Instructions for Completing the Sea Level Rise Checklist

A companion to the Checklist for Incorporating Sea Level Rise into Capital Planning

THE CITY AND COUNTY OF SAN FRANCISCO

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CLIMATE SF

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Version Control: *This document supports Version 5.0 (2025) of the Checklist Form*

Cover photo by Jason O'Rear

Introduction

Sea level rise (SLR) is the long-term increase in the average level of the ocean due to climate change. It is primarily caused by the expansion of water as it warms, and the melting of glaciers and ice sheets, which increases the volume of ocean water. SLR threatens San Francisco by increasing coastal flood risk, erosion, and saltwater intrusion, which endanger lives, livelihoods, infrastructure, and ecosystems. SLR is estimated using global climate models that incorporate various factors influencing the Earth's climate system. SLR projections represent a range of possible outcomes depending on future emission scenarios and the pace of global climate change.

The City and County of San Francisco (the City) has adopted a *Checklist for Incorporating Sea Level Rise Considerations into Capital Planning*. The *SLR Checklist* provides a three-step process for screening SLR-related risks to capital projects that are located in San Francisco's SLR vulnerability zone.

This compendium provides practical guidance for completing the *SLR Checklist* during capital planning. In integrating these measures, project managers may enhance their projects' compliance with SLR-related regulatory requirements, maintain alignment with city-wide adaptation strategies, and contribute to the resilience of San Francisco's infrastructure over the long term. This document is organized into three sections, which are hyperlinked below:

Section I: Project Characterization
Section II: Vulnerability Assessment
Section III: Risk Assessment

This compendium also compliments the *SLR Guidance document*, which provides more comprehensive background information on sea level rise science, scientific and regulatory source documents, and California's recommended vulnerability assessment process. The SLR Checklist and other supporting documents can be found at:

https://onesanfrancisco.org/sea-level-rise-guidance.

Key Terms

The following terms used in discussions of adaptation planning are used in this document and the SLR Checklist:

- **100-year Extreme Tide Elevation:** The water level associated with a coastal storm event that has a 1% chance of being equaled or exceeded in any given year.
- **100-Year Total Water Level**: the combination of tides, surge, and wave runup that has a 1% chance of being equaled or exceeded in any given year.

- **Adaptive Capacity**: The ability of an asset or system to adjust to SLR impacts without significant intervention, such as through modular design or inherent design features.
- **Functional Lifespan (or Useful Life)**: The realistic period an asset or project will remain in place and in use, accounting for the anticipated number of repair and maintenance cycles. This differs from the "design life," which is the expected lifespan of an asset based solely on its engineering specifications.
- **Groundwater Rise**: The increase in groundwater levels as a result of rising sea levels, particularly in low-lying coastal areas and reclaimed lands.
- **Inundation Mapping**: Tools and maps used to visualize areas that could be exposed to flooding under specific SLR scenarios and storm surge events.
- **Permanent Inundation**: The long-term and continuous submergence of land, where areas that were previously dry become permanently underwater, due to rising sea levels or land subsidence.
- **Planning Horizon:** The anticipated year at the end of the project's Functional Lifespan starting from the anticipated construction completion year. Future SLR risk must be evaluated up to this point in time.
- **Mean Higher High Water (MHHW):** The average height of the higher of the two high tides each day, calculated over a 19-year period, and is used as a vertical datum for sea level rise.
- **Risk Assessment**: An evaluation of the consequences of an asset's failure or disruption due to SLR impacts, which is typically based on the likelihood of occurrence and the magnitude of potential damage.
- **SLR Vulnerability Zone**: The area in San Francisco potentially inundated by 66-inches of SLR plus 42-inches of tidal and storm surge. This represents a high-end estimate by 2100.
- **Scenarios:** The State of California provides SLR scenarios for planning purposes. These scenarios account for differing levels of global mitigation and adaptation efforts being achieved, and so and vary in their predictions of increases in SLR by the year 2100.
- **Sensitivity**: The degree to which project features or performance can be affected by seawater inundation or groundwater.
- **Storm Surge**: The temporary rise in water levels caused by storms, wind, and atmospheric pressure changes, which can exacerbate flooding during high tides.
- **Vulnerability Assessment**: A process to determine the exposure, sensitivity, and adaptive capacity of assets to SLR hazards, which collectively define their vulnerability.

Step I: PROJECT CHARACTERIZATION

In this initial step, provide basic information about the project's setting and scope that will be used to inform the vulnerability and risk assessment sections that follow. This information includes the project's anticipated construction completion year, the functional lifespan, existing site-elevation information, and coastal hazard information.

