

City of Alameda Local Hazard Mitigation Plan



Final Report
June 2016

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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:

Building and Facility Resiliency

- 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.

Utility and Transportation Infrastructure Resiliency

- 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 occurred¹. 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.

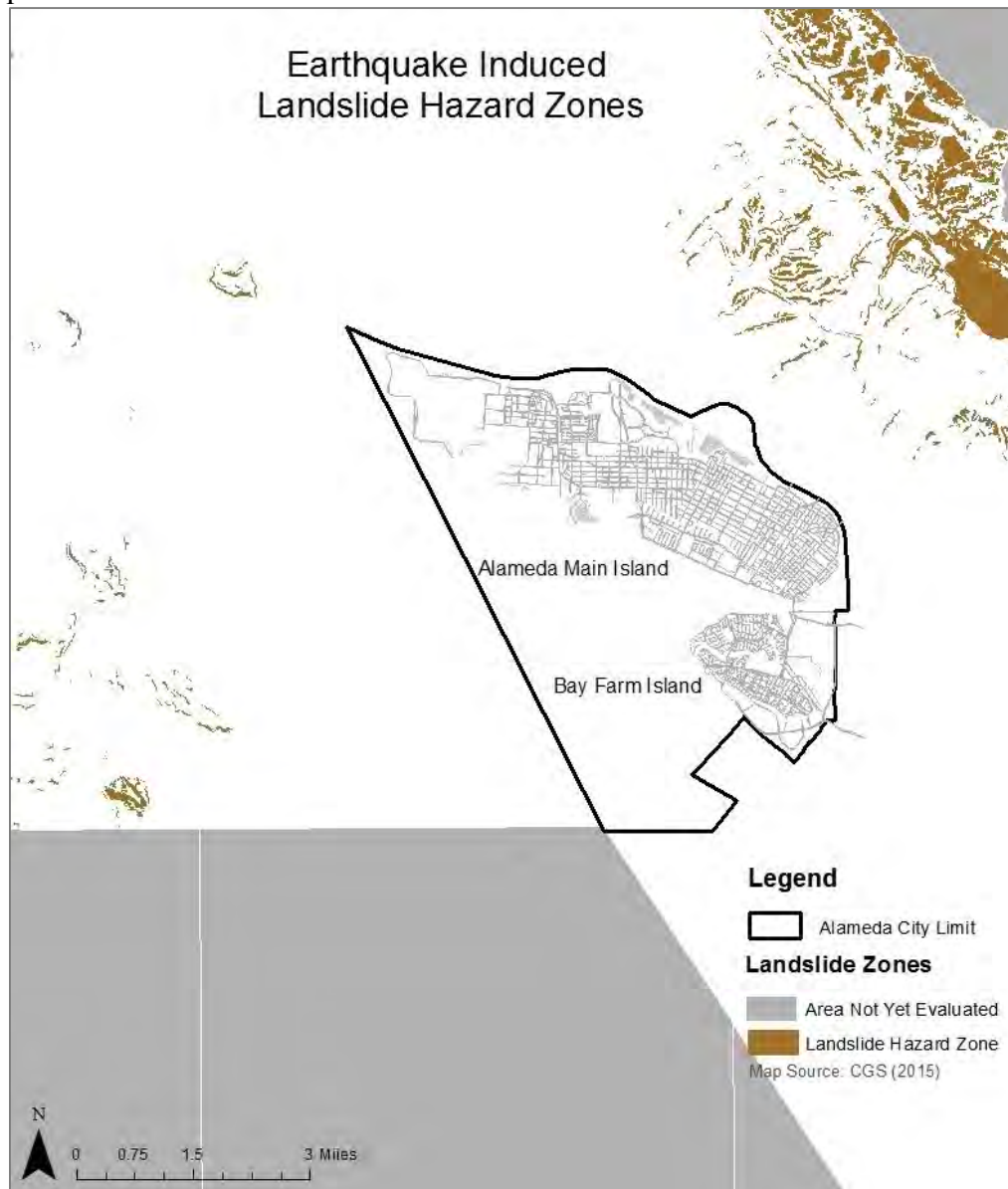


Figure 2. Earthquake Induced Landslide Hazard Zones

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

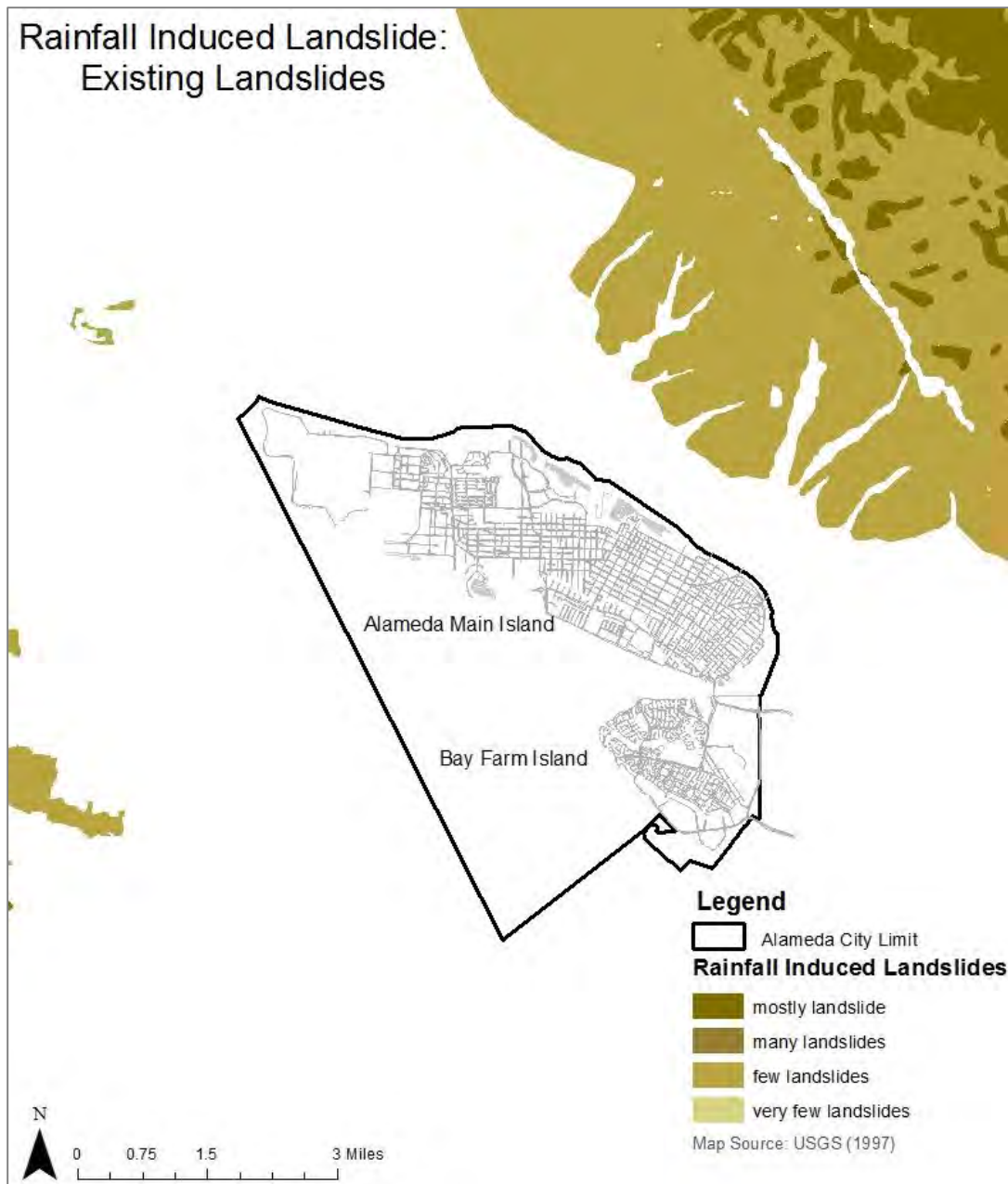


Figure 3. Rainfall Induced Landslides: Existing Landslides

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.

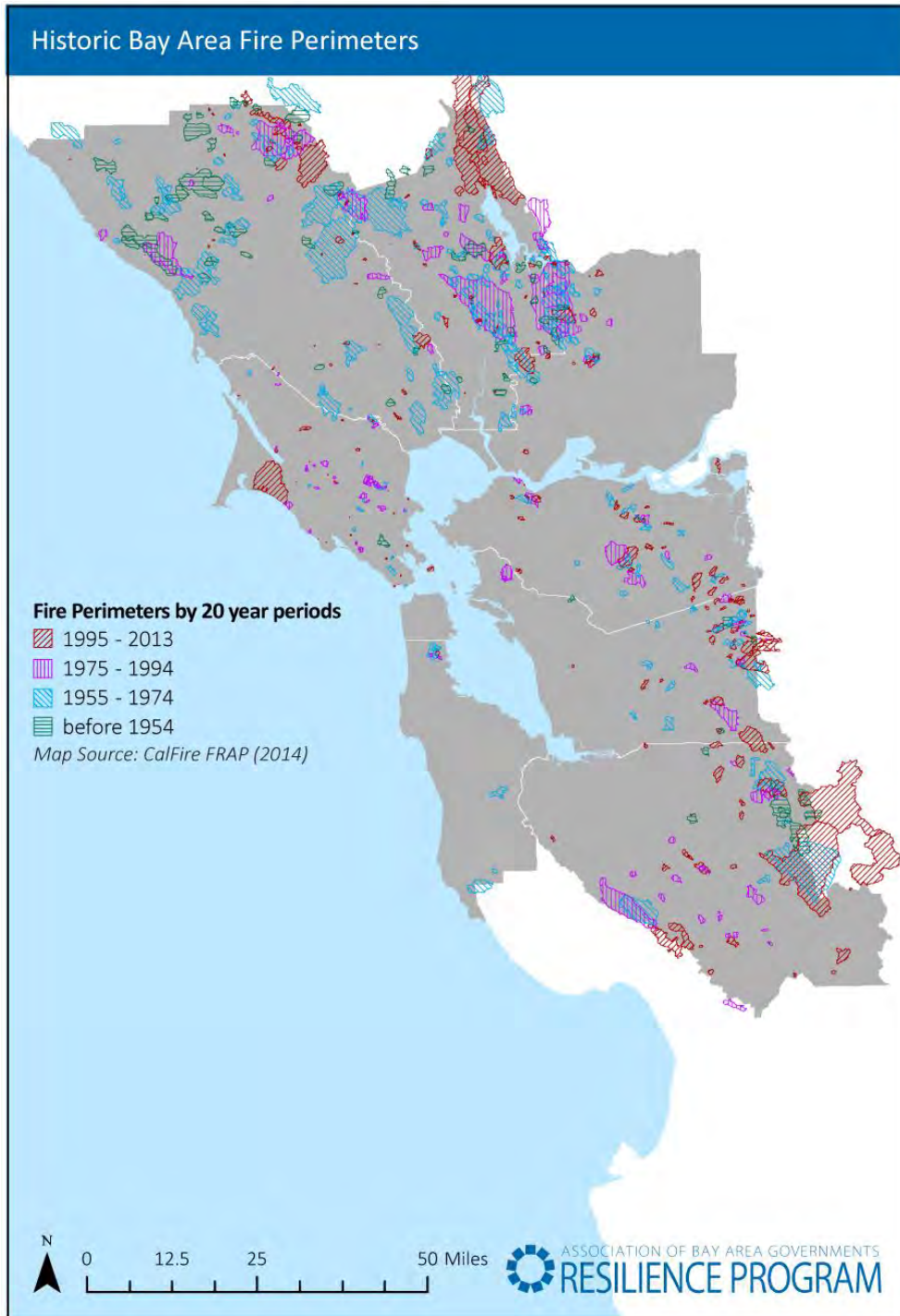


Figure 4. Historic Bay Area Fire Perimeters

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 children².

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.

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.

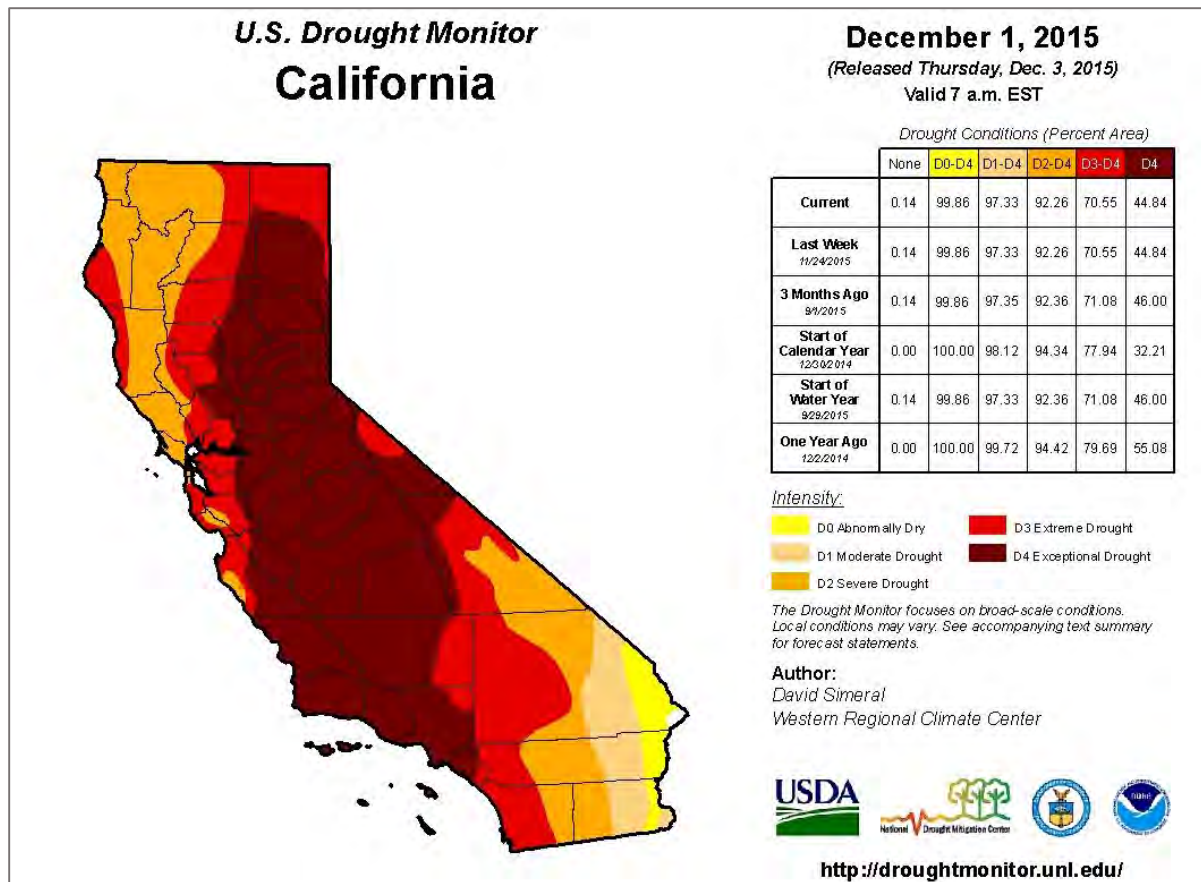


Figure 5. California Drought Monitor, as of December 1, 2015

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.

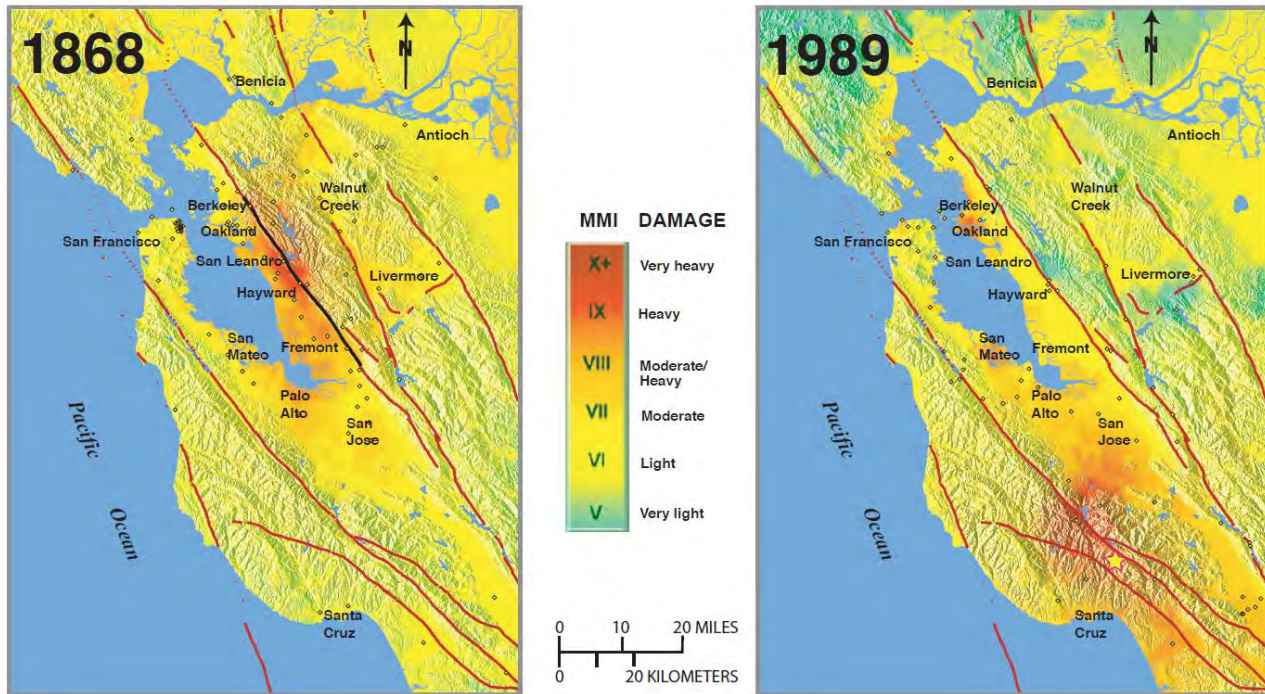
Hazard Characterization. The total amount of energy released in an earthquake is described as the earthquake magnitude, as measured by the Moment Magnitude Scale, abbreviated as “M”. The Moment Magnitude Scale refined and succeeded the Richter Scale in the 1970s. The Moment Magnitude Scale is logarithmic. 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.

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.

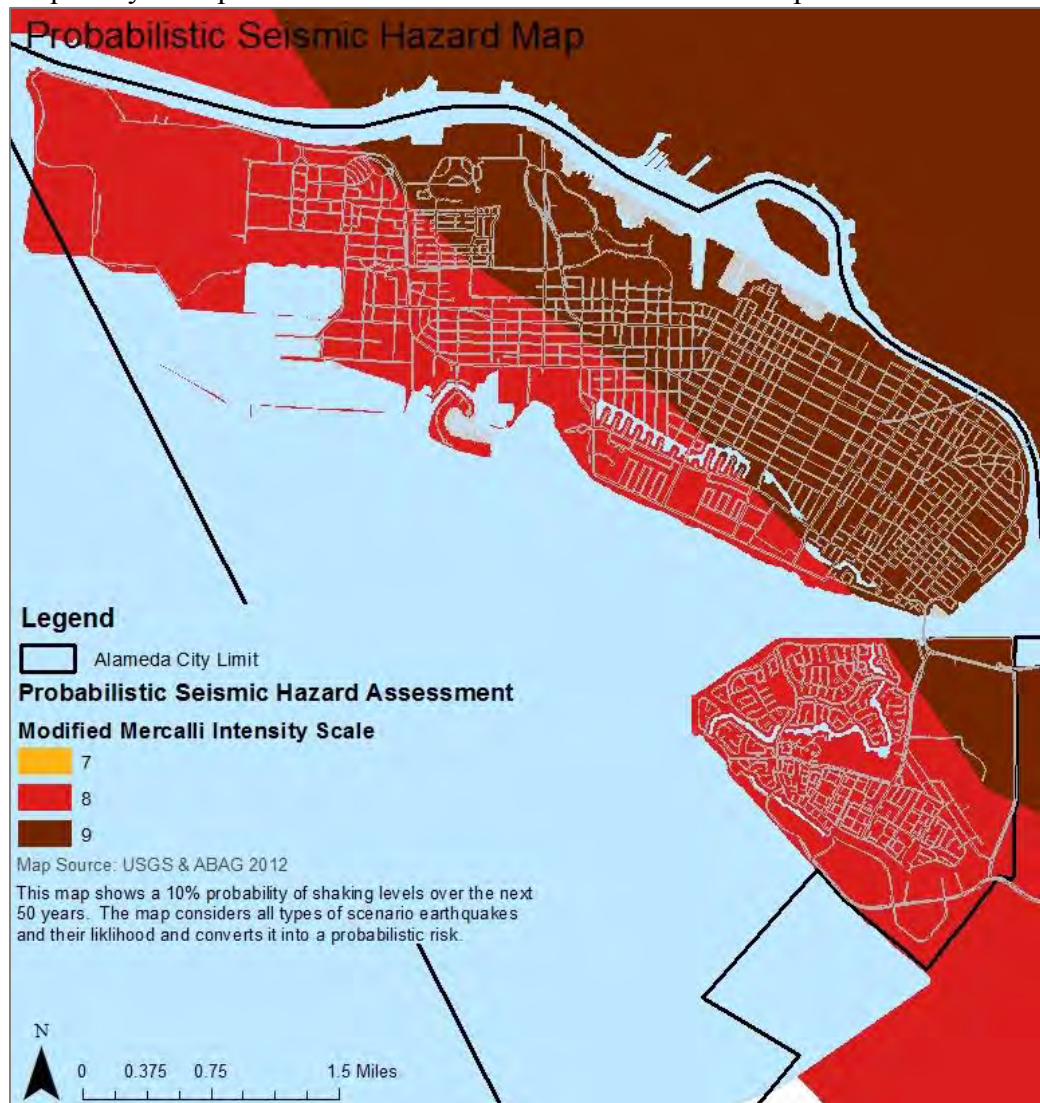


Figure 8. Probability Seismic Hazard Map

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.

