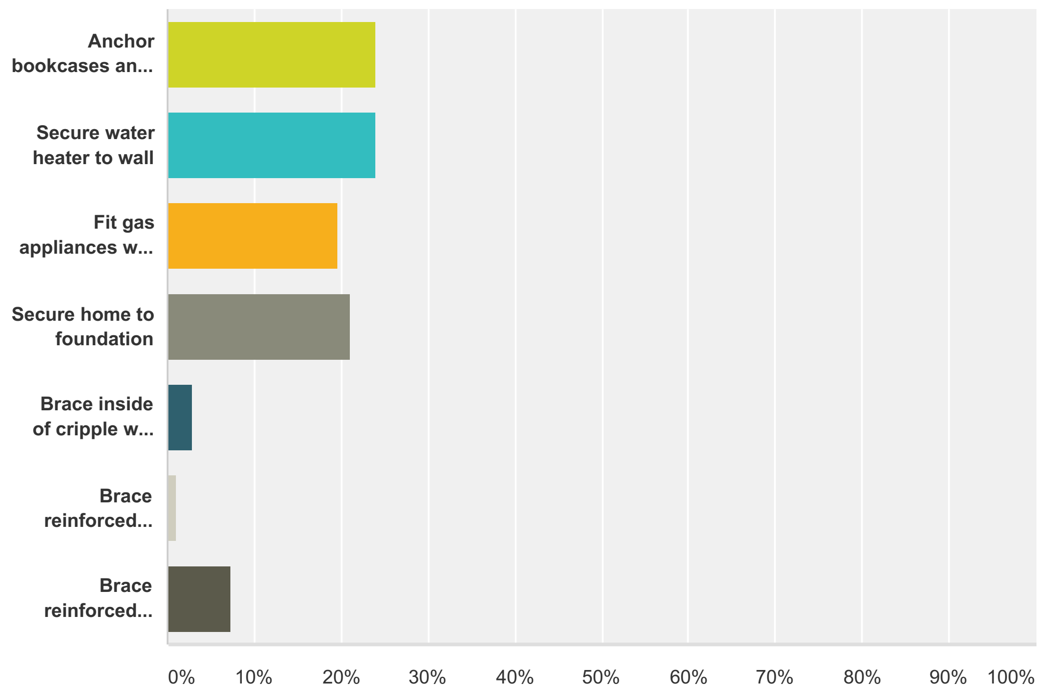


Answer Choices	Responses	
Yes	**19.11%**	43
No	**68.00%**	153

Don't know	**12.89%**	29
Total		**225**

Q9 What modification or construction practice, if any, do you find most important or a top priority when it comes to mitigating earthquake risks to your home or business? Choose one.

Answered: 204 Skipped: 24



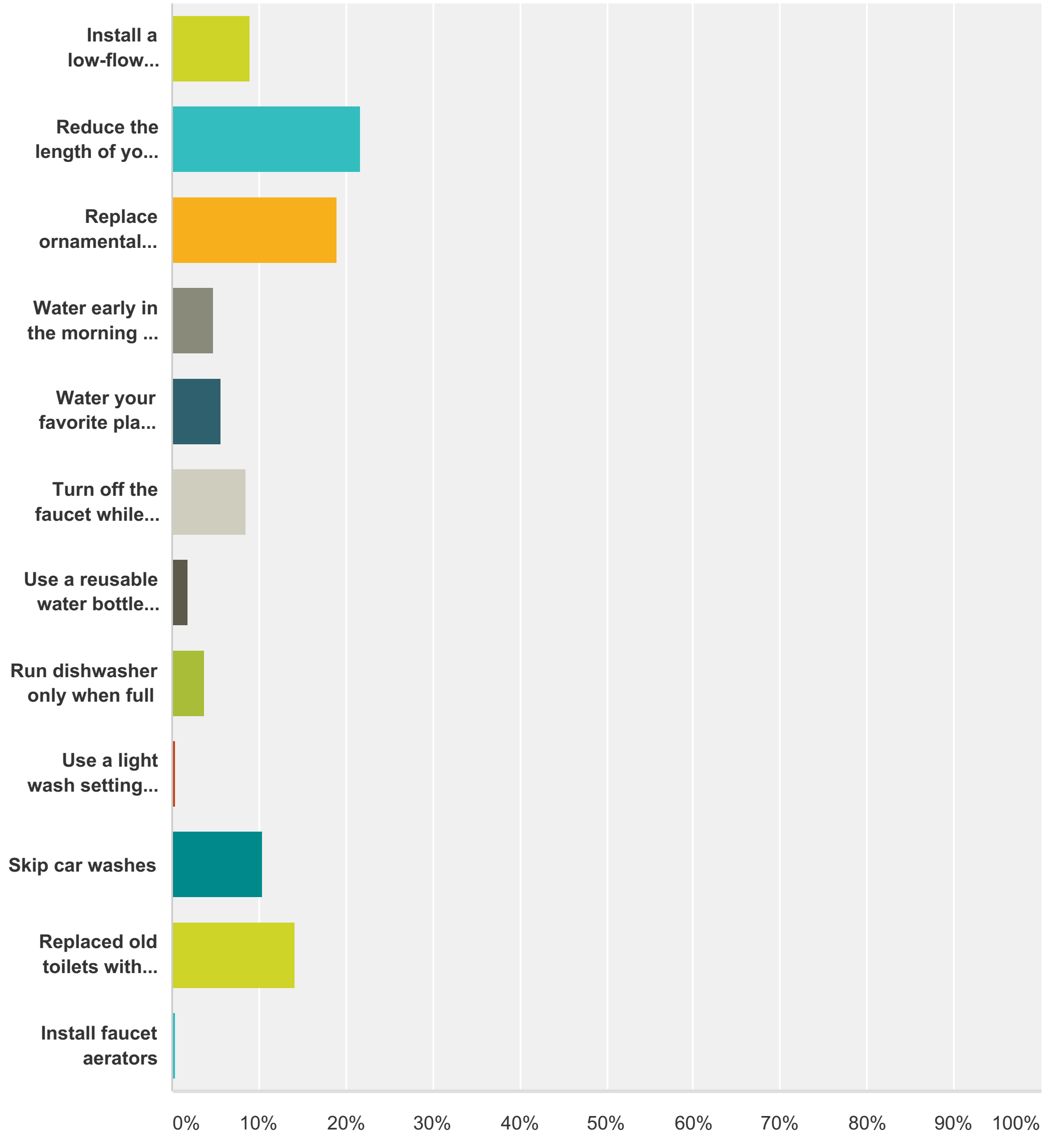
Answer Choices	Responses	
Anchor bookcases and cabinets to wall	**24.02%**	49
Secure water heater to wall	**24.02%**	49
Fit gas appliances with flexible connections	**19.61%**	40
Secure home to foundation	**21.08%**	43
Brace inside of cripple wall with sheathing	**2.94%**	6
Brace reinforced chimney	**0.98%**	2
Brace reinforced masonry, concrete walls & foundations	**7.35%**	15
Total		**204**

#	Other (please specify)	Date
1	Teach all to cover under a table	12/8/2016 7:37 AM
2	All are important	3/1/2016 11:43 AM
3	It seems silly to pick just one, they are not mutually exclusive.	2/12/2016 6:59 AM

4	all the above	2/11/2016 5:18 PM
5	At the Masonic Home on the Hill a lot has been done, but I don't know the details.	2/11/2016 1:31 PM
6	gas earthquake shutoff valve	2/10/2016 5:52 PM
7	All items that can be secure, are secured	2/10/2016 1:36 PM
8	NONE	2/10/2016 11:32 AM
9	I don't know what HOA has done.	1/26/2016 6:31 PM
10	None	1/23/2016 6:58 PM
11	Actually all the above.	1/23/2016 9:21 AM
12	moved in to my mother's home recently and i have a lot of mitigation to do. I was a former union city resident for many years. City of Union City leadership is excellent and progressive !!	1/16/2016 2:49 PM
13	Water heater and appliances	1/16/2016 12:39 PM

Q10 What modifications, if any, do you consider the most important in reducing your water usage due to the drought, in either your home or business? (Check one)

Answered: 211 Skipped: 17



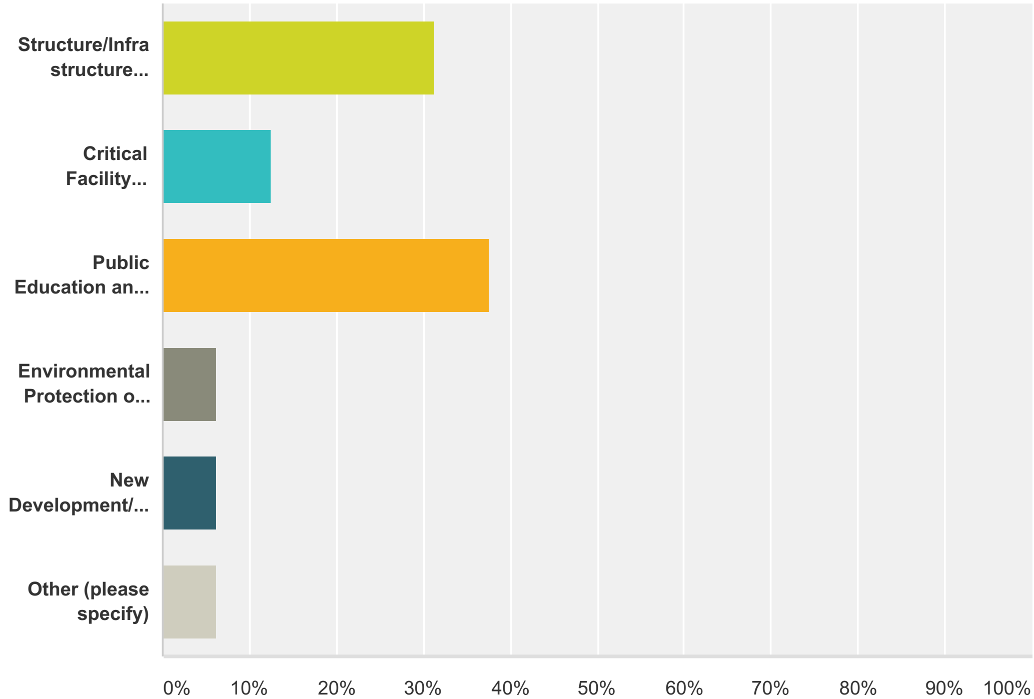
Answer Choices	Responses	
Install a low-flow showerhead	**9.00%**	19
Reduce the length of your shower	**21.80%**	46
Replace ornamental landscaping with drought resistant plants	**18.96%**	40
Water early in the morning or the evening	**4.74%**	10
Water your favorite plants by hand instead of using sprinklers	**5.69%**	12
Turn off the faucet while brushing your teeth	**8.53%**	18
Use a reusable water bottle (rather than buying bottled water)	**1.90%**	4
Run dishwasher only when full	**3.79%**	8
Use a light wash setting on the dishwasher	**0.47%**	1
Skip car washes	**10.43%**	22
Replaced old toilets with newer, more water efficient toilets	**14.22%**	30

Install faucet aerators	**0.47%**	1
Total		**211**

#	Other (please specify)	Date
1	Spring loaded or timed faucets that shut down water flow automatically	12/2/2016 3:14 PM
2	reduced outside watering, and inside conserve where ever possible.	3/2/2016 2:47 PM
3	Dunno	2/26/2016 9:00 AM
4	I have done almost everything on your list.	2/20/2016 4:54 PM
5	Flush toilets with water caught in buckets while waiting for flow to warm	2/20/2016 8:05 AM
6	I have done most of these for years as a matter of protecting the environment.	2/18/2016 10:08 AM
7	I can't choose one, indie/do all. I don't buy any bottled in california bottled water.	2/15/2016 10:14 PM
8	Sharing bathwater and limiting it to every other day	2/12/2016 6:09 PM
9	It seems silly to pick just one, they are not mutually exclusive.	2/12/2016 6:59 AM
10	all the above	2/11/2016 5:18 PM
11	& turn off water while brushing teeth & reuse water bottles	2/11/2016 1:31 PM
12	Install a graywater system	2/10/2016 9:08 PM
13	we have done all of the above	2/10/2016 4:37 PM
14	zero watering lawns	2/10/2016 1:23 PM
15	I can only identify one item.	1/26/2016 6:31 PM
16	Multiple - reduce shower time, stop sprinkles, stop faucets during brushing & shaving	1/24/2016 7:38 PM
17	Use paper plates/disposable utensils to reduce amount of dish washing	1/24/2016 12:40 PM
18	Stopped watering the lawn.	1/24/2016 5:52 AM
19	Done all the above.	1/23/2016 9:21 AM
20	We "catch" the water in shower to rain barrel for landscape and we have no grass only pavers and artificial grass.	1/21/2016 6:26 PM
21	this question only lets me check one modification	1/19/2016 4:08 PM
22	All of the above.	1/19/2016 8:24 AM
23	Could not check more than one!!	1/17/2016 6:27 PM
24	reduced length of showers, water by hand,	1/16/2016 2:49 PM
25	All	1/16/2016 12:39 PM

Q11 What types of projects should the cities of Union City and Newark focus on to reduce hazard impacts?

Answered: 16 Skipped: 212

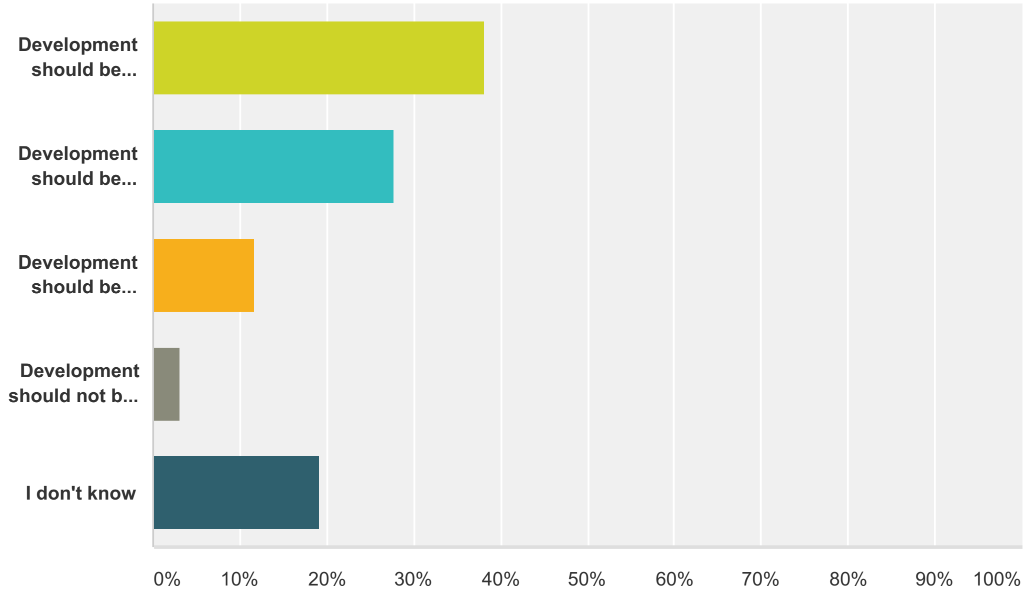


Answer Choices	Responses	
Structure/Infrastructure Improvements	**31.25%**	5
Critical Facility Upgrades	**12.50%**	2
Public Education and Outreach	**37.50%**	6
Environmental Protection of Natural Buffers (for example, open space in a floodplain)	**6.25%**	1
New Development/Regulatory Standards and Strategic Plans	**6.25%**	1
Other (please specify)	**6.25%**	1
Total		**16**

#	Other (please specify)	Date
1	More solar energy less fossil fuel	9/16/2016 9:48 PM

Q12 What development restrictions, if any, should be made in hazard areas?

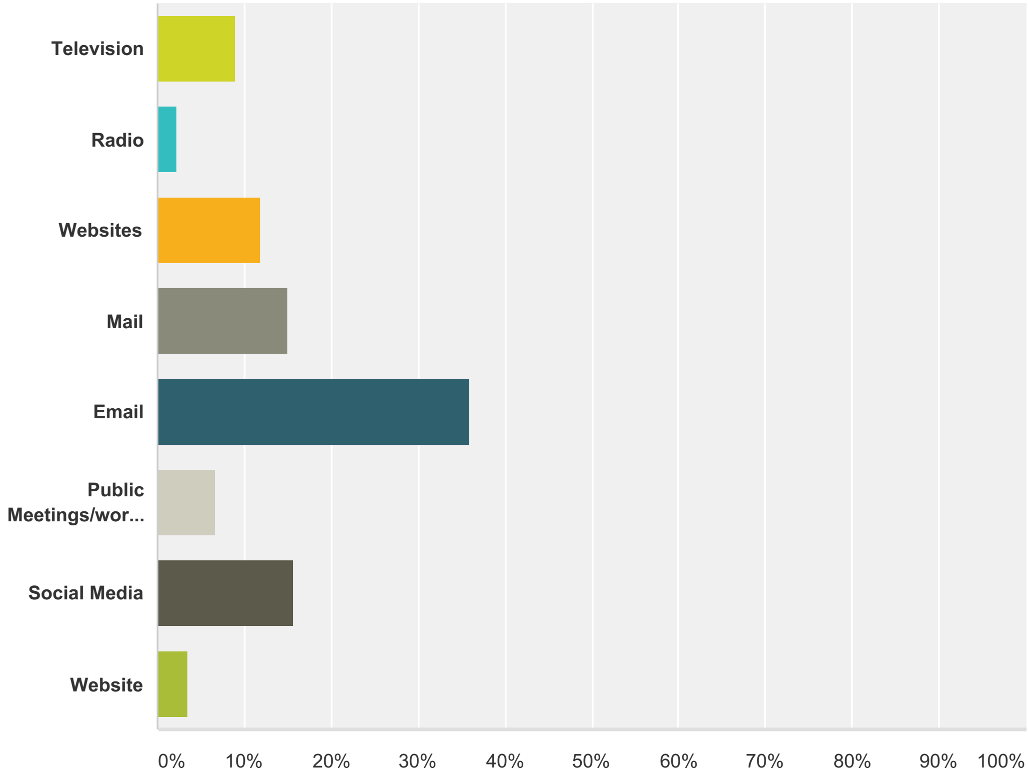
Answered: 223 Skipped: 5



Answer Choices	Responses	
Development should be prohibited in hazard areas	**38.12%**	85
Development should be restricted in hazard areas	**27.80%**	62
Development should be restricted only in severe hazard areas	**11.66%**	26
Development should not be restricted in hazard areas	**3.14%**	7
I don't know	**19.28%**	43
Total		**223**

Q13 What is the most effective way for you to receive information about how to protect your family and prepare your home for hazard events?