Project Details

Question 1: The project location and lowest ground elevation will be used to determine the project's sensitivity to SLR-influenced hazards. If the project is located in the City's designated SLR Vulnerability Zone, the project may be vulnerable to SLR.

Question 2: The type of project identified here will factor into the determination of the project's Functional Lifespan, and in turn determines how far into the future sensitivity to SLR and its consequences must be considered.

Questions 3-5: This information relates to the anticipated planning horizon, which is calculated by adding the estimated functional lifespan of the project to the anticipated construction completion year. Guidance for estimating a project's Functional Lifespan is provided in Question 3.

Note: Determination of functional lifespan should consider the number of repair and rehabilitation cycles that would be necessary given the type of project.

Existing Site Elevation and Historical Coastal Hazards Information

Question 6: Past flood occurrences indicate that future flooding is very likely to occur. Conduct data searches and/or make inquiries with other project managers, maintenance staff, and engineers to seek information on historical flood risk associated with high tides, storm surge, or rainstorms.

Question 7: Use the City's Digital Elevation Model Visualization Tool located at https://onesanfrancisco.org/sea-level-rise-guidance/ to determine the lowest ground elevation at the project location. The elevation represents the location of greatest risk to coastal hazards influence by SLR.

Question 8: Use the City's Water Level Visualization Tool at https://onesanfrancisco.org/sea-level-rise-guidance/ to determine the Mean Higher High Water (MHHW) elevation closest to the project. This elevation represents the baseline against which changes in sea level are measured (SLR).

Question 9: Use the City's Water Level Visualization Tool at https://onesanfrancisco.org/sea-level-rise-guidance/ to determine the 100-Year Extreme Tide Elevation closest to the project. This elevation represents the baseline against which we measure changes in SLR-influenced storm surge.

Question 10: Use the City's Water Level Visualization Tool at https://onesanfrancisco.org/sea-level-rise-guidance/ to determine if the project is located within the 100-ft shoreline buffer zone. If the answer is yes, then complete Questions 11 and 12. If not, skip Question 11 and proceed to Question 12.

Question 11: If the project is within the 100-ft shoreline buffer zone, use the City's Water Level Visualization Tool at https://onesanfrancisco.org/sea-level-rise-guidance/ to determine the nearest 100-Year Total Water Level value.

Question 12: Check yes here if the project is influenced by subsurface conditions. Subsurface conditions, including soil type, rock structure, and groundwater levels, influence design considerations and the construction techniques required. A project's foundation design will be influenced by buoyancy and uplift pressure if groundwater is present. The presence of saline groundwater can cause subsurface materials to corrode. The presence of groundwater can affect the stability of certain types of soils such as clay. It can also increase liquefaction risk in loose and/or sandy soils.

Step II: VULNERABILITY ANALYSIS

In this step, evaluate the potential for SLR impacts on the project by analyzing three project characteristics: *exposure, sensitivity,* and *adaptive capacity*. Over a defined planning horizon, and based on the project's location and characteristics, this process involves determining whether the project is exposed, sensitive, and capable of being adapted to sea level rise. By screening for vulnerability, we establish a foundation for evaluating whether additional design features are necessary to manage future SLR.

Exposure

Exposure is the degree to which an asset is at risk of inundation, storm surge, and/or wave action exacerbated by SLR. In most cases, it is appropriate to use the Intermediate and Intermediate-High SLR scenarios included in the SLR Checklist. These scenarios allow a project manager to consider SLR risk associated with conservative (high emission/low mitigation) scenarios that are not overly influenced by existing 'low confidence" science (see the SLR Guidance Document for more details).

- The Intermediate scenario projects up to 3.1 feet of SLR by 2100, represents a moderate rise consistent with gradual global mitigation of emissions.
- The Intermediate-High scenario projects up to 4.9 feet of SLR by 2100, which reflects a more accelerated rise in sea levels due to higher emissions or less effective mitigation strategies. The checklist enables project managers to assess a project's exposure to both scenarios.

Example: A new structure is being developed at a wastewater treatment facility located near the San Francisco Bay shoreline. Using the City's inundation maps, project managers determine that the facility will be subject to temporary flooding by 2050 under the Intermediate scenario. Depth analysis shows flooding from a 100-Year Extreme Tide could reach 2 feet.