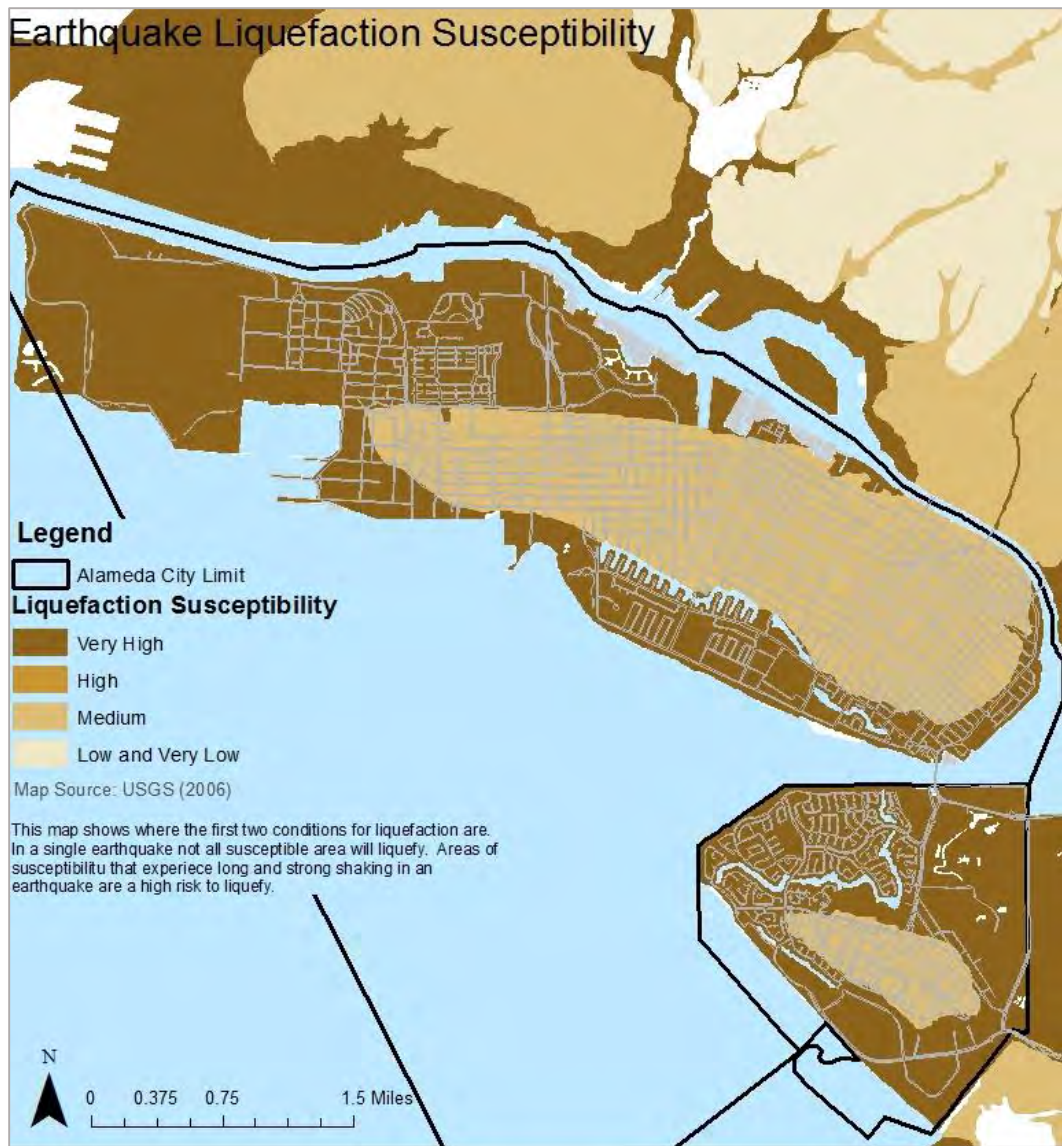


Figure 9. Liquefaction Susceptibility

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 $\frac{1}{4}$ 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 | Pacific | Ocean Beach | Black Point Aquatic Park | Candlestick Park | Alcatraz Island | Treasure Island | Yerba Buena Island | Redwood City | Alameda | Richmond | Mare Island | Sausalito | Bollinas |
|-----------------|----------------------------------|-------------------------|---------|-------------|--------------------------|------------------|-----------------|-----------------|--------------------|--------------|---------|----------|-------------|-----------|----------|
| 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 |

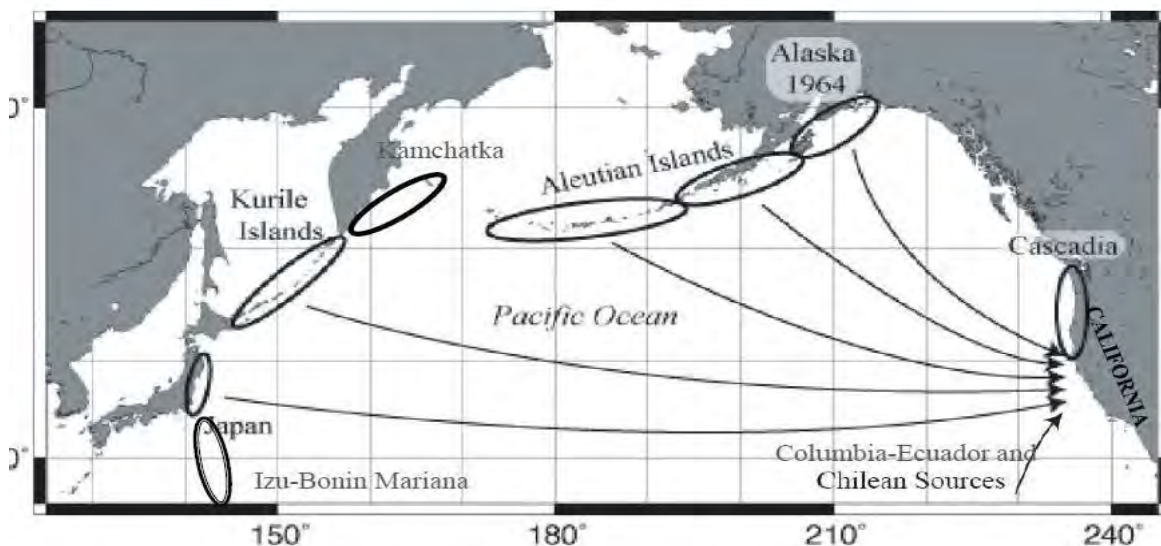


Figure 10. Inundation Depths in Feet based on Tsunami Scenarios from Local and Distant Sources

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%          |
| <b>Total</b> | <b>100.0%</b> | <b>100.0%</b> | <b>100.0%</b> | <b>100.0%</b>  |

*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%       |
| <b>Total of Households in Alameda</b>        | <b>30,123</b> | <b>--</b>  |

*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**

| Income Level                           | Renter Occupied |        | Owner Occupied |        | Total  |        |
|----------------------------------------|-----------------|--------|----------------|--------|--------|--------|
|                                        | No.             | %      | No.            | %      | No.    | %      |
| Extremely Low<br>Income <30% of<br>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 susceptibility 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**

| <b>Street Owned By:</b> | <b>Mileage</b>                                             |
|-------------------------|------------------------------------------------------------|
| City                    | 121.6 Local Classification<br>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 met 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:

I. Building and Facility Resiliency

- 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)

II. Utility and Transportation Infrastructure Resiliency

- 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 | <p>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.</p> <p>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:</p> <ol style="list-style-type: none"> 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 | <p>In July 2014, the City Council approved sources of funding Fire Station 3 as follows:</p> <table> <tr> <td>Facility Maintenance Fund (706)</td><td>\$400,000</td></tr> <tr> <td>Capital Project 91344 (EOC and Fire Station 3) FY13-14</td><td>\$341,000</td></tr> <tr> <td>Internal Loan from Equipment Replacement</td><td>\$809,000</td></tr> <tr> <td>Proceeds from sale of 1703 Grand Street</td><td>\$450,000</td></tr> <tr> <td><u>IBank Loan</u></td><td><u>\$3,000,000</u></td></tr> <tr> <td>Subtotal</td><td>\$5,000,000</td></tr> </table> <p>Other funding sources approved by the City Council:</p> <table> <tr> <td>Capital Project 9061401 (EOC and Fire Station 3) FY11-12</td><td>\$400,000</td></tr> <tr> <td>2003 A Tax Allocation Bonds unspent proceeds*</td><td>\$863,000</td></tr> <tr> <td>Refinancing of City's 2013 COPS - EOC construction FY13-14</td><td>\$3,000,000</td></tr> <tr> <td><u>Subtotal</u></td><td><u>\$4,263,000</u></td></tr> </table> <p>Total Available Sources \$9,263,000</p> <p>*Pursuant to the Amended Agreement Regarding Expenditures of Excess Bond Proceeds dated October 22, 2014.</p> <p>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.</p> <p>The 2003 A&B Tax Allocation Bonds (TABs) unspent proceeds are available to the City pursuant to the</p> | 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 | <u>IBank Loan</u> | <u>\$3,000,000</u> | Subtotal | \$5,000,000 | 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 | <u>Subtotal</u> | <u>\$4,263,000</u> |
| 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 | | | | | | | | | | | | | | | | | | | | |
| <u>IBank Loan</u> | <u>\$3,000,000</u> | | | | | | | | | | | | | | | | | | | | |
| Subtotal | \$5,000,000 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| <u>Subtotal</u> | <u>\$4,263,000</u> | | | | | | | | | | | | | | | | | | | | |

| 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 | <ul style="list-style-type: none"> • 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 | <p>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.”</p> <p>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.</p> <p>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.</p> | | | | | | |

| 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 | <p>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.</p> <p>Strengthen or replace City shoreline facilities in the identified prioritized order as funding is available.</p> <p>Include shore protection (dike, armoring) in development of Alameda Point.</p> | | | | | | |
| 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 | <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • 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 | |
|--|---|
| | <ul style="list-style-type: none"> • 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 | <p>Activities Completed:</p> <ul style="list-style-type: none"> 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. <p>Activities Underway and to Continue during this Plan Cycle:</p> <ul style="list-style-type: none"> 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

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|------------------|---|
| | <p>funding.</p> <ul style="list-style-type: none"> • 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 <p>New Activities To Be Implemented during this Plan Cycle:</p> <ul style="list-style-type: none"> • 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 | <p><u>Activities Completed:</u></p> <ul style="list-style-type: none"> -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. <p><u>Activities Underway and to Continue During this Plan Cycle:</u></p> <ul style="list-style-type: none"> -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

| | |
|------------------|--|
| | <p>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.</p> <p><u>New Activities to be Implemented During this Plan Cycle:</u></p> <p>-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.</p> |
| 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 (intelligent 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 | <ul style="list-style-type: none"> 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: <i>25% below 2005 baseline levels</i> . 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) | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • Natural gas distribution system, including main pipelines, lateral pipelines and meters. • Electrical power feeds to Alameda Island under the Estuary. | <ul style="list-style-type: none"> • 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 |
|---|--|---|
| | | <p>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.</p> <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Telecommunications aerial and underground conduits. Switching facilities. Cell towers. | <ul style="list-style-type: none"> • Improvements are ongoing. |
| Caltrans | <ul style="list-style-type: none"> • Posey and Webster Tubes, Bay Farm Island (AKA San Leandro Channel) Bridge and Bike Bridge, Constitution Overpass, State Routes 61 and 260. | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Miller Sweeney (Fruitvale), Park Street, and High Street Bridges. | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Fruitvale RR Bridge | <ul style="list-style-type: none"> • Unknown |
| Federal Government – Coast Guard and Navy | <ul style="list-style-type: none"> • Portions of Alameda Point, all of Coast Guard Island including bridge, Coast Guard Housing, Ready Reserve, Navy Operations Reserve Center | <ul style="list-style-type: none"> • Unknown |
| East Bay Regional Park District (EBRPD) | <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> The Housing Authority has 572 senior, disabled, and low income housing units. | <ul style="list-style-type: none"> 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) | <ul style="list-style-type: none"> The AUSD has 19 schools in Alameda, serving K through 12 grades, plus a special education preschool and an adult school. | <ul style="list-style-type: none"> |
| American Red Cross (ARC) | <ul style="list-style-type: none"> Tasked with providing shelter operations and feeding during disasters. | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> There are numerous medical facilities that provide services to vulnerable populations. | <ul style="list-style-type: none"> Alameda Hospital Private Clinics Alameda County Health (Future) Veterans Administration Clinic Pharmacies |
| Water Emergency Transportation Authority (WETA) | <ul style="list-style-type: none"> WETA operates ferries that travel to two terminals within the City of Alameda. The land-side 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 Roller | 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 |



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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...

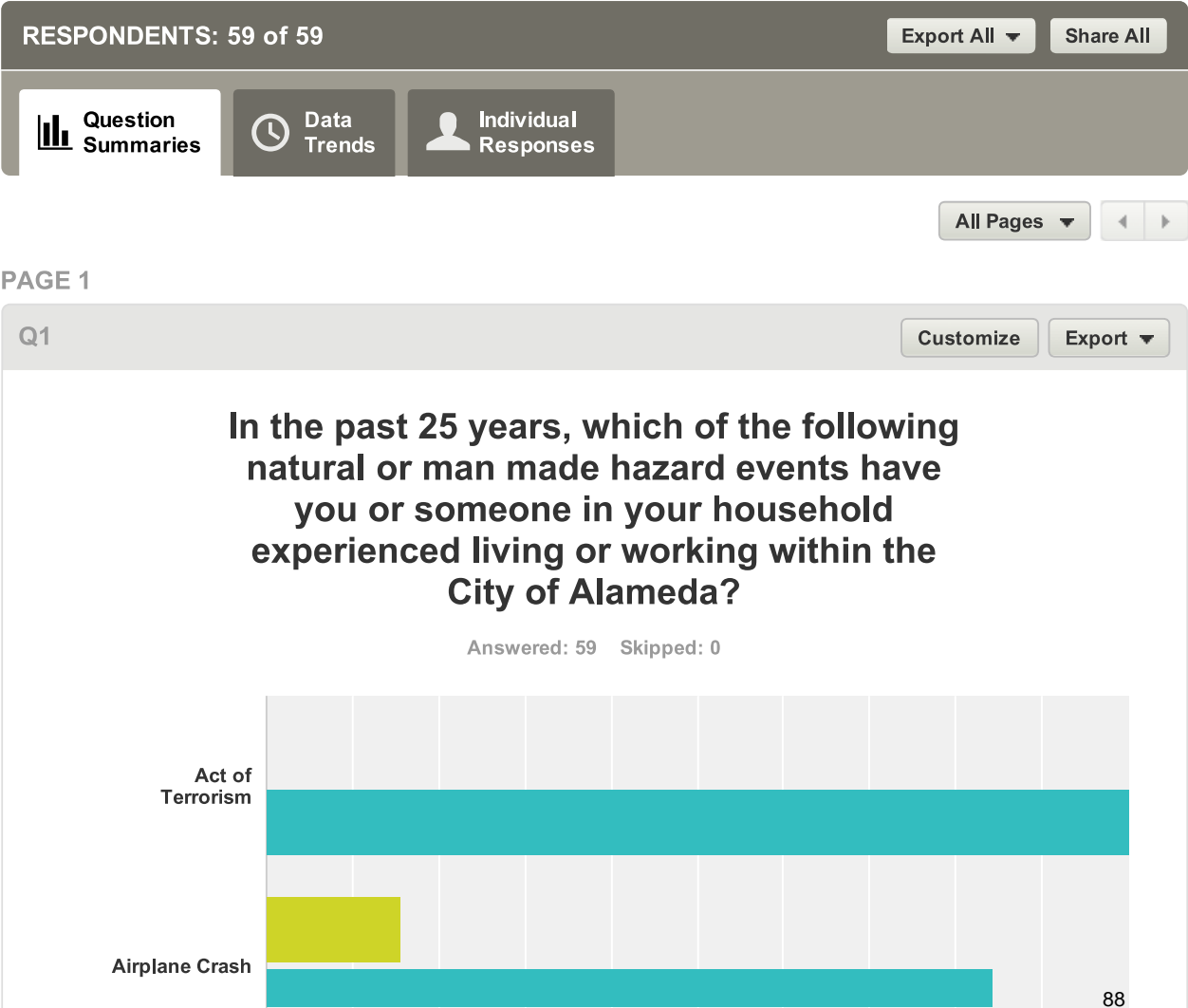
EXPORTS ?

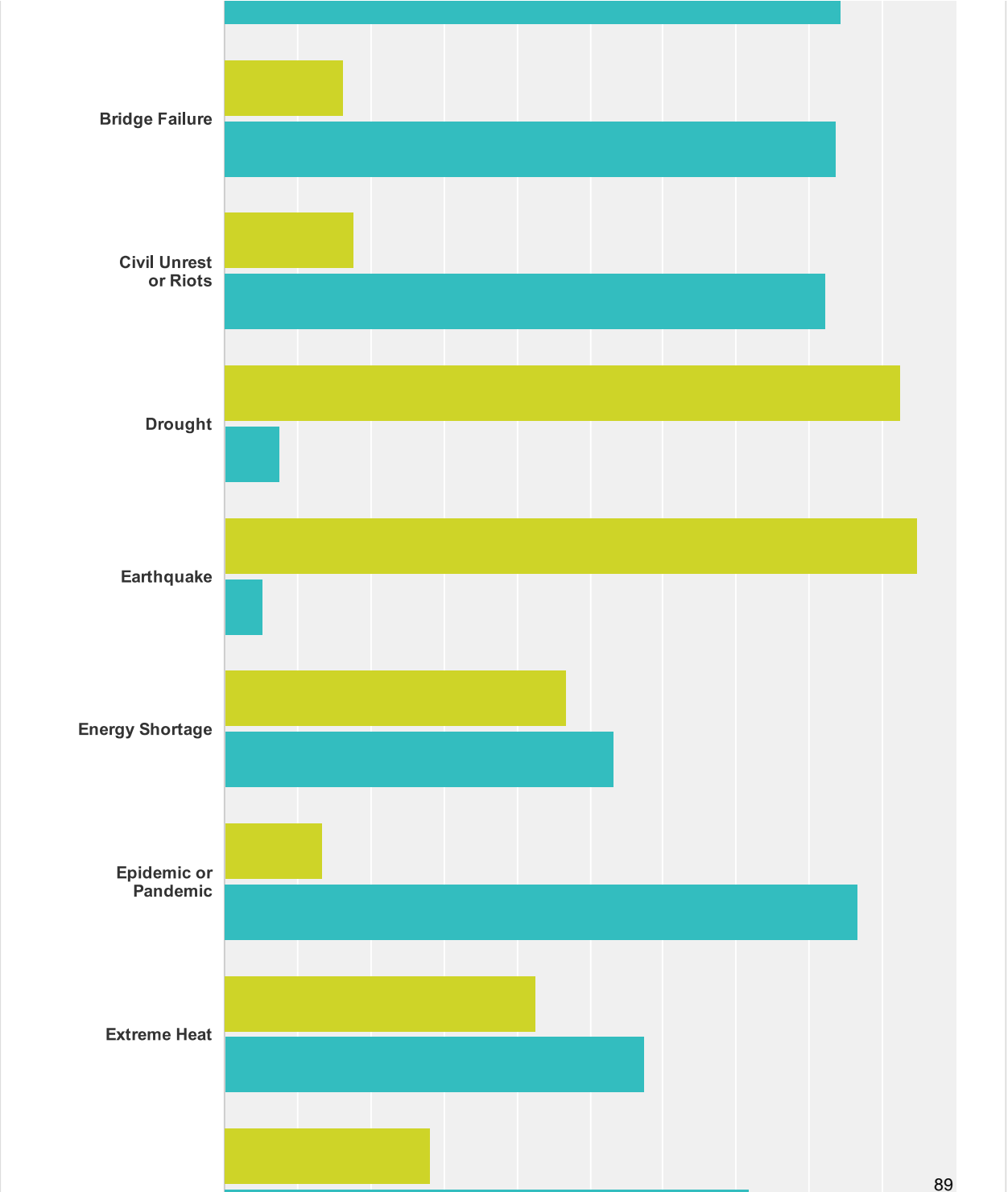
SHARED DATA ?

