Assessment Questions

ADAPTING TO RISING TIDES PROGRAM

This guide helps with…

Using the ART Assessment Questions to collect data and information that will inform your characterization of vulnerability and consequences for the assets, systems of assets, sectors and services addressed in the project.

Definitions: Assessment Questions

The ART assessment questions provide a framework for collecting the data and information that lead directly to the identification of vulnerabilities, consequences, and key planning issues. These assessment questions, which have been tested and refined in a number of previous assessments, can be applied to a variety of asset categories, sectors and services, and to a number of different asset scales, with little customization. Answers to the questions help build an understanding of the underlying causes and components of vulnerability and the potential consequences of those vulnerabilities on society and equity, environment and economy.

Don't wait for exposure!

It is not necessary to analyze the exposure of the project area or assets to the selected climate impacts before answering the assessment questions. Most questions will not require knowing when or how assets will be exposed. If understanding exposure becomes critical to initiating the assessment, there are, for most locations, adequate planning-level maps available to inform the extent and timing of climate impacts.

Steps to using the ART assessment questions:

1. Get familiar with the assessment questions and the types of vulnerability and consequence findings that these questions have revealed in the ART program
2. Develop an approach for answering the questions
3. Gather answers to assessment questions
4. Ground-truth answers with asset managers, owners, and topic experts

1. Get familiar with assessment questions and example findings

Types of Assessment Questions

The ART assessment questions are grouped according to those that describe existing conditions, different types of vulnerabilities often observed, and consequences. This organization – referred to as the ART classifications – simpliflies translating the information into vulnerability and consequence statements later on. The types of ART questions are listed below with a few examples for each. Note that the term "asset" refers collectively to an asset, a system of assets, a sector or a service. The assessment questions can be found in Appendix A, Tables 1 and 2, and are available to download as a spreadsheet (**ART Assessment Questions Supplement.xls**) with a separate worksheet for each asset type (e.g., transportation, wastewater, etc.).

Existing Conditions: Describes the asset and highlights current conditions or stressors that could affect its vulnerability.

- Where is the asset located?
- What is its function?
- Who owns and manages it?

Physical: Identifies conditions or design aspects that make an asset particularly vulnerable to impacts.

- Is the asset co-located with other assets?
- Are water- or salt-sensitive components of the asset located at- or below-grade?

Information: Determines if data or information is lacking, incomplete, poorly coordinated, or difficult to access.

- What types of information sources for the asset(s) are publicly available?
- What is the quality of available information?
- What types of mechanisms exist to share information between owners of connected infrastructure?

Governance: Identifies challenges with management, regulatory authority or funding options for adapting to impacts.

- What plans, procedures, etc are in place to manage the assets?
- What types of permits are needed to make changes?
- What funding sources exist that can be used for adaptation?

Functional: Considers the function of the assets and their relationship to or dependence on other assets.

- What services does the asset rely on?
- Is it physically connected to other assets such that failure in one part of the system disrupts the entire system?
- Does the asset provide functions or services that are limited?

Consequences: Informs how climate change may impact society and equity, the economy and environment.

- Does the asset serve vulnerable communities or critical facilities?
- Are hazardous materials at the asset site that could pose a risk to the environment?
- What is the scale of economic costs if the asset experiences disruptions or damage?

Example Findings

In addition to reviewing the questions themselves, review examples of summarized vulnerability and consequence findings from the ART Program. These findings were developed using the assessment questions, and reviewing them will enable your project staff, working group members and others who are

providing assessment information to understand the types of vulnerabilities and consequences that are likely to be revealed by the assessment questions. Three suggested sources of examples are available in **ART Portfolio: How-to > ART Supplies**:

- **ART Subregional Findings** (PDF)
- **Hayward Shoreline Resilience Project Profile Sheets** (PDF)
- **Oakland/Alameda Resilience Study Example Profile Sheets** (PDF).

2. Develop an approach for answering the questions

Before diving into the work of gathering answers to the assessment questions, consider which assets will be evaluated and to what extent. Depending on the type and number of assets being considered it many not be possible or reasonable to collect detailed answers for each. In addition, if one agency or organization owns or manages a number of different assets it can be difficult to decide how to collect the answers: e.g., for all of the assets collectively or for each asset seperately.