Question 13: SLR projections are ***automatically populated*** by the Checklist based on the information provided in Section I. Based on the Planning Horizon year determined in Question 5, the Checklist provides Intermediate and Intermediate-High SLR projections.

Question 14: If the current Mean Higher High Water (MHHW) is lower than the lowest ground level (from Question 7), the "Difference in feet" will be negative. This means the site might already be permanently underwater. To check for future risk, subtract the Intermediate and Intermediate-High sea level rise (SLR) projections from the "Difference in feet." If either result is negative, select "Yes" - this means the site would be permanently inundated under that SLR scenario.

Question 15: If the current 100-year Extreme Tide Elevation (from Question 9) is lower than the lowest ground level (from Question 7), the "Difference in feet" will be negative. This suggests the site could already be at risk of temporary flooding. Subtract the Intermediate and Intermediate-High SLR projections from the "Difference in feet." If either result is negative, select "**Yes**" - this means the site would flood temporarily under that SLR scenario.

Question 16: Only complete this question if you answer "**Yes**" to Question 10. Otherwise, skip to Question 17.

If the 100-Year Total Water Level (from Question 11) is lower than the lowest ground level (from Question 7), the "Difference in feet" will be negative. This means the site may already be

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vulnerable to severe flooding and erosion. Subtract the Intermediate and Intermediate-High SLR projections from the "Difference in feet." If either result is negative, select "**Yes**" - this means the site would face flooding under that SLR scenario.

Question 17: Only complete this question if you answer **"Yes"** to Question 12. Otherwise, skip to Question 18.

Sea level rise can raise groundwater levels and increase salinity, especially near the shoreline. If the project could be affected by these changes, select **"Yes"** - this means the project may be vulnerable to higher or excessively saline groundwater under Intermediate or Intermediate-High SLR scenarios.

Sensitivity

A sensitivity analysis is the second step in determining vulnerability. Sensitivity is to the degree to which an asset's functionality, structure, and lifespan may be compromised by storm surge, and/or wave action. Project managers perform sensitivity analysis to consider the types of impacts that flooding may have on an asset's operations, maintenance needs, and long-term performance. Project managers must evaluate these factors:

1. **Asset Design and Material Analysis:** Some materials, such as reinforced concrete or corrosion-resistant alloys, may tolerate periodic inundation without significant damage, while others, such as untreated wood or older electrical components, may degrade quickly when exposed to moisture or saltwater intrusion. Project managers should consider the effects of saltwater on design features and material selections.

   For example, a modern bridge elevated above flood level and constructed of corrosion-resistant steel would be expected to exhibit low sensitivity to periodic flooding. An old, unprotected utility pole exposed to saltwater may require frequent repairs or early replacement, which are indicators of high sensitivity.

2. **Operational and Functional Impacts:** Project managers must consider how flooding and/or inundation may affect an asset's ability to perform its intended function. The potential impacts may vary significantly depending on the asset type, duration of inundation, and water depth. Short-term operational disruptions, such as temporary road closures due to shallow flooding, are indicators of minor sensitivity, while prolonged or deep flooding that could cause catastrophic functional failure are indicators of high sensitivity.

   In addition to current disruptions, project managers must evaluate long-term operational impacts, such as how often repairs or maintenance will be needed, and how much they will cost. For example, a wastewater treatment plant that experiences repeated flooding could suffer damage to essential equipment, leading to service interruptions and public-health risks.

3. **Secondary Effects:** Secondary or "indirect" effects of inundation and/or flooding can include:

   - **Structural Instability:** Inundation or recurring flooding can weaken structural foundations by soil erosion and waterlogging, particularly in reclaimed land or areas prone to subsidence. Buoyancy effects acting upon underground infrastructure, such as tunnels and pipelines, may cause misalignments or breaks.
   - **Corrosion and Material Degradation:** Exposure to saltwater accelerates the corrosion of metal components, including electrical systems, pipelines, and support

structures. Groundwater rise can induce saltwater intrusion, damaging underground infrastructure and increasing maintenance costs.

- **Loss of Ancillary Systems:** Flooding of access roads, power supply systems, or backup equipment can indirectly affect asset functionality, even if the primary structure remains intact.

Example - High Sensitivity: An electrical substation located near a shoreline may fail completely if exposed to even minor flooding, as water can damage transformers, circuit breakers, and other critical systems. Such a failure would disrupt the supply of electricity to nearby areas, requiring significant repair and replacement costs.

Example - Low Sensitivity: A concrete roadway designed to tolerate periodic shallow inundation may remain functional after flooding, with minor damage limited to surface erosion or temporary closures for cleanup. The asset's core functionality would not be compromised, indicating low sensitivity.