Answered: 225 Skipped: 3

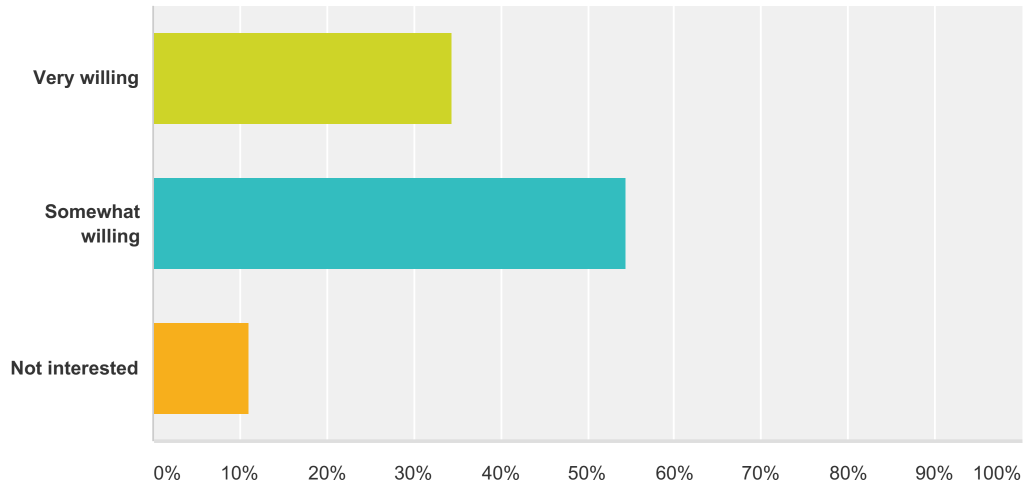


Answer Choices	Responses	
Television	**8.89%**	20
Radio	**2.22%**	5
Websites	**12.00%**	27
Mail	**15.11%**	34
Email	**36.00%**	81
Public Meetings/workshops	**6.67%**	15
Social Media	**15.56%**	35
Website	**3.56%**	8
Total		**225**

#	Other (please specify)	Date
1	Text	2/15/2016 10:14 PM
2	all the above	2/11/2016 5:18 PM
3	text alerts	2/10/2016 1:46 PM
4	All of the above	2/10/2016 11:15 AM
5	WEB, Radio, mail are the best.	1/23/2016 9:21 AM
6	All the above	1/22/2016 11:22 PM

Q14 How willing would you be to volunteer during a disaster event?

Answered: 224 Skipped: 4



Answer Choices	Responses	
Very willing	**34.38%**	77
Somewhat willing	**54.46%**	122
Not interested	**11.16%**	25
Total		**224**

Q15 You know better than anyone else what your home, neighborhood, and community hazards are and as your local government, we want to do our best to help. What else do you think we should know?

Answered: 81 Skipped: 147

#	Responses	Date
1	Gas lines, may it be oil or natural gas.	12/8/2016 7:37 AM
2	Community resource guide that is updated every other year and published. Then distributed to every household in UC	12/2/2016 3:14 PM
3	Educate public about disaster recovery. Initiate neighborhood programs to help and protect each other	12/2/2016 9:09 AM
4	Providing community with grants for group(s) emergency preparedness equipment's and tools along with educational workshops.	12/2/2016 9:09 AM
5	Where to go/meet/evacuate to in the event of an emergent and/or hazardous situation.	10/19/2016 9:50 PM
6	Better explain the tradeoffs to earthquake and flood insurance, from a public agency (rather than an insurance agent who has an interest in selling it).	10/16/2016 1:49 PM
7	I think we need strong and confident leaders to delegate tasks in a calm manner and we would need proper funding for any potential "hazards" or disasters.	9/17/2016 7:27 AM
8	What are the locations of elderly and home-bound members of our communities.	9/16/2016 6:20 PM
9	The levy in town and the waterways that run thru UC	9/16/2016 6:03 PM

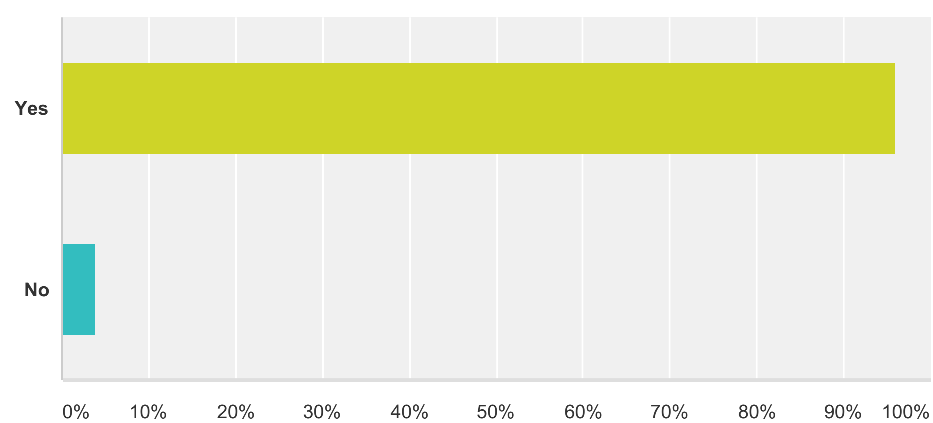
10	Create a community based evacuation disaster plan with tight-knit group leaders and emergency supply stock + HAM radio for communication network between command post and these individual groups. this will help mobilize assistance much faster in case of an emergency situation	3/3/2016 7:48 PM
11	Alameda creek is an extremely important watershed and links wildlife from Niles Canyon to the bay. More must be done to protect it and work in conjunction with other agencies including east bay parks, and save the bay.	3/2/2016 2:47 PM
12	If problems do happen a line of communication would be needed (radio station, web page, or meeting location)	3/2/2016 11:02 AM
13	Traffic in and around Delaine Eastin Elementary School. Possibly bike lane/pedestrian lane on actual sidewalk for children that bike or walk to school and is in no way safe to share the road with vehicles.	3/1/2016 5:57 PM
14	.	3/1/2016 3:34 PM
15	Provide and distribute information and procedure to residents which they can keep in a place for reference in the event of a hazard or disaster. (Places to go for shelter, food, numbers to call, assembly areas for evacuation).	3/1/2016 3:15 PM
16	Need to send information regarding how the drought is affecting the stability of our hills and large trees. I live on Mission and have concerns about mudslides and trees coming down (root surfacing) due to the drought.	2/29/2016 10:45 AM
17	Ensure we have proper man power and supplies	2/25/2016 8:34 PM
18	Local neighborhood meetings in places like the voting locations. With mailing and social media announcements make sure of refreshments!	2/22/2016 5:41 AM
19	Hazards from falling trees.	2/20/2016 8:05 AM
20	I see too many nonoperative vehicles parked on streets. On an emergency, they take place of emergency vehicles thus traffic hampered.	2/18/2016 7:15 PM
21	Overcrowding is becoming a HUGE issue. If daily traffic causes gridlock, how do you expect to deal with large scale evacuations or establishing supply chains in a potential hazard zone?	2/18/2016 6:13 PM
22	Steet violence.	2/18/2016 3:48 PM
23	I appreciated the emergency preparedness meeting the city hosted in conjunction with the congressman. It would be beneficial to host similar meetings about other hazards.	2/18/2016 2:46 PM
24	That most of us are very complacent and speak up only to complain. I took the Emergency Preparedness Class but haven't heard about updates for sometime.	2/18/2016 10:08 AM
25	Homeless population, crime	2/13/2016 10:09 PM
26	The Flood Channel/Creek of Regents and Jean should be better maintained to prevent flood and fire hazard	2/13/2016 3:49 PM
27	overspeeding inresidential area homeless encampments vegetation maintenance around Alameda Creek	2/11/2016 5:44 PM
28	?	2/11/2016 5:18 PM
29	We have an important wetland area's within UC city limits (Alameda Creek) we can do more to protect it. UC should have more joint planning, community volunteer projects with others e.g., Save the Bay, ACWD, and East Bay Parks.	2/11/2016 3:28 PM
30	What residents are willing to help and how they can help.	2/11/2016 1:48 PM
31	The possibility of a plane crash on approach to Oakland Airport.	2/11/2016 1:31 PM
32	railroad hazard plan	2/11/2016 11:59 AM
33	Where heavy equipment is located in order to help after a major disaster.	2/10/2016 10:22 PM
34	I think the roads are getting impacted with traffic and not changing to accommodate population growth. Stop building but instead make improvements to what is already here.	2/10/2016 9:18 PM
35	I live in a largely residential area which happens to be in a 0.5 mile DOT evacuation zone for oil train derailments. There are, in fact, many Union City residents in similar proximity to this hazard. I hope this potential hazard has been factored into the city's hazard mitigation plan.	2/10/2016 9:08 PM
36	Use social media like Twitter, Facebook & NextDoor to communicate to residents in preparation to, during and after an emergency.	2/10/2016 8:29 PM
37	I am 83 yrs old.	2/10/2016 7:59 PM
38	Parks need better up keep trees hazard Home using electricity from park , dogs loose in parks , not cleaning up after animals no signs posted, smoking pot close to play grounds! Congested traffic	2/10/2016 7:51 PM
39	CERT training	2/10/2016 7:45 PM

40	Enforce speed limit on Union City Boulevard - it's a freeway, not a boulevard! The cost of tickets might reduce need for a supplemental sales tax, which encourages me NOT to shop in Union City.	2/10/2016 6:33 PM
41	Keep Alameda Creek dredged	2/10/2016 5:52 PM
42	Street lights c are too dim. People in dark clothing cannot be seen at night.	2/10/2016 5:11 PM
43	Keep drainage's clean and working	2/10/2016 3:09 PM
44	Communicate the cities disaster plan to residents.	2/10/2016 2:19 PM
45	More signs!	2/10/2016 2:12 PM
46	More Awareness programs and preparation guide. For example: Steps to make home earthquake withstand	2/10/2016 1:57 PM
47	It's imperative that our water be clean and adequate esp with water shortages with high risk of drought and climate change. Union City and California in general does not do enough to ensure the roadways and neighborhood streets stay free of trash. Tremendous and ongoing amounts of garbage and dumping all over. Absolutely no deterents are in place to stop this. The State and cities need to begin and enforce massive consistent and more frequent street cleaning and start instituting real fines for pollution. Make all residents personally responsible for garbage and trash in the streets in front of their house for starters. Everyone needs to be responsible to make sure garbage doesn't end up in waterways. Plus city needs to require cars be moved so streets can be cleaned and clean them more often. As water supplies go down and garbage stays as is and grows, there will be more concentrated pollutants in the water. Also concern about all types of drugs people flush in their toilet. Quite surprising how Ca is so far behind other states when it comes to roadway garbage and concern for clean water. Take a look at the freeways and Mission Blvd. Tons of garbage thrown out by drivers and pedestrians. Use people in jails, juveniles and those needing community service to clean up the city. Hire more maintenance workers. It's an evitiable reality that cannot be ignored!!! If we can't obtain more water, ensure that the water we have is clean or there will be a Flint Michigan crisis' happening more with the lack of water.	2/10/2016 1:46 PM
48	Cannot think of specific at this moment without spending money.	2/10/2016 1:36 PM
49	Rezone industrial areas to business office or residential areas. We are next to Fremont, which is thriving from the office demand, new residential demand, and school districts which all have improved over the past 5 to 8 years. We should look at rezoning industrial to safe non-toxic and non hazardous areas.	2/10/2016 12:34 PM
50	I am not sure at this point of time.	2/10/2016 12:20 PM
51	not sure...I am barely new here and still exploring.	2/10/2016 12:13 PM
52	I live at the Contempo townhome complex and am unaware of any earthquake retrofits that were made to the homes as well as to the surrounding areas. I think it would be helpful to check these.	2/10/2016 12:08 PM
53	Nothing comes to mind.	2/10/2016 12:05 PM
54	Can anything be done about liquefaction?	2/10/2016 12:04 PM
55	Educate neighborhoods about emergency plan and think might happen in those region	2/10/2016 11:32 AM
56	Offer more classes.	2/10/2016 11:29 AM
57	What can the people do when we live in a multi-level condo/apartment community. Where are the shelters? Where can we go for help? walking distance? since there is only one road accessible.	1/26/2016 6:31 PM
58	Work shop at school to prepare families during an emrergency.	1/24/2016 9:37 PM
59	Each locality should have its evacuation plan & count verification	1/24/2016 7:38 PM
60	How is the city going to deal with public panic regarding food supply, lack of water and electricity in the event of an emergency?	1/24/2016 5:49 PM
61	Think so	1/24/2016 3:27 PM
62	High risk of theft crime for houses around kitayama elementary school	1/24/2016 11:12 AM
63	None	1/23/2016 6:58 PM
64	Keep doing what your doing to keep our familys safe	1/23/2016 5:17 PM
65	Grass growing so tall along sides of flood control that worries residents in summer of danger of fire. Only one side of the creek (flood control) is always being taken cared of by the City, what about the other side?	1/23/2016 2:29 PM
66	More effort to encourage neighborhood groups to get together and prepare.	1/23/2016 9:43 AM
67	If I have to inform you then I'm in trouble already.	1/23/2016 9:35 AM

68	Inform community of neighborhood hazards and	1/23/2016 9:33 AM
69	Tree trimming the home owners city's trees. iTopping the large branches which are very dangerous,and can kill, injure or damage. This could lead too big city lawsuits as a result.	1/23/2016 9:21 AM
70	The creek along the Tropics Mobile Home Park is overgrown and a flood hazard as well as falling tree hazard.	1/22/2016 9:36 PM
71	What's coming in with the fish from the Pacific Ocean, possibly bringing in toxic chemicals.	1/22/2016 9:35 PM
72	Fix the lights on union city Blvd and dyer. They take so long I have seen people run the red lights. That's is also a hazard.	1/21/2016 6:55 PM
73	Union City does a pretty good job at this already, but any information on hazards and emergencies should be in English, Spanish, and Filipino.	1/21/2016 6:31 PM
74	I like the idea of street cleaning to keep gutters clean but do not know where to find out when it is scheduled. Would be nice to notify Neighbors not to park in streets.	1/21/2016 6:26 PM
75	Use CERT members to promote disaster preparedness.	1/21/2016 12:12 PM
76	Continue educating public in person, via social media, & on city's website as well as hosting in-person events such as recent PEP event at senior center.	1/19/2016 4:08 PM
77	Talk to people out in the community not just over the web also let people know of what's going on by sending flyers out with the kids or posting at the local church	1/19/2016 2:03 PM
78	Storm drains/road grading in historic Alvarado is outdated and can cause flooding.	1/19/2016 8:24 AM
79	law abiding citizens should be allowed concealed carry permits	1/17/2016 6:27 PM
80	Integrate plans with school district as schools can serve as shelters and meeting locations. Each school has emergency radios and ham radio antennas.	1/16/2016 2:49 PM
81	We appreciate the work that our firefighters and police officers do.	1/16/2016 12:39 PM

Q16 Are you a resident of Union City?

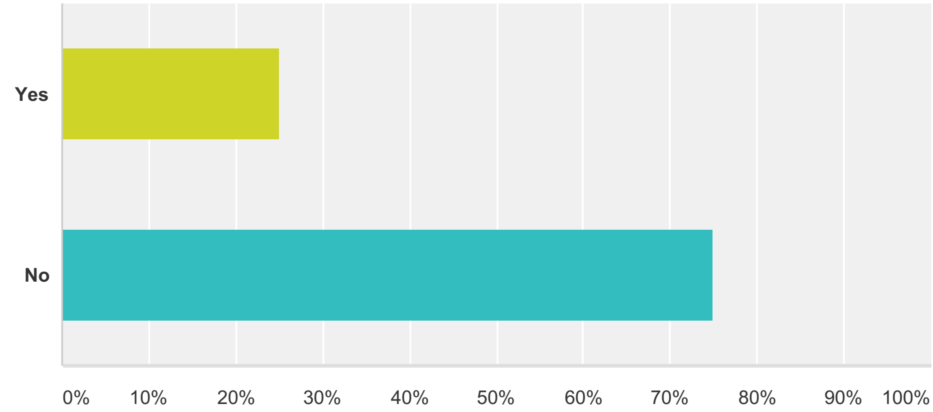
Answered: 227 Skipped: 1



Answer Choices	Responses	
Yes	**96.04%**	218
No	**3.96%**	9
Total		**227**

Q17 Are you a resident of Newark?

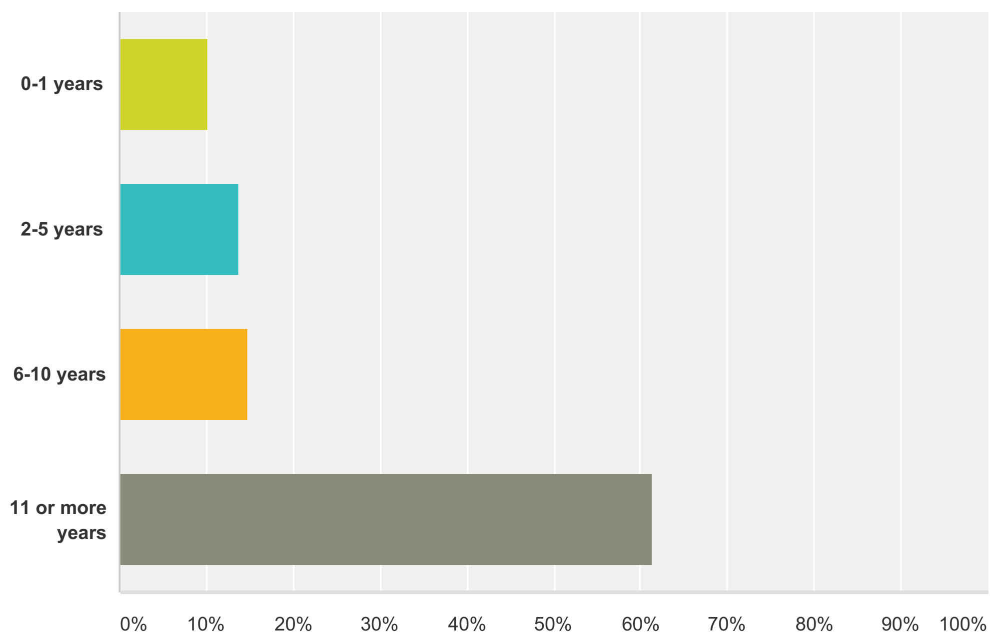
Answered: 16 Skipped: 212



Answer Choices	Responses	
Yes	**25.00%**	4
No	**75.00%**	12
Total		**16**

Q18 If "yes" to question 14, how many years have you lived in Union City?

Answered: 217 Skipped: 11

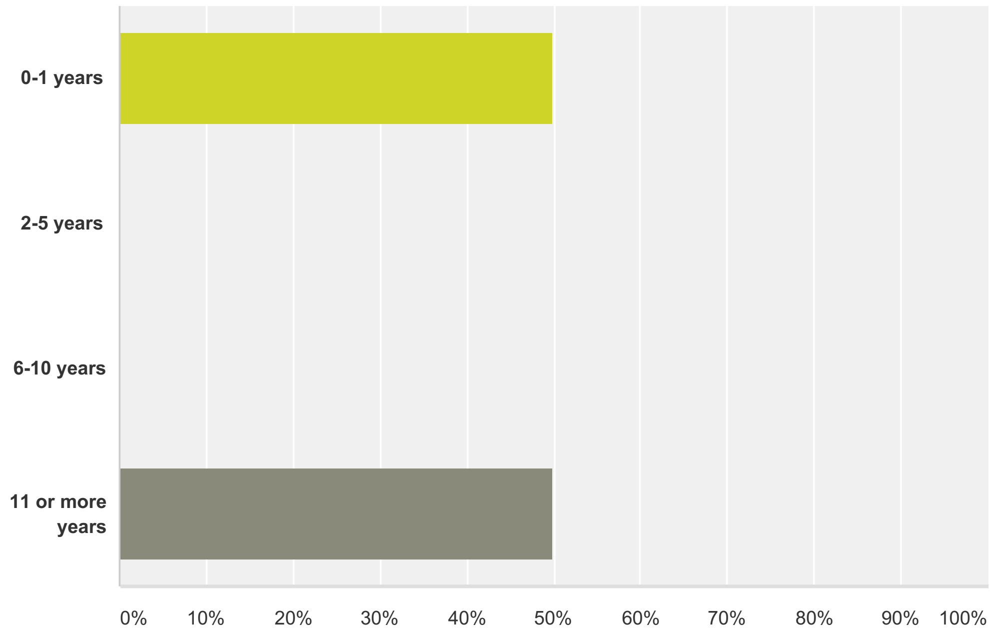


Answer Choices	Responses	
0-1 years	**10.14%**	22
2-5 years	**13.82%**	30
6-10 years	**14.75%**	32
11 or more years	**61.29%**	133

Total	**217**

Q19 If "yes" to question 15, how many years have you lived in Newark?