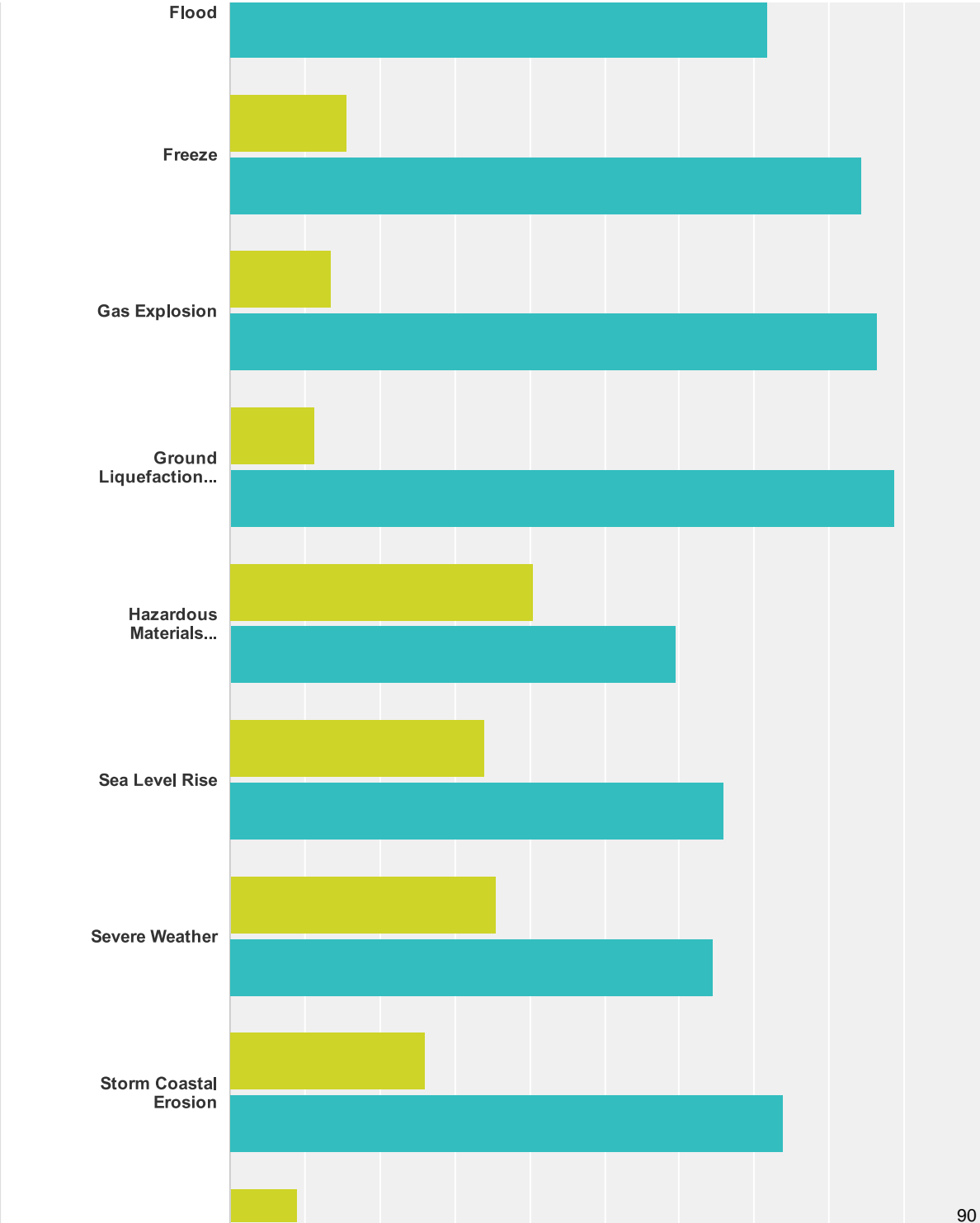
No shared data

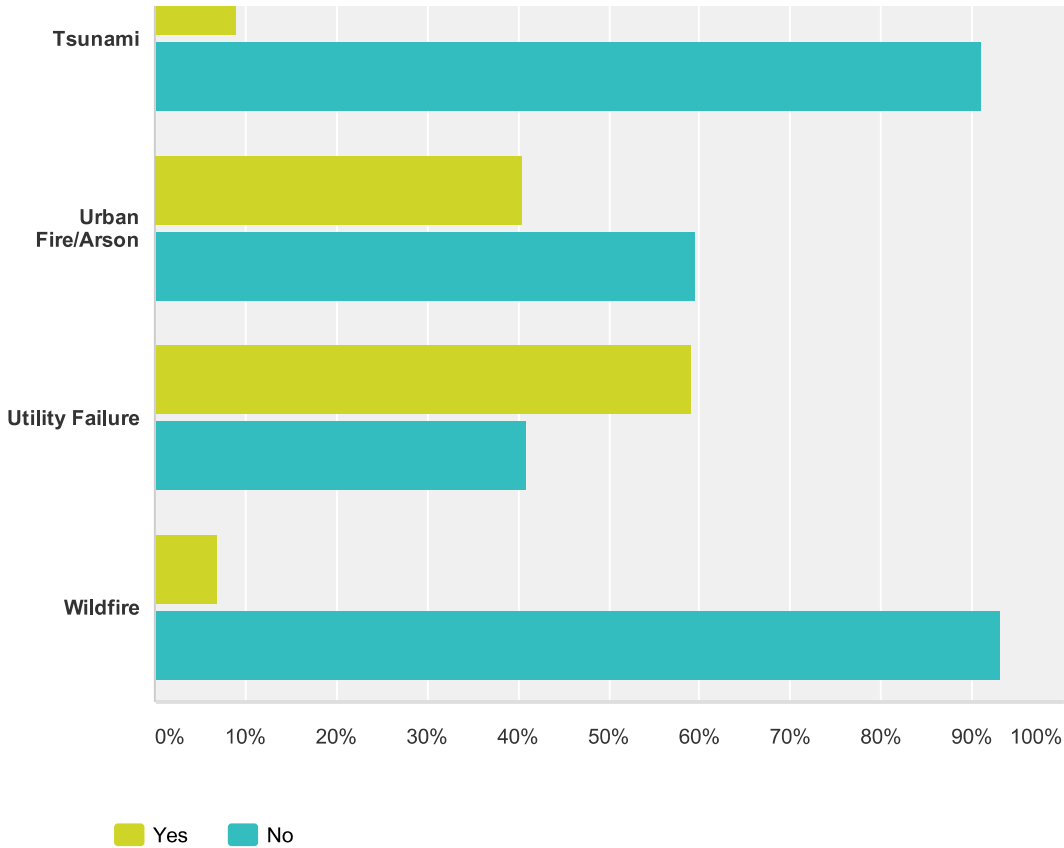
Sharing allows you to share your survey results with others. You can share all data, a saved view, or a single question summary. [Learn more »](#)

Share All









| | 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

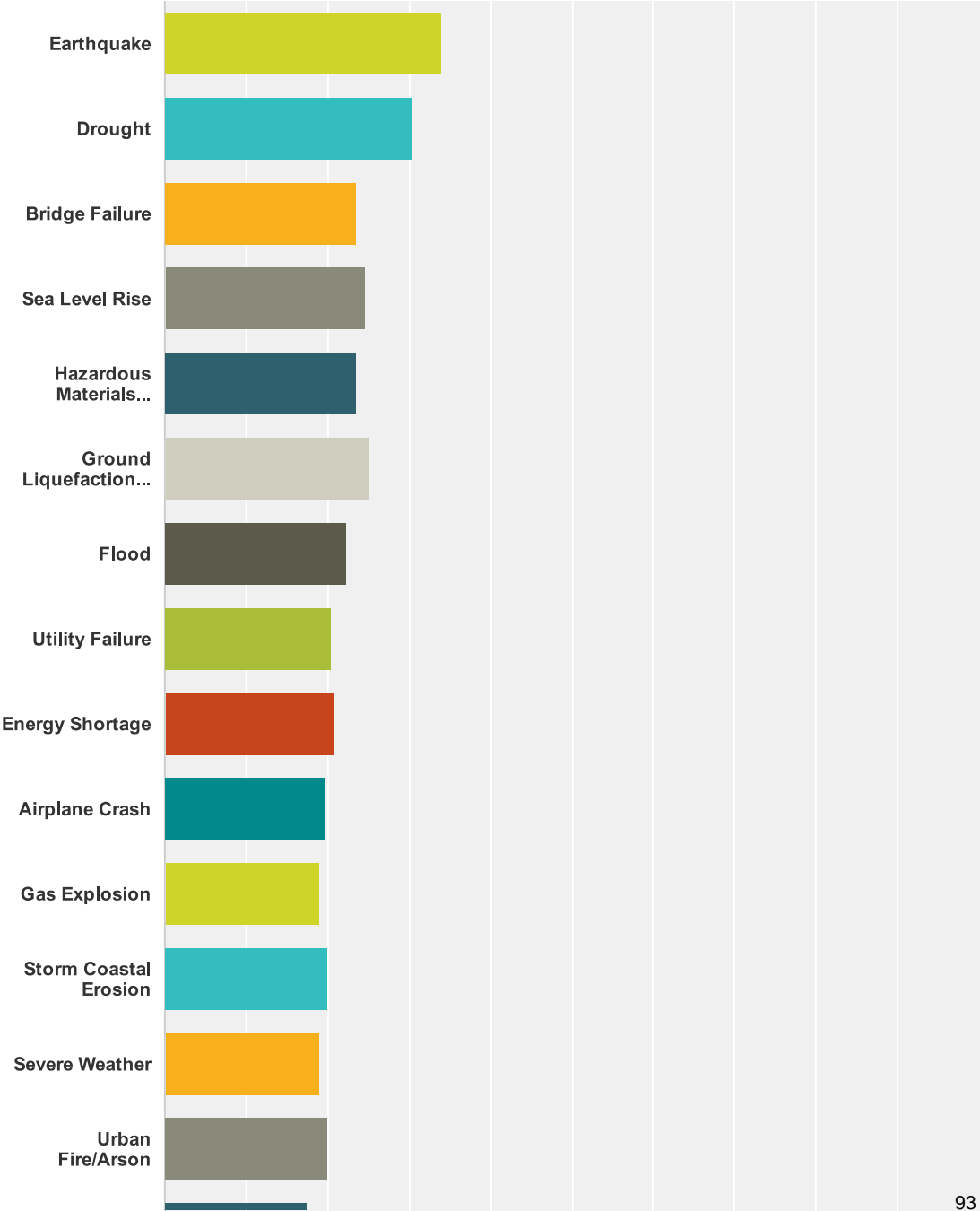
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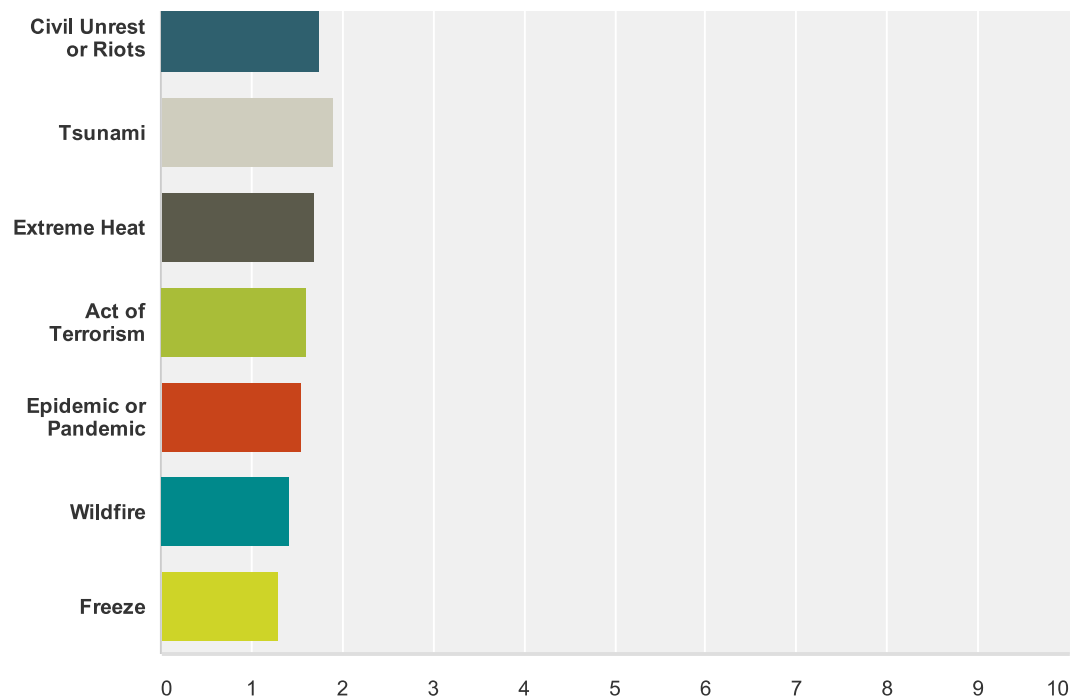
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How concerned are you about the following

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

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

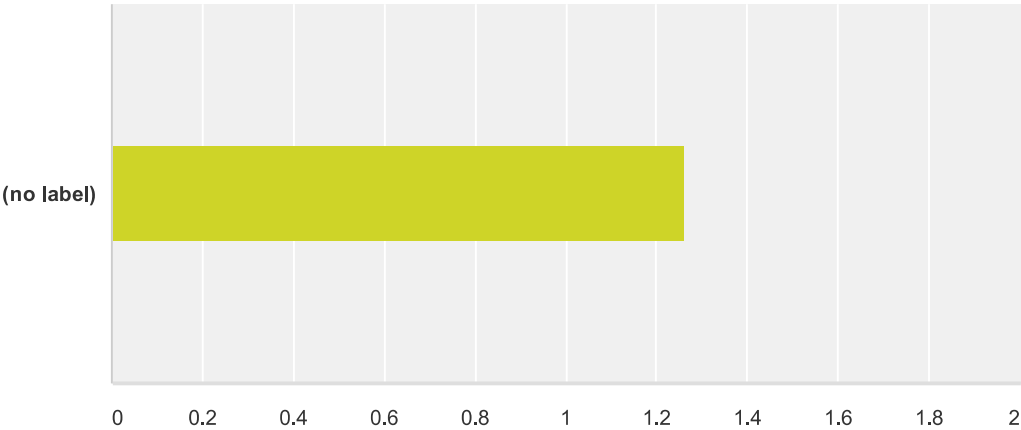
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Is there another significant natural or man

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

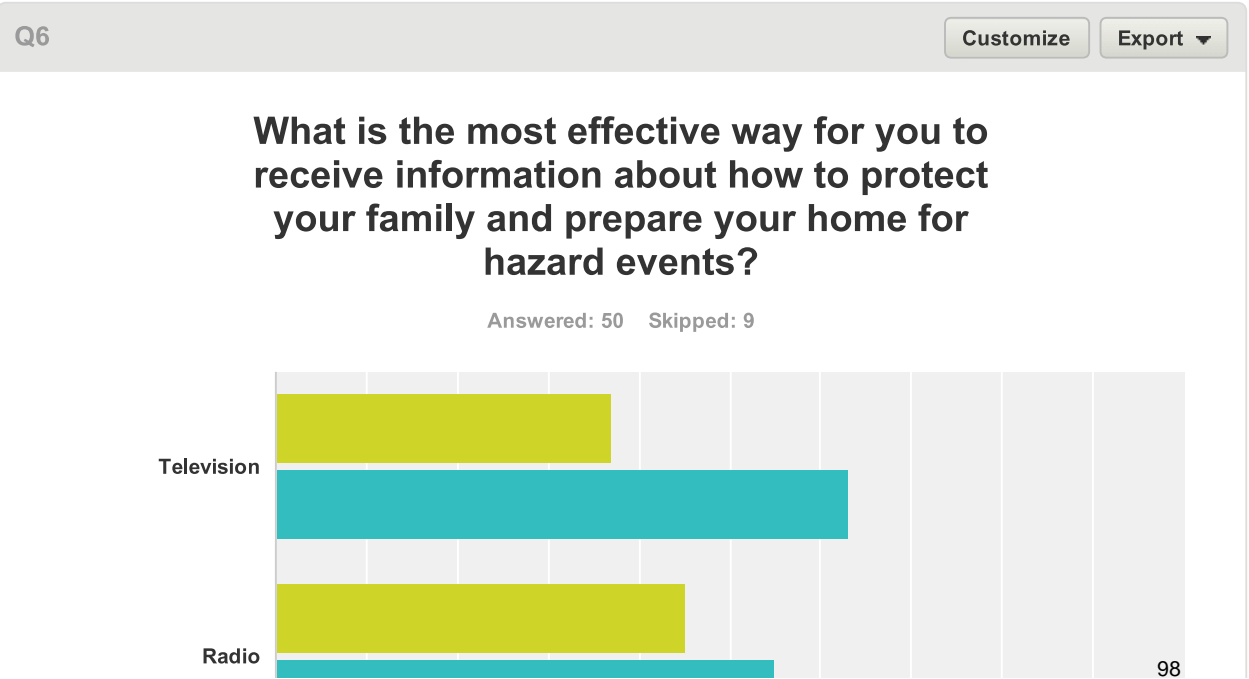
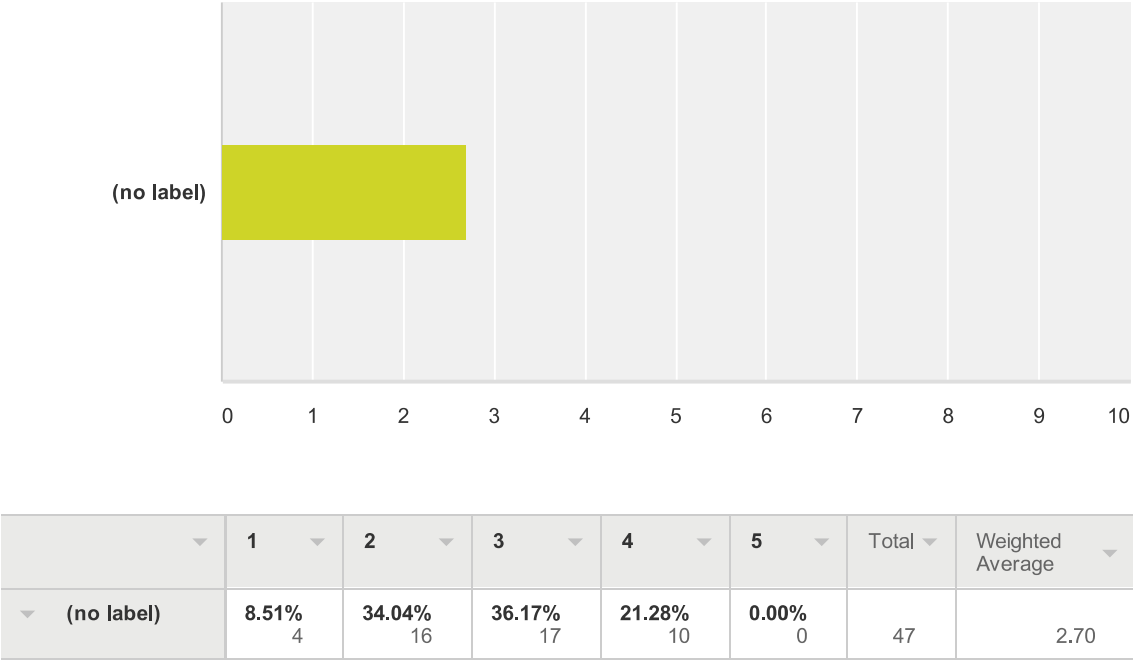
Q5