Remember that the assessment questions are a tool to guide the collection of targeted information that can then be summarized in different ways, e.g., for individual assets; agencies or organizations; watersheds or focus areas within the project area, etc. Ultimately, the approach will depend on the scope of the project as well as the type of asset. Refer to the **ART Scope & Scale Issue Paper** (PDF) to learn more about how these factors affect project outcomes.

For each type of asset, identify whether the assessment questions will be answered for representative or specific assets, recognizing that it may be necessary to modify the approach for certain assets depending on input from the working group and other stakeholders, availability of information and preliminary findings as the assessment progresses.

Representative vs. Specific Assets

REPRESENTATIVE ASSETS

Answering the assessment questions for a smaller number of representative assets works well for numerous, similar assets. For example, vulnerabilities and consequences of climate impacts to numerous contaminated sites within a project area may be very similar. Rather than assessing each site individually, answering the questions for a few examples that represent a cross-section of the types of contaminated sites can reveal the range of vulnerabilities and consequences that are likely. Other types of assets that can be addressed with this approach often include schools and local roads.

SPECIFIC ASSETS

Unique assets for which the findings from the assessment questions are unlikely to carry over from asset to asset need to be addressed individually. Examples of these include wastewater treatment plants, and tidal creeks and flood channels. Additionally, if the project scope includes only a small number of assets, the questions should be answered for each of these specifically.

3. Gather answers to the assessment questions

In gathering answers to the assessment questions it is often necessary to use a number of approaches, including research to uncover readily available reports, documents, inspection and monitoring reports, and maps. The table in Appendix B has a list of asset types and useful information and data sources.

Gathering the information to answer the assessment questions is a balancing act. On the one hand, it may be helpful to check in with asset managers, owners or topic experts early on in the process to make sure that you are aware of and using recommended data and information sources. However, it is important not to seek significant input on the questions without having made a diligent effort to gather information and answer them on your own. It can be challenging for your stakeholders and other experts to generate complete answers from scratch, and it is far easier and more efficient for them to help refine answers or provide additional, specific resources to fill information gaps. Keep in mind answers typically range in length from a phrase to a couple of sentences. It is okay if the answer uncovers further, specific challenges that need to be further investigated.

When gathering information make sure to use the assessment question sheets to keep track of sources, including if information is provided through personal communications. Knowing where and when the information was collected and by whom is very helpful later on when validating the assessment findings, and it is critical for maintaining transparent decision-making in the project.

Gathering answers: Keep looking? Stop and ask?

Some questions can be answered with data and information that is readily available, while others will require much more effort or cannot be answered through research. It can be difficult to know how much effort to expend when answering an assessment question with or without assistance from the asset manager. Below are a few examples of topics and questions for which the ART Program has had to rely on information and best professional judgments provided directly from asset owners and managers.

- Land subsidence at the site of the asset.
- Detailed information about asset management: e.g., types and frequency inspections and maintenance conducted, major repairs and upgrades.
- Has the asset been disrupted in the past due to an unplanned event e.g., weather-related closure, emergency repair or improvement, work strike, or other event?

Avoid spending the effort to uncover hard-to-find, or in some cases nonexistent information. Instead, flag critical data needs and knowledge gaps that will require further consideration or research.

4. Ground-truth answers with asset managers, owners, and topic experts

It is important to confirm, or ground-truth preliminary assessment answers with asset managers, owners, and topic experts. There are a number of approaches that can be used to solicit input as efficiently as possible, including;

- written surveys
- individual or small group meetings
- phone interviews
- field visits
- collaborative websites (e.g., Google docs)

Prior to taking any of these approaches to get input from an asset manager or owner or topic expert, it is essential to provide them with any preliminary assessment information already gathered.

Some asset managers may be able to provide needed information and data when given the assessment questions and "raw" answers in a spreadsheet or Word® document. However, the ART Team has found that many asset managers and owners tend to respond better and more effectively when the preliminary information has been summarized in draft profile sheets. See the **How-to Guide: Profile Sheets** for an explanation of the different components of a profile sheet, and the **Hayward Shoreline Resilience Project Profile Sheets** and **Oakland/Alameda Resilience Study Example Profile Sheets** for examples of *finalized* profile sheets. (Note that at this stage in the planning process, the draft profile sheets would be much less complete, and would not have proposed adaptation actions or responses.) The questions on their own can be overwhelming, whereas the summarized information on the profile sheets provides context for why certain information (questions) are helpful to understanding vulnerability and consequence. It may be helpful to share an example final profile sheet to help them understand how the information will be ultimately communicated. Additionally, be sure to provide them with enough background on the assessment objectives if they are not already familiar with the project.