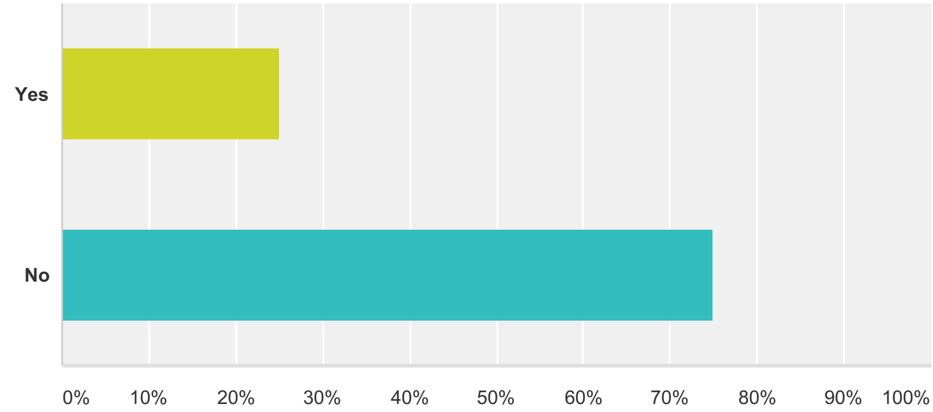
Answered: 8 Skipped: 220



Answer Choices	Responses	
0-1 years	**50.00%**	4
2-5 years	**0.00%**	0
6-10 years	**0.00%**	0
11 or more years	**50.00%**	4
Total		**8**

Q20 Do you work in Union City or Newark?

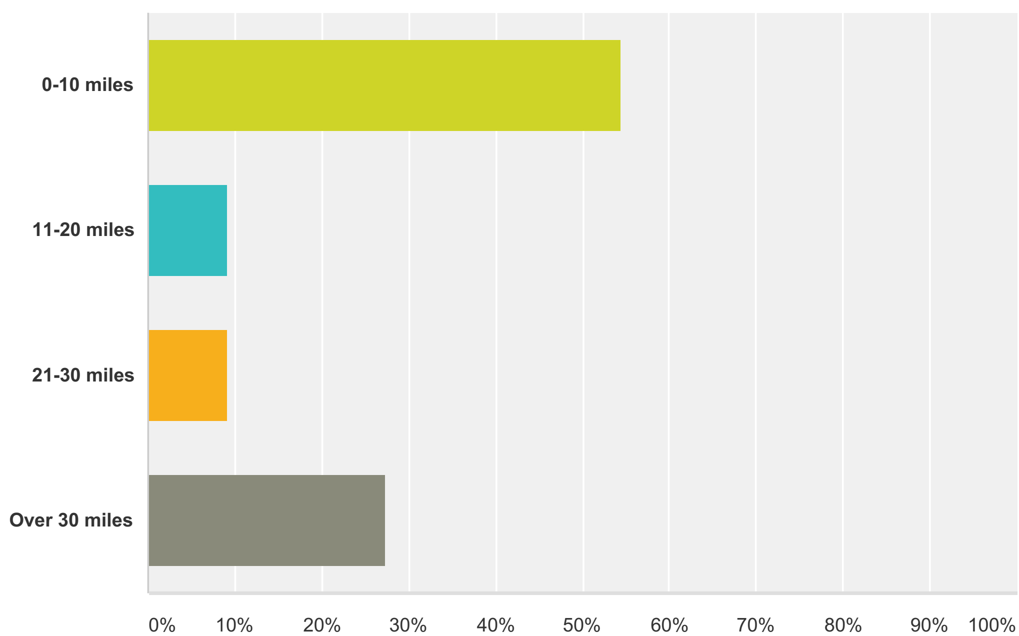
Answered: 16 Skipped: 212



Answer Choices	Responses	
Yes	**25.00%**	4
No	**75.00%**	12
Total		**16**

Q21 If you do not work in Union City or Newark, how far is your daily commute from your home?

Answered: 11 Skipped: 217

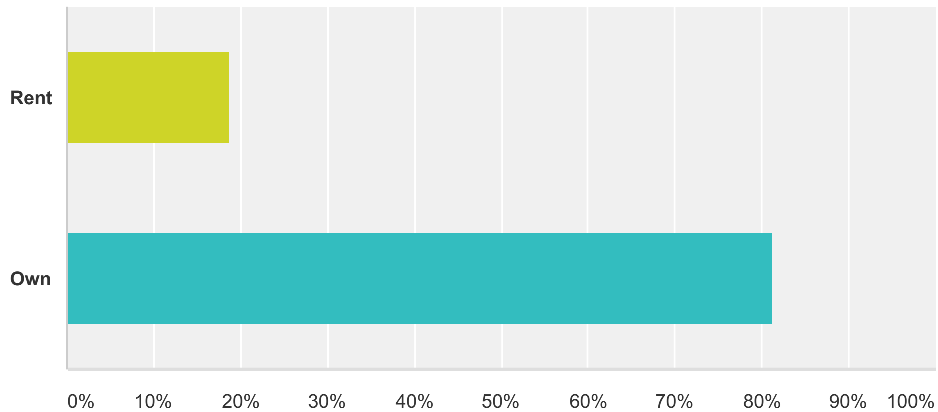


Answer Choices	Responses	
0-10 miles	**54.55%**	6
11-20 miles	**9.09%**	1
21-30 miles	**9.09%**	1

Over 30 miles	**27.27%**	3
Total		**11**

Q22 Do you rent or own the home you currently live in?

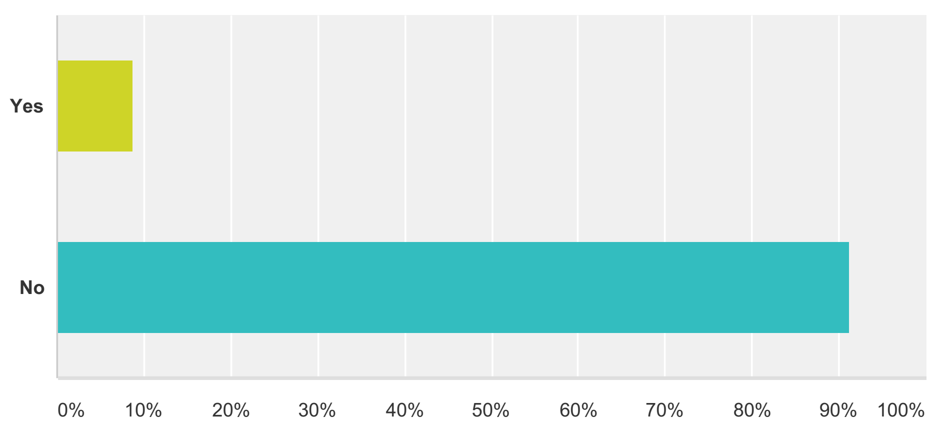
Answered: 224 Skipped: 4



Answer Choices	Responses	
Rent	**18.75%**	42
Own	**81.25%**	182
Total		**224**

Q23 Do you own a business in Union City or Newark?

Answered: 226 Skipped: 2



Answer Choices	Responses	
Yes	**8.85%**	20
No	**91.15%**	206

Total	226

Q24 Do you want to be notified of upcoming mitigation public events? If so, please leave your contact information.

Answered: 7 Skipped: 221

#	Responses	Date
1	Alex Aranda 1.510.926.3479 or ap.aranda@gmail.com	12/8/2016 7:37 AM
2	Kevin Finnerty, 4567 Fellows Street, Union City, CA, 94587	12/2/2016 3:14 PM
3	p_vasavi@hotmail.com	12/2/2016 9:09 AM
4	dhsuscg@aol.com	10/19/2016 9:50 PM
5	wilyworm1@aol.com	10/10/2016 12:31 PM
6	Aguilar.Kristine@gmail.com or text "alert system" to 510-999-0225	9/17/2016 7:27 AM
7	cburpee@csdf-cde.ca.gov	9/16/2016 6:03 PM

Q25 Do you have any additional comments?

Answered: 6 Skipped: 222

#	Responses	Date
1	None	12/2/2016 3:14 PM
2	Public officials should have neighborhood meetings to get to know what people want. Initiate forming groups in neighborhoods and educate them for emergencies.	12/2/2016 9:09 AM
3	None	10/19/2016 9:50 PM
4	For Question 18, question 14 was about volunteering. Curious to know, if Fremont has a plan, what is theirs? If we ever have some type of emergency, how will our phone and cell phone lines be effected? Is there a way to register our cell phones to a Mass Alert System so we can get up-to-date information?	9/17/2016 7:27 AM
5	Nice to see there is some planning happening	9/16/2016 6:03 PM
6	The question numbers in questions 18 & 19 are wrong. I hope the plan is proof read.	8/11/2016 2:53 PM

IS YOUR CITY AT RISK FOR NATURAL DISASTERS?

Take the Online Survey!

Please join Union City and Newark in the development of the Union City/Newark Hazard Mitigation Plan.

A hazard mitigation plan is the foundation of a community's long term strategy to reduce losses and break the disaster cycle. As a result, we want to partner with you in developing this plan:

- We want to hear about what concerns you the most and what impact disasters have had on you and your family.
- We want your feedback throughout the planning process.
- We want your edits and suggestions to the plan as drafts become available for review.

Take the first step by submitting your response to the Union City/Newark Hazard Mitigation Public Survey!

PARTICIPATING STAKEHOLDERS:

- Union City
- Newark
- Alameda County Water District
- Union Sanitary District
- Newark Unified School District
- New Haven Unified School District
- *And Most Important…*

➤ ***YOU***

TELL US ABOUT YOUR EXPERIENCE WITH THE FOLLOWING HAZARDS:

- ❖Climate Change
- ❖Dam Failure
- ❖Drought
- ❖Earthquake
- ❖Flood
- ❖Landslide
- ❖Severe Weather
- ❖Wildfire
- ❖Man-made Hazards
- ❖Health Hazards

STAY INFORMED OF UPCOMING EVENTS:

www.uc-newark-hmp.com

COMPLETE THE SURVEY NOW:

www.surveymonkey.com/r/UCNewarkhazards

SIGN-IN

1. Activity:	2. Activity #:	3. Operational Period:	
Disaster Council Meeting	1 - City of Newark	From	Date: 10/13/16 Time: 6pm
		To	Date: 10/13/16 Time: 7pm

4. Sign In:

Name (Print)	Organization/Position	Phone Number	E-mail	Signature
MIKE BERKE	NEWARK CERT/HAM	510-909-3354	MBERKE@ECHELON.COM	
DAVID ZEHNDER	NEWARK	510-227-9650	david.zehnder@newark.org	
JOHN BECKER	Newark	510-578-4272	john.becker@NEWARK.org	
AL NAGY	Newark	510-381-2906	alan.nagy@sbcglobal.net	
Jessica Cerutti	Tetra Tech	269-377-6698	jessica.cerutti@tetratech.com	
Susie Woodstock	Newark	510-578-4804	susie.woodstock@newark.org	
Terrence Grindall	Newark	510-578-4208	Terrence.Grindall@Newark.org	
MICHAEL HANNON	Newark	510-793.0405	RUPHANNON@comcast.net	
BOB HASTINGS	NEWARK Cert	510-792-8051	DHSUSCG@AOL.com	
David Libby		510 745-9926	CONCHANEL@LIVE.Com	

SIGN-IN

1. Activity:	2. Activity #:	3. Operational Period:	
Disaster Council Meeting	1 - City of Newark	From	Date: 10/13/16 Time: 6pm
		To	Date: 10/13/16 Time: 7pm

4. Sign In:

Name (Print)	Organization/Position	Phone Number	E-mail	Signature
Sucy Collazo	City Council	510 209-6242	Sucy4Newark@gmail.com	
Eric Moore	Division Chief	510-693-3401		
David Benoun	City Attorney/Newark	510-578-4427	david.benoun@newark.org	
Soren Fajeau	C.O.N./Public Works Dir	510 578-4286	soren.fajeau@newark.org	
Sandy Abe	City of Newark HR	510-578-4347	Sandy.Abe@newark.org	
HILDA HURTADO	ACFD	510-693-3487	hilda.hurtado@acgov.org	

CITY OF NEWARK

Minutes for the Disaster Council Meeting
Thursday, October 13, 2016
Silliman Activity Center
6800 Mowry Ave., Newark
6:00 p.m.

DRAFT

A. ROLL CALL

Meeting Attendees:
Newark Mayor: Alan Nagy
Newark City Council Members: Michael Hannon, Sucy Collazo
Newark City Manager: John Becker
Newark City Attorney: David Benoun
City of Newark Executive Staff: Susie Woodstock, Sandy Abe, Terrence Grindall, Soren Fajeau and David Zehnder
Newark CERT members: Mike Berke, Bob Hastings, David Libby
Alameda County Fire Department employees: Division Chief Eric Moore and Hilda Hurtado.
Tetra Tech: Jessica Cerutti:

Mayor Nagy called the meeting to order at 6:00 p.m.

B. MINUTES

Previous meeting notes approved from November 13, 2014.

C. SET NEXT MEETING DATE

The next regular Disaster Council meeting is set for December 8th, 2016

D. OLD BUSINESS

D.1 No Old Business

E. NEW BUSINESS

E.1 Muni Code Update:

- General discussion and update on the Muni Code.
- There was a motion made and approved to move the Muni Code to City Council.

E.2 Local Hazard Mitigation Plan Update:

Jessica Cerutti, a representative from Tetra Tech, gave an update on the Newark/Union City Mitigation Plan:

- Disaster Mitigation 2000 allows for funding mechanism from Federal resources.

- The Mitigation Plan is multijurisdictional, including Newark, Union City, and four special districts.
- Two Volume Approach:
  - 1st Volume – Planning Area Information, including planning process, public outreach, and hazard risk assessments
  - 2nd Volume – Jurisdictional Annexes, including jurisdiction specific mitigation action plan
- The mandatory public draft comment period will open on December 2nd, 2016.
- Once the public comment period ends, the Mitigation Plan will be submitted to CAL OES/ FEMA.
- After a satisfactory review, FEMA will issue a notice of Approval Pending Adoption (APA).
  - APA is anticipated to occur in mid to late February 2017.
  - After APA, participating jurisdictions will adopt the plan and be covered for a 5-year performance period.
- Some questions were asked by attendees.

E.3 Disaster Service Worker Volunteer Resolution

- Explanation of Service worker volunteer.
- Recommended for resolution
- Resolution moved to Newark City Council
- CAL/OES information and Executive Summary to Council

E.4 CERT Program

- Discussion on Member Agreement
- Meeting disaster service worker requirement
- Forms go to City Clerk who will hold records and perform follow up.
- Council Member Hannon asked about the medical requirement for CERT members.
- Council Member Collazo asked how many CERT members participate in Newark
- Motion for forward to City Council for Approval.

F. ROUND-TABLE

- 2016 Urban Shield wrapped up and had good participation.
- CERT class is midway through. New "Academy Style" format incorporated for this training.
- Hilda Hurtado announced her departure with ACFD. Everyone thanked her for her time and involvement.
- Council Member Hannon thanked public safety for their service.

G. ADJOURNMENT

The meeting was adjourned at 6:50 p.m.

IS YOUR CITY AT RISK FOR NATURAL DISASTERS?

NEWARK california

UNION CITY california

Review the Plan!
Give us *YOUR* suggestions!

All residents and visitors to Union City and Newark are invited to join us in reviewing the draft Union City/Newark Hazard Mitigation Plan.

A hazard mitigation plan is the foundation of a community's long term strategy to reduce losses and break the disaster cycle. As a result, we want your suggestions for the draft plan.

PARTICIPATING STAKEHOLDERS:

- Union City
- Newark
- Alameda County Water District
- Union Sanitary District
- Newark Unified School District
- New Haven Unified School District
- *And Most Important…*

➢ ***YOU***

TELL US ABOUT YOUR EXPERIENCE WITH THE FOLLOWING HAZARDS:

- ❖Climate Change
- ❖Dam Failure
- ❖Drought
- ❖Earthquake
- ❖Flood
- ❖Landslide
- ❖Severe Weather
- ❖Wildfire
- ❖Man-made Hazards
- ❖Health Hazards

REVIEW THE DRAFT 2016 PLAN:

www.uc-newark-hmp.com/draft-documents-for-review

GIVE US YOUR COMMENTS:

https://www.surveymonkey.com/r/UCNewarkDraft

CITY OF NEWARK

Agenda for the Disaster Council Meeting
Thursday, December 8th, 2016
Silliman Activity Center
6800 Mowry Ave., Newark
6:00 p.m.

A. ROLL CALL AND INTRODUCTIONS

B. MINUTES

B.1 Approval of Minutes of Disaster Council meeting of Thursday, October 13th, 2016 meeting. (MOTION)

C. SET NEXT MEETING DATE

D. OLD BUSINESS

D.1 None

E. NEW BUSINESS

E.1 Local Hazard Mitigation Plan Review

F. ROUND-TABLE

F.1

G. ADJOURNMENT

Pursuant to Government Code 54957.5: Supplemental materials distributed less than 72 hours before this meeting, to a majority of the City Council, will be made available for public inspection at this meeting and at the Alameda County Fire Department's Fire Prevention Office located at 37101 Newark Blvd. during normal business hours. Materials prepared by City staff and distributed during the meeting are available for public inspection at the meeting or after the meeting if prepared by some other person.

UNION CITY/NEWARK MULTI-JURISDICTION HAZARD MITIGATION PLAN

Union City Disaster Council

Thursday – December 15, 2016

What is the Disaster Mitigation Act (DMA)?

Federal legislation that establishes a pre-disaster hazard mitigation program and requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

"No Plan, No Money!"

What We will Talk About

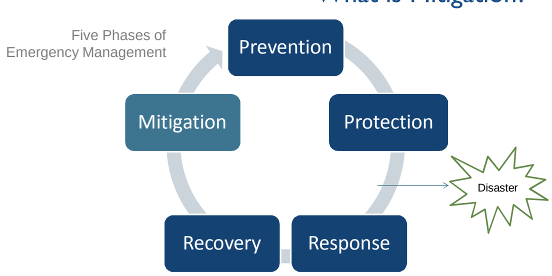
- Mitigation Overview
- The Planning Process
- Public Engagement
- The Steering Committee and Planning Partnership
- Mission, Goals, and Objectives
- The Hazards
- Mitigation Alternatives
- Union City Annex
- Next Steps
- Questions

What is Required in a DMA Plan?

