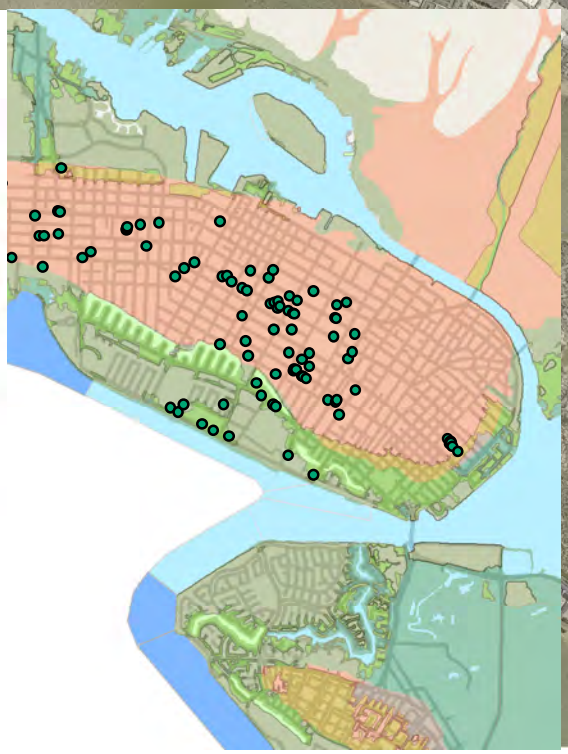
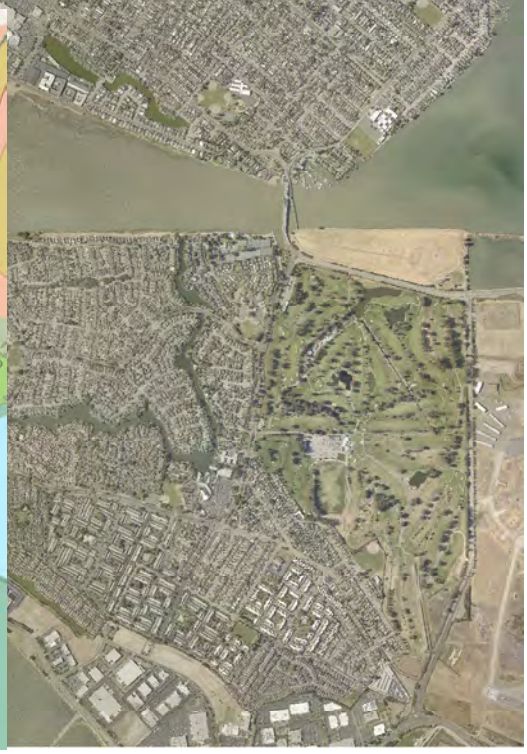
City of Alameda
Local Hazard Mitigation Plan





Final Report

June 2016

TABLE OF CONTENTS

Executive Summary
1. Introduction
2. Hazard Characterization and Risk Assessment
    - 2.1 Hazards Determined to Present Minimal Risk to Alameda
        - 2.1.1 Landslides
        - 2.1.2 Wildland Fires
        - 2.1.3 Extreme Heat
        - 2.1.4 Other Minimal Risk Hazards
    - 2.2 Hazards Determined to Present Risk to Alameda's People and Assets
        - 2.2.1 Earthquakes
        - 2.2.2 Flooding
            - 2.2.2.1 Tsunamis
3. Exposure and Vulnerability
    - 3.1 The History of Alameda
    - 3.2 The People of Alameda
    - 3.3 Alameda's Building Inventory
    - 3.4 Alameda's Utility Inventory
    - 3.5 Alameda's Transportation Inventory
    - 3.6 Alameda's Park and Open Space Inventory
    - 3.7 The Hazard, Risk, Exposure and Vulnerability Nexus
4. Mitigation Plan
    - 4.1 Vision Statement and Mitigation Goals
    - 4.2 Mitigation Plan Development
    - 4.3 Prioritization of Mitigation Strategies
    - 4.4 Assignment of Mitigation Strategies
    - 4.5 Continued Public Involvement
    - 4.6 Adoption and Integration with Other Planning Efforts
    - 4.7 Summary of Mitigation Strategies
        - 4.7.1 Mitigation Strategies Completed
        - 4.7.2 Mitigation Strategies Selected for Implementation or Continuation
        - 4.7.3 Mitigation Strategies not Highlighted
        - 4.7.4 Mitigation Strategies Provided by Key Partners and the Public

APPENDICES

Appendix A – Public Outreach
Appendix B – Vicinity Map
Appendix C – Recorded Tsunami Measurements in the San Francisco Bay Area
Appendix D – Local Non-Coastal Flooding Maps
Appendix E – Sea Level Rise Maps .
Appendix F – Inventory of Building and Park Assets
Appendix G – Inventory of Utility Assets
Appendix H – Inventory of Transportation Assets
Appendix I – Approval Documentation

TABLE OF TABLES

Table 1. MMI Intensity Table 17
Table 2. Recorded or Deduced Strong Earthquakes - Hayward Fault 19
Table 3. Recorded Strong and Major Earthquakes - San Andreas Fault 19
Table 4. Combination of Sea Level Rise and Extreme Tides 28
Table 5. City of Alameda Population Projections, 1994–2020 35
Table 6. Population Age Distribution, 1990–2010 36
Table 7. Household Composition in the City of Alameda, 2010 37
Table 8. Households by Income Level, 2010 37
Table 9. Historic and Projected Employment, 1990–2030 38
Table 10. City-owned Sewer, Storm and Electrical Utilities 42
Table 11. Street Inventory 43
Table 12. Mitigation Strategies Selected for Implementation 53
Table 13. Key Partner's Mitigation Strategies 79

TABLE OF FIGURES

Figure 1. The Emergency Management Cycle 6
Figure 2. Earthquake Induced Landslide Hazard Zones 9
Figure 3. Rainfall Induced Landslides: Existing Landslides 10
Figure 4. Historic Bay Area Fire Perimeters 12
Figure 5. California Drought Monitor, as of December 1, 2015 15
Figure 6. Shake Maps 18
Figure 7. Areas of Loma Prieta Earthquake Damage 20
Figure 8. Probability Seismic Hazard Map 21
Figure 9. Liquefaction Susceptibility 23
Figure 10. Inundation Depths based on Tsunami Scenarios 31
Figure 11. Tsunami Evacuation Zones 33

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Executive Summary

The purpose of this Local Hazard Mitigation Plan is to identify the City of Alameda's natural hazards, review and assess past disaster occurrences, estimate the probability of future occurrences, and set goals to mitigate potential risks, in order to reduce or eliminate long-term risk to people and property from natural hazards.

The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to achieve eligibility and potentially secure mitigation funding through Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance, Pre-Disaster Mitigation, and Hazard Mitigation Grant Programs and to receive federal mitigation funding and additional State recovery funding after disasters.

This Local Hazard Mitigation Plan was developed using the following model:

1. HAZARDS: Identify all natural hazards that could impact Alameda.
2. RISK: For each hazard, determine the potential magnitude of the hazard and the likelihood that an event of that magnitude will happen. For example, there is an X% chance that an earthquake of magnitude Y will strike the East Bay within Z years and cause significant damage.
3. VULNERABILITY: Identify all vulnerable populations in the City. This includes people who would have more difficulty preparing for or avoiding hazards, that would be harmed more by the hazard, and/or have a harder time recovering after the disaster. Identify all assets within the City that could be affected by a disaster. Both the immediate disaster response and the long-term recovery of the City are important.
4. EXPOSURE: Determine the intersection of risk and vulnerabilities – where the people and assets are most exposed to the risks.
5. MITIGATIONS: Determine what can be done to decrease the hazard risk, to make people and assets less vulnerable or more resilient, and to minimize exposures to hazards. Determine what the City can do and how it can be paid for. Determine what other governments, non-governmental organizations (NGOs), and the private sector can do.
6. IMPLEMENTATION: Start a public information campaign, make changes to City codes and planning documents, assign personnel, and start to implement the mitigation strategies. Periodically, reassess and update this Local Hazard Mitigation Plan.

Natural Hazard Risks in Alameda

This plan defines and maps significant natural hazards that may affect people and assets in the City of Alameda. The hazards considered are those that could cause major impacts, including death, injury, building and facility damage, infrastructure (utilities, roads) damage, and the temporary or permanent loss of personal, private business, and public service functions.

Two natural hazards determined to present the greatest risk and therefore are considered in more detail are earthquakes and flooding caused by a combination of storms and high seas.

Combining all likely scenarios of a major earthquake on the Hayward or San Andreas faults, Alameda has a 10% chance of experiencing "Very Strong" to "Violent" (MMI 8 to MMI 9) shaking in the next 50 years. The report details what areas of Alameda, and what populations and structures would be most affected. Coastal flooding caused by winter storms and elevated sea levels – is also examined, based upon FEMA's latest 100 year flood mapping effort.

Hazards that were examined and found to be of minimal risk to Alameda, either because they have never occurred in Alameda in recorded history, or their occurrences have been rare and have resulted in no recorded damage in Alameda include the following: landslides (earthquake or rainfall induced), wildland fires, extreme heat, extreme cold, and drought.

Mitigation Strategy

Alameda aims to be a resilient community that can be prepared for future hazards by having reduced exposure and reduced short and long-term loss due to hazards. The Mitigation Goals of this plan are as follows:

1. ***Reduction of hazard exposure where possible.***
2. ***Protection of the health, safety and welfare of City of Alameda residents, workers and visitors.***
3. ***Minimal damage of public and private property.***
4. ***Minimal damage of the natural environment.***
5. ***Minimal disruption of essential services, facilities, and infrastructure.***
6. ***Timely and complete recoveries.***
7. ***Increased understanding and awareness of hazards and hazard mitigation by City employees and the public.***
8. ***Participation in mitigation and resiliency by all stakeholders, as appropriate.***
9. ***Protection of the City's character.***

Alameda has accomplished much towards increasing our community's disaster resilience:

<u>Building and Facility Resiliency</u>

- Evaluation and retrofit of City buildings. The following were either built to acceptable seismic standards, or retrofitted: City Hall, Police Station, Fire Station 1, 2, and 4, Main Library, West End Library, Bay Farm Library, Alameda Municipal Power Headquarters, Maintenance Service Center, Central Garage at City Hall, Parking Structure on Central/Oak, Godfrey Park Rec Center, Leydecker Park Recreation Center, Tillman Park Recreation Center, Carnegie Library, Bay Fairview Hall, and the Chuck Corica Golf Course Buildings.
- Retrofit of 100% of Alameda's unreinforced masonry buildings.

<u>Utility and Transportation Infrastructure Resiliency</u>

- Seismic upgrade of Ballena Bridge to Lifeline status
- Seismic evaluation of Grand Street Bridge with a determination that no upgrades are needed
- Repair of Veterans Wall and Walnut Street Retaining Wall
- Four time redundancy in emergency wi-fi communication systems

Networking, Planning, and Education

- Assignment of a full time Disaster Preparedness Coordinator
- Post Disaster Assessment Certification of all inspectors, code enforcement officers and planners.
- Ability to broadcast important information via public access television, channel 15 and the low power city radio notification for system, 1280 AM.
- Adoption of Nixle 360, a system that allows the City to send voicemails, emails and texts to all subscribers or specific geographic areas simultaneously.
- Mutual Aid Agreements and Compatibility with Fire and Police
- Participation in Interoperable Communications System

Long-term maintenance and improvements to these programs will help to protect the Alameda community in our next disaster.

Mitigation actions selected for implementation in this plan were specified through a collaborative planning processes among City staff, key institutional partners and the general public. They include:

Building and Facility Resiliency

A. Construction of New Emergency Operations Center and Fire Station #3 *
B. Soft Story Buildings Program *
C. Wood Framed Buildings Program *
D. Resilient City Buildings *
E. National Flood Insurance Program *
F. Community Rating System
G. Resilient Shoreline Facilities *
H. Street Tree and Park Tree Trimming *

Utility and Transportation Infrastructure Resiliency

A. Resilient Sanitary Sewer Service *
B. Resilient Storm Water Conveyance Service *
C. Reduction of Stormwater Runoff *
D. Resilient Electrical Service *
E. Mutual Aid Utility Repair Agreements *

Networking, Planning, and Education

A. Public Education and Outreach *
B. City Personnel Education and Training *
C. Integration of Hazard Mitigation with Climate Change, Emergency Management, General, and CIP Plans *
D. Disaster Debris Plan and Agreements
E. Emergency Fuel Agreements
F. Update the Health and Safety Element of the General Plan
G. Tsunami inundation hazard zone and evacuation route sign placement and public education on Tsunami risk.

*Items marked with an asterisk are programs already in place and will be continued

Implementation and Updates

Alameda has developed processes to implement, track and update the status of its disaster mitigation activities. The City Manager's Office directs implementation and tracking of mitigation activities; funded actions will be inserted into departmental work plans each year. Department heads task staff members with projects. Lead staff identified in each action will meet together at the beginning of each calendar year to address their progress on the actions that comprise Alameda's mitigation strategy. Staff will conduct a complete review and update of the plan, including the hazard analysis and mitigation strategy, once every five years.

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1. INTRODUCTION

Hazardous events happen regularly, whether caused by nature or human activity. Hazards can become disasters when we put our lives and valuables within harm's way. A flood can be disastrous when we build and live on floodplains. A flood in the wilderness, on the other hand, may be beneficial, and not a disaster. It is up to us to mitigate, or lessen, the disastrous effects of hazards.

The intent of this City of Alameda Local Hazard Mitigation Plan is to examine the intersection between hazards to the City of Alameda, and the people and assets of value in the City. By being informed, we can make choices to decrease those hazards we have control over, to strengthen our ability to withstand hazardous events we don't have control over, and to make our City more resilient to bounce back after events. All disaster planning runs in cycles. If we are fortunate enough to get a warning, there is a preparation phase just before the event. Then there is the response phase during the event, and the recovery phase after the event. The mitigation phase, in particular, includes the activities we take between events to decrease impacts of future events, and is key to the long-term prosperity of our City. Mitigation activities are independent of individual disaster events.

Figure 1. The Emergency Management Cycle
source http://ezt.ca/Municipal-Services/Home-Fire-Safety/Emergency-Management

The Disaster Mitigation Act of 2000 (DMA 2000) reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. DMA 2000 requires jurisdictions to have a Federal Emergency Management Agency (FEMA) approved Local Hazard Mitigation Plan in order to be eligible for post-disaster funds. The Local Hazard Mitigation Plans must be updated every five years.

In 2010, the Association of Bay Area Governments (ABAG) created a region-wide Local Hazard Mitigation Plan entitled, "Taming Natural Disasters". Each of the local governments, including the City of Alameda, created an annex to the ABAG Plan for the

unique hazards and assets of their jurisdictions. Now, five years later, the City of Alameda has drafted a stand-alone Local Hazard Mitigation Plan that goes into much more depth and detail about local hazards and resources. Since the 2010 ABAG Annex, the City's priorities on how to address hazards and implement mitigation strategies were updated. Those updates are reflected in this revised Local Hazard Mitigation Plan.

This new Local Hazard Mitigation Plan outlines specific steps the City and its citizens can take to mitigate against losses for future hazards. Development of this Plan has included input from citizens, City departments, utilities, and other stakeholders. A description of citizen outreach and input opportunities are presented in **Appendix A**. As demonstrated in Appendix A, the City was diligent and successful in providing public involvement opportunities for this five year plan review process through multiple methods.

This Local Hazard Mitigation Plan was developed using the following model:

7. HAZARDS: Identify all natural and man-made hazards that could impact Alameda.
8. RISK: For each hazard, determine the potential magnitude of the hazard and the likelihood that an event of that magnitude will happen. For example, there is an X% chance that an earthquake of magnitude Y will strike the East Bay within Z years and cause significant damage.
9. VULNERABILITY: Identify all vulnerable populations in the City. This includes people who would have more difficulty preparing for or avoiding hazards, that would be harmed more by the hazard, and/or have a harder time recovering after the disaster. Identify all assets within the City that could be affected by a disaster. Both the immediate disaster response and the long-term recovery of the City are important.
10. EXPOSURE: Determine the intersection of risk and vulnerabilities – where the people and assets are most exposed to the risks.
11. MITIGATIONS: Determine what can be done to decrease the hazard risk, to make people and assets less vulnerable or more resilient, and to minimize exposures to hazards. Determine what the City can do and how it can be paid for. Determine what other governments, non-governmental organizations (NGOs), and the private sector can do. .
12. IMPLEMENTATION: Start a public information campaign, make changes to City codes and planning documents, assign personnel, and start to implement the mitigation strategies. Periodically, reassess and update this Local Hazard Mitigation Plan.

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2. HAZARD CHARACTERIZATIONS AND RISK ASSESSMENT

This chapter defines and maps significant natural hazards that may affect people and assets in the City of Alameda. The hazards considered are those that could cause major impacts, including death, injury, building and facility damage, infrastructure (utilities, roads) damage, and the temporary or permanent loss of personal, private business, and public service functions. Two main natural hazards were determined to present the greatest risk and are therefore considered in more detail – those caused by earthquakes and those caused by a combination of storms and high seas. The chapter addresses how these hazards have historically affected the City of Alameda and the Bay Area at large, what are the chances of them affecting Alameda in the future, and the likely location and severity of the hazards within Alameda. While this report focuses on hazards to the City of Alameda, it is important to remember that Alameda is an island and dependent upon its connections to Oakland and the surrounding Bay Area. Any disaster that affects Alameda may also affect services outside off the island that the City depends upon, including emergency services, transportation, power, food, water, sanitation, communication, gasoline, natural gas, housing, medical care, education, and other services. Regional disasters may also disrupt availability of tax revenues, prioritize who has first access to rebuilding supplies and services, and cause temporary or permanent changes in populations. **Appendix B** contains a map of Alameda and the surrounding area. The following is a discussion of hazards deemed low-risk, then of the hazards that pose a greater risk – earthquakes and storms with tides.

2.1. Hazards Determined to Present Minimal Risk to Alameda

The following hazards were examined and found to be of minimal risk to Alameda, either because they have never occurred in Alameda in recorded history, or their occurrences have been rare and have resulted in no recorded damage in Alameda. These hazards are not appropriate for mitigation efforts in the City of Alameda, but their potential for causing damage and indirect impacts to surrounding jurisdictions and infrastructures that Alameda relies upon should be considered during general preparedness planning.

2.1.1 Landslides

In the Bay Area landslides typically occur as a result of either earthquakes or heavy and sustained rainfall events. A given area can be at risk for both earthquake-induced landslides as well as rain-induced landslides but the variables that contribute to each landslide risk are different. Typically an earthquake-induced landslide occurs when seismic energy at the top of a slope gets concentrated and breaks off shallow portions of rock. In rainfall-induced landslides, the slide can begin much deeper in the slope, in very-saturated layers of soil.

For both types of landslides, there are not currently methods available to estimate the probabilities of future landslides at a local, or jurisdictional, scale. Steep slopes and varied types of underlying soils can influence the likelihood of landslides. Additionally, surface

and subsurface drainage patterns also affect landslide hazard, and vegetation removal can increase landslide likelihood. Future landslides are most likely to occur within and around the places where they have previously occurred[1]. Given Alameda's very flat topography, there has been no historic instance of an earthquake or rainfall induced landslide in the City of Alameda. **Figure 2** and **Figure 3** show this in map view.

Coastal erosion caused by wave action against bluffs is addressed below under Storms and Tides. Subsidence caused by earthquake liquefaction is addressed below under Earthquakes.

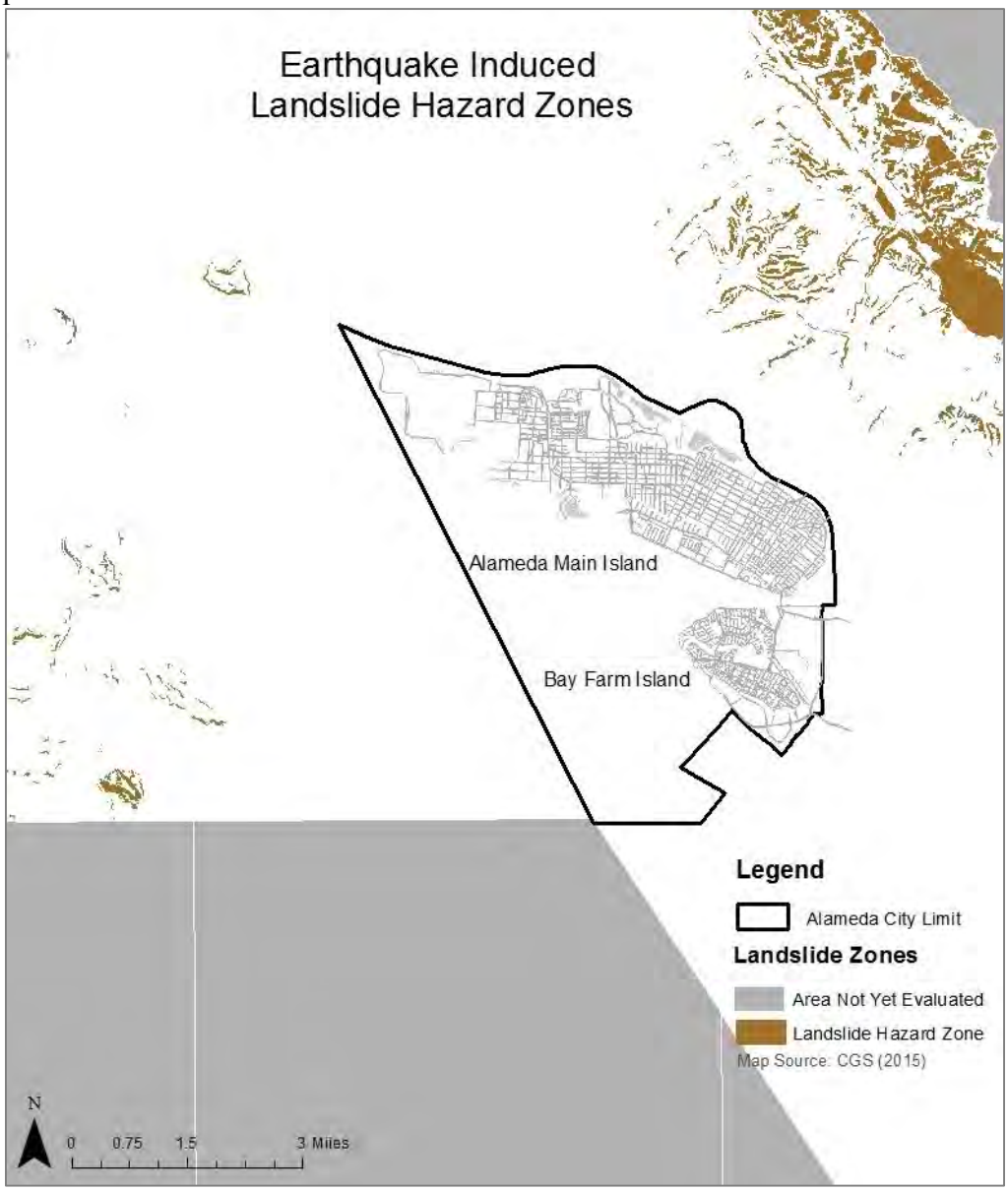

Figure 2. Earthquake Induced Landslide Hazard Zones

[1] State of CA Multi-Hazard Mitigation Plan, Appendix M, CA Governor's OES

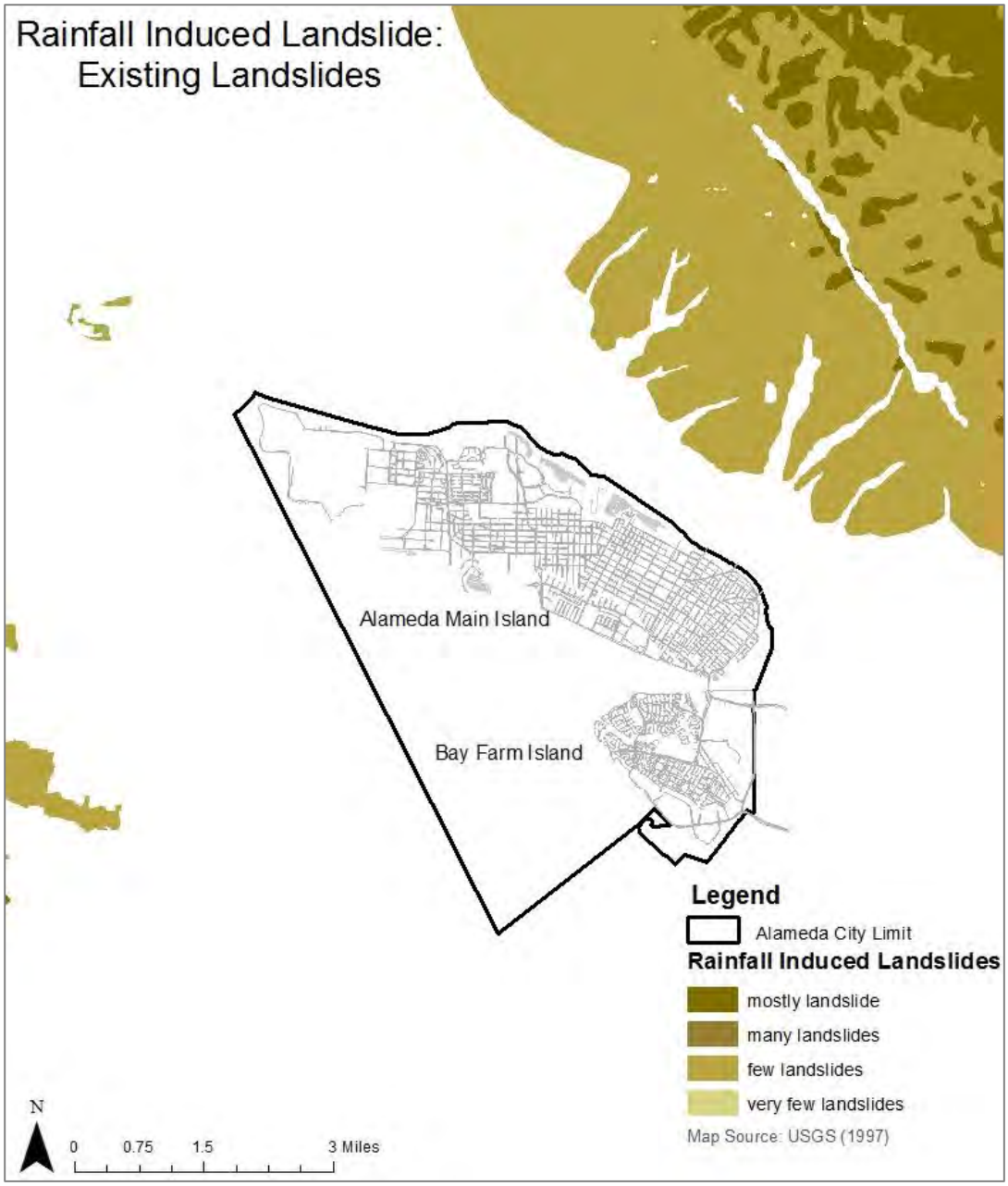

Figure 3. Rainfall Induced Landslides: Existing Landslides

Climate Adaption and Landslides: As described above, landslides are typically triggered by earthquakes or prolonged severe wet seasons. Climate change is predicted to change the behavior of winter storms. The regional models project fairly similar precipitation totals in the Bay Area, but the variability season to season may increase. If winters are compressed, with more rain falling in fewer months, or if individual years are more extreme, the chance of rainfall-induced landslide will increase. Although Alameda will be impacted by more severe wet seasons, the flat topography does not present risk of landslide even with the more severe conditions. The only impact from rainfall triggered landslides are the regional effects of damages to the City's neighboring jurisdictions.

2.1.2 Wildland Fires

Fires are typically characterized into three categories: urban fires, wildland-urban interface fires, and wildland fires.

- Urban fires occur within a developed area and pose a direct risk to development.
- Wildland-urban interface (WUI) fires occur where the built environment and natural areas are intermixed (the fringe of urban areas).
- Wildland fires exist in wilderness land.

Fires in the urban environment and in the wildland-urban interface result in direct damage to the built environment and can injure or kill residents. Wildland fires can cause damage to linear infrastructure systems that serve the Bay Area, causing outages downstream of the failure; can impact the air quality in cities during the duration of the fire; and can impact water quality in watersheds impacted by a wildland fire.

In the Bay Area, fire areas generally fall into two categories – State Responsibility Areas, where CALFIRE is responsible for fire protection, and Local Responsibilities, where local fire departments and fire protection districts have responsibility. Wildfire is an unlikely event as Alameda Island is an island separated from the mainland by the Oakland Estuary. Bay Farm Island lies at the end of a peninsula bordered by Metropolitan Oakland International Airport and Metropolitan Golf Links, neither of which has the kind of vegetation needed for a wildland fire. **Figure 4** is a map by Calfire showing historic Bay Area fire perimeters and that there are no historic occurrences in the City of Alameda.

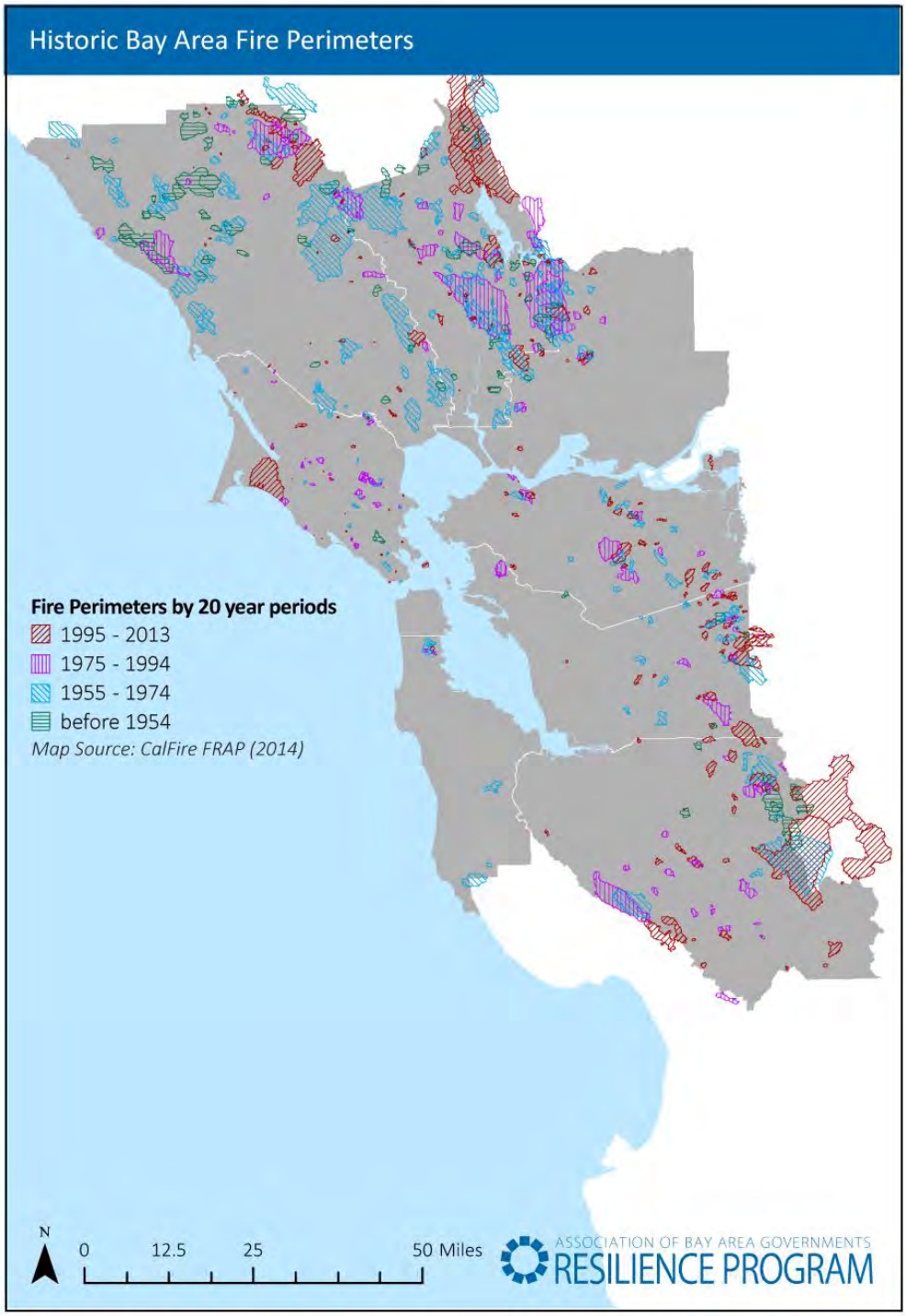

Figure 4. Historic Bay Area Fire Perimeters

2.1.3 Extreme Heat

The Bay Area, especially away from the coast and bay, can experience extreme heat days, where the Heat Index, a function of heat and relative humidity, is high. Extreme heat days pose a public health threat, causing symptoms such as exhaustion, heat cramps, and

sunstroke if the Heat Index is over 90°F. The National Weather Service has developed a Heat Index Program Alert, which gets triggered when high temperatures are expected to exceed 105°F to 110°F for at least two consecutive days. Heat emergencies occur when residents are subject to heat exhaustion and heatstroke, and are more likely to occur in areas not adapted to heat and without air conditioning, cooling centers, or vegetation to mediate heat impacts in exposed areas. Certain populations are typically the most at risk during extreme heat emergencies, including people with disabilities, chronic diseases, the elderly, and children[2].

Extreme heat emergencies typically build over time with cumulative effects. Because of this, and the fact that they do not cause substantial physical damage to the built environment, they do not elicit the same immediate response that other hazards do.

No heat emergencies in the City of Alameda or California at large have been declared a disaster at the state or federal level between 1960 and 2008.[3] Climate change is, however, expected to generate an increase in ambient average air temperature, particularly in the summer. The outer Bay Area will likely experience greater temperature increases than coastal or bayside jurisdictions, like the City of Alameda. The frequency, intensity, and duration of extreme heat events and heat waves are also expected as regional climate impacts.[4] According to California Climate Change Center, by mid-century, extreme heat in urban centers could cause two to three times more heat-related deaths than occur today.[5] Statewide, temperatures could increase anywhere from 3°F to 10.5°F depending on CO2 emission levels, leading to more frequent, hotter days throughout the year.

Cal-Adapt, California's database of climate data and visualization tools provides five different ways to define the extreme heat hazard: (1) number of extreme heat days by year, (2) number of warm nights by year, (3) number of heat waves by year (heat wave is defined as 5 consecutive extreme heat days), (4) timing of extreme heat days by year (i.e. which months do extreme heat hazards occur), (5) the maximum duration of heat wave by year. These metrics are projecting both the intensity and the temporal nature of extreme heat.

The intensity of extreme heat is defined differently for each location in the region. In the City of Alameda, an extreme heat day is defined as a day above 81°F, while for inland portions of Solano County extreme heat is defined as a day above 100°F. The threshold is the 98th percentile historic maximum temperature based on daily temperature data between 1961-1990. The highest recorded temperature in Alameda was 109°F recorded on September 14, 1971. The threshold is set locally to recognize services and buildings in cooler climates may not be designed to handle moderate heat, while those areas where high heat has always been an occurrence, already have measures to address their historic temperatures. A heat wave is defined as 5 or more consecutive extreme heat days. Record temperatures over 81°F have occurred in every month except January, February and December, though most are isolated days rather than heat waves.

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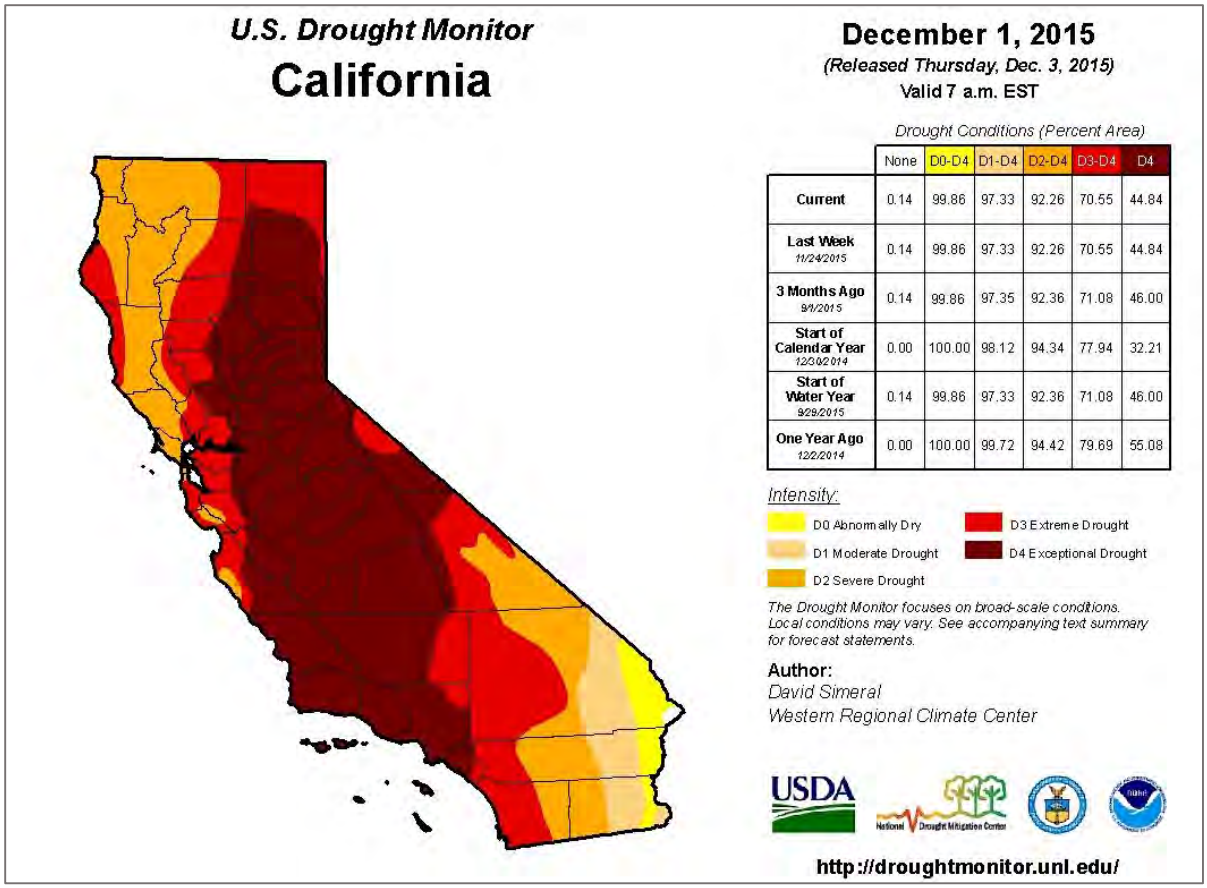
[2] State of California Multi-Hazard Mitigation Plan, California Governor's Office of Emergency Services
[3] State of California Multi-Hazard Mitigation Plan, California Governor's Office of Emergency Services
[4] Drechsler D. M., et al, (2006)
[5] California Climate Change Center (2006)

In addition to the number of extreme heat days expected to rise in the Bay Area, the temperature is expected to increase well above thresholds over the next century. In the City of Alameda, the historic average number of extreme heat days per year is four days, not necessarily consecutive. By 2050 it is predicted to be close to 30, and by the end of the century it is predicted to be about 70 days. By then, the definition of extreme heat for Alameda will have changed, because the 98th percentile of the historic maximum temperature will also rise. While extreme heat is not considered a serious risk in Alameda at this time, future Local Hazard Mitigation Plan revisions should re-assess as the climate changes. Changes in energy reliability in the summer months may also affect the impact of future extreme heat days on Alameda residents.

2.1.4 Other Minimal Risk Hazards

Lesser natural hazards for the City of Alameda include extreme cold and drought. While these hazards are important to plan for, and have occurred in Alameda, they present a much lower risk to life and property. The record low temperature for Alameda was 26°F, set in December of 1972, during an unusual week-long cold snap below freezing. Alameda – along with all of California – is currently in a long term drought. The primary impact on the City of Alameda has been loss of, or decreased health of, landscaping material and trees in the City's parks and street rights-of-way. **Figure 5** shows the California Drought Monitor, as of December 2015. This may contribute to more downed trees during future storms. Long term concerns are a lack of adequate water to fight fires, but at this time, the effects of drought are not a major concern. Drought conditions and circumstances will be re-assessed in future Local Hazard Mitigation Plan updates and revisions.



	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.14	99.86	97.33	92.26	70.55	44.84
Last Week 11/24/2015	0.14	99.86	97.33	92.26	70.55	44.84
3 Months Ago 9/1/2015	0.14	99.86	97.35	92.36	71.08	46.00
Start of Calendar Year 12/30/2014	0.00	100.00	98.12	94.34	77.94	32.21
Start of Water Year 9/29/2015	0.14	99.86	97.33	92.36	71.08	46.00
One Year Ago 12/2/2014	0.00	100.00	99.72	94.42	79.69	55.08

Figure 5. California Drought Monitor, as of December 1, 2015

Natural hazards not included in this Plan because they are not likely to occur in Alameda include earthquake fault line ruptures, hurricanes, tornadoes, and severe hail.

Hazards caused by immediate human activity are not within the required scope of this Local Hazard Mitigation Plan. Such hazards include chemical spills, tanker spills, large urban fires, arson, pandemics, cyber attacks, civil unrest, energy shortages, terrorism, and transportation incidents (airplane, truck, ship, ferry, pipeline and bus). However, the City learned through its citizen survey, conducted as a part of this update process, that the community is concerned and interested in mitigating against certain human-made hazards. The intent is to either prepare an addendum to this report in the coming years or include select human-made hazards in the next five-year plan update. Also not included is accidental dredging damage to Alameda infrastructures in the Estuary and San Leandro Channel, including sewer, water, power, natural gas, communications, marinas, and transportation.

2.2. Hazards Determined to Present Risk to Alameda's People and Assets

Unlike the hazards discussed above, Alameda is exposed to significant risk from both earthquakes and severe storms combined with high tides.

2.2.1 Earthquakes

In Alameda, earthquakes are the hazards that are most likely to cause extensive damage. This damage can come from violent shaking and ground disturbances. The perceived magnitude of earthquakes is dependent upon the energy released by the earthquake, how close it is, and the underlying geology. Bay Farm Island and Alameda Island consist of central cores of higher ground that are relatively stable, and surrounding areas of man-made fill or "made-ground" that are subject to more violent shaking and ground disturbances.

In addition to the concern for damage to Alameda itself, the city depends upon its mainland connections for transportation, utilities, commerce, and services. Major damage to Oakland, San Leandro, and adjacent cities would have an indirect effect upon Alameda in both the short term and long term recovery of the City. After an earthquake, Alameda may need to plan on being completely self-sufficient for 72 hours or more, until bridges and utility crossings are restored.

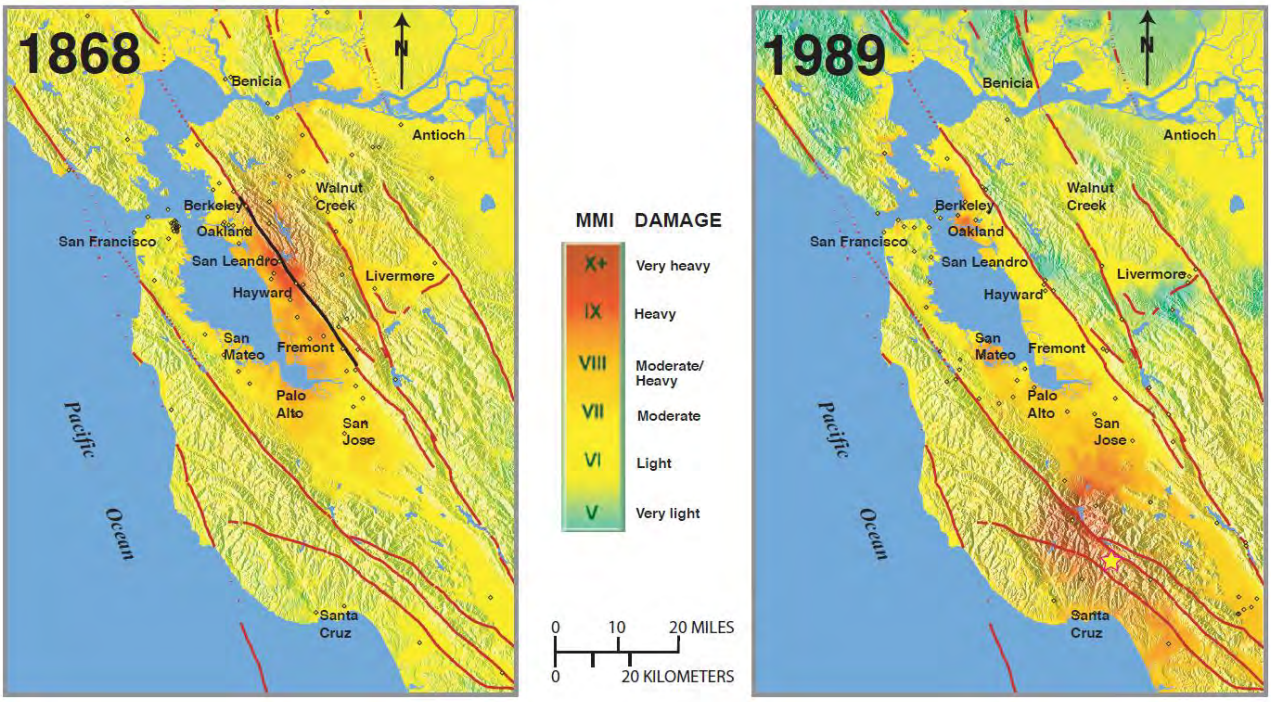
Hazard Characterization. The total amount of energy released in an earthquake is described as the earthquake magnitude, as measured by the Moment Magnitude Scale, abbreviated as "M". The Moment Magnitude Scale refined and succeeded the Richter Scale in the 1970s. The Moment Magnitude Scale is logarithmic. The 1906 San Andreas earthquake, M7.8, released 500 times more energy than the 2014 South Napa Quake, M6.0. But fortunately, the frequency of large earthquakes is much less than that of smaller earthquakes. "Strong" earthquakes, M6.0-6.9, occur about 120 times per year somewhere in the world, "major" earthquakes, M7.0-7.9 occur about 18 times per year, and a "great" quake of M8.0 or more is likely to occur only once in the world per year. Fortunately, the types of faults in the Bay Area (strike/slip) are unlikely to produce quakes larger than M8.0. Farther up the coast in Oregon, Washington and Alaska, with subduction faults, M9.0 quakes are possible.