Since input on the preliminary assessment answers is partially based on best professional judgment, it may be that others besides those participating directly in the working group have the necessary knowledge or expertise. It is often helpful to ask for assistance in engaging colleagues, co-workers, others in the field, community members and non-profit organizations to gather needed information. Lastly, be sure to ask if there are any additional data or resources available that can help fill in knowledge gaps. If there are none then make sure to note this data need or knowledge gap as an information challenge.

Appendix A: ART Assessment Questions

Questions in Table 1 apply (as noted) to all asset types except Community Characteristics which are in Table 2. The questions are also available to download as a spreadsheet (**ART Assessment Questions Supplement**) with a separate worksheet for each asset type (e.g., transportation, wastewater, etc.).

- Remember that it is not necessary or advisable to answer every question! Some questions may not apply (mark 'NA') and others you may not know (mark '?').

TABLE 1. QUESTIONS FOR TRANSPORTATION, STORMWATER, WASTEWATER, STRUCTURAL SHORELINES, NATURAL SHORELINES, COMMUNITY FACILITIES, PARKS, ENERGY AND PIPELINES AND WATER SUPPLY.

Existing Conditions		
Describe the asset and highlight current conditions or stressors that could affect vulnerability		
1	Briefly describe the asset and its functions.	.
2	Where is the asset located, and what is its geographic extent? Attach maps or diagrams if necessary.	For private facilities, permit documents can have maps that with useful info.
3	Is asset located within a FEMA Special Flood Hazard Area (SFHA), e.g., within the current 100-year floodplain (1% annual chance event)? Is it located in the 500-year floodplain (0.2% annual chance event)?	.
4	Has there been locally observed land subsidence that could potentially put the asset at greater risk of flooding? If yes, describe the location, amount of land motion, and the approximate timeframe over which the subsidence has occurred.	Information is difficult to find, so it's best to ask the asset manager.
5	Who owns and manages the asset? Note if the owner and manager are different entities.	It may be useful to include the names of past owners, because some of the information you may look for may be under the old name or owner.
6	What year was the asset built and what is its expected remaining service life?	Remaining service life is a difficult number to find sometimes. It may be more helpful to look at when/how often the asset is upgraded and inspected.
7	When and what was the last major repair or improvement to the asset?	.
8	What is the most frequent type of maintenance and how often is it conducted?	.
9	Has the asset been disrupted in the past due to an unplanned event e.g., weather-related closure, emergency repair or improvement, work strike, or other event? If yes, how long did the disruption last and was the asset able to continue functioning either partially or fully?	.
10	Is the asset currently under consideration for capital improvement or investment, or is it in an area that is planned for future development or redevelopment?	This information may be found on the City/County's General Plan, Capital Improvements Plan, or budget.
11	Is the asset located in a state mandated "Zone of Required Investigation" due to proximity to an earthquake fault zone, liquefaction seismic hazard zone, or earthquake-induced landslide zone?	For multi-hazard assessment
12	Has a seismic assessment or other hazard assessment been conducted for the asset? If so, how does this inform asset maintenance or future capital improvements or investments?	For multi-hazard assessment

13	Has the asset been retrofited? If yes when was the retrofit completed and what guidelines or standards were used?	For multi-hazard assessment, for COMMUNITY FACILITIES only.
14	Has any mitigation occurred for earthquake-induced liquefaction? This could include ground strengthening or enhanced foundation designs. If yes, describe what mitigation was done and what standards or guidelines were used.	For multi-hazard assessment, for COMMUNITY FACILITIES only.

Information Vulnerabilities		
Describe if data is lacking, incomplete, poorly coordinated, or hard to obtain. (It's best to answer these questions after you've attempted to answer all of the other questions first. Difficulties finding data for the assessment may inform your answers to these questions.)		
15	Is planning-level or project-level information available to assess vulnerability, e.g., existing conditions reports, as-built drawings, monitoring or inspection reports, etc.?	.
16	What mechanisms exist to share information between departments within the managing agency? What mechanisms exist to share information with partner agencies, non-governmental organizations, and the public? Are these mechanisms adequate?	.

