CHAPTER 10—MONITORING AND ACTION TRIGGERS
The Project Partners developed an approach to monitoring local environmental conditions, new sea level rise research and science, and storm events and response in order to inform our adaptation implementation decisions. Monitoring climate change and sea level rise will be an essential element of effective response decision making. Given the long time horizon of the Plan and the level of scientific uncertainty regarding sea level rise, the Plan will need to be flexible and adaptable in the decades ahead. Implementing the Plan will require long lead times for financing and constructing flood protection structures. Governance responses, such as revisions to development standards and regulations, will also need to be incorporated into response timelines.

**MONITORING PROGRAM**

The Project Partners have a history of monitoring flood dynamics in Olympia as well as strong connections to scientific and academic researchers. The Project Partners will establish a monitoring program to track changing environmental conditions, new sea level rise research, and storm events and impacts to better prepare Olympia to respond to the challenges of sea level rise. This goal will be achieved by establishing key action triggers and implementing adaptation strategies to address key vulnerabilities before the frequency and severity of flooding due to sea level rise reaches an intolerable level for our community.

Building upon our current work, the Project Partners intend to implement the following approach to monitoring. Development and refinement of a monitoring program is identified as a key work task for the Project Partners in 2019.

**LOCAL ENVIRONMENTAL CONDITIONS**

The Project Partners identified a number of informational strategies (Chapter 7) to better understand local environmental conditions, including measuring land subsidence, conducting groundwater studies, and tracking local precipitation trends. In addition, the Project Partners identified the following strategies to monitor sea level trends within Puget Sound:

- Monitor changes in mean sea level and storm event data from the Seattle tide station. These data have been collected since 1899 and analyzed by State and federal researchers since the 1990s to identify sea level trends. This work will continue and provide the Puget Sound area observations on long-term sea level rise. The analysis will be critical to Olympia decision making.
- Monitor changes in mean sea level and storm event data from the Tacoma tide station. This tide station has been active since 1997 and provides real-time water levels. Tides at this station precede tides in Olympia by approximately 45 minutes. Monitoring the real-time water levels compared to predicted water levels helps inform emergency response efforts. As more data are collected, researchers will better understand regional sea level trends in central and southern Puget Sound.
- Monitor and document changing water levels in Budd Inlet associated with high tides and weather systems to create a trend analysis of Olympia-specific information. Pursue the installation of a NOAA-certified tide gauge in Budd Inlet.
- Consider partnering with area high schools, colleges, and citizen groups (e.g. Stream Team) to monitor local environmental conditions where feasible.

**NEW SEA LEVEL RISE RESEARCH AND SCIENCE**

- Strengthen relationships with regional academic, State, and federal researchers. The Project Partners expect that sea level rise projections in the coming years will be more accurate and precise. Incorporate new science and data into planning and design of adaptation strategies as they are implemented.
- Track trends in global warming and its implications for local sea level rise. Sea level rise beyond 2050 is largely a function of future human activities (e.g., global population growth, land use, energy mix, new
technologies, etc.) and our efforts to mitigate harmful impacts of climate change.

STORM EVENTS AND RESPONSE
- Track changes in wet-weather flow patterns and any increases in peak flows to the Budd Inlet Treatment Plant attributable to sea level rise
- Monitor the condition and performance of flood barriers responsible for protecting downtown
- Track Project Partner participation in emergency response events, including cost to respond to such events

ACTION TRIGGERS
The monitoring program presented above will provide key information for local decision making in the decades ahead. Implementation plans will be based on projected sea level rise translated to a range of likely timeframes extending to 2100. However, actual implementation timelines for physical strategies will be based on monitoring of sea level rise trends and pre-determined action triggers for planning, design, permitting, financing, and construction. Action triggers for implementation of physical and governance strategies will be refined annually as needed.

Given current research and Olympia-specific flood dynamics, key sea level rise thresholds for actions identified in this Plan include the 6 inch, 24 inch, and 68 inch scenarios.

Key action responses to prepare Olympia for the key sea level rise thresholds include:
- Implement financing structures for funding flood protection projects
- Initiate project implementation (including planning, design, permitting, and construction), in many cases phased over time
- Modify development standards and regulations

The lead time for flood protection projects can be lengthy. Likely timeframes for small to large construction projects are as follows:
- Secure funding: 1 – 10 years
- Project design: 1 – 5 years
- Construction: 1 – 3 years

Depending on scale and complexity, flood protection projects could require 3 to 18 years from start to finish. The longest timelines are appropriate for the larger-scale projects identified for 24 to 68 inches of sea level rise. These timeframes need to be considered in decision making to ensure that projects are initiated with sufficient lead time to implement before flood risk reaches unacceptable levels for our community. Once a given set of flood barriers is constructed, the Project Partners will maintain the barriers and monitor changing environmental conditions to identify triggers to initiate planning of the next phase of projects. Given these timeframes and assuming sea level rise remains as currently projected, decision making needs to meet the following general timelines:

<table>
<thead>
<tr>
<th>Level of Flood Protection</th>
<th>Phasing</th>
<th>Initiate Project Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current conditions</td>
<td>Near-term</td>
<td>2019-2020</td>
</tr>
<tr>
<td>6 inches of sea level rise</td>
<td>Near-term</td>
<td>2019-2024</td>
</tr>
<tr>
<td>24 inches of sea level rise</td>
<td>Mid-term</td>
<td>2025-2050</td>
</tr>
<tr>
<td>68 inches of sea level rise</td>
<td>Long-term</td>
<td>2050 and beyond</td>
</tr>
</tbody>
</table>

If monitoring indicates changing sea level rise projections, in terms of either the magnitude or rate of sea level rise, the timeline for project initiation will necessarily change (either sooner or later). The projected amount of sea level rise is the key driver to decision making rather than the exact year. Additionally, nearer term projects will need to support and integrate into the longer projects.