Earthquakes with the same magnitude of energy released can have different effects on nearby facilities, depending upon how close the rupture is, horizontally and vertically, and the type of soils the facility sits upon. The Modified Mercalli Intensity (MMI) scale illustrates the intensity of damage felt. Using eye witness reports, the USGS can make shake maps that show the MMI in areas surrounding the epicenter of the quake. **Table 1** below shows the expected damage caused by various MMIs.

Alameda's worst-case scenario is a major earthquake along the southern portion of the Hayward Fault, because that is the closest fault line to Alameda, only four miles away. A major earthquake on any one of the faults in the Bay Area is predicted to cause at least some ground disturbance on the made-ground portions of Alameda. Made-ground is much more sensitive to shaking and ground disturbance. Shaking is likely to be felt all over Alameda, but more violently on made-ground. **Figure 6** has shake maps showing the Modified Mercalli Intensity of ground shaking for the magnitude M 6.9 quakes at Hayward (1868) and Loma Prieta (1989). In places, Alameda experienced MMI 8 (very strong) to 9 (violent) intensity shaking during these two quakes.

Table 1. MMI Intensity Table *(*Source: ABAG, 2013, Modified Mercalli Intensity Scale*)*

Intensity	Building Contents	Masonry Buildings	Multi-Family Wood-Frame Buildings	1&2 Story Wood-Frame Buildings
MMI 6	Some things thrown from shelves, pictures shifted, water thrown from pools	Some walls and parapets of poorly constructed buildings crack.	Some drywall cracks.	Some chimneys are damaged, some drywall cracks. Some slab foundations, patios, and garage floors slightly crack.
MMI 7	Many things thrown from walls and shelves. Furniture is shifted.	Poorly constructed buildings are damaged and some well-constructed buildings crack. Cornices and unbraced parapets fall.	Plaster cracks, particularly at inside corners of buildings. Some soft-story buildings strain at the first floor level. Some partitions deform.	Many chimneys are broken and some collapse, damaging roofs, interiors, and porches. Weak foundations can be damaged.
MMI 8	Nearly everything thrown down from shelves, cabinets, and walls. Furniture overturned.	Poorly constructed buildings suffer partial or full collapse. Some well-constructed buildings are damaged. Unreinforced walls fall.	Soft-story buildings are displaced out of plumb and partially collapse. Loose partition walls are damaged and may fail. Some pipes break.	Houses shift if they are not bolted to the foundation, or are displaced and partially collapse if cripple walls are not braced. Structural elements such as beams, joists, and foundations are damaged. Some pipes break.
MMI 9	Only very well anchored contents remain in place.	Poorly constructed buildings collapse. Well-constructed buildings are heavily damaged. Retrofitted buildings damaged.	Soft-story buildings partially or completely collapse. Some well-constructed buildings are damaged.	Poorly constructed buildings are heavily damaged, some partially collapse. Some well-constructed buildings are damaged.
MMI 10	Only very well anchored contents remain in place.	Retrofitted buildings are heavily damaged, and some partially collapse.	Many well-constructed buildings are damaged.	Well-constructed buildings are damaged.



A ShakeMap showing the inferred intensity of ground shaking in the 1868 earthquake (MMI, or Modified Mercalli Intensity), compared to a ShakeMap for the 1989 magnitude 6.9 Loma Prieta earthquake. Red lines are earthquake faults; black line shows the portion of the Hayward Fault that ruptured in 1868; yellow star marks the epicenter of the 1989 quake. Diamonds show locations of damage reports (1868) and of seismic recordings (1989).

Figure 6. Shake Maps Comparing Damage from the 1868 Hayward Quake (approx. M6.9) to the 1989 Loma Prieta Quake (M6.9)

Historic Activity. The Bay Area has experienced about 20 strong earthquakes and one major earthquakes in the past 165 years, including the 1868 Hayward Fault quake (~M6.9) and 1906 San Andreas quake (M7.8). Those two earthquakes occurred before the infilling of made-ground in Alameda, and when the majority of buildings in Alameda were relatively flexible wood construction. The most notable damage was to the brick tower at Alameda City Hall, built in 1895 and damaged by the San Francisco earthquake in 1906. The damage was extensive enough to warrant removal of the tower in 1937.

Tables 2 and **Table 3** show the historic recorded earthquakes along the Hayward and San Andreas Faults, respectively.

Table 2. Recorded or Deduced Strong (M6.0+) Earthquakes along the Hayward Fault

Date	Magnitude	Notes
1315	Over M6.3	Based on geologic data
1470	Over M6.3	Based on geologic data
1630	Over M6.3	Based on geologic data
1725	Over M6.3	Based on geologic data, predates California missions
1868	M6.8 to M7	Based on geologic data, predates California missions
1984	M6.2	Morgan Hill (on nearby Calaveras Fault)

Table 3. Recorded Strong (M6.0+) and Major (M7.0+) Earthquakes along the San Andreas Fault

Date	Magnitude	Notes
1812	M7+	Southern California
1838	M7	Santa Cruz Mountains
1857	M7.9	Fort Tejon
1890	M6.3	Corralitos
1906	M7.8	San Andreas (San Francisco Quake)
1940	M7.1	Imperial Valley
1983	M6.5	Coalinga
1989	M6.9	Scotts Valley (Loma Prieta Quake)
1991	M6.3	Fortuna
1992	M7.2	Fortuna

The 1989 Loma Prieta earthquake, M6.9, occurred after the infilling of Alameda along South Shore, Bay Farm Island, and Alameda Point. This quake caused $2.1M damage to properties owned by the City of Alameda, including broken water mains, broken sewer lines, street buckling, and bulkhead damage. There were documented liquefaction (mud boils) in the made ground at Alameda Point and Harbor Bay Business Park on Bay Farm Island. Several neighborhoods including South Shore experienced buckled streets and sidewalks, and subsidence that made the sanitary sewer pipes no longer flow downhill, requiring the City to build a new sanitary sewer pump station. **Figure 7** contains a replication of map produced showing the settlement damage to streets from the Loma Prieta Earthquake. All were in areas of made ground, outside of the original shoreline.

The dollar amount of private properties is not included here. The $ 2.1M is inclusive of damage to buildings, fuel tanks, private utilities, bulkheads, and private roads. This earthquake was strong enough to cause the collapse of the nearby Cypress Structure in Oakland.

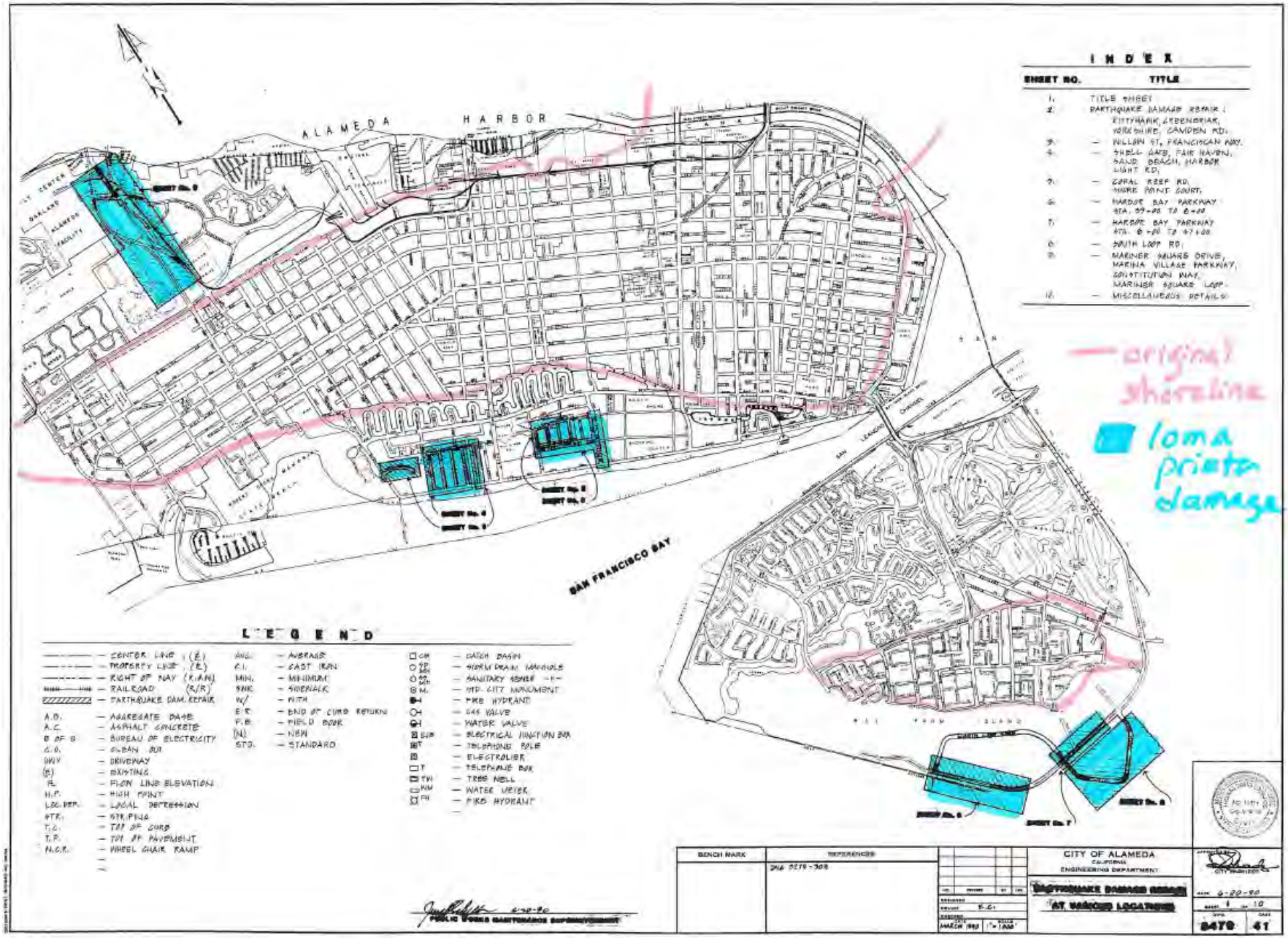


Figure 7. Areas of Loma Prieta Earthquake Damage and Original Shoreline of Alameda

The only strong quake to occur in the Bay Area since the 1989 Loma Prieta Earthquake is the 2014 South Napa Earthquake, M6.0, which caused extensive building and underground utility damage in Napa, along the fault line rupture. The damage was highly concentrated in the Napa area and no damage was reported in Alameda.

Future Activity. According to the USGS, the chance of an earthquake of M6.7 or greater in the Bay Area in the next 30 years is 72%. The chance of a M6.7 or greater earthquake on our closest fault, the Hayward Fault, in the next 30 years is a 28%. The California Integrated Seismic Network has developed scenario earthquakes and has shown what areas will be affected by each earthquake. A M6.8 quake on the Hayward fault or a M7.2 quake on the San Andreas fault is likely to cause at least a "strong" or MMI 7 shaking in Alameda. Combining all likely scenarios, Alameda has a 10% chance of experiencing "Very Strong" to "Violent" (MMI 8 to MMI 9) shaking in the next 50 years. This probability can also be expressed as a 0.2% chance per year, or a 500-year event, which could happen any time. **Figure 8** portrays this probabilistic seismic hazard scenario as a map.

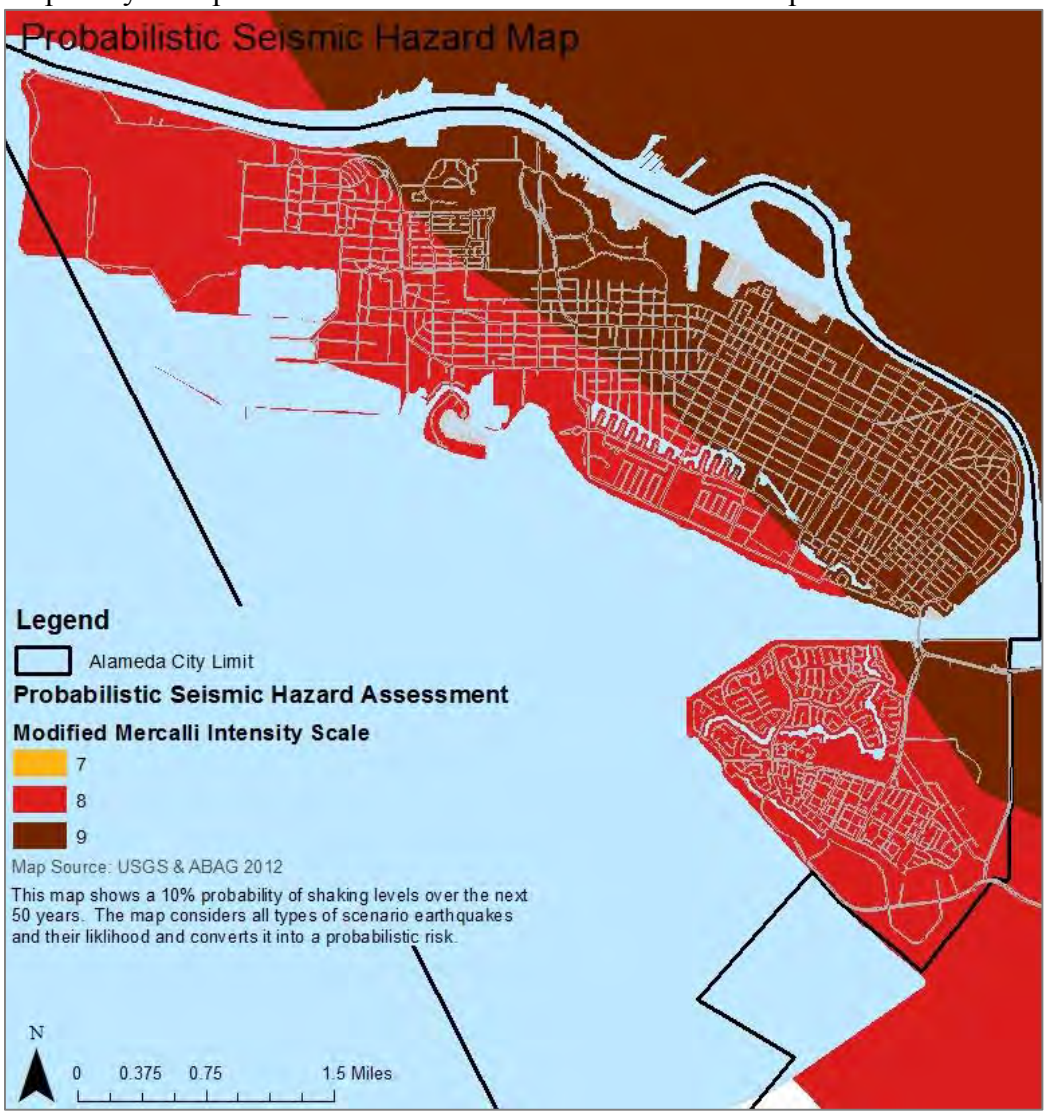


Figure 8. Probability Seismic Hazard Map

Strong earthquakes strike the Hayward Fault at approximately 140 year intervals, so we may be due for another strong quake in the relative short term. On the other hand, recent major fault events on both the Hayward and San Andreas faults in Northern California have been preceded by 10-20 years of M5.5-6.2 events occurring an average of one every one to two years (foreshocks). In the past 15 years, such a pattern has not appeared on the Hayward or San Andreas Faults. At the next revision of the Local Hazard Mitigation Plan, the reviewers should be alerted if there is a pattern of foreshocks from 2014 thru 2020. But this does not preclude an earthquake from breaking the pattern and occurring without warning.

Earthquake Liquefaction. Earthquakes can cause ground disturbances include liquefaction and subsidence. Liquefaction occurs when the underlying wet sands and muds become softer during shaking and may even come to the surface as mud boils. Subsidence happens when small pockets or whole neighborhoods sink down permanently because of the loss of strength during liquefaction. During the Loma Prieta Earthquake for example, Franciscan Way, which was built on 40-year-old made-ground, sank slightly due to liquefaction. This caused difficulties with the sanitary sewer system and necessitated the construction of a sanitary sewer pump station to boost flows from the neighborhood to the main line. The storm drain lines, while still functional, were also impaired. Several residential streets needed emergency repair due to differential settlement. There is no mitigation to prevent liquefaction and subsidence, but the City is alert to the possibility that some areas may need temporary sanitary sewer and storm drainage assistance, as well as more permanent solutions to changes in elevation. **Figure 9** shows high potential liquefaction areas throughout the city.

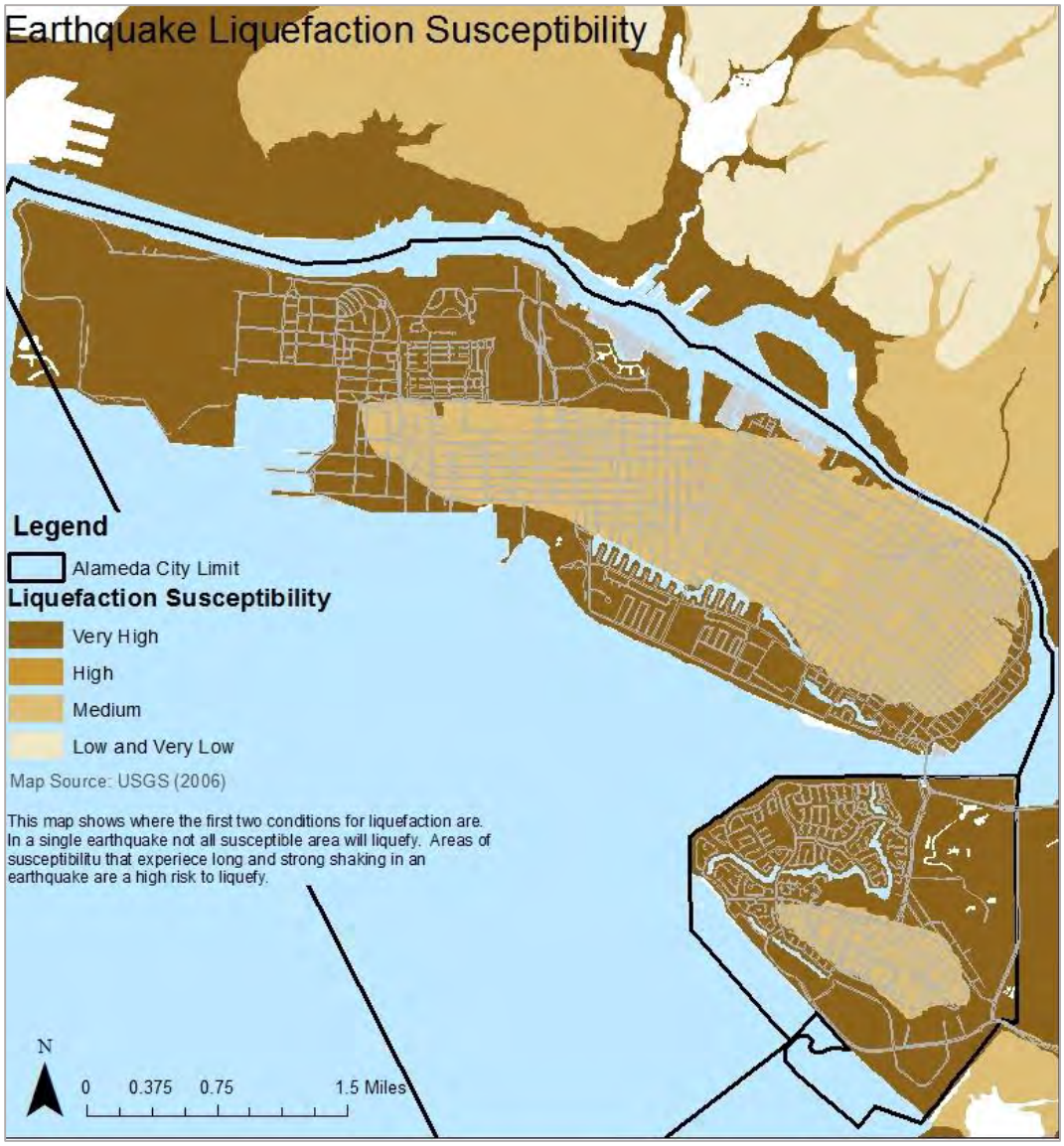


Figure 9. Liquefaction Susceptibility

Earthquake Caused Fires. After direct losses caused by violent shaking, liquefaction and subsidence, the largest secondary effect to consider during and after an earthquake is fire. The Great Earthquake of 1906 was also known as the Great Fire of 1906, because much of the damage to San Francisco was caused by fires started by the earthquake. Fires can be caused by damages to natural gas lines, electrical lines, heating systems, and fueling systems. After an earthquake, fire-fighting efforts may be hampered by streets blocked by rubble or trees, lack of water pressure, lack of mutual aid if Oakland and San Leandro are equally hard-hit, and loss of access across bridges. Firefighting personnel would have to be split between fighting fires and performing paramedic services.

The City was recently classified with a Class 01/1Y ranking, placing it in the top 0.2% of over 48,000 fire agencies evaluated by Insurance Services Office, Inc. The high ranking

was due to high scores across the board for water supply availability and adequacy (fire flows), enhanced 9-1-1, E9-1-1 wireless and VoIP communications, computer aided dispatch (CAD), geographical information systems (GIS), automatic vehicle location, alarm receipt and processing, dispatch protocols, equipment quantity and quality, staffing levels, training, certification, continuing education, quality assurance, geographical coverage, annual building inspections, standard operating procedures, established incident management system (IMS), fire prevention program, code enforcement, public fire safety education, fire investigation program, fire code adoption.

Other Earthquake Related Losses. In addition to the direct losses caused by earthquakes and earthquake-started fires, there are other secondary effects to consider during and after an earthquake, especially if the surrounding cities are impacted. This includes loss of circulation for emergency vehicles, evacuation, commuting, education, and commerce; lack of access to hospitals; lack of access from mutual aid outside of the City; loss of utilities such as power, water, telecom, and natural gas; generation of large quantities of debris; release of hazardous materials; and loss of displaced population, industry and commerce.

Since Alameda is relatively flat, it is not exposed to the earthquake hazards of seismically triggered landslides. There are no known faults running through Alameda and no history or geological evidence of ground rupture at faults. There is a hypothetical chance of minor sloughing along the shoreline perimeter, since much of the perimeter is built on mudflats, subject to liquefaction.

Climate Adaptation and Earthquakes: Climate change is expected to have a role in earthquake hazards. Rising sea levels correspondingly cause rising groundwater levels. Soils that are more saturated with groundwater are more likely to liquefy and subside. Climate change may also exacerbate periodic droughts, which can lead to excessive groundwater depletion as an alternative water source. Some preliminary evidence suggests that changes in groundwater levels in the vicinity of fault lines can promote more frequent small earthquakes.

2.2.2 Flooding

Historical Flooding. The City of Alameda normally experiences tides that range from -0.2 Mean Lower Low Water (MLLW) to +6.4’ Mean Higher High Water (MHHW), based on the NAVD88 datum. (The NAVD88 datum or zero elevation is approximately the same as the elevations used local tide tables.) The highest tide of the year, or “king tide”, normally occur during the winter months of November thru February, and is usually about 7.4’. Every year, there is a 1% chance the king tide will exceed 9.4’. This can be called the 100-year tide. The ten highest king tides recorded by NOAA in Alameda for the last 75 years measured 8.6’ to 9.5’ elevation.

Winter months are also when the City is likely to experience storms. During an extreme storm event, the level of the sea can temporarily rise several feet above the level predicted

by tide tables. This is caused by storm set-up if the storm pushes and piles up water along the coast. Temporary sea level rise can also be caused by wind-caused waves, and by the seawater increasing in volume as its temperature rises (as happens during an El Niño year). During the El Niño event of 1997-98, for example, there was up to 2 feet of standing water on Main Street, due to higher sea levels (king tide plus weather related temporary sea level rises) and heavy rainwater runoff. In 1981, storms eroded Crown Beach all the way to the edge of Shoreline Drive. In 2006 storm waves damaged the Harbor Bay Ferry Terminal, and washed away portions of the adjoining Coastal Trail. While these are relatively minor events in terms of damage, and none involved structures, there is potential for much more extensive flooding and erosion.

The Federal Emergency Management Agency (FEMA) publishes Federal Insurance Rate Maps (FIRMs), which designate areas with a 1% per year chance of flooding if an extreme storm event happens during an extreme high tide - "the 100 year flood plain". The Base Flood Elevation FEMA uses for this flood plain is 10.0', which is 2.5' above the yearly typical king tide, and 0.5' above the highest recorded tide in Alameda. This flood elevation could be achieved by a combination of a king tide plus weather-related temporarily higher sea levels. The last published FIRMS were in 2009. FEMA issued preliminary FIRMs in 2015, which show a much more extensive area designated in the 100 year flood plain than was previously mapped in 2009. The City has done extensive modeling of the local area and is in the process of appealing the preliminary flood plain designations. Both the 2009 official Flood Insurance Rate Maps and those proposed in 2015 can be viewed on the City website (https://alamedaca.gov/permits/news/2015/09/29/new-FEMA-maps). FEMA has handled 8 flood loss claims in the past 33 years, for a total of $34,195. *As of April 2015, iService Regional Manager Region IX informed that the City that there are no Repetitive Loss or Sever Repetitive Loss structures in the City of Alameda (Community ID# is 060002) and therefore none in the identified and proposed flood hazard areas.*

Bay Farm Island Coastal Flooding. Bay Farm Island is especially vulnerable to flooding. There are three main watersheds within Bay Farm Island – the area surrounding Chuck Corica Golf Course, the area surrounding the Harbor Bay Island Lagoon System, and the rest of Bay Farm Island that drains directly to the Bay. According to the new FEMA modeling, flood waters can over top various locations along the Oakland Airport shoreline and Doolittle Drive, which would then flood the low lying areas of the golf course and homes surrounding the golf course on Island Drive and Maitland Drive. The floodwaters could potentially block Doolittle Drive, Harbor Bay Parkway, Ron Cowan Parkway and the approach to Bay Farm Island Bridge, rendering Bay Farm Island completely cut off from Oakland and the rest of Alameda for both emergency and recovery access. Also threatened is the lagoon system. There is a narrow isthmus of land between the north end of the lagoon system and San Leandro Channel that could be considered a dike. This dike, about 100 feet long, is mapped at an elevation of about 9.5'. It could be breached during an earthquake or during a weather-plus-king-tide event. If it did, the lagoons might flood too quickly to be pumped down, resulting in the flooding of adjacent homes. The dike, built on old sunken ships and Bay dredgings, was not engineered to be a certifiable levee, and there remains an unknown risk of failure during a storm event or during an earthquake event. It may not have a uniform density or strength. According to the State Hazard

Mitigation Plan of 2013, there are several ways that dikes can fail, including deep-seated bearing failures induced by seismic ground shaking, sliding along weak or brittle zones, increased pore pressures from unusually high water levels, erosion due to water action, seepage through the sandy layers under the dike, and land subsidence that makes the dike more vulnerable to overtopping. There is a difference of opinion between FEMA and the Army Corps of Engineers as to whether the flooding of the golf course watershed would also flood the lagoon system along Island Drive, or visa versa, independent of any dike failure at the north end of the lagoon system.

Non-Coastal Flooding. In addition to the coastal flooding hazard of heavy storm and high tide flooding, there is the frequent but more minor hazard of flooding from intense rainstorms that can overtax or plug the storm drain system. Alameda is very flat, especially in areas of made-ground, and so the storm drain system cannot gravity drain all of the storm water to the Bay. During high tides, the outfalls are often under water and the pipes upstream are partially full. Some outfalls are frequently underwater during high tides and have chronic issues with mud deposition. In some areas, storm drainage is collected through pipes to a pump station (or lift station). That way, the water can be pumped out under pressure if the outfall is below high tide. Alameda recently modeled the storm drain system and determined what intersections are at risk of flooding during a 10 year storm or 25 year storm due to undersized pipes, undersized pump stations, or the inability to drain during high tides. Maps showing storm drain related flooding potential are shown in **Appendix C**.

California experiences a megaflood event every 100 to 200 years. During the megaflood of 1861-62, that destroyed ¼ of California's economy, 28 inches of rainfall fell on San Francisco in 1 month, and a record 7.76 inches fell in one 24 hour period. Other areas on the West Coast experienced similarly intensity and volume. Since then, there have been less extreme flood-inducing storms every two to three years striking some part of California. These storms are not necessarily related to El Niño or La Niña years. Of the ten costliest California storm seasons between 1949 and 1997, four (1979-80, 1985-86, 1992-93, and 1996-97, in 1998 dollars) were neither El Niño nor La Niña types. The most expensive storm (1994-95) was a weak El Niño with 100 year to 1000 year events. (J. Null, "El Niño and La Niña … Their Relationship to California Flood Damage", http://ggweather.com/enso/calif_flood.htm). So any year, El Niño or not, could potentially have a severe storm. The City's storm drain modeling looked at 10 and 25 year storms, which is the normal return period used for storm drain construction. It is likely that a 100 year rain event, especially if during a normal high tide, will cause serious temporary flooding. With the increased understanding and tracking of atmospheric rivers, these events will become easier to predict and prepare for.

Flooding Effects. Both coastal and non-coastal flooding is likely to be a temporary condition limited by high tide cycles and storm events. The flooding is likely to be shallow – on the order of 2 feet or less except at the center of the golf course. Flooding of buildings, yards and streets can cause loss of use and damage of contents of residences, commercial establishments, schools, and other buildings. The floodwaters can damage underground utility boxes, prevent emergency circulation if streets are blocked, and release of hazardous

material leachates. Recovery may include removal of water, mud and debris; removal of moldy building material; repair of salt water damage to electrical and telecom facilities; and replacement of goods and furniture stored in low-lying areas.

High winds associated with storms can damage or knock down trees onto streets, power lines or buildings. Storms combined with high tides can also cause coastal erosion, beach loss, habitat loss, shoreline street damage, shoreline trail damage, and marina damage.

Non-Pertinent Flood Issues. Alameda does not have any creeks or hills, so creek flooding and landslides due to saturated soils are not issues here. The winds are strong enough to topple trees, but not strong enough or with enough shear to cause the kind of building damage found in tornado or hurricane country. The city has not experienced the massive waves that are generated by storms in unprotected coastal areas, hail large enough to damage cars, or fire-starting lightning strikes. But all such events in the region could affect Alameda indirectly by limiting goods, services, transportation, and employment.

Climate Adaptation and Flooding: Storm related hazards will occur more frequently and more extensively in the future due to climate change, which contributes to both sea level rise and more intense storms. A home located in a currently predicted 100 year flood level would have a 1% annual likelihood of being flooded in any one year. As the sea levels rise, the normal high tide will rise, so that smaller and smaller high tides and storms will have the same flooding capabilities. **Table 4** shows this relationship. It is based on Mean Higher High Water (MHHW), the average of all the current higher high tides of the year. It does *not* include additional temporary sea level rise possible during storms, which is why the predicted values are slightly lower than FEMA's. For Alameda, the MHHW is about 6.4'. We usually get at least one king tide per year that is a foot higher or about 7.4'. We have a 1% annual chance of getting a very strong king tide of 9.4'. But by mid-century, we are likely to see sea levels of 9.4' once every 5 years (20% chance per year). By the end of the century, the new normal would be a MHHW of 9.4', with yearly king tides of 10.4', and an annual 1% chance of seeing a 12.8' tide.

The predictions in Table 4 are based upon a 36 inch sea level rise by the end of the century. The Coastal and Ocean Working group of the Californian Climate Action Team issued a Sea Level Rise Guidance Document in March 2013 stating that the best science-based sea level rise projections for California are for 5 to 24 inches by mid-century and 17 to 66 inches by the end of the century. Table 4 uses a conservative estimate of 36 inches by 2100. **Appendix D** shows NOAA predicted coastal flooding with 36 and 60 inch SLR. Their 36 inch SLR prediction is comparable to the 500 year flood plain shown on the FEMA maps, and covers extensive portions of Alameda Point, Bay Farm Island, South Shore, and the east end of Alameda Island.

Table 4. Combination of Sea Level Rise and Extreme Tides (ABAG Risk Landscape 2015)

Time Frame	Sea Level Rise	Total water level above today's daily high tide, MHHW (inches NAVD88), by tide recurrence interval							
		MHHW (≈ daily high tide)	1-yr (≈ King Tide)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr (1% annual chance)
Today		0	12	19	23	27	32	36	41
	+6	6	18	25	29	33	38	42	47
Likely Mid-Century	+12	12	24	31	35	39	44		53
	+18	18	30	37	41	45	50	54	59
	+24	24	36	43	47	51	56	60	65
	+30	30	42	49	53	57	62	66	71
Likely End-Century	+36	36	48	55	59	63	68	72	77
	+42	42	54	61	65	69	74	78	83
	+48	48	60	67	71	75	80	84	89

More violent storms than those currently predicted by FEMA are likely to occur as the climate changes. The more violent storms are likely to have more intense rainfall, more wind-driven waves and more storm set-up. More intense storms will be more likely to overtax the storm drain system, which would increase the likelihood of non-coastal flooding and damage if catch basins and pipes are not sized adequately to carry off the storm flow. The City looked at the predicted functionality of the system after an 18 inch SLR, and after a 55 inch SLR, using current intensity 25 year storms. The 18 inch SLR had little effect on the system, but the 55 inch SLR presents major flooding difficulties if the system is not upsized to handle the increased inefficiency of the pipes to handle flows during high tides. Renovation will have to include new pump stations in addition to the 10 that the city already has. Rising sea levels will also result in rising groundwater levels, which can flood underground utility vaults and basements.

2.2.2.1 Tsunamis

Large underwater displacements from major earthquake fault ruptures or underwater landslides can lead to ocean waves called tsunamis. Tsunamis can result from off-shore earthquakes within the Bay Area, or from distant events. While it is most common for tsunamis to be generated by subduction faults such as those in Washington and Alaska, local tsunamis can be generated from strike-slip faults. The Bay Area faults that pass through portions of the Pacific coastline or under portions of the Bay are not likely to produce significant tsunamis because they move side to side, rather than up and down, which is the displacement needed to create significant tsunamis. They may have slight vertical displacements, or could cause small underwater landslides, but overall there is a minimal risk of any significant tsunami occurring in the Bay Area from a local fault. The greatest risk to the Bay Area is from tsunamis generated by earthquakes elsewhere in the Pacific.

Over 70 tsunamis have been observed or recorded within the San Francisco Bay in the past 200 years with two recorded in the vicinity of Alameda before 1946. One of questionable record was in 1868 with a latitude and longitude in the Bay near Oakland Airport, listed as 4.5 feet, plus a sighting of unknown height at Government (Coast Guard) Island. Another was recorded in 1898 in Oakland at 0.31 feet.

Since 1946, when record keeping increased, there have been 30 tsunamis within the San Francisco Bay, and of those, about half have been recorded in Alameda or Oakland. Recorded heights at Alameda and Oakland have ranged from 0.02 feet to 1.22 feet. Most records are under 3 inches. There are no reported inundation run-ups within the Bay. There have been two tsunamis in this time period that have caused damage within the San Francisco Bay, including the 1964 Alaskan event (M9.1) which caused widespread damage to the West Coast, including $2.2M in recorded damage and water heights up to 1.52 feet in the San Francisco Bay Area and Half Moon Bay and one death in Bolinas.

The other major earthquake was the 2011 Tohoku (Japan) event (M8.9) which caused $125,000 damage at the Berkeley Marina and had water heights up to 1.50 feet. This latter tsunami caused at least $48M statewide, but resulted in only a non-destructive 6 inch wave along the shoreline of Alameda. **Appendix E** contains a detailed list of all tsunamis that have been measured in Alameda or Oakland, along with measurements taken elsewhere in the Bay Area.

Recent studies of Tsunami conducted by the United States Geologic Survey (USGS) Science Applications for Risk Reduction (SAFRR) also examine paleo Tsunami. This study looks back in geological time by using core sampling and other means to identify Tsunami events before record keeping. Although there has not been an impact or any major devastation from Tsunami in more than 100 years, geologic study suggest that worst case Tsunamis have impacted the San Francisco Bay Area in the past and are likely to happen again.

Tsunami planning is currently being done with assistance from the California Geological Survey, California Governor's Office of Emergency Services (CalOES) and the National

Oceanic and Atmospheric Administration (NOAA) and is funded by the National Tsunami Hazard Mitigation Program.

Studies which modeled the effects of hypothetical Tsunami scenarios entering the San Francisco Bay Area shows that the City of Alameda is susceptible to Tsunami inundation to varying degrees based on the location and strength of an earthquake.

The SAFRR tsunami scenarios depicts a hypothetical but plausible tsunami created by an earthquake offshore from the Alaska Peninsula, Aleutian island chain and other location around the pacific rim and its impacts on the California coast and the San Francisco Bay Area. The study presents evidence for past tsunamis, the scientific basis for the source, likely inundation areas, current velocities in key ports and harbors, physical damage and repair costs, economic consequences, environmental and ecological impacts, social vulnerability, emergency management and evacuation challenges, and policy implications for California associated with this hypothetical tsunami. The study assists those who will need to make rapid decisions during tsunami events. The results of the tsunami scenario will help managers understand the context and consequences of their decisions and how they may improve preparedness and response. **Figure 10** contains information regarding the inundations depth in feet, based on Tsunami scenarios from local and distant sources.

Modeled Tsunami Scenarios: Because very large tsunamis are infrequent and the likelihood that the largest potential tsunamis have not yet occurred in Alameda County, the state tsunami program developed a suite of maximum credible tsunami scenarios as part of their tsunami inundation mapping project for local evacuation planning. The general tsunami wave height for key locations from these scenarios are provided below. As identified in the historical tsunami table, the largest tsunamis could occur from large earthquakes in the Alaska-Aleutian Islands region, or from a local fault or landslide offshore.

Tsunami Source Scenario Model Results for the San Francisco Bay Area

Near shore tsunami heights (flow depths) for both local and distant source scenarios, in FEET above Mean Sea Level. NOTE: The projections do not include any adjustments for ambient conditions, such as storm surge and tidal fluctuations, and model error (it is very important to note this difference, as those numbers can increase the projected water height during an event).

	TSUNAMI SOURCES	Approximate Travel Time	Pacifica	Ocean Beach	Black Point Aquatic Park	Candle-stick Park	Alcatraz Island	Treasure Island	Yerba Buena Island	Redwood City	Alameda	Richmond	Mare Island	Saucilito	Bolinas
Local Sources	M7.3 Point Reyes Thrust Fault	10-15min	7	6	4	3	4	3	3	4	4	4	3	6	8
	M6.6 Rodgers Creek-Hayward Fault	10-15min	2	2	2	2	2	2	2		3	3	3	3	
	M7.1 San Gregorio Fault	10-15min	4	4	3	3	3	3	3		4	3	3	3	
Distant Sources	M9 Cascadia-full rupture	1hr	4	5	3	3	3	4	3		4	3	3	4	4
	M9.2 Alaska 1964 EQ	5hr	13	12	7	4	6	5	6		9	7	3	8	10
	M8.9 Central Aleutians I	5hr	9	11	6	4	6	5	4	4	9	7	3	7	7
	M8.9 Central Aleutians II	5hr	5	6	5	3	5	4	4		5	4	3	5	7
	M9.2 Central Aleutians III	5hr	18	22	11	6	10	8	7	5	16	10	4	10	19
	M8.8 Kuril Islands II	9hr	3	3	3	3	3	3	2		5	3	3	4	3
	M8.8 Kuril Islands III	9hr	4	4	3	3	3	3	3		4	3	3	4	5
	M8.8 Kuril Islands IV	9hr	5	5	3	3	3	3	3		4	3	3	4	5
	M8.8 Japan II	10hr	5	5	4	3	3	3	3		6	3	3	3	4
	M8.6 Marianas Trench	11hr	3	3	3	3	3	3	3	4	3	3	3	6	3
	M9.5 Chile 1960 EQ	13hr	5	6	3	3	3	3	3		5	4	3	5	5
	M9.4 Chile North	13hr	4	5	4	3	4	4	4		6	3	3	4	5
	Maximum Runup - Local Source		8	6	3	3	4	4	4	4	5	4	3	7	9
	Maximum Runup - Distant Source		20	24	12	6	12	10	9	6	18	10	4	11	22

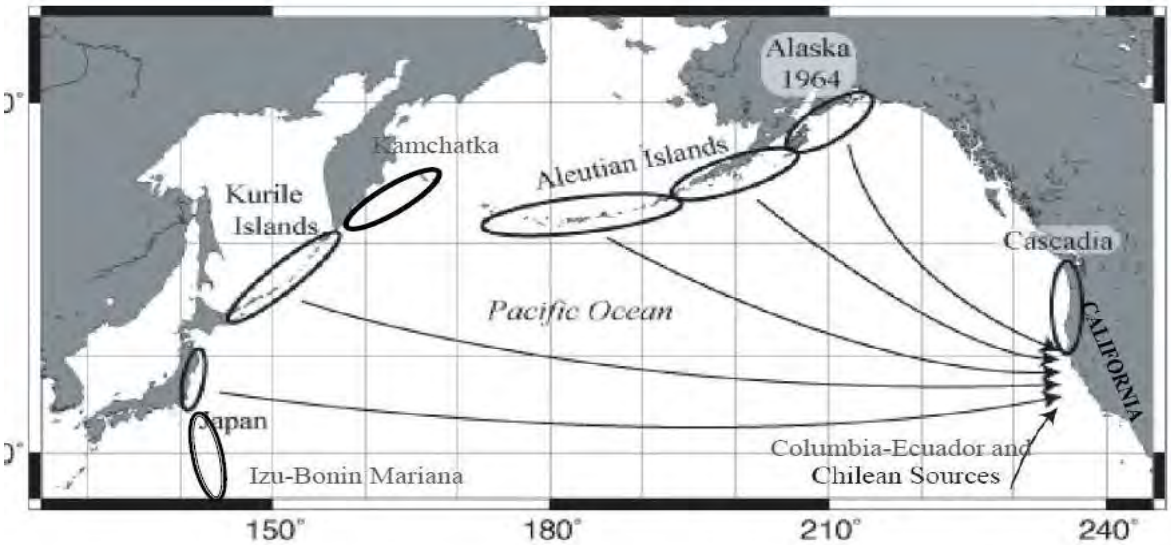


Figure 10. Inundation Depths in Feet based on Tsunami Scenarios from Local and Distant Sources

A response "Playbook" has been developed to assist the City of Alameda emergency management staff in making critical decisions about evacuation notification. Evacuation areas are based on expected run up, plus a margin of error, for a Tsunami generated from local or distant earth quake events.

There are four phases of evacuation scenarios in the "Playbook", with Phase One being evacuation of the shoreline and harbor's and the Maximum Evacuation Phase, which effects large areas of the City. **Figure 11** shows a map presentation of the four phases and they are described below.

Phase 1 evacuates beaches, harbor docks/piers and boats. Strong currents and potential scour maybe is expected in harbors. Mitigation actions include encouraging the maritime community to improve the harbors to mitigate the risk of damage due to the threat of Tsunami and make use of the Maritime Response Playbook Guidance documents.

Phase 2 evacuates areas outlined in red on the map. The zones of inundation shown are similar to that of flooding caused by storms plus king tides and therefore mitigation actions to decrease flooding damage will also address tsunami inundation.

Phase 3 evacuates areas outlined in red on the map. Mitigation actions include public education, utilizing the mass notification system and working closely with the media to alert the public. Inundation of this magnitude is generally precipitated by an earth quake occurring in the Alaskan-Aleutian subduction zone.

Maximum Phase evacuates areas are outlined in red on the map. Mitigation actions include public education, utilizing the mass notification system and working closely with the media

to alert the public. Inundation of this magnitude is generally precipitated by an earth quake occurring in the Alaskan-Aleutian subduction zone.

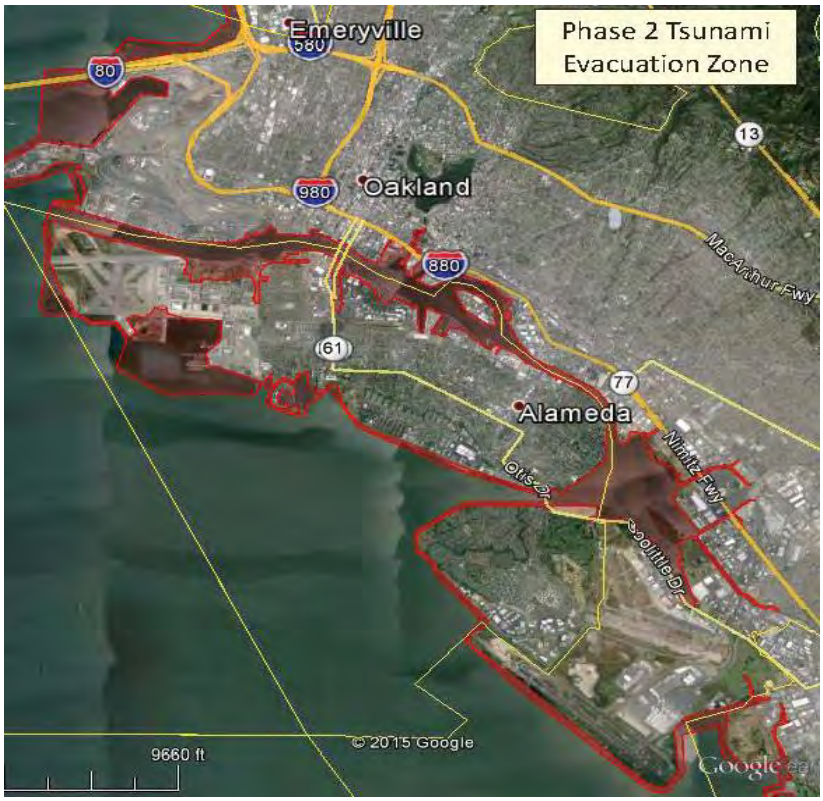


Figure 11. Tsunami Evacuation Zones

New evacuation planning maps and "playbooks" produced for Alameda in 2015 show worse case scenarios in evacuation Phase 3 and Maximum Evacuation Phase. Mitigation actions will include Tsunami inundation hazard zones, evacuation route sign placement, public education about the risk of tsunami on land and to the many boat harbor's in Alameda, encouraging citizens to listen for news of tsunamis when they hear about or feel earthquakes, and refinement of the citizen alert system to reach more people.