According to Section 201.6, 44CFR, an approved plan must:

- Engage the public through all phases of the plan's development
- Review and incorporate plans and programs that can support/enhance hazard mitigation
- Assess risk to natural hazards that impact a planning area
- Identify a plan maintenance strategy
- Identify and prioritize actions
- Update every 5 years

What is Mitigation?



"Sustained action taken to reduce or eliminate long-term risk to life and property"

Why Plan?

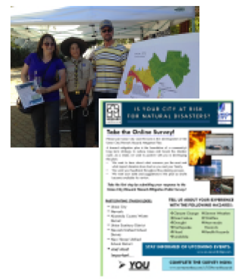
- Establish/maintain eligibility for grant funds
- Preparedness: pro-active vs. reactive
- Sustainability
- Key element in emergency management
- Can set the course for response and recovery to impacts from natural disasters
- Requires commitment and support from both elected officials and their constituents

A Multi-Jurisdictional Plan

- Preferred format by FEMA
- Identifies/creates the partnerships that enhance grant funding opportunities
- For multi-jurisdictional plans, all partners must:
  - *Participate in the process*
  - *Rank Risk*
  - *Perform a capability assessment*
  - *Identify/Prioritize jurisdiction specific actions*
- Two-volume approach for multi-jurisdictional plans
  - Volume 1 – Planning Area (Parent Plan)
  - Volume 2 – Jurisdiction Specific Annexes

Public Engagement

- Comprehensive Public Engagement Strategy on behalf of the whole Planning Partnership
  - Public Survey
  - Informational Booths
  - Committee/Council Meetings
  - Press Releases
  - Social Media
  - Flyers and Handouts



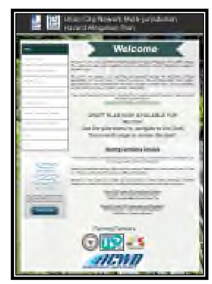
Process Objectives for this Project

- Promote the wise use of resources and increase coordination among partner jurisdictions. Multi-Jurisdictional plans:
  - Reduce the level of effort for each partner
  - Promote consistency within the planning area
  - Create enhanced grant opportunities
  - Preferred approach by FEMA and CalOES
- Identify natural hazard risks and vulnerabilities for the people, property and economy of the Planning Area
- Develop specific strategies to reduce disaster risk and improve resilience

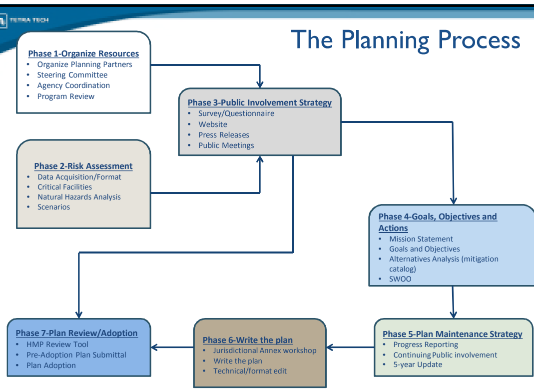
Public Engagement Example: Project Website

This site includes:

- FAQs
- Steering Committee Meeting Agendas/Minutes
- Project Announcements/ Calendar
- The Draft Plan (Pending)



The Planning Process



The Steering Committee

- Provided recommendation and guidance throughout the planning process
- Met 6 times since June 2016
- Multi-stakeholder
  - Planning Partners
  - Volunteer Organizations
  - County Representatives

The Planning Partnership

- Plan will cover 5 local governments:
  - Union City
  - Newark
  - Alameda County Water District
  - Union Sanitary District
  - Newark Unified School District

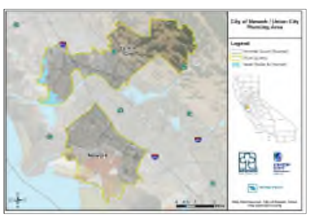
Goals and Objectives

- The Steering Committee has identified 7 goals and 12 objectives that support the mission for the plan
- All of these planning components are linear

The Planning Area

The planning area for this effort covers all of Union City and Newark.

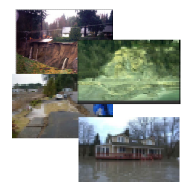
For ACWD and Union Sanitary…
the plan also covers identified critical facilities located outside of the Planning Area in the City of Fremont.



Hazards of Concern

Hazards :

➔Dam failure
➔Drought
➔Earthquake
➔Flood
➔Landslide
➔Severe Weather
➔Wildfire
➔Other Hazards profiled, but not fully assessed (climate change, health hazards, human-caused hazards)



Mission Statement

"Through partnerships, maintain and enhance the disaster resistance of Union City and Newark by reducing the potential loss of life, property, damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters."

Risk Assessment

- The foundation of the plan is a comprehensive risk assessment of 7 natural hazards of concern
  - ✓ Assess hazard
    - Past events
    - Areas most affected
    - Frequency
    - Severity
    - Warning time for response
  - ✓ Determine Exposure
  - ✓ Assess Vulnerability
    - Loss Estimation

Mitigation Alternatives

- Mitigation Catalog has been developed by looking at Strengths, Weaknesses, Obstacles and Opportunities within the Planning Area.
- This represents the range of alternatives to be considered.
- Each planning partner will use the catalog to guide identification and prioritization of actions.

Union City Draft Annex Highlights (cont.)

- Natural Hazard Event History
- Jurisdiction-Specific Vulnerabilities
- Hazard Risk Ranking

Table 2-8. Hazard Risk Ranking

Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Earthquake	54	High
2	Severe Weather	33	Medium
3	Flood	18	Medium
4	Wildfire	18	Medium
5	Dam Failure	18	Medium
6	Landslide	12	Low
7	Drought	3	Low

Union City Draft Annex Highlights

- Jurisdiction Profile
  - History and establishment
  - Current population and population trends
  - Location
  - Climate
  - Governing Body Format
  - Development Trends

Union City Draft Annex Highlights (cont.)

- Status of previous initiatives
- Risk Ranking (Probability x Impact)
- Status of Previous Initiatives

Table 2-9. Hazard Risk Ranking

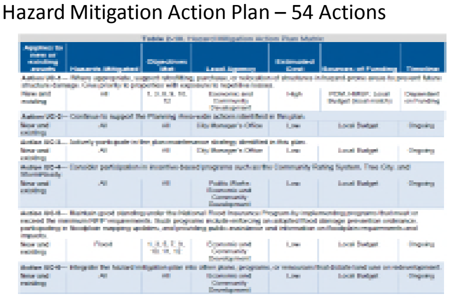
Rank	Hazard Type	Risk Rating Score (Probability x Impact)	Category
1	Earthquake	54	High
2	Severe Weather	33	Medium
3	Flood	18	Medium
4	Wildfire	18	Medium
5	Dam Failure	18	Medium
6	Landslide	12	Low
7	Drought	3	Low

Union City Draft Annex Highlights (cont.)

- Capability Assessment
  - Legal/Regulatory
  - Fiscal
  - Administrative and Technical
  - National Flood Insurance Program
  - Public Education and Outreach
  - Community Classifications
  - Development and Permitting
  - Plan Integration
    - How Union City incorporated city initiatives into the Plan
    - How Union City will incorporate the Plan into city initiatives

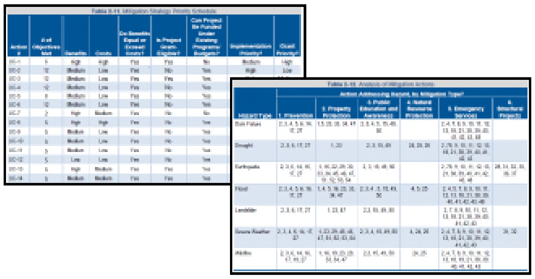
Union City Draft Annex Highlights (cont.)

- Hazard Mitigation Action Plan – 54 Actions

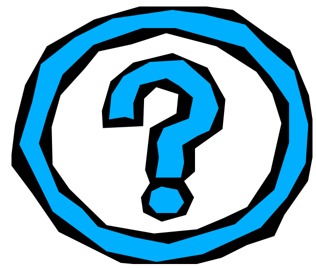


Union City Draft Annex Highlights (cont.)

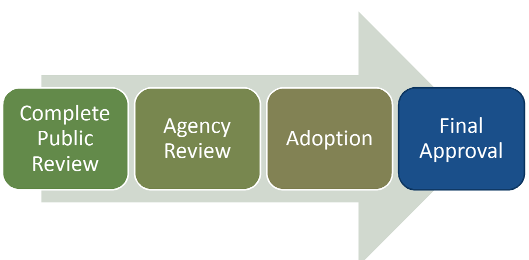
- Prioritization and Analysis



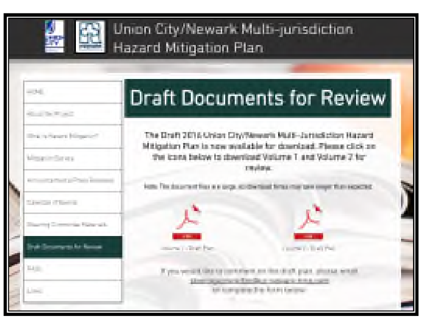
QUESTIONS



Next Steps



Review the Plan!



www.uc-newark-hmp.com

UNION CITY
california

DISASTER COUNCIL
CITY OF UNION CITY
Thursday, December 15, 2016
9:00 AM – 11:00 AM
Charles F. Kennedy Community Center
1333 Decoto Road, Union City

Name	Organization	Title
✓ Acosta, Tony		City Manager
Arroyo, Gus	WASHINGTON HOSP	SAFETY MGR
✓ Block, Andrew	UNION CITY	Env. Programs Manager
✓ Campbell, Carmela	" "	
✓ Carlson, Mark	Union City	ASD Director
✓ Cheng, Mintze	Union City	Public Works Director
✓ Dutra-Vernaci, Carol		Mayor
✓ Evanoff, Mark		Deputy City Manager
✓ Guio, Lee	UC CERT	CERT Coordinator
Hurtado, Hilda		
Malloy, Joan JM	Union City	ECD Director
✓ Marzano, Mike	UNION SANITARY	Safety Manager
Mattos, John		
✓ Peterson, Steve	ACWD	Mgr of Oper & Maint.
Perdue, Pamela		
Primer, Anthony		
Reid, Treva		
✓ Rinetti, Jared		Police Captain
✓ Ruark, Thomas	Union City	City Engineer
Sealana, Richard		Red Cross
Souza, Travis		Police Lieutenant
✓ Sugayan, Lauren	UC	Communications Manager
Tsang, Moses		
Velasquez, Michael		

Any writings or documents provided to a majority of the Commission regarding an item on this agenda will be made available for public inspection at the City Clerk's Counter at City Hall located at 34009 Alvarado-Niles Road, Union City, California, during normal business hours.

UNION CITY
california

DISASTER COUNCIL
CITY OF UNION CITY
Thursday, December 15, 2016
9:00 AM – 11:00 AM
Charles F. Kennedy Community Center
1333 Decoto Road, Union City

Name	Organization	Title
Karen White	kwhite@ix.netcom.com	
Jessica Cerutti	jessica.cerutt[illegible]	Lead Planner

Any writings or documents provided to a majority of the Commission regarding an item on this agenda will be made available for public inspection at the City Clerk's Counter at City Hall located at 34009 Alvarado-Niles Road, Union City, California, during normal business hours.

CITY OF UNION CITY

DRAFT Minutes for the Union City Disaster Council Meeting
December 15, 2016
Kennedy Community Center
1333 Decoto Road
Union City, CA 94587
9:00 - 11:00 a.m.

I. Introductions

Mayor Dutra-Vernaci called the meeting to order and facilitated introductions at 9:10 a.m.

Attendees:

NAME	ORGANIZATION	EMAIL	PHONE #
Carol Dutra-Vernaci, Mayor	City of Union City	ucmayor@unioncity.org	510-675-5325
Tony Acosta , City Manager	City of Union City	tonya@unioncity.org	510-675-5394
Mark Evanoff , Deputy City Manager	City of Union City	marke@unioncity.org	510-675-5345
Mintze Cheng, Director	Union City, Public Works Department	mintzec@unioncity.org	510-675-5306
Joan Malloy, Director	Union City, Economic and Community Development Department	joanm@unioncity.org	510-675-5327
Mark Carlson, Director	Union City, Finance Department	markc@unioncity.org	510-675-5338
Jared Rinetti, Captain	Union City, Police Department	jaredr@unioncity.org	510-471-1365
Tom Ruark, City Engineer	Union City, Public Works Department	thomasr@unioncity.org	510-675-5301
Lauren Sugayan	Union City, City Manager's Department	laurens@unioncity.org	510-675-5400
Carmela Campbell	City of Union City, Economic and Community Development Department	carmelac@unioncity.org	510-675-5315
Andy Block	City of Union City, Economic and Community Development Department	andrewb@unioncity.org	510-675-5358
Lee Guio	Union City Community Emergency Response Team (CERT)	leeguio@gmail.com	408-888-8413

NAME	ORGANIZATION	EMAIL	PHONE #
Mike Marzano	Union Sanitary District	mikema@unionsanitary.ca.gov	510-477-7531
Steve Peterson	Alameda County Water District	steve.peterson@acwd.com	510-668-6501
Gus Arroyo	Washington Hospital Healthcare System	gus_arroyo@whhs.com	510-818-7206

II. Public Comment

a. A member of the public in attendance stated her concern about access to the Seven Hills area and Masonic Homes after a disaster. These areas have limited egress routes and the Hayward fault, running along the Mission Boulevard corridor, could cut-off these areas from first responders.
b. A member of the public in attendance stated her concern for the welfare of pets and animals after a disaster.

III. Matters for Consideration – Local Hazard Mitigation Plan

a. Jessica Cerruti, Emergency Management Specialist with Tetra Tech consultants, made a PowerPoint slide presentation on the 2016 Local Hazard Mitigation Plan (LHMP) process. The members of the Disaster Council participated in an active discussion of the issues.
b. The draft Union City/Newark Multi-Jurisdiction Local Hazard Mitigation Plan, Volume 1 was distributed to the Disaster Council representatives.
c. Mr. Peterson pointed out that the hazard rankings for the special districts (Alameda County Water District, Union Sanitary District, New Haven Unified School District, Newark Unified School District) are specific to those organizations and differ from the Union City-specific hazard rankings; in particular, drought is ranked as a high hazard for the Water District.
d. It was noted that the LHMP process determined that dam inundation poses a higher-than-expected risk for Union City and Newark.
e. The sea level rise estimates were based on the San Francisco Bay Conservation and Development Commission's Adapting to Rising Tides portfolio, available at www.adaptingtorisingtides.org.
f. The 2016 LHMP public comment period will end on December 23, 2016.
g. Next steps in the LHMP process include:
    i. Tetra Tech will submit the draft LHMP for review by CalOES and FEMA, leading to issuance of 'Approval Pending Adoption' (APA) status, or request for clarification or amendments;

ii. The City Council will then vote to approve the APA-version of the LHMP, at which point it becomes final. The adoption resolution shall be provided to Tetra Tech for submittal to CalOES and FEMA.
iii. Seeking to promote 'Whole Community' disaster planning and mitigation into the City's preparedness programs.
iv. Conducting regular reviews of the LHMP to incorporate LHMP recommendations into the budget cycle and Capital Improvement Plan.
v. Completing a mid-term progress report 30 months after adoption.

h. The LHMP shall be deemed current and valid for five years after approval.
i. The Tetra Tech PowerPoint presentation is incorporated as an attachment to these meeting minutes.

IV. Meeting adjourned at 10:35 a.m.

DRAFT

Draft Plan Public Comment Results and Responses

Where do you live?	Please provide your comments on the plan below.	Comments/Revisions to Plan
Union City	Need a plan for pets in case of the need for people to evacuate their homes. Local shelter capacity is limited, should investigate cooperative options with other communities in the area or close enough that pets could be moved there for temporary shelter. Need a digest version of the plan for homeowners, who are unlikely to read the comprehensive report. This could be supplemented with readily available "how to" brochures. URL on Page 121 is broken. I'd like to see a higher priority on Mitigation Action Plan UC-39 for Four Wheel Drive emergency vehicles. These could be a very important element in dealing with potentially isolated communities if earthquakes or other disaster damaged normal access roads.	Planning for pets - a response function as opposed to mitigation. City representatives were made aware of this request, however no action taken for this plan. Digest version of plan - the plan already contains an Execituve Summary for easier public consumption. "How to" Brochures - recommendation added to public outreach plan for Performance Period Outreach Broken URL - Checked and found to be working. 4WD Vehicles - priority was increased.
Union City	Overall, the plan is very impressive and comprehensive. (I read most of Volume 1.) However, there are a few factors that I did not see covered. These span multiple risk areas, so I can't point you to specific sections. Living in the Seven Hills neighborhood, east of Mission Boulevard, I believe that we have a unique exposure due to the fact that the one access road into the neighborhood, Appian Way, could be ruptured by earthquake on the Hayward Fault. This could isolate residents and make emergency response more difficult. If an earthquake caused rupture of gas lines, there could be a significant disaster. The same risk may apply to the Masonic Home complex, though in that case I know of at least two access roads. However, both of those roads are also crossed by the Hayward Fault. I'm a long time resident of this neighborhood, and recall an occasion when there was a wildfire in an area of inaccessible terrain. In that case, it was necessary to use boron bombers to release chemicals over the fire area. I did not see that called out in the mitigation section as a possible tactic to fight wildfire. I did not see the issue of sinkholes mentioned, and we did have at least one recent incidence of this, causing traffic disruption. Traffic is also a big concern because of bad commute backups, particularly on Decoto Road, Mowry Avenue, and Mission Boulevard. I have personally witnessed emergency vehicles having a very difficult time getting through these traffic backups.	Seven Hills Neighborhood and Masonic Home - Vulnerability added to Union City annex Boron Bombers - Not addressed in this plan, issue is response oriented, not mitigation focused Sinkholes - subsidence qualitatively addressed as part of the drought chapter. Recommendation to address subsidence during the next planning process based on anticipated data sources added to Chapter 5. Transportation - Transportation already addressed in secondary hazards, vulnerability assessment, goals/objectives, and jurisdictional action plans

Draft Plan Public Comment Results and Responses

Where do you live?	Please provide your comments on the plan below.	Comments/Revisions to Plan
Newark	I'm not sure where it belongs in the Plan volumes, but Newark (and maybe also Union City) need "Reverse 911" callout systems. There are times that citizens need to be notified of Shelter-In-Place restrictions during normal times, and also after an earthquake, it will be good to have announcements of locations of shelters, water distribution centers, medical treatment centers, etc. The system should be capable of sending text messages also, and should be configurable for different languages via some sort of an interface for citizens to use to configure their account. It would be good if something in the LHM Plan would help us secure grant funding for such a system. It would go a long way toward mitigating the consequences from emergency and disaster situations, IMO.	A brief description of the Reverse 9-1-1 system and initiative in Newark has been added to the City of Newark's annex under "Additional Considerations"
Union City	Primary concerns is effect on environment Hazard anything is most concerning If only we could be like nature and not pollute	Jurisdiction action items include and assessment for items that fall under the category "Natural Resource Protection."

Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

Appendix B – Steering Committee Documentation

STEERING COMMITTEE CHARTER

PURPOSE OF THE STEERING COMMITTEE

The name of this organization shall be the Hazard Mitigation Plan Steering Committee, hereafter referred to as the Steering Committee (SC). The purpose of the SC shall be to:

- Provide guidance and leadership, oversee the planning process, and act as the point of contact for local governments and the various interest groups interested in this planning effort.
- Solicit a wide range of input into the planning process and advocate for public involvement.
- Educate all participants in hazard mitigation planning.

Members of the SC were selected to represent a cross-section of views and interests within the planning area. Through this inclusion of diverse interests, the SC hopes to enhance the robustness of the planning effort and to build support for hazard mitigation activities across stakeholder groups. A successful planning effort will result in the adoption and approval of a HMP that sets the stage for reducing adverse impacts of natural hazards within the planning area through activities and strategies embraced by both elected officials and their constituents.

CO-CHAIRS

Terrence Grindall and Joan Malloy have been selected as the co-chairs of the SC. The role of the co-chair is to:

- Lead meetings so that agendas are followed and meetings adjourn on-time;
- Allow all members to be heard during discussions;
- Moderate discussions between members with differing points of view; and
- Be a sounding board for staff in the preparation of agendas and how to best involve the full Committee in work plan tasks.

The responsibilities of the co-chairs are interchangeable. When both co-chairs are present, they will work together to provide a unified leadership voice for the SC. When one co-chair is absent, the remaining co-chair will serve as the primary facilitator of the SC meeting.

QUORUM

A quorum for the SC will be 9 members. When less than 9 members are present at a meeting, items listed on the agenda may still be reviewed and discussed; however, any committee action as to those items will be postponed until a quorum is present. SC members will be considered present if they attend the meeting in-person or via teleconference. Members may also delegate their voting power to other members of the SC to vote in their absence, and/or select an alternate from their agency. To vote by proxy, SC members must inform the planning team at least 24 hours in advance.

ALTERNATES

Committee members were selected for the SC based on their specific backgrounds and perspectives on matters related to hazard mitigation. Regular attendance by members is needed to understand the issues presented, identify and reflect on various stakeholder perspectives, and reach agreements on plan recommendations. However, there may be circumstances when regular members cannot attend. To address these circumstances, alternates may be designated for each SC member at the discretion of the SC member. An alternate attending on behalf of a SC member shall have the same rights and responsibilities as the SC member during that meeting. Alternates will be included on all SC emails and should stay informed of the business of the SC.

DECISION-MAKING

The SC will strive for consensus in its decision-making process. If consensus cannot be reached as to a particular item or issue, the SC's decision will be determined by a majority vote of the Committee members in attendance at the meeting, and the meeting minutes will reflect the number of votes in favor, opposed and in abstention. Meeting minutes will additionally contain a summary of dissenting opinion if a consensus cannot be reached.

RECOMMENDATIONS

The SC's recommendations will be recorded in the meeting summaries and reflected in the HMP as appropriate. The Committee may also be asked to assist in public presentations of the Plan and its recommendations.

STAFFING

The Planning Team for this project includes appropriate representatives from Union City and Newark along with contract consultant assistance provided by Tetra Tech, Inc. The Planning Team will schedule meetings, distribute agendas, prepare information/presentations for Steering Committee meetings, write meeting summaries, and generally seek to facilitate the Steering Committee's activities.

Lauren Sugayan (Union City) and Terrence Grindall (Newark) will be the designated public spokespeople for this planning effort for their respective planning areas.

MEETING DATES

Meetings generally will be conducted on the 2nd Wednesday of each month from 9:00am to 11:00am at alternating locations for the participating Cities.
The location for SC meetings held in Union City (June, August, October) will be:

Union City Hall – City Council Conference Room
34009 Alvarado-Niles Road
Union City, California 94587

The location for SC meetings held in Newark (July, September, November) will be:

Silliman Center – Community Meeting Room
6800 Mowry Avenue
Newark, California 94560

Members of the SC may also participate via conference call. Meetings will be open to the public and advertised as such.

ATTENDANCE

Participation of all Committee members in meetings is important and members should make every effort to attend each meeting. If Committee members cannot attend, they should inform the planning team before the meeting is conducted. If a primary member and his or her alternate miss two consecutive meetings or three cumulative meetings over the course of the planning process, the member will be relieved of his or her membership on the SC. If a member of the SC needs to resign from the Committee, the designated alternate will be asked to take his or her place on the SC. The new primary member may then designate an alternate.

PUBLIC INVOLVEMENT

All Steering Committee meetings will be open to the public. Members of the public wishing to address the SC at a meeting may do so based on the following protocol:

- Requests to be heard must be made to one of the co-chairs of the Steering Committee by submitting a completed speaker request form to the Chairperson before the meeting is called to order. Speaker request forms shall ask for the following information :
    - Agenda item number to be discussed or Public Comment
    - If the person is in favor/opposed to the agenda item (if applicable)
    - Person's name
    - Person's telephone number (optional)
    - Person's address (optional)
    - Name of organization (if applicable)
    - A brief summary of the person's position on the matter (optional).
- Each member of the public will be granted a total of 3 minutes to address their topics of concern. This allotted time cannot be aggregated or passed on to another individual.
    - In instances where more than five members of the public wish to address the SC, the three minute time limit may be abbreviated at the discretion of the co-chairs in order facilitate the business to the SC meeting.
- All comments must have relevance to the Hazard Mitigation Plan and the planning area. Relevance will be determined by the co-chairs.

A member of the public may request clarification from the SC by raising his or her hand during the normal course of the meeting; however, permission to speak will be granted at the discretion of the chairperson.

The SC will strive to post meeting agendas on the Hazard Mitigation website 72 hours prior to all scheduled meetings.

COURTESY

Committee members should treat each other with respect, listen to each other, work cooperatively, and allow all members to voice their opinions.

STEERING COMMITTEE MEMBERSHIP

Agency	Steering Committee Member	**Alternate**
City of Union City	Joan Malloy*	Andy Block
City of Union City	Travis Souza	Jeff Snell
City of Union City	Thomas Ruark	Farooq Azim
City of Newark	Terrence Grindall*	
City of Newark	Robert Costa	
City of Newark	Chomnan Loth	
Alameda County Fire Department	Hilda Hurtado	
Alameda County Flood Control District	Moses Tsang	
Alameda County Water District	Steve Peterson	Jacob Reed
American Red Cross	Jack McCredie	Richard Sealana
Newark CERT	Mike Berke	
Newark Unified School District	Vince Belloni	
New Haven Unified School District	Jason Rodgers	Jason Mattos
PG&E	Les Putnam	
Union City CERT	Lee Guio	Jim Rothman
Union Sanitary District	Mike Marzano	

***** Denotes Steering Committee Co-chairs***

Union City/Newark 2016 Multi-jurisdiction Hazard Mitigation Plan
Steering Committee Sign-in

Role	Attendee	Please Initial Under the Appropriate SC Meeting Date					
		10-Jun-16	13-Jul-16	10-Aug-16	14-Sep-16	12-Oct-16	14-Dec-16
SC	Berke, Mike	Yes	Yes	Yes	Yes	[illegible]	[illegible]
SC	Belloni, Vince	Yes	Yes	Yes	Yes	[illegible]	[illegible]
SC	Costa, Robert	Yes	Yes	Yes	Yes		
SC/PT	Grindall, Terrence *	Yes	Yes	Yes	Yes	X	X
SC	Guio, Lee	Yes	Yes	No	Yes	LG.	X
SC	Hurtado, Hilda	Yes	Yes	Yes	No	ym for HH	
SC	Loth, Chomnan	-	Yes	No	Yes	RJ for CL	[illegible]
SC/PT	Malloy, Joan*	Yes	Yes	No	Yes	JM.	JM
SC	Marzano, Mike	Yes	Yes	Yes	Yes	[illegible]	[illegible]
SC	Peterson, Steve	Yes	Yes	Yes	Yes		SP
SC	Putnam, Les	-	Yes	Yes	No		
SC	Rodgers, Jason	-	Yes	Yes	Yes	[illegible]	[illegible]
SC	Ruark, Tom	Yes	Yes	No	No	[illegible]	[illegible]
SC	Sealana, Richard	Yes	Yes	Yes	Yes		
SC	Souza, Travis	Yes	Yes	Yes	Yes	[illegible]	[illegible]
SC	Tsang, Moses	-	Yes	Yes	No		
Alt.	Azim, Farooq			Yes	Yes		
Alt.	Block, Andy	Yes	Yes	Yes	No	AB	
Alt.	Fateman, Richard	Yes					
Alt.	Mattos, Jason						
Alt.	McCredie, Jack						
Alt.	Reed, Jake	Yes	Yes	Yes		[illegible]	
Alt.	Snell, Jeff						
SME	Acosta, Tony	Yes					
SME	Campbell, Carmela						
SME	Campbell, Chase	Yes		Yes			
SME	Primer, Anthony	Yes	Yes				
SME	Sugayan, Lauren	Yes	-	Yes	Yes		

*Denotes co-chair

Union City/Newark Hazard Mitigation Plan
1st Steering Committee (SC) Meeting
Friday - June 10, 2016
8:30am – 11:00am
34009 Alvarado-Niles Road
Union City, California 94587

Welcome and Introductions

- Group Introductions
- Review Agenda

Project Overview

- Work plan
- Timeline
- Important milestones

The Steering Committee's Role

- SC Purpose
- SC Expectations
- SC Organization
- SC Charter

Update Process and Schedule

- Steering Committee Meeting Objectives Schedule

Plan Review

- Discuss and Confirm Hazards of Concern
- Discuss Current Plan Goals/Objectives
- Discuss Mission/Vision Statement

Public Involvement Strategy

- Public Engagement Meetings
- Additional Outreach Capabilities (suggestions welcomed)
    - Websites
    - Questionnaires
    - Press/media
    - Social Media

Action Items and Next Steps

- Document and Data Request
- Review Existing HMPs – City and State
    - Identify changes/enhancements to be included in existing HMP
- Confirm Hazards of Concern, Goals, and Public Involvement Strategy
- Define and Confirm Critical Facilities
- Update the Risk Assessment

Adjourn

MEETING MINUTES

Date/Time of Meeting:	Friday – June 10, 2016; 8:30am to 11:00am
Location:	34009 Alvarado-Niles Road, Union City, California
Subject:	Steering Committee No.1
Project Name:	Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan
In Attendance:	**Attendees:** Steve Peterson, Jake Reed, John Warren, Mike Berke, Hilda Hurtado, Robert Costa, Lee Guio, Tony Acosta, Travis Souza, Vince Belloni, Jack McCredie, Joan Malloy, Anthony Primer, Lauren Sugayan, Chase Campbell, Tom Ruark **Planning Team:** Andy Block, Richard Sealana, Terrence Grindall, Rob Flaner, Jessica Cerutti
Not Present:	N/A
Summary Prepared by:	Jessica Cerutti – 6/13/16
Quorum – Yes or No	N/A – Steering Committee not finalized

Item	Action
Welcome and Introductions, Review Agenda • Mr. Rob Flaner opened the meeting and facilitated group introductions. • Distributed handouts included: Agenda; Sample Steering Committee Charter; Union City/Newark HMP Project Overview • The agenda was reviewed and no modifications were made.	
Project Overview After introductions, Mr. Flaner began by providing an overview of the Disaster Mitigation Act (DMA) of 2000. He noted that per DMA 2000 requirements, hazard mitigation plans (HMP) are needed to be eligible for certain types of federal grant funding opportunities. He provided a history of hazard mitigation planning and noted that the Union City/Newark initiative is multi-jurisdictional in nature. To this end, he said that special purpose districts are eligible to receive funding as direct applicants to the federal government. Mr. Flaner noted the strong representation of special purpose districts at the meeting and invited these entities to participate as part of the planning partnership and develop an annex to the HMP. Mr. Flaner reviewed requirements for participation and indicated that Tetra Tech will distribute a Planning	Tetra Tech to distribute Planning Partner Expectations to special purpose districts for Planning Partnership Participation. Special Districts wishing to participate in the Planning Partnership must submit a letter of intent to participate to the Planning Team.

Item	Action
Partner Expectations document outlining specific requirements for special purpose participation, beginning with the submission of a letter of intent to participate. Mr. Flaner ended the discussion by noting that special purpose districts are not required to participate as a planning partner and may link to the plan at a later time.	
Mr. Flaner then reviewed the purpose of the Steering Committee (SC), noting that the SC is an advisory body to the core Planning Team. Mr. Flaner said that each participant was selected based on their knowledge and position within the community and the government. He reviewed the importance of public involvement throughout the process and thanked members from the Community Emergency Response Team (CERT) for serving on the SC.	
Mr. Flaner discussed the need for SC meeting s to be public, noting the Brown Act as one of the driving factors. He said that SC meeting will be held on a monthly basis and a conference line will be made available to those who are unable to attend in person.	
Ms. Jessica Cerutti reviewed the work plan and associated timeline, beginning with the general organizational structure. She reiterated what Mr. Flaner had stated earlier, and further emphasized the distinguishing characteristics of the Planning Team, SC, and Planning Partnership. Next, Ms. Cerutti briefly discussed the anticipated subjects for future meetings and the initial steps to developing a public outreach strategy.	
Mr. Flaner discussed the purpose of the risk assessment and hazard identification. He noted the importance of acquiring accurate data for the purpose of developing an accurate hazard risk assessment. Mr. Flaner reviewed the use of a tool, HAZUS-MH, for conducting the risk assessment. He noted HAZUS would be used to develop specific outputs on hazard scenarios decided upon by the SC. Mr. Flaner noted that the SC would be provided with the data driven risk assessment results for each jurisdiction. Ms. Cerutti added to the discussion by indicating that while the risk assessment results are data driven, qualitative, local knowledge should be used to refine the results.	
Next, Ms. Cerutti reviewed the purpose of goals and objectives, noting that goals serve as the general description of what a jurisdiction wants to achieve. Objectives further refine goals and provide guidance for ultimately selecting actions. Ms. Cerutti then described the capability assessment, noting that actions must have the support of fiscal, regulatory, and administrative capabilities in order to be successful. She noted that draft capability assessments for Union City and Newark were already completed.	

Item	Action
Ms. Cerutti discussed the Strengths, Weaknesses, Opportunities, and Obstacles (SWOO) session, indicating that this session will be an important milestone during the planning process. She noted that the SWOO session will allow the SC to identify opportunities as the basis for developing mitigation action items and subsequently prioritizing them.	
Ms. Cerutti discussed the development of a plan maintenance strategy, emphasizing the need for a strong strategy to maintain the relevance of the plan during the 5 year cycle.	
Ms. Cerutti concluded the conversation on the work plan and timeline review by covering briefly the need for a draft plan public review period and assessment by California Office of Emergency Services (CalOES) and the Federal Emergency Management Agency (FEMA).	
<u>The Steering Committee's Role</u>	
Mr. Flaner turned attention to the sample Steering Committee Charter and requested that the group discuss the specific composition and rules of the HMP SC. He began by asking who should be the Chair and Vice Chair. Mr. Terrence Grindall recommended Co-chairs, and the group agreed. Mr. Grindall indicated that he would be a co-chair and recommended Mr. Tony Acosta as a co-chair.	Tetra Tech to revise SC Charter based on discussion. Mr. Andy Block to follow up with Mr. Acosta regarding co-chair designation.
Mr. Flaner next asked about the number of SC members, noting that 19 people had attended the first SC meeting. Mr. Richard Sealana stated that some attendees would not be part of the final SC. Mr. Grindall recommended a composition of three representatives from each city and one representative from each special purpose district/community agency. The group agreed and recommended the designation of alternates for identified SC Members. Ms. Cerutti said that she would develop a survey to capture the identified primary and alternate SC members. Though the final SC was not determined, the group came to a consensus that an ultimate quorum would be 50-percent attendance plus one. Regarding decision making, the group agreed that the SC will strive for consensus. Should consensus not be reached, majority vote will rule and any dissenting opinions/statements would be reflected in SC meeting minutes. Next, Mr. Flaner asked about the designated spokesperson for the planning effort. Ms. Lauren Sugayan noted that Union City had a well-established public information group that could represent the project. Mr. Grindall indicated that Tetra Tech might consider being the spokes	Tetra Tech to send a SC Confirmation survey for completion.

Item	Action
company given subject matter expertise. Ms. Sugayan recommended local government spokespeople given local familiarity and trust. Mr. Grindall agreed and said that he would be the project spokesperson for Newark. Ms. Sugayan confirmed herself as the spokesperson for Union City. Next, Mr. Flaner asked the preferred recurring day and time for SC meetings, noting that since SC meetings are public, they should be regular and easily accessible. Ms. Hilda Hurtado reminded the group about the importance of maintaining compliance under the Americans with Disabilities Act and ensuring accessibility during public SC meetings. The group discussed an appropriate recurring day and agreed upon the second Wednesday of each month from 9:00am to 11:00am. Ms. Cerutti noted that some meetings may run longer due to the subject matter, such as the SWOO session, but that SC members will be notified in advance. The group agreed that the location will alternate between Union City and Newark to maximize public accessibility. Mr. Grindall said that the Silliman Center Community Room located at 6800 Mowry Avenue will be the designated Newark SC meeting place. Mr. Sealana indicated that he will find a Union City meeting location.	Mr. Sealana to find and confirm a regular SC meeting location for Union City SC meetings. Mr. Grindall to confirm availability at the Silliman Center for the July 13th SC meeting.

Public involvement language in the sample SC charter was confirmed with the suggestion by Ms. Joan Malloy that time or number of public speakers be abbreviated for the sake of time if many members of the public attend.