Governance Vulnerabilities		
Describe challenges with management, regulatory authority, or funding options for adapting to impacts		
17	Is the asset managed to achieve multiple goals or objectives e.g., habitat, water quality, flood control, recreation, shoreline access, etc.? If yes, are their conflicts among them?	.
18	If the asset owner and manager are different, what is the relationship between them, e.g., a legal agreement such as a lease, right-of-way, access easement, JPA, MOU or MOA?	.
19	Describe any plans that are relevant to asset management or improvement, e.g., Master Plan, Capital Improvement Plan, and if/how they consider sea level rise.	May not be directly relevant to your asset, but it provides context on existing policies and political climate.
20	If the asset is protected from flooding by land or assets owned or managed by others (e.g., structural protection, roadways, rail embankments), what is the relationship between the asset owner/manager and these entities? Do they coordinate information, funding or decision-making?	The easiest way is to look at a map with the asset manager to determine neighboring parcels that may be protecting the asset and discuss these questions.
21	What types of permits (and from which agencies) are necessary to maintain, repair or improve the asset? Are there special processes for emergency repairs?	.
22	What funding sources currently exist that can be used to assess hazard risk or vulnerability to climate change? To improve asset resilience?	.

Physical Vulnerabilities		
Identify conditions or design aspects that make an asset particularly vulnerable to impacts		
23	To what extent is the asset currently exposed to tidal, wind or wave erosion or scour?	.
24	What water or salt sensitive components of the asset are at-grade or below-grade, e.g., mechanical or electrical equipment, pumps, utilities, building heat, ventilation, power systems, or finished basements?	Specific information is best found by asking the asset manager.

Sector-specific questions		
25	Is the facility or building a mobile or manufactured structure? If yes, describe the foundation type.	For multi-hazard assessment, for COMMUNITY FACILITIES only.
26	Is the facility or building (commercial or residential) susceptible to a seismic event? E.g.,	.
26a	Is the facility or building constructed from unreinforced masonry? If yes, describe how and if seismic hazards have been assessed and/or mitigated.	For multi-hazard assessment, for COMMUNITY FACILITIES only.
26b	Is the facility or building constructed from concrete and was built between 1950 and 1971? If yes, describe if and how seismic hazards have been assessed and/or mitigated.	For multi-hazard assessment, for COMMUNITY FACILITIES only.
26c	For residential buildings (either single family or multifamily), is it cripple wall construction (typically with short unreinforced walls that raise the first floor 1-5 feet above ground level)? If yes, describe how and if seismic hazards have been mitigated (i.e. the home has been bolted to the foundation and/or the cripple wall has been strengthened).	For multi-hazard assessment, for COMMUNITY FACILITIES only.
26d	For 1-2 unit residences, is the building house over garage construction? For multifamily residential, are there garages or other large openings on the first floor (soft-story construction)? If yes to either, describe how and if seismic hazards have been assessed and/or mitigated.	For multi-hazard assessment, for COMMUNITY FACILITIES only.
27	Does the asset have openings that are at-grade or below-grade that are entry points for flooding, e.g., entryways, tubes, tunnels, ventilation grates? If yes, are their barriers (temporary or permanent) that can protect these openings from allowing floodwaters to enter? Are there pumps or other systems in place to remove floodwaters if they do enter?	For TRANSPORTATION, WASTEWATER, COMMUNITY FACILITIES, ENERGY/PIPELINES, WATER SUPPLY
28	Are there existing systems in place to manage groundwater, e.g., pumps or other systems to keep water away from below-grade systems, basements, or foundations? Would these systems have adequate capacity to remove additional groundwater if levels increase?	For TRANSPORTATION, WASTEWATER, COMMUNITY FACILITIES, ENERGY/PIPELINES, WATER SUPPLY
29	Is the asset currently being used or functioning at capacity, or does it have additional capacity to meet future conditions, e.g., projected increases in demand, level of service, higher Bay water levels, or elevated groundwater?	For TRANSPORTATION, WASTEWATER, ENERGY/PIPELINES, WATER SUPPLY
30	For stormwater infrastructure and flood control channels what recurrence-interval rainfall event and Bay tide level (if considered) was the system designed for? Is the asset currently at capacity or does it have additional capacity to meet future conditions, e.g., projected higher Bay water levels, combined riverine and higher Bay water levels, or elevated groundwater?	For STORMWATER/FLOOD CONTROL
31	For flood control channels, what is the current extent of tidal influence, e.g., how far inland does high tide currently reach? If the tide migrates upstream are there protections in place that would prevent adjacent areas from flooding?	For STORMWATER/FLOOD CONTROL
32	For flood control channels and stormwater outfalls, is there a mechanism to control inflow to the system from the Bay such as a flap gate, tide gate, check valve, etc.? Can these water control structures be adjusted to maintain system function as sea level rises?	For STORMWATER/FLOOD CONTROL
33	For pipelines located below-ground, are they secured or tied down in a manner that as groundwater levels rises they will not float or become buoyant?	For WASTEWATER, ENERGY/PIPELINES, WATER SUPPLY
34	Describe the structural shoreline design, e.g., engineered levee or floodwall, engineered shoreline protection (revetment or bulkhead), non-engineered berm or levee?	For STRUCTURAL SHORELINES