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3. EXPOSURE AND VULNERABILITY

3.1 The History of Alameda

The City of Alameda, located 7 miles east of San Francisco and just west of Oakland, is made up of Alameda Island and Bay Farm Island. The City includes 22.7 square miles of land. Alameda in its natural state was a peninsula covered by a dense forest of coastal live oak. Prior to the arrival of the Spanish and Mexicans it was inhabited by Coastal Miwoks who sustained themselves through hunting, fishing and gathering. Settlement by non-natives began in 1776 after Luis Peralta divided part of his large East Bay land grant, the Rancho San Antonio, among his four sons. Alameda derived its original name, "the Encinal," from the large stands of native oaks ("Encino" means "oak" in Spanish) on the Main Island. The name "Alameda," meaning "grove of poplar trees," was given to the City as a poetic gesture upon popular vote in 1853.

In 1849, the California Gold Rush brought Americans and Northern Europeans to San Francisco Bay. Many made their fortunes in supplying goods and services to the region's burgeoning population. Among these were two young entrepreneurs, William Worthington Chipman and Gideon Aughinbaugh, who purchased the Encinal from Antonio Maria Peralta for $14,000 in 1851, the year after California became a state. They subdivided the land and sold tracts for residences and orchards. By 1872, three separate settlements, the Town of Alameda, Encinal and adjacent lands, and Woodstock, were established in the east, central and western sections of the peninsula. The Town of Alameda was granted a charter by the State Legislature in 1854; incorporation of all peninsula settlements under one local government occurred in 1872.

Early growth of residential, commercial and industrial areas depended upon water and rail transportation, and an excellent climate. The City's industrial waterfront and small commercial districts ("the stations") developed in conjunction with rail improvements, while neighborhoods of Victorian homes were built, and beach resorts attracted tens of thousands of weekend visitors. In 1902, the Tidal Canal was completed and Alameda became an island. Major shipyards and Neptune Beach (the "Coney Island of the West") were established along the northern and southern shores to take advantage of the island's assets.

The decades between 1920 and 1970 witnessed cycles of boom and bust. Following an enlightened era of civic building during the 1920s, Alameda endured difficult years of political scandal and corruption through the 1930s. The entry of the United States into World War II focused the City's attention on the war effort. During World War II, shifts ran around the clock at the Naval Air Station (commissioned in 1940) and in the City's shipyards, and the City's population reached an all-time high of 89,000.

By 1973 concern about replacement of Victorian homes by boxy apartment buildings and the prospect of all-apartment development on Bay Farm Island led to passage of initiative Measure A, which prohibits residential structures having more than two units. Despite this restriction, an average of 300 homes per year were built between 1970 and 1990, mainly on Bay Farm Island. Bay Area growth pressure has facilitated redevelopment of unused shipyards on the Northern Waterfront as business park, homes, and marinas.

The City is currently redeveloping the former Alameda Naval Air Station into mixed use residential, commercial, and industrial use called Alameda Point. Master planning and environmental documents that were developed in 2014 envision a cumulative build out by 2035 of 1,425 housing units and 5.5 million square feet of office, retail and manufacturing, with a significant portion of the buildout during the first 10 years (by 2025). (Source, Alameda Point Transportation Demand Management Plan, 2014)

3.2 The People of Alameda

According to the 2010 Census, Alameda's population was 73,812. Alameda has lost population since a peak of 79,297 in 1994, due to the closing of the Alameda Naval Air Station (NAS) and the Fleet Industrial Supply Center (FISC). However, the City has seen slight growth (2.1 percent) since 2000. This is partly due to residential growth in the former military installations, as well as in the formerly industrial Northern Waterfront; this growth is expected to continue in the coming decade.

ABAG projects the City's population will grow by a moderate 8.8 percent between 2010 and 2020. **Table 5** shows population for the City of Alameda and Alameda County for 1994, 2000, and 2020 projections.

Table 5. City of Alameda Population Projections, 1994–2020

Year	Alameda	Alameda County
1994 (year of peak Alameda population)	79,297	1,338,421
2000	72,259	1,443,741
2010	73,812	1,510,271
2020 ABAG Projections	80,300	1,654,200
Change 1994-2010	-5,485	171,850
Percent Change	-6.9%	12.8%

Change 2010-2020	6,488	143,929
Percent Change	8.8%	9.5%

Source: 2013 ABAG Projections

Alameda's projected population increase will result largely from residential development in industrial areas and former military installations, in areas that are susceptible to liquefaction and/or coastal flooding. New housing development is planned at Alameda Point and Alameda Landing, and along the Northern Waterfront. Both of these areas are Priority Development Areas (PDA). The ratio of persons per household will not play a significant role in population growth because, according to ABAG projections, the ratio is not expected to change significantly over the next two decades. The 2007–2011 ACS indicated that Alameda had 2.48 persons per household, a slight increase in size compared to previous decades. All new infrastructure in these areas are built to modern day standards. A Master Infrastructure Plan was done for Alameda Pont in December, 2014. The Plan address flood protection and site grading with extensive consideration given to projected sea level rise.

Age Characteristics. Alameda did not experience any significant change in its age structure over the last decade – see **Table 6**. As with many communities in the county and across the nation, there has been an increase in the percentage of citizens over the age of 55. However, this increase has been very slight in Alameda, with the population in the 55-64 age group growing by 5 percent and the over 65 age group staying at a roughly equal share of the population between 2000 and 2010. The number of children under the age of 15 remains under 18 percent.

According to the 2010 Census data, Alameda's age breakdown is roughly comparable to Alameda County as a whole. Alameda had a slightly lower percentage of children under 15, and a slightly higher percentage of people 55 or older. Table A-3 shows the age characteristics for the City of Alameda as well as for the County.

Table 6. Population Age Distribution, 1990–2010

Age Group	Alameda			Alameda County
	1990	**2000**	**2010**	**2010**
Under 15	17.3%	18.0%	17.1%	20.8%
15 – 19	5.1%	5.5%	5.7%	6.4%
20 – 34	31.4%	20.4%	18.3%	23.7%
35 – 54	27.3%	34.0%	31.7%	31.1%
55 – 64	7.2%	8.8%	13.8%	7.8%
65 +	11.7%	13.3%	13.5%	10.2%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Sources: 1990, 2000 and 2010 Census

Ethnicity. Alameda has a very diverse population. In fact, the city is moving closer to becoming a minority- majority population. A review of 2000 and 2010 data from the Census shows that the trend to greater diversity in the population in Alameda has continued over the last decade. The non- Hispanic white population declined 12 percent from 2000 to 2010. At the same time, the Asian population grew dramatically over the past decade. Asians and Pacific Islanders increased by 22 percent and the Hispanic population (of every race) grew by 20 percent.

Household Composition. According to the 2010 Census, the City of Alameda had 30,123 households, as shown in **Table 7**. Of those, 18,291 households (60.7 percent) were categorized as families and 11,832 (39.3 percent) were categorized as non-family households. Households categorized as "non-family" include single individuals and persons living with roommates.

Table 7. Household Composition in the City of Alameda, 2010

Household Description	Number	Percentage
Family households (families)	18,291	60.7%
Female head of household, no husband present	3,623	12.0%
with own children under 18	2,128	58.7%
Non-family households	11,832	39.3%
Householder living alone	9,347	31.0%
Householder not living alone	2,485	8.2%
Total of Households in Alameda	**30,123**	**--**

Source: 2010 Census

Income and Employment. For the purpose of evaluating housing affordability, housing need, and eligibility for housing assistance, income levels are defined by guidelines adopted each year by the California Department of Housing and Community Development (HCD).

According to the 2007–2011 ACS, in 2011, the median income for a household of four in Alameda was $75,832, which is significantly higher than both the county ($70,821) and the Bay Area as a whole ($61,632). As shown in **Table 8**, more than one-third of the households in Alameda are categorized as lower income.

Table 8. Households by Income Level, 2010

	Renter Occupied		Owner Occupied		Total	
Income Level	**No.**	**%**	**No.**	**%**	**No.**	**%**
Extremely Low Income <30% of AMI	14,945	100.0%	14,230	100.0%	29,180	100.0%
Very Low Income	3,050	20.4%	780	5.5%	3,830	13.1%

Income Level	Renter Occupied		Owner Occupied		Total	
	No.	%	No.	%	No.	%
≤50% of AMI						
Low Income 50 to 80% of AMI	1,910	12.8%	860	6.0%	2,770	9.5%
Moderate 81 to 100% of AMI	2,255	15.1%	1,450	10.2%	3,705	12.7%
Above Moderate 101%+ of AMI	1,525	10.2%	1,065	7.5%	2,590	8.9%

Source: CHAS 2006–2010 ACS

Extremely Low-Income Households. The US Department of Housing and Urban Development (HUD) 2010 Comprehensive Housing Affordability Strategy (CHAS) data set provides information on households by income group for the City of Alameda. According to the CHAS data, in 2010, approximately 3,830 households (13.1 percent of total households) in the City of Alameda were extremely low income. Of those households, 5.5 percent were owner-occupied and 20.4 percent were renter-occupied households (see Table 8 above).

Just as with population growth, employment history has been turbulent in Alameda over the past decades. **Table 9** shows current and projected jobs for Alameda and Alameda County. Jobs decreased in the 1990s as the result of the NAS and FISC closures and declined again between 2000 and 2010 as result of the nationwide economic recession. Job growth is expected to rise in the decades ahead in Alameda with the redevelopment of the former NAS and the Northern Waterfront. Currently, the largest private employers in Alameda are Abbott Diabetes Care, Alameda Hospital, Bay Ship and Yacht, Safeway Stores, VF Outdoors, and Wind River Systems. The largest public employers are the Alameda Unified School District, City of Alameda, and College of Alameda (part of the Peralta Community College District). The most common businesses are restaurants, grocery/drug stores, apparel and footwear, home furnishings, and home improvement/remodeling.

Table 9. Historic and Projected Employment, 1990–2030

Year	Alameda		Alameda County	
	Total Employment	% Change	Total Employment	% Change
1990	38,730	--	644,100	--
2000	27,380	-17.3%	750,160	16.3%
2010	24,070	-12.1%	694,460	-7.4%
2020	28,770	19.5%	826,790	19.1%
2030	30,590	6.3%	875,390	5.9%

Source: ABAG Projections 2013

The City continues to grow, as industrial and former military lands are turned into residential housing, and as densities increase in already built out area. Rents and housing prices continue to rise as tech workers from Silicon Valley, San Francisco, and the San Mateo Peninsula are priced out of the housing markets there. The short-term effect is the decreased resiliency of residents who must spend more of their disposable income on housing, and less on disaster preparation and recovery. The likely long-term effects will be a shift to a more affluent population, and the loss of retirees, people with disabilities, families with young children, and other vulnerable populations.

3.3 Alameda's Building Inventory

Certain types of buildings are more susceptible to the shaking and ground disturbances of earthquakes. Soft story buildings, with a "softer" or more flexible first floor, compared to the more rigid second floor. These two stories flex differently during violent ground shaking, resulting in damage to the building and sometimes collapse. Soft stories are commonly found with businesses that have large expanses of glass on the first floor storefront, and a more traditional structure on the second story. Another common soft story is the apartment or business building with ground level parking (just pillars and open spaces) and traditional structures above. Similar to the soft story is the "cripple wall" or half-height wall often found in Victorian-era houses. These also tend to be damaged during violent ground shaking because the half-height walls react differently to the shaking than the more flexible house above. Houses that are not bolted to their foundations are vulnerable to violent shaking. They can become momentarily airborne as the ground shakes under them, not always landing back on their foundations. Depending on the severity of the earthquake, damage to these kinds of buildings can range from minor facade and glass damage to total loss.

Other types of vulnerable buildings are those with unreinforced masonry or tilt-up construction. Depending on the severity of the earthquake, these buildings can partly or completely collapse. Fortunately, all of the City's unreinforced masonry buildings have been retrofitted at this time. Older houses, especially Victorian-era houses, were built without fire blocking, which means that fire can easily spread up walls and through ceilings to other parts of the house. These houses are very vulnerable to fire.

Newer multistory buildings are built to withstand most shaking, or to at least remain standing and protective of the people inside. The good news is that most of Alameda's building stock is one- and two-story, newer wooden buildings, which are very good at withstanding violent earth shaking with no more than cosmetic damage.

Buildings subject to violent shaking can also dislodge asbestos or encapsulated (abated) asbestos, lead paint, and other hazardous materials. Broken plumbing can discharge sewage. Broken gas lines and damaged electrical wiring can spark fires and present health and safety hazards. Other hazards from shaking buildings include falling piping, shelving, and goods.

As discussed in the California Multi-Hazard Mitigation Plan, non-ductile concrete buildings are vulnerable buildings. These are concrete structures, built before 1980 standards, which are more likely to collapse in an earthquake. The City had a survey done of these buildings in 2009 by volunteers. The objective of the survey was to get a total number of these buildings not a definitive inventory like the City has for soft story buildings. The survey was based external observations made by volunteers and therefore is not definitive. However, based on the work performed it is estimated that the City has between 140 and 160 non-ductile concrete buildings.

All buildings are vulnerable to flooding, especially if they are slab-on-grade or have basements. Damage consists of direct damage by water and later damage by mold. If the flooding is relatively shallow, then carpet, sheetrock and paneling can be removed and replaced and mold abated. The building can be returned to its former level of service.

All building contents are vulnerable to flooding and violent earth shaking. More importantly, many buildings lose function temporarily until they are deemed safe or are rebuilt. Depending upon the building, this loss of service may include emergency services, sheltering and gathering, commerce, education, medical care, daycare, elder care, government, and recreation. Short term and long term recovery of the City depends upon quick restoration of these services.

The vulnerability of City buildings is examined in detail in **Appendix F** and summarized below. Some of the City's most important buildings are vulnerable to earthquake shaking because they were constructed with the building standards that pre-dated current knowledge about earthquake dynamics. The City Hall, for example, completed in 1896, lost its central bell tower during the 1906 San Francisco Earthquake. The tower was never re-built. Since then, most of the City buildings have been seismically retrofit, or have been constructed to more modern standards. Of particular concern are the 1940s era residences and hangers on Alameda Point, the former Alameda Naval Air Station, that would be subject to earthquake shaking, liquefaction, ground settlement, and flooding. The Alameda Point Master Infrastructure Plan addresses areas of redevelopment, where buildings will be constructed to modern day seismic standards and reuse areas where retrofit work may be needed.

All City-owned buildings and the facility type are listed in **Appendix F.**

The City houses a number of facilities belonging to other governmental agencies and school districts. These include buildings of the Alameda Housing Authority, Alameda Unified School District, Peralta Community College District, Alameda County, East Bay Regional Park District, the State of California, and the U.S. Government. These buildings serve vulnerable populations including children and people with low incomes. These buildings are also included in **Appendix F**. The City will share the final version of this Local Hazard Mitigation Plan with these outside agencies and collaborate on implementation of mitigation efforts.

The City is home to a number of facilities that serve and/or house vulnerable populations,

such as day cares, elder cares, medical offices and clinics, a hospital, private schools, and others. The location of these facilities can change from year to year, thereby making targeted building mitigation efforts challenging. The City does maintain a listing of current locations as this is critical information for effective disaster response.

3.4 Utility Inventory

The broad types of utilities in the City are overhead (power, telecom), underground-dry (power, telecom, gas), underground-wet (water, sanitary sewer, storm drain), and utility buildings (substations, telecom switching, pump stations). In addition there is solid waste handling (trash pickup and landfills), and there are abandoned fuel pipelines on Alameda Point. The City owns and maintains the sanitary sewer collection system (excluding the interceptor pipes that convey flow to the regional treatment plant), storm and electrical infrastructure. The City also is responsible for the Doolittle Landfill. Potable water and natural gas are provided by the East Bay Municipal Utility District (EBMUD) and Pacific Gas and Electric (PG&E), respectively.

EBMUD provides high-quality drinking water for 1.3 million customers in Alameda and Contra Costa counties. EBMUD also owns and operates an award-winning wastewater treatment plant that serves 650,000 customers in the San Francisco Bay, including Alameda residents.

PG&E provides natural gas to Alameda residents; Alameda Municipal Power provides electricity. PG&E has a staff of 20,000 prepared to respond to restore service after disasters and storms. They also have a well-established priority system for restoring power to emergency services before other community needs.

Natural gas infrastructure is subject to damage and disruption in areas with soil failure, for example landslide and liquefaction. Broken lines can create fires if ignited until the fuel supply is exhausted. The repair of damaged underground lines will take time. Following the Loma Prieta earthquake it took about 30 days to repair damaged lines in the San Francisco Marina.

The large scale natural gas transmission lines that service the cities along the East Bay shoreline of Alameda County are primarily located near the bay shore. The transmission line does not run through the City of Alameda but instead runs along a single corridor through Albany, Berkeley, Emeryville before splitting into two parallel lines in Oakland that run through Oakland, San Leandro and Hayward. Across the entirety of the natural gas line between Albany and Hayward the natural gas transmission line(s) pass through medium-level susceptibility zones with some lines passing through very high liquefaction susceptibly zones in East Oakland and San Leandro. The thousands of miles of natural gas distribution lines are also at risk to damage from liquefaction. Neighborhoods that experience significant liquefaction are not likely to have gas service for a significant amount of time.

EBMUD is internationally recognized for its proactive seismic improvements of facilities

in its service area, as well as strengthening vulnerable portions of aqueducts, dams and Sierra reservoirs. The District also works closely with other agencies on emergency responses planning and hazard mitigation.

City-owned sewer, storm and electrical utilities are summarized in **Table 10** and examined in detail in **Appendix G**.

Table 10. City-Owned Sewer, Storm and Electrical Utilities

Utility	Amount
Sewer Mains	142 miles
Sewer Manholes	3,122 each
Sewer Pump Stations	42 each
Storm Pipes and Cross Culverts	90 miles
Storm Manholes	2,058 each
Storm Pump Stations	11 each
Other Storm Structures (ex. Catchbasins, outlets)	401 each
Storm Outfalls	227 each
Alameda Municipal Power Overhead	86.1 pole miles
Alameda Municipal Underground	176.4 circuit miles

The sewer, storm and electrical systems are vulnerable to a variety of hazards. In storm events downed trees can damage overhead lines and flooding can impact pump station function. In earthquakes electrical substation and pump station components can be destroyed by strong shaking, often requiring more extensive and time intensive repairs to return service. Underground pipes can shear, crack or reverse grade. Alameda Municipal Power recognizes that large earthquakes may damage key facilities and that electric power might be lost for limited periods of time. The potential for a loss of power means that emergency and critical uses should have dedicated emergency power sources.

3.5 Alameda's Transportation Inventory

Transportation in Alameda is via streets, pathways, bridges, tubes, overpass, marinas, docks and waterways, using private vehicles, trucks, bicycles, buses, paratransit, ferries, private boats, and travel by foot. Alameda depends upon neighboring Oakland for air, light rail, heavy rail, ferry, shipping and freeway transportation of people and goods. These modes of transportation are examined in detail in **Appendix H** and summarized below. During and right after the disaster, transportation facilities serve vital functions of providing access for emergency vehicles, Public Works and utility repair teams, evacuation, distribution of food and supplies, and movement to shelters. For long term recovery, transportation corridors are needed to facilitate removal of debris, delivery of repair materials, and restoration of normal commuting and daily activities. Fuel is a vital part of the transportation system. Power and telecom are needed for full restoration of traffic signal and SMART technology functions. **Table 11** summarizes street ownership/responsibility

within City limits. In addition to the City and State maintained streets in Table 11, the City maintains and is responsible for two bridges and 87 signalized intersections. Caltrans is responsible for and has jurisdiction of one vehicle bridge, one vehicle overpass, one bike bridge and two under-estuary tubes. The County of Alameda is responsible for three bridges and the Army Corps of Engineers is responsible for one non-operational railroad bridge. The Water Emergency Transportation Authority (WETA) manages two ferry docks, one on the main island and the other on Bay Farm Island.

Table 11. Street Inventory

Street Owned By:	Mileage
City	121.6 Local Classification 32.8 Arterial Classification
Caltrans	5.9 miles
Private & Federal	29.5 miles
Total:	189.8 miles

3.6 Alameda's Park and Open Space Inventory

While open spaces may not be required during or immediately after a disaster, quick recovery of these facilities is necessary for the full recovery of the City. Restoration of open spaces is also needed for the recovery of the wild animals and plants that call Alameda home. These open spaces include City and Regional parks and playgrounds, school playgrounds, the golf course, parking lots, landfills, shore protection (riprap), lagoons, street landscaping, the runways and open spaces on Alameda Point, bluffs, marshes, and beaches. City owned park facilities are examined in **Appendix F**.

3.7 The Hazard, Risk, Exposure, and Vulnerability Nexus

The four topics of hazard characterization, hazard risk, hazard exposure, and vulnerability of assets can be combined to determine where the highest potential for damage lies. This damage may include loss of life, injury, deprivation, economic loss, asset damage, loss of services, and impediments to short and long term recovery. Those with the highest scores are summarized below. Mitigation efforts suggested in the following section focus on these higher needs.

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4. MITIGATION PLAN

4.1 Vision Statement and Mitigation Goals

The City of Alameda aspires towards resiliency through the continual implementation of mitigation actions that reduce the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters. A resilient City is reliant on functional infrastructure systems, buildings, and programs to keep key societal services operational to help damaged areas rebuild, to keep undamaged homes habitable, and businesses open during recovery.

Actions in this mitigation strategy are a result of a collaborative planning process among City departments, institutional partners and the general public. The first step in designing the mitigation strategy was the establishment of a vision statement that represents the overall intended outcome of the City's Local Hazard Mitigation Plan. The Plan's vision statement is as follows:

MITIGATION VISION STATEMENT

The City of Alameda will be better prepared for future hazards by having reduced exposure and reduced short and long-term loss due to hazards.

In addition to the vision statement, nine mitigation goals were identified. The mitigation goals are broad statements that are achieved through implementation of the more specific mitigation actions. The mitigation goals are as follows:

MITIGATION GOALS

1. ***Reduction of hazard exposure where possible.***
2. ***Protection of the health, safety and welfare of City of Alameda residents, workers and visitors.***
3. ***Minimal damage of public and private property.***
4. ***Minimal damage of the natural environment.***
5. ***Minimal disruption of essential services, facilities, and infrastructure.***
6. ***Timely and complete recoveries.***
7. ***Increased understanding and awareness of hazards and hazard mitigation by City employees and the public.***
8. ***Participation in mitigation and resiliency by all stakeholders, as appropriate.***

4.2 Mitigation Plan Development

The second step in developing the mitigation strategy identified, considered, and analyzed available mitigation measures to achieve the goals. Mitigation strategies include those that were in the previous LHMP, suggestions from the State of California Hazard Mitigation Plan, Association of Bay Area Governments recommendations, public input, staff input, board and commission input, and other sources. Alternative mitigation

measures will continue to be considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as the Plan is maintained over time.

4.3 Prioritization of Mitigation Strategies

The third and final step selected and prioritized the specific mitigation actions. The mitigation actions represent an unambiguous and functional plan for action and are considered to be the most essential outcome of the mitigation planning process.

In general, all mitigation strategies considered by the Planning Team can be classified under one of the following seven broad categories

- Long Range Planning (for example: master plans, climate action plans)
- Land Use Planning (ex: general plan, specific plan)
- Capital Planning (ex: capital improvement plan)
- Operations (ex: annual budgeting)
- Emergency and Hazard Planning (ex: emergency operations)
- Project Planning and Design (ex: private and public development projects)
- New Initiatives (ex: legislation, ballot measure)

The City incorporated six key factors in the prioritization of mitigation actions. These criteria are described below:

- **Support of goals and objectives**
  Actions that support multiple goals and objectives are prioritized.
- **Funding availability**
  Actions with secured funding are prioritized.
- **Hazards addressed**
  Actions addressing the Plan's hazards of greatest concern (earthquake and flooding) are prioritized.
- **Public and political support**
  Actions with public and political support are prioritized.
- **Adverse environmental impact**
  Actions with low environmental impact are prioritized.
- **Environmental benefit**
  Actions that provide an environmental benefit are prioritized.
- **Timeline for completion**
  Actions that are ongoing, or that can be completed in the short-term, are prioritized.
  - Ongoing: Currently being funded and implemented under existing programs
  - Short-term: To be completed in 1-5 years
  - Long-term: To be completed in more than 5 years

4.4 Assignment of Mitigation Strategies

Each mitigation strategy has a mitigation action plan presented in table format. Every proposed action is assigned to a specific local department or agency in order to assign responsibility and accountability and increase the likelihood of subsequent implementation. In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date or window has been assigned to each mitigation action to help assess whether actions are being implemented in a timely fashion. Resource availability will strongly influence the pace of achievements for those actions noted as currently unfunded.

The City Manager's Office will remain charged with ensuring that the goals and strategies of the City's Local Hazard Mitigation Plan remain relevant and practical. The Assistant City Manager (currently, Robert Haun) will request annual status reports from each Responsible Department/Agency listed for each Mitigation Strategy Table 12. A review will be performed to determine if each strategy on track to be me its objective within the stated timeline. Needed corrective actions, if any, will be made in writing and kept on file for each strategy. These will be used for subsequent assessments and included in future Plan updates. A complete review and update of the Plan, including the hazard analysis and mitigation strategy, is performed once every five years. The plan review provides community officials, school groups, community groups, CERT, and the public with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. Outreach will include public meetings, questionnaires and interactive websites. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned, and to consider new technologies and new funding sources.

4.5 Continued Public Involvement

Public participation is an integral component of the mitigation planning process and will continue to be essential as this Plan evolves and is updated over time. The most appropriate and meaningful opportunities for the general public to be involved in the maintenance and implementation of the Plan is during the five-year plan review process as described earlier in this section. As demonstrated in **Appendix A**, the City was diligent and successful in providing public involvement opportunities during this five-year plan review process through multiple methods. While the five- year plan review process represents the greatest opportunity for input on the Plan, the City intends to do hazard mitigation outreach and education during the interim periods, which may promote a more engaged citizenry for the five year update process.

4.6 Adoption and Integration with Other Planning Efforts

The final Local Hazard Mitigation Plan will be submitted to CalOES for review and ultimate approval by FEMA. Once FEMA issues the Approval Pending Adoption, the City will present the approved Plan to City Council for adoption by resolution.

Comprehensive Emergency Management Plan. The Local Hazard Mitigation Plan is a key component of the City's Comprehensive Emergency Management Plan (CEMP) of 2008. The CEMP defines and describes the fundamental systems, strategies, policies, assumptions, responsibilities, and operational priorities that the City of Alameda uses to guide and support emergency management efforts. The key mitigation effort of the CEMP is to have planning, strategies, personnel assignments, and training in place before a disaster strikes, so that the response and recovery can be effective and professional. The City's CEMP includes discussions of the National Incident Management System (NIMS) to establish the chain of command, the Standardized Emergency Management System (SEMS) to identify functions and responsibilities, Incident Command (IC), mutual aid, functioning of the Emergency Operations Center (EOC), and ongoing training. It is expected that this document will be updated soon to coincide with the opening of the new EOC. The rewrite will include an update of Chapter 13 of the CEMP, "Hazard Vulnerability Assessments/Risk Analyses", to conform to the more detailed information in this LHMP. The rewrite will also incorporate LHMP suggestions into all of the Annexes, especially Annex F – Hazard Mitigation Planning Guide.

Capital Improvement Program (CIP). The most recent CIP, for FY 15-17, is more streamlined. Instead of a large number of specific projects, the CIP has one budget for each of the main infrastructures, such as sanitary sewer piping, city buildings, street resurfacing, etc. Concurrently, the Public Works Department is developing short and long term master plans for each infrastructure, to best spend the limited dollars to address both new needs and the draw down of deferred maintenance. This more flexible budget also allows for re-prioritization as serious maintenance needs become apparent.

Master Plans. Master plans have been developed, or are in the final stages of development. All of these have been developed to best meet the needs of the users, within the projected CIP budget. Some address hazard mitigation, more specifically:

- **General Plan:** The City is updating various sections of the General Plan. The Health and Safety element will be updated following FEMA's approval of this plan so that the information is consistent between the two documents.
- **Local Action Plan for Climate Protection (2008)**: In July 2006, City Council adopted a resolution to join the Alameda County-Cities for Climate Protection Campaign. By doing so, the City pledged to take a leadership role in promoting public awareness about the causes and impacts of climate change by accomplishing five milestones that will reduce greenhouse gas and air pollution emissions throughout the community. The first milestone accomplished was the analysis of greenhouse gas emission to determine a baseline and forecast growth in emissions that would occur without preventive action. The second milestone accomplished was the setting of reduction targets to be achieved by the City for designated years. The third milestone was the drafting of this Local Action Plan that describes the policies, programs, and measures that Alameda can implement in order to meet the reduction targets. Milestones 5 and 6 are the implementation of monitoring of the specified programs and targeted reductions. Reduction of greenhouse gas emissions may influence the hazards presented by climate change.
- **City-Owned Buildings Facility Assessment**: The City completed a study on the

highest maintenance needs for existing city buildings. This included the immediate needs of code deficits, ADA issues, damage repair, normal wear and tear (paint, carpet, etc.) and deferred maintenance. The study did not include a seismic review of each building. This will be done in future revisions of the Plan. Other than the golf course buildings, no city buildings have been identified within the 100 year flood plain.

- **Storm Drain Master Plan** (Conveyance and Pump Stations): The City's recently completed master plans specifically address lack of capacity during 10-year and 25-year storms. While the plans were completed before the new preliminary FEMA floodplain maps were issued, they do address 18-inch and 55-inch sea level rise adaptations, which impact the same areas identified by FEMA as flood-prone.
- **Sewer Master Plan:** This plan updates all pump stations to meet current capacity and prioritizes rehabilitation of aging sewer pipe with more flexible material known to withstand seismic and flooding hazards.
- **Transportation Master Plans** (transportation plans addressing transit, bicycle, pedestrian, signals, goods movement, air quality, and other transportation needs): These plans encourage the flexibility of transportation by diversifying both routing and conveyance means. This will be useful during times when regular transportation is disrupted. These plans are updated on a five year cycle. The next updates will specifically plan for resiliency and recovery during and after hazard events.
- **Master Infrastructure Plan for Alameda Point**: This document established the requirements and standards for the backbone infrastructure to support re-development and reuse of Alameda Point (the old Navy Base). The infrastructure improvements will create a seismically stable site that can adapt to the potential impacts of climate change.
- **City of Alameda Underground Utility District (UUD) Policy**

Regional Plans. These plans were considered for consistency and collaboration during the writing of this LHMP:

- Alameda County Multi-Hazard Functional Plan
- Alameda County Emergency Medical Services Plan
- California Emergency Plan

Future Plans. Additional local planning efforts not yet consolidated into plans include efforts to make the city more resilient. As these plans take form, consistency with the LHMP will be considered.

- Sustainable Development
- Affordable Housing
- Waterway Restoration
- Historic Preservation
- Citizen Preparedness
- Program Accessibility
- Economic Growth
- Economic Diversification

The City Manager's Office will be responsible for maintaining this LHMP as a living document, which interacts with other City and Regional planning documents. As various City and regional plans are updated, they will be reviewed for adherence to this LHMP. The construction of new infrastructure or completion of mitigation programs, will be also be tracked for inclusion in the subsequent update of the Local Hazard Mitigation Plan.

4.7 Summary of Mitigation Strategies

Due to changes in priority from the City of Alameda's 2010 Annex to the Association of Bay Area Governments Local Hazard Mitigation Plan *Taming Natural Disasters*, as well completion of many of the mitigation projects included in that plan, an updated prioritization of mitigation strategies is included in **Table 12**. Completed mitigation efforts are stated in Section 4.7.1. Only one 2010 mitigation project was not complete and no longer planned for – this project is noted in Section 4.7.3.

4.7.1 MITIGATION STRATEGIES COMPLETED

The City and community members have worked together for years to address certain aspects of risk such as strengthening structures and utilities, bolstering pre and post disaster communication systems and hiring City staff tasked specifically with increasing disaster readiness in Alameda. Accomplishments include:

<u>I. Building and Facility Resiliency</u>

- Evaluation and retrofit of City buildings. The following were either built to acceptable seismic standards, or retrofitted: City Hall, Police Station, Fire Station 1, 2, and 4, Main Library, West End Library, Bay Farm Library, Alameda Municipal Power Headquarters, Maintenance Service Center, Central Garage at City Hall, Parking Structure on Central/Oak, Godfrey Park Rec Center, Leydecker Park Recreation Center, Tillman Park Recreation Center, Carnegie Library, Bay Fairview Hall, and the Chuck Corica Golf Course Buildings.
- Retrofit of 100% of Alameda's unreinforced masonry buildings. (Project 3 from City's 2010 LHMP)
- Continued use of the Soft-Story Ordinance (Project 1 from City's 2010 LHMP)
- Continued use of the Wood Frame Ordinance (Project 2 from City's 2010 LHMP)
- Alameda Housing Authority completed a structural evaluation of its senior and low income facilities and began implementation of the recommended projects (Project 11 from City's 2010 LHMP)

<u>II. Utility and Transportation Infrastructure Resiliency</u>

- Seismic upgrade of Ballena Bridge to Lifeline status
- Seismic evaluation of Grand Street Bridge (no upgrades needed)
- Repair of Veterans Wall and Walnut Street Retaining Wall
- 4X redundancy in emergency wi-fi communication systems
- Between 2010 and 2015, 10.3 miles of old clay sewer pipe was replaced with high-density plastic or PVC, materials demonstrated to better withstand shaking. (Project 4 from City's 2010 LHMP)

- Storm culvert replacement and condition assessment of storm pipes for master planning purposes (Project 4 from City's 2010 LHMP)

III. Networking, Planning, and Education

- Assignment of a full time Disaster Preparedness Coordinator
- Post Disaster Assessment Certification of all inspectors, code enforcement officers and planners.
- Important information may be broadcast via public access television, channel 15 and the low power city radio notification for system, 1280 AM.
- In June 2009, the City contracted with Code Red, a nationally recognized automated telephone and text message system that can notify affected portions of the community, or the entire community when emergency alerts or notifications are needed. Shared communication technology systems are outlets that enable multiple users to simultaneously share the communication channel. This may include email and other instant messaging technologies, groupware, forums, or other platforms. This technology facilitates local, cross-system coordination of on-going communication between critical entities during emergency events through a connected network of key partners, facilitating efficient response efforts. In 2014, the City replaced Code Red with Nixle 360, a system that uses the newest technology and performance capability to allow agencies the ability to simultaneously send thousands of voice messages to landlines and cell phones in specified geographic areas in a very short amount of time. The level of severity differs depending on what event is happening in the community. It's important for all agencies to communicate with as many people as possible, and Nixle 360 provides agencies with this opportunity. Nixle 360 allows residents and subscribers to receive real time informational bulletins from the Police Department, the Fire Department, Public Works, and Alameda Municipal Power. With this ability, notifications regarding public hazards, public safety, police actions, traffic collisions, missing persons, roadway closures/construction, and anything deemed important enough to warn the public may be sent out (Project 5 from City's 2010 LHMP)
- Mutual Aid Agreements and Compatibility with Fire and Police
- Participation in Interoperable Communications System

4.7.2 MITIGATION STRATEGIES SELECTED FOR IMPLEMENTATION OR CONTINUATION

Each mitigation strategy listed below is explained in greater detail in **Table 12** below.

I. Building and Facility Resiliency

A. Construction of New Emergency Operations Center and Fire Station #3 *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

B. Soft Story Buildings Program *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction*

C. Resilient City Buildings *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction*

D. National Flood Insurance Program *
Hazards Addressed: *Current and Future Flooding*

E. Community Rating System
Hazards Addressed: *Future Flooding*

F. Resilient Shoreline Facilities *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding*

G. Street Tree and Park Tree Trimming *
Hazards Addressed: *Other hazards*

II. Utility and Transportation Infrastructure Resiliency

A. Resilient Sanitary Sewer Service *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

B. Resilient Storm Water Conveyance Service *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

C. Reduction of Stormwater Runoff *
Hazards Addressed: *Current and Future Flooding*

D. Resilient Electrical Service *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

E. Mutual Aid Utility Repair Agreements *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

III. Networking, Planning, and Education

A. Public Education and Outreach *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards (tsunami)*

B. City Personnel Education and Training *
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards (tsunami)*

C. Integration of Hazard Mitigation with Climate Change, Emergency Management, General, and CIP Plans *
Hazards Addressed: *Current and Future Flooding and other hazards*

D. Disaster Debris Plan and Agreements
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

E. Emergency Fuel Agreements
Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

F. Update the Health and Safety Element of the General Plan

Hazards Addressed: *Earthquake Ground Shaking and Liquefaction, Current and Future Flooding and other hazards*

G. Tsunami inundation hazard zone and evacuation route sign placement and public education on Tsunami risk. Educate and assist local marinas and the maritime community to take action on life safety and damage reduction mitigation measures.
Hazards Addressed: *Tsunami*

*Items marked with an asterisk are programs already in place and will be continued

4.7.3 MITIGATION STRATEGIES NOT SELECTED

The following mitigation strategies were examined and found to score lower on the key factors used to prioritize mitigation actions They are not included in the Mitigation Strategy at this time but will be considered if circumstances or funding changes.

I. Building and Facility Resiliency
   A. Fire Prevention/Inspection
   B. Off-site Data Storage

II. Utility and Transportation Infrastructure Resiliency
   A. Resilient Telecommunications Services (City-owned components)
   B. Resilient Traffic Signal System
   C. Additional Public Warning Systems
   D. Resilient Doolittle Landfill
   E. Resilient Transit and Paratransit Services
   F. Seawater Surge Wall Around Cartwright station (Project 9 from City's 2010 LHMP)

III. Networking, Planning, and Education
   A. Evacuation Planning
   B. Law Enforcement and Zoning Enforcement to Decrease Human Caused Hazards

Table 12.
MITIGATION STRATEGIES SELECTED FOR IMPLEMENTATION OR CONTINUATION

I.A. Mitigation Strategy: Construction of New Emergency Operations Center (EOC) and Fire Station #3							
Strategy Objective	**Construct a new Emergency Operations Center and Fire Station #3**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	Evaluation	**Program/Operation**	Policy Development	Coordination	Education/Outreach		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	**Operations**	**Emergency & Hazard Planning**	**Project Planning & Design**	New Initiatives
Responsible City Department or Agency	Public Works Department, Fire Department and City Manager's Office						
Partners							
Priority	High						
Actions/Activities	In 2015, the City of Alameda began construction of a new Fire Station 3 to replace the one located at 1709 Grand Street, which was deemed seismically unsafe and obsolete in the year 2000. The new fire station is being constructed on the same site, and in conjunction with, an approved Emergency Operations Center (EOC). The EOC will be located at 1809 Grand Street and the Fire Station at 1625 Buena Vista Avenue. Three community meetings were held in the fall 2012, focusing on operations, space needs, and site arrangement of both structures. On July 9, 2013, a fourth community meeting was conducted to present potential design concepts. The City Council approved the plans and specifications for the Emergency Operations Center (EOC) on September 2, 2014 and separately for Fire Station 3 on March 3, 2015. The combined project includes: 1. Perimeter site and street improvements including utility tie-ins and curb cuts for both the EOC and Fire Station 3; 2. On-site improvements integral for the operation of the EOC. This includes the driveway approaches, parking lot improvements, perimeter fencing and gates, site lighting, and landscape; 3. The completion of the EOC including all finishes, fixtures, and equipment for a facility that is ready for occupancy; and						

I.A. Mitigation Strategy: Construction of New Emergency Operations Center (EOC) and Fire Station #3	
	4. The replacement of Fire Station 3 which will accommodate firefighting operation activities, firefighter living quarters, apparatus bays, a conference room, and a public lobby with public restrooms. The facility is designed to accommodate one engine company, storage for one truck company, and an ambulance in reserve status. The fire station's office, living quarters, public lobby, and public restrooms would be situated along Buena Vista Avenue. Outdoor vehicle service areas consisting of concrete pads would be located at the front and rear of the apparatus bays to facilitate inspections, servicing, cleaning, and fueling. Fire trucks would enter the bays from Hibbard Street and exit onto Grand Street.
Cost Estimate	Pre-engineering and design costs: $706,800 Construction costs: $7,960,608
Funding	In July 2014, the City Council approved sources of funding Fire Station 3 as follows: Facility Maintenance Fund (706) $400,000 Capital Project 91344 (EOC and Fire Station 3) FY13-14 $341,000 Internal Loan from Equipment Replacement $809,000 Proceeds from sale of 1703 Grand Street $450,000 IBank Loan $3,000,000 Subtotal $5,000,000 Other funding sources approved by the City Council: Capital Project 9061401 (EOC and Fire Station 3) FY11-12 $400,000 2003 A Tax Allocation Bonds unspent proceeds* $863,000 Refinancing of City's 2013 COPS - EOC construction FY13-14 $3,000,000 Subtotal $4,263,000 Total Available Sources $9,263,000 *Pursuant to the Amended Agreement Regarding Expenditures of Excess Bond Proceeds dated October 22, 2014. The General Fund will be impacted in the future by repayment of the IBank Loan (estimated at 2.29% over 20 years) and to the extent necessary an internal loan from the Equipment Replacement Fund (3% over 20 years). Total estimated additional debt service is anticipated not to exceed $300,000 annually, $5.3 million over the 20 year term. These costs are anticipated to be offset by approximately $50,000 of annual savings from removal of the need to lease staff housing quarters and energy savings from the new Fire Station 3. The General Fund will also pay for the IBank loan origination fee estimated at $30,000 and an annual fee of 0.3% of outstanding principal balance estimated at $96,000 over 20 year term. The 2003 A&B Tax Allocation Bonds (TABs) unspent proceeds are available to the City pursuant to the

I.A. Mitigation Strategy: Construction of New Emergency Operations Center (EOC) and Fire Station #3	
	Amended Agreement Regarding Expenditures of Excess Bond Proceeds dated October 22, 2014. These proceeds are being used consistent with the State Redevelopment Law. The Successor Agency refinanced the 2003 TABs in 2014. The debt service payments are reported on the Successor Agency Recognized Obligation Payment Schedule and are repaid from Redevelopment Property Tax Trust Fund.
Timeline	Construction estimated to be complete 2017 ((Project 6 and 7 from City's 2010 LHMP)
Related Policies	Comprehensive Emergency Operations Plan

I.B. Mitigation Strategy: Soft Story Buildings Program							
Strategy Objective	**Continue to implement the City's Soft Story Program**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	Current Flooding	Future Flooding	Other Hazards		
Asset Classes Addressed	Utilities	**Community**	**Buildings**	Transportation	**Economy and Business**		
Strategy Type	Evaluation	**Program/Operation**	Policy Development	Coordination	**Education/Outreach**		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	**Operations**	Emergency & Hazard Planning	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Community Development Department						
Partners							
Priority	High						
Actions/Activities	Continue to implement the 2009 ordinance outlining mandatory compliance requirements for substantially improving the seismic performance of certain residential buildings. The buildings targeted are wood frame condos and apartment buildings with 5 or more dwelling units, permitted for construction prior to December 17, 1985, in which the ground floor has a soft, weak, or open-fronted construction such as a carport. This ordinance prompted the following activities: City produced an inventory of potential soft story buildings and notified owners, owners were required to evaluate affected buildings and if found to be potentially hazardous, issue written and posted warnings to tenants, and install an earthquake-actuated gas shutoff valve. The ordinance does not require retrofitting of any structural inadequacies found, but did offer permit and inspection fee reductions timely response. As of March 2015, only 99 buildings were still on the List of Potentially Hazardous Soft-Story Buildings.						
Cost Estimate	N/A						
Funding	Ongoing ((Review costs are paid for by permit fees))						
Timeline	Initial Notice and Orders completed. Follow up compliance steps 18 to 24 months completed.						
Related Policies	Municipal Code Section 13-80.1 through 13-80.16						

I.C. Mitigation Strategy: Wood Framed Buildings Program							
Strategy Objective	**Continue to implement the City's Wood Frame Program.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	Current Flooding	Future Flooding	Other Hazards		
Asset Classes Addressed	Utilities	**Community**	**Buildings**	Transportation	**Economy and Business**		
Strategy Type	Evaluation	**Program/Operation**	Policy Development	Coordination	**Education/Outreach**		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	**Operations**	Emergency & Hazard Planning	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Community Development Department						
Partners							
Priority	High						
Actions/Activities	Continue to implement 2006 ordinance that outlines voluntary minimum standards which shall substantially improve the seismic performance of certain residential buildings. The buildings targeted are one and two story wood framed buildings, with one to four units, with continuous perimeter concrete foundations and wooden cripple walls less than 4 feet high. The retrofits are voluntary. Incentives include waving the requirements for plans prepared by a licensed architect or engineer, and waiving of the requirement to simultaneously upgrade plumbing, mechanical, electrical and life/safety systems that are not a hazard to life or property, but which might be out of compliance with current building codes. Residential Seismic Strengthening Plans and building code guidance are posted on the City website at http://alamedaca.gov/community-development/building/seismic-retrofit.						
Cost Estimate	N/A						
Funding	Ongoing (Review costs are paid for by permit fees)						
Timeline	Ongoing						
Related Policies	Municipal Code Section 13-70.1 through 13-70.6						

I.D. Mitigation Strategy: Resilient City Buildings							
Strategy Objective	**Strengthen and rehabilitate City owned buildings**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	Utilities	Community	Buildings	Transportation	Economy and Business		
Strategy Type	**Evaluation**	Program/Operation	Policy Development	Coordination	Education/Outreach		
Process/Implementation Mechanism	**Long Range Planning**	Land Use Planning	**Capital Planning**	Operations	**Emergency & Hazard Planning**	**Project Planning & Design**	New Initiatives
Responsible City Department or Agency	Public Works Department						
Partners							
Priority	High						
Actions/Activities	• Thorough review of all City buildings to determine any needed structural, mechanical or electrical seismic weaknesses. • Identify deficits and protection needed for City buildings subject to coastal flood hazards and local storm hazards. • For all critical City Buildings, consider responses needed to the secondary hazards of fire, temporary utility loss, and temporary access loss. • Address appropriate seismic, fire, and flood safety analysis based on current and future use for all City-owned facilities and structures. • Strengthen or replace City buildings in the identified prioritized order as funding is available. • Evaluate Alameda Point buildings as they are turned over to the City from the Navy. Have a plan to demolish them or make them habitable.						
Cost Estimate	Total cost not yet known. Due to cost constraints, recent deferred maintenance evaluation of City buildings did not include seismic considerations of the structural, mechanical, or electrical components. Seismic analysis still needs to be scoped.						
Funding	Facility Maintenance Fund 706						
Timeline	Ongoing (Project 12 from City's 2010 LHMP)						
Related Policies							

I.E. Mitigation Strategy: National Flood Insurance Program							
Strategy Objective	**Continue the City's participation in the National Flood Insurance Program.**						
Hazards Addressed	Earthquake Ground Shaking	Earthquake Liquefaction	**Current Flooding**	**Future Flooding**	Other Hazards		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	Evaluation	**Program/Operation**	**Policy Development**	Coordination	**Education/Outreach**		
Process/Implementation Mechanism	Long Range Planning	**Land Use Planning**	Capital Planning	Operations	**Emergency & Hazard Planning**	**Project Planning & Design**	New Initiatives
Responsible City Department or Agency	City Council, Department of Public Works, Community Development Department						
Partners	Federal emergency Management Agency						
Priority	High						
Actions/Activities	The City is a National Flood Insurance Program (NFIP) participant and intends to continue its participation. City of Alameda Municipal Code Chapter XX – Floodplain Management includes an automatic adoption clause for all subsequent amendments and/or revisions to the Flood Insurance Study (FIS) for Alameda County, California, and Incorporated Area dated August 3, 2009, with accompanying flood insurance rate maps (FIRMs) and flood boundary and floodway maps (FBFMs), dated August 3, 2009. The provisions of Municipal Code Chapter XX will, as such, apply to the revised Areas of Special Flood Hazard once issued by FEMA (expected sometime in 2016). The City requested that the NFIP Specialist in Region 9 (Sarah Owen) review the City's Municipal Code Chapter XX – Floodplain Management. On March 19, 2016, an email was sent to the City by the NFIP Specialist stating that she "reviewed your code and see no major problems with it. It has all the minimum requirements. Your City will automatically adopt the new FIRMs when they officially become effective." **Activities Underway and to Continue during this Plan Cycle**: The City will continue to educate residents about the preliminary and ultimately final FIRMs, flood insurance and flood preparedness. The City will also continue to work with Homeowner Associations regarding dike improvement. **New Activities To Be Implemented during this Plan Cycle:** The city will continue to regulate new construction in Special Flood Hazard Areas, per Municipal Code Chapter XX – Floodplain Management, administer any local requests for map updates, give community assistance, and monitor activities.						