Question 18: Compile the results of the sensitivity analysis for inundation and develop a clear, logical narrative that explains how they relate to one another. Use this summary to justify whether the project's overall sensitivity to flooding over the planning horizon is low, medium, or high. The justification must be clearly linked to each result and fully consistent with the entire analysis. Assign the most conservative sensitivity rating - that is, the lowest rating for which all individual results support that level of sensitivity.

Question 19: Compile the results of the sensitivity analysis for groundwater and develop a clear, logical narrative that explains how they relate to one another. Use this summary to justify whether the project's overall sensitivity to changes in groundwater levels and salinity over the planning horizon is low, medium, or high. The justification must be clearly linked to each result and fully consistent with the entire analysis. Assign the most conservative sensitivity rating - that is, the lowest rating for which all individual results support that level of sensitivity.

Adaptive Capacity

Adaptive capacity is the extent to which an asset can adjust to SLR impacts through modifications, operational changes, or upgrades. Assessing adaptive capacity provides project managers with a clear understanding of how well an asset can deal with future flooding and how feasible enhancements to those capabilities over time may be. An asset with high adaptive capacity can be retrofitted, upgraded, or operationally adjusted with minimal effort and cost, while assets with low adaptive capacity may require significant investment or may not be adaptable at all. To assess adaptive capacity, project managers should evaluate the following key factors:

1. **Existing Design Features that Support Adaptation:** Review the current conceptual design of the project to identify features that may allow for future modifications in response to increased flooding or groundwater rise risk. Some assets may already incorporate modular or scalable components designed to accommodate future conditions. For example:
   - If the heights of floodwalls, berms, or levees can be raised in stages as SLR progresses, this demonstrates high adaptive capacity.
   - Infrastructure with relocatable components, such as prefabricated buildings or modular utilities, can be adjusted or moved as needed.

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2. **Feasibility and Cost of Retrofitting or Upgrading:** Project managers must assess the practicality and financial implications of modifying or upgrading an asset to address higher SLR scenarios. This includes:
   - The cost of physical interventions, such as elevating structures, adding flood barriers, or installing waterproofing systems.
   - The complexity of retrofitting work, including any disruptions to operations or services during implementation.
   - The timeline required for adaptations, particularly for critical infrastructure that must remain operational.
3. **Relocation or Replacement Potential:** In cases where retrofitting or upgrades are not feasible, project managers must evaluate whether the asset can be relocated to a less vulnerable location or replaced entirely. This option is particularly relevant for assets with low adaptive capacity and significant exposure to flooding risks.
   - Relocation may be a cost-effective solution for modular or portable infrastructure, such as pump stations, prefabricated structures, or utilities with flexible layouts.
   - Replacement may be considered for aging infrastructure nearing the end of its functional lifespan, where designing for resilience from the outset is more efficient than retrofitting.

Example - High Adaptive Capacity: A floodwall built with provisions to add additional height over time demonstrates strong adaptability. Similarly, a modern pump station designed with flexible components and adequate elevation can be upgraded or relocated as conditions change.

Example - Low Adaptive Capacity: A building constructed at grade with no space for elevation or floodproofing has limited ability to adapt. If located in a constrained urban area, relocation may also prove infeasible, resulting in low adaptive capacity.

Question 20: Considering existing design features, the cost of retrofitting or upgrading, and relocation or replacement potential, assess the adaptive capacity of the project to projected sea level rise impacts over the planning horizon (Low, Medium, or High). Provide a short narrative explanation in the space provided, including which aspects of the project have low adaptive capacity and which have high adaptive capacity.

Question 21: Considering existing design features, the cost of retrofitting or upgrading, and relocation or replacement potential, assess the adaptive capacity of the project to projected groundwater rise impacts over the planning horizon (Low, Medium, or High). Provide a short narrative explanation in the space provided, including which aspects of the project have low adaptive capacity and which have high adaptive capacity.

Step III: RISK ASSESSMENT

Risk is usually assessed by comparing the likelihood of an impact occurring with the severity of its consequences. However, in the case of sea level rise, likelihood is difficult to quantify, as the pace of sea level rise is not known with complete certainty.

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As a result, when evaluating risks identified in a sea level rise vulnerability assessment, the most important factor is the **consequence** of failing to adapt. This focus on consequence helps prioritize assets for adaptation planning. “Consequence” refers to the scale of impact under selected sea level rise and storm surge scenarios and can be informed by details such as an asset’s age, condition, and construction materials.