Plan Review

After the discussion on the SC Charter concluded, Ms. Cerutti drew attention to some upcoming tasks. First, she noted the need to select hazards of concern. She stated that the previous plans assessed the following hazards:

- Dam Failure
- Drought
- Earthquake
- Landslide
- Flood
- Wildfire

She recommended keeping these hazards and adding Climate Change. Ms. Cerutti stated that climate change will be addressed in a standalone

Item	Action
chapter. Mr. Flaner clarified that the standalone chapter serves as a summary of how climate change affects each identified hazard and not as a chapter on climate change as a singular hazard. Ms. Cerutti asked if the group would like a human-caused hazard chapter, noting that DMA only requires natural hazards. The group agreed that addressing human-caused hazards would be beneficial and discussed inclusion of intentional hazards and technological hazards. Ms. Cerutti noted that all selected human-caused hazards would be addressed in one chapter as opposed to a standalone chapter per hazard. Mr. Flaner asked if the group would like to include a health hazard chapter as well, and the group agreed.	
Next, Ms. Cerutti reiterated the purpose of goals and objectives and noted that the next SC meeting would include an exercise on selecting goals. She then turned to a whether or not the group would like to establish a vision/mission statement. She explained that such a statement serves as an overarching theme to the plan and serves as an anchor for future planning efforts. The group agreed that a vision/mission statement would be beneficial. Ms. Cerutti said that she would develop a survey for the group to review vision statements and select one or create their own. The results of this survey would be reviewed during the next SC meeting.	Tetra Tech to distribute a Vision/Mission Statement Survey. Group to complete survey before July SC meeting.
Public Involvement Strategy	
Ms. Cerutti briefly touched on the public involvement strategy. She said that public engagement meetings are an option and noted that there would be an opportunity for 4 public meetings – two per city. Ms. Cerutti said that public engagement could mean a standalone meeting specifically discussing hazard mitigation or as part of a larger community event. Ms. Sugayan said that she would share the roster of upcoming public events that could be used as a vehicle for public engagement.	
Finally, Ms. Cerutti noted additional items for consideration for public engagement. She said that a discussion for the next SC meeting will focus on developing a specific public engagement strategy.	
With no further comments, the meeting adjourned.	
Action Items for Next Meeting	
Action items identified for the next meeting include the following:	

Item	Action
• Confirm SC and SC Charter • Discuss and Confirm Mission Statement • Discuss and Confirm Goals and Hazards of Concern • Discuss the Public Involvement Strategy • Define and Confirm Critical Facilities	

Union City/Newark Hazard Mitigation Plan
2nd Steering Committee (SC) Meeting
Wednesday - July 13, 2016
9:00am – 11:00am
Silliman Center, Community Room
6800 Mowry Avenue
Newark, CA 94560

Welcome and Introductions
- Group Introductions
- Review Agenda

Planning Process
- Review and Confirm SC#1 Minutes
- Review and Confirm SC Charter
- Review Existing HMPs – City and State
    - Identify changes/enhancements to be included in existing HMP
- Planning Partner Update

Plan Review
- Define Critical Facilities
- Confirm Hazards of Concern
    - Hazard Scenarios Discussion
- Confirm Mission Statement and Goals

Public Involvement Strategy
- Public Engagement Meetings – Early October
- Additional Outreach Capabilities (suggestions welcomed)
    - Websites
    - Questionnaires
    - Press/media
    - Social Media

Action Items and Next Steps
- Confirm Critical Facilities Definition
- Confirm Objectives
- Update the Risk Assessment
- Discuss Capability Assessment
- Discuss Plan Maintenance

Adjourn

MEETING MINUTES

Date/Time of Meeting:	Wednesday – July 13, 2016; 9:00am to 11:15am
Location:	Silliman Center Community Room, 6800 Mowry Avenue, Newark, CA 94560
Subject:+	Steering Committee No.2
Project Name:	Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan
In Attendance:	**Steering Committee:** Mike Berke, Vince Belloni, Robert Costa, Terrence Grindall, Lee Guio, Hilda Hurtado, Chomnan Loth, Joan Malloy, Mike Marzano, Steve Peterson, Les Putnam, Jason Rodgers, Tom Ruark, Travis Souza, Moses Tsang, Richard Fateman (Alt. for Jack McCredie) **Planning Team:** Jessica Cerutti, Andy Block, Rob Flaner, Denise Davis **Non-voting Attendees:** Anthony Primer, Richard Sealana
Not Present:	Jack McCredie
Summary Prepared by:	Denise Davis – 7/15/16
Quorum – Yes or No	Yes

Item	Action
Welcome and Introductions, Review Agenda • Ms. Jessica Cerutti opened the meeting and facilitated group introductions. The meeting attendees gave self-introductions. • Distributed handouts included: Agenda; LHMP Steering Committee Meeting #1 Minutes; Steering Committee Charter Draft; Mission Statement & Goal Setting Exercise Summary; Critical Facility Definitions; Hazard Selection and Scenario Discussion.	
Review and Confirm SC#1 Minutes Ms. Cerutti opened the discussion by asking the SC if they reviewed the meeting minutes from the previous SC meeting. Mr. Steve Peterson asked about the scope of the project related to clarifying the decision made to include human caused hazards. He noted that the human caused hazards in the minutes were not discussed in detail. Ms. Cerutti reminded the committee that the Disaster Mitigation Act of 2000 requires only natural hazards but the option to include non-natural hazards is present. Ms. Joan Malloy clarified that during the first steering committee meeting it was decided that human caused hazards would be addressed in a single chapter at a high level, with not as much detail. Ms. Malloy also reminded the SC that the decision was also made to	Tetra Tech to revise minutes to capture the more general discussion of human caused hazards and review minutes to ensure that the decision to capture health hazards is reflected.

Item	Action
include health hazards as a chapter and asked Ms. Cerutti to confirm that this was reflected in the previous minutes. With the generalized discussion on human caused hazards, and ensuring health hazards were reflected in the minutes, a motion to confirm the minutes was made and approved.	
Review and Confirm SC Charter	
Ms. Cerutti stated the draft SC Charter had been distributed with the invitation to this meeting. The Steering Committee now has two co-chairs (Terrence Grindall and Joan Malloy serving as co-chairs). Ms. Cerutti asked if there were any questions or requested revisions to the Charter. With no questions, a motion was made to approve the Steering Committee Charter and was approved.	
Review Existing HMPs – City and State	
Ms. Cerutti stated that one of the tasks for the SC before the next meeting was to perform a high level review of the previous Association of Bay Area Governments (ABAG) plans and the California State HMP. She said that the link to the state and Union City plans were provided in the meeting materials sent the week prior to the SC meeting, and would resend the review recommendations document again with a PDF version of the Newark Plan. Ms. Cerutti reminded the committee that hazard mitigation plans are robust plans, some ranging in 800-900 pages or more. Ms. Cerutti asked the steering committee members to please review these plans to identify any changes or enhancements to be included in the planning area HMP. Ms. Cerutti asked that considerations be provided prior to August 1, 2016, so that she can summarize the comments to be presented at the next steering committee meeting. Mr. Moses Tsang asked if the Alameda County Hazard Mitigation Plan should be reviewed as well. Ms. Cerutti noted that the primary focus should be on the previous planning area plans and the State Plan for consistency, but that the SC is welcome to review the draft Alameda County Plan as well.	Ms. Cerutti to resend the review guidance document and Newark Plan to the SC for review SC to provide summary of their reviews of the State and ABAG HMPs to Ms. Cerutti by August 1st.
Planning Partner Update	
Ms. Cerutti stated that the plan will be a multi-jurisdictional plan and that Special Districts in the planning area have been invited to participate as part of this initiative. Currently, there are two letters of intent to participant and one verbal intention to send a letter of intent to participate. Additional time will be allowed to see if more special districts will participate. A question was asked of which districts have decided to participate. Ms. Cerutti replied the Alameda County Water District and Newark Unified School District have submitted their letters of intent to participate.	

Item	Action

Confirm Mission Statement

Tetra Tech distributed a Vision/Mission Statement Survey to enable the group to review vision/mission statements and select one or create their own. The committee agreed to review the survey and provide comments prior to the July meeting. There were ten people that responded to the survey. Ms. Cerutti provided a Mission Statement & Goal Setting Exercise Summary document with a draft mission statement and top goals. Ms. Cerutti noted that all but one respondent recommended keeping the singular ABAG goal as a mission statement. She also said that Mr. Andy Block recommended tailoring the former ABAG goal to be more planning area specific. Ms. Hilda Hurtado recommended sample revised language, which the SC approved below:

> Through partnerships, maintain and enhance the disaster resistance of Union City and Newark by reducing the potential loss of life, property, damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.

Define Critical Facilities

Ms. Cerutti asked the Project Manager, Rob Flaner, to discuss the concept of critical facilities related to hazard mitigation planning. Mr. Flaner stated it is a requirement for each jurisdiction to define what a critical facility is. A principal question is how this project will benefit the planning area by identifying critical facilities and infrastructure. Mr. Flaner explained the definition of a critical facility is tied to funding for future projects. There are several options to consider: a broad high level definition or a more specific narrow level. The high level and broad definition, e.g., government facility, facilities that may serve as a shelter, city infrastructure, etc., makes it easier to select a facility and state that it does meet the definition. A more narrow definition, e.g., mass gathering locations, malls, designated shelters, police and fire department facilities, may limit the number of critical facilities allowed for project funding. Mr. Flaner further explained there is often confusion about critical facilities as they are defined in an emergency operations plan compared to an HMP, but they are very different types of plans.

Mr. Flaner stated a discussion needs to open by asking the SC if they want to define critical facilities broadly to make sure the umbrella captures everything, or more specifically. Once the definition for a critical facility is defined, the next thing to do is conduct a critical facility/infrastructure inventory within the planning area. Following the inventory, the risk and vulnerability of every critical facility/infrastructure that meets the

Item	Action
definition should be identified for the HMP. The broad definition needs further parameters to inventory and identify facilities, whereas a specific definition makes it a lot easier. There is no right or wrong in defining critical facilities/infrastructure, just what is best for the planning area. Tetra Tech tasked the SC with defining critical facilities and infrastructure in Union City and Newark. The Critical Facilities Definition handout provides a general definition of a critical facility and a specific emergency response definition. The definition provided can be amended to say whatever the SC decides is best. Mr. Vince Belloni asked if specific names and addresses of the critical facilities are captured in the HMP. Ms. Cerutti replied no, but that the addresses will be used to define a data point for the inventory and identification process in the plan but not listed in the plan. A comment was made about hazardous materials facilities and if those facilities could be a private sector asset. Ms. Cerutti stated the facility could be a private asset and that many critical facilities can be private due to the economic or response importance of the facility to the planning area. The SC was asked if the definition provided in the handout was a good definition or if additions are needed. Mr. Terrence Grindall stated that multiple types of facilities could be determined to be a shelter facility, so it would be best to list "potential emergency shelters" generically instead of a more specific definition. Mr. Richard Fateman mentioned that the American Red Cross (ARC) has existing lists of identified disaster shelters in cities and counties and it would legitimize the HMP to list those sites that have been pre-identified. Mr. Mike Marzano asked if there is a benefit of listing a more broad definition or a specific definition. Mr. Flaner explained the benefits of a more broad or specific definition – stating that broader definition allows for more non-typical critical facilities to be included whereas specific definitions make grant funding applications easier. Mr. Flaner recommended to make a broad definition with specific examples through "critical facilities include but are not limited to…" and provide bullets of the types of facilities. Each hazard in the plan has a profile and the critical facilities affected by the hazard will be listed – not with addresses – but generally. Mr. Grindall mentioned that levees should be mentioned as critical infrastructure. Mr. Flaner agreed that levees definitely need to be included. Ms. Cerutti stated she would adjust the example definition to include potential shelters, potential morgue facilities, transportation facilities, private facilities and levees. The critical facilities was amended and approved as follows: A structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential	Tetra Tech to revise the critical facility definition.

Item	Action
to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities include potential shelters, transportation facilities, potential morgue facilities, private facilities, levees, health and safety facilities, utilities, government facilities, and hazardous materials facilities.	
Confirm Hazards of Concern	
Ms. Cerutti discussed process of hazards of concern for the planning area. The plan will include seven natural hazards: dam failure, drought, earthquake, flood, landslide, severe weather, and wildfire. Climate change will be a stand-alone chapter to help summarize the effect of climate change on each hazard to show the impact. This chapter will also represent sea level rise, with proposed data provided by ABAG. Mr. Grindall noted that the ABAG dataset had inaccuracies and recommended looking for an alternate dataset. Mr. Flaner added that the ABAG plan utilized United States Geological Survey (USGS) data, using it as a standard but there are other models to measure sea level rise. Mr. Flaner added that on some of the impacts a qualitative impact analysis will need to be conducted. For example, although there is a lot of data on sea level rise, but sea level rise is a static rise. Mr. Anthony Palmer offered to develop a list of potential alternate sea level rise datasets. Ms. Hurtado asked if emissions will be addressed as part of the climate change chapter. Ms. Cerutti stated that emissions will be briefly addressed in this chapter.	Mr. Palmer will develop a list of alternate sea level rise datasets for consideration.
Mr. Tsang noted a concern regarding the regional nature of the plan, and asked how risk will be assessed for each individual jurisdiction. Ms. Cerutti stated the plan will be set up as a two-volume plan. The first volume will include the entire planning process; the steering committee meetings, the planning partnership, and the public outreach initiative which will be a joint effort on behalf of all jurisdictions involved. The second volume will include specific jurisdiction annexes that will look at demographics, the services provided, the critical facilities identified. The first volume looks at the planning area as a whole. The second volume will look at each jurisdiction. The risk assessment will reflect hazards specific to each jurisdiction.	
Other hazards include dam failure and the exposure from the James H. Turner dam (San Antonio Reservoir). The Cal OES data is provided by San Mateo County. Multiple SC members brought up additional dams for consideration, including the Calaveras Dam. Ms. Cerutti stated information regarding the other dam can be mentioned in the chapter for dam failure hazards and a section that discusses previous occurrences of	

Item	Action
actual emergencies. A comment was made about adding the reservoirs in the planning area to the dam failure section. Ms. Cerutti noted that the drought hazard will be more of a qualitative assessment due to non-tangible effects of drought on a community.	
Ms. Cerutti proposed four earthquake scenarios: 100 and 500 year probabilistic scenarios, a Hayward Fault scenario, and a Northern San Andreas scenario. Multiple SC members requested more information on the Calaveras fault. Ms. Cerutti noted that differences between Calaveras and San Andreas scenarios were negligible, but would revisit the Calaveras scenario as an option. Ms. Cerutti will provide more information on the different scenarios for the SC to review. Mr. Peterson noted that additional events triggered by another hazard should be included in the analysis. Ms. Cerutti agreed, stating that secondary hazards, such as landslides induced by earthquakes, would be addressed for each identified hazard. Next, Ms. Cerutti asked what types of events should be captured in the Severe Weather chapter. The SC agreed upon extreme heat, thunderstorm, heavy rains (including the pineapple express phenomenon), and high wind. Mr. Sealana recommended the addition of solar flares, as they have a potential to affect communications. Ms. Cerutti said that the human caused hazards will be divided by technological hazards and intentional hazards. Cyber terrorism has previously been attached to terrorism, but will have its own section. Mr. Chomnan Loth recommended additional inclusion of active threat and civil unrest as intentional human caused hazards. Technological hazards will include hazardous materials, both fixed site and transportation involved, and pipeline hazards as its own individual component. For hazardous materials as critical facilities, none of the identifying information will be published. Mr. Marzano recommended the inclusion of sanitary pipelines into the pipeline failure section. The public health hazard chapter will cover vector borne, infectious diseases, and food borne illnesses. Mr. Sealana noted that the County Department of Public Health has an accurate list of public health threats that could be a reference for the plan. Ms. Malloy asked the attendees if they could stay an additional ten minutes to cover the public outreach strategy. Ms. Cerutti noted that she would stay afterwards if anyone has additional questions about hazards.	Tetra Tech to provide alternate considerations for hazard scenarios.
Public Involvement Strategy	

Item	Action
Ms. Cerutti stated that the initial press release informing the public of the planning process is scheduled to be released on August 1st. Ms. Cerutti stated that she had been working with Ms. Lauren Sugayan on developing a multi-jurisdiction survey which would be released on August 1st as well. Ms. Cerutti showed the SC the draft Hazard Mitigation Plan Website. This website will be a location where the public can get information about the plan, review draft documents for input and get additional information. Ms. Cerutti asked the SC to approve the title of the plan as the Union City/Newark Hazard Mitigation Plan and the website URL as www.uc-newark-hmp.com. The SC approved. Mr. Grindall asked if a point of contact email could be established that covers both Union City and Newark. Ms. Cerutti said that she should be able to establish a singular point of contact email once the domain name was purchased. Ms. Malloy requested that a mailing list form be included onto the website homepage to allow people to sign up for additional information regarding the plan.	Ms. Cerutti to complete the website. Press release announcing the plan scheduled for August 1st.

Confirm Plan Goals

Ms. Cerutti asked the SC to review and confirm the goals for the 2016 plan. She presented the goals handout, which contained the results from the goals exercise completed by the SC. She noted the top 7 goals selected as part of the exercise. Mr. Peterson asked if the plan could contain all seven goals. Ms. Cerutti said yes, but noted that the first and seventh goals contained similar language. She recommended combining the two into one goal of "Protect the public's health and safety and minimize the damage to essential services, structures, property, and infrastructure as a result of hazards." The SC agreed. Ms. Cerutti then recommended the inclusion of an additional goal for the purpose of addressing repetitive damage properties. The SC agreed and confirmed the following seven goals for the 2016 plan:

1. Protect the public's health and safety and minimize the damage to essential services, structures, property, and infrastructure as a result of hazards.
2. Promote hazard mitigation as an integrated public policy and as a standard business practice.
3. Encourage the development and implementation of long-term, cost effective, and environmentally sound mitigation projects.
4. Build and support local capacity to enable the public to prepare, respond, and recover from the impact of natural hazards.
5. Provide increased safety through the provision of adequate infrastructure, public education, and outreach programs.
6. Incorporate elements of hazard mitigation into cross functional planning and regulatory initiatives
7. Retrofit, purchase, or relocate structures in high hazard areas, especially those known to be repetitively damaged.

Item	Action

Action Items and Next Steps

- Discuss and confirm objectives
- Discuss Plan Maintenance
- Risk Assessment Update
- Review Comments on ABAG Plan and State plan

Adjourn

Union City/Newark Hazard Mitigation Plan
3rd Steering Committee (SC) Meeting
Wednesday, August 10, 2016
0900-1100
Union City Hall – City Council Conference Room
34009 Alvarado-Niles Road
Union City, CA 94587

Welcome and Introductions

- Group Introductions
- Review Agenda
- Confirm Meeting Minutes
- Public Comment

Planning Partner Update

- Confirmation of Planning Partners
- Phased Approach to Annex Completion
    - Distribution of Phase 1
    - Annex completion timeline
- Annex Workshop

Risk Assessment Update

- Hazards Follow-up
    - Climate Change
    - Dam Failure
    - Earthquake
- Critical Facilities Collection

Plan Review

- Review ABAG and State HMP Comments
- Review Objectives
- Discuss Previous Action Review
- Discuss Capability Assessment
- Discuss Plan Maintenance

Public Outreach Strategy

- Website Launch
- Public Meeting #1

Action Items and Next Steps

- Confirm Objectives
- Confirm Plan Maintenance
- Risk Assessment Update
- Strengths, Weaknesses, Obstacles, Opportunities Session

Adjourn

MEETING MINUTES

Date/Time of Meeting:	Wednesday – August 10, 2016; 9:00am to 10:55am
Location:	Union City Hall – City Council Conference Room, 34009 Alvarado-Niles Road, Union City, CA 94587
Subject:	Steering Committee Meeting No.3
Project Name:	Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan
In Attendance:	**Steering Committee:** Terrence Grindall, Andy Block (Alt. for Joan Malloy), Farooq Azim (Alt. for Tom Ruark), Jason Rodgers, Vince Belloni, Robert Costa, Les Putnam, Mike Marzano, Mike Berke, Travis Souza, Hilda Hurtado, Steve Peterson, Richard Sealana (Alt. for Jack McCredie)
	Planning Team: Jessica Cerutti, Rob Flaner, Denise Davis
	Non-voting Attendees: Lauren Sugayan; Anthony Primer; Jacob Reed
Present Via Phone:	Moses Tsang
Not Present:	Chomnan Loth; Joan Malloy; Tom Ruark; Lee Guio
Summary Prepared by:	Denise Davis – 8/12/16
Quorum – Yes or No	Yes

Item	Action
Welcome and Introductions, Review Agenda	

- Ms. Jessica Cerutti opened the meeting and facilitated group introductions. The meeting attendees gave self-introductions.
- Distributed handouts included: Agenda; LHMP Steering Committee Meeting #2 Minutes; Objectives Handout, and Review Comments and Plan Maintenance.
- Ms. Cerutti reviewed the agenda with the attendees.