I.E. Mitigation Strategy: National Flood Insurance Program	
Cost Estimate	1/10 FTE for Flood Plain Manager
Funding	Urban Runoff Fund
Timeline	Ongoing implementation of building and construction standards for properties designated in specific flood zones.
Related Policies	Municipal Code Section XX

I.F. Mitigation Strategy: Community Rating System							
Strategy Objective	**Research and consider becoming a Community Rating System (CRS) classified community.**						
Hazards Addressed	Earthquake Ground Shaking	Earthquake Liquefaction	Current Flooding	**Future Flooding**	Other Hazards		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	**Evaluation**	**Program/Operation**	**Policy Development**	**Coordination**	**Education/Outreach**		
Process/Implementation Mechanism	**Long Range Planning**	**Land Use Planning**	**Capital Planning**	**Operations**	**Emergency & Hazard Planning**	**Project Planning & Design**	**New Initiatives**
Responsible City Department or Agency	Department of Public Works, Community Development Department						
Partners	FEMA						
Priority	Medium						
Actions/Activities	The Community Rating System, implemented by FEMA, encourages cities to take certain steps to reduce flood exposure through public information, mapping, regulations, flood damage reduction, warning, and response. As an incentive, insurance rates for individual policy holders would be decreased by a percentage for creditable activities. FEMA offers assistance in designing, implementing and documenting the program. The City will review possible activities, produce a plan, and start working on projects as funding becomes available.						
Cost Estimate	Unknown						
Funding	Part of the Flood Plain Manager cost cited above.						
Timeline	Ongoing						
Related Policies							

I.G. Mitigation Strategy: Resilient Shoreline Facilities							
Strategy Objective	**Make shoreline facilities more resilient to earthquake, storm, and high water elevation hazards, in order to maintain functionality and protect inland facilities.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	Other Hazards		
Asset Classes Addressed	Utilities	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	**Evaluation**	**Program/Operation**	Policy Development	Coordination	Education/Outreach		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	**Capital Planning**	Operations	**Emergency & Hazard Planning**	**Project Planning & Design**	**New Initiatives**
Responsible City Department or Agency	Public Works Department and work done through Alameda Point redevelopment						
Partners	East Bay Regional Park District, Homeowner Associations, Port of Oakland, Coastal Conservancy						
Priority	High						
Actions/Activities	Perform appropriate seismic, storm, flooding and other safety analyses based on current and future use for all City-owned shoreline facilities, including dikes, shore protection (rip rap), lagoon sea walls, stormwater outfalls, marinas and protective marshlands. Strengthen or replace City shoreline facilities in the identified prioritized order as funding is available. Include shore protection (dike, armoring) in development of Alameda Point.						
Cost Estimate	1/4 FTE Engineer						
Funding	Urban Runoff; Measure B and Gas Tax in street Right of Ways; Dike Fund; Lagoon Homeowner Associations; Marina maintenance funds; Coastal Conservancy; other grants						
Timeline	Ongoing (Project 13 from City's 2010 LHMP)						
Related Policies							

I.H. Mitigation Strategy: Street Tree and Park Tree Trimming							
Strategy Objective	**Trim trees to lessen storm-related utility and building damage.**						
Hazards Addressed	Earthquake Ground Shaking	Earthquake Liquefaction	Current Flooding	Future Flooding	**Other Hazards**		
Asset Classes Addressed	**Utilities**	Community	**Buildings**	**Transportation**	Economy and Business		
Strategy Type	**Evaluation**	**Program/Operation**	Policy Development	Coordination	Education/Outreach		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	**Operations**	**Emergency & Hazard Planning**	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Public Works and Recreation and Parks Departments						
Partners							
Priority	High						
Actions/Activities	Proactive tree trimming every fall before storm season. Standby crews ready during predicted heavy storms.						
Cost Estimate	$750,000/year						
Funding	General and Assessment District Funds						
Timeline	Ongoing						
Related Policies	Alameda Master Street Tree Plan						

II.A. Mitigation Strategy: Resilient Sanitary Sewer Service							
Strategy Objective	**Protect vulnerable wastewater systems and facilities so as to minimize disruption to the system following from current and projected ground shaking and extreme weather events.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	**Evaluation**	**Program/Operation**	Policy Development	Coordination	Education/Outreach		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	**Capital Planning**	**Operations**	Emergency & Hazard Planning	**Project Planning & Design**	New Initiatives
Responsible City Department or Agency	Public Works Department						
Partners	EBMUD						
Priority	High						
Actions/Activities	Alameda's wastewater pumping stations are necessary to convey wastewater to the EBMUD interceptor system. Alameda is retrofitting these stations for resiliency with measures including raised or flood-proofed critical equipment, constructing barriers, redundancy measures to avoid pumping failures, and reliable backup power sources. All pump stations will be retrofitted by 2025. The City operates under a federal and State enforcement action to improve its aging wastewater infrastructure. In light of future increased intensity of storm events, this work is especially important. There are several things the City is doing to prevent sanitary sewer overflows: • Cleaning and maintaining sewer pipes • Reducing the opportunity for stormwater infiltration and inflow into the sanitary sewer • Maintaining a root control program to keep tree roots from damaging sewer pipes • Increasing and upgrading the capacity of the sanitary sewer system. • Annually rehabilitate approximately 2% of the sanitary sewer system pipes in the system, which are predominantly old clay pipe, with high-density plastic or PVC, materials demonstrated to better withstand shaking.						

II.A. Mitigation Strategy: Resilient Sanitary Sewer Service	
	• Implement a private sewer lateral program where upon point of sale, remodel or change in water meter size, a property owner is required to demonstrate that the private sewer lateral on that property is compliant with City standards. • Implement an inflow and rapid infiltration identification and reduction program
Cost Estimate	Operations are estimated to cost approximately $3.5 million per year. Capital expenses are estimated at approximately $8 million per year.
Funding	The Sewer Enterprise Fund is dedicated source funding for the management of the City's sewer system. The City completed a sewer rate review and subsequent increase in 2015 to support the above-mentioned capital and operational actions. The Sewer Enterprise Fund will be able to support such actions, given current conditions and assumptions, for the next 20 years assuming a continuous 3% increase to the rate per year. This 3% increase is approved through fiscal year 2019-2020.
Timeline	All activities stated above are already being implemented and will be in perpetuity for the next 22 years, at minimum, unless conditions change and priorities are shifted.
Related Policies	Sanitary Sewer Master Plan, Capital Improvement Plan, General Plan, Final Consent Decree for Cases C 09-00186-RS and C 09-05684-RS.

II.B. Mitigation Strategy: Resilient Stormwater Conveyance Service							
Strategy Objective	**Rehabilitate the existing storm system conveyances and pump stations so as to give them more capacity and resilience during storms, high tides, sea level rise, seismic events, and power outages, thereby decreasing the chance of flooding of nearby streets, utilities, and buildings.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	**Evaluation**	**Program/Operation**	Policy Development	**Coordination**	Education/Outreach		
Process/Implementation Mechanism	**Long Range Planning**	Land Use Planning	**Capital Planning**	**Operations**	**Emergency & Hazard Planning**	**Project Planning & Design**	**New Initiatives**
Responsible City Department or Agency	Department of Public Works						
Partners	Homeowner Associations with co-responsibility for maintenance of lagoon systems.						
Priority	High						
Actions/Activities	**Activities Completed:** • Visual inspection: 10 storm drain pump stations and all 200+ outfalls. Needed for master planning. • Models: pump stations, all piping systems and lagoon systems, under current and future SLR conditions. Needed for master planning. • Master Plans: Pump Station Rehab to increase capacity and seismic resiliency, and decrease maintenance. • Dredging: Dredging select locations of Alameda Lagoon System where there has been sedimentation. **Activities Underway and to Continue during this Plan Cycle:** • Video Inspection: all storm drain pipes recommended for upsizing by modeling. • Cleaning: all pipes recommended for upsizing, to restore capacity where partially blocked with debris and mud, and to facilitate video inspection. • Master Plans: Water Quality Facilities, Pipe Replacement/Upsizing, and Culvert Replacement. To address capacity, maintenance, SLR predictions, Clean Water regulations, and available						

II.B. Mitigation Strategy: Resilient Stormwater Conveyance Service	
	funding. • Replace: Arbor Street Pump Station, crushed culvert ends, poorly designed culverts in the FY 15-17 budget cycle. • Research: Explore ways to increase pollution capture without decreasing storm capacity, locate additional funding **New Activities To Be Implemented during this Plan Cycle:** • Inspection of Lagoon Systems: Pumps and Weirs. Needed for Master Planning. • Master Plans: Lagoon Facilities. • Repair or Replace: Storm drain pump stations, outfalls, pipes, culverts, and water quality facilities for the FY 17-21 budget cycles. Additional lagoon dredging and facility upgrades. • Emergency Power Supply: Perform hard wiring for emergency generators and arrange with FEMA for generators and emergency fuel re-supply at pump stations. See Mitigation Strategy III.E.
Cost Estimate	Total cost has not yet been determined, as inspection and master planning is ongoing.
Funding	Street-related funding such as Measure B and Gas Tax; Urban Runoff; Assessment Districts; New Sources (taxes and fees); Grants
Timeline	Cleaning and videoing will take approximately 5 more years. Pump station upgrades will take approximately 8 more years. Pipe upgrades will take 20 years or more, depending on funding and rate of SLR.
Related Policies	Storm Drain Master Plan 2008 plus Addenda regarding 18” SLR, 55” SLR, and CIP Implementation

II.C. Mitigation Strategy: Reduced Stormwater Runoff							
Strategy Objective	**Modify urban landscaping requirements and increase permeable surfaces to reduce stormwater runoff, thereby decreasing the chances of flooding and system overloading.**						
Hazards Addressed	Earthquake Ground Shaking	Earthquake Liquefaction	**Current Flooding**	**Future Flooding**	Other Hazards		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	Evaluation	Program/Operation	**Policy Development**	Coordination	**Education/Outreach**		
Process/Implementation Mechanism	Long Range Planning	**Land Use Planning**	**Capital Planning**	**Operations**	Emergency & Hazard Planning	**Project Planning & Design**	**New Initiatives**
Responsible City Department or Agency	Department of Public Works and Community Development Department						
Partners	State and Regional Water Quality Control Boards; property owners						
Priority	High						
Actions/Activities	<u>Activities Completed:</u> -Implemented 2009 Municipal Stormwater NPDES permit requirements to require the design and construction of low impact development (LID) strategies, measures and infrastructure systems on all relevant new development and redevelopment projects within the City's jurisdiction. -Executed twenty (20) stormwater treatment measures maintenance agreements with private developers to ensure the long-term preservation and maintenance of LID systems installed to-date at private development and redevelopment sites within the City's jurisdiction. -Implemented municipal service district maintenance responsibilities of low impact development systems at three (3) public-domain redevelopment sites. <u>Activities Underway and to Continue During this Plan Cycle:</u> -Continue to oversee the long-term maintenance and preservation of LID measures and systems completed to-date on all relevant new development and redevelopment projects within the City's jurisdiction. -Implement 2015 Municipal Stormwater NPDES permit requirements to continue requiring the design and installation of low impact development (LID) strategies, measures and infrastructure systems on all relevant new development and redevelopment projects within the City's jurisdiction. -Implement project approval, permit issuance and construction activity oversight activities to ensure						

II.C. Mitigation Strategy: Reduced Stormwater Runoff	
	the installation of acceptable low impact development measures and systems within all relevant new development and redevelopment projects currently under municipal approval and inspection authority. New Activities to be Implemented During this Plan Cycle: -Complete and implement a municipal Green Infrastructure Plan (GIP) for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands. The GIP is intended to describe how the City will shift impervious surfaces and traditional storm drain infrastructure to more-resilient, sustainable systems that slow runoff by: dispersing it to vegetated areas, harvesting it for re-use, promoting infiltration and evaporation, and using bioretention and other green infrastructure practices.
Cost Estimate	TBD
Funding	Clean Water Program revenue; potential grants
Timeline	Ongoing
Related Policies	Storm Drain Master Plan, Regional Water Board Municipal Separate Stormwater Sewer System

II.D. Mitigation Strategy: Resilient Electrical Service							
Strategy Objective	**Protect vulnerable electric systems and facilities and build resiliency so disruption to the system is minimized following current and projected ground shaking and extreme weather events.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	**Evaluation**	**Program/Operation**	Policy Development	Coordination	Education/Outreach		
Process/Implementation Mechanism	**Long Range Planning**	Land Use Planning	**Capital Planning**	**Operations**	Emergency & Hazard Planning	**Project Planning & Design**	**New Initiatives**
Responsible City Department or Agency	Alameda Municipal Power						
Partners	Northern California Power Agency, California Independent System Operator, PG&E						
Priority	Medium						
Actions/Activities	Project				Cost	Funding	Timeline
	Microgrid - Install distribution automation (intellegent switches) to automatically locate fault and restore electric service; provide distributive generation (solar, wind or other generation) and back up storage (utility grade batteries, flywheel, ect.)				$1,000,000	TBD	2020
	Relocate electric facilities from overhead to underground				$7,600,000	Reserves	Ongoing
	Harden transmission resiliency by replacing wooden poles with steel poles				$1,500,000	Rates	2020
	Procure a backup power transformer (Project 10 from City's 2010 LHMP)				$1,800,000	Rates	2020
	Replace UPS system at 2000 Grand Street				$10,000	Rates	2018
	Secure an outage information system technology solution				$100,000	Rates	2017
	Construct a Backup Systems Operations Center (Project 8 from City's 2010 LHMP)				$500,000	TBD	2018
Related Policies	Underground Utility District Policy						

II.E. Mitigation Strategy: Mutual Aid Utility Repair Agreements							
Strategy Objective	Participate in and foster in General Mutual Aid Agreements.						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	Evaluation	Program/Operation	Policy Development	**Coordination**	Education/Outreach		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	Operations	**Emergency & Hazard Planning**	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Police, Fire and Public Works						
Partners	CalWARN Mutual Aid participating members						
Priority	Medium						
Actions/Activities	• Alameda Municipal Power is a signator on two mutual aid agreements - California Utility Emergency Association (CUEA) and Northern California Power Agency (NCPA) • Maintain agreements with adjoining jurisdictions for cooperative response to fires, floods, earthquakes, and other disasters (GOVT-c-13). • Working Relationships and Lifeline Committee Meetings with Caltrans, County, Coast Guard, Ready Reserve, Port of Oakland, San Leandro, Utilities, FEMA, and Other Agencies. • Membership in CalWARN Mutual Aid for City-run and independent utilities that provide water and wastewater.						
Cost Estimate	Unknown.						
Funding	Assistance provided or received during an emergency will be reimbursed with state or federal funding if it is a declared emergency.						
Timeline	As needed.						
Related Policies	Comprehensive Emergency Operations Plan						

III.A. Mitigation Strategy: Public Education and Outreach							
Strategy Objective	**Conduct education and outreach to the general community on hazard mitigation and disaster preparedness.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards (Tsunami)**		
Asset Classes Addressed	Utilities	**Community**	Buildings	Transportation	**Economy and Business**		
Strategy Type	Evaluation	Program/Operation	Policy Development	Coordination	**Education/Outreach**		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	Operations	**Emergency & Hazard Planning**	Project Planning & Design	**New Initiatives**
Responsible City Department or Agency	City Manager's Office, Fire Department						
Partners	CERT participants						
Priority	Moderate						
Actions/Activities	Collect, analyze and share information with the Alameda community about Alameda hazards and associated risk reduction techniques. Address businesses, special populations, HOAs, and general public. Promote the CERT program. Provide outreach and coordination with Voluntary Organizations Active in Disasters (VOAD).						
Cost Estimate	0.25 FTE						
Funding	General fund for staffing						
Timeline	Summer 2016: objectives and implementation framework defined January 2017: outreach implementation begins and becomes ongoing						
Related Policies	Comprehensive Emergency Operations Plan						

III.B. Mitigation Strategy: City Employee Education and Training							
Strategy Objective	**Conduct education and training in disaster preparedness, response, recovery and mitigation.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards (Tsunami)**		
Asset Classes Addressed	Utilities	**Community**	Buildings	Transportation	**Economy and Business**		
Strategy Type	Evaluation	Program/Operation	Policy Development	Coordination	**Education/Outreach**		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	Operations	**Emergency & Hazard Planning**	Project Planning & Design	**New Initiatives**
Responsible City Department or Agency	City Manager's Office, Fire Department						
Partners							
Priority	Moderate						
Actions/Activities	EOC training exercises on a City, County, Regional and State level. Training for emergency repair, traffic control, evacuations, shelter in place, crowd control, emergency medical aid, grant reimbursement, etc. Education of City Employees about personal emergency preparedness and mitigation.						
Cost Estimate							
Funding	General fund for staffing						
Timeline	Summer 2016: objectives and implementation framework defined January 2017: outreach implementation begins and becomes ongoing						
Related Policies	Comprehensive Emergency Operations Plan						

III.C. Mitigation Strategy: Integration of Hazard Mitigation with Climate Change							
Strategy Objective	**In February of 2008, Alameda City Council adopted a Resolution, which set a citywide greenhouse gas reduction goal: *25% below 2005 baseline levels*. The City Council also adopted the Local Action Plan for Climate Protection, which offers a framework for achieving this goal. The City will revisit and asses the goals and actions specified in this plan and will consider points of integration with the Local Hazard Mitigation Plan. If determined feasible, actions in the Local Action Plan for Climate Protection may become hazard mitigation strategies.**						
Hazards Addressed	Earthquake Ground Shaking	Earthquake Liquefaction	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	**Evaluation**	Program/Operation	**Policy Development**	**Coordination**	Education/Outreach		
Process/Implementation Mechanism	**Long Range Planning**	Land Use Planning	Capital Planning	**Operations**	Emergency & Hazard Planning	Project Planning & Design	**New Initiatives**
Responsible City Department or Agency	City Manager's Office, Department of Public Works, Alameda Municipal Power, Community Development Department						
Partners	Community Action for a Sustainable Alameda						
Priority	Low						
Actions/Activities	Asses if the targeted goals established in the Local Action Plan for Climate Protection were achieved. If not, consider additional implementable actions to meet those goals and include those actions as mitigation strategies in the Local Hazard Mitigation Plan. If targeted goals are determined achieved, consider future targets and mitigation strategies to incorporate into the Local Hazard Mitigation Plan.						
Cost Estimate	TBD						
Funding	Currently unfunded						
Timeline	TBD						
Related Policies	City of Alameda Local Action Plan for Climate Protection, General Plan						

III.D. Mitigation Strategy: Disaster Debris Plan and Agreements							
Strategy Objective	**Complete the City's Disaster Debris Plan for review by CalOES, and establish relationships with contractors and haulers who will be able to bid on very short notice if needed.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	Evaluation	Program/Operation	**Policy Development**	**Coordination**	Education/Outreach		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	**Operations**	**Emergency & Hazard Planning**	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Public Works Department						
Partners	Alameda County Industries, CalOES						
Priority	Medium						
Actions/Activities	**Activities Completed:** Training, first draft of Debris Plan. **Current Activities to Continue under this Plan Cycle:** Complete Debris Plan. **New Activities to be Initiated under this Plan Cycle:** Obtain review from CalOES, develop agreements with contractors and haulers to provide debris handling bids on a very short notice. Keep list and agreements updated yearly. If implemented, reassess after event.						
Cost Estimate	Existing staff hours						
Funding	NA						
Timeline	Will complete plan and agreements in 2016.						
Related Policies	Comprehensive Emergency Operations Plan						

III.E. Mitigation Strategy: Emergency Fuel Agreements							
Strategy Objective	**Work with FEMA to arrange for emergency fuel delivery and generators at key locations. Work with local fuel suppliers to ensure fuel delivery during emergency events.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	Utilities	Community	Buildings	Transportation	**Economy and Business**		
Strategy Type	Evaluation	**Program/Operation**	Policy Development	**Coordination**	Education/Outreach		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	**Capital Planning**	Operations	**Emergency & Hazard Planning**	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Public Works						
Partners	FEMA, local fuel suppliers.						
Priority	High						
Actions/Activities	Will complete Fuel Agreement with FEMA						
Cost Estimate	Existing staff hours						
Funding	NA						
Timeline	To be complete in 2016						
Related Policies	Comprehensive Emergency Operations Plan						

III.F. Mitigation Strategy: Update the Health and Safety Element of the General Plan							
Strategy Objective	**Update the Health and Safety Element of the General Plan, including key features of Local Hazard Mitigation Plan.**						
Hazards Addressed	**Earthquake Ground Shaking**	**Earthquake Liquefaction**	**Current Flooding**	**Future Flooding**	**Other Hazards**		
Asset Classes Addressed	**Utilities**	**Community**	**Buildings**	**Transportation**	**Economy and Business**		
Strategy Type	Evaluation	Program/Operation	**Policy Development**	Coordination	Education/Outreach		
Process/Implementation Mechanism	**Long Range Planning**	Land Use Planning	Capital Planning	Operations	Emergency & Hazard Planning	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Community Development Department, Planning Division						
Partners	Public Works Department						
Priority	Moderate						
Actions/Activities	Consult with federal, state and regional agencies for current information related to seismic, flood, fire, landslides and other hazards. Prepare updated Draft of the Health and Safety Element of the General Plan. Conduct public outreach and community meetings for public input on Draft Element. Take Draft Element to the Planning Board for public hearing and recommendation to City Council. Take Draft Health and Safety Element to the City Council for public hearing and final action/adoption.						
Cost Estimate	$50,000						
Funding	Community Planning Fee						
Timeline	2016						
Related Policies	General Plan						

III.G. Mitigation Strategy: Tsunami Inundation Zone and Evacuation Route Sign Placement							
Strategy Objective	**Reduce the risk tsunami inundation presents to Alameda citizens**						
Hazards Addressed	Earthquake Ground Shaking	Earthquake Liquefaction	Current Flooding	Future Flooding	**Other Hazards**		
Asset Classes Addressed	Utilities	**Community**	Buildings	Transportation	Economy and Business		
Strategy Type	**Evaluation**	Program/Operation	Policy Development	Coordination	**Education/Outreach**		
Process/Implementation Mechanism	Long Range Planning	Land Use Planning	Capital Planning	**Operations**	**Emergency & Hazard Planning**	Project Planning & Design	New Initiatives
Responsible City Department or Agency	Public Works and Fire Department Disaster Preparedness Coordinator						
Partners	National Tsunami Hazard Mitigation Program (US), USGS, Cal OES, NOAA, CGS						
Priority	High						
Actions/Activities	Sign placement and general public tsunami education. With the number of marinas in Alameda, there will be a targeted component of the education program towards tsunami impacts in the maritime communities.						
Cost Estimate	TBD						
Funding	USGS/ Cal OES and Public Works funds						
Timeline	Ongoing. Sign placement and public education to be completed by the end of 2017.						
Related Policies	Comprehensive Emergency Management Plan						

Table 13.
Key Partners' Mitigation Strategies

The table below shows owners of key infrastructure and facilities in Alameda and includes known mitigation actions. The individual agencies should be contacted directly for a complete list of hazard mitigation efforts.

Owner/Manager	Infrastructure Within City	Known Hazard Mitigation Efforts
East Bay Municipal Utility District (EBMUD)	• Potable, non-potable (irrigation), and fire suppression water supply system consisting of pipelines, pumping plants, flow/pressure control facilities, and storage tanks and reservoirs owned by the East Bay Municipal Utility District • Sanitary sewer transmission pipeline (wastewater interceptor) and pumping stations • Sewer and water connections under the Estuary and San Leandro Bay	• EBMUD water service to the City of Alameda is provided by four existing underwater pipeline crossings at three separate locations between the City of Oakland, Alameda Island, and North Bay Farm Island. Failure of one of three existing crossing locations could lead to a reduction in the level of service for existing customers and potentially reduce the available water supply to Alameda Island and North Bay Farm Island. Three new pipeline crossings are proposed to replace the existing pipeline crossings to ensure long-term reliability of the water distribution system, meet existing and future water needs, and facilitate repair and replacement of aging infrastructure. The environmental review process for the project is underway. Through this process, EBMUD will assess the impacts of the project and identify ways to reduce or eliminate the impacts with input from stakeholders and the community. • EMBUD has an ongoing program to replace aging and brittle water lines with more modern materials. • EBMUD is collaborating with the City on development of a Debris Management Plan and a Utility Staging Area. • For more information about activities EBMUD is taking for earthquake readiness: http://resilience.abag.ca.gov/wp-content/documents/resilience/EBMUD_Earthquake_Readiness.pdf
Pacific Gas and Electric (PG&E)	• Natural gas distribution system, including main pipelines, lateral pipelines and meters. • Electrical power feeds to Alameda Island under the Estuary.	• PG&E has an ongoing program to replace aging pipelines with more modern materials, and to install new valves and pressure regulation facilities. • PG&E is considering replacement of the power feeds under the Estuary. • As a consequence of the San Bruno rupture, the National Transportation Safety Board (NTSB) has issued a number of recommendations to State and federal administrations and institutions to improve the safety of pipeline networks as well as to

Owner/Manager	Infrastructure Within City	Known Hazard Mitigation Efforts
		upgrade the integrity management program and emergency response system. As a result, PG&E proposed a $2.2 billion Pipeline Safety Enhancement Plan to modernize its gas transmissions operations over the next several years. As part of this plan, PG&E has installed approximately 13 SCADA units to remotely monitor and manage the pressure in gas transmission lines in the City of Alameda. • Additionally, PG&E has created a First Responders Safety website, which provides secure access to maps and information about natural gas transmission lines, natural gas storage facilities, and shut-off valves.
AT&T, Comcast, and other telecoms	• Telecommunications aerial and underground conduits. Switching facilities. Cell towers.	• Improvements are ongoing.
Caltrans	• Posey and Webster Tubes, Bay Farm Island (AKA San Leandro Channel) Bridge and Bike Bridge, Constitution Overpass, State Routes 61 and 260.	• Caltrans plans for seismic upgrades (?) • Caltrans has temporary detour plans (?) • Caltrans has an action plan for quickly evaluating after an earthquake or other potentially damaging event (?)
County of Alameda	• Miller Sweeney (Fruitvale), Park Street, and High Street Bridges.	• The County retrofit all three bridges to "no collapse" status in 2008-9, and is currently (late 2015) retrofitting the Fruitvale Bridge to "lifeline" status.
Federal Government – Fruitvale RR Bridge	• Fruitvale RR Bridge	• Unknown
Federal Government – Coast Guard and Navy	• Portions of Alameda Point, all of Coast Guard Island including bridge, Coast Guard Housing, Ready Reserve, Navy Operations Reserve Center	• Unknown
East Bay Regional Park District (EBRPD)	• The EBRPD manages the Robert Crown Memorial State Beach and the City's Shoreline Drive Park. EBRPD is responsible for major maintenance and upgrades; the City is responsible for storm drain maintenance.	• EBRPD recently completed restoration of Crown Beach, which has the indirect effect of protecting Shoreline Drive from storm erosion. • EBRPD is currently (Late 2015) designing an inland extension of the groin at Park Street to decrease beach erosion there.

Owner/Manager	Infrastructure Within City	Known Hazard Mitigation Efforts
Housing Authority	• The Housing Authority has 572 senior, disabled, and low income housing units.	• The Housing Authority has recently completed a comprehensive needs assessment at all properties. A capital improvements plan has been prepared to reduce risks to vulnerable populations. The plan includes management training, waterproofing work, communications systems, back up generators and other features.
Alameda Unified School District (AUSD)	• The AUSD has19 schools in Alameda, serving K through 12 grades, plus a special education preschool and an adult school.	•
American Red Cross (ARC)	• Tasked with providing shelter operations and feeding during disasters.	• The ARC and the City are working on shelter agreements for sheltering locations within the City. • The ARC is also working on shelter agreements with other organizations, including schools and churches, for additional sheltering locations. • The ARC is working with other organizations to prepare for mass feeding needs. • The ARC has a warehouse at Alameda Point with supplies (cots, food, etc.) for Bay Area sheltering needs.
Medical Facilities	• There are numerous medical facilities that provide services to vulnerable populations.	• Alameda Hospital • Private Clinics • Alameda County Health • (Future) Veterans Administration Clinic • Pharmacies
Water Emergency Transportation Authority (WETA)	• WETA operates ferries that travel to two terminals within the City of Alameda. The landside portion of the ferry terminals is operated and maintained by the City; the water side portion is operated and maintained by WETA. • WETA is planning to build a maintenance facility on Alameda Point.	

APPENDICES

Appendix A – Public Outreach

Appendix B – Vicinity Map

Appendix C – Recorded Tsumani Measurements in the San Francisco Bay Area

Appendix D – Local Non-Coastal Flooding Maps

Appendix E – Sea Level Rise Maps

Appendix F – Inventory of Building and Park Assets

Appendix G – Inventory of Utility Assets

Appendix H – Inventory of Transportation Assets

Appendix I– Approval Documentation

Local Hazard Mitigation Plan Update
Public Outreach and Input Process

An open public involvement process is essential to the development of an effective plan. As demonstrated below, the community was provided multiple opportunities for public comment on the plan during the drafting stage and prior to plan approval. In addition, the City worked collaboratively with neighboring communities through the Association of Bay Area Governments (ABAG) hosted workshops and a separately convened group with Alameda County cities only. There are a number of regional utility and service providers (ex. PG&E, EBMUD) in Alameda County and therefore the Alameda County cities decided it best to reach out to these entities as a group. PG&E, EBMUD, Bay Area Rapid Transit (BART), Union Pacific and Kinder Morgan were contacted. Applicable information is included in the Local hazard Mitigation Plan Table 13 - Key Partners' Mitigation Strategies.

In 2015, the City convened an interdepartmental planning team, which was tasked, among other things, of defining the update process, schedule and responsibilities within the planning team. The agenda of the initial planning team meeting is included as **Attachment A** to this Appendix.

The planning team agreed on the benefits of having a dedicated Hazard Mitigation webpage on the City website. This site was established and can be found here: http://alamedaca.gov/hazard-mitigation-planning. The site explains what hazard mitigation planning is, provides an overview of the emergency management cycle and gives regulatory context for the Local Hazard Mitigation Plan. The site contains a copy of the City's 2011 Local Hazard Mitigation Plan and the process/schedule for the 5-year update. And lastly, the site contains a host of outside links and resources pertaining to hazard mitigation, personal preparedness, and resiliency.

Through the City's hazard mitigation website and other means of distribution, the City conducted a public opinion survey to solicit community input on natural and man- made hazards that pose risk to Alameda and what their opinions are regarding methods and/or techniques for reducing those risks and losses associated with the hazard. Monkey Survey was used to collect answers electronically. The survey was also distributed in paper form at library branches, the City's senior center and City department counters where the public is served. In total, the City received input from 59 citizens. Those received in paper form were entered into Survey Monkey by City staff for statistical analysis purposes. Through the survey process the City developed a list of individuals interested in receiving more information on the Local Hazard Mitigation Plan update. This list was used to publicize subsequent public information meetings. The survey and associated summary statistics are included as **Attachment B** to this Appendix. As a result of the marked interest in human-made hazards, the City will consider an update/addendum to this plan where human-made hazards are considered.

At the September 24, 2015 joint Commission on Disability Issues and Social Services and Human Relations Board meeting, City staff presented a Power Point presentation on hazard mitigation planning and the importance of public. The agenda and slides from the presentation are included in **Attachment C**.

On October 27, 2015, City staff hosted a public information meeting on Local Hazard Mitigation Planning at City Hall. The meeting was announced on the City website and directly via email to those citizens that elected to receive additional hazard mitigation information. At this meeting, City staff presented a shortened version of the slides in Attachment D.

In addition to outreach specific to development of the Local Hazard Mitigation Plan, the City conducted an extensive outreach concerning the new Floodplain Insurance Rate Maps (FIRMs) from FEMA. Preliminary Maps were announced in the Federal Register in October of 2015. The new maps included over 2,000 new parcels in the 100 year floodplain that were not in the floodplain in the previous (2009) maps. The City outreach included early meetings with FEMA before the maps were released, presentation to the City Council at a regular (public) Council meeting, sending individual letters to every land owner and tenant with an address that was within or partly within the proposed 100 year floodplain limits, sending press releases to the press and various organizations, placing a front-page splash and an informational webpage on the City website, hosting a well-attended public information meeting, and working with the Port of Oakland to review the hydrology of Oakland's airport lands and Bay Farm Island. A copy of the City press release is in **Attachment D**, along with a sample letter that was sent to all impacted property owners and a copy of the City established webpage. This public outreach is continuing, as people are contacted by their insurance companies and mortgage companies and call the City for more information on how to proceed. The intent of the City is to make all residents and land owners, but especially those residing within the floodplain, aware of flood hazards due to storms, high tides, and climate change. The City encouraged personal mitigation efforts (education, flood insurance, storm preparation) as well as collaborative mitigation efforts with the HOAs (such as strengthening and raising the dike between the lagoons and San Leandro Channel).

Personnel from the City of Alameda has also been involved with BCDC's Adapting to Rising Tides Study (ARTS). Alameda's Bay Farm Island, plus adjacent portions of Oakland, were chosen as a representative sample area that could be studied in depth and applied to the larger Bay Area. The City cooperated with BCDC and representatives from Oakland, East Bay Regional Park District (EBRPD), Caltrans, BART, and other interested parties, to examine hazards, critical facilities, and mitigations. This has fostered inter-agency cooperation in such efforts as improving Doolittle Drive (owned in part by Caltrans, the Port of Oakland, the City of Alameda, and EBRPD) to improve multi-modal trail usage while decreasing the potential for flooding in Bay Farm Island and the Port of Oakland. City personnel have attended other similar planning meetings, including those with the Coastal Hazards Adaptation Resiliency Group (CHARG), the Floodplain Management Association, the

Association of Bay Area Governments (ABAG), the Community Emergency Response Team (CERT), the American Red Cross, and various utilities, governments, and organizations.

Attachments:

A. Planning Team Agenda/Participants
B. Public Survey and Summary Statistics
C. Power Point Presentation given September 24, 2014 and October 27, 2015
D. List of Recipients for FEMA Flood Insurance Rate Maps Press Release, Sample Letter Sent to Impacted property Owners, City Website

Local Hazard Mitigation Plan
Planning Team
April 21, 2015
3:00 – 4:00 PM

1. Local Hazard Mitigation Plan (LHMP) Introduction
    a. FEMA approved 5 year update by March 2016
    b. Historically, Alameda's plan has been an annex to ABAG's regional plan

2. Define purpose of LHMP
    a. ABAG's 2011 goal: To maintain and enhance a disaster-resistant region by reducing the potential loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters.

3. Review and agree on update process and schedule (Attachment 1)

4. Establish Planning Team Responsibilities
    a. Community Engagement
    b. City overview – history, geography, population, households, employment, property values and other demographics
    c. Conduct and inventory that identifies all assets and critical facilities
    d. Past Hazards by date and type
    e. Identify and profile existing hazards; vulnerability analysis of identified assets and critical facilities
    f. Identify mitigation strategy (goals, actions, prioritization of actions, implementation plan)
    g. Climate Change
    h. Plan Integration (two-way exchange)

5. Develop Outreach Strategy:
    a. Answer the following: What do we want to accomplish through outreach, who to involve in the process, and how and when to effectively engage the community.
    b. Develop stakeholder list
    c. How can stakeholders and the general public contribute to the development of capability review, risk assessment, and mitigation strategy?
    d. Define feasible and effective methods of outreach: online surveys, roundtable discussion, presentations, popular community events, make use of other CBO meetings, etc…
    e. Define feasible and effective information methods: news media, social media, fliers, websites, etc...

6. Reiterate Alex Nguyen's request made at the Executive Management Team meeting to provide updates to the existing LHMP (mitigation actions complete, changes in asset inventory, etc…)
    a. If your department has not already provided this to Alex, please provide to me no later than May 13th.

Local Hazard Mitigation Plan Update Planning Team

Name	Title	City Department/Organization
Erin Smith	Acting Deputy Director of Public Works	Public Works Department
Laurie Kozisek	Senior Engineer	Public Works Department
Greg McFann	Building Official	Community Development Department
Sharon Oliver	Disaster Preparedness Coordinator	Fire Department
Cynthia Whitchurch	Compliance Supervisor	Alameda Municipal Power
Rick Zombeck	Division Chief	Fire Department
Jim Franz	Resiliency Coordinator	City Manager's Office
Paul Rolleri	Chief of Police	Police Department
Jill Otaviano	Lieutenant	Police Department
Kathleen Livermore	Planner	Community Development Department
	Executive Director	Alameda Point Collaborative

Key Partner Outreach

Name	Title	Key Partner
Michael J. Algots	Hazmat Manager	Union Pacific Railroad
Nicole Stewart	Area Manager – Brisbane Terminal & Richmond Station	Kinder Morgan
Scott Holmquist	Senior Public Safety Specialist	Pacific Gas & Electric
Les Putnam	Senior Public Safety Specialist	Pacific Gas & Electric

Attachment B

SurveyMonkey®

Add Users | CityofAlameda_CA

My Surveys | Examples | Survey Services | Plans & Pricing | + Create Survey

Update your billing information: Keep access to survey data and powerful features. Update billing! →

City of Alameda Local Hazards Co...

Summary | Design Survey | Collect Responses | Analyze Results

▼ CURRENT VIEW

+ FILTER | + COMPARE | + SHOW

No rules applied

Rules allow you to **FILTER**, **COMPARE** and **SHOW** results to see trends and patterns. Learn more »

▼ SAVED VIEWS (1)

Original View (No rules applied)

+ Save as...