For most projects, the **Intermediate** scenario is the Risk Assessment’s recommended starting point. If the project includes major new assets, particularly with low adaptive capacity per Questions 20 and 21, assessing risk using the **Intermediate-High** scenario is appropriate.

Before beginning the Risk Assessment, compile the findings from the exposure, sensitivity, and adaptive capacity analyses into a single table to classify project assets, locations, or features by overall vulnerability. This summary will identify the assets that require further evaluation in the risk assessment phase. Multiple tables may be needed to address different sea level rise scenarios or timeframes.

The key steps are as follows:

1. **Create a Vulnerability Matrix:** Classify assets based on the intersection of exposure, sensitivity, and adaptive capacity. This helps visualize which assets are most vulnerable and prioritize them for further action. A sample matrix is provided below.
2. **Rank Assets by Priority:** Assign priority rankings to assets based on their level of vulnerability. High-priority assets will require immediate risk assessment and adaptation planning.
3. **Document Key Findings:** Clearly document the results of the vulnerability assessment, including which assets are most vulnerable and why along with any supporting data such as inundation maps, sensitivity analysis results, and adaptive capacity evaluations.

Assets or specific project features not exposed to projected sea level rise or storm surge over the planning horizon do not need to be considered further for adaptation planning. Assets that score low for sensitivity or high for adaptive capacity at the risk assessment phase could be considered further, but adaptation planning may not be critical, as these assets are either not sensitive to the sea level rise impacts, or they have a high ability to adapt without the need for the identification, design, and implementation of new adaptation strategies. See example asset #2 in the sample matrix below.

On the other hand, Assets such as #3 through #5 in the example matrix below are exposed, sensitive to some degree, and have moderate to low adaptive capacity to sea level rise.

Example Vulnerability Matrix for One Sea Level Rise Scenario

	Exposure (2050)		Sensitivity			Adaptive Capacity			Total
	SLR	Storm Surge	SLR	Storm Surge	GW Rise	SLR	Storm Surge	GW Rise	
Component #1	None	None	N/A	N/A	Low	N/A	N/A	High	1
Component #2	None	Low	N/A	Low	Low	N/A	High	High	5
Component #3	Low (1)	Low	Low	Med (2)	Med	Med	Med	Med	13
Component #4	Med	Med	Med	High	High	Low	Med	Low	20
Component #5	High (3)	High	High	Med	Med	Low	Low	Low	22

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Consequences Analysis

Project managers must analyze the consequences of flooding based on three key factors: damage, disruption, and cost. Damage refers to the extent of physical harm to the asset, such as structural failures or erosion. Disruption evaluates the duration and severity of service interruptions, particularly for critical infrastructure. Cost includes the financial burden of repairs, replacements, and economic losses associated with disrupted services.

Example: A wastewater treatment plant that floods during a storm surge could suffer significant damage, disrupt essential services for weeks, and pose health and safety risks to the community. This asset would have a high consequence rating, making it a priority for adaptation planning.

Question 22: Based on the matrix results, determine whether the overall level of damage from coastal flooding and/or groundwater rise would be low, medium, or high. Consider "moderate" damage to include components requiring full replacement or costly repairs, and "high" damage to include features that cannot be repaired or replaced. Use the matrix findings to develop a clear, concise narrative identifying which project components would experience the greatest damage and explaining how these impacts contribute to the overall damage rating.

Question 23: Using the matrix results, assess whether the overall level of disruption to services or functionality from coastal flooding and/or groundwater rise would be low, medium, or high. Consider “moderate” disruptions to involve non-critical public health and safety services, and “high” disruptions to involve critical services or functions. Provide a concise narrative identifying which project components would be most affected and explain how these disruptions contribute to the selected disruption level.

Question 24: Using the matrix results, assess whether the overall cost of repairs, service restoration, or health and safety response due to coastal flooding and groundwater rise would be low, medium, or high. Provide a concise narrative identifying which project components would incur the highest costs or impacts and explain how these contribute to the selected cost level.

Adaptation Measures

The final step in the process is to consider if, based on the vulnerability assessment and risk analysis, additional adaptation features are needed. The project manager should consider strategies, triggers, and monitoring measures needed to increase resilience to sea level rise over the functional lifespan of the project. Project components or features that are determined to have a combination of high vulnerability and high consequences to SLR flooding and/or groundwater rise may require additional design considerations.