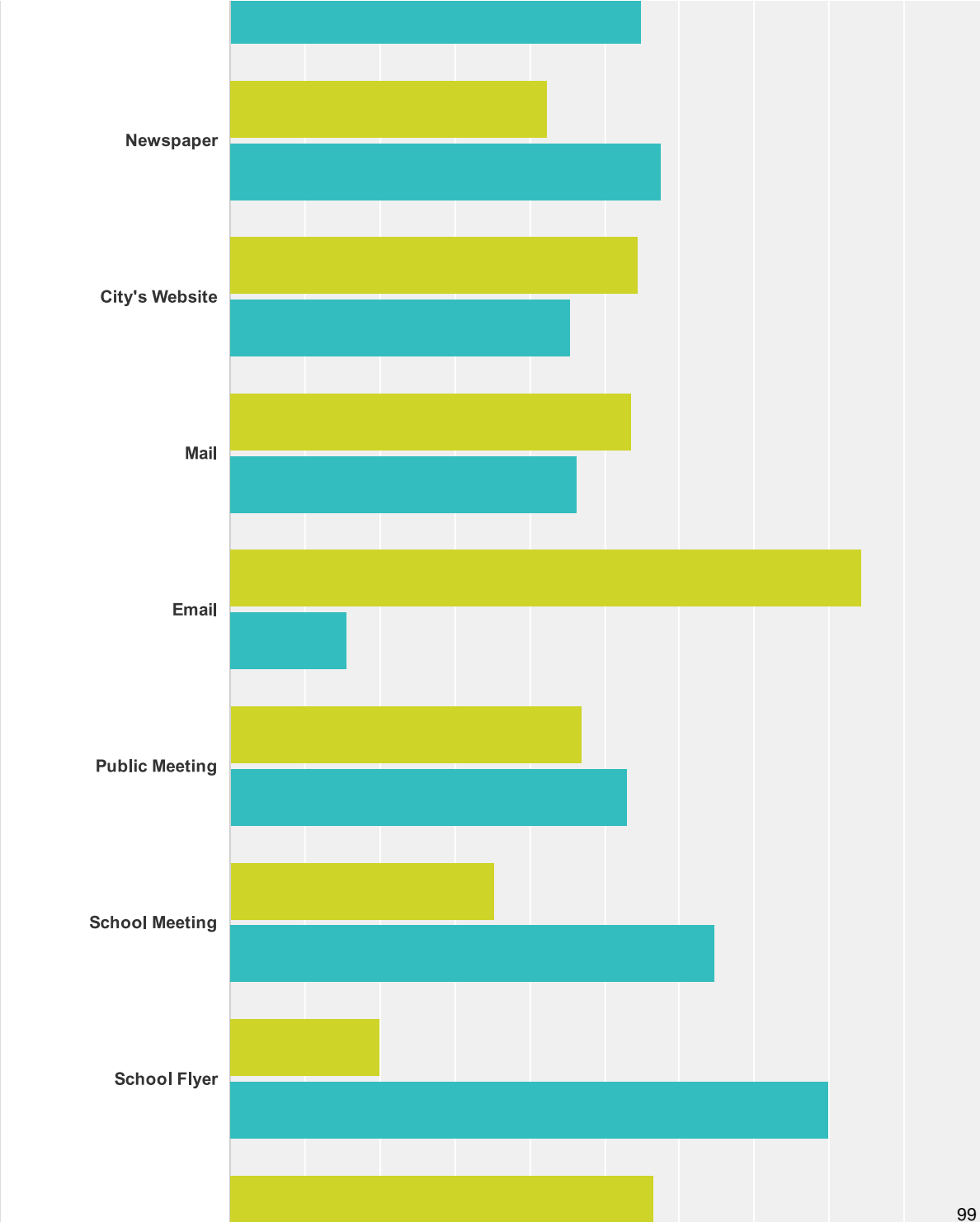
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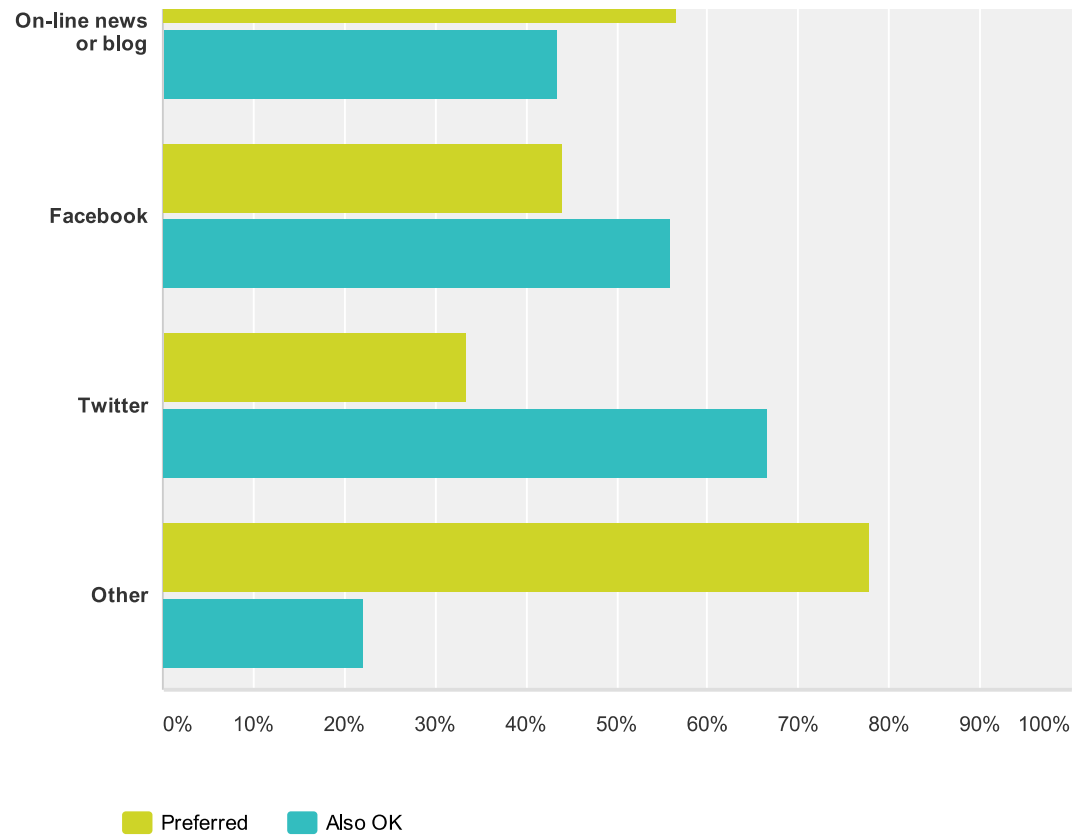
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Please rank how prepared you feel you and your household are for the probable impacts of natural or man-made hazard events. Rank on a scale of 1 to 5, with 5 representing the most prepared.

Answered: 47 Skipped: 12







| | 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)

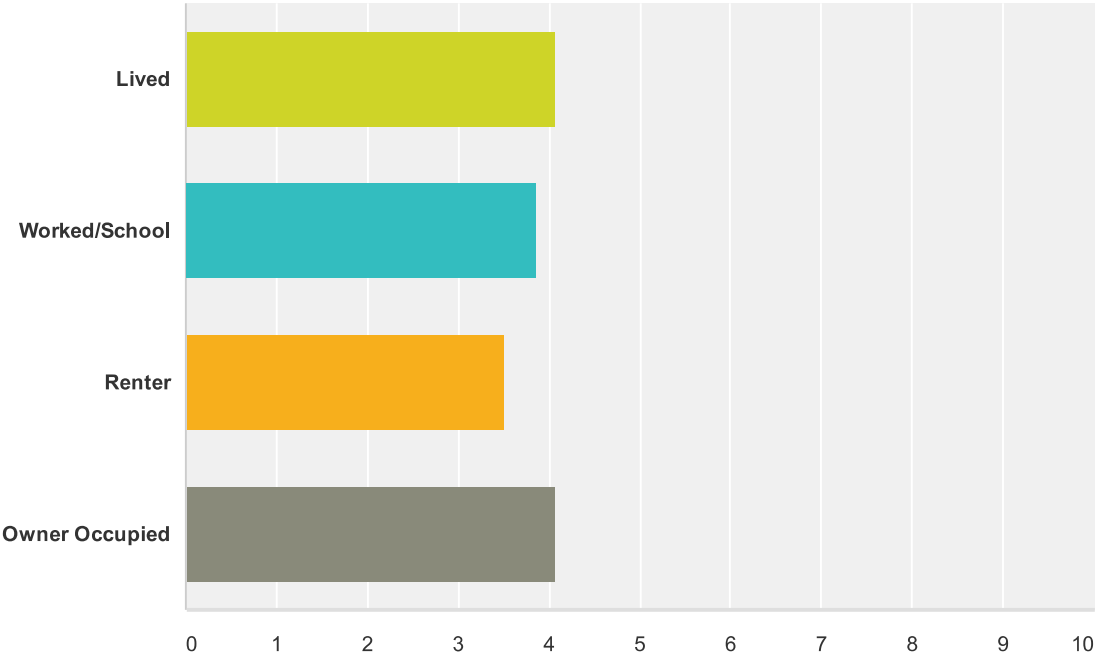
PAGE 4

Q7

CustomizeExport ▼

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 | Weighted 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

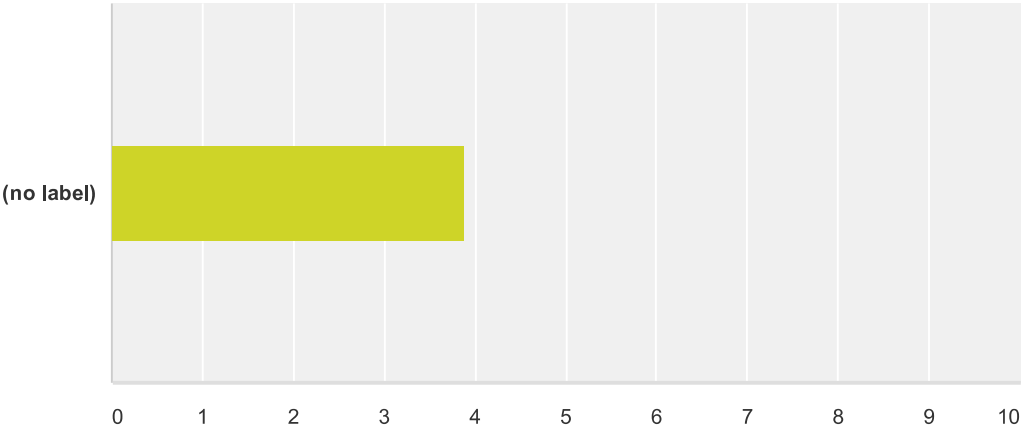
Q8

Customize

Export

Please indicate your age

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 |

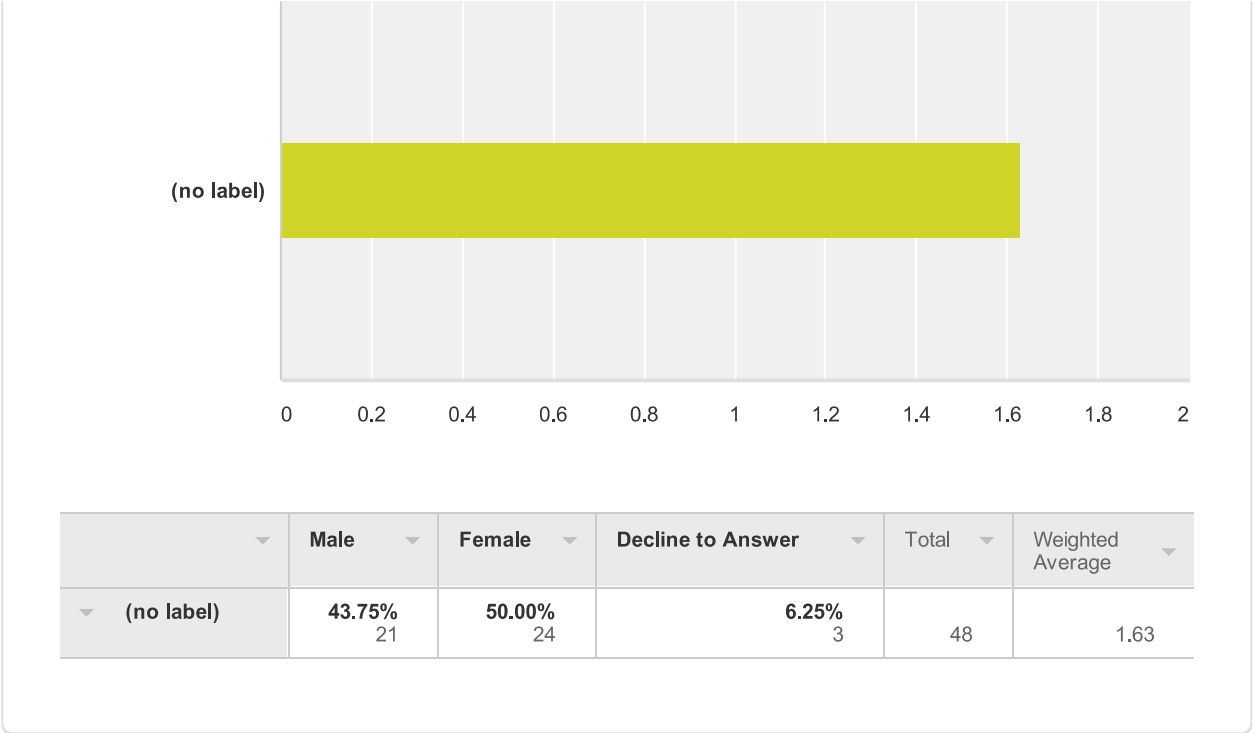
PAGE 6

Q9

CustomizeExport

Gender

Answered: 48 Skipped: 11



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 needs 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 |

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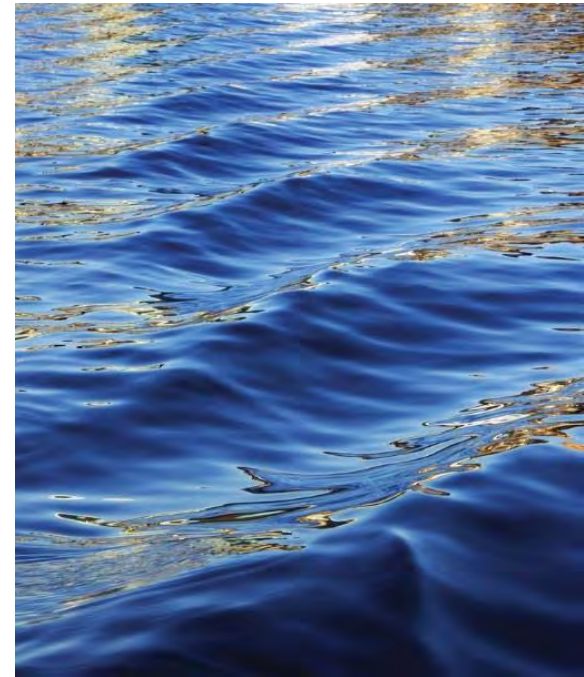
TRUSTe



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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

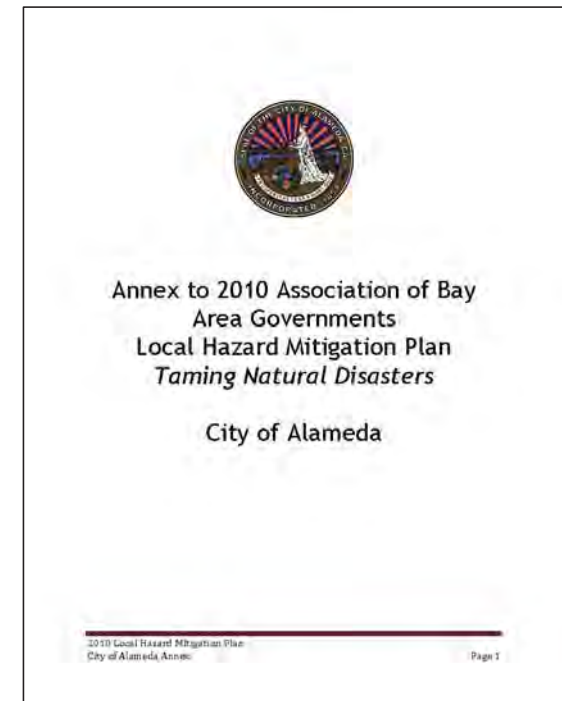
What is Hazard Mitigation Planning?

- 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.



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





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

IDENTIFY
HAZARDS AND
RISK

VULNERABILITY
ASSESSMENT

EXPOSURE

IDENTIFY
MITIGATION
ACTIONS

PLAN
IMPLEMENTATION

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:

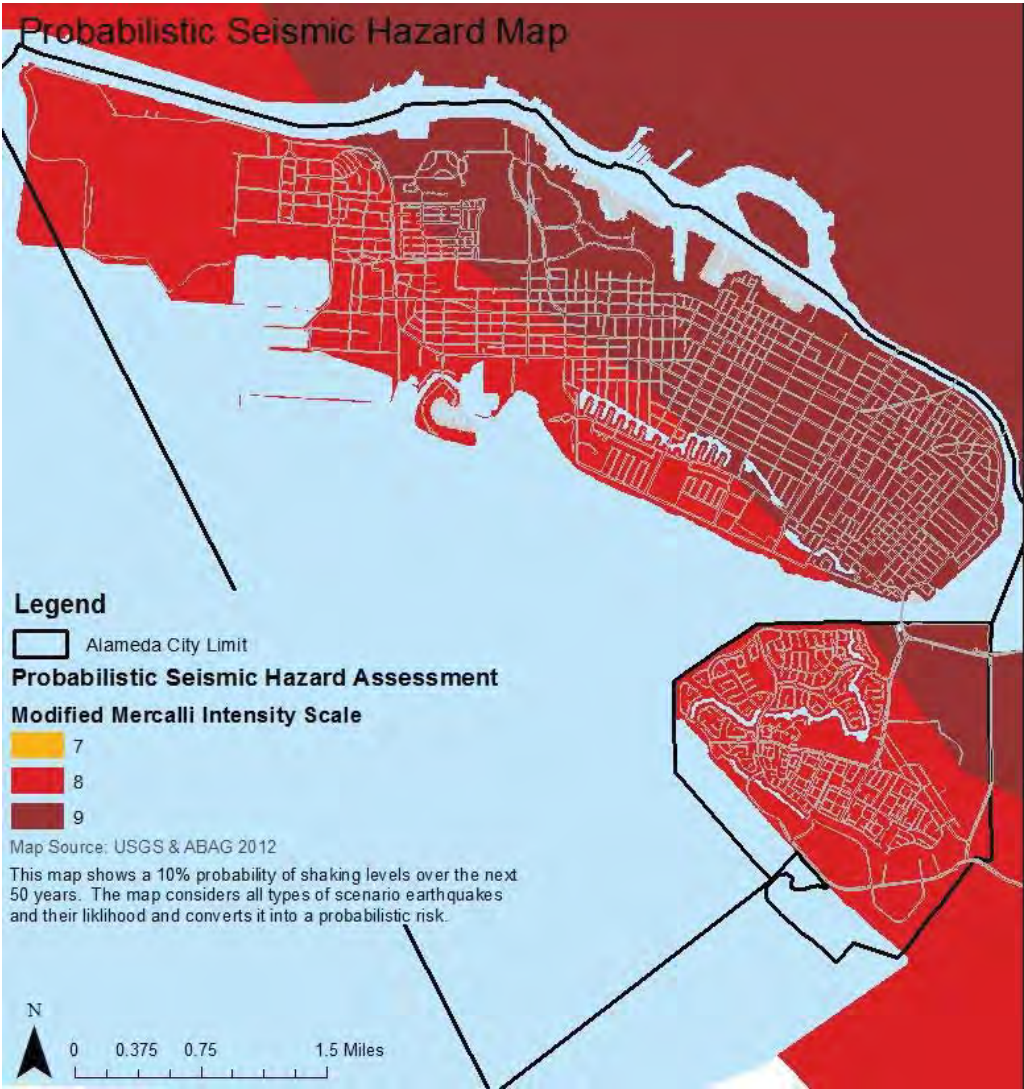
- Extreme drought
- Extreme heat
- Tsunami