▶ EXPORTS

▼ SHARED DATA

No shared data

Sharing allows you to share your survey results with others. You can share all data, a saved view, or a single question summary. Learn more »

Share All

RESPONDENTS: 59 of 59

Export All | Share All

Question Summaries | Data Trends | Individual Responses

All Pages

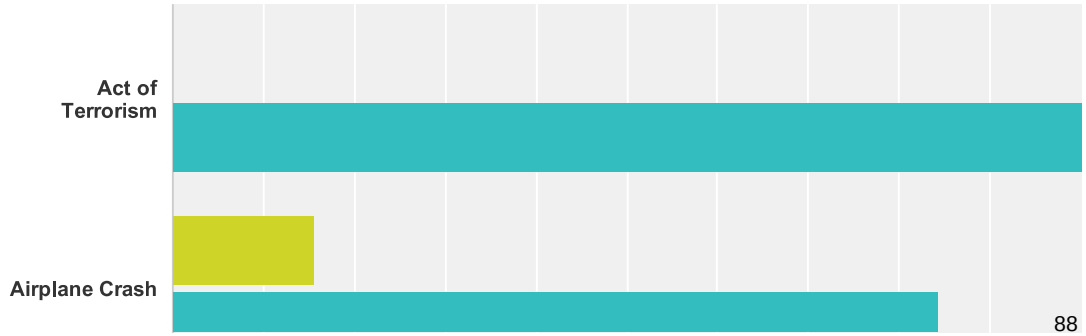
PAGE 1

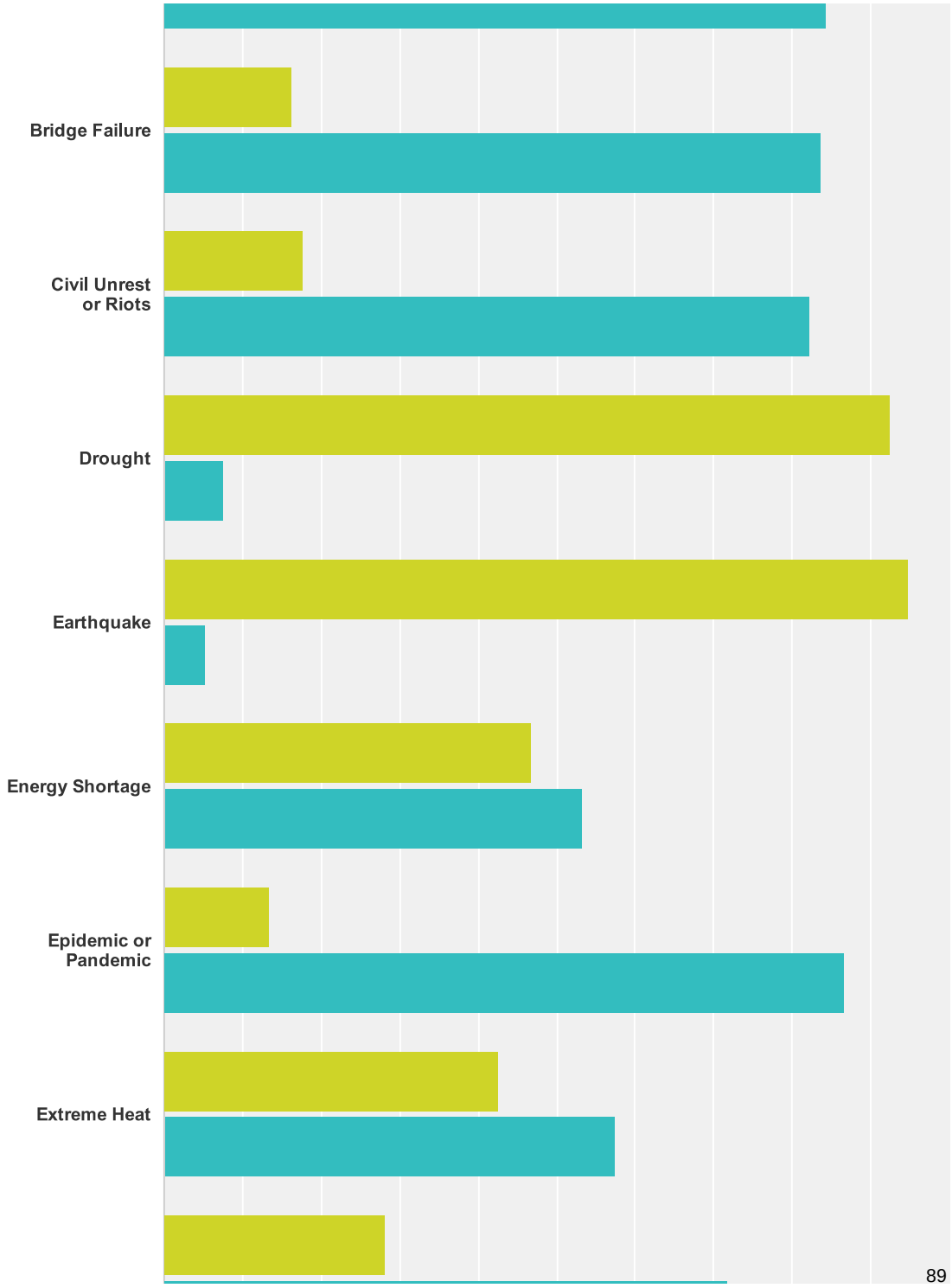
Q1

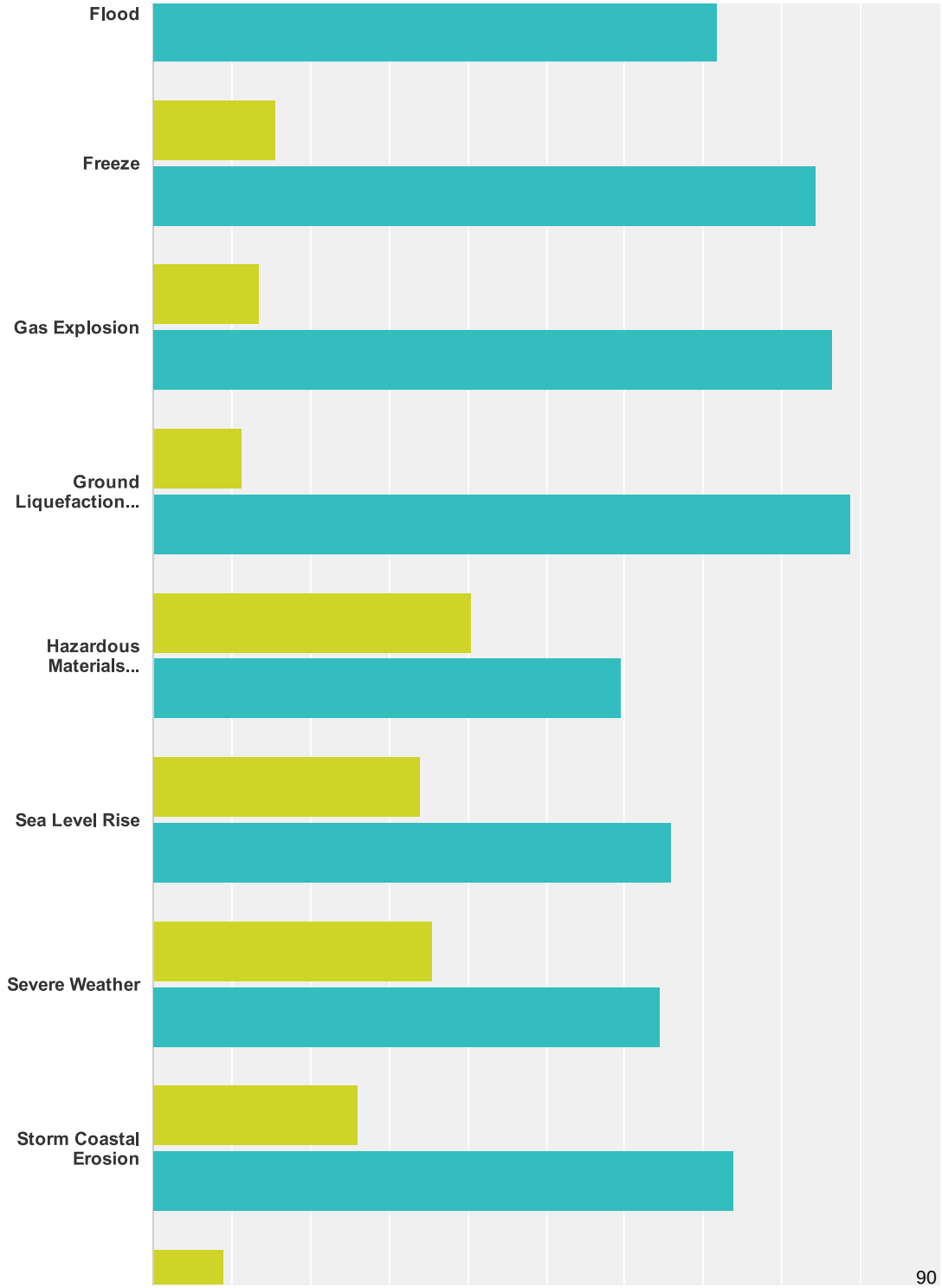
Customize | Export

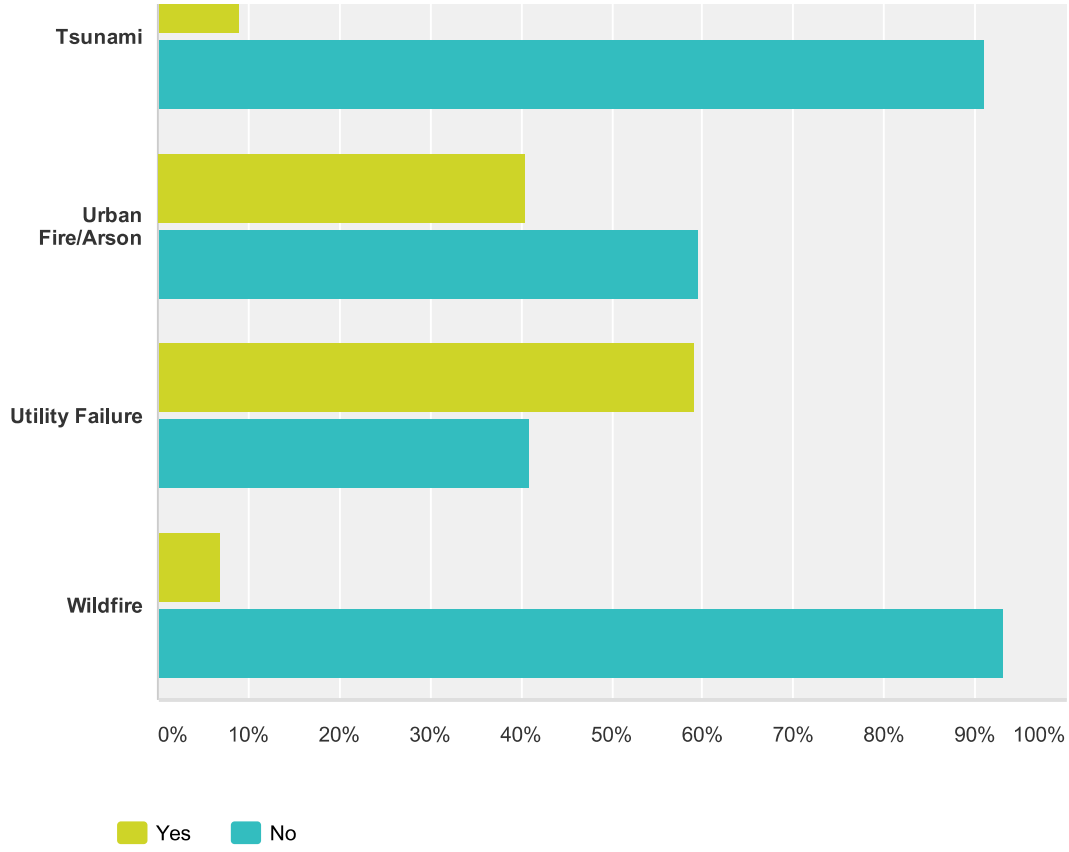
In the past 25 years, which of the following natural or man made hazard events have you or someone in your household experienced living or working within the City of Alameda?

Answered: 59 Skipped: 0




Bridge Failure
Civil Unrest or Riots
Drought
Earthquake
Energy Shortage
Epidemic or Pandemic
Extreme Heat
89


Flood
Freeze
Gas Explosion
Ground Liquefaction...
Hazardous Materials...
Sea Level Rise
Severe Weather
Storm Coastal Erosion
90



	Yes	No	Total
Act of Terrorism	**0.00%** 0	**100.00%** 44	44
Airplane Crash	**15.56%** 7	**84.44%** 38	45
Bridge Failure	**16.28%** 7	**83.72%** 36	43
Civil Unrest or Riots	**17.78%** 8	**82.22%** 37	45
Drought	**92.45%** 49	**7.55%** 4	53
Earthquake	**94.74%** 54	**5.26%** 3	57
Energy Shortage	**46.67%** 21	**53.33%** 24	45
			91

Epidemic or Pandemic	13.33% 6	86.67% 39	45
Extreme Heat	42.55% 20	57.45% 27	47
Flood	28.26% 13	71.74% 33	46
Freeze	15.56% 7	84.44% 38	45
Gas Explosion	13.64% 6	86.36% 38	44
Ground Liquefaction or Subsidence	11.36% 5	88.64% 39	44
Hazardous Materials Release (on land or in Bay)	40.43% 19	59.57% 28	47
Sea Level Rise	34.04% 16	65.96% 31	47
Severe Weather	35.56% 16	64.44% 29	45
Storm Coastal Erosion	26.09% 12	73.91% 34	46
Tsunami	8.89% 4	91.11% 41	45
Urban Fire/Arson	40.43% 19	59.57% 28	47
Utility Failure	59.18% 29	40.82% 20	49
Wildfire	6.98% 3	93.02% 40	43

Comments (8)

Q2

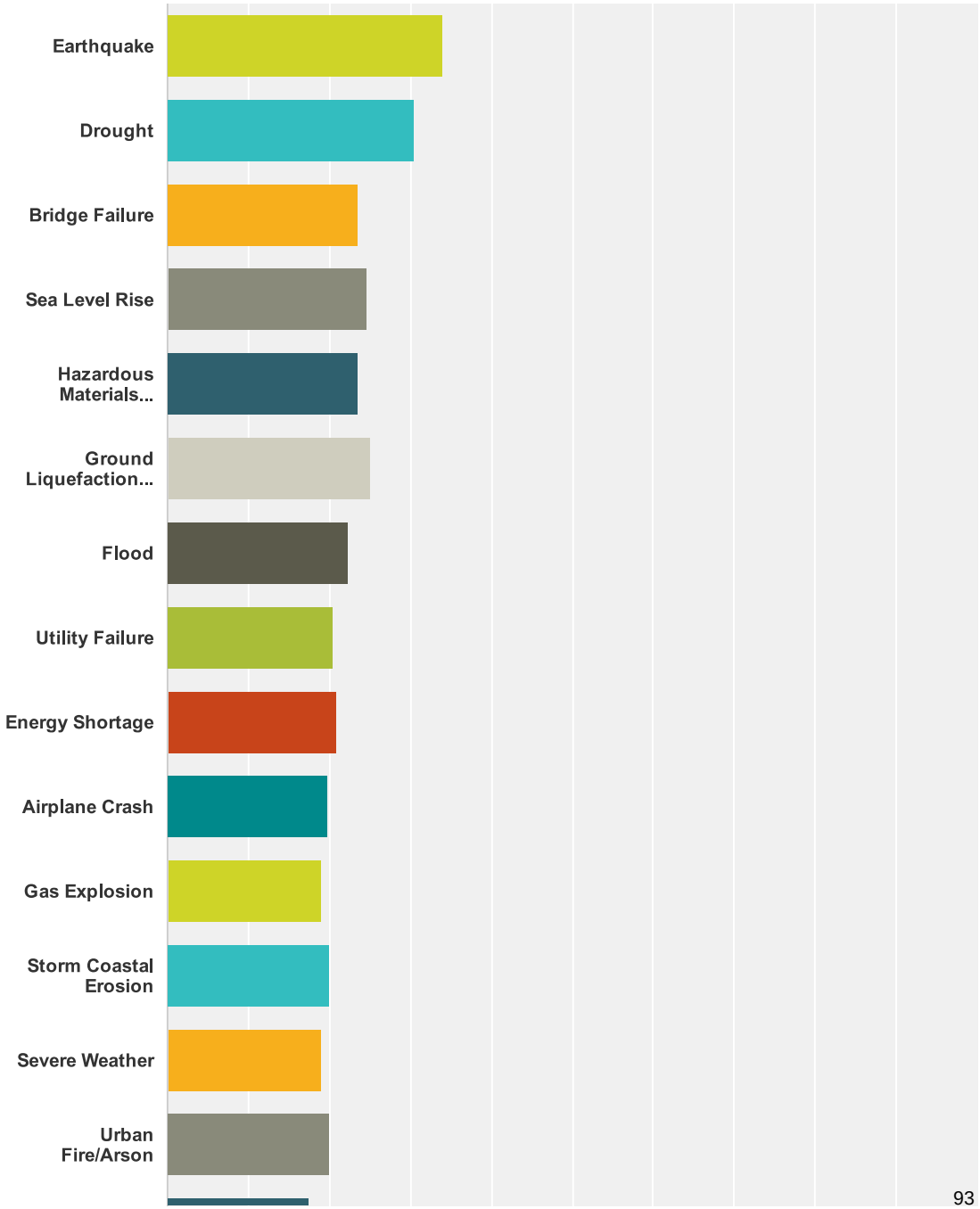
Customize Export

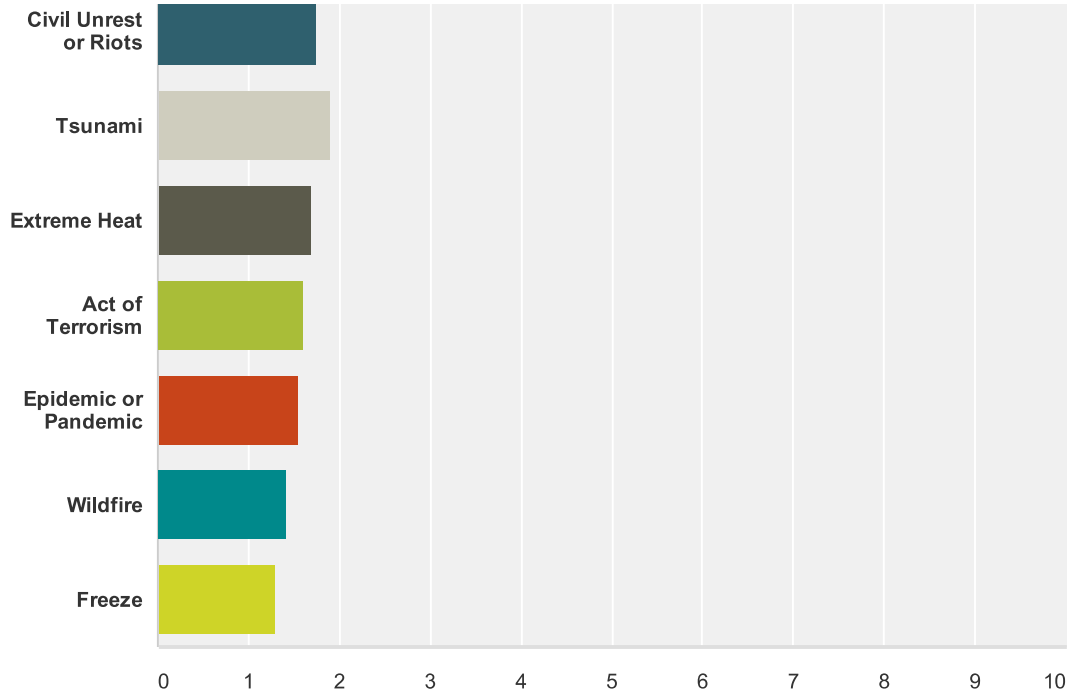
How concerned are you about the following

92

hazards impacting the City?

Answered: 59 Skipped: 0





	Not Concerned	Somewhat Concerned	Very Concerned	Extremely Concerned	Total	Weighted Average
Earthquake	**3.51%** 2	**5.26%** 3	**38.60%** 22	**52.63%** 30	57	3.40
Drought	**5.36%** 3	**16.07%** 9	**48.21%** 27	**30.36%** 17	56	3.04
Bridge Failure	**12.50%** 7	**50.00%** 28	**26.79%** 15	**10.71%** 6	56	2.36
Sea Level Rise	**13.56%** 8	**35.59%** 21	**40.68%** 24	**10.17%** 6	59	2.47
Hazardous Materials Release (on land or Bay)	**20.37%** 11	**37.04%** 20	**29.63%** 16	**12.96%** 7	54	2.35
Ground Liquefaction or Subsidence	**19.64%** 11	**26.79%** 15	**37.50%** 21	**16.07%** 9	56	2.50
Flood	**23.21%** 13	**39.29%** 22	**28.57%** 16	**8.93%** 5	56	2.23
Utility	**25.45%**	**47.27%**	**23.64%**	**3.64%**		94

Failure	14	26	13	2	55	2.05
Energy Shortage	25.93% 14	48.15% 26	16.67% 9	9.26% 5	54	2.09
Airplane Crash	28.30% 15	49.06% 26	18.87% 10	3.77% 2	53	1.98
Gas Explosion	29.09% 16	54.55% 30	12.73% 7	3.64% 2	55	1.91
Storm Coastal Erosion	30.91% 17	43.64% 24	20.00% 11	5.45% 3	55	2.00
Severe Weather	33.33% 18	46.30% 25	16.67% 9	3.70% 2	54	1.91
Urban Fire/Arson	34.55% 19	38.18% 21	20.00% 11	7.27% 4	55	2.00
Civil Unrest or Riots	37.04% 20	53.70% 29	5.56% 3	3.70% 2	54	1.76
Tsunami	42.86% 24	32.14% 18	16.07% 9	8.93% 5	56	1.91
Extreme Heat	46.30% 25	40.74% 22	11.11% 6	1.85% 1	54	1.69
Act of Terrorism	50.94% 27	41.51% 22	3.77% 2	3.77% 2	53	1.60
Epidemic or Pandemic	50.91% 28	43.64% 24	5.45% 3	0.00% 0	55	1.55
Wildfire	73.08% 38	13.46% 7	11.54% 6	1.92% 1	52	1.42
Freeze	75.47% 40	18.87% 10	5.66% 3	0.00% 0	53	1.30

Comments (9)

PAGE 2

Q3

Export

Do you have ideas on how to reduce the risk from the natural or man made hazards for the City? Please describe any projects you can think of that would help reduce

95

risk.

Answered: 37 Skipped: 22

Answer Choices		Responses	
Act of Terrorism	Responses	18.92%	7
Airplane Crash	Responses	27.03%	10
Bridge Failure	Responses	45.95%	17
Civil Unrest, Riots	Responses	27.03%	10
Drought	Responses	45.95%	17
Earthquake	Responses	67.57%	25
Energy Shortage	Responses	27.03%	10
Epidemic or Pandemic	Responses	16.22%	6
Extreme Heat	Responses	18.92%	7
Flood	Responses	27.03%	10
Freeze	Responses	10.81%	4
Gas Explosion	Responses	24.32%	9
Ground Liquefaction or Subsidence	Responses	24.32%	9
Hazardous Material Release (on land or in Bay)	Responses	21.62%	8
Sea Level Rise	Responses	27.03%	10
Severe Weather	Responses	8.11%	3
Storm Coastal Erosion	Responses	5.41%	2
Tsunami	Responses	18.92%	7
Urban Fire/Arson	Responses	13.51%	5
Utility Failure	Responses	18.92%	7
Wildfire	Responses	10.81%	4

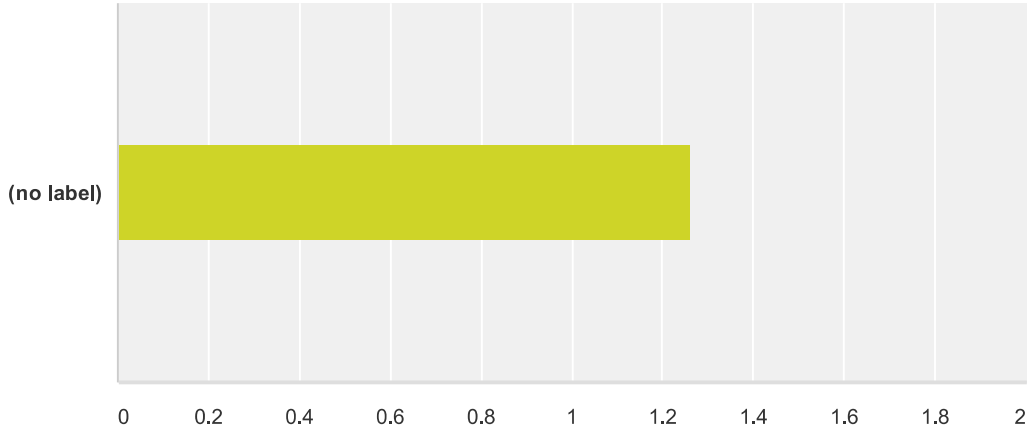
Q4 Customize Export

Is there another significant natural or man

96

made hazard that is a threat to your household or neighborhood that is not listed above?

Answered: 42 Skipped: 17



	No	Yes(Please Specify Below)	Total	Weighted Average
(no label)	73.81% 31	26.19% 11	42	1.26

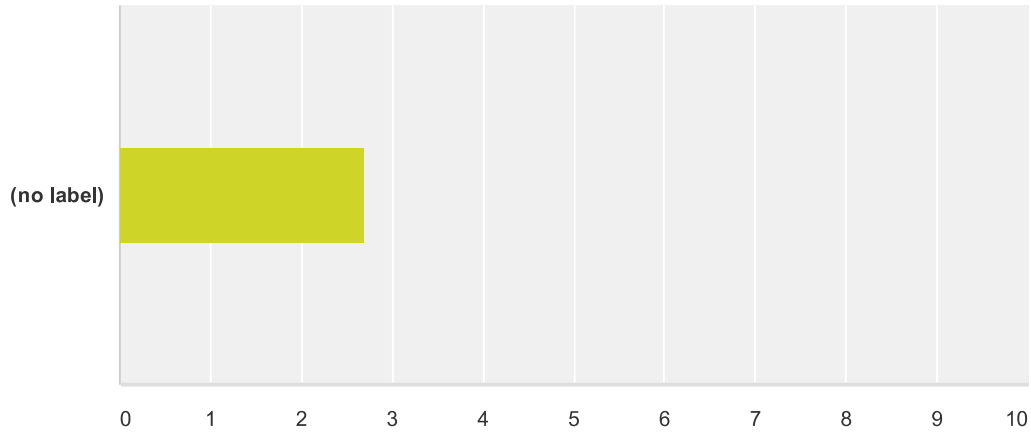
Comments (13)

PAGE 3

Q5 Customize Export

Please rank how prepared you feel you and your household are for the probable impacts of natural or man-made hazard events. Rank on a scale of 1 to 5, with 5 representing the most prepared.

Answered: 47 Skipped: 12



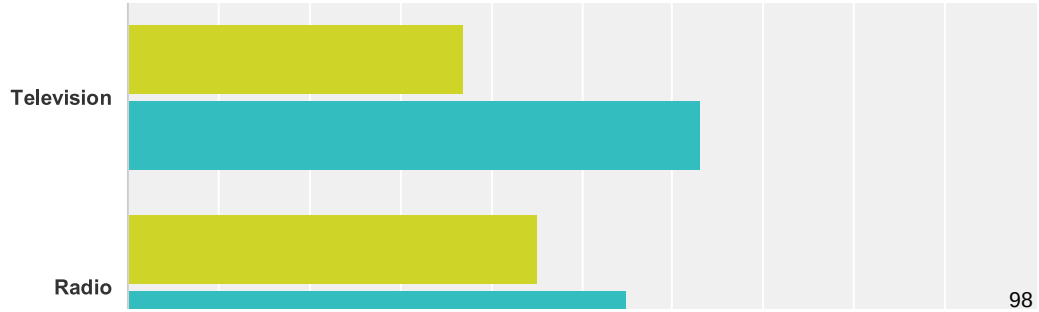
	1	2	3	4	5	Total	Weighted Average
(no label)	8.51% 4	34.04% 16	36.17% 17	21.28% 10	0.00% 0	47	2.70

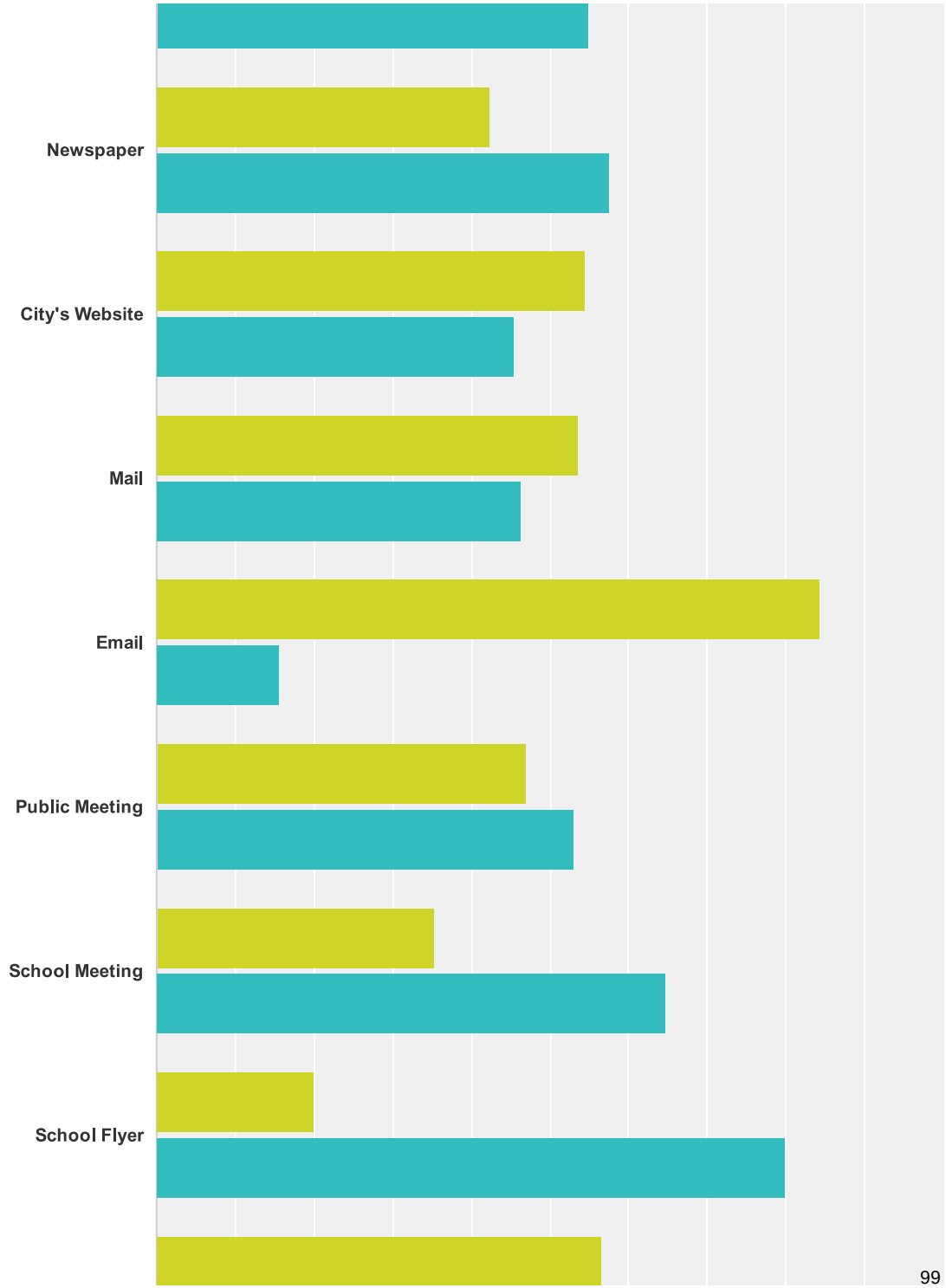
Q6

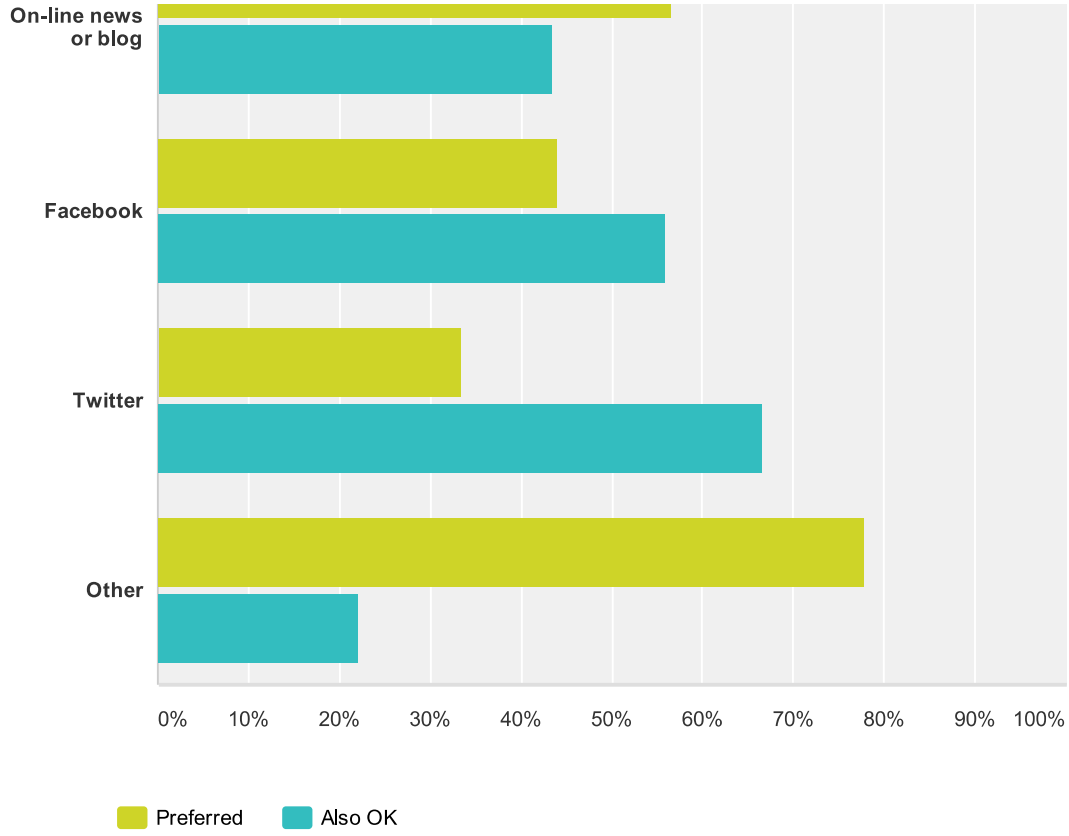
Customize Export

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: 50 Skipped: 9




Newspaper
City's Website
Mail
Email
Public Meeting
School Meeting
School Flyer
99



	Preferred	Also OK	Total Respondents
Television	37.04% 10	62.96% 17	27
Radio	45.16% 14	54.84% 17	31
Newspaper	42.31% 11	57.69% 15	26
City's Website	54.55% 18	45.45% 15	33
Mail	53.57% 15	46.43% 13	28
Email	84.44% 38	15.56% 7	45
Public Meeting	46.88% 15	53.13% 17	32
			100

School Meeting	35.29% 6	64.71% 11	17
School Flyer	20.00% 3	80.00% 12	15
On-line news or blog	56.52% 13	43.48% 10	23
Facebook	44.00% 11	56.00% 14	25
Twitter	33.33% 7	66.67% 14	21
Other	77.78% 7	22.22% 2	9

Comments (13)

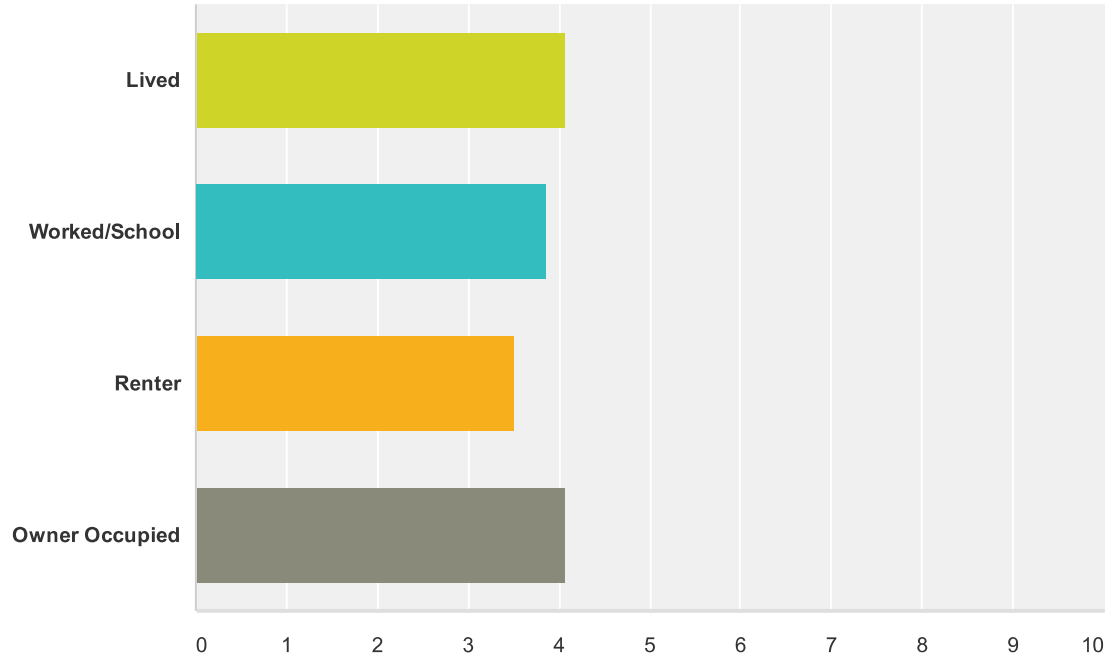
PAGE 4

Q7

Customize Export

How long have you lived or worked in Alameda?

Answered: 50 Skipped: 9



	Less than 1 year	1 to 5 years	6 to 9 years	10 to 19 years	20 years or more	Decline to answer	Total	Weighte Average
Lived	0.00% 0	12.00% 6	18.00% 9	22.00% 11	46.00% 23	2.00% 1	50	4.0
Worked/School	5.26% 2	15.79% 6	10.53% 4	31.58% 12	28.95% 11	7.89% 3	38	3.8
Renter	13.64% 3	27.27% 6	18.18% 4	9.09% 2	0.00% 0	31.82% 7	22	3.5
Owner Occupied	6.98% 3	11.63% 5	13.95% 6	13.95% 6	41.86% 18	11.63% 5	43	4.0

PAGE 5

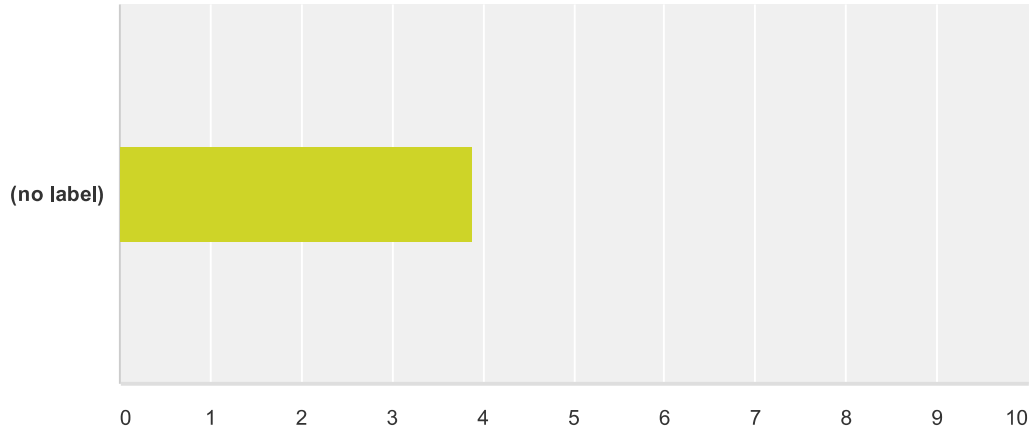
Q8

Customize Export

Please indicate your age

102

Answered: 49 Skipped: 10



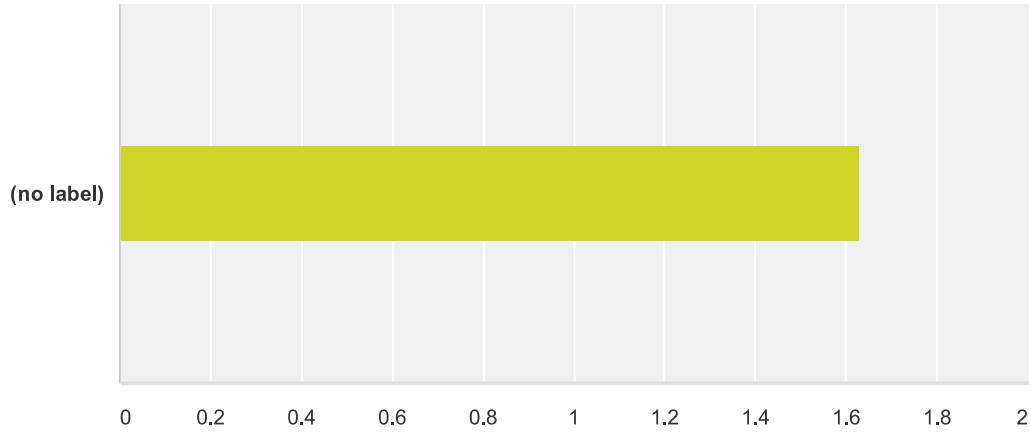
	18-30	31-40	41-50	51-60	60 or over	Decline to answer	Total	Weighted Average
(no label)	4.08% 2	10.20% 5	24.49% 12	20.41% 10	36.73% 18	4.08% 2	49	3.88

PAGE 6

Q9 Customize Export

Gender

Answered: 48 Skipped: 11



	Male	Female	Decline to Answer	Total	Weighted Average
(no label)	**43.75%** 21	**50.00%** 24	**6.25%** 3	48	1.63

PAGE 7

Q10 Export

Other Comments are Welcome:

Answered: 13 Skipped: 46

Responses (13) Text Analysis My Categories (0)

Categorize as... Filter by Category Search responses

Showing **13** responses

Crime is a growing issue - someone has broken into my home once - and I'm afraid to park my car on the street - it seems Oakland Crime is now in Alameda, too. Something nees to be done now! I very rarely see police cruising here in Marina Village area.
10/12/2015 11:47 AM View respondent's answers Categorize as...

I am CERT trained, but the activities so far seem to be short wave radio training and periodic city-wide training on checking out houses in an earthquake etc. CERT teams should be developed in each neighborhood to get ordinary people ready. My neighborhood is completely unprepared except on an individual basis - sporadic. I am very concerned that there is so little done to prepare families on this island. Most are way to busy to be involved with CERT, which in any case seems to have little to do with family and neighborhood prep. I know lots of other towns that are way better prepared.
9/2/2015 12:34 PM View respondent's answers Categorize as...

Please look at San Leandro's excellent earthquake and retrofit information and programs. Alameda is lagging. I scoured the alameda city website for similar info and could find none that was very helpful. A call to the city produced no info either. The City needs to be doing much more. Please refer to this website; it's a great model. http://www.sanleandro.org/depts/cd/bldg/retrofit/default.asp
8/31/2015 1:33 PM View respondent's answers Categorize as...

It is good to be prepared.
8/17/2015 5:40 PM View respondent's answers Categorize as...

PAGE 8

Q11

Export

Would you like to learn more as the City develops its plan? If so, please add your preferred contact info below.

Answered: 28 Skipped: 31

Answer Choices		Responses	
Name	**Responses**	**89.29%**	25
Company	**Responses**	**0.00%**	0
Address	**Responses**	**75.00%**	21
Address 2	**Responses**	**7.14%**	2
City/Town	**Responses**	**82.14%**	23
State/Province	**Responses**	**78.57%**	22
ZIP/Postal Code	**Responses**	**82.14%**	23
Country	**Responses**	**53.57%**	15
			105

Email Address	**Responses**	**92.86%**	26
Phone Number	**Responses**	**64.29%**	18

Community: Developers • Facebook • Twitter • LinkedIn • Our Blog • Google+ • YouTube

About Us: Management Team • Board of Directors • Partners • Newsroom • Office Locations • Jobs • Sitemap • Help

Policies: Terms of Use • Privacy Policy • Anti-Spam Policy • Security Statement • Email Opt-In • Accessibility

Language: English • Español • Português • Deutsch • Nederlands • Français • Русский • Italiano • Dansk • Svenska • 日本語 • 한국어 • 中文(繁體) • Türkçe • Norsk • Suomi

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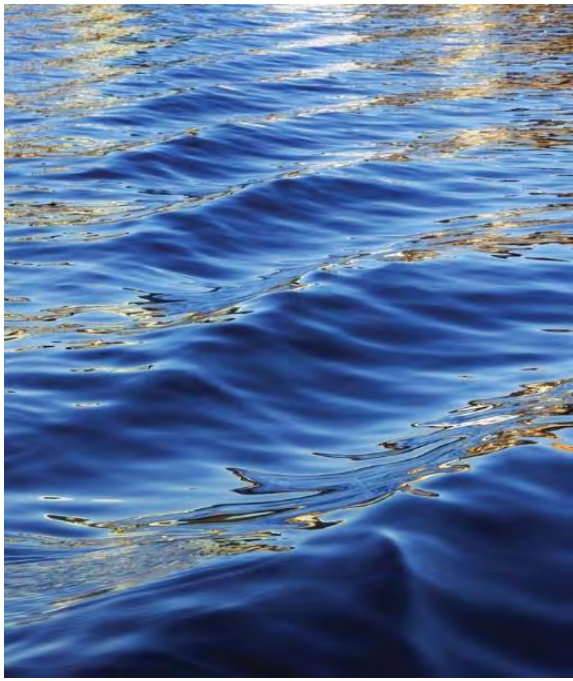
Attachment C

Hazard Mitigation Planning in the City of Alameda



Hazard Mitigation Planning

- What is Hazard Mitigation Planning?
- FEMA required Update to Local Hazard Mitigation Plan
- Invite input on how plan can specifically address the disability community and the social service needs of the people of Alameda
- Alameda Community (people, built environment, economy and society)
- Natural Hazard Identification
- Mitigation strategy

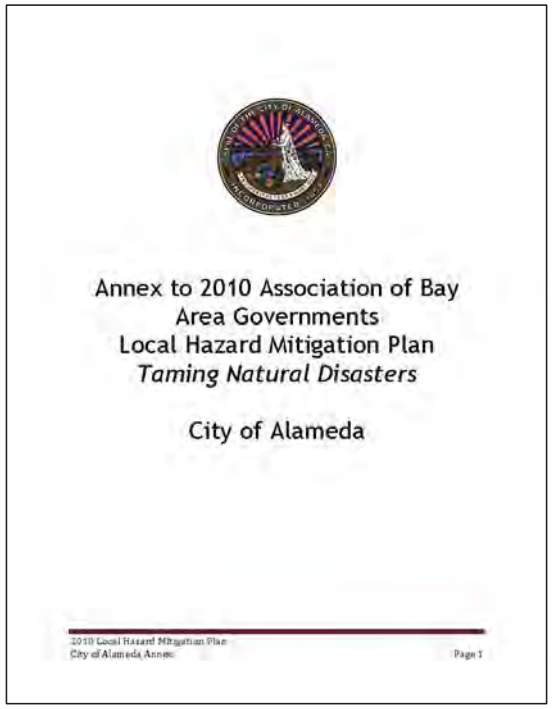
What is Hazard Mitigation Planning?

- Natural disaster that threatens an area.
- Many hazards are predictable.
- Mitigation actions are intended to lessen the impact of known hazards.
- *Hazard Mitigation Planning* - a process that identifies natural hazards that threaten a community, assesses the impacts of those hazards, develops and prioritizes mitigation actions.