35	For natural and restored tidal marshes, do current sustainability models predict they will keep up with sea level rise, e.g., accrete vertically? If so, for how long? Is there space adjacent of the marsh that would allow for landward migration?	For NATURAL AREAS
36	For managed ponds and managed marshes, can the water control infrastructure such as berms, levees, and tide gates be adjusted to maintain system function as sea level rises?	For NATURAL AREAS

Functional Vulnerabilities		
Describe asset relationships with or dependence on other assets that can make them vulnerable to impacts		
37	Is the asset part of a networked system such that damage to other parts of the system would affect the assets ability to function? Describe what alternatives exist that could help maintain continuity of service if parts of the system are disrupted.	.
38	If the asset is disrupted or damaged, what redundant assets exist that could help maintain the capacity, function, or level of service that is normally provided by the asset?	.
39	What external services, such as power, communications, food or fuel supplies or materials does the asset rely on? If these external services were interrupted, are there back up supplies ready and in place, and how long would they last?	.
Sector-specific questions		
40	Does the asset serve or house the elderly or very young, mobility or medically challenged individuals, or animals? If yes, describe how and if these services and functions can be protected to ensure continuity of service. What systems or plans are in place to enable either shelter-in-place or safe evacuation and relocation of the facility if necessary?	For COMMUNITY FACILITIES
41	Does the asset serve or house community members that are resource limited, e.g., are they low or very low income, housing or transportation cost burdened, renters, or without a car? If yes, what programs or plans in place to help these members prepare for, respond to, or recover from flooding?	For COMMUNITY FACILITIES
42	Does the asset serve or house community members that are ethnically or culturally diverse, have limited English-speaking capacity, or are non-English speakers? If yes, what programs or plans in place to help these members prepare for, respond to, or recover from flooding?	For COMMUNITY FACILITIES
43	Does the asset serves as a critical access road, emergency or lifeline route, provide sole or limited access to communities or facilities, or provide service to transit dependent communities? If yes, describe the communities, services, facilities the asset serves.	For TRANSPORTATION
44	Does the asset provide recreational access or opportunities that are unique or limited in the area and/or region, e.g., access for persons with limited mobility, interpretive programs, access to the Bay, etc.? Could these functions be easily replaced in other areas?	For STRUCTURAL SHORELINES, NATURAL SHORELINES, PARKS
45	Does the asset provide or protect habitat for threatened or endangered species? Is this habitat scarce in the region? Could this habitat be established in other areas?	For STORMWATER/FLOOD CONTROL, NATURAL AREAS

46	Is the facility or building a mobile or manufactured structure? If yes, describe the foundation type.	For multi-hazard assessment, for COMMUNITY FACILITIES only.
47	Is the facility or building (commercial or residential) constructed from unreinforced masonry? If yes, describe how and if seismic hazards have been assessed and/or mitigated.	For multi-hazard assessment, for COMMUNITY FACILITIES only.
48	Is the facility or building (commercial or residential) constructed from concrete and was built between 1950 and 1971? If yes, describe if and how seismic hazards have been assessed and/or mitigated.	For multi-hazard assessment, for COMMUNITY FACILITIES only.
49	For residential buildings (either single family or multifamily), is it cripple wall construction (typically with short unreinforced walls that raise the first floor 1-5 feet above ground level)? If yes, describe how and if seismic hazards have been mitigated (i.e. the home has been bolted to the foundation and/or the cripple wall has been strengthened).	For multi-hazard assessment, for COMMUNITY FACILITIES only.
50	For 1-2 unit residences, is the building house over garage construction? For multifamily residential, are there garages or other large openings on the first floor (soft-story construction)? If yes to either, describe how and if seismic hazards have been assessed and/or mitigated.	For multi-hazard assessment, for COMMUNITY FACILITIES only.