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



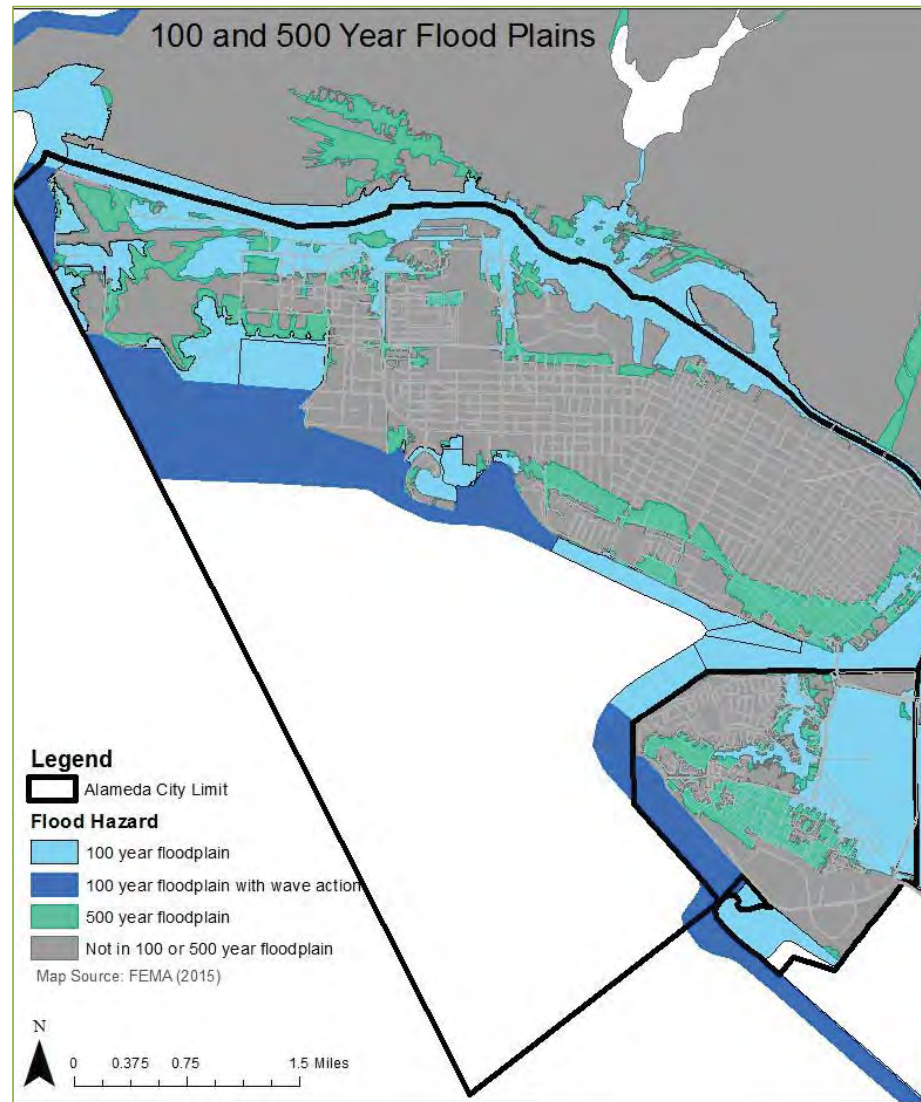
Earthquake Hazard in Alameda



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.

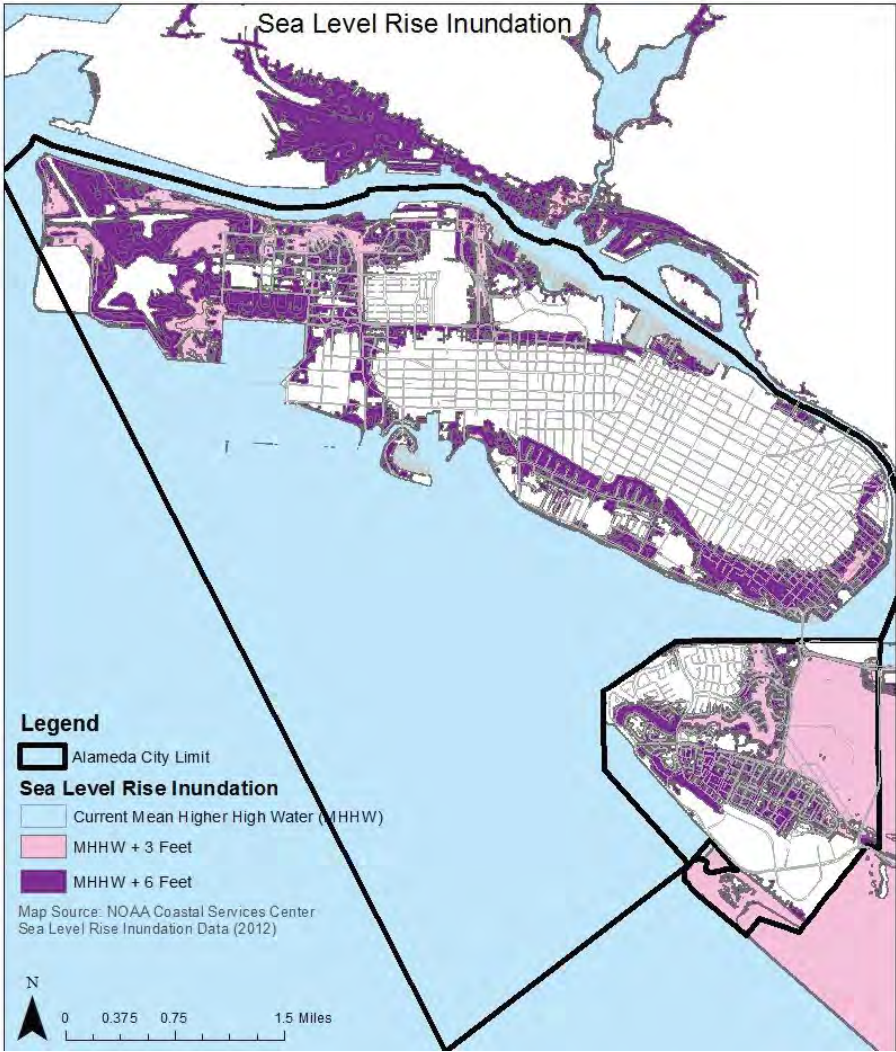
*500 Year floodplain is the area affected by a storm event having a 0.2% chance of being equaled or exceeded in any given year.



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" |



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 Sense 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.

#

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.

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 floodplain. To appeal, you have 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. Additionally, the Port of Oakland is studying FEMA's conclusions for the Oakland Airport and parts of Bay Farm Island based on their own hydrologic data and intends to appeal if determined the results are found to conflict with FEMA. The City will support what is deemed most scientifically valid and issued in the new Flood Insurance Rate Maps. The City is reviewing the low spot at the north end of the lagoon system to see if raising it would lessen the likelihood of flooding for those living along the lagoon system. The City is looking forward to working with the local Home Owners Associations to solve this problem.

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.

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 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.

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 your 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.
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If you wish 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.

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

Accessibility

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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?
pfidProdId=56598](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56598)
([https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56598](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56598))

06001C0066H (Alameda Point NE and Bayport)

[https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56599](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56599)
([https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56599](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56599))

06001C0067H (Marina Village)

[https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56600](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56600)
([https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56600](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56600))

06001C0068H (Alameda Point SE and Ballena Bay)

[https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56601](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56601)
([https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56601](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56601))

06001C0069H (West Alameda Island)

[https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56602](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56602)
([https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56602](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56602))

06001C0088H (East Alameda Island)

[https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56604](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56604)
([https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56604](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56604))

06001C0232H (West Bay Farm Island)

[https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56606](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56606)
([https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?
pfidProdId=56606](https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfidProdId=56606))

06001C0251H (East Bay Farm Island)

<https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfid=56607>
(<https://hazards.fema.gov/femaportal/prelimdownload/prelim/ProductsDownloadServlet?pfid=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:

- o Information on flood insurance, flood maps and how to find a local insurance agent <http://www.floodsmart.gov> (<http://www.floodsmart.gov/>)
- o FEMA Map Portal for general mapping info <http://msc.fema.gov/portal> (<http://msc.fema.gov/portal>)
- o 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)
- o FEMA Region 9 mapping effort in the San Francisco Bay Area
<http://www.r9map.org/> (<http://www.r9map.org/>)
- o 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)
- o Elevation Certificate and Instructions
<https://www.fema.gov/elevation-certificate> (<https://www.fema.gov/elevation-certificate>)
- o More Flood Preparedness Info <http://www.fema.gov> (<http://www.fema.gov/>)
- o 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/>)

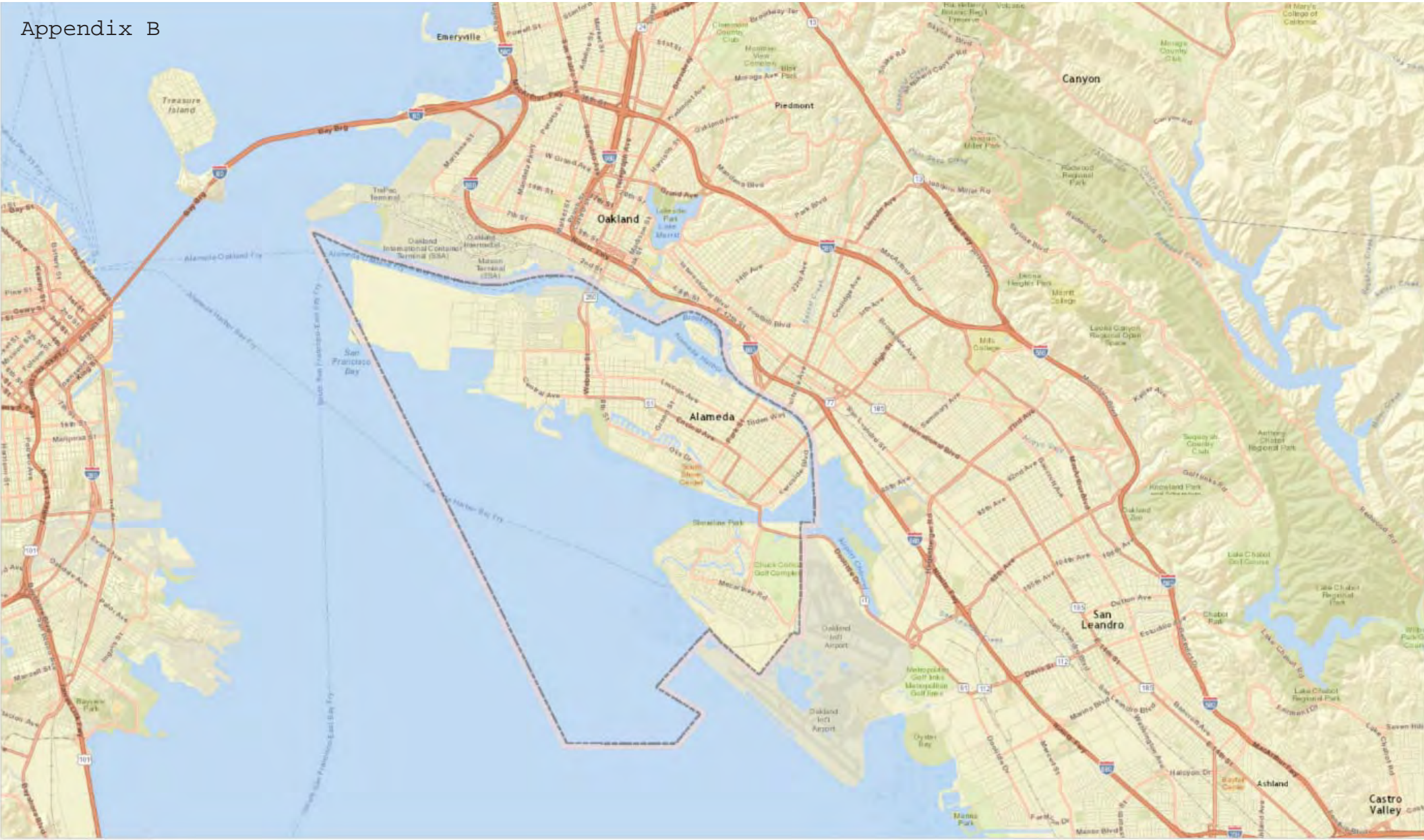
If you wish to submit an official appeal or protest during the 90 day appeal period, contact Laurie Kozisek, Associate Civil Engineer, City of Alameda Public Works, 950 West Mall Square, Alameda CA 94501, or phone 510-747-7930, or email LKozisek@alamedaca.gov (<mailto:LKozisek@alamedaca.gov>)

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



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

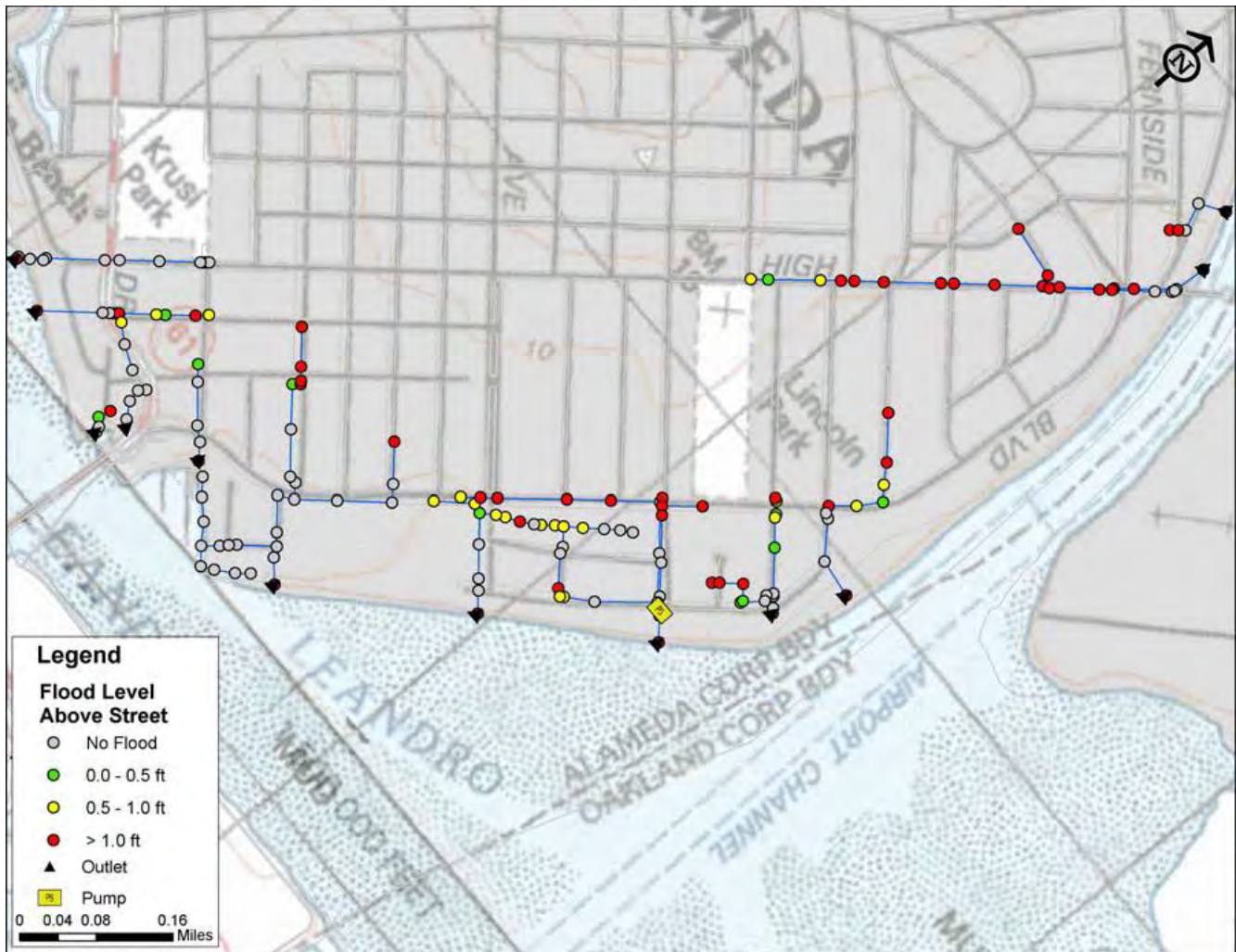
| YEAR | LOCATION NAME | LAT | LONG | DIST FROM SOURCE | WATER HT | DAMAGE \$M | HORIZ INUND | DEATHS |
|------|----------------------------------|------------|--------------|------------------------|-------------|---------------|----------------|--------|
| 1868 | SAN FRANCISCO BAY NEAR ALAMEDA | 37.71 | -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](https://doi.org/10.7289/V5PN93H7), accessed 11/30/15