Emergency Management Cycle

Local Hazard Mitigation Plan

- Disaster Mitigation Act of 2000 requires a FEMA approved Plan to be eligible for post-disaster funds.
- Plans must be updated every five years.
- Alameda was an Annex to ABAG Regional Plan
- 2015 Update will be City's own plan



Annex to 2010 Association of Bay Area Governments
Local Hazard Mitigation Plan
Taming Natural Disasters

City of Alameda

2010 Local Hazard Mitigation Plan
City of Alameda Annex
Page 1

Public Participation is Critical Component of Planning

- City issued a survey for public input
- Paper copies available tonight or Survey Monkey on City website
- Tonight's meeting is intended to introduce the topic and invite input from this group's unique perspective on community

- An additional public informational meeting will be held late October
- New City website established about hazard mitigation

2015 Update to Local Hazard Mitigation Plan

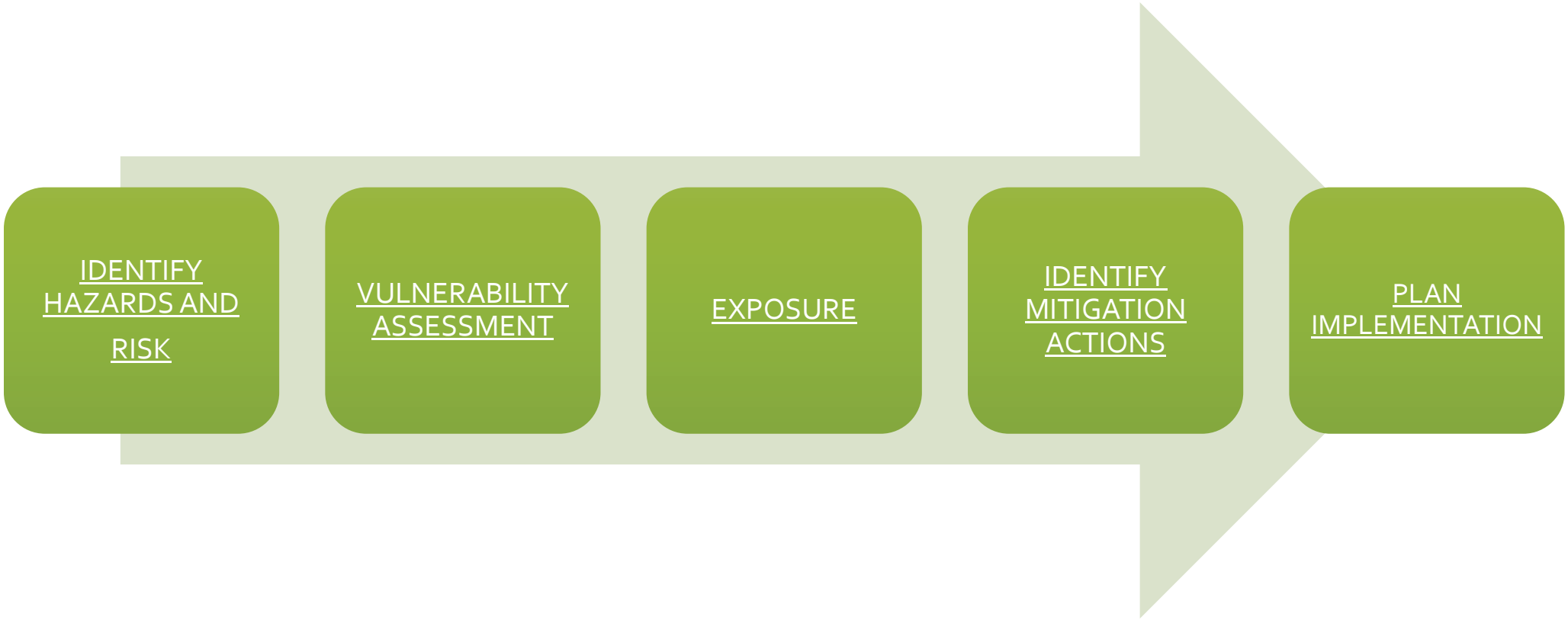
Vision Statement:

The City of Alameda will be better prepared for future hazards by having reduced exposure and reduced short and long term loss due to hazards.

Plan Goals:

- Reduction of hazard exposure where possible.
- Protection of the health, safety and welfare of City of Alameda residents, workers and visitors.
- Minimal damage of public and private property.
- Minimal damage of the natural environment.
- Minimal disruption of essential services, facilities, and infrastructure.
- Timely and complete recoveries.
- Increased understanding and awareness of hazards and hazard mitigation by City employees and the public.

Technical Model for Mitigation Plan



Alameda Community– Population, Age

- 2010 Census: Alameda's population was 73,812.
- ABAG projects City population to grow by 8.8% between 2010 and 2020.
- Alameda's age breakdown is roughly comparable to Alameda County as a whole.

Age Group	Alameda			Alameda County
	1990	2000	2010	2010
Under 15	17.3%	18.0%	17.1%	20.8%
15 – 19	5.1%	5.5%	5.7%	6.4%
20 – 34	31.4%	20.4%	18.3%	23.7%
35 – 54	27.3%	34.0%	31.7%	31.1%
55 – 64	7.2%	8.8%	13.8%	7.8%
65 +	11.7%	13.3%	13.5%	10.2%
Total	100.0%	100.0%	100.0%	100.0%

Alameda Community– People, Economy

- Median income for a household of four in Alameda was $75,832 (2011), which is significantly higher than the county ($70,821) and the Bay Area median ($61,632).
  - More than 1/3 of Alameda households are categorized as lower income.

- 16% of Alamedans report that a family member has a disability.
  - Limited data on geographic distribution

- Alameda is diverse - between 2000 and 2010:
  - non- Hispanic white population declined 12 percent
  - Asians and Pacific Islanders increased by 22 percent
  - Hispanic population (of every race) grew by 20 percent.

Alameda Community – Built Environment

Utilities:

- overhead (power, telecom, cell towers)
- underground (power, telecom, gas, sewer, storm, water)
- Solid waste handling (landfills)
- Abandoned fuel pipelines on Alameda Point.

Transportation:

- streets and pathways
- bridges, tube and overpass, ferry terminal, fueling stations, parking garages, signals
- marinas, docks and waterways

Alameda at a Glance – Built Environment

Buildings

- Residences
- Commercial establishments (basic needs, reconstruction supplies, employment, tax base, banking)
- City, regional, state and federal governmental buildings (first responder facilities)
- Hospitals and Clinics, other medical offices
- Schools, preschools, colleges, Churches
- Assisted living and nursing homes, elder day care
- Substations and telecom switching
- Sewer and storm pump stations
- Historic and architectural resources

Open Space:

- City and Regional parks/playgrounds and school playgrounds, golf course
- Shore protection (riprap), bluffs, marshes, and beaches, Elsie Romer Bird Sanctuary

Hazard Identification and Analysis

Two main natural hazards that threaten Alameda:

- Earthquakes
- Flooding
- Sea level rise

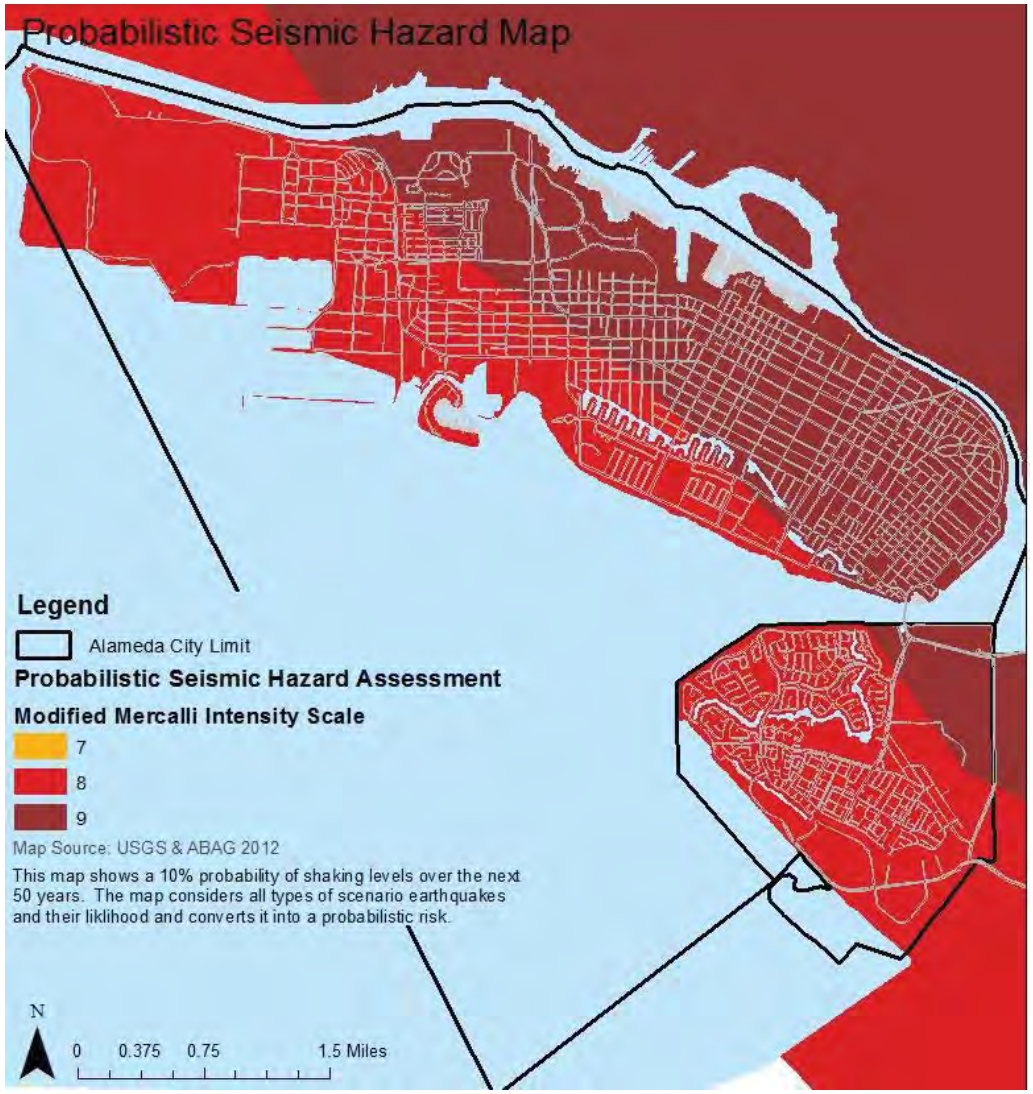
Lesser natural hazards for Alameda:

- Extreme drought
- Extreme heat
- Tsunami

Hazards ruled out as not at likely to occur in Alameda:

- wild land fires, train derailments, landslides, earthquake fault line ground rupture, pipeline explosions, and extreme cold

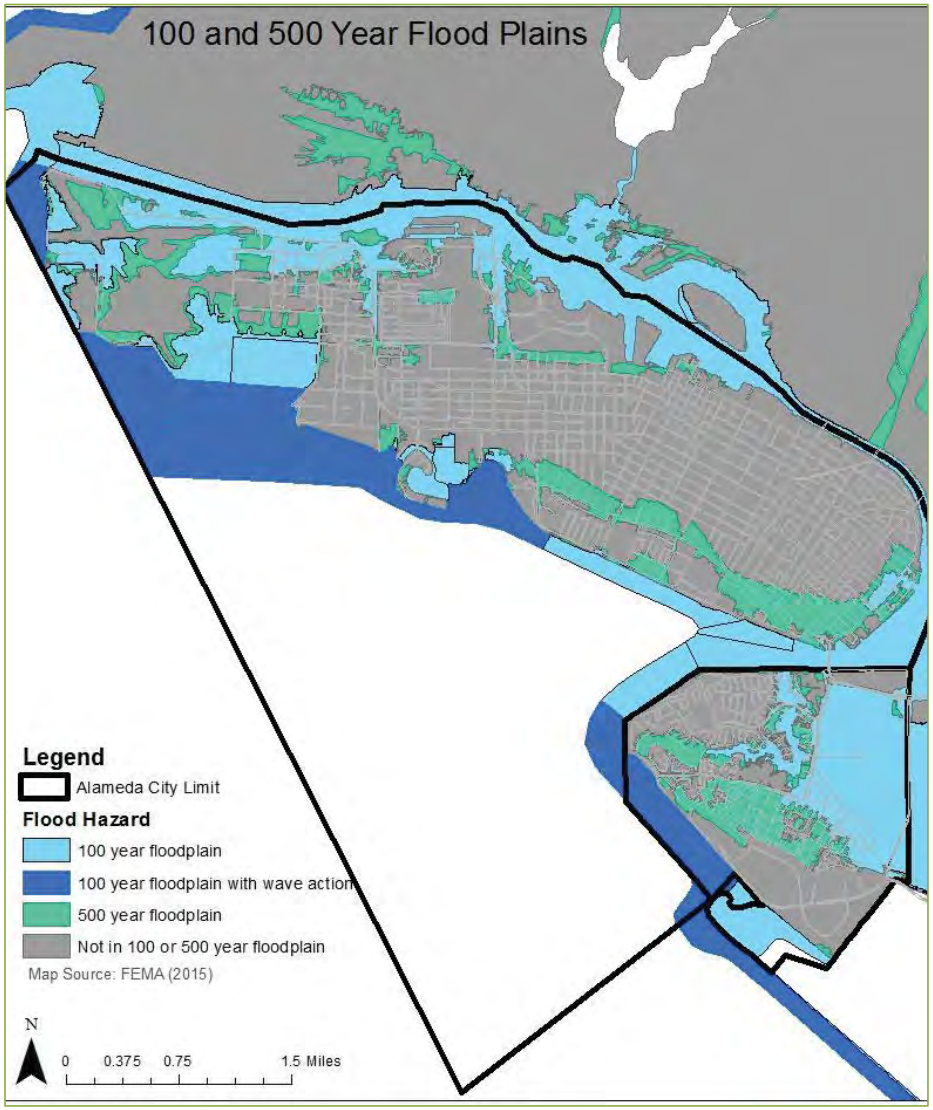
Earthquake Hazard in Alameda



Storm and Tides in Alameda

*100 Year floodplain is the area affected by a storm event having a 1% chance of being equaled or exceeded in any given year.

*500 Year floodplain is the area affected by a storm event having a 0.2% chance of being equaled or exceeded in any given year.



Sea Level Rise

Variability of sea level projections exist in scientific community. After mid century – more uncertainty and variability.

Time Period	Amount of Sea level Rise
2000-2030	1.5 – 12″
2000-2050	5 – 24″
2000-2100	17 – 66″

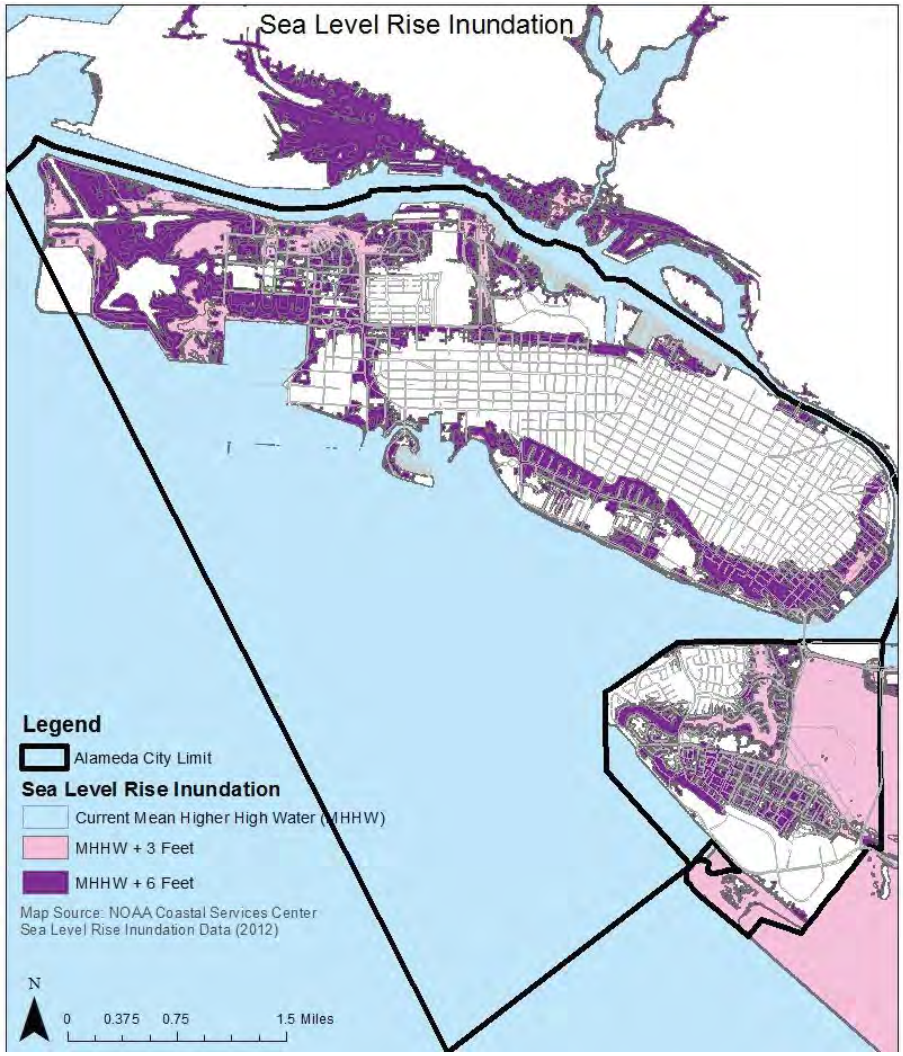


Table Data: Coastal and Ocean Working Group and California Climate Action Team

Mitigation Strategy

Disaster mitigation is a foundational element of disaster resilience.

- Alameda has accomplished a lot towards hazard mitigation
- A lot can still be done
- Public input on identify and prioritize mitigation strategies

Mitigation Accomplishments and Ongoing Activities

Goal: Reduce impact of ground shaking on private and public structure

- **Ongoing Action:** City continues Soft-Story Ordinance, which contains mandatory requirements for seismic retrofit standards.
- **Ongoing Action**: City continues Wood Frame Retrofit Ordinance, which outline voluntary minimum standards to improve the seismic performance of these residential buildings
- **Completed Action:** Unreinforced Masonry Building Retrofit Program addressed all of these building types in the City.
- **Completed Action:** Seismic upgrades at Carnegie Library, City Hall
- **Completed Action:** Construction of Alameda Free Library to modern day seismic standards
- **Ongoing Action:** Bridge retrofitting

Mitigation Accomplishments and Ongoing Activities

Goal: Minimize disruption of essential services, facilities and infrastructure

- **Ongoing Action**: Rehabilitation of 3 miles a year of sewer to a material known better to withstand ground shaking.
- **Ongoing Action:** Renovation of storm and sewer pump stations to better withstand disasters
- **Completed Action:** City upgraded to regional communication system for better performance post disaster
- **Ongoing Action:** Housing Authority performed structural evaluation of all critical senior and low income housing facilities t. Will evaluate, prioritize and secure funding.

Mitigation Accomplishments and Ongoing Activities

Goal: Reduce impact of flooding on private and public structures

- **Ongoing Action:** City continues participation in the National Flood Insurance Program, allowing affordable insurance for property owners and the enforcement of floodplain management regulations.
- **Planned Action:** City participation in the Community Rating System (CRS)
- **Ongoing Action:** Participation in the Adapting to Rising Tides, Oakland/Alameda Resiliency Project

Goal: Protect health, safety, and welfare of people and foster a timely recovery

- **Completed Action:** Information Technology upgrades
- **Planned Action:** Construction of New Emergency Operations Center

Mitigation Accomplishments and Ongoing Activities

Goal: Increase understanding and awareness of hazards and hazard mitigation

- **Ongoing Action:** Community Emergency Response Team (CERT)
- **Ongoing Action**: Maintain new City website dedicated to Hazard Mitigation
- **Ongoing Action**: Map Your Neighborhood" program
- **Planned Action:** Outreach to hospital, schools, nursing homes, etc..

How Else Can You be Prepared & Resilient

Educate yourself (resources here tonight):

- "Earthquake Preparedness Guide for People with Disabilities and other Access or Functional Needs"
- "Prepare for Emergencies Now: Information for Pet Owners"
- "Preparing Makes Send for People with Disabilities, Others with Access and Functional Needs and the Whole Community"
- "Emergency Preparedness: Taking Responsibility for your Safety"

Participate in Mitigation Planning

- The public is welcome and encouraged to participate in the City's Hazard Mitigation planning process.

- Please complete our survey at this link:
  https://www.surveymonkey.com/r/BMK7FJ7
  The City wants to know what hazards you have experienced, what you are concerned about, and what you think the City should do about them.

- Public informational meeting will be held sometime in October/November. Date will be announced on City website: http://alamedaca.gov/hazard-mitigation-planning

- Or, provide your contact information this evening and we can communicate with you directly.

PRESS RELEASE

October 5, 2015
FOR IMMEDIATE RELEASE

Contact:
Laurie Kozisek, Senior Engineer
(510) 747-7940

New Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps Affects Property Owners in Alameda

About 2,000 parcels in the City of Alameda are within the newly identified 100-year floodplain. That means there is a 1% chance that in any one year the property will experience flooding from extreme high tides and storm activity.

People with federally backed building loans that are located in the new 100-year floodplain may be required by their lender to purchase flood insurance. If flood insurance is not required but the property is in the 100-year floodplain, flood insurance should still be considered for the building and contents within it. The cost is fairly low. Typical homeowner and renter insurance does not cover floods.

The Federal Emergency Management Agency (FEMA) issued a Proposed Flood Hazard Determination, with new Flood Insurance Rate Maps (FIRMs) in the Federal Register on September 30, 2015. Effected landowners now have 90 days to appeal the FIRMs. An appeal is an objection to the elevation of the 100-year flood. To appeal, one has to present scientific proof that the base flood elevation was calculated incorrectly. Please note that the City hired a hydrologist to review the work by FEMA. The hydrologist found no flaws in the techniques used to predict the water levels and extent of flooding.

During the appeal period one can also file a protest. A protest is an objection to

anything else on the map. For example, one could protest that their property was recently filled in and is actually higher than the proposed 100-year floodplain. For that, one would need to present evidence from a licensed surveyor or registered civil engineer.

After the close of the appeal period, FEMA will review all appeals and protests, make changes if warranted, and issue a Final Flood Hazard Determination, with the finalized FIRMs. The City must adopt the final maps in order to continue participation in the National Flood Insurance Program, which allows property owners to be eligible for federally subsidized flood insurance, federally backed mortgages, federal grants or federal disaster relief. The final maps are expected to become effective in late 2016.

In addition to the right of appeal, after the maps are effective, the property owner may choose to have their house surveyed to certify that the lowest adjacent grade is above the predicted flood level (known as the Base Flood Elevation). This requires an Elevation Certificate from a licensed surveyor or registered civil engineer. This can then be used to apply for a FEMA Letter of Map Revision based on Fill (LOMR-F) or Letter of Map Amendment (LOMA). Lenders have the option of waiving the insurance requirement if a LOMA or LOMR-F has been approved by FEMA.

Once the new maps are effective, all new and substantially (over 50%) improved structures within the identified 100-year floodplain will be required to obtain an Elevation Certificate and file it with the City.

There are several ways to find out what a property's flood risks are, and how to become more flood resilient:

- Come to an informational meeting on the proposed floodplain maps that will be

presented by City staff from 6:30 to 8 PM on Wednesday, November 4, 2015, at the Poppy Room of the Harbor Bay Community Center, 2195 Mecartney Road. All Alameda residents and property owners are welcome to attend. The Community Center is in the Harbor Bay Landing Shopping Center on Bay Farm Island, behind CVS Pharmacy and Leydecker Park. AC Transit Bus 21 serves this location from Park Street.

- Visit the City of Alameda website, to see maps, informational flyers and links, at http://alamedaca.gov/permits/news/2015/09/29/new-FEMA-maps.
- View paper maps and informational flyers at City Hall, City Hall West, or the Main Library.
- Visit http://msc.fema.gov/portal for general mapping information.
- Visit http://www.floodsmart.gov for information about flood insurance, flood maps, and how to find a local insurance agent.
- Talk with your home owner's or renter's insurance provider.

For those wishing to submit an official appeal or protest during the 90 day appeal period, contact Laurie Kozisek, Associate Civil Engineer, City of Alameda Public Works, 950 West Mall Square, Alameda CA 94501, or phone 510-747-7930, or email LKozisek@alamedaca.gov .

# # # # #

Attachment D

October 5, 2015

New Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps May Affect You

Dear Resident and/or Land Owner,

You are receiving this letter because you own or rent a property within the new FEMA designated 100-year floodplain. That means there is a 1% chance that in any one year your property will experience flooding from extreme high tides and storm activity.

If you have a federally backed loan on your building and are within the 100-year floodplain, you may be required by your lender to purchase flood insurance. If you aren't required to do so, you may want to still consider getting flood insurance on your contents and/or structure. The cost is fairly low.

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During the appeal period you can also file a protest. A protest is an objection to anything else on the map. For example, you could protest that your property was recently filled in and is actually higher than the 100-year floodplain. For that, you would need to present evidence from a licensed surveyor or registered civil engineer.

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In addition to your right of appeal, after the new maps are effective, you may choose to get your house surveyed to certify that the lowest adjacent grade is above the predicted flood level (known as the Base Flood Elevation). This requires that you get an Elevation Certificate from a licensed surveyor or registered engineer. This can then be used to apply for a FEMA Letter of Map Revision based on Fill (LOMR-F) or Letter of Map Amendment (LOMA). Lenders have the option of waiving the insurance requirement if a LOMA or LOMR-F has been approved by FEMA.

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There are several ways to find out what your flood risks are, and how to become more flood resilient:

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Sincerely,

Laurie Kozisek
Associate Civil Engineer

LK:ms

g:\cip\fema flood\prelim map rollout\letter to residents\alameda city firm resident notice 94502 bfi 093015.docx

Attachment D

Accessibility

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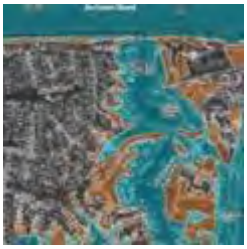

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View and download the maps:
06001C0062H (Alameda Point NW)
https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56597
(https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56597)

06001C0064H (Alameda Point SW)

https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56598 (https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56598)

06001C0066H (Alameda Point NE and Bayport)
https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56599 (https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56599)

06001C0067H (Marina Village)
https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56600 (https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56600)

06001C0068H (Alameda Point SE and Ballena Bay)
https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56601 (https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56601)

06001C0069H (West Alameda Island)
https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56602 (https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56602)

06001C0088H (East Alameda Island)
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06001C0232H (West Bay Farm Island)
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06001C0251H (East Bay Farm Island)

https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56607 (https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownLoadServlet?pfiProdId=56607)

View paper maps and informational flyers at City Hall, City Hall West, or the Main Library

- Talk with your home owner's or renter's insurance provider

Visit FEMA's websites for general mapping and flood resiliency info:

- Information on flood insurance, flood maps and how to find a local insurance agent http://www.floodsmart.gov (http://www.floodsmart.gov/)
- FEMA Map Portal for general mapping info http://msc.fema.gov/portal (http://msc.fema.gov/portal)
- FEMA Publication 495 - Adoption of Flood Insurance Rate Maps by Participating Communities http://www.fema.gov/media-library-data/20130726-1903-25045-4716/fema_495.pdf (http://www.fema.gov/media-library-data/20130726-1903-25045-4716/fema_495.pdf)
- FEMA Region 9 mapping effort in the San Francisco Bay Area http://www.r9map.org/ (http://www.r9map.org/)
- How to File Appeals and Protests http://www.fema.gov/media-library-data/20130726-1627-20490-1536/r6_appeals_protests_supporting_data.pdf (http://www.fema.gov/media-library-data/20130726-1627-20490-1536/r6_appeals_protests_supporting_data.pdf)
- Elevation Certificate and Instructions https://www.fema.gov/elevation-certificate (https://www.fema.gov/elevation-certificate)
- More Flood Preparedness Info http://www.fema.gov (http://www.fema.gov/)
- Direct link for downloading preliminary maps of the City of Alameda and surrounding cities including Oakland, Berkeley and San Leandro https://hazards.fema.gov/femaportal/prelimdownload/ (https://hazards.fema.gov/femaportal/prelimdownload/)

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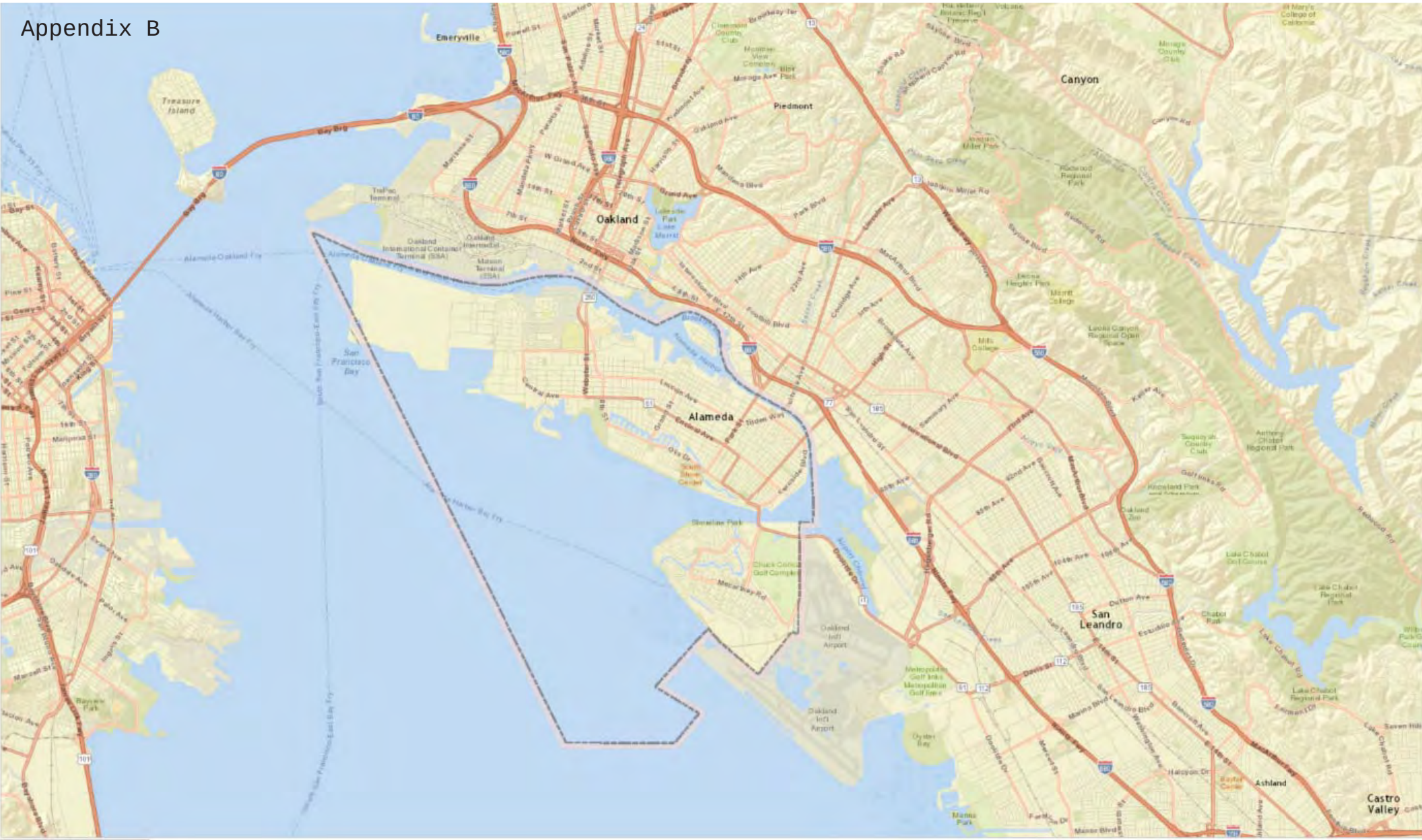
NOTES ABOUT THE DATUM:

The FIRMs use a zero elevation (datum) that is different than local tide tables. These maps use NAVD88, which is a fixed datum used throughout the US. The tide tables use a different local datum or zero at each gage. The Park Street Bridge gage, for example, has a datum that is 1.8 feet lower than NAVD88. So a 7.8 foot tide (tide table datum) would be 6.0 feet in NAVD88. The FEMA maps show the 100-year flood in this area as 10.0 feet NAVD88, which represents an unusually high tide, plus a significant storm surge, to make water levels 4 feet higher than a typical high tide.

loading

Appendix B


Emeryville
Treasure Island
Piedmont
Canyon
Oakland
Alameda
San Leandro
Ashland
Castro Valley
San Francisco Bay

Tsunamis in the San Francisco Bay with Measurements Recorded in Alameda and Oakland

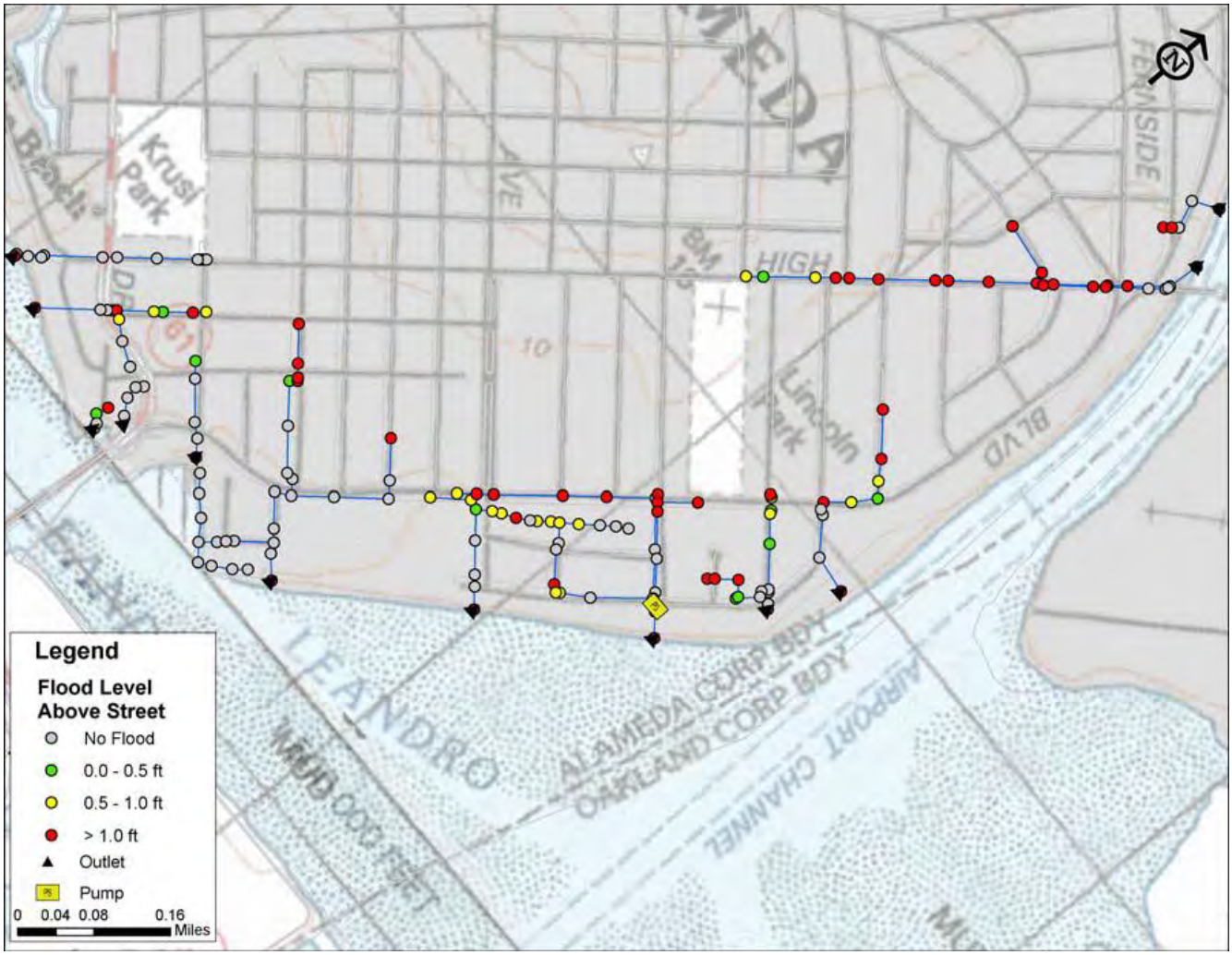
YEAR	LOCATION NAME	LAT	LONG	DIST FROM SOURCE	WATER HT	DAMAGE $M	HORIZ INUND	DEATHS
1868	SAN FRANCISCO BAY NEAR ALAMEDA	37.71	-122.27	15	4.50			
1868	GOVERNMENT ISLAND, CA	37.77	-122.23	14				
1898	OAKLAND, CA	37.8	-122.27	46	0.31			
1946	SAN MATEO, CA	37.58	-122.32	3552	0.03			
1946	SAN FRANCISCO, HUNTERS POINT, CA	37.724	-122.369	3538	0.08			
1946	ALAMEDA, CA	37.79	-122.27	3539	0.20			
1946	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	3525	0.26			
1946	BOLINAS, CA	37.9	-122.68	3505	1.30			
1946	MUIR BEACH, CA	37.86	-122.58	3514	2.00			
1946	PRINCETON, HALF MOON BAY, CA	37.5049409	-122.4869222	3547	2.10	0.02	305	
1946	HALF MOON BAY, CA	37.5017	-122.4866	3547	2.60	0.001		
1952	ALAMEDA, CA	37.79	-122.27	7584	0.02			
1952	SAN FRANCISCO, CA	37.807	-122.465	7569	0.02			
1952	SAUSALITO, CA	37.865	-122.493	7564	0.05			
1952	ALAMEDA, CA	37.79	-122.27	5989	0.40			
1952	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	5976	0.54			
1957	ALAMEDA, CA	37.79	-122.27	4379	0.18			
1957	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	4364	0.26			
1960	ALAMEDA, CA	37.79	-122.27	9817	0.31			
1960	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	9828	0.46			
1960	PACIFICA, CA	37.614	-122.487	9812	1.20			
1960	STINSON BEACH, CA	37.9	-122.63	9845	1.50		15.24	
1960	PRINCETON, HALF MOON BAY, CA	37.5049409	-122.4869222	9802	2.20			
1964	COLLINSVILLE, CA	38.075	-121.85	3115	0.03			
1964	BENICIA, CA	38.05	-122.16	3106	0.06			
1964	ALAMEDA – ALVISO SOUGH , CA	37.42	-121.98	3175	0.18			
1964	POINT SAN PABLO, CA	37.963	-122.428	3104	0.67			
1964	BELVEDERE, CA	37.872	-122.463	3112	0.76			
1964	ALAMEDA – NAVAL AIR STATION, CA	37.79	-122.27	3127	0.80			
1964	SAN PABLO, CA	37.962	-122.419	3104	0.98			

YEAR	LOCATION NAME	LAT	LONG	DIST FROM SOURCE	WATER HT	DAMAGE $M	HORIZ INUND	DEATHS
1964	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	3118	1.13	1		
1964	SAUSALITO, CA	37.865	-122.493	3111	1.20	0.118		
1964	OAKLAND, CA	37.78	-122.24	3129	1.22			
1964	RICHMOND, CA	37.923	-122.365	3110	1.37			
1964	SAN RAFAEL, CA	37.97	-122.52	3100	1.50	0.078		
1964	MUIR BEACH, CA	37.86	-122.58	3108	1.37			
1964	PACIFICA, CA	37.614	-122.487	3136	1.40			
1964	HALF MOON BAY, CA	37.5017	-122.4866	3148	1.50	0.001		
1964	SEACLIFF, CA	37.783	-122.483	3120	1.52			
1964	MARIN COUNTY, CA	38.07	-122.73	3081		1		
1964	BOLINAS, CA	37.9	-122.68	3100				1
1968	ALAMEDA, CA	37.79	-122.27	7710	0.10			
1968	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	7695	0.10			
1992	FORT POINT, CA	37.81	-122.47	326	0.03			
1992	ALAMEDA, CA	37.79	-122.27	337	0.04			
1994	ALAMEDA, CA	37.79	-122.27	7249	0.04			
2006	ALAMEDA, CA	37.79	-122.27	8422	0.04			
2006	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	8410	0.05			
2010	ALAMEDA, CA	37.79	-122.27	9663	0.12			
2010	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	9675	0.32			
2010	HALF MOON BAY, CA	37.5017	-122.4866	9650	0.60			
2011	PORT CHICAGO, CA	38.057	-122.038	7922	0.04			
2011	MARTINEZ, CA	38.0189	-122.13323	7918	0.06			
2011	MARE ISLAND, CA	38.07	-122.25	7906	0.07			
2011	REDWOOD CITY, CA	37.5066	-122.21	7944	0.12			
2011	RICHMOND, CA	37.92833	-122.4	7904	0.35			
2011	ALAMEDA, CA	37.79	-122.27	7922	0.51			
2011	Berkeley Marina, CA	37.87	-122.27	7917	0.51	0.125		
2011	Emery Cove Yacht Harbor, CA	37.8313	-122.2852	7918	0.60			
2011	Pier 39 (SF), CA	37.811	-122.41082	7911	0.60			
2011	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	7907	0.62			
2011	Clipper Yacht Harbor, Sausalito, CA	37.865	-122.493	7901	0.80			

YEAR	LOCATION NAME	LAT	LONG	DIST FROM SOURCE	WATER HT	DAMAGE $M	HORIZ INUND	DEATHS
2011	Waldo Point Marina, Sausalito, CA	37.865	-122.493	7901	1.50			
2011	Pillar Point Harbor, CA	37.5	-122.4833	7925	0.70			
2011	HALF MOON BAY, CA	37.5017	-122.4866	7925	0.70			
2011	Bolinas/Stinson Beach, CA	37.9	-122.68	7886	0.90			
2011	Pacifica, CA	37.614	-122.487	7917	1.00			
2012	RICHMOND, CA	37.92833	-122.4	1815	0.09			
2012	ALAMEDA, CA	37.79	-122.27	1833	0.11			
2012	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	1825	0.14			
2015	RICHMOND, CA	37.92833	-122.4	9349	0.05			
2015	ALAMEDA, CA	37.79	-122.27	9330	0.06			
2015	SAN FRANCISCO, PRESIDIO, CA	37.807	-122.465	9343	0.12			

Source: National Geophysical Data Center / World Data Service (NGDC/WDS): Global Historical Tsunami Database. National Geophysical Data Center, NOAA.doi:10.7289/V5PN93H7, accessed 1130/15

Alameda Eastside Area Existing 25-Year Flooding Depths



Source: Storm Drain Master Plan, Alameda, California, 2008, Schaaf & Wheeler, Appendix A