Consequences		
Describe potential impacts on society, equity, the economy, and the environment		
51	What degree and scale of economic disruption would occur if the asset was damaged, disrupted, or failed? Local, regional, state, or national? If based on a past weather event or an unplanned disruption, describe the type and duration of that disruption.	.
52	If the asset was damaged, disrupted or failed, how much direct revenue would be lost? For how long?	.
53	What would the water quality impacts be if the asset was damaged, disrupted, or failed, e.g., release of hazardous materials stored on site or pollutants leaching into groundwater as the water table rises?	.
54	What habitat or species benefits would be lost if the asset was damaged or lost? What would the effect of this loss have on local and regional biodiversity and ecosystem health?	.
55	If the asset was damaged, disrupted, or failed, would there be a loss of flood protection or wave attenuation benefits? If yes, what would the affect of this loss be on adjacent assets or communities?	.
56	If the asset was damaged, disrupted or failed, would there be a loss of public access to the shoreline? Of recreational, educational or interpretation opportunities?	.
57	What critical emergency services would be affected if the asset was damaged, disrupted or failed?	.
58	How would the community, particularly at-risk members, be affected by damage, disruption, or loss of asset function?	.
59	If the asset was damaged, disrupted or failed, how many and what type of jobs or employment centers would be affected? For how long?	.

TABLE 2. QUESTIONS FOR COMMUNITY CHARACTERISTICS

Existing Conditions – Community Characteristics	
Describe the asset and highlight current conditions or stressors that could affect vulnerability	
1	Generally describe the community(ies) in the project area, e.g., neighborhood names and general boundaries, current land uses, transportation infrastructure.
2	Describe community serving facilities in the project area that could play a role in responding to or recovering from a flood or other hazard, e.g.,
2a	Emergency responders, e.g., police and fire stations, operations centers, etc.
2b	Medical facilities, e.g., hospitals, clinics, pharmacies, skilled nursing facilities, etc.
2c	Places of worship.
2d	Community centers, shelters, food banks, grocery stores.
2e	Public schools, buildings, parks or other public spaces that could serve as a gathering or sheltering-in-place location.
3	Describe the agencies, organizations, and informal groups that increase the community or neighborhood capacity to respond to or recover from a flood or other hazard. Consider:
3a	What groups active in the project area such as NERTS, CERTS, neighborhood councils that increase preparedness.
3b	Are their emergency caches in the project area? If yes where are they, how many can they serve, and for how long?
3c	What community-based organizations, non-profits, faith-based or civic organizations are active in the project area? Where are they focusing attention and on what issues?
3d	What existing public or private programs that serve the socially or economically disadvantaged have a presence in the project area? Where are they focusing attention and on what issues?
4	Describe the distribution of households with characteristics that limit access to resources or capacity to respond to or recover from a flood or other hazard, e.g.,
4a	Very low income household, e.g., earning less than 50% of the Area Median Income or less than 200% of the federal poverty level.
4b	Housing cost burdened, e.g., moderately burdened (spending greater than 30% of gross monthly income on housing) or severely burdened (spending greater than 50% of gross monthly income on housing).
4c	Transportation cost burden, e.g. spending greater than 5% of gross monthly income on transportation.
4d	Housing tenure, e.g., number or proportion of rented households
4e	Overcrowded households, e.g., those having a high number of persons per room compared to the city/county/regional average.
4f	Transit dependent households, e.g. those without a vehicle.
4g	Non-English speaking households, e.g. households where no one age 14 or older speaks English well.
5	Describe the distribution of individuals with characteristics that limit access to resources or capacity to respond to or recover from a flood or other hazard, e.g.,
5a	Educational attainment, e.g. people without a high school diploma and/or college education.
5b	Race or ethnicity, e.g., Hispanic or Latino, African American, Asian, Pacific Islander, etc.
5c	People of dependent ages such as the elderly (e.g., over 65) or very young (e.g., under 5 or under 14).
5d	Elderly living alone or as head of household.
5e	People with functional needs, e.g., physical, mental or emotional disabilities, chronic diseases, homebound or medically dependent.
5f	Institutionalized, e.g., people in nursing homes, hospitals, jail or prison.