Review and Confirm SC#2 Minutes

Ms. Cerutti opened the discussion by asking the SC if they reviewed the meeting minutes from the previous SC meeting. Ms. Cerutti asked if there were any comments, edits, or recommendations, and there were none. A motion to confirm the SC #2 meeting minutes was made and approved. Ms. Cerutti asked if there were any public members present at the meeting to address the SC. There were none.

Item	Action
Planning Partner Update	
Ms. Cerutti stated the SC had received three confirmation of planning partners and reminded the SC that the planning partners are districts that will be completing annexes to add to the parent plan. This brings the total number of participating agencies to five. The confirmed planning partners include Union City and Newark City as the municipalities, and Union Sanitary District, Newark Unified School District, and Alameda County Water District. New Haven Unified School District noted that they would be participating as a planning partner as well, and needed to develop and send a Letter of Intent to Participate. Ms. Cerutti said that New Haven Unified could get started on their Phase 1 without the LOIP submitted in order to remain on track with the other planning partners.	New Haven Unified to provide a Letter of Intent to Participate. Ms. Cerutti to send Phase 1 to New Haven Unified
The participating districts will be presented with a phased approach to planning for their annexes. Phase one, which has already been sent out, included an overview of the service area, critical facilities, and assets for the district to complete. Phase two will represent the capabilities assessment, and Phase three will include risk assessment and mitigation strategy for each annex. The planning approach for the districts will be explained with each assignment via annex instructions as the process progresses.	
Phase one, which was handed out last week, will be due mid- September. Phase two will be handed out the middle of September and due the middle of October. Phase three will be handed out the middle of October and due the middle to end of November. Tetra Tech will be providing an annex Workshop for the participating districts with a specific date and time to be determined.	Identify date/time for special district workshop.
Mr. Flaner explained that especially for the district partners the law regarding hazard mitigation planning is very specific in that the plan must document how each jurisdiction participated in the planning process. Tetra Tech has found that this deliberative documentation of jurisdictional participation is best done in a workshop format. Prior to the workshop, jurisdictions will have completed phases one and two, and during the workshop, participants will be guided through phase three. Tetra Tech will facilitate the risk ranking for each jurisdiction at the workshop and describe how the jurisdictions should use the ranking to identify projects. The majority of the workshop is dedicated to the development of action plans. Ms. Cerutti stated the target date for the workshop will be sometime during October, after phases one and two have been developed. Ms. Cerutti stated that Tetra Tech is completing the annexes for the cities, as much as possible, and that she will go over each annex with representatives from the cities individually. A question	Identify and schedule time to review the Union City and Newark Annexes with each city.

Item	Action

was asked if there was any need for other agencies or cities to attend the workshop, such as the American Red Cross. Ms. Cerutti responded that other than the planning partners, no other jurisdictions need to attend. Mr. Peterson asked if the workshop will be conducted during phase three or after phase three. Ms. Cerutti stated ideally it is best if the workshop is conducted at the beginning of phase three.

Risk Assessment Update

Ms. Cerutti stated that regarding the hazard selection, there were a few items to review with the SC, one being the best model to use for climate change. The 2012 NOAA data has some issues and Tetra Tech has been trying to figure out an acceptable alternate to conduct a climate change assessment. Two possible alternates were identified by the Planning Team: Our Coast, Our Future, an online resource that collaborates with USGS and NOAA; and Adapting to Rising Tides (ART), a program sponsored by the San Francisco Bay Conservation and Development Commission. ART is very promising if the appropriate data can be acquired. If ART data is unavailable, the Our Coast, Our Future data will be used to conduct the exposure analysis for sea level rise.

For dam failure, one of the discussions we had was about alternate dams, in particular the Turner Dam, the Calaveras Dam, and the Del Valle Dam to the northeast. Tetra Tech was able to find alternate data that addresses all three dams. Although cities may not have the jurisdictional authority to address the operations of these dams, the inundation areas directly affect Newark and Union City. A comment was made that the Turner and Calaveras dams are owned by the City and County of San Francisco as part of the regional water system for the Bay Area. Calaveras Dam is currently going through construction as part of their infrastructure improvement, with a completion date two to three years from now. Should the Calaveras Dam breach, approximately three to six feet of water would ultimately inundate Union City.

As a reminder for earthquake hazards, the four original assessments were the 100-year probabilistic, the 500-year probabilistic, the Northern San Andreas Fault, and the Hayward Fault. The planning team agreed to forego the 500-year probabilistic in order to include the Calaveras Fault scenario.

Ms. Cerutti reminded the SC at the last meeting they came to a consensus on the definition of critical facilities. Tetra Tech has the initial data collection for critical facilities based on the general building stock and tax collector data subsets that we collected during out initial research, but would like to discuss the other types of critical facilities that are not included in the list. Last meeting shelters were mentioned. Ms. Cerutti asked where to get the information on facilities used for sheltering. Richard Sealana stated the OA had polled each city

Item	Action
for shelter facilities, so between the cities, the OA, and the Red Cross we can get a list together.	
Mr. Vince Belloni asked about the valuation of critical facilities and if the information could be found in the ABAG plan. Mr. Flaner stated that for city facilities, the ranking of the risk is based on the hazards to the facility's general building stock. For a district, since they don't have the business of taxing and regulating development, etc., for general building stock, risk is based on the value of district assets as they intersect the hazard zones. Districts can choose to use replacement costs, or market/assessed value. Current data is preferred but we have to use what is available and state such in the HMP. Mr. Belloni asked if appraisal data from the city's insurance carrier would suffice to send for the values. Ms. Cerutti stated the data needed to be in Excel format that would easily integrate into the data collection and that she would discuss individual situations directly with each district. A comment was made about Vallejo Sanitation District getting a $2 million grant for raising the levees, including the environmental impact if their treatment plant was flooded. Ms. Cerutti stated levees can have an exposure analysis run on them but not necessarily a Hazus model. Mr. Flaner stated levees are a challenge due to the different risk involved: overtopping versus levee failure. The biggest concern is the levee failure. Tetra Tech can run analysis but the information is very limited and the intent of the HMP regulations don't really apply. If the levee profiles are available, Tetra Tech can identify which levees in the planning area have the potential to fail and identify projects. Mr. Grindall stated not all of the levees are FEMA certified. Mr. Block asked if Tetra Tech is still looking for the cities to submit repetitive loss for flooding. Ms. Cerutti stated it is a requirement to report the number of repetitive loss properties in the HMP without referencing precise locations due to privacy laws. She stated that Union City received word from FEMA that Union City has no RL/SRL properties. Mr. Grindall said that he would follow up with FEMA regarding Newark.	Mr. Grindall to request RL/SRL data from FEMA.
<u>Public Outreach Strategy</u>	
Ms. Cerutti stated a solid strategy has been developed for public outreach. The online survey was revised to include Newark and provide the public with an opportunity to register for more mitigation information about planning milestones, outreach initiatives, and available draft documents. Ms. Sugayan coordinated a press release for Tri-City Voice Newspaper that announced the official start of the project, and directed the public to the survey and the HMP website. Ms. Cerutti reminded the SC that a key function of the website is to allow the public an opportunity to review the draft plan. The DMA requires a minimum 14-day review period for public comment, but the length of the public review period also depends on what each city decides to do regarding the California Environmental Quality Act (CEQA). Ms. Cerutti stated that Union City and	

Item	Action
Newark have both decided they will file for exemptions for CEQA, which will be noted in the HMP. Mr. Flaner stated it is the State's stance on CEQA is that it is a local decision on what they do with CEQA. The State doesn't require any formal reporting on it. Mr. Grindall noted that there is no notification of any kind required for CEQA – it is prudent to file a notice of decision when a city uses an exemption, but it is not required.	

Ms. Cerutti added the website will be updated as needed with activities for the HMP. Ms. Lauren Sugayan said that the Union City mayor brought up the city's Disaster Council and asked how the council integrates into the HMP process. Other comments made were that the disaster councils should not be left out of this process, and that most of the members of the SC serve on a disaster council. Ms. Cerutti stated that a disaster council meeting could be used as one of the public meetings that are required. Ms. Sugayan asked about engaging social media for the HMP public outreach. Ms. Cerutti stated it is fine as long as the message is the same message for all planning partners to release.

Ms. Cerutti said there are two identified tentative public meeting venues for Newark: Newark Days on September 18, and the Arts and Wine Festival on October 8, 2016. Ms. Cerutti discussed the Hazus work station where the public can run their address to find out the potential hazards. Mr. Flaner stated the work station is contingent on having the risk assessment completed prior to the festival.

Plan Review

Ms. Cerutti stated that at the next meeting, September 14, an extra hour is needed for the strengths, weaknesses, obstacles, and opportunities (SWOO) session. Mr. Flaner will be at the meeting to help conduct the session. Mr. Flaner stated that a statutory requirement of an HMP is that the plan must include a comprehensive range of alternatives that were considered besides the actions that were actually identified and prioritized in the plan. The plan will achieve compliance with this required element through the use a catalog of best management practices based on capabilities in the planning area. The catalog is developed by looking at the strengths, weaknesses, opportunities, and obstacles in the planning area. The plan will break the catalog down by scale: Personal Scale (citizen), Corporate Scale (business/industry), and Government Scale (local government). This catalog will assist partners in developing their actions for the HMP.

Mr. Block asked if there would be an anticipated start time for the SWOO session, noting that he might invite a few key businesses to participate. Ms. Cerutti stated that the SWOO session will start around 10:00 AM.

Item	Action
Ms. Cerutti discussed that the capability assessment in the HMP is different than capabilities identified in emergency management and preparedness. Capabilities in an HMP are related to physical capabilities and administrative capabilities, i.e. flood insurance program. In a HMP, capabilities are related to physical, such as funding, or administrative, such as staffing. The capability assessment will be different. Between the planning partners the capabilities will be different. For the cities we are looking for plans, programs, code enforcement, and administrative capabilities. A comment was made that the cities may be identifying what they don't have. The capability assessment looks to identify ways minimize disasters. The HMP requires planning partners to identify previous action items (from ABAG) and what was done. A review was done on the ABAG action items for both cities and Alameda County Water District. An Excel workbook was developed with all of the action items listed partners to report the progress. This workbook will be included in the plan. Ms. Cerutti stated she had previously requested the SC to participate in an exercise to review the objectives of the plan. There was some confusion about the exercise and I would like to resend out the exercise for the SC to select the up to 15 top objectives for the HMP. A comment was made about reviewing the California HMP, and it being over 900 pages. Ms. Cerutti stated that what the plan review is aiming for is planning consistency across the all of the plans that are pertinent to the HMP. Ms. Cerutti stated the comments from the ABAG and State HMP were very useful. We want to streamline the HMP so that it is useable, but comprehensive. Part of what we will be doing is identifying jurisdiction specific vulnerabilities. A couple of specific questions referred to cross references with initiatives and the ABAG plan, the CA HMP, and the Bay Area Threat and Hazard Identification Risk Assessment (THIRA). Ms. Cerutti stated the HMP needs to remain consistent with all the previous plans and initiatives for the planning area. The Bay Area THIRA covers the planning area as part of the region, since Alameda County is part of the San Francisco Urban Area Security Initiative (UASI). Another part of the risk assessment is understanding disaster history and the science behind hazard phenomenon. Mr. Peterson asked about background information and if the information is already developed due to the expedited timeframe. Ms. Cerutti stated that we research open information for the profiles that are in the plan, but need to develop specific jurisdiction information that is not readily available. There are parts to each hazard chapter in volume one. The first part discusses the general information about the hazard. The second part of the hazard chapter discusses risk	Ms. Cerutti to distribute the previous action plan review tool to the cities and ACWD. Ms. Cerutti to distribute the updated objective exercise.

Item	Action
assessment on the planning area level. In volume two, the annexes rank risk specific to the cities and districts based on data. The planning partners are encouraged to adjust the risk ranking based on qualitative, local knowledge. Each partner knows the nuances specific to their jurisdiction. For the districts we are looking for functional downtime. Mr. Flaner stated that all partners' risk rankings are based on probability multiplied by impact (impact = people, property, economy).	
Ms. Cerutti stated the plan maintenance includes the future of the plan and documentation of the action progress. Annual progress reporting is highly recommended, although not required. Ms. Cerutti gave an example of how the annual report would occur through the SC meeting once a year to revise sections of the HMP. Tetra Tech recommends using March as the date for the annual meeting because that is the timeframe for many grant opportunities. A comment was made that annual updates are an opportunity to avoid the plan being one that sits on a shelf and is never reviewed. Ms. Cerutti stated with annual reviews, much of the work is done at the 5-year mark and the update on previous action required in each plan update is already completed. Mr. Flaner added that an actual progress report would be written each year via a template Tetra Tech would provide. The progress report can be posted on the City website for review by the public. A question was asked if the action items would be broken up by jurisdiction and that multi-jurisdiction may be more effective for grant applications. Ms. Cerutti confirmed it would be broken up by jurisdiction, but that the multi-jurisdiction is a good idea and may by conducive to grant awards. Ms. Cerutti also noted that any multi-jurisdiction action must be contained in both action plans for consistency. A grant funding matrix will be provided for the planning area.	Ms. Cerutti to develop draft Plan Maintenance procedures for review and approval during the September SC meeting.
Ms. Cerutti asked the question if the SC body wants to remain together. A comment was made that how would it not remain intact as-is, and how the city disaster councils should be integrated into the process. A strategy for plan maintenance is a requirement and the SC must come up with something.	
<u>**Action Items and Next Steps**</u>	
Ms. Cerutti stated the objectives questionnaire will be distributed as homework for the SC and gave a reminder that the next meeting will be three hours long. The meeting will be in Newark at the Silliman Center.	
Adjourn	

Union City/Newark Hazard Mitigation Plan
4th Steering Committee (SC) Meeting
Wednesday, September 14, 2016
0900-1200
Silliman Center, Community Room
6800 Mowry Avenue
Newark, CA 94560

Welcome and Introductions
- Group Introductions
- Review Agenda
- Confirm Meeting Minutes
- Public Comment

Planning Partner Update
- Phase 1 Completion
- Annex Workshop

Plan Review
- Confirm Objectives
- Confirm Plan Maintenance

Public Outreach Strategy
- LHMP Social Media Plan
- Public Meeting #1
- Draft Plan Review Public Meeting Discussion

Strengths, Weaknesses, Obstacles, Opportunities Session

Action Items and Next Steps
- Risk Assessment Review
- District Workshops
- SWOO Session Results

Adjourn

MEETING MINUTES

Date/Time of Meeting:	Wednesday – September 14, 2016; 9:00am to 10:00am
Location:	Union City Hall – Silliman Center, Community Room, 6800 Mowry Avenue Newark, CA 94560
Subject:	Steering Committee Meeting No.4
Project Name:	Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan
In Attendance:	**Steering Committee:** Mike Berke, Vince Belloni, Robert Costa, Terrence Grindall, Lee Guio, Chomnan Loth, Joan Malloy, Mike Marzano, Steve Peterson, Jason Rodgers, Richard Sealana, Travis Souza, Farooq Azim (Alt. for Tom Ruark)
	Planning Team: Jessica Cerutti, Rob Flaner, Denise Davis
	Non-voting Attendees: Lauren Sugayan; Anthony Primer; Karoline Tarrazas
Present Via Phone:	Denise Davis
Not Present:	Moses Tsang, Hilda Hurtado, Les Putnam, Tom Ruark, Andy Block
Summary Prepared by:	Denise Davis – 9/14/16
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions

- Ms. Jessica Cerutti opened the meeting and facilitated group introductions. The meeting attendees gave self-introductions. Ms. Cerutti advised the SC that the meeting room was available only until 11:00am.
- Distributed handouts included: Agenda; LHMP Steering Committee Meeting #3 Minutes; and LHMP Objectives Exercise Results.
- Ms. Cerutti reviewed the agenda with the attendees.

Review and Confirm SC#3 Minutes

Ms. Cerutti asked the SC if they reviewed the meeting minutes from the previous SC meeting. Ms. Cerutti asked if there were any questions, comments, concerns, clarifications, and there were none. A motion to approve the SC #3 meeting minutes was made and seconded.

Planning Partner Update

Item	Action
Ms. Cerutti provided an update on the status of the planning partnership annexes. The Districts were provided with the phase one annex template to complete, which was due on September 9th. Ms. Cerutti received some of the Districts' templates, while a couple of Districts have asked for an extension to complete it. Ms. Cerutti stated she will review the Districts' phase one templates, write comments about the annexes, and return the comments and the phase two template to the Districts. Mr. Steve Peterson asked if there would be additional time to make revisions to the template. Ms. Cerutti stated the process is a building block approach, and throughout the entire process there will be the opportunity to make edits and revisions to previously completed phases. Ms. Cerutti said she and Mr. Flaner would be conducting an annex workshop to bring partners through the entire annex development process. Further questions or comments about any of the annexes can be addressed at the workshop. Ms. Cerutti stated she is always available for questions or comments by phone or email.	
The annex workshop will be held on Tuesday, October 11, 2016 in the Union City Conference Room (the room normally used to hold the SC meetings) from 9:00am to 12:00pm. Mr. Flaner added that partners should ensure someone from their jurisdiction attend the Annex Workshop due to CalOES being strict on representation at meetings for multi-jurisdictional LHMPs. Attendance at the workshop will be documented in the LHMP and Tetra Tech wants to make sure all jurisdictions are represented. Mr. Flaner recommended that multiple participants from each jurisdiction attend the workshop. Mr. Flaner stated the workshop is where all phases of the annexes are addressed and directions provided to complete the LHMP.	Ms. Cerutti to send an updated meeting invitation for the Annex Workshop to be held on October 11, 2016 in Union City, from 9:00am to 12:00pm.
<u>Objectives Exercise Results</u>	
Ms. Cerutti stated the original objectives survey listed 33 total objectives. There was confusion with the first iteration of the survey and a revised version was sent to the SC. A total of 8 participants responded to the second version sent. The Objectives Exercise Results handout lists the top 13 choices of objectives. The first two on the list were selected by five or six respondents as the top choices for objectives. Ms. Cerutti asked the SC to take a moment to review the objectives to see if any language can be consolidated, or if anything stands out on the list. Ms. Cerutti stated between 10 and 15 objectives is a good amount of objectives for a LHMP.	
Ms. Cerutti gave a reminder of where the objectives came from. Part of the DMA requires that the LHMP list any plans, technical reviews, codes, ordinances, or anything of that nature that were used in the development of the plan. All of these objectives came from the California State HMP	

Item	Action
and various plans from Union City and Newark, including climate action plans and general plans. Ms. Cerutti asked if having reviewed the objectives, were there any questions, comments, or concerns. Mr. Flaner stated that none of these objectives address climate change, and asked the SC if one should be adjusted for climate change or if the SC should develop a standalone climate change objective. Mr. Grindall recommended developing a standalone climate change objective. Ms. Cerutti stated if the SC can agree on the 11 objectives for now, she will draft a standalone objective about climate change as the 12th objective for the list. The selected objectives for the plan are as follows:	

1. Advance community resilience through preparation, adoption, and implementation of state, regional and local multi-hazard mitigation plans and projects.
2. Create financial and regulatory incentives to motivate stakeholders such as homeowners, private sector businesses, and nonprofit community organizations to mitigate hazards and risk.
3. Incorporate risk reduction considerations in new and updated infrastructure and development plans to reduce the impacts of hazards.
4. Develop and provide updated information about threats, hazards, vulnerabilities, and mitigation strategies to state, regional, and local agencies, as well as private sector groups.
5. Establish and maintain partnerships among all levels of government, private sector, community groups, and institutions of higher learning that improve and implement methods to protect life and property.
6. Improve the quality and effectiveness of local hazard mitigation planning through effective training and guidance that strengthens linkages between the Union City/Newark hazard mitigation plan, general plan safety elements, and SHMP.
7. Promote and enhance outreach and education efforts by state, regional and local agencies with hazard mitigation plans and programs to actively encourage engagement of stakeholder groups such as homeowners, private sector businesses, and nonprofit community organizations.
8. Improve transportation conditions through infrastructure and program improvements to provide better access for response

Item	Action

personnel and provide residents with a means of egress during a disaster.