Figure A-3: Alameda North Central Area Existing 25-Year Flooding Depth

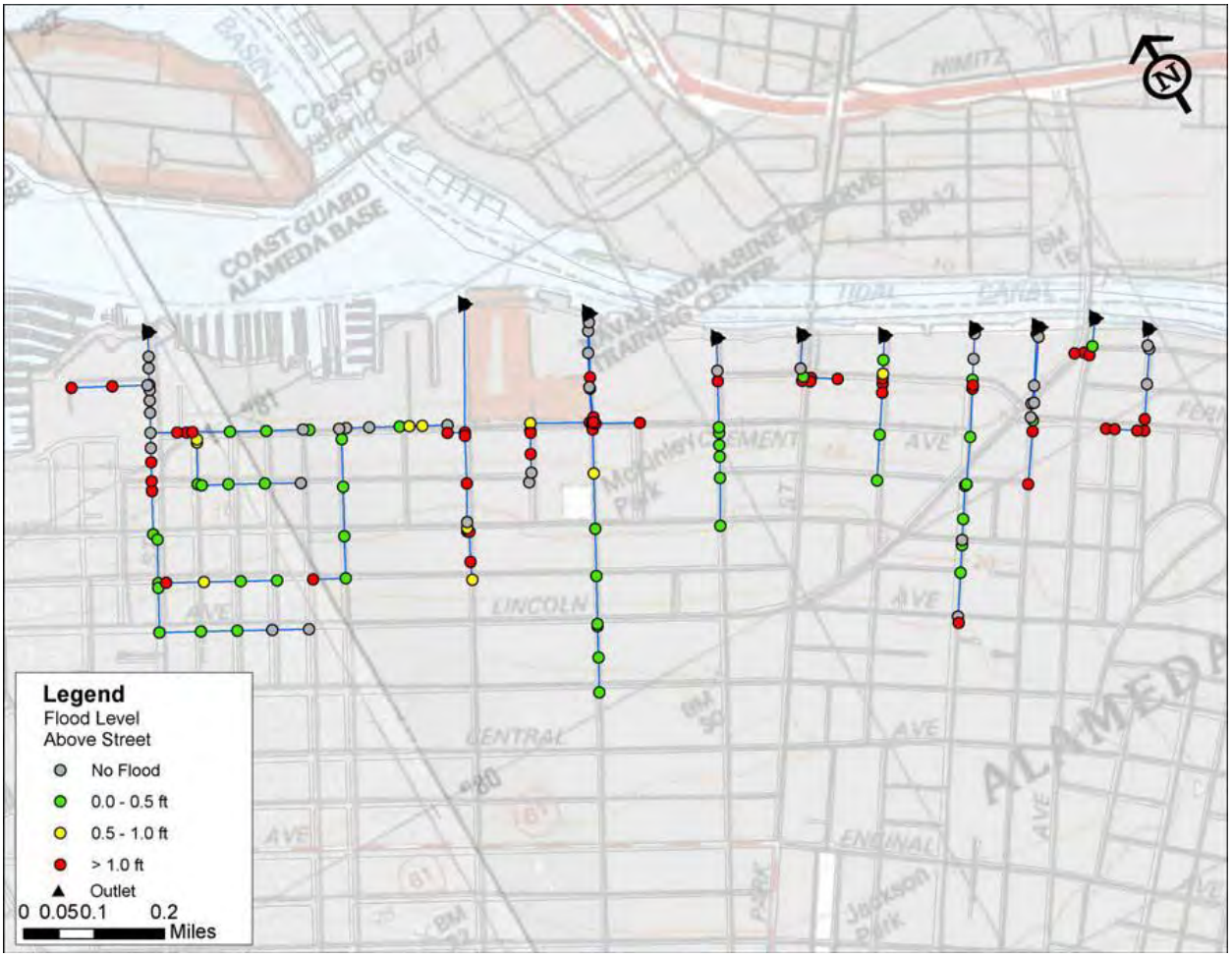


Figure A-5: Alameda Northside Area Existing 25-Year Flooding Depths

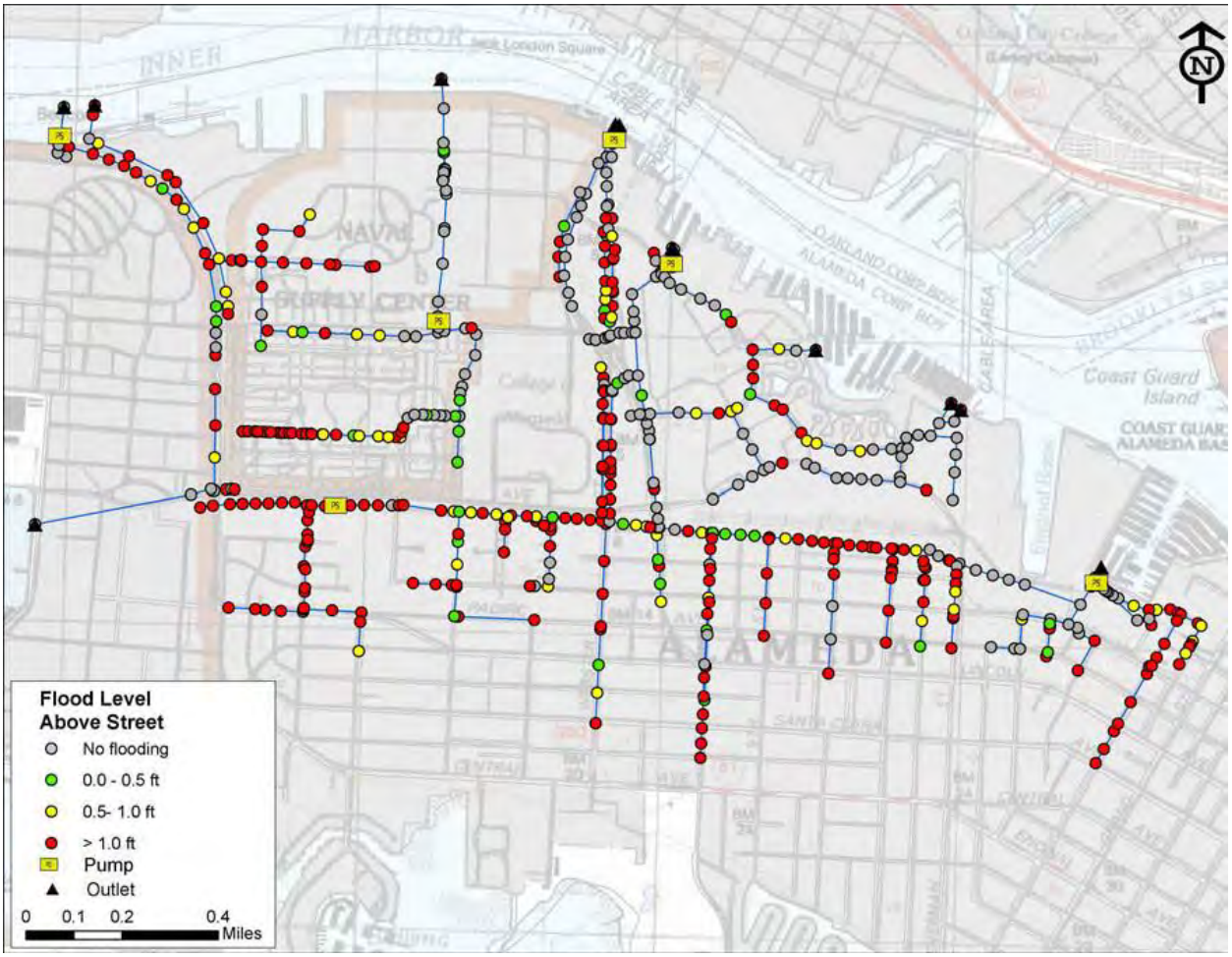


Figure A-7: Alameda South Area Existing 25-Year Flooding Depths

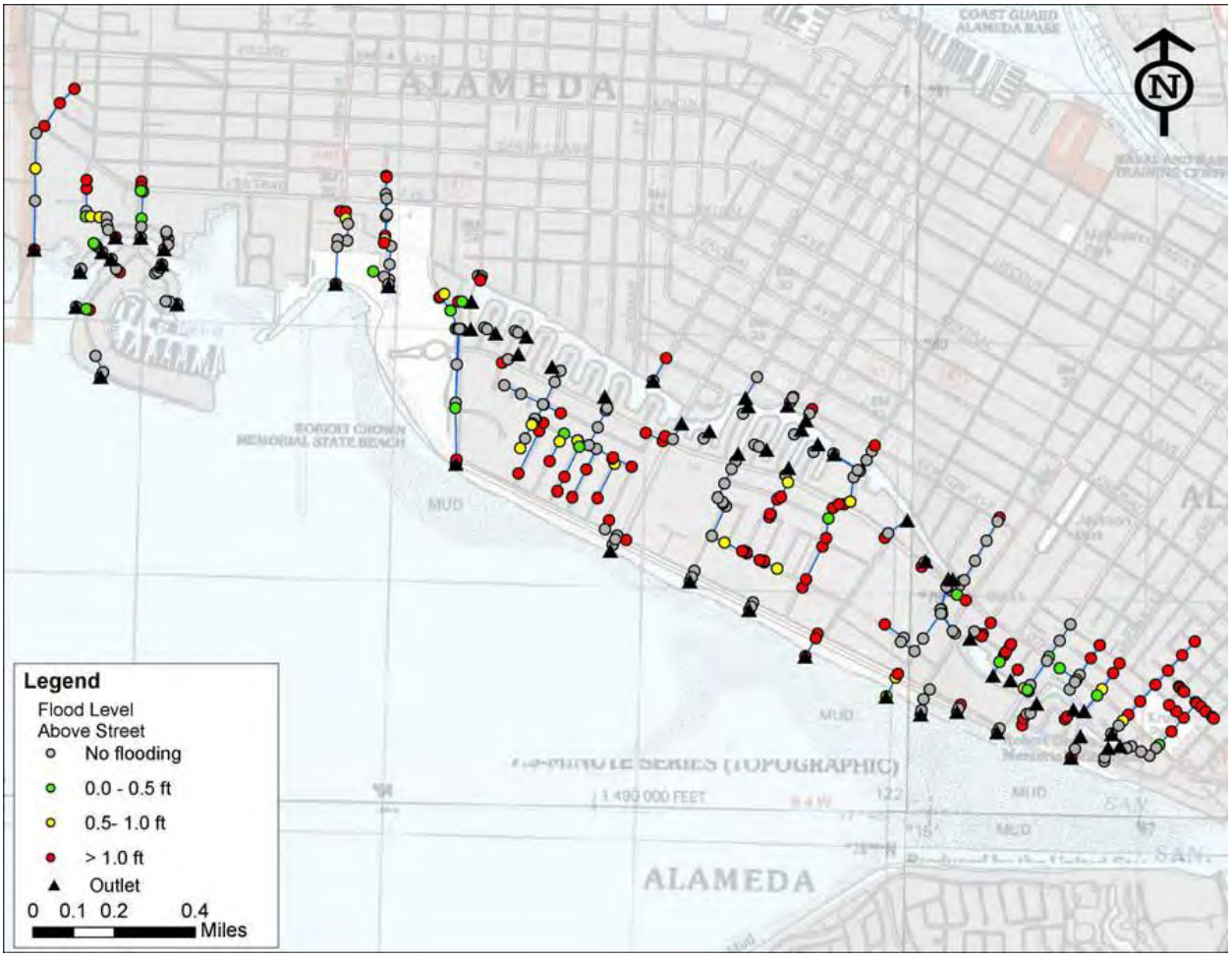


Figure A-9: Bay Farm East Area Existing 25-Year Flooding Depths

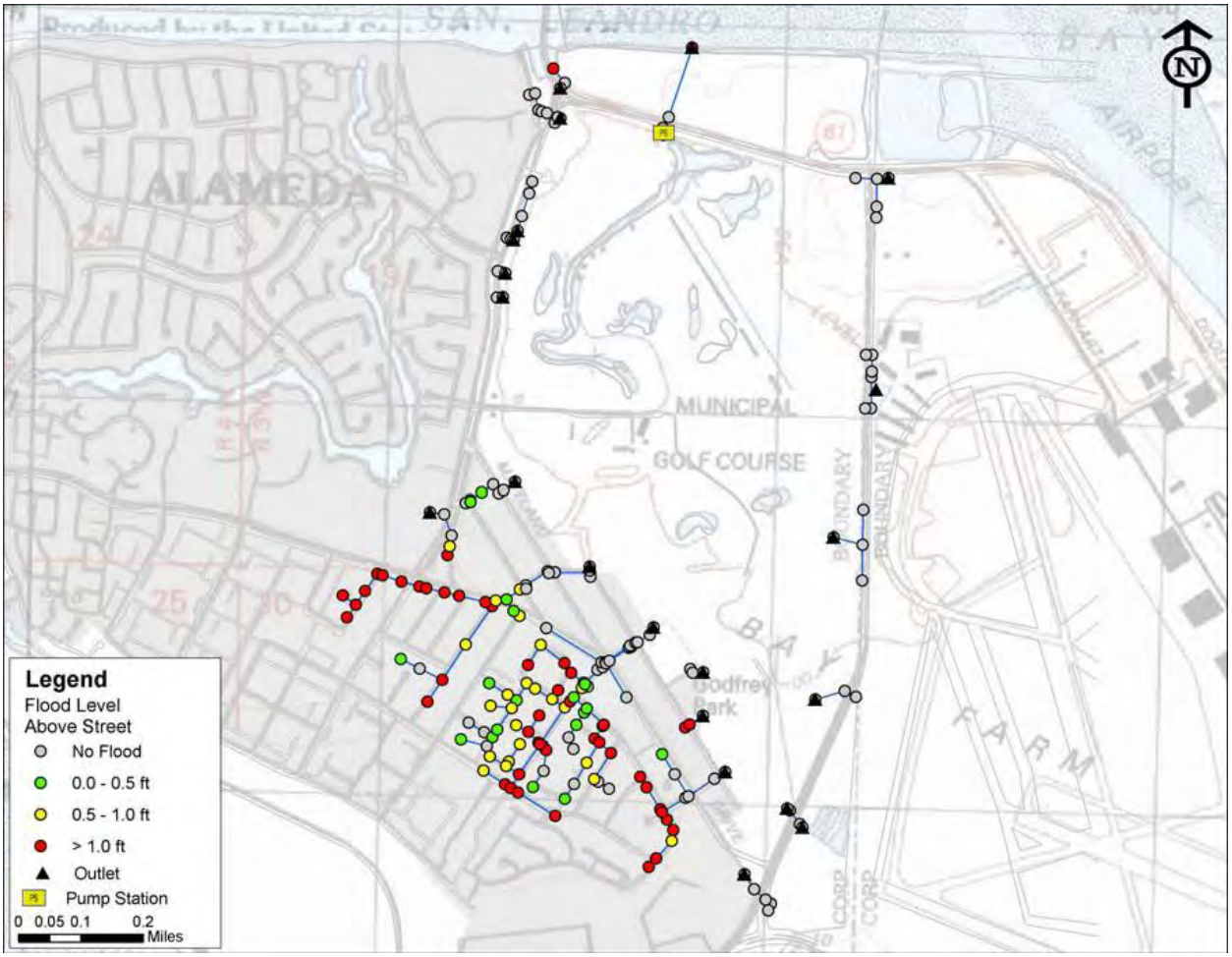


Figure A-11: Bay Farm North Area Existing 25-Year Flooding Depths

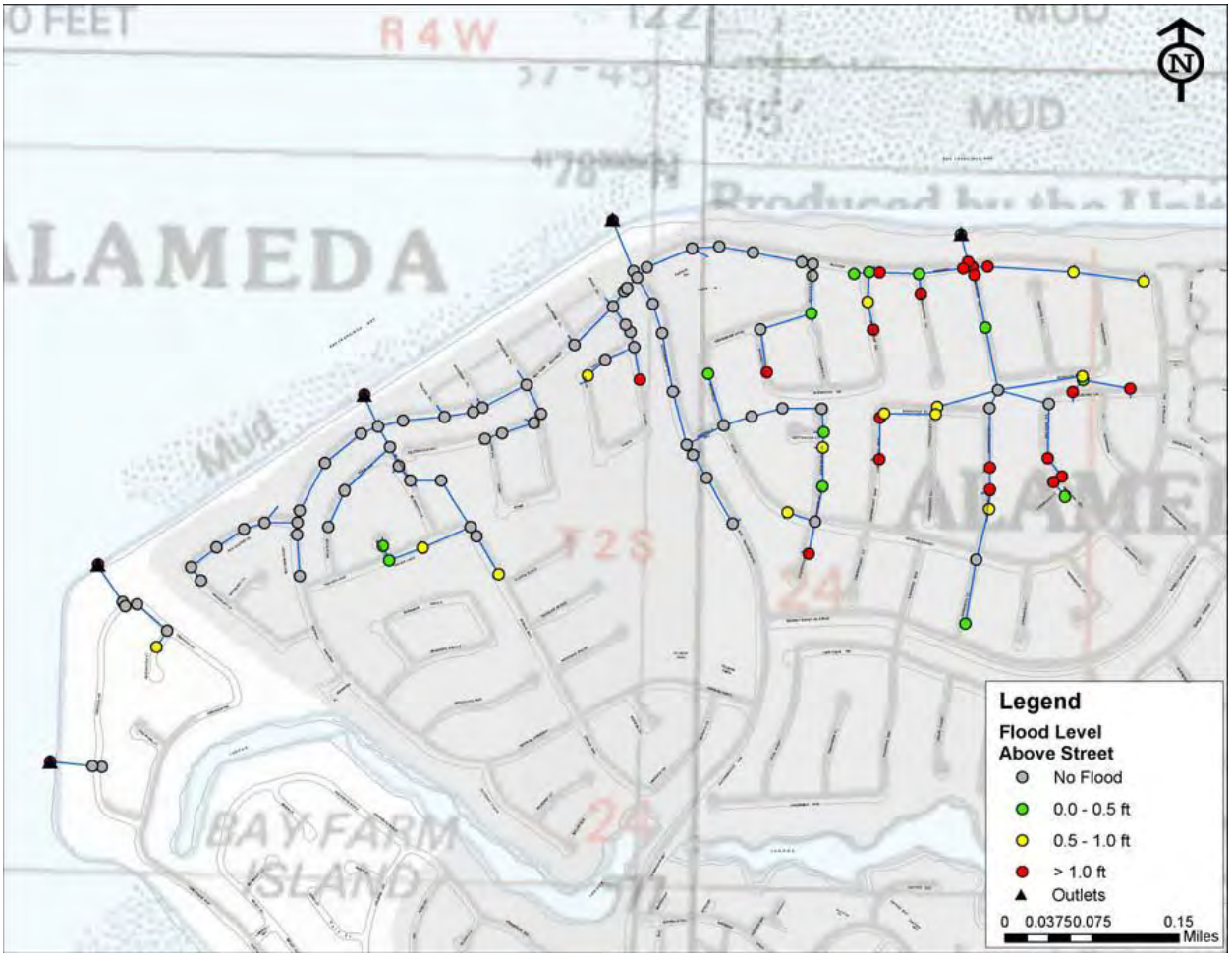


Figure A-13: Bay Farm Central Area Existing 25-Year Flooding Depths

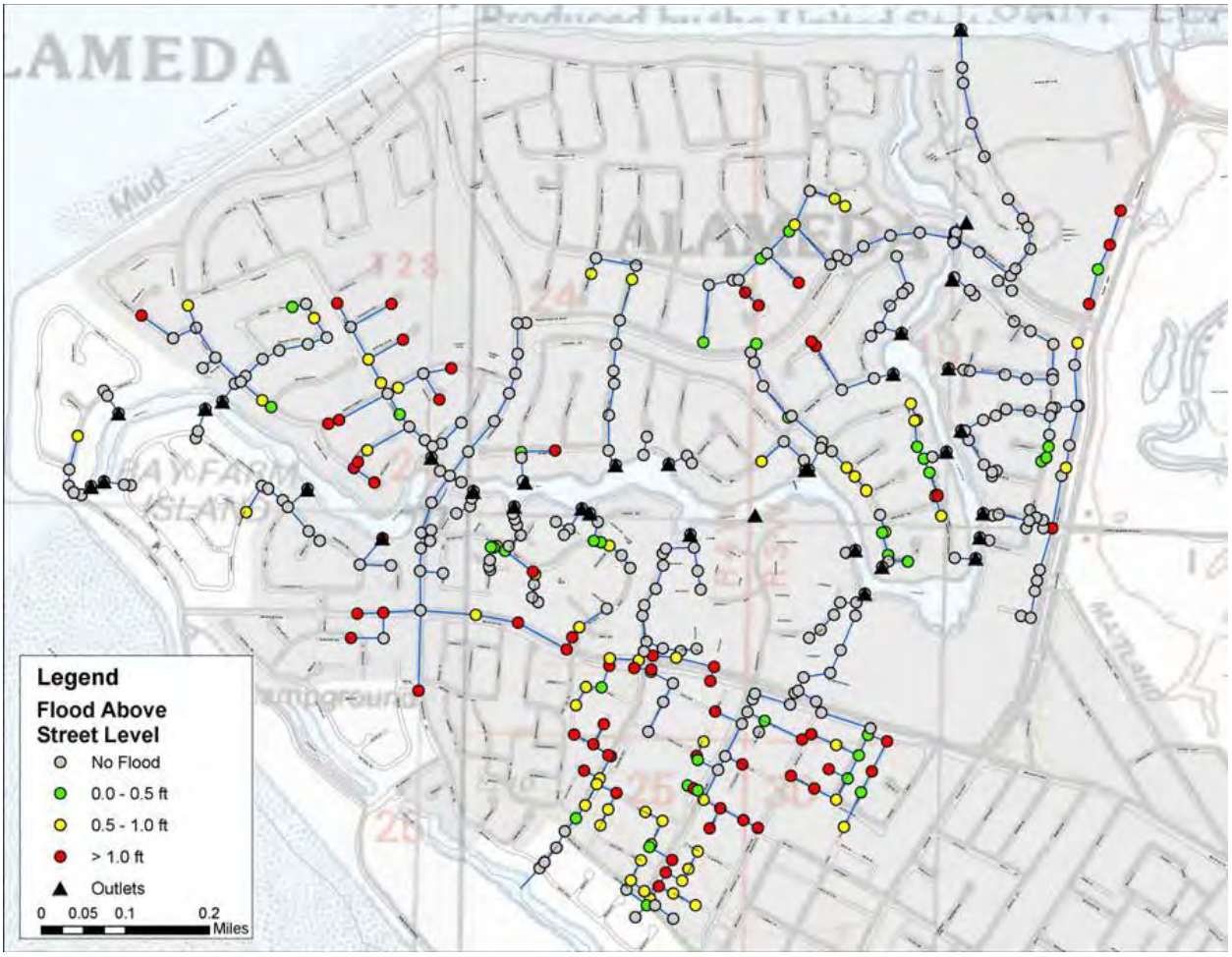


Figure A-15: Bay Farm South Area Existing 25-Year Flooding Depths

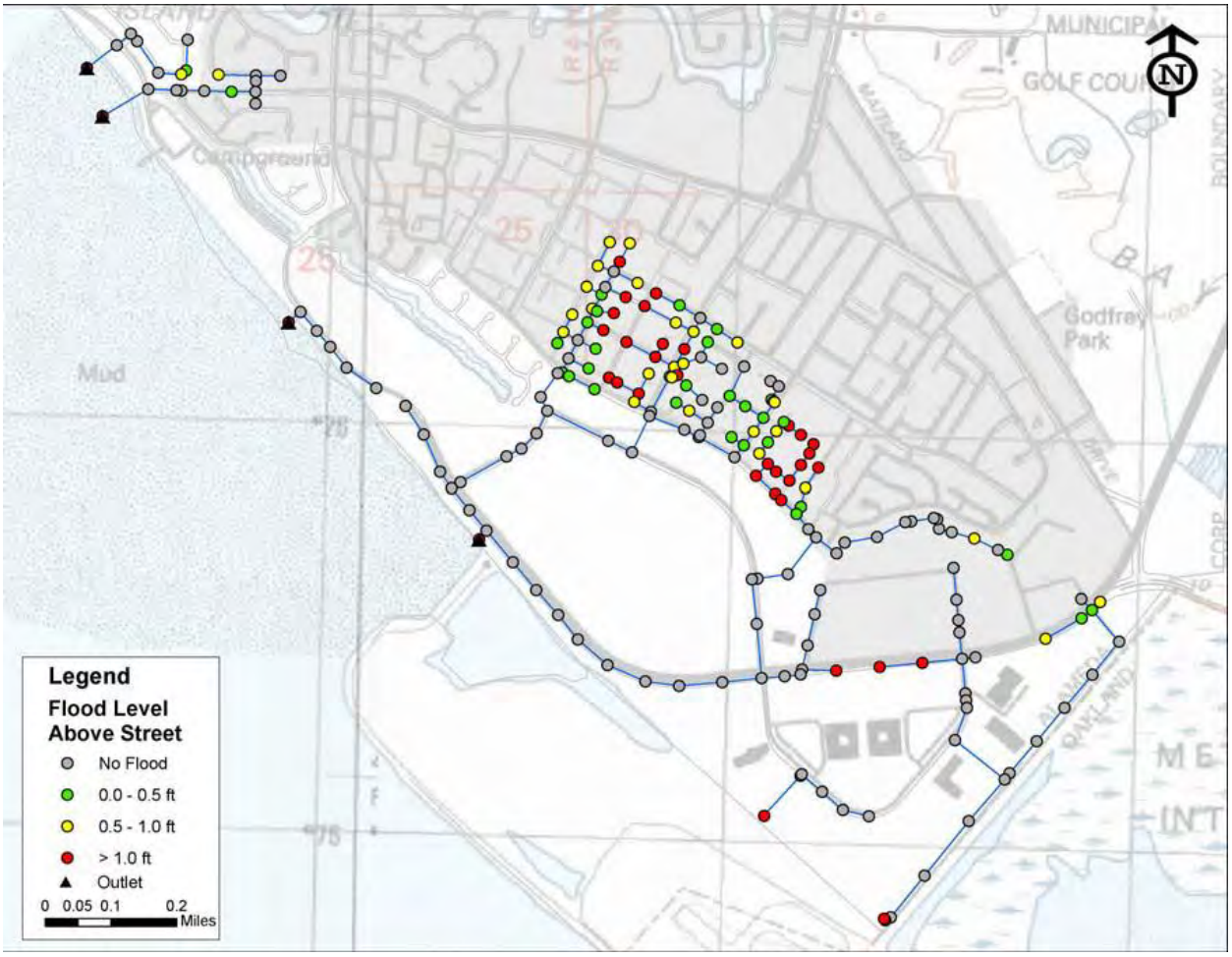


Table A-2: Pumping Station Summary with 25-Year Storm Drain Improvements

Station Name	Location (Watershed)	Year Built or Updated	Design Capacity of Existing Station (GPM)	Actual Station Peak Discharge from Model (GPM)	Additional Req'd Station Discharge (GPM)
Main Street	Alameda Northside	1998	13,500 GPM	11,900 GPM	0 GPM
Third Street	Alameda Northside	1993	1,650 GPM	2,000 GPM	2,000 GPM
Webster Street	Alameda Northside	1947	5,250 GPM	2,400 GPM	0 GPM
Northside (Marina Village)	Alameda Northside	1984	72,000 GPM	89,800 GPM	73,300 GPM
Arbor	Alameda Northside	1994	31,600 GPM	38,200 GPM	57,000 GPM
Central / Eastshore	Alameda Eastside	1967	8,600 GPM	9,100 GPM	13,500 GPM
Bayport	Alameda Northside	2004	42,600 GPM	44,000 GPM	0 GPM
Golf Course	Bay Farm East	1986	19,200 GPM*	GPM	GPM

* Pump design capacity data based on bid documents

Sea Level Rise Inundation

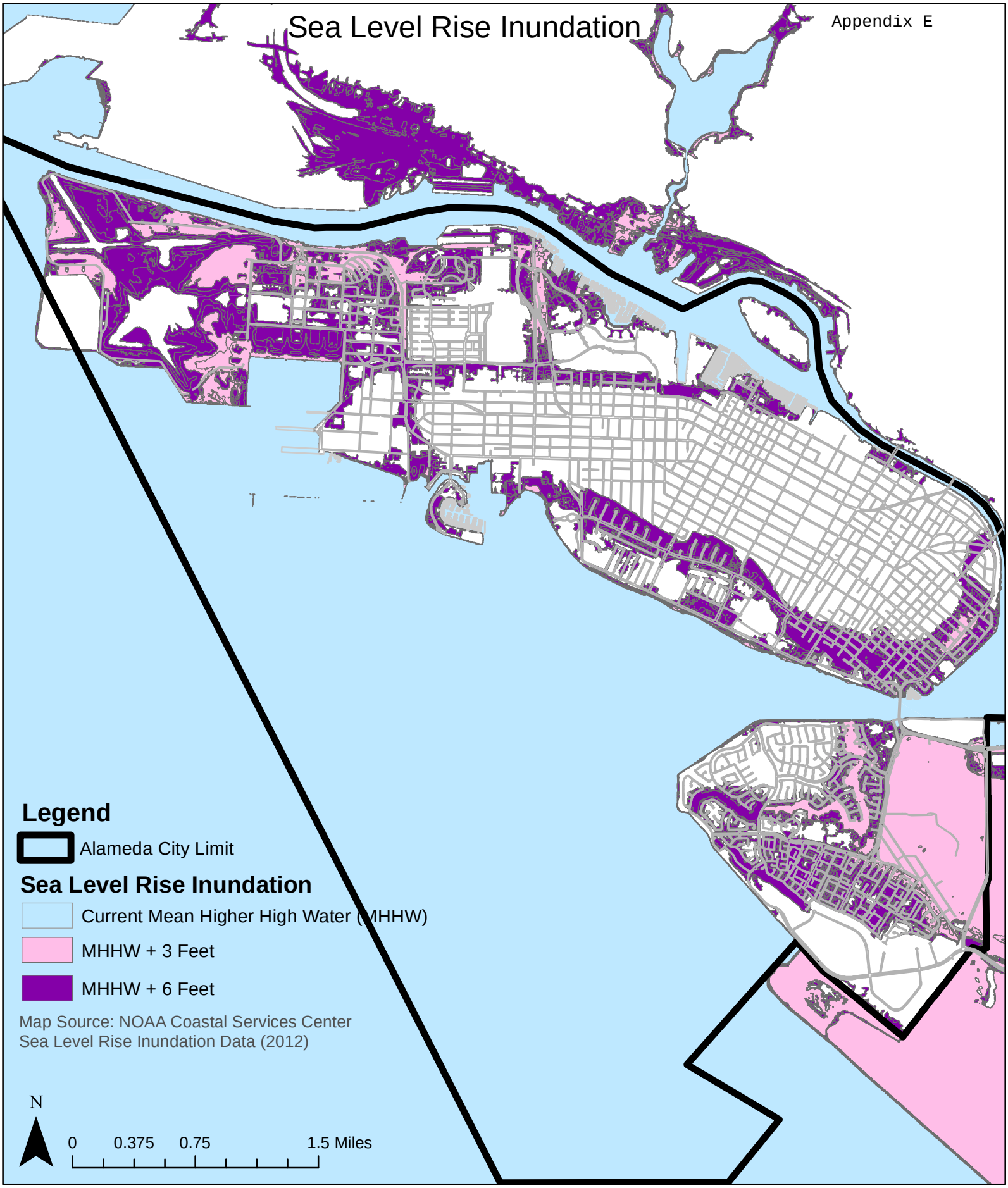


Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
City Bldg	Alameda Municipal Power Office Bldg & Warehouse	2000 Grand St	Alameda Municipal Power	Corp Yard & Offices	Critical	Modern construction
City Bldg	Building 2 Storage	Bldg 2 Alameda Pt	City Hall	Record storage	Low	No data
City Bldg	Central Garage (at City Hall)	2263 Santa Clara Ave	City Hall	Gov't Offices, garage	High	Inspected approx 2010, found to be OK
City Bldg	City Hall	2263 Santa Clara Ave	City Hall	Gov't Offices	Critical	Repaired after tower lost in 1906. Electro/Mechanical retrofits 2012.
City Bldg	City Hall West	950 West Mall Sq	City Hall	Gov't Offices	Critical	Concrete bldg, elec/mech retrofit 2012, no other data
City Bldg	Building 522, Fire Dept Conf Rm	431 Stardust Place	Fire	Gov't Office	Low	No data
City Bldg	Emergency Ops Ctr (under constr)	1850 Grand (approx)	Fire	EOC	Critical	Currently under construction
City Bldg	Fire Sta #3 (current)	1709 Grand	Fire	Fire Sta only	Critical	Apparatus bays retrofit and OK, residence abandoned as not OK
City Bldg	Fire Sta #3 (under constr)	1850 Grand (approx)	Fire	Fire Sta & Residence	Critical	Currently under construction
City Bldg	Fire Sta #3 Residence (current)	1703 Grand	Fire - Leased private home	Firemen's residence	Critical	Short term lease, assume OK
City Bldg	Fire Station 1	2401 Encinal Ave	Fire	Fire Sta & Residence	Critical	Reinforced masonry, no data
City Bldg	Fire Station 2	635 Pacific Ave	Fire	Fire Sta & Residence	Critical	Stucco, no data
City Bldg	Fire Station 4	2595 Mecartney Rd	Fire	Fire Sta & Residence	Critical	Modern construction
City Bldg	Fire Station 5, Building 6	950 W Ranger Ave	Fire	Fire Sta only	Critical	Day use only, 1940s concrete bldg, no data
City Bldg	Golf Driving Range Shop and assoc bldgs	1 Clubhouse Memorial Dr	Golf	Retail	High	No data
City Bldg	Golf Misc Bldgs (6 or more)	1 Clubhouse Memorial Dr	Golf	Maint Bldgs	High	No data
City Bldg	Golf Pro Shop	1 Clubhouse Memorial Dr	Golf	Retail	High	No data
City Bldg	Jim's on the Course	1 Clubhouse Memorial Dr	Golf	Pro Shop, Clubhouse, Restaurant	High	No data
City Bldg	Bay Farm Library	3221 Mecartney Rd	Library	Library	High	Assessed and found OK in 2007
City Bldg	Main Library	1550 Oak St	Library	Library	High	Modern construction
City Bldg	West End Library	788 Santa Clara Ave	Library	Library	High	Retrofit in 2007
City Bldg	Bldg behind Carnegie (old library annex)	1429 Oak St	Planning/Bldg/Dev	Gov't Office	Low	Need for retrofit identified in 1990s
City Bldg	Carnegie Library	2264 Santa Clara	Planning/Bldg/Dev	Unoccupied bldg	Low	According to 2012 doc, already seismically upgraded
City Bldg	Grand Marina Harbormaster's Office	end of Grand St	Planning/Bldg/Dev	Harbormaster Bldg	High	No data
City Bldg	Police Station	1555 Oak St	Police	Police & Jail	Critical	Modern construction, elec/mech upgrades 2012
City Bldg	Animal Shelter	1590 Fortmann	Police/Friends of AAS	Animal Shelter	Critical	No data
City Bldg	Maintenance Service Center	1616 Fortmann	Public Works	Corp Yard & Offices	Critical	Elec/Mech retrofit in 2012, no other data
City Bldg	MSC City Garage	2000 Grand St	Public Works	Repair Garage	Critical	No data
City Bldg	Alameda Point Gym	1101 West Redline Ave	Rec & Park	Rec Ctr, unused pool	High	1940s building, no data
City Bldg	Albert H. Dewit "O" Club	641 West Redline	Rec & Park	Meeting Hall	High	1940s building, no data
City Bldg	Bayport Park Rec Center	301 Jack London	Rec & Park			
City Bldg	Bay Fairview Hall	300 Island Dr	Rec & Park	Meeting Hall	High	Modern construction
City Bldg	Franklin Rec Center and Pool	1432 San Antonio Ave	Rec & Park	Rec Ctr, Outdoor Pool	High	No data
City Bldg	Godfrey Rec Center	301 Beach Rd (approx)	Rec & Park	Rec Ctr	High	Modern construction
City Bldg	Harrison Ctr and Lincoln Park Pool	1450 High St	Rec & Park	Rec Ctr, Pool bldg	High	No data
City Bldg	Jackson Park Bandstand	2430 Encinal Ave	Rec & Park	Bandstand, RR	Low	No data

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
City Bldg	Krusi Rec Center	900 Mound St	Rec & Park	Rec Ctr	High	No data
City Bldg	Leydecker Rec Ceter	3225 Mecartney Rd	Rec & Park	Rec Ctr	High	Modern construction
City Bldg	Littlejohn Rec Center	1401 Pacific Ave	Rec & Park	Rec Ctr , Day Care	High	No data
City Bldg	Longfellow Rec Center	520 Lincoln Ave	Rec & Park	Rec Ctr	High	No data
City Bldg	Mastick Senior Center	1155 Santa Clara Ave	Rec & Park	Senior Center	Critical	Former school, no other data
City Bldg	McKinley Rec Center	2165 Buena Vista Ave	Rec & Park	Rec Ctr	High	No data
City Bldg	Parking Structure	1401 Oak St (approx)	Public Works	Parking Structure	High	Modern construction
City Bldg	Recreation & Park Building	2226 Santa Clara Ave	Rec & Park	Gov't Offices	Critical	No data
City Bldg	Tillman Rec Center	220 Aughinbaugh Wy	Rec & Park	Rec Ctr	High	Modern Construction
City Bldg	Veterans Memorial Building	2203 Central Ave	Rec & Park	Meeting Hall	High	Concrete Bldg, no data
City Bldg	Washington Rec Center	740 Central Ave	Rec & Park	Rec Ctr	High	No data
City Bldg	Woodstock Rec Center	351 Cypress Ave	Rec & Park	Rec Ctr	High	No data
City Bldg	Alameda Recreation & Parks Main Office	2266 Santa Clara Ave	Rec & Park			
City Bldg	Other City Bldgs on Alameda Point	Various	Alameda Point	Various	Low	No data
City Open Space	Chuck Corica Golf Courses	1 Clubhouse Memorial Dr	Rec & Park	Golf Course, RR	High	N/A
City Open Space	City Parking Lots	Various	Public Works	Parking Lot	High	N/A
City Open Space	Thompson Field	2165 Buena Vista Ave	Rec & Park	Park	Low	N/A
City Open Space	Alameda Park and Encinal Boat RAlameda Municipal Power	S. end Central Ave	Rec & Park	Dock, RR	Low	N/A
City Open Space	Bayport Park	301 Jack London	Rec & Park	Park, RR	Low	N/A
City Open Space	BFI Shoreline Park near Brunswick	2801 Seaview Parkway	Rec & Park	Park, RR	Low	N/A
City Open Space	BFI Shoreline Park near Oldcastle	2801 Seaview Parkway	Rec & Park	Park, RR	Low	N/A
City Open Space	BFI Shoreline Park on HBI	2801 Seaview Parkway	Rec & Park	Park, RR	Low	N/A
City Open Space	Bill Osborne Model Airplane Field	Doolittle Dr	Rec & Park	Park	Low	N/A
City Open Space	Cityview Skatepark	1177 West Redline Ave	Rec & Park	Park	Low	N/A
City Open Space	Elsie Romer Bird Sanctuary	S. of Bayview	Rec & Park	Open space	Low	N/A
City Open Space	Estuary Park (future)	Mosley Ave	Rec & Park	Open space	Low	N/A
City Open Space	Franklin Park	1432 San Antonio Ave	Rec & Park	Park	Low	N/A
City Open Space	Godfrey Park	301 Beach Rd (approx)	Rec & Park	Park	Low	N/A
City Open Space	Grand Street Boat	North End of Grand	Rec & Park	Boat RAlameda Municipal Power	High	N/A
City Open Space	Harrington Field	3400 Oleander Ave	Rec & Park	Park, RR	Low	N/A
City Open Space	Hornet Field	W. Hornet Ave	Rec & Park	Park, RR?	Low	N/A
City Open Space	Jackson Park	2430 Encinal Ave	Rec & Park	Park	Low	N/A
City Open Space	Jean Sweeny Park (future)	S. of Atlantic	Rec & Park	Open space	Low	N/A
City Open Space	Krusi Park	900 Mound St	Rec & Park	Park	Low	N/A
City Open Space	Lexington Fields					
City Open Space	Leydecker Park	3225 Mecartney Rd	Rec & Park	Park	Low	N/A
City Open Space	Lincoln Park	1450 High St	Rec & Park	Park, RR	Low	N/A
City Open Space	Linear Park	~2001 Main St	Rec & Park	Park	Low	N/A
City Open Space	Littlejohn Park	1401 Pacific Ave	Rec & Park	Park	Low	N/A

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
City Open Space	Longfellow Park	520 Lincoln Ave	Rec & Park	Park	Low	N/A
City Open Space	Main St Dog Park	Main St & Navy Way	Rec & Park	Dog Park	Low	N/A
City Open Space	Main St Soccer Field	~1900 Main St	Rec & Park	Park	Low	N/A
City Open Space	Marina Cove Waterfront Park	1591 Clement Ave	Rec & Park	Park	Low	N/A
City Open Space	Marina Village Shoreline Park	N. of Independence	Rec & Park	Park	Low	N/A
City Open Space	McKinley Park	2165 Buena Vista Ave	Rec & Park	Park	Low	N/A
City Open Space	Multi Purpose Fields	W. Red Line Ave	Rec & Park	Park, RR?	Low	N/A
City Open Space	Neptune Park	2301 Webster St	Rec & Park	Park	Low	N/A
City Open Space	Portola Triangle (undeveloped)	S. of Portola	Rec & Park	Open space	Low	N/A
City Open Space	Rittler Park	1400 Otis Dr	Rec & Park	Park	Low	N/A
City Open Space	Scout Park	Powell St	Rec & Park	Park	Low	N/A
City Open Space	Shoreline Beach	Shoreline Drive	Rec & Park	Beach, RR	High	N/A
City Open Space	Tillman Park	220 Aughinbaugh Wy	Rec & Park	Park	Low	N/A
City Open Space	Towata Park	3315 Bridgeway Isle	Rec & Park	Park	Low	N/A
City Open Space	Veterans Park	Veterans Ct	Rec & Park	Park	Low	N/A
City Open Space	Washington Dog Park AKA Alameda Dog Park	1200 Eighth St (approx)	Rec & Park	Dog Park	Low	N/A
City Open Space	Washington Park	740 Central Ave	Rec & Park	Park, RR	Low	N/A
City Open Space	Woodstock Park	351 Cypress Ave	Rec & Park	Park, RR	Low	N/A
City Open Space	City-owned portions of Alameda Point	Various	Alameda Point	Open space	Low	N/A
Non-City Open Spac	Crown Beach Park	McKay Ave	EBRPD/State	Park, RR	High	N/A
City Utility	Cartwright Substation	90 Atlantic Ave	Alameda Municipal Power	Utility Bldg & Yard	Critical	No data
City Utility	East Transfer Station	2000 High St	Alameda Municipal Power	Utility Yard	Critical	No data
City Utility	Jenny substation	2179 Clement Av	Alameda Municipal Power	Utility Bldg & Yard	Critical	No data
City Utility	West Transfer Station	Webster Tube at Estuary	Alameda Municipal Power	Utility Yard	Critical	No data
City Utility	Building 2 Telecom Switch Sta	Bldg 2 Alameda Pt	Alameda Municipal Power or IT?	Utility Bldg	Critical	No data
City Utility	Doolittle Landfill	N. of Doolittle Dr	Public Works	Utility - Landfill	Critical	No info (leakage and burning unit)
Non-City Bldg	Alameda County Municipal Ct	Shoreline	County	Offices	Critical	No data
Non-City Bldg	US Post Office	Southshore	USPS	Post Office	Critical	No data
Non-City Bldg	All buildings on Coast Guard Island	Coast Guard Island	US Coast Guard	Military Base	Critical (some)	No data
Non-City Bldg	All Coast Guard Housing	Singleton	US Coast Guard	Military Housing	Low	No data
Non-City Bldg	All non-City Alameda Point Buildings	Various	US Navy	Various	Low	No data
Non-City Open Spac	Crown Beach Park	McKay Ave	EBRPD/State	Park, RR	High	N/A
Non-City Bldg	Crab Cove Visitors Center	McKay Ave	EBRPD/State	Visitors Center	Moderate	No data
Non-City Bldg	College of Alameda	555 Atlantic Ave	Peralta Colleges	College, Day Care	High	No data
Non-City Bldg	Alameda Head Start - Sue Matheson Center	670 West Midway	AHS	Child Day Care	High	No data
Non-City Bldg	ALAMEDA ADULT SCHOOL	401 Pacific Ave	AUSD	School	High	No data
Non-City Bldg	ALAMEDA HS, Emma Hood Swim Ctr	2201 Encinal Ave	AUSD	School	High	No data

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
Non-City Bldg	AUSD Woodstock Child Development Center	190 Singleton Ave	AUSD	Child Day Care	High	No data
Non-City Bldg	BAY FARM ELEM & MS	200 Auginbaugh	AUSD	School	High	No data
Non-City Bldg	EARHART ELEMENTARY	400 Packet Landing Dr	AUSD	School	High	No data
Non-City Bldg	EDISON ELEMENTARY	2700 Buena Vista	AUSD	School	High	No data
Non-City Bldg	FRANKLIN ELEMENTARY	1433 San Antonio Ave	AUSD	School	High	No data
Non-City Bldg	HENRY HAIGHT ELEMENTARY	2025 Santa Clara Ave	AUSD	school	High	No data
Non-City Bldg	Island HS, Cal Safe Infant Care, Head Start	1900 Third St	AUSD	School, Child Day Care	High	No data
Non-City Bldg	LINCON MIDDLE SCHOOL	1250 Fernside Blvd	AUSD	school	High	No data
Non-City Bldg	LUM ELEMENTARY/WOOD MIDDLE	420 Grand St	AUSD	School	High	No data
Non-City Bldg	MAYA LIN ELEM	825 Taylor	AUSD	School, Day Care	High	No data
Non-City Bldg	OTIS ELEMENTARY	3010 Filmore St	AUSD	School	High	No data
Non-City Bldg	PADEN ELEMENTARY	444 Central Ave	AUSD	School	High	No data
Non-City Bldg	RUBY BRIDGES ELEMENTARY	351 Jack London	AUSD	School	High	No data
Non-City Bldg	Woodstock Ctr, Various Schools & Child Care	500 Pacific Ave	AUSD	School, Day Care	High	No data
Non-City Bldg	ENCINAL HS & Pool, Jr. Jets MS, Ala. CLC, NEA CLC	210 Central Ave	AUSD	School	High	No data
Non-City Bldg	ABC Preschool	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Bayside Montessori Association	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Child Education Center-Kathleen Seabolt	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Child Unique Montessori School	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Fuzzy Caterpillar	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	ICRI of Alameda Child Care Center	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Jean Wonderful Child Care	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Kiddie KAlameda Municipal Powerus Cooperative Play School	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Kindercare Learning Center	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Little Seeds Childrens Center	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Luna's Montessori Bilingual School	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Lynn Chen	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Marriann Cassidy	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Park Avenue Child Care	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Peter Pan Learning Center	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Peter Pan Preschool/Infant Center	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Rising Star Montessori School	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Rising Star School	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Small Size big Mind Preschool & Infant Ctr	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Son Rise Preschool	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Son-Light Preschool	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Star Bright Child Care	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Sugar and Spice	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Sui Ying Feng	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Suzhen Zhen	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	The Child Unique Montessori School	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Tiny Treasures Preschool	*Address on File w City*	Private	Child Day Care	Moderate	No data

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
Non-City Bldg	Veronica Carraza	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Wee Care Preschool and Child Care	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Xiulan Wu and Huilian Shangguan	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Yanhong Li	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Yanyi Ma	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	Zazueiro Cucchiara	*Address on File w City*	Private	Child Day Care	Moderate	No data
Non-City Bldg	St Joseph Notre Dame Schools	*Address on File w City*	Catholic Chuch	School	High	No data
Non-City Bldg	St. Barnabas School	*Address on File w City*	Catholic Chuch	School	High	No data
Non-City Bldg	St. Joseph Elementary School	*Address on File w City*	Catholic Chuch	School	High	No data
Non-City Bldg	Alameda Chinese Christian School	*Address on File w City*	Private	School	High	No data
Non-City Bldg	Saint Philip Neri Catholic Elementary	*Address on File w City*	Catholic Chuch	School	High	No data
Non-City Bldg	Althea Riley-Franklin	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Anita Stevens	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Catherine Cook	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Chang Zhu	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Chikako Narahara	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Colleen Bang	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Elizabeth Rollins-Rucker	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Elizabeth Rollins-Rucker	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Esguerra	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Fredeswinda Wilkins	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Iluminada Dela Cruz	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Ivette Fagel	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Janette Howard	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Jian Li	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Josephine Esguerra	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Josephine Quale	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Las Semillas Coop School	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Lourdes Curry	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Marva Lyons	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Norma Washington-Palmer	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Rachel Rodrigues	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Roberta Meno	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Rosemarie & Alan Sapalicio	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Sandra Reyes	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Shaosun Zhu	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Shu Fang Huang	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Sun-Mui Chow	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Tenisha Tatom	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Veronica Carraza	*Address on File w City*	Private	Family Day Care	Moderate	No data
Non-City Bldg	Wenyan Shi	*Address on File w City*	Private	Family Day Care	Moderate	No data