Information Vulnerabilities – Community Characteristics	
Describe if data is lacking, incomplete, poorly coordinated, or hard to obtain.	
6	What up-to-date information is available to understand the location and specific needs of the communities, neighborhoods, households, and/or individuals with limited resources or capacity to respond to or recover from a flood or other or hazard?
7	What information is available to decision-makers to help them understand and respond to specific community needs during and after an emergency, e.g., the amount and type of financial or technical aid that is needed to offset job or housing loss to avoid displacement/dislocation.
8	What mechanisms exist for public agencies to coordinate information gathering efforts with the non-profit, community or faith-based groups that could serve as trusted partners in the community?

Governance Vulnerabilities – Community Characteristics	
Describe challenges with management, regulatory authority, or funding options for adapting to impacts	
9	What capacity do the non-profits, faith-based and community based organizations in the project area have to actively participate in adaptation planning? What processes are in place for the local jurisdiction and these groups to engage in existing planning and decision making?
10	Do neighborhoods in the project area have a strong social networks, e.g., informal connections between those that live, work, obtain services, or are invested in the neighborhood? If yes, describe how the social network currently functions. Which non-profits, faith, or community-based organizations have a role in building and maintaining strength and capacity of the networks?
11	Does the jurisdiction, community serving facilities, or neighborhoods have up-to-date emergency plans? Are these plan adequate to address the potential contingencies and secondary impacts that could occur with widespread or long lasting flood events?
12	What level of coordination exists among local, regional and state authorities to undertand and respond to specific community characteristics and needs, e.g., emergency response policies, trainings, procedures such as the purchase of specialized equipment or the development of appropriate evacuation procedures?

Consequences – Community Characteristics	
Describe potential impacts on society, equity, the economy, and the environment	
13	What would the economic effects be on communities if a flood occurred? Would there be lost wages, lost housing, lower productivity, or relocation of community members (temporary or permanently)? Would there be disproportionate effects on those that have limited access to resources or capacity, e.g., socially or economically disadvantaged?
14	What would the effects be on community mobility if a flood occurred (ability to access jobs, schools, goods or services)? Would there be disproportionate effects on those that have limited access to resources or capacity, e.g., socially or economically disadvantaged?
15	What would the effects on public health or safety if a flood occurred? Would there be disproportionate effects on those that have limited access to resources or capacity, e.g., socially or economically disadvantaged?
16	What would the effect be on community or neighborhood social networks if a flood occurred? Would there be disproportionate effects on those that have limited access to resources or capacity, e.g., socially or economically disadvantaged?

Appendix B: Information Sources

TABLE 3. COMMON DATA SOURCES FOR DIFFERENT TYPES OF ASSETS

Asset: People	Data Sources
Total population – current and future	U.S. Census, American Community Survey, General Plan, Specific Plan, Plan Bay Area and Planned Development Areas, Regional Housing Needs Assessment, Housing Element, ABAG Projections Series 2013, Current Zoning, County Quick Facts
Population with access or functional needs, including:	U.S. Census, American Community Survey, General Plan, Specific Plans, Local studies, Housing Element, Local Hazard Mitigation Plan, County Health Department Status Reports, Non-Profit and Community Based Organizations, Bay Area Regional Health Inequities Initiative, East Bay Indicators-East Bay Economic Development Alliance
· Age dependent, children and seniors	
· Medically or mobility dependent	
· Language constraints	
· Low income	
· Lack of education	
· Culture or ethnicity	
· Cost burdened (housing and/or transportation)	
· Transit dependent (no car)	
· Housing tenure (renters)	
Asset: Building Stock	**Data Sources**
City-owned buildings	County Tax Assessor Parcel Data
Privately-owned buildings:	County Tax Assessor Parcel Data, U.S. Census, American Community Survey, Housing Element of Local General Plan, Specific Plans, General Plans, Zoning Code, Google
· Residential buildings, e.g., single and multi-family, mobile homes, senior and dependent housing	
· Nonresidential buildings, e.g., industrial, commercial or institutional structures	
Future buildings, growth areas and infrastructure	General Plan, Plan Bay Area, Regional Housing Needs Assessment, Capitol Plans, City and County Budgets, Zoning Code, Housing Element, Local Growth Boundaries or growth phasing ordinances
Asset: Critical Response Facilities	**Data Sources**
Public health infrastructure, e.g., hospitals and medical facilities	County Tax Assessor Parcel Data, Safety Element of Local General Plan, Emergency Operations Plans, Local Area Formation Commission Municipal Service Reviews
Police stations	County Tax Assessor Parcel Data
Fire stations	County Tax Assessor Parcel Data
Public schools	County Tax Assessor Parcel Data