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

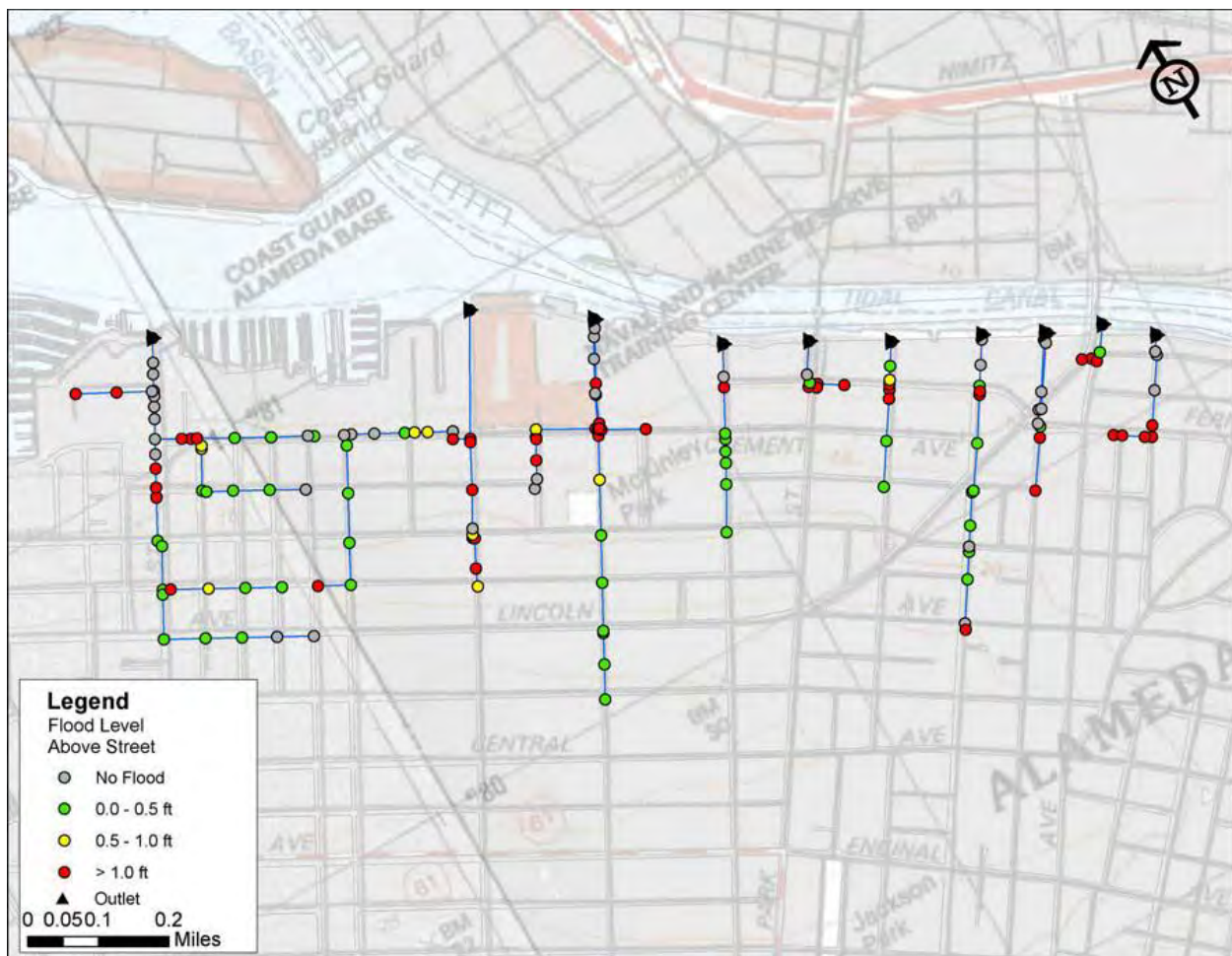


Figure A-5: Alameda Northside Area Existing 25-Year Flooding Depths

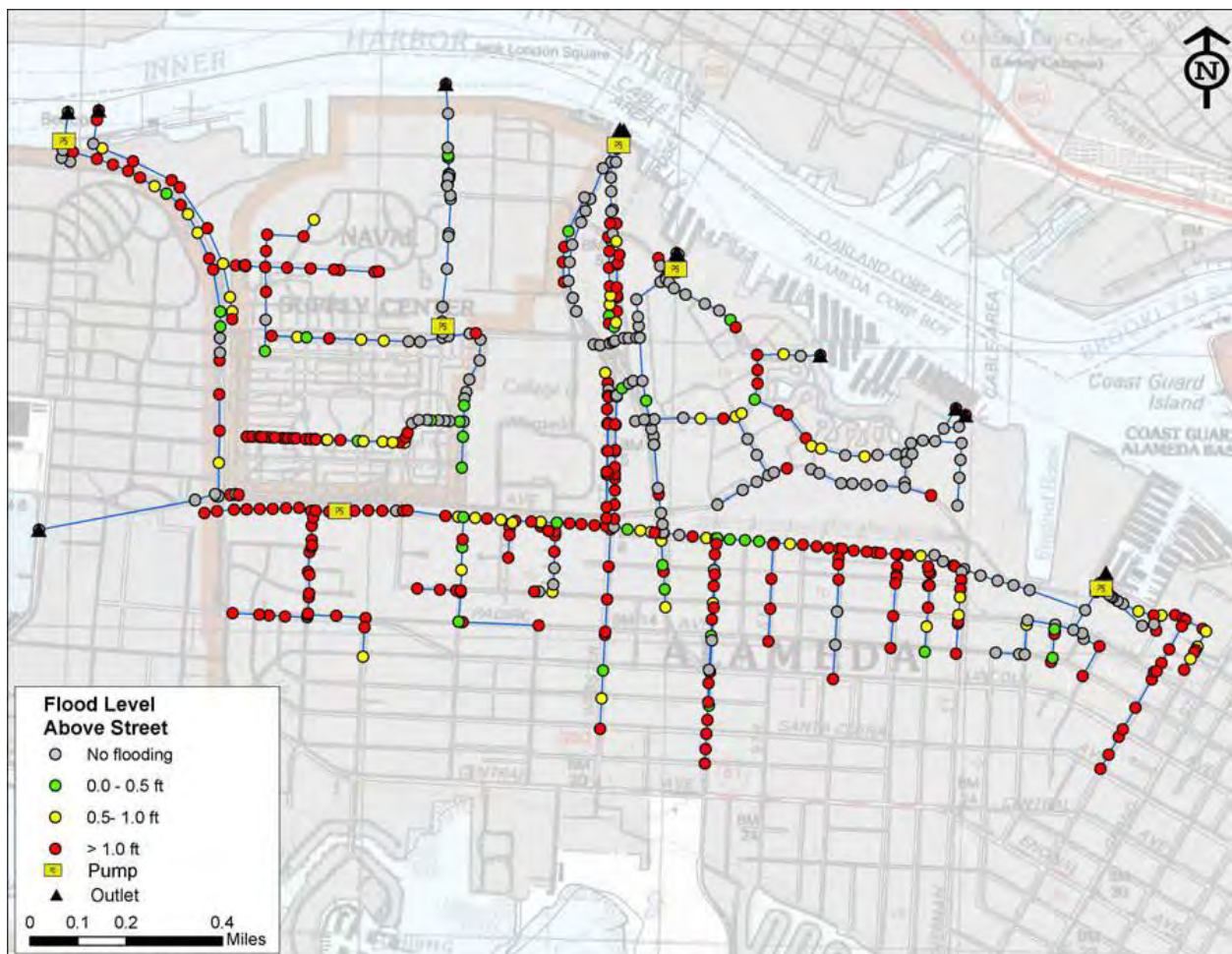


Figure A-7: Alameda South Area Existing 25-Year Flooding Depths

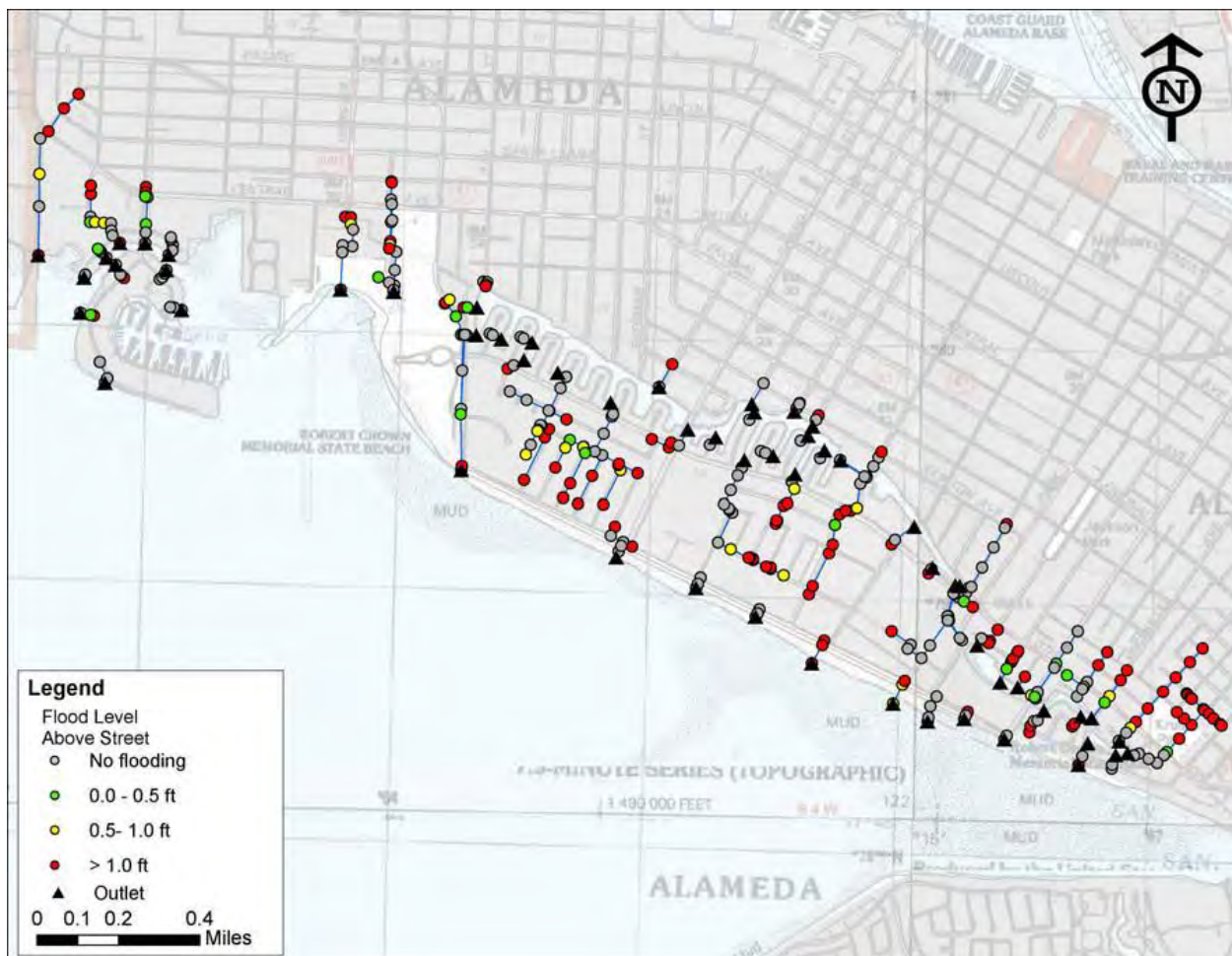


Figure A-9: Bay Farm East Area Existing 25-Year Flooding Depths

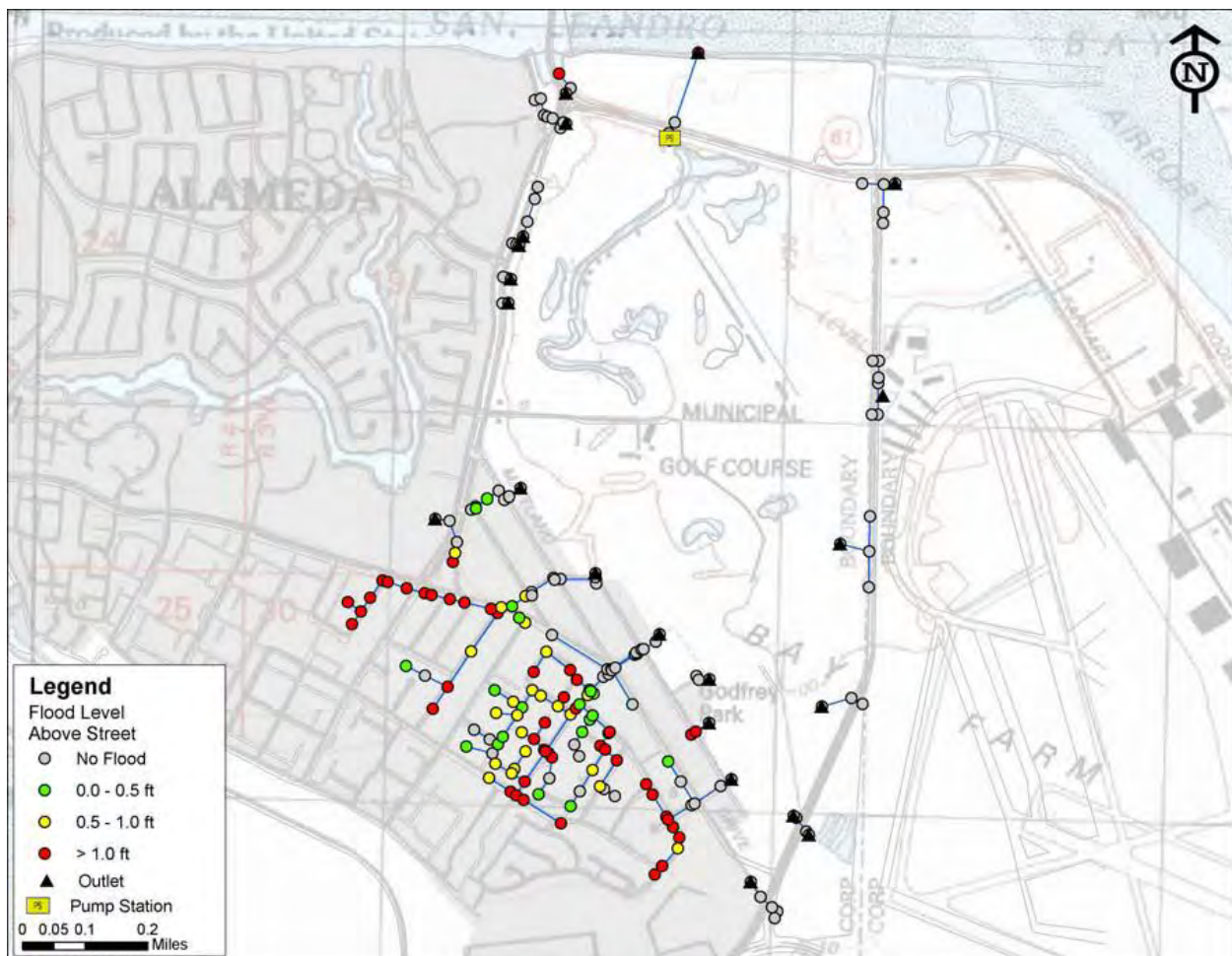


Figure A-11: Bay Farm North Area Existing 25-Year Flooding Depths

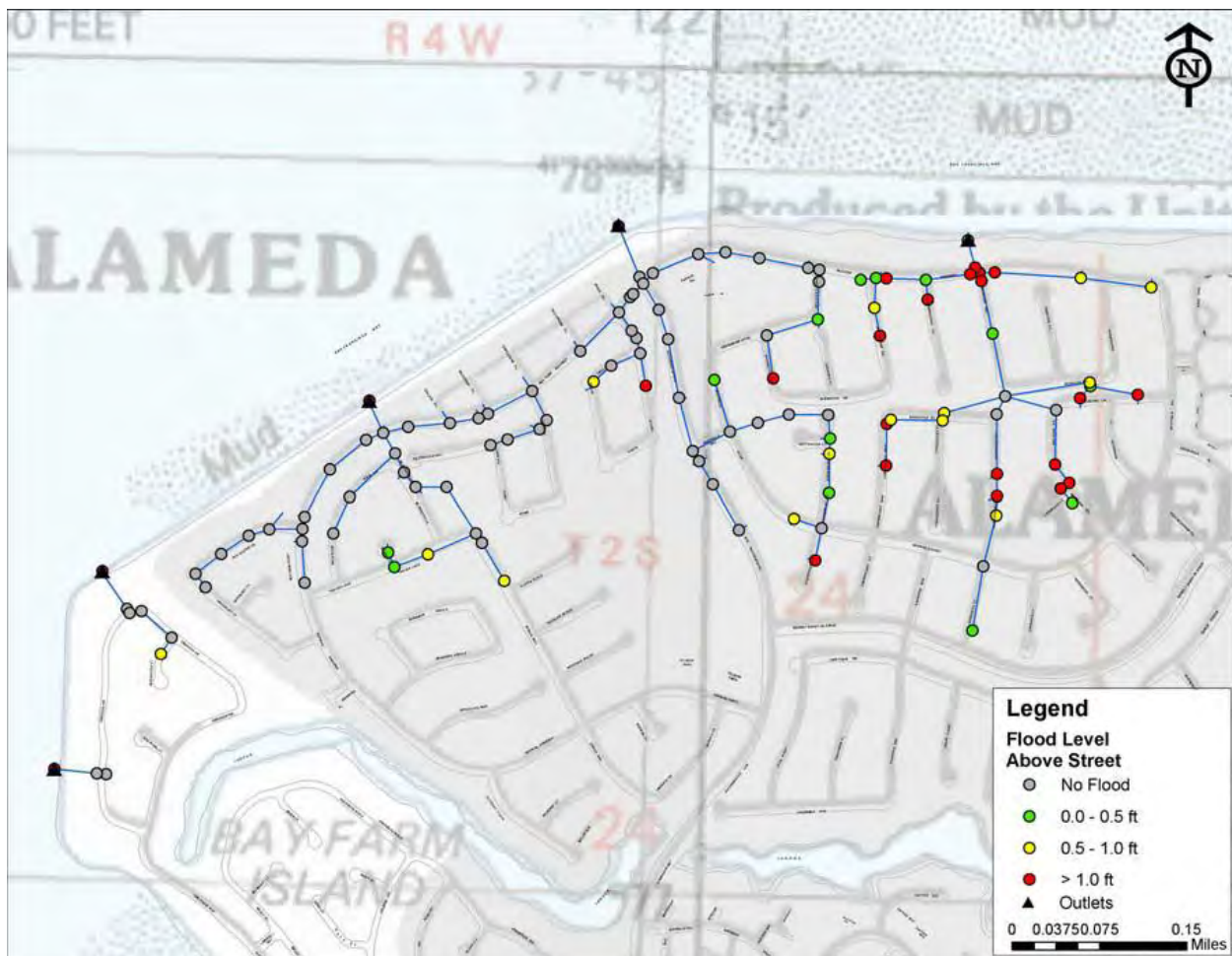


Figure A-13: Bay Farm Central Area Existing 25-Year Flooding Depths

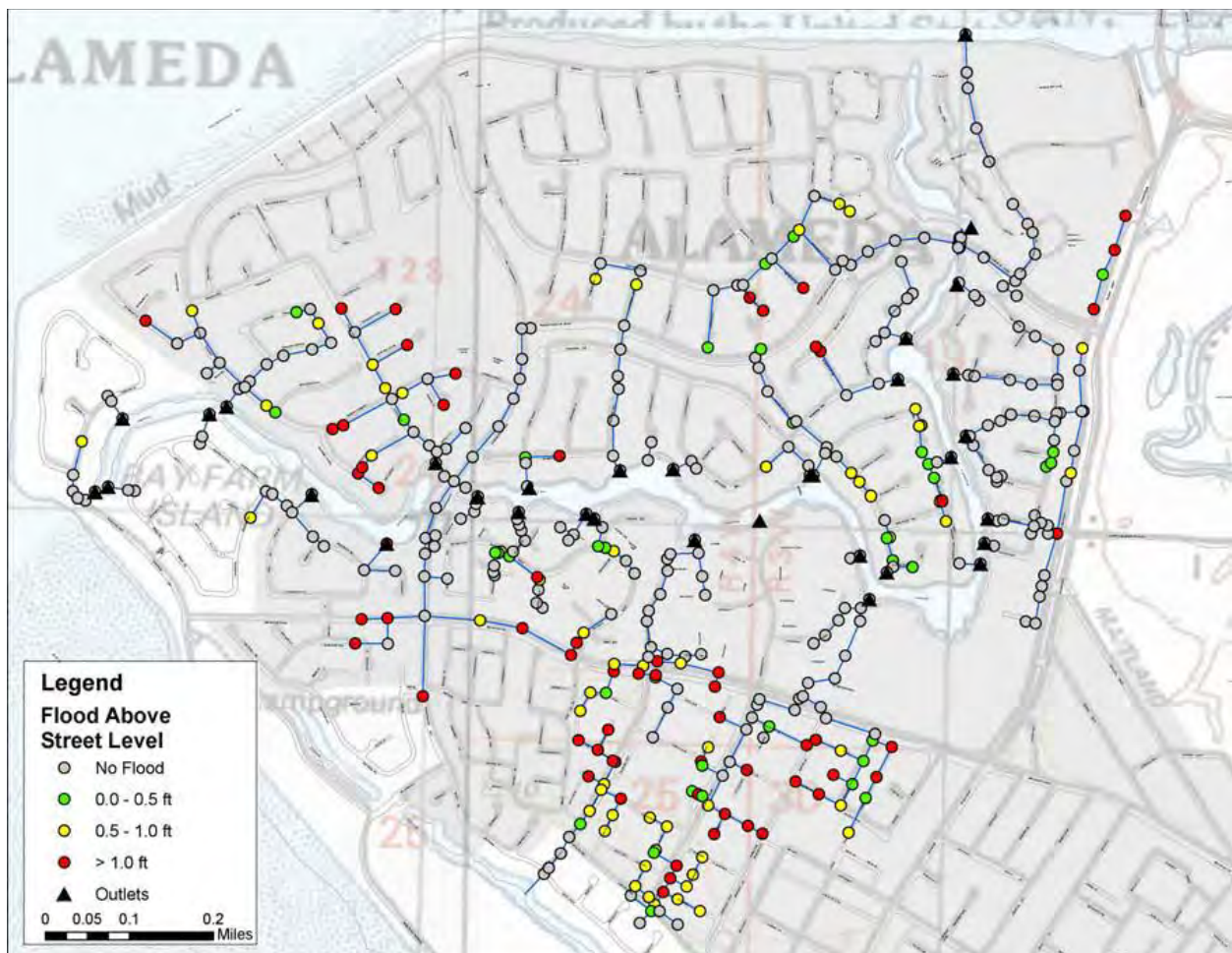


Figure A-15: Bay Farm South Area Existing 25-Year Flooding Depths

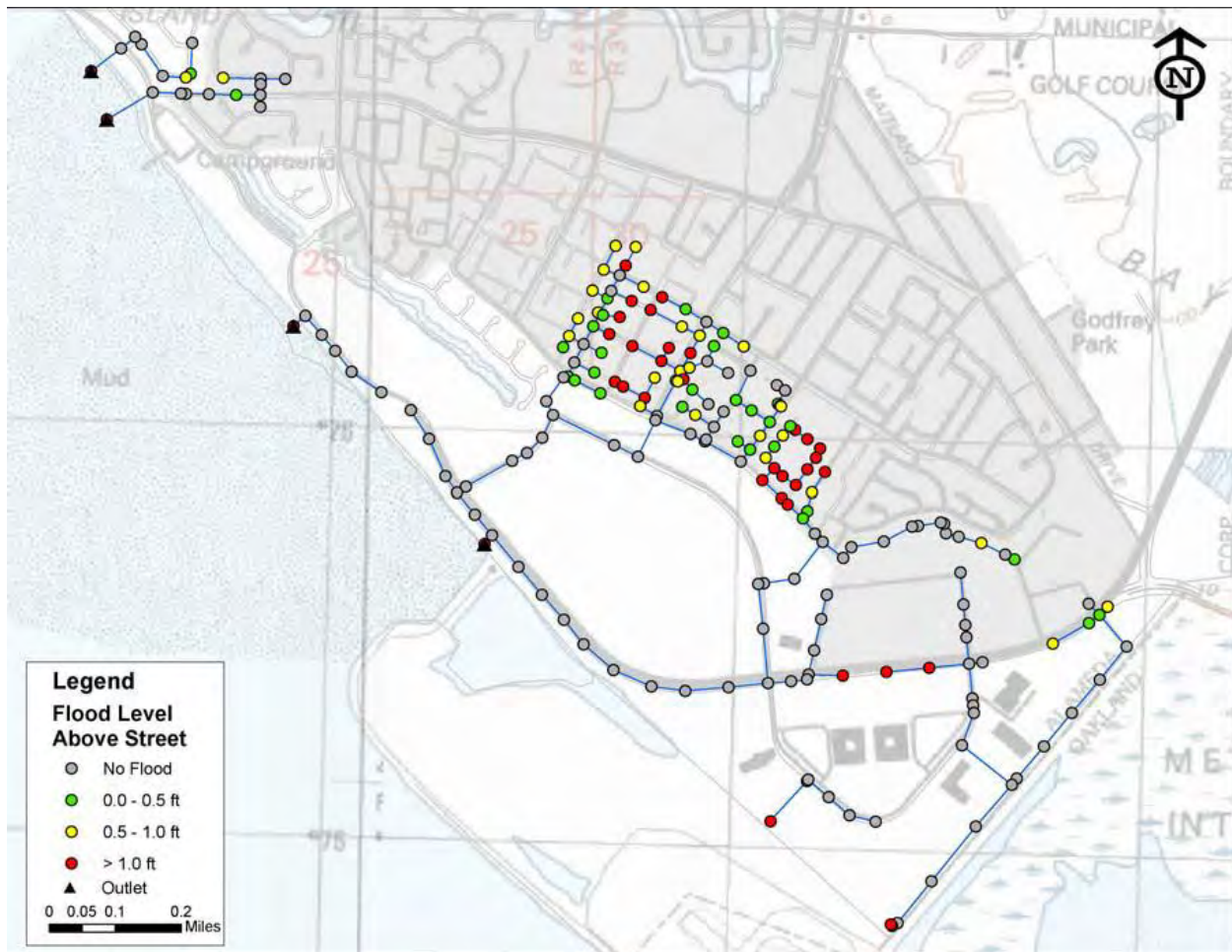


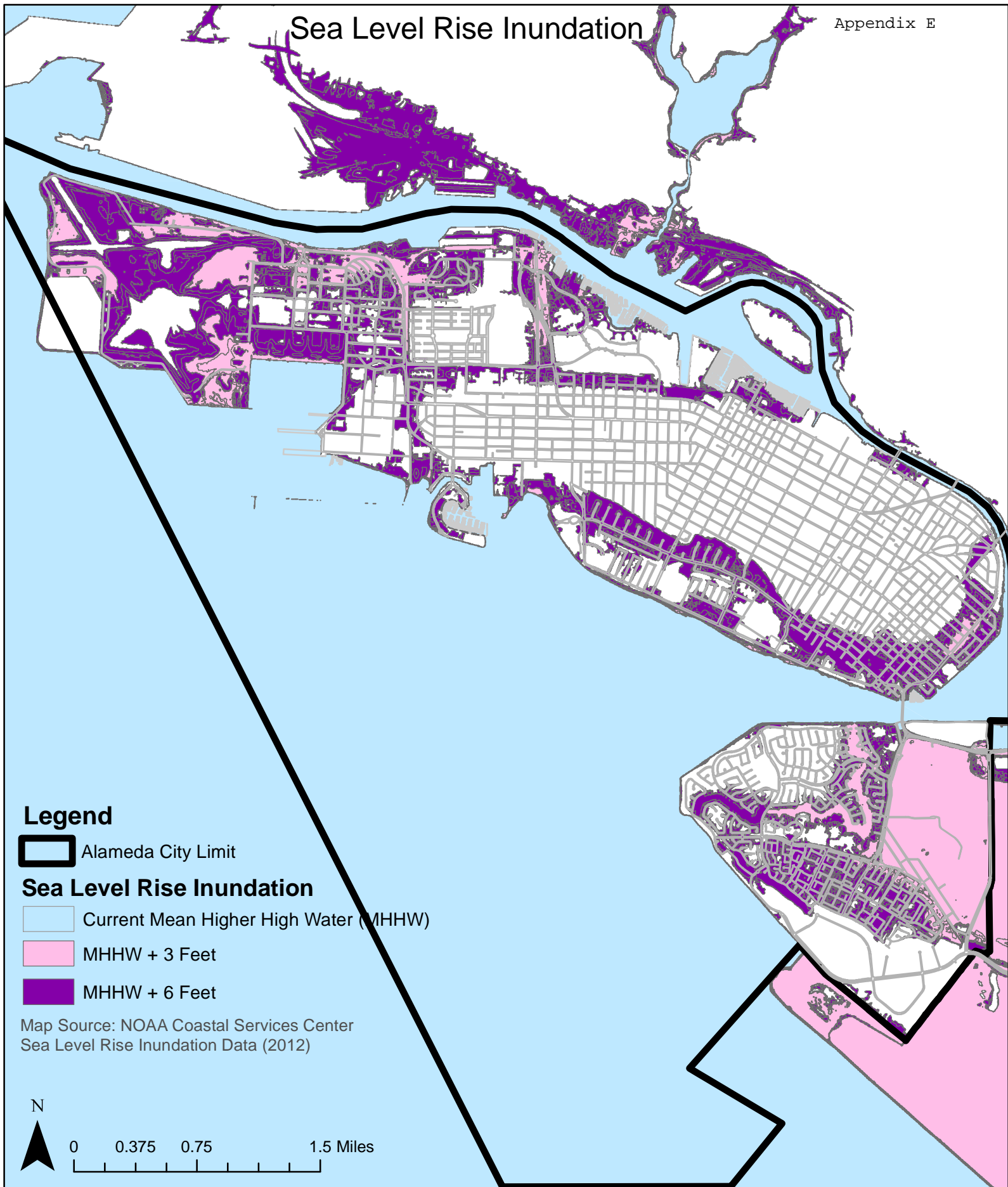
Table A-2: Pumping Station Summary with 25-Year Storm Drain Improvements

| 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

Appendix E



| 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 Space | 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 Space | 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 | <i>Draft List on File w City</i> | Public and Private | Various | Moderate | No data |
| | | | | | | |
| Non-City Bldg | China Clipper Plaza | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Eagle Village | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Esperanza | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Lincoln House | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Parrot Gardens | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Parrot Village | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Rosefield Village | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Sherman House | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Stanford house | <i>Address on File w City</i> | Housing Authority | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Shinsei Gardens | <i>Address on File w City</i> | Private | Section 8 Housing | Moderate | No data |
| Non-City Bldg | The Breakers at Bayport | <i>Address on File w City</i> | Private | Section 8 Housing | Moderate | No data |
| Non-City Bldg | The Park Alameda | <i>Address on File w City</i> | Private | Section 8 Housing | Moderate | No data |
| Non-City Bldg | Alameda Elder Services | <i>Address on File w City</i> | Housing Authority | Housing Offices | Moderate | No data |
| Non-City Bldg | Anne B. Diamant Senior Plaza | <i>Address on File w City</i> | Housing Authority | Senior Section 8 Housing | Moderate | No data |
| Non-City Bldg | Independence Plaza Senior Housing | <i>Address on File w City</i> | Housing Authority | Senior Housing | Moderate | No data |
| Non-City Bldg | Lincoln Willow Apartments | <i>Address on File w City</i> | Housing Authority | Senior Section 8 Housing | Moderate | No data |
| Non-City Bldg | Senior Condominiums (various) | <i>Address on File w City</i> | Housing Authority | Senior Section 8 Housing | Moderate | No data |
| Non-City Bldg | Jack Capon Villa | <i>Address on File w City</i> | Private | Housing for People with De | Moderate | No data |
| | | | | | | |
| Non-City Bldg | Golden Age of Channing II | <i>Address on File w City</i> | Housing Authority | Elder Care | High | No data |