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
Non-City Bldg	Non-Ductile Concrete Buildings built before 1980	*Draft List on File w City*	Public and Private	Various	Moderate	No data
Non-City Bldg	China Clipper Plaza	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Eagle Village	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Esperanza	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Lincoln House	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Parrot Gardens	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Parrot Village	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Rosefield Village	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Sherman House	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Stanford house	*Address on File w City*	Housing Authority	Section 8 Housing	Moderate	No data
Non-City Bldg	Shinsei Gardens	*Address on File w City*	Private	Section 8 Housing	Moderate	No data
Non-City Bldg	The Breakers at Bayport	*Address on File w City*	Private	Section 8 Housing	Moderate	No data
Non-City Bldg	The Park Alameda	*Address on File w City*	Private	Section 8 Housing	Moderate	No data
Non-City Bldg	Alameda Elder Services	*Address on File w City*	Housing Authority	Housing Offices	Moderate	No data
Non-City Bldg	Anne B. Diament Senior Plaza	*Address on File w City*	Housing Authority	Senior Section 8 Housing	Moderate	No data
Non-City Bldg	Independence Plaza Senior Housing	*Address on File w City*	Housing Authority	Senior Housing	Moderate	No data
Non-City Bldg	Lincoln Willow Apartments	*Address on File w City*	Housing Authority	Senior Section 8 Housing	Moderate	No data
Non-City Bldg	Senior Codominiums (various)	*Address on File w City*	Housing Authority	Senior Section 8 Housing	Moderate	No data
Non-City Bldg	Jack Capon Villa	*Address on File w City*	Private	Housing for People with De	Moderate	No data
Non-City Bldg	Golden Age of Channing II	*Address on File w City*	Housing Authority	Elder Care	High	No data
Non-City Bldg	Sunset Home for the Elderly	*Address on File w City*	Housing Authority	Elder Care	High	No data
Non-City Bldg	Waters Edge Lodge	*Address on File w City*	Housing Authority	Elder Care	High	No data
Non-City Bldg	Golden House Adult Dev. Center	*Address on File w City*	Private	Adult Day Care	High	No data
Non-City Bldg	Autumn Residential Care Home	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Bay Harbour Residential Care Home	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Elders Inn on Webster	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Golden Age Bayside II	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Golden Age of Sweet Rd	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Goldencare Assisted Living, Inc	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Sandcreek Lodge	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Sea Breeze Care Home, Inc	*Address on File w City*	Private	Elder Care	High	No data
Non-City Bldg	Waters Edge	*Address on File w City*	Private	Health Care Facility	High	No data
Non-City Bldg	Alameda Care Center	*Address on File w City*	Private	Skilled Nursing	High	No data
Non-City Bldg	Bay View Nursing & Rehab Center	*Address on File w City*	Private	Skilled Nursing	High	No data
Non-City Bldg	CROWN BAY NURSING&REBAB CENTER	*Address on File w City*	Private	Skilled Nursing	High	No data
Non-City Bldg	Marina Garden Nursing Center	*Address on File w City*	Private	Skilled Nursing	High	No data
Non-City Bldg	South Shore Convalescent Hospital	*Address on File w City*	Private	Skilled Nursing	High	No data
Non-City Bldg	The Waters Edge	*Address on File w City*	Private	Skilled Nursing	High	No data
Non-City Bldg	Alameda Hospital	2070 Clinton Ave	Ala Hosp	Hospital	High	No data

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
Non-City Bldg	686 Soft Story Buildings	Various - See Map	Privately Owned	Residence	Low	Soft Story needs retrofit
Non-City Bldg	Alameda Museum	2324 Alameda Ave	Private	Museum	Moderate	No data
Non-City Bldg	Alameda Naval Air Museum	2151 Ferry Point	Private	Museum	Moderate	No data
Non-City Bldg	Hornet Museum	707 W. Hornet Ave	Private	Museum	Moderate	No data
Non-City Bldg	Pinball Museum	1510 Webster St	Private	Museum	Moderate	No data
Non-City Bldg	Rythmics Culture Works	Blanding	Private	Art House	Moderate	No data
Non-City Bldg	Altarena Playhouse	High Street	Private	Art House	Moderate	No data
Non-City Bldg	Meyer's House & Garden Museum	2021 Alameda Av	Alameda Museum	Museum	Moderate	No data, built 1897

Non-City Bldg	All other residences				Low	
Non-City Bldg	All other commercial/industrial/institutional				Moderate	

Recovery Priority: Critical = Life/Safety issues or needed for recovery within 1 week
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Low = Needed for property owner's recovery, but alternative available

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
City Utility	Cartwright Substation	90 Atlantic Ave	Alameda Municipal Power	Utility Bldg & Yard	Critical	No data
City Utility	East Transfer Station	2000 High St	Alameda Municipal Power	Utility Yard	Critical	No data
City Utility	Jenny substation	2179 Clement Av	Alameda Municipal Power	Utility Bldg & Yard	Critical	No data
City Utility	West Transfer Station	Webster Tube at Estuary	Alameda Municipal Power	Utility Yard	Critical	No data
City Utility	Building 2 Telecom Switch Sta	Bldg 2 Alameda Pt	Alameda Municipal Power or IT?	Utility Bldg	Critical	No data
City Utility	Wireless Telecom (Cell, wifi)	see Utility list	IT?	Towers	Critical	No data
City Utility	Doolittle Landfill	N. of Doolittle Dr	Public Works	Utility - Landfill	Critical	No info (leakage and burning unit)
City Utility	Sani Sewer Pump Stations (42)	Various	Public Works	Utility Bldg	Critical	Currently retrofitting all
City Utility	Storm Sewer Pump Stations (10)	Various	Public Works	Utility Bldg	Critical	No data
City Utility	Sanitary Sewer Pipes	Various	Public Works	Utility Lines	Critical	No data
City Utility	Storm Dain Pipes and Culverts	Various	Public Works	Utility Lines	Critical	No data
City Utility	Alameda West Lagoon Bayview Weir Structure	Various	Public Works	Utility Structure	Critical	No data
City Utility	HBI Lagoon I & II Pumps, Gates & Weirs	Various	Public Works	Utility Structure	Critical	No data
City Utility	Power Lines, Overhead and Underground	Various	Alameda Municipal Power	Utility Lines	Critical	No data
City Utility	Signals and Interconnects	Various	Public Works	Utility Poles and Lines	Critical	No data
City Utility	Street Lights on Signal Poles	Various	Public Works	Utility Poles	Critical	No data
City Utility	Street Lights	Various	Alameda Municipal Power	Utility Poles	Moderate	No data
Non-City Utility	Alameda West Lagoon Intake	Shoreline Dr	AWLHOA	Pump & Line	High	No data
Non-City Utility	Alameda West Lagoon Willow Weir Structure	Willow St	AWLHOA	Utility Structure	High	No data
Non-City Utility	Telecom Lines	Various	Various Telecoms	Utility Lines	Critical	No data
Non-City Utility	Gas Lines	Various	PG&E	Utility Lines	Critical	No data
Non-City Utility	Sewer Trunk Lines	Various	EBMUD	Utility Lines	Critical	No data
Non-City Utility	Water Lines	Various	EBMUD	Utility Lines	Critical	No data
Non-City Utility	Main Island Drain - BFI - sewer	Near BFI bridge	EBMUD	Estuary xing	Critical	No info, drains BFI to Main Island
Non-City Utility	Main Island Drain - West - sewer	Near Marina Village	EBMUD	Estuary xing	Critical	No info
Non-City Utility	Main Island Feed - BFI- water	At BFI bridge	EBMUD	Estuary xing	Critical	In environmental phase to replace, as of Aug 2015
Non-City Utility	Main Island Feed - East - water	Extension of Broadway	EBMUD	Estuary xing	Critical	In environmental phase to replace, as of Aug 2015
Non-City Utility	Main Island Feed - West - recycled water	Near tubes	EBMUD	Estuary xing	Critical	Proposed for 2017
Non-City Utility	Main Island Feed - West - water	Near Marina Village	EBMUD	Estuary xing	Critical	In environmental phase to replace, as of Aug 2015
Non-City Utility	Main Island Feed - BFI - gas	Near Doolittle	PG&E	Estuary xing	Critical	Not sure if it exists, or its status
Non-City Utility	Main Island Feed - BFI - power	Near Doolittle	PG&E	Estuary xing	Critical	Not sure if it exists, or its status
Non-City Utility	Main Island Feed - East - power	Near Park St	PG&E	Estuary xing	Critical	On PG&Es radar
Non-City Utility	Main Island Feed - Oakland - gas	Near Park St ?	PG&E	Estuary xing	Critical	On PG&Es radar
Non-City Utility	Main Island Feed - West - power	Near tubes	PG&E	Estuary xing	Critical	On PG&Es radar
Non-City Utility	Main Island Feed - Telecom	various	various	Estuary xing	Critical	No info

Recovery Priority: Critical = Life/Safety issues or needed for recovery within 1 week
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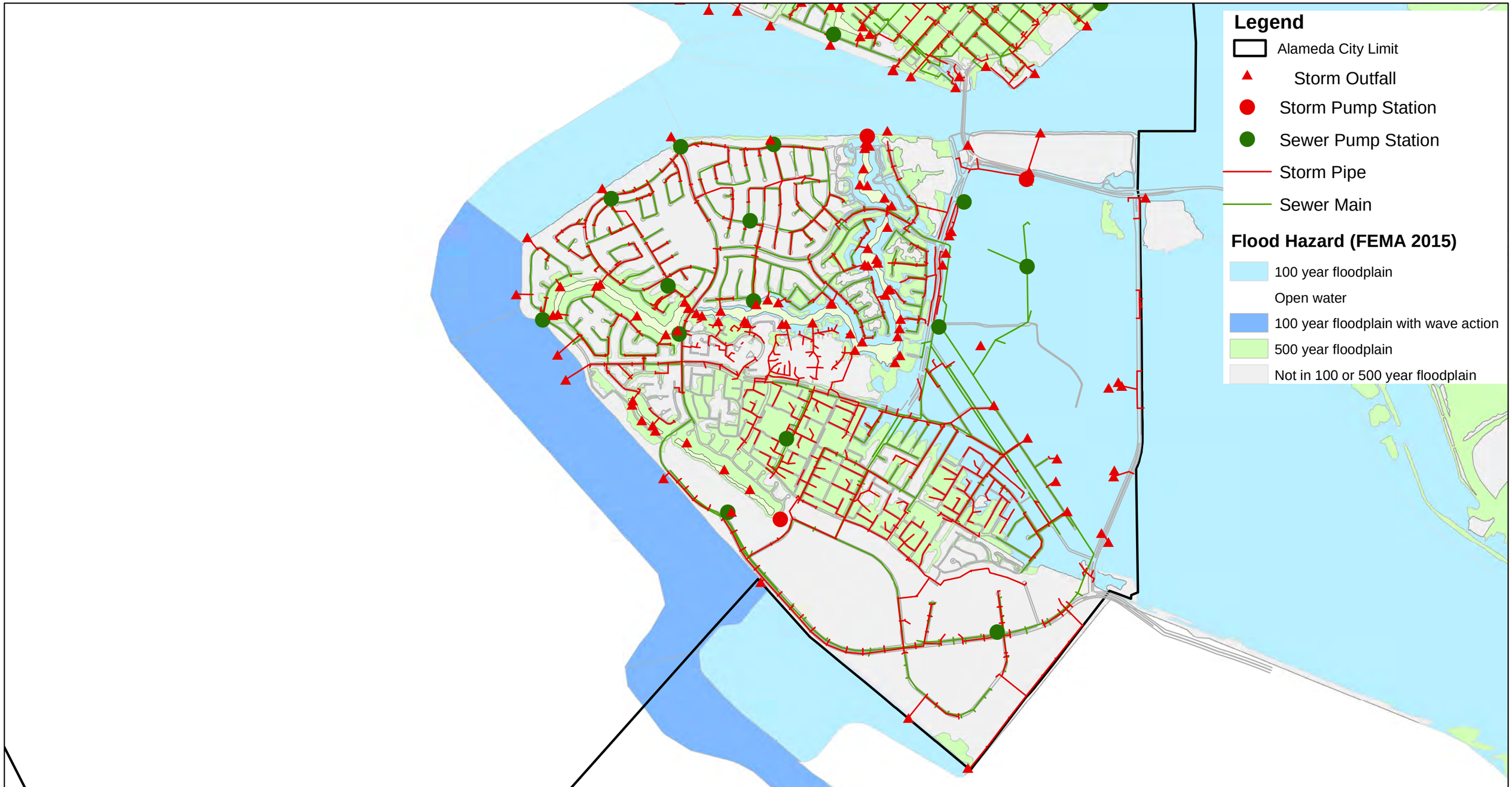
Low = Needed for property owner's recovery, but alternative available

Location of City Sewer and Storm Facilities in Relation to FEMA Proposed 100 and 500 Year Flood Zones

Page 1 of 2

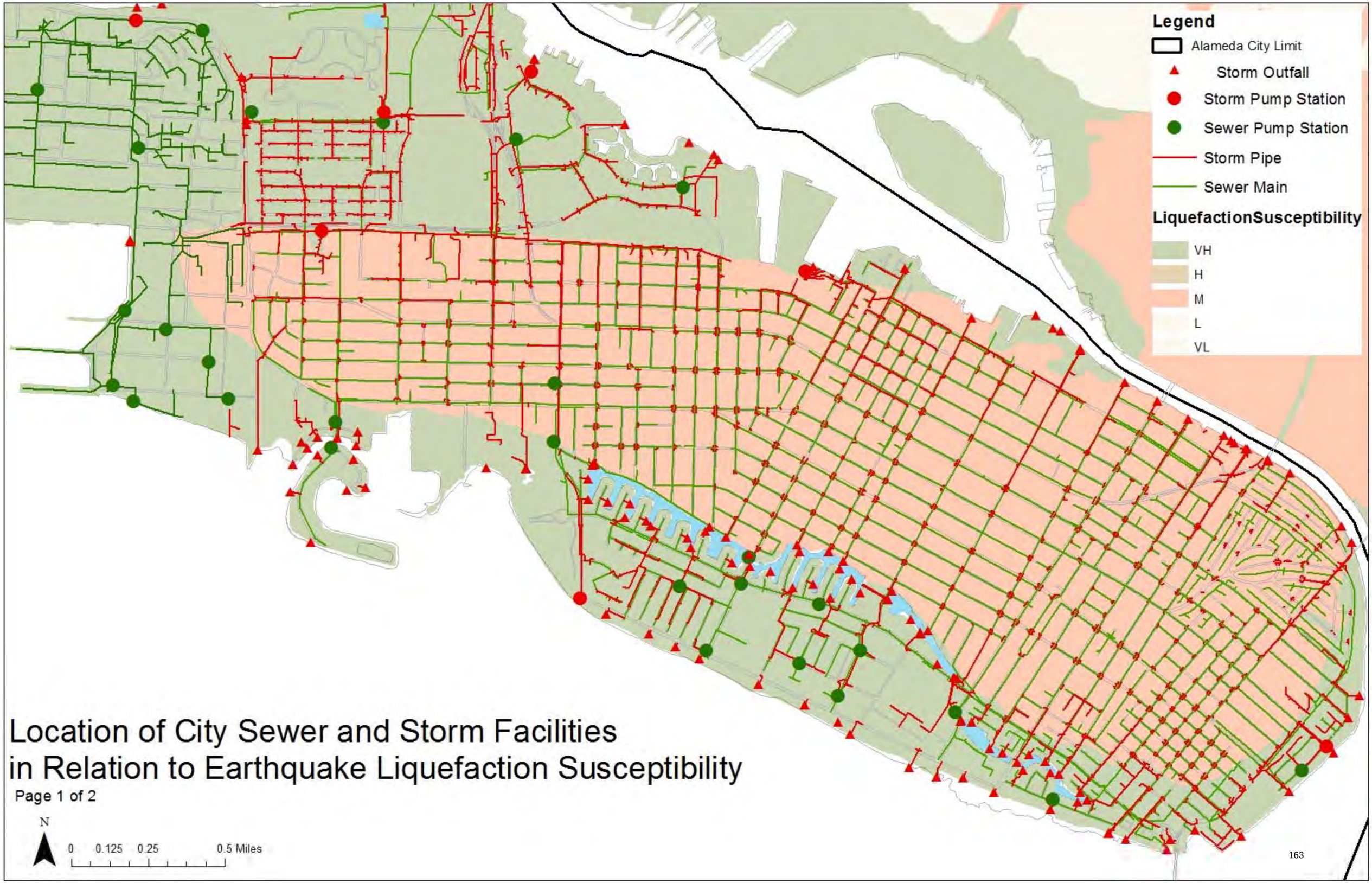


Location of City Sewer and Storm Facilities in Relation to FEMA Proposed 100 and 500 Year Flood Zones

Page 2 of 2

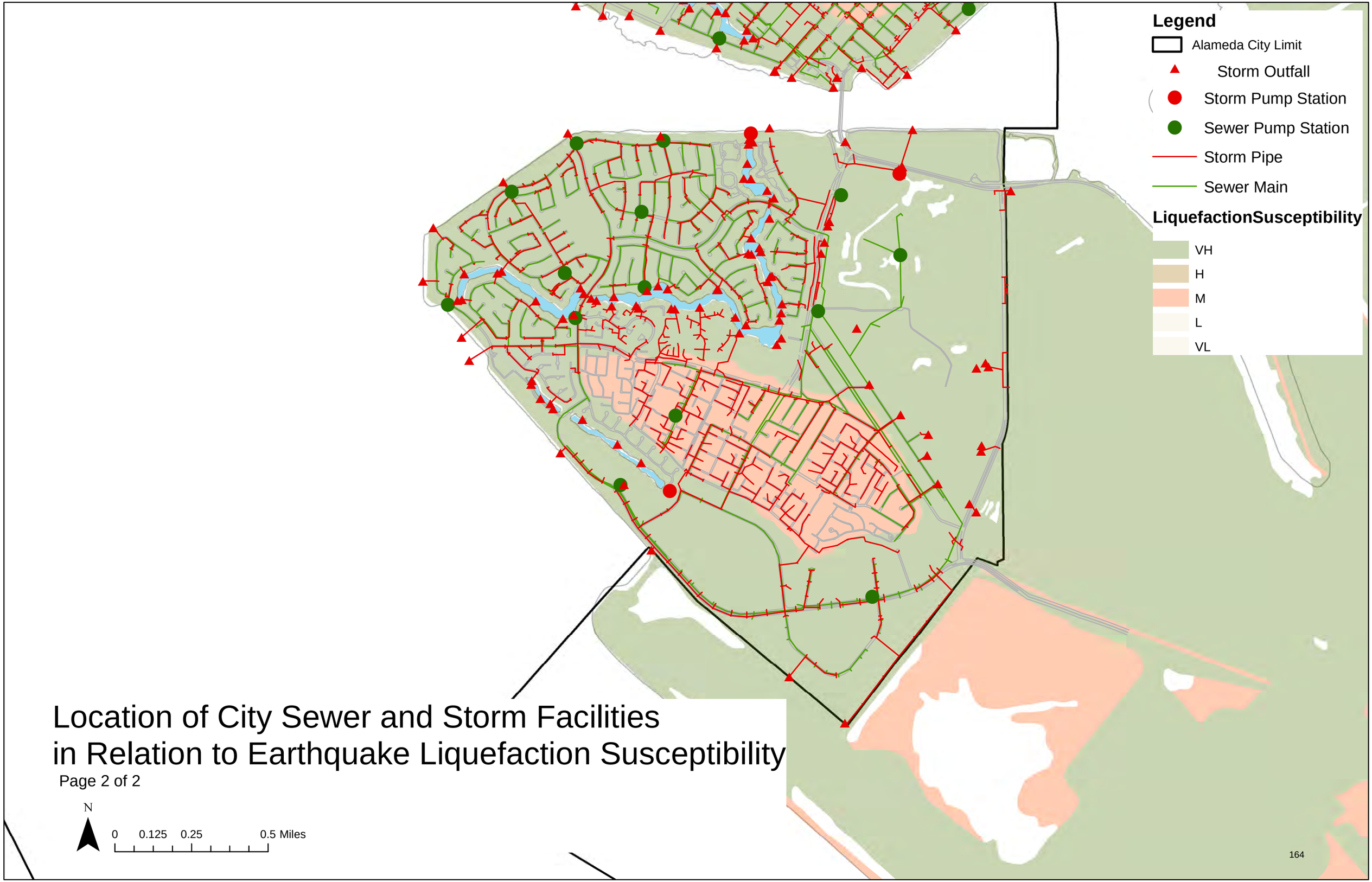
N

0 0.125 0.25 0.5 Miles



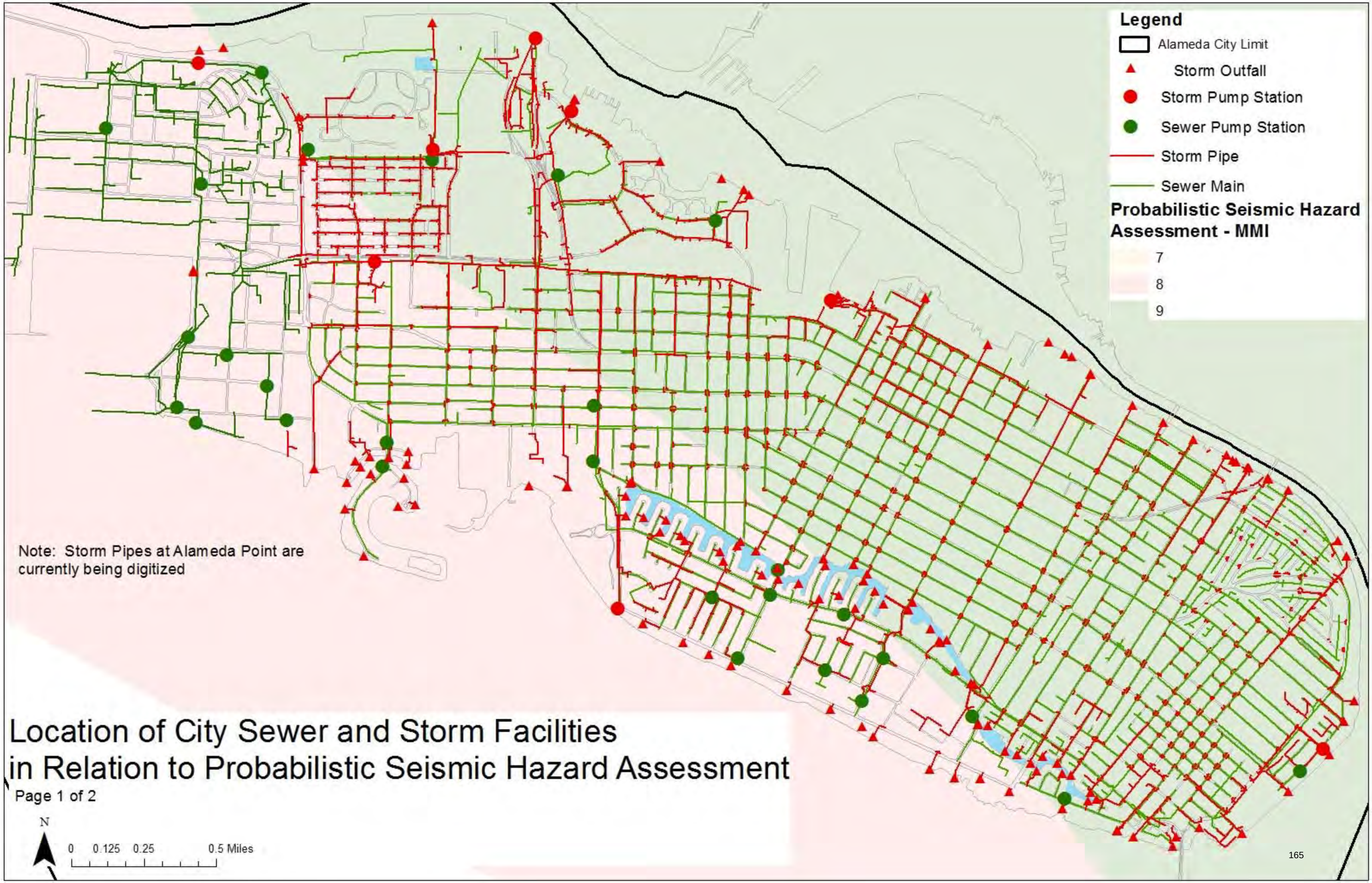
Location of City Sewer and Storm Facilities
in Relation to Earthquake Liquefaction Susceptibility

Page 1 of 2



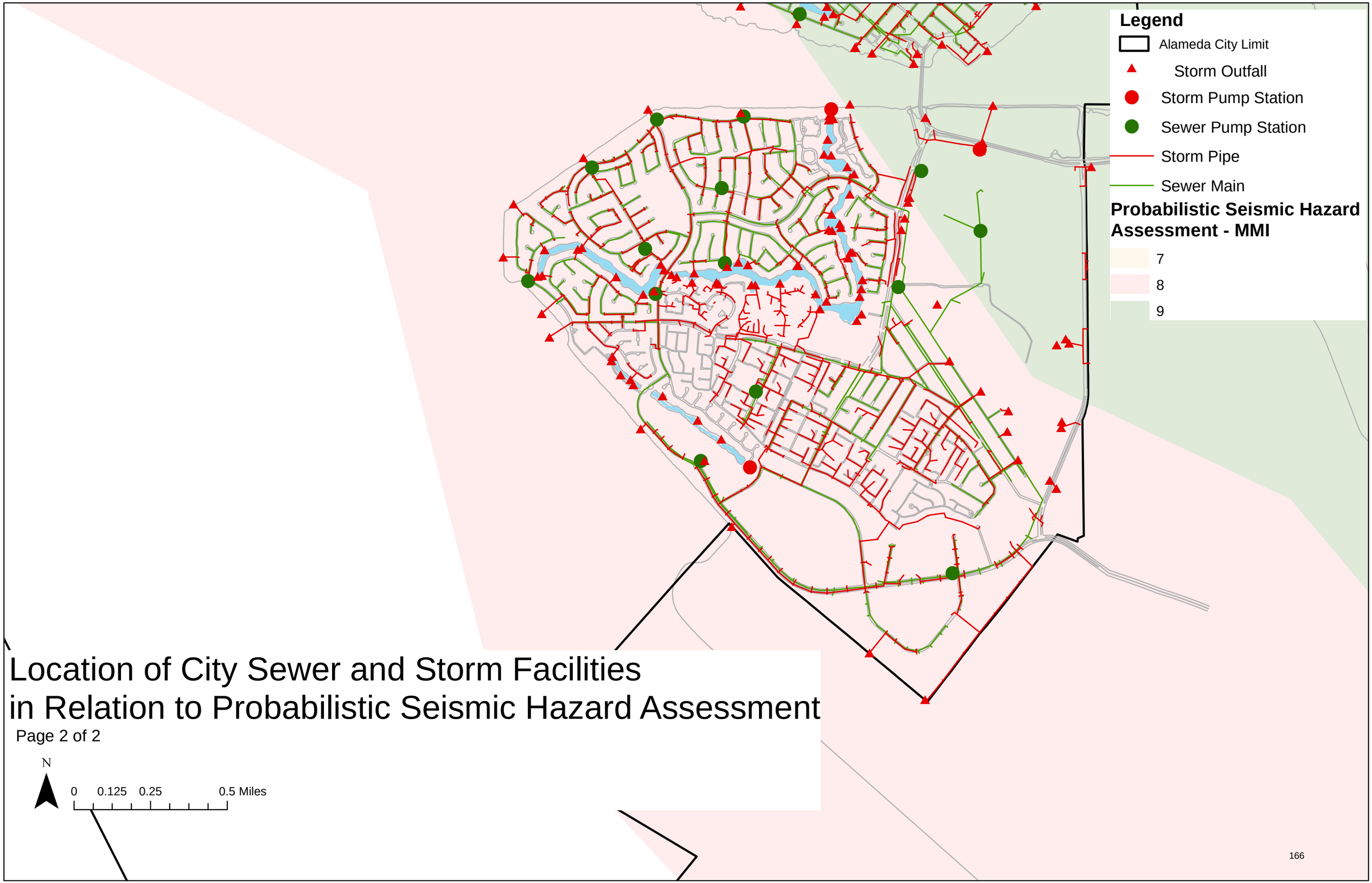
Location of City Sewer and Storm Facilities in Relation to Earthquake Liquefaction Susceptibility

Page 2 of 2



Location of City Sewer and Storm Facilities in Relation to Probabilistic Seismic Hazard Assessment

Page 1 of 2



Location of City Sewer and Storm Facilities in Relation to Probabilistic Seismic Hazard Assessment

Page 2 of 2

Table	Facility Name	Address	City Department or Owner	Function	Recovery Priority	Seismic Retrofit Notes
City Transpo	Grand Marina Boat Slips	end of Grand St	Planning/Bldg/Dev	Boat Slips	Low	No data
City Transpo	Ballena Bridge	Ballena Blvd	Public Works	Bridge	Critical	Retrofit 2008 to Lifeline stds
City Transpo	Grand Bridge	Grand St	Public Works	Bridge	Critical	Assessed as OK in 2008
City Transp	Harbor Bay Ferry Terminal - Land side	Mecartney Rd	Private/Public Works	Parking lot, RR	Critical	N/A
City Transp	Main Street Ferry Terminal - Land side	2990 Main St	Public Works	Parking lot, RR	Critical	N/A
City Transpo	Public Streets	Various	Public Works	Streets	High	N/A
Non-City Transp	BFI Bridges	Doolittle Dr	Caltrans	Bridge	Critical	City sent letter in 2007 requesting retrofit to lifeline stds.
Non-City Transp	Posey/Webster Tubes, incl ventilation buildings	Webster, Constitution	Caltrans	Tubes	Critical	2003 Retrofit to No Collapse
Non-City Transp	Fruitvale RR Bridge	Tilden Way	Corps of Engineers?	Bridge	Low	Needs to be retrofit to "no collapse" or removed.
Non-City Transp	Fruitvale Miller Sweeney Bridge	Tilden Way	County	Bridge	Critical	Retrofit in 2009 to "No collapse". Retrofitting to "Lifeline" stds planned.
Non-City Transp	High St Bridge	High Street	County	Bridge	Critical	Retrofit in 2009 to "No collapse"
Non-City Transp	Park St Bridge	Park St	County	Bridge	Critical	Retrofit in 2008 to "No collapse"
Non-City Transp	Harbor Bay Ferry Terminal - Water side	Mecartney Rd	WETA	Dock, RR	Critical	No data
Non-City Transp	Main Street Ferry Terminal - Water side	2990 Main St	WETA	Dock, RR	Critical	No data
Non-City Transp	Ballena Isle Marina	Ballena Blvd	City, Onshore private?	Docks, slips	Low	No data
Non-City Transp	Fortman Marina	Grand St	City, Onshore private	Docks, slips, bldg	Low	No data
Non-City Transp	Other Marinas?	Various	City, Onshore private?	Docks, slips	Low	No data

Transpo includes streets, bridges, tubes, overpasses, signals, ferry terminals, bus facilities

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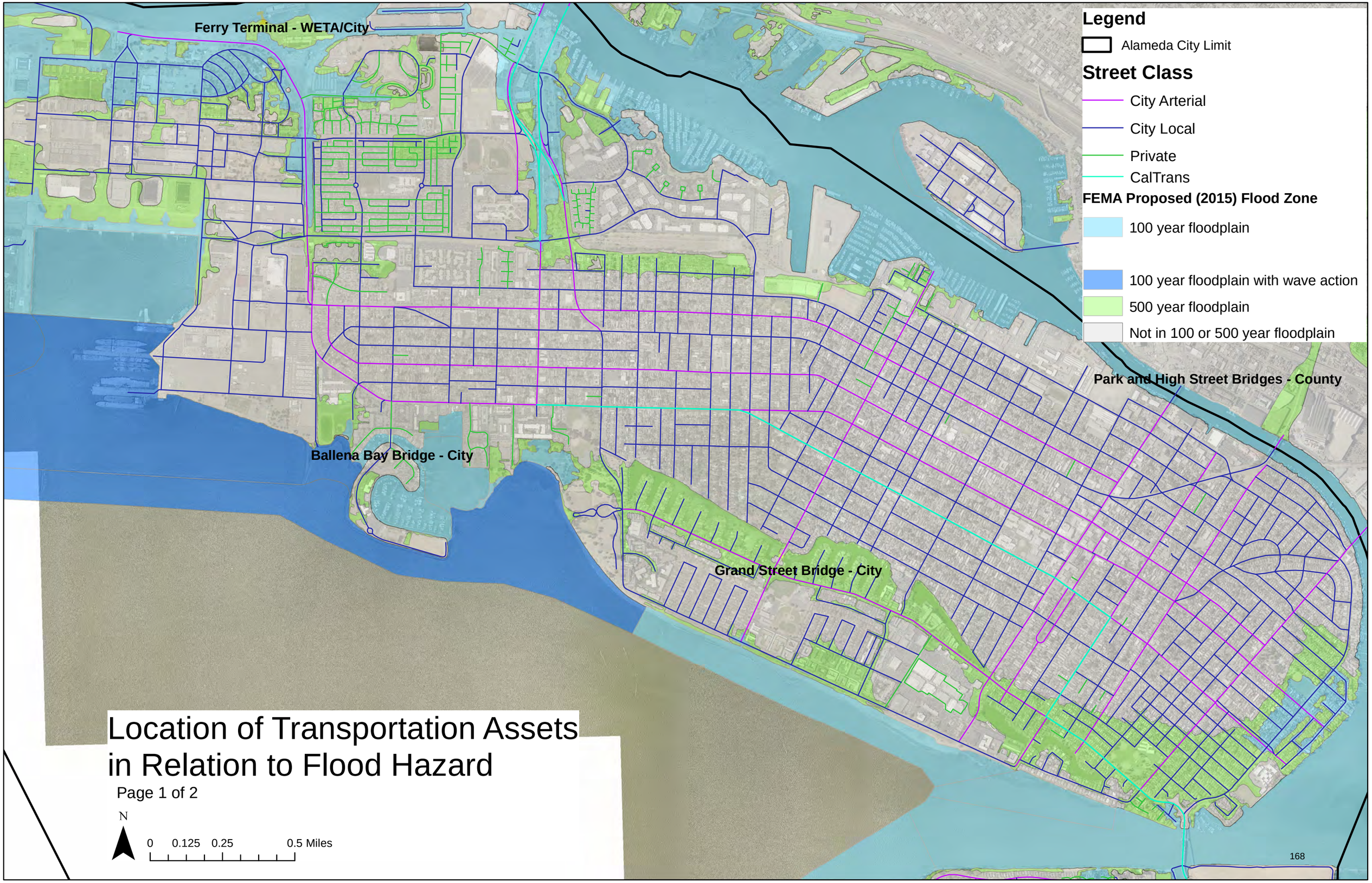
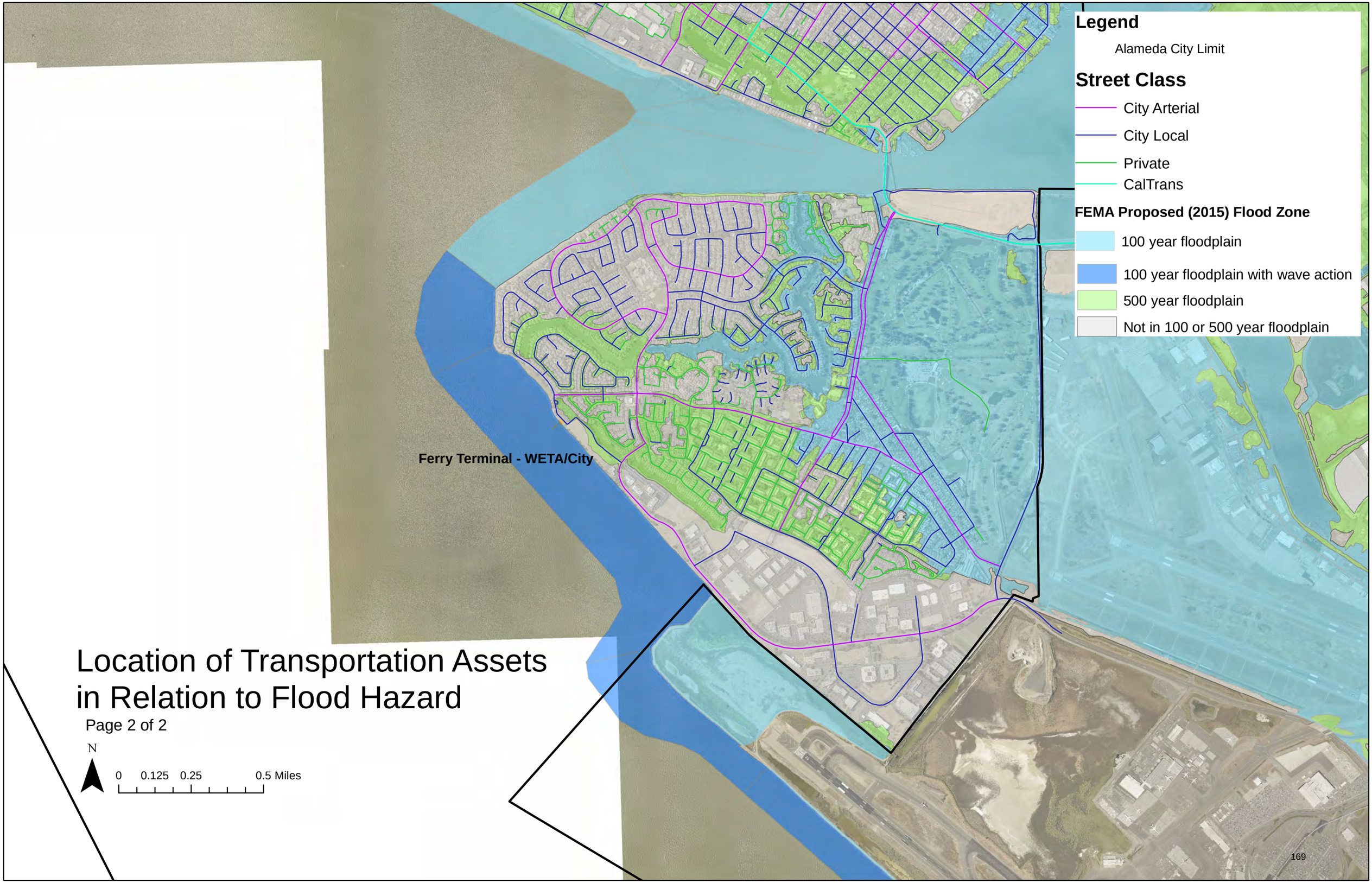


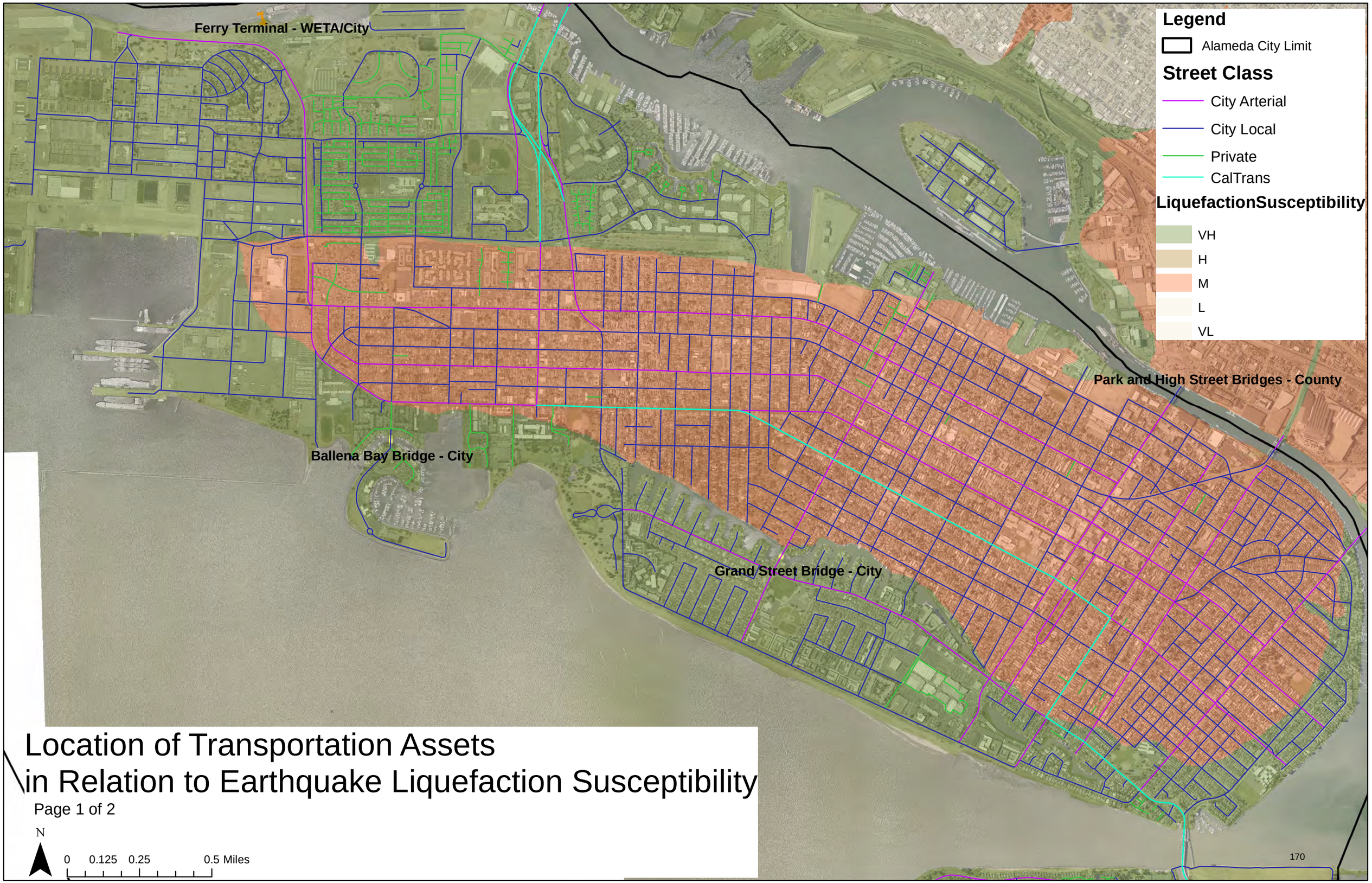
Location of Transportation Assets in Relation to Flood Hazard

Page 1 of 2



Location of Transportation Assets in Relation to Flood Hazard

Page 2 of 2

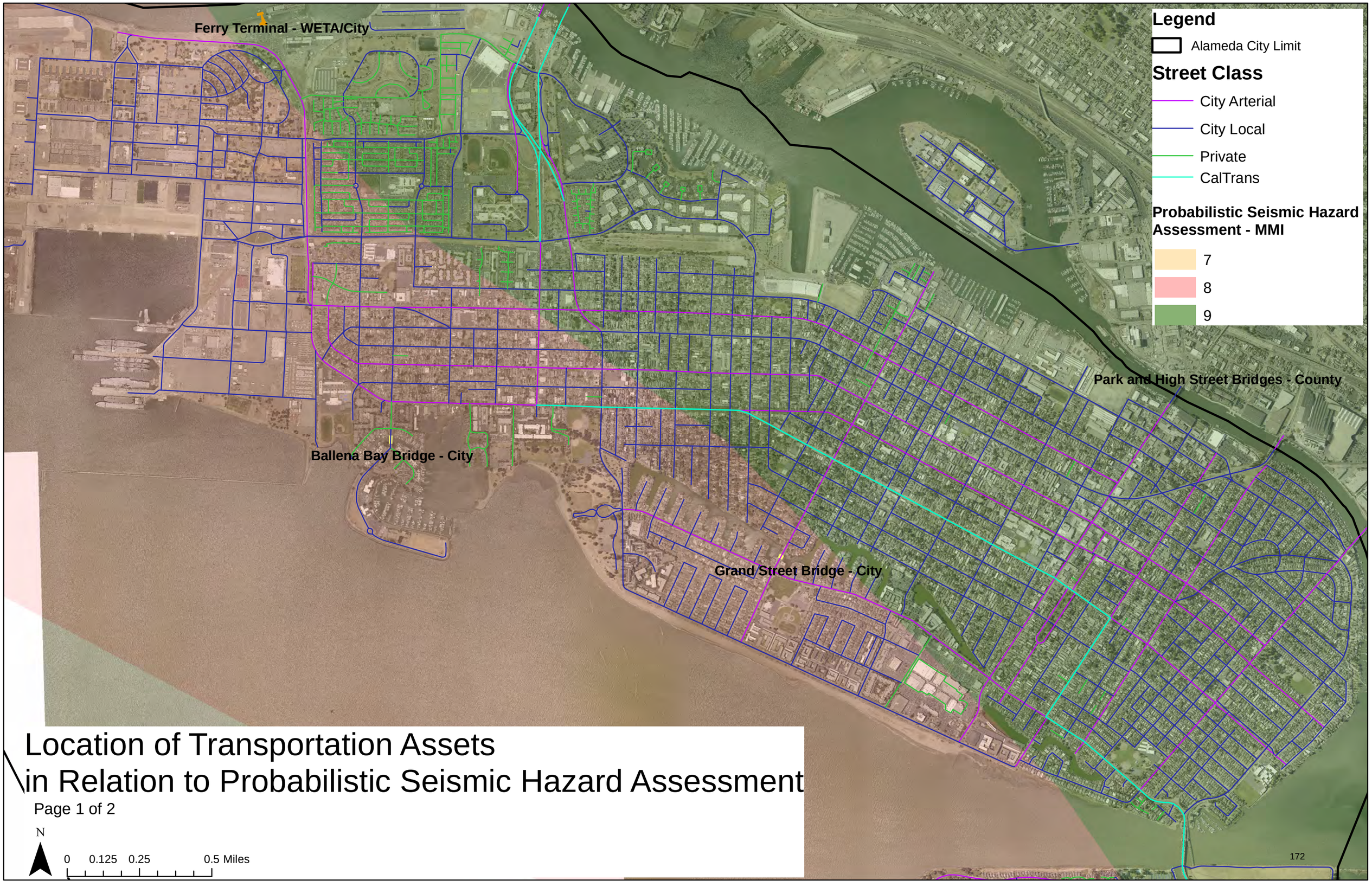


Location of Transportation Assets in Relation to Earthquake Liquefaction Susceptibility

Page 1 of 2

Location of Transportation Assets in Relation to Liquefaction Susceptibility

Page 2 of 2



Location of Transportation Assets in Relation to Probabilistic Seismic Hazard Assessment

Page 1 of 2

Appendix I
Approval Documentation

Council/Board/Commission /Agency	Action Taken	Date
FEMA	Approve 2015 Local Hazard Mitigation Plan	
City Council	Approve by Resolution the FEMA Approved 2015 Local Hazard Mitigation Plan	