Adaptation planning must emphasize strategies that enhance an asset's ability to adjust to future SLR conditions. These strategies should incorporate flexibility, allowing for incremental upgrades or modifications as projections and local conditions evolve. By addressing both short-term and long-term needs, this approach will increase the likelihood that assets remain operational, cost-effective, and responsive to changing conditions. Key approaches include:

Modular and Phased Design Features
Assets should be designed or retrofitted in a way that allows for incremental adaptation. This approach minimizes upfront costs while providing flexibility to address uncertainties in long-term SLR projections. It also ensures that future upgrades can occur with minimal disruption to operations. Examples include:

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- **Flood Protection:** A sea wall can be designed with modular components, such as removable panels, that allow for height increases over time as SLR progresses.
- **Building Elevation:** Raising elevations of foundations for critical structures can allow for accommodation of SLR rise.
- **Drainage Systems:** Stormwater systems can be engineered for higher flow capacity while maintaining provisions for further upgrades.

Nature-Based Solutions
Incorporating natural systems into adaptation plans can provide both flood protection and environmental co-benefits. Nature-based solutions are often cost-effective and sustainable, particularly for projects in areas with sensitive ecosystems or limited space for hard infrastructure. Examples include:

- **Living Shorelines:** Constructed using natural elements, such as tidal marshes, oyster reefs, or mangroves, which buffer wave action and reduce erosion while providing habitat benefits.
- **Green Infrastructure:** Bioswales, rain gardens, and permeable pavements enhance stormwater management and reduce surface flooding risks.
- **Beach Nourishment:** Adding sand or sediment to shorelines helps mitigate erosion and protect coastal assets.

Site-Specific Resilience Strategies
Adaptation measures should be tailored to the asset's location, functionality, and vulnerability assessment results. Project managers must balance site-specific needs with feasibility, ensuring that strategies provide the greatest benefit. For example:

- For **underground infrastructure**, such as tunnels or pipelines, floodproofing techniques may include waterproof linings, sump pumps, or elevation of access points.
- For **critical facilities**, such as hospitals or emergency response centers, relocation to higher ground or designing for vertical evacuation may be required.

By designing for adaptive capacity, project managers ensure that assets remain resilient to both projected and unforeseen changes in SLR conditions.

Triggers and Monitoring

Adaptation plans must include clear triggers—specific thresholds or conditions—that dictate when additional measures should be implemented. These triggers ensure a proactive, phased approach to resilience, avoiding costly emergency retrofits.

Identifying Triggers for Action
Triggers may include:

- **SLR Thresholds:** Specific increases in SLR (e.g., 1.5 feet, 3 feet) that warrant upgrades to flood barriers or drainage systems.
- **Frequency of Flooding:** A defined number of flooding events (e.g., annual nuisance flooding) signaling the need for adaptation measures.
- **Performance Metrics:** Structural or operational thresholds, such as water intrusion exceeding tolerable levels or soil instability requiring reinforcement.

For example, an adaptation plan for a shoreline facility might specify raising a floodwall when tidal flooding reaches a depth of 1 foot under Intermediate SLR projections.

Ongoing Monitoring and Evaluation
Regular monitoring of local conditions, such as water levels, groundwater rise, and storm surge impacts, is essential to ensure timely implementation of adaptation measures. By setting clear triggers and establishing robust monitoring systems, project managers can ensure that adaptation measures are implemented before conditions become critical, safeguarding both assets and public safety. Key components of a monitoring program include:

- **Data Collection:** Leveraging tide gauges, SLR projection tools, and local weather models to track changes.
- **Performance Evaluation:** Assessing whether existing adaptation measures are functioning as intended under current conditions.
- **Plan Updates:** Incorporating updated scientific data and observed trends to refine triggers and adaptation strategies.

Question 25: Based on the risk assessment, including the identified consequences, describe the project's planned adaptation measures. This narrative should flow logically from the preceding analyses and reflect the vulnerability and risk findings. Consider the full range of adaptation options discussed above and include any proposed triggers for action or monitoring requirements associated with incremental adaptation strategies.

Supporting Documentation

Project managers should attach any relevant supporting documentation related to the vulnerability analysis and risk assessment. These materials could include design documents, vulnerability matrices, monitoring plans, etc.

Review and Approval

As a final step, please submit the completed SLR Checklist for review and approval by your department Director or an appropriate Deputy Director. Once the departmental approval is secured, the SLR Checklist should be routed to the City Engineer for review and approval. The final step is to submit it to the Capital Planning Committee for review and approval.