9. Support the protection of vital records, and strengthening or replacement of buildings, infrastructure, and lifelines to minimize post-disaster disruption and facilitate short-term and long-term recovery.
10. Maximize the likelihood that structures are modified, as necessary, over time to meet life safety standards.
11. Research, develop, and promote adoption of cost-effective building and development laws, regulations, and ordinances exceeding the minimum levels needed for life safety.
12. Incorporate considerations for future conditions and impacts of climate change into programmatic, regulatory, and development priorities.

Confirm Plan Maintenance

The Planning Team discussed revisions to the plan maintenance procedures during the last SC meeting and the idea of resources came up. As was mentioned prior, annual progress reporting is not a requirement. Based on the level of resources for the planning area jurisdictions, instead of requiring an annual progress report, the Planning Team discussed a review or revision on a five year update process. Ms. Cerutti stated that the plan maintenance section will provide an option for annual progress reporting, based on a jurisdiction by jurisdiction basis.

Ms. Cerutti stated the plan maintenance section will be part of the plan itself. With this being the first time the SC has seen this draft section, she asked the SC to let her know if there are any questions, comments, or concerns.

Public Outreach Strategy

Ms. Cerutti stated that Ms. Lauren Sugayan has been developing the public outreach plan for the project. Ms. Cerutti introduced Ms. Sugayan, who will spoke about the Social Media Plan.

Union City and Newark has a wide social media reach. For Union City, outside of Facebook and Twitter, the City has email newsletters with 8000 plus subscribers. The City feels this will be a good source to get participation. The other source the City uses is Next Door. This is a relatively new media, starting within the last year. Many people rely on Union City communications thorough Next Door, and the City expects to

Item	Action
get feedback. Ms. Sugayan stated she and Ms. Cerutti worked on messaging. The goal of messaging is to advertise the survey, talk about the public events, and then the public review period for the LHMP. The outreach should also tie into general emergency preparedness to push out messages about emergency preparedness.	
Next, Ms. Sugayan addressed predefined messaging. These statements are general news statement covering what the Planning Area is doing with the LHMP. These messages can also be used to advertise upcoming events such as Newark Days and the Arts and Wine Festival; the hazard mitigation plan booth; learning about natural disasters; and draft plan review. The reason why this plan was put together is so that cities are on same page. Depending on the audience, the plan doesn't have to be used word for word. It is up to the tone effective for your City.	Ms. Sugayan to update the Social Media Plan. Ms. Cerutti to update plan maintenance to incorporate direct reference to the social media plan.
Mr. Flaner stated that a required element of DMA is identifying how the public will continue to be engaged throughout the plan performance period. This social media plan is an ideal framework for performance period pre-scripted messaging for outreach.	
Mr. Richard Sealana commented that the Operational Area, Cal OES, FEMA, and the Red Cross all have good information put together to distribute to the public. It may be good to link the social media to those entities for additional information. Ms. Cerutti stated that it is desired that the hazard mitigation plan remain relevant, the same applies to the social media plan. As resources are identified, they should be incorporated into the social media plan. The social media plan will be useful as a baseline in the future because public engagement is required at the jurisdictional level, whether multi-jurisdictional or not.	
Mr. Grindall requested a change in the social media plan, indicating that paid advertisement should be included as an option and instead of a standard practice.	
<u>Public Meetings</u> The first public event will be held as part of Newark Days on Sunday, Sept. 18, 2016 from 12:00pm to 4:00pm. Tetra Tech will have a hazard mitigation booth with a display of hazard maps, provide information on the plan, run the HAZUS personalized risk assessments, and distribute general hazard and preparedness information at both of the public events.	

Item	Action
The second public event will be October 8, 2016 at the Union City Alvarado Historical District Arts and Wine Festival from 11:00am to 6:00pm. Ms. Cerutti asked the SC if anyone is willing to volunteer to represent the SC at the booth for either event. The SC are local experts on the planning process and can answer questions about hazard mitigation. Ms. Cerutti asked the SC to please let her know if anyone can work for a minimum of half-hour or hour. Set up at Newark Days begins at 10:30am. Mr. Mike Marzano asked how public engagement and questions will be tracked. Ms. Cerutti explained that she will print out a set number of mitigation handouts advertising the website and survey. These handouts will be counted at the end of the events and establish a metric for public contacts. In addition, Tetra Tech will track the number of property risk assessments provided throughout the events.	

Mr. Flaner stated to keep in mind this is the first public engagement. The topic is primarily risk related, and documentation of the questions at phase one is not critical. Document of questions that we get at phase two will be critical. The first round of engagement is an open forum and structured to inform.

Draft Plan Review Public Meeting Discussion

Ms. Cerutti stated the LHMP planning project is moving along well. The Planning Team has opted to coordinate the Steering Committee review simultaneously with the public comment review period. Ms. Cerutti initiated a discussion about the draft plan review public meeting – if the SC would like to have that in conjunction with a regularly scheduled SC meeting or if it is preferred to have the meeting with the emergency disaster councils in each of the Cities. This topic will be discussed in greater detail next month, so come prepared next month with venues for the public meeting or if it is preferred to have the meeting in conjunction with the regular SC meeting. Mr. Grindall noted that the next Newark Disaster Council meeting will be held on October 13th, and asked if this would be an opportunity for engagement. Ms. Cerutti stated in terms of having the draft public review, that date is a little early. The draft plan should be available in late November for submission in early December. October 13th is a potential opportunity for additional engagement related to discussing the purpose and completed milestones of the plan.

Mr. Flaner said technically the plan will not be adopted prior to receiving the approval pending adoption (APA) from Cal OES, but you can't have full plan compliance unless you show the two week public review comment period – a disconnect exists. The regulations state there must be a two-

Item	Action

week public review comment time period prior to adoption. It doesn't say there has to be a public meeting, just engage the public.

Mr. Flaner stated the normal review process is an internal review by the SC which would approve a public review draft copy. As soon as that was approved the public review comment period would be initiated. Tetra Tech would like to eliminate that step and have both the SC review and public comment review at the same. This would eliminate about 30 days of the process and allow Tetra Tech to input all the comments at one time to prepare the final draft.

Tetra Tech anticipates submission to the State by December 31, 2016.

Strengths, Weaknesses, Obstacles, Opportunities Session

The regular SC meeting adjourned at 10:00am and SC members participated in the SWOO session.

Action Items and Next Steps

- City/District workshops
- Review Public Outreach Milestones
- Review Risk Assessment Results
- Review SWOO Session Results (mitigation best practices)
- Review Remaining Timeline

Adjourn

Union City/Newark Hazard Mitigation Plan
5th Steering Committee (SC) Meeting
Wednesday, October 12, 2016
0900-1100
Union City Hall – City Council Conference Room
34009 Alvarado-Niles Road
Union City, CA 94587

Welcome and Introductions

- Group Introductions
- Review Agenda
- Confirm Meeting Minutes
- Public Comment

Planning Partner Update

- Annex Workshops Review
- Final Annex Due Date
    - Monday - November 14, 2016

Plan Review

- Discuss Plan Maintenance
- Remaining Timeline

Public Outreach Strategy

- Newark Days
- Alvarado Historical District Arts and Wine Fest
- Public Comment Period
    - Disaster Councils
    - Steering Committee Meeting #6

Risk Assessment Update

- Risk Assessment Results Review

Action Items and Next Steps

- Finish Annexes
- Review Plan
- Submit to CalOES/FEMA Region IX

Adjourn

MEETING MINUTES

Date/Time of Meeting:	Wednesday – October 12, 2016; 9:00am to 11:00am
Location:	Union City Hall – 34009 Alvarado-Niles Road, Union City, CA 94587
Subject:	Steering Committee Meeting No.5
Project Name:	Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan
In Attendance:	**Steering Committee:** Mike Berke, Vince Belloni, Terrence Grindall, Lee Guio, Joan Malloy, Mike Marzano, Tom Ruark, Jason Rodgers, Travis Souza, Andy Block, Jacob Reed (alt. for Steve Peterson) **Planning Team:** Jessica Cerutti, Rob Flaner
Present Via Phone:	None
Not Present:	Moses Tsang, Hilda Hurtado, Les Putnam, Robert Costa, Richard Sealana, Chomnan Loth, Steve Peterson
Summary Prepared by:	Jessica Cerutti 11/2/16
Quorum – Yes or No	Yes

Item | **Action**

Welcome and Introductions

- Ms. Jessica Cerutti opened the meeting and facilitated group introductions. The meeting attendees gave self-introductions.
- Distributed handouts included: Agenda; LHMP Steering Committee Meeting #4 Minutes.
- Ms. Cerutti reviewed the agenda with the attendees.

Review and Confirm SC#4 Minutes

Ms. Cerutti asked the SC if they reviewed the meeting minutes from the previous SC meeting. Ms. Cerutti asked if there were any questions, comments, concerns, clarifications, and there were none. A motion to approve the SC #4 meeting minutes was made and seconded.

Planning Partner Update

Ms. Cerutti noted that the Special Districts participated in an annex workshop in order to facilitate Phase 3 of annex development in mid-

Action: Planning Partners to submit final draft annex by no later than Monday – November 14, 2016.

Item	Action
October. She reminded the SC that Phase 3 is that last phase for annex development and will serve as the basis for Volume 2 of the plan.	
Plan Review	
The Steering Committee discussed revisions and finalization to the plan maintenance procedure. The final revisions include a guidance matrix that demonstrates DMA compliance through the identification of monitoring, evaluating, and updating the plan. Additionally, the revised plan maintenance procedure identified a midterm progress report that will also serve to identify potential actions for updating the plan. The actions include 1) complete a plan similar in composition to the 2016 initiative, 2) develop single jurisdiction plans completed separately by each planning partner, or 3) participate in an Operational Area Mitigation Planning process.	
Mr. Rob Flaner recommended establishing a single point of contact for maintaining awareness of upcoming grant funding opportunities. Mr. Andy Block recommended that district partners participate in the Operational Area Emergency Council to maintain awareness of such opportunities.	Complete draft plan and post on the project website beginning on December 2nd.
Next, Ms. Cerutti reviewed the remaining timeline, noting that the target public launch date would be December 2nd. She emphasized the need to receive all annexes by November 14th in order to remain on schedule for a Dec. 2nd public comment launch. From there, she indicated that the plan would be sent to CalOES for an initial review immediately following the public comment period. The target for submittal is the week of December 26th.	
Public Outreach Strategy	
Ms. Cerutti reviewed the success of both Newark Days in September and the Alvarado Historic District Arts and Wine Fest in October. She noted that over 70 survey invitations were distributed to the public and nearly 30 residents received a personalized risk assessment. Additionally, she thanked the members of the SC who volunteered their time on these days, including Mr. Marzano, Mr. Peterson, and Mr. Grindall.	
The next step for the public outreach strategy will be public comment. To this end, Ms. Cerutti brought up the cities' disaster councils as potential venues for presenting the draft plan per a recommendation made earlier in the process. Mr. Grindall and Ms. Malloy agreed and noted that dates for each cities' disaster councils will be identified during the public comment period.	Union City and Newark to coordinate Disaster Councils during public comment period.
Finally, Ms. Cerutti noted that the draft plan was almost complete and proposed postponing the final Steering Committee Meeting until	

Item	Action
December as part of the public comment period. The SC agreed and the November meeting was postponed until December 14th.	SC to meet in December for final meeting

Risk Assessment Update

Mr. Flaner drew attention to the raw risk assessment results provided in excel workbook format. He provided detail regarding the associated risk assessment results for each hazard of concern and noted that these results will be published in the final plan.

Action Items and Next Steps

- Complete Public Comment
- Revise plan based on public comment (if applicable)
- Submit to CalOES/FEMA

Adjourn

MEETING MINUTES

Date/Time of Meeting:	Wednesday – December 14, 2016; 9:00am to 10:00am
Location:	Silliman Center – 6800 Mowry Avenue, Newark, CA 94560
Subject:	Steering Committee Meeting No.6
Project Name:	Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan
In Attendance:	**Steering Committee:** Mike Berke (via conference call), Vince Belloni, Terrence Grindall, Lee Guio, Chomnan Loth, Joan Malloy, Mike Marzano, Steve Peterson, Tom Ruark, Jason Rodgers, Travis Souza
	Planning Team: Jessica Cerutti, Rob Flaner
Not Present:	Moses Tsang, Hilda Hurtado, Les Putnam, Robert Costa, Richard Sealana, Andy Block
Summary Prepared by:	Jessica Cerutti 12/23/16
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions

- Ms. Jessica Cerutti opened the meeting and facilitated group introductions. The meeting attendees gave self-introductions. One member of the public was present.
- Distributed handouts included: Agenda; LHMP Steering Committee Meeting #5 Minutes.
- Ms. Cerutti reviewed the agenda with the attendees.

Plan Review

Ms. Cerutti described the overall planning process and program requirements for mitigation planning. Ms. Cerutti briefly reviewed the background for federal compliance with the Disaster Mitigation Act of 2000. Additionally, she touched on the regulatory necessities of compliance.

After providing an overview of the overall reasoning behind mitigation planning, Ms. Cerutti started to talk about the process undertaken by the Union City/Newark Planning Partnership. She noted that this was the 6th time the project Steering Committee met. She said that multiple

Item	Action
representatives not only served on the Steering Committee, but also served as planning partner.	

Ms. Cerutti described the local process, speaking to the comprehensive public outreach strategy undertaken in order to reach as many planning area residents as possible. She noted a dual approach with both traditional print media and social media. Additionally, she described the public meetings, including two information booths held towards the beginning of the process and the current plan review public strategy, of which the 6th Steering Committee Meeting served as a public draft meeting.

Ms. Cerutti next went into more detail on the components of the plan. She described the Planning Partnership, the hazards of concern, risk assessment, plan maintenance, and each jurisdictional partner. She noted that each partner developed their own action plan specific to their jurisdiction.

Finally, she noted that the public draft review period was underway and will close on December 23rd.

<u>Action Items and Next Steps</u>

- Complete Public Comment
- Revise plan based on public comment (if applicable)
- Submit to CalOES/FEMA

Adjourn

Union City/Newark Multi-Jurisdiction Hazard Mitigation Plan

Appendix C - Progress Report Template

HAZARD MITIGATION PLAN MIDTERM PROGRESS REPORT

Reporting Period: *(Insert reporting period)*

Background: The Cities of Union City and Newark and participating local districts developed a hazard mitigation plan to reduce risk from all hazards by identifying resources, information, and strategies for risk reduction. The federal Disaster Mitigation Act of 2000 requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. To prepare the plan, the participating planning partners organized resources, assessed risks from natural hazards, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from natural hazards. By completing this process, these jurisdictions maintained compliance with the Disaster Mitigation Act, achieving eligibility for mitigation grant funding opportunities afforded under the Robert T. Stafford Act. The plan can be viewed on-line at:

www.uc-newark-hmp.com

Summary Overview of the Plan's Progress: The performance period for the Hazard Mitigation Plan became effective on ____, 2017, with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before March 2022. As of this reporting period, the performance period for this plan is considered to be __% complete. The Hazard Mitigation Plan has targeted __ hazard mitigation actions to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- __ out of __actions (__%) reported ongoing action toward completion.
- __ out of __actions (__%) were reported as being complete.
- __ out of __actions (__%) reported no action taken.

Purpose: The purpose of this report is to provide an midterm update on the implementation of the action plan identified in the Union City/Newark Multi-jurisdiction Hazard Mitigation Plan. The objective is to ensure that there is a continuing and responsive planning process that will keep the Hazard Mitigation Plan dynamic and responsive to the needs and capabilities of the planning partners. This report discusses the following:

- Natural hazard events that have occurred within the last year
- Changes in risk exposure within the planning area
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement.

The Hazard Mitigation Plan Steering Committee: The Hazard Mitigation Plan Steering Committee, made up of planning partners and other stakeholders within the planning area, reviewed and approved this progress report at its midterm meeting held on _____, 20__. It was determined through the plan's development process that a steering committee consisting of primarily of the Planning Partnership would reconvene to oversee maintenance of the plan. At a minimum, the Steering Committee will provide technical review and oversight on the development of the midterm progress report. It is anticipated that there will be turnover in the membership, which will be documented in the progress reports. For this reporting period, the Steering Committee membership is as indicated in Table 1.

Table 1. Steering Committee Members

Name	Title	Jurisdiction/Agency

Natural Hazard Events within the Planning Area: During the reporting period, there were ## natural hazard events in the planning area that had a measurable impact on people or property. A summary of these events is as follows:

- ______________________________
- ______________________________

Changes in Risk Exposure in the Planning Area: *(Insert brief overview of any natural hazard event in the planning area that changed the probability of occurrence or ranking of risk for the hazards addressed in the hazard mitigation plan)*

Mitigation Success Stories: *(Insert brief overview of mitigation accomplishments during the reporting period)*

Review of the Action Plan: Table 2 reviews the action plan, reporting the status of each action. Reviewers of this report should refer to the Hazard Mitigation Plan for more detailed descriptions of each action and the prioritization process.

Address the following in the "status" column of the following table:

- Was any element of the action carried out during the reporting period?
- If no action was completed, why?
- Is the timeline for implementation for the action still appropriate?
- If the action was completed, does it need to be changed or removed from the action plan?

Table 2. Action Plan Matrix

Action Taken? (Yes or No)	Time Line	Priority	Status	Status (X, O,✓)
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
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			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	
			Action #__—_______________________[description]	

Completion status legend:
✓= Project Completed
O = Action ongoing toward completion
X = No progress at this time

Changes That May Impact Implementation of the Plan: *(Insert brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan. Specify any changes in technical, regulatory and financial capabilities identified during the plan's development)*

Recommendations for Changes or Enhancements: Based on the review of this report by the Hazard Mitigation Plan Steering Committee, the following recommendations will be noted for future updates or revisions to the plan:

- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________

Public review notice: *The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the governing boards of all planning partners and to local media outlets. The report is posted on the Union City/Newark Multi-jurisdiction Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:*

Insert Contact Info Here

Appendix D – Plan Adoption Resolutions from Planning Partners