| Non-City Bldg | Sunset Home for the Elderly | <i>Address on File w City</i> | Housing Authority | Elder Care | High | No data |
| Non-City Bldg | Waters Edge Lodge | <i>Address on File w City</i> | Housing Authority | Elder Care | High | No data |
| Non-City Bldg | Golden House Adult Dev. Center | <i>Address on File w City</i> | Private | Adult Day Care | High | No data |
| Non-City Bldg | Autumn Residential Care Home | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Bay Harbour Residential Care Home | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Elders Inn on Webster | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Golden Age Bayside II | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Golden Age of Sweet Rd | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Goldencare Assisted Living, Inc | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Sandcreek Lodge | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Sea Breeze Care Home, Inc | <i>Address on File w City</i> | Private | Elder Care | High | No data |
| Non-City Bldg | Waters Edge | <i>Address on File w City</i> | Private | Health Care Facility | High | No data |
| Non-City Bldg | Alameda Care Center | <i>Address on File w City</i> | Private | Skilled Nursing | High | No data |
| Non-City Bldg | Bay View Nursing & Rehab Center | <i>Address on File w City</i> | Private | Skilled Nursing | High | No data |
| Non-City Bldg | CROWN BAY NURSING&REBAB CENTER | <i>Address on File w City</i> | Private | Skilled Nursing | High | No data |
| Non-City Bldg | Marina Garden Nursing Center | <i>Address on File w City</i> | Private | Skilled Nursing | High | No data |
| Non-City Bldg | South Shore Convalescent Hospital | <i>Address on File w City</i> | Private | Skilled Nursing | High | No data |
| Non-City Bldg | The Waters Edge | <i>Address on File w City</i> | 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
High = Needed for 90% recovery within one month, especially for vulnerable populations
Moderate = Quick recovery would benefit City's overall recovery, especially for vulnerable populations, but alternatives available
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
High = Needed for 90% recovery within one month, especially for vulnerable populations
Moderate = Quick recovery would benefit City's overall recovery, especially for vulnerable populations, but alternatives available
Low = Needed for property owner's recovery, but alternative available



Legend

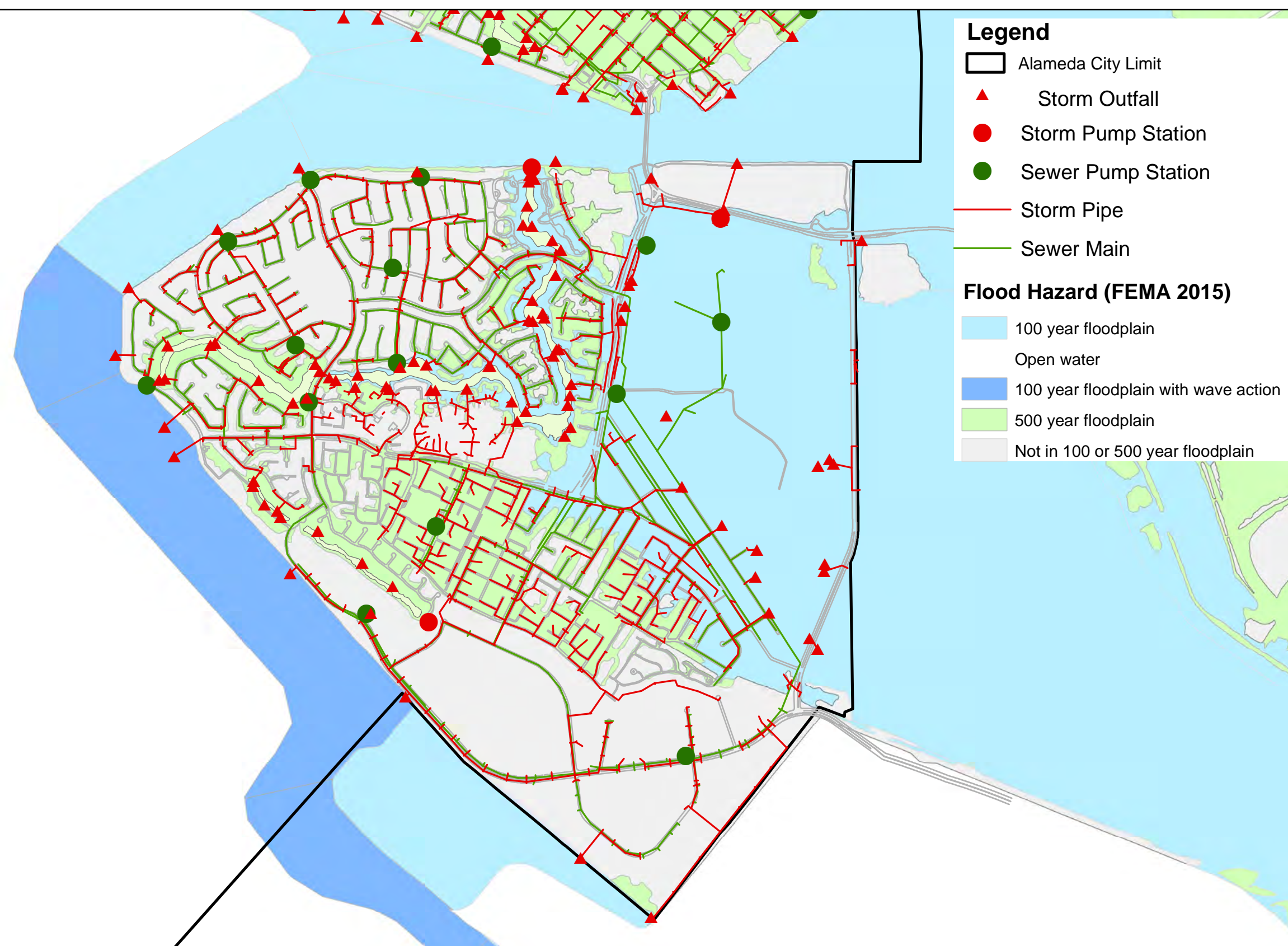
- Alameda City Limit
- Storm Outfall
- Storm Pump Station
- Sewer Pump Station
- Storm Pipe
- Sewer Main

Flood Hazard (FEMA 2015)

- 100 year floodplain
- Open water
- 100 year floodplain with wave action
- 500 year floodplain
- Not in 100 or 500 year floodplain

Note: Storm Pipes at Alameda Point are currently being digitized

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



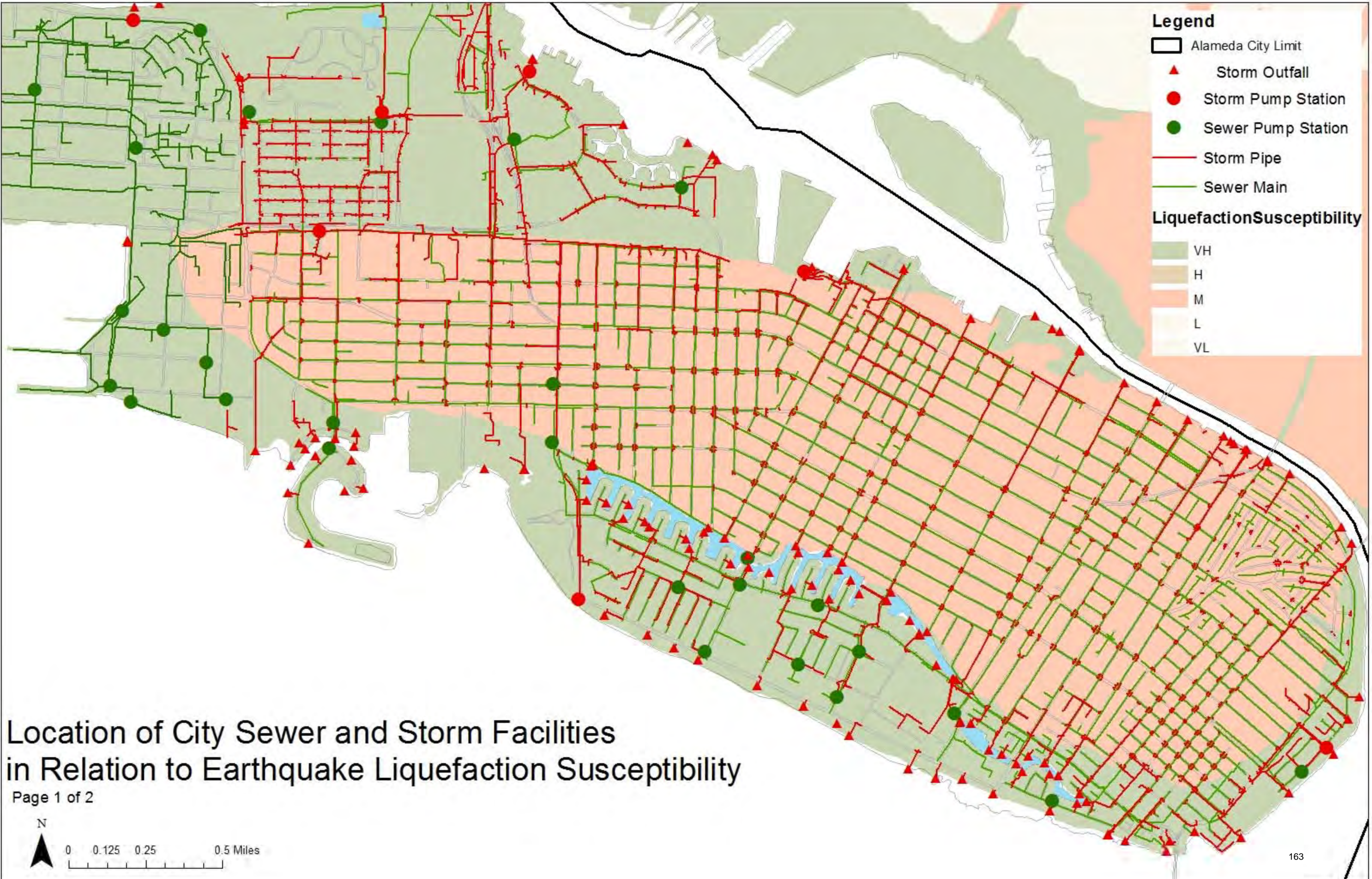
Legend

- Alameda City Limit
- Storm Outfall
- Storm Pump Station
- Sewer Pump Station
- Storm Pipe
- Sewer Main

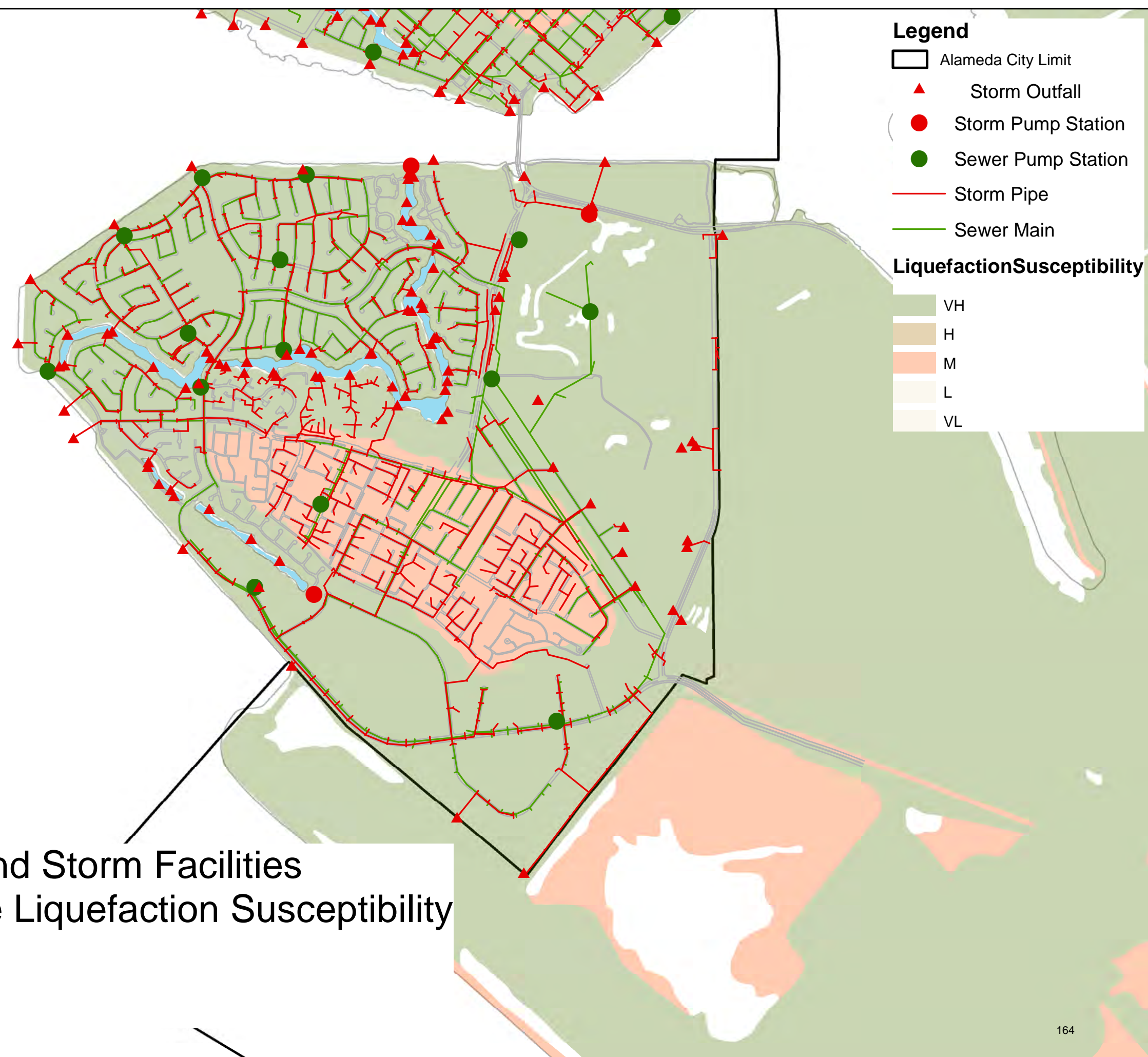
Flood Hazard (FEMA 2015)