Asset: Community Services	Data Sources
Community facilities, e.g., day cares, food banks, senior centers, grocery stores	County Tax Assessor Parcel Data, Google, City licensing and regulating authorities, General and Specific Plans and Local Zoning
Places of worship	County Tax Assessor Parcel Data, Same as above
Education and research institutions, e.g., schools, colleges, universities	County Tax Assessor Parcel Data, Same as above
Waste transfer stations	CalRecycle, County Environmental Health Departments
Household hazardous waste collection sites	CalRecycle, County Environmental Health Departments
Asset: Utilities Infrastructure	**Data Sources**
Water systems, including reservoirs and dams	Urban Water Management Plans, Bay Area Integrated Regional Management Plan
Wastewater, e.g., industrial and sanitary sewer systems)	Urban Water Management Plans, Bay Area Integrated Regional Management Plan
Flood control infrastructure	City/county public works or flood control district watershed restoration plans, hydrology and hydraulics analyses, and environmental assessments/impact reviews/studies
Stormwater (storm drain) system	City/county public works, special studies within cities and counties, Local Agency Formation Commission
Power utilities, e.g., electricity generation, distribution, transmission systems	California Energy Commission, PG&E, California Public Utilities Commission,
Pipelines, e.g., fuel and natural gas	California Energy Commission, National Pipeline Mapping System, Kinder Morgan
Oil refineries	County and City General Plans, EPA, Air Resources Board, State Employment Statistics
Asset: Transportation Infrastructure	**Data Sources**
Local streets and roads	Metropolitan Transportation Commission 2011TeleAtlas
Federal and state highways	Metropolitan Transportation Commission 2011TeleAtlas, CA Department of Transportation
Bridges, tubes and tunnels	Metropolitan Transportation Commission 2011TeleAtlas, CA Department of Transportation, Bay Area Toll Authority
Railroads, passenger and freight lines	Metropolitan Transportation Commission 2011TeleAtlas, Capitol Corridor JPA, Altamont Corridor Express, Caltrain
Transit services (bus, BART, light rail)	Metropolitan Transportation Commission 2011TeleAtlas, Bay Area Rapid Transit
Ferry service	Golden Gate Bridge Highway and Transportation District, Water Emergency Transportation Authority
Bike/pedestrian routes	Local General Plan, SF Bay Trail
Airport	Federal Aviation Administration, Regional Airport Planning Committee
Seaports and Marine terminals	

Asset: Communication Infrastructure	**Data Sources**
Land line telephone systems	Communication service providers
Cable systems	Communication service providers
Cellular telephone antennae	Communication service providers
Underground communication conduits	Communication service providers
Asset: Recreation, Open Space and Working Lands	**Data Sources**
Park and recreation facilities	California Protected Areas Database
Designated open space	California Protected Areas Database, Conservation Lands Network Explorer Tool
Bike/pedestrian trails	SF Bay Trail
Natural areas	San Francisco Estuary Institute (SFEI) EcoAtlas
Agricultural and working lands	General Plan, County Tax Assessor Parcel Data, National Land Cover Database
Asset: Hazardous Materials Sites and Contaminated Lands	**Data Sources**
Hazardous Materials Sites, e.g., RCRA regulated sites, CUPA sites	US EPA Envirofacts
Landfills (open and closed)	US EPA Envirofacts, State Water Resources Control Board Geotracker
Clean up sites, e.g., US EPA or DTSC regulated brownfield, cleanup sites, or landfills	US EPA Envirofacts, State Water Resources Control Board Geotracker