- 100 year floodplain
- Open water
- 100 year floodplain with wave action
- 500 year floodplain
- Not in 100 or 500 year floodplain

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



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



Legend

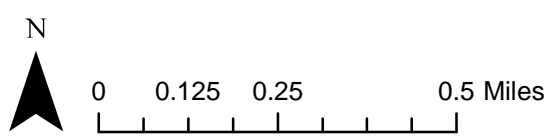
- Alameda City Limit
- Storm Outfall
- Storm Pump Station
- Sewer Pump Station
- Storm Pipe
- Sewer Main

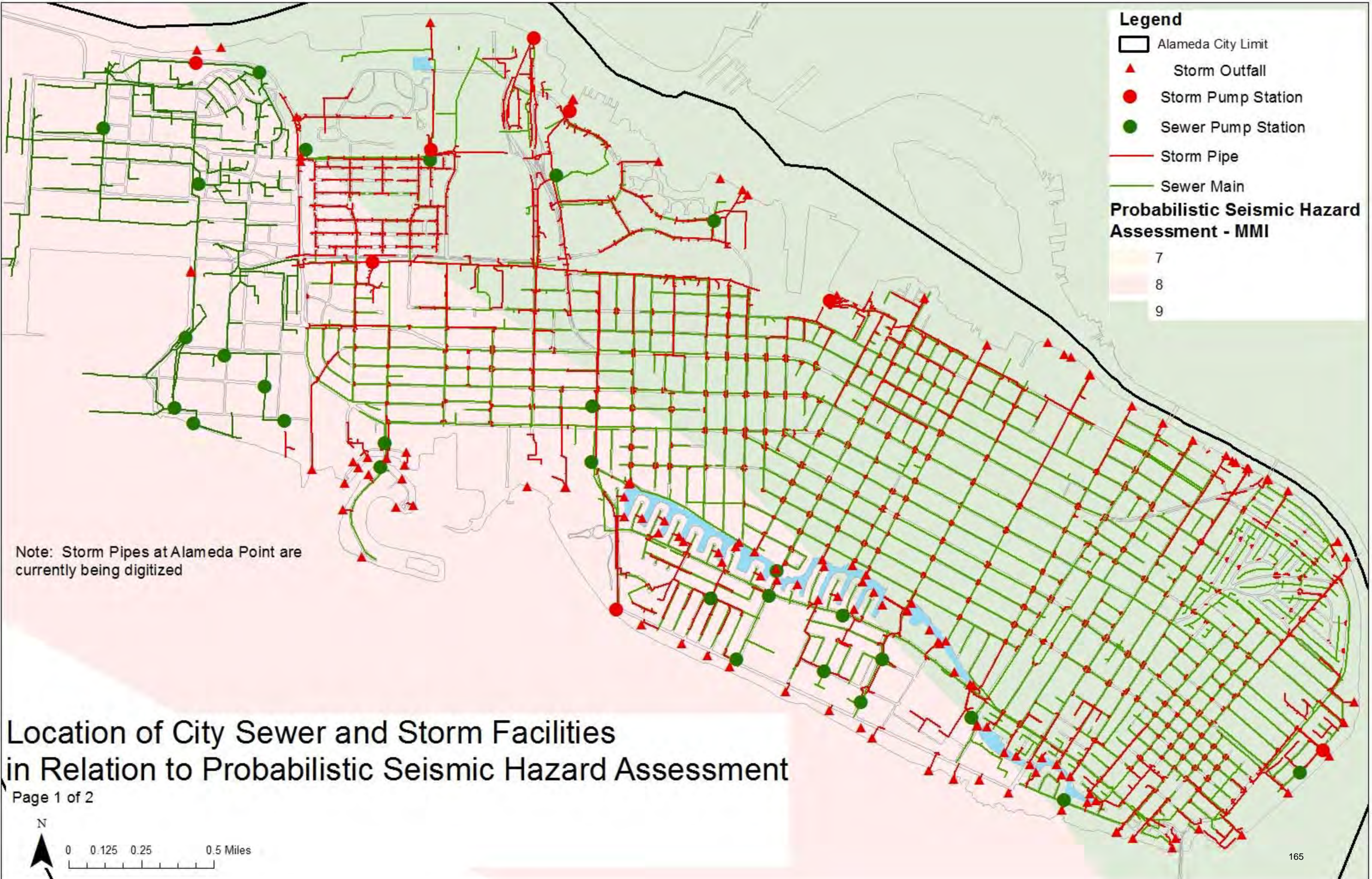
Liquefaction Susceptibility

- VH
- H
- M
- L
- VL

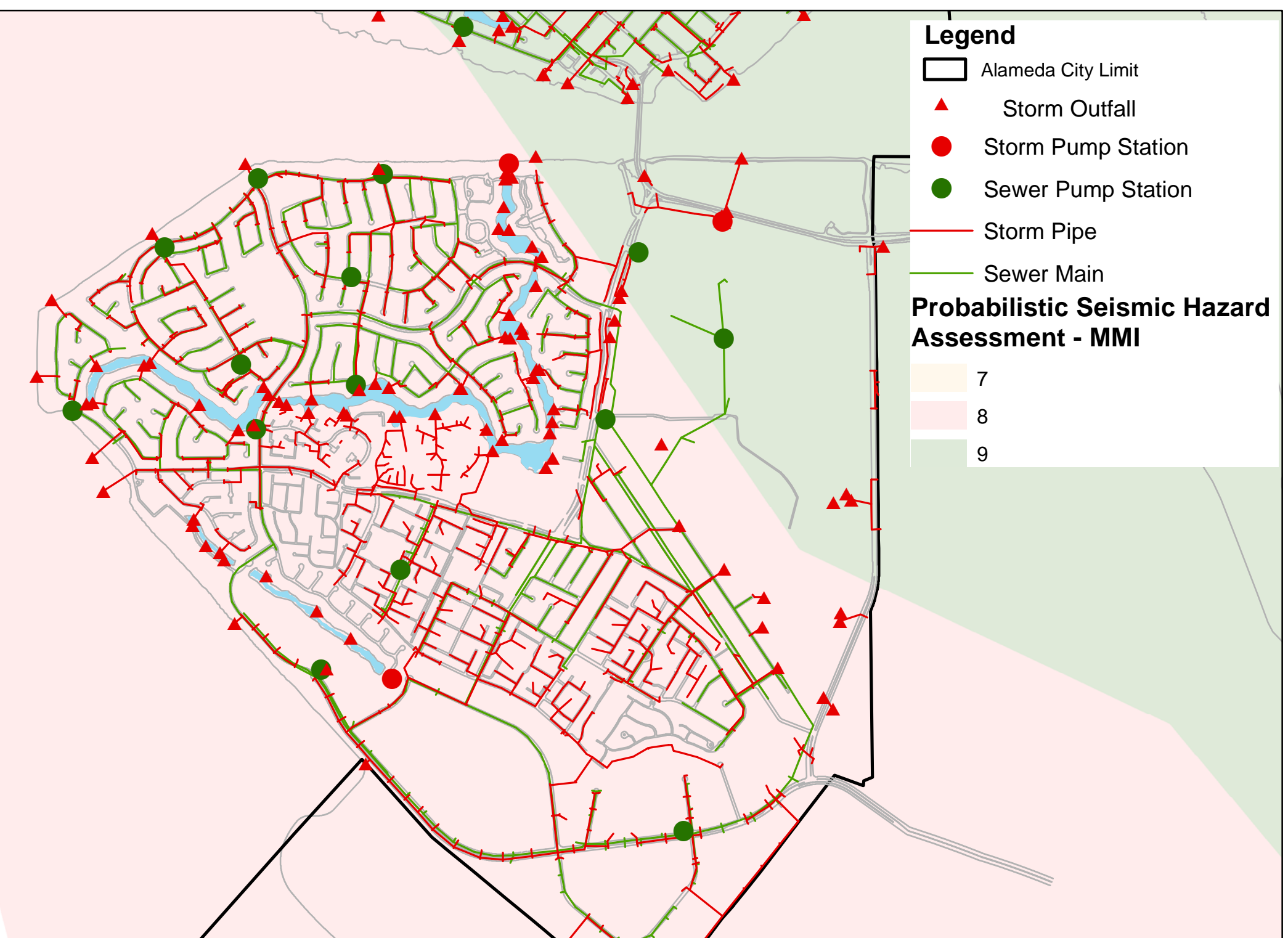
Location of City Sewer and Storm Facilities
in Relation to Earthquake Liquefaction Susceptibility

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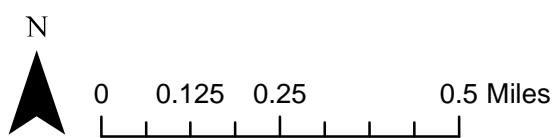


Location of City Sewer and Storm Facilities
in Relation to Probabilistic Seismic Hazard Assessment



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

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| 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

Recovery Priority: Critical = Life/Safety issues or needed for recovery within 1 week
High = Needed for 90% recovery within one month, especially for vulnerable populations
Moderate = Quick recovery would benefit City's overall recovery, especially for vulnerable populations, but alternatives available
Low = Needed for property owner's recovery, but alternative available

Ferry Terminal - WETA/City

Legend

Alameda City Limit

Street Class

- City Arterial
- City Local
- Private
- CalTrans

FEMA Proposed (2015) Flood Zone

- 100 year floodplain
- 100 year floodplain with wave action
- 500 year floodplain
- Not in 100 or 500 year floodplain

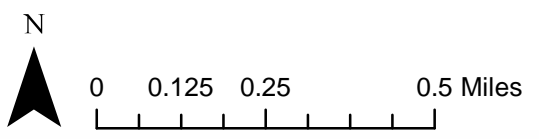
Park and High Street Bridges - County

Ballena Bay Bridge - City

Grand Street Bridge - City

Location of Transportation Assets in Relation to Flood Hazard

Page 1 of 2



Legend

Alameda City Limit

Street Class

City Arterial

City Local

Private

CalTrans

FEMA Proposed (2015) Flood Zone

100 year floodplain

100 year floodplain with wave action

500 year floodplain

Not in 100 or 500 year floodplain

Ferry Terminal - WETA/City

Location of Transportation Assets in Relation to Flood Hazard

Page 2 of 2

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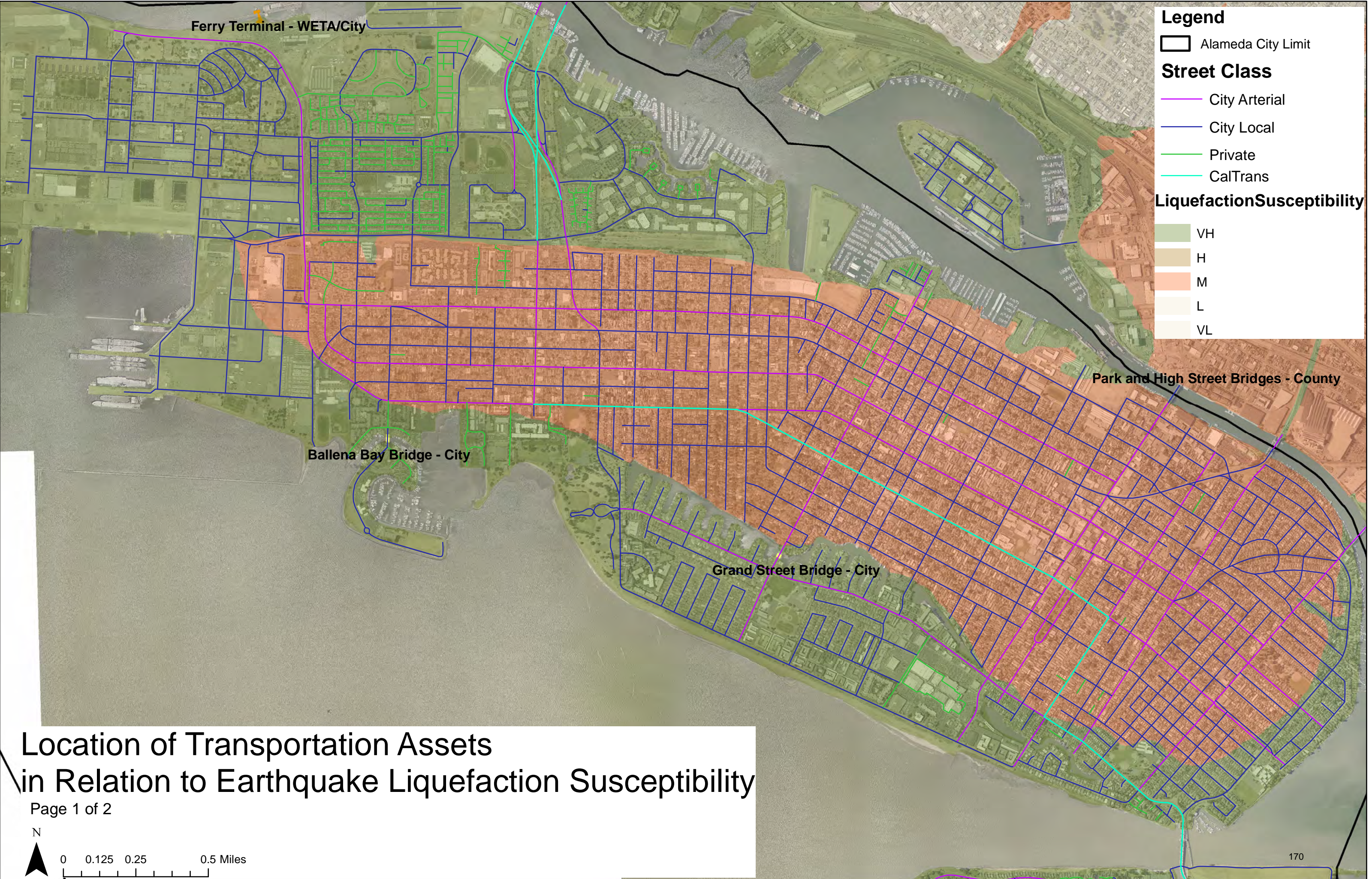
0

0.125

0.25

0.5 Miles

169



Location of Transportation Assets
in Relation to Earthquake Liquefaction Susceptibility

Legend

 Alameda City Limit

Street Class

 City Arterial

 City Local

 Private

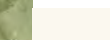
 CalTrans

Liquefaction Susceptibility

 VH

 H

 M

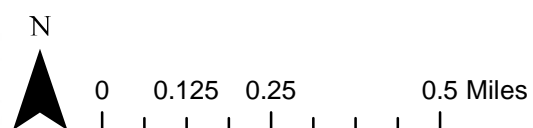
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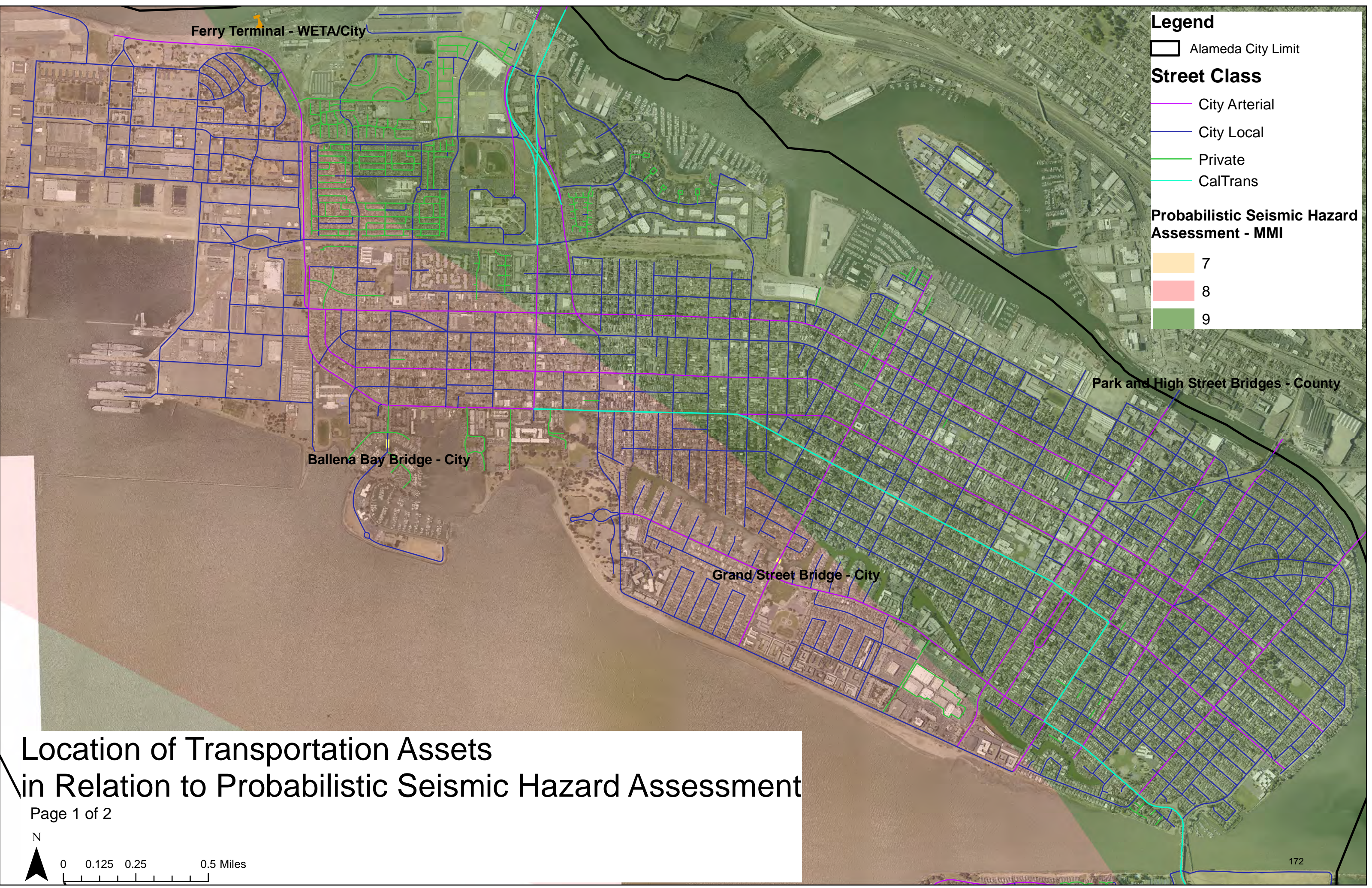
 VL

Ferry Terminal - WETA/City

Location of Transportation Assets in Relation to Liquefaction Susceptibility

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Legend

Alameda City Limit

Street Class

- City Arterial
- City Local
- Private
- CalTrans

Probabilistic Seismic Hazard Assessment - MMI

- 7
- 8
- 9

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 | |
| | | |
| | | |
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