

Adapting to Rising Tides Municipal Stormwater Assessment Questionnaire

Existing Conditions

1. Briefly describe the municipal stormwater system and its functions, e.g., types of services provided, level of use, area and population served.

For stormwater retention facilities, what is their design capacity (e.g. 20 percent of mean annual precipitation)? What pumping system is used, and is their additional pumping system capacity? Are the pump system components protected? How long does the retention facility require to drain after reaching maximum capacity (e.g. 24 hours)?

For stormwater detention facilities, are there any parking lot/multipurpose detention facilities? If so, is there adequate signage/notice indicated the area is subject to stormwater ponding, and indicating escape routes? For conduit storage by oversizing the below-ground drainage facilities, is there design/plan for siltation and long-term maintenance?

Where are the above-ground versus below-ground detention facilities? For the above-ground facilities, do they:

- a. Serve new development projects which could impact the FEMA floodplains?
- b. Have long-term maintenance managed by a public authority?
- c. Comply with DWR limitations regarding storage capacity and height for non-jurisdictional dams?

For detention ponds, which/where are the dry ponds versus the wet ponds? How much freeboard is provided? What is the emergency spillway designed for (e.g. 500-year event)? What is used to protect the emergency spillway from erosion during normal and high flow conditions (e.g. riprap, concrete, etc.)?

2. What year was the municipal stormwater system built, and what is its expected remaining service life? To what flow capacity is it designed for? What recurrence-interval (e.g. 10% event or 10-year peak discharge) and Bay tide level (if considered) was the system designed for?

3. When and what was the last major repair or improvement to the stormwater system? Is the system currently at capacity, or does it have additional capacity to meet future conditions such as projected higher Bay water levels, combined riverine and higher Bay water levels, or elevated groundwater? Are there minimum/maximum district criteria for pipe sizes, concrete box height, manhole spacing, etc.?

4. What is the most frequent type of inspection/maintenance and how often is it conducted? Is there any evidence of saltwater infiltration into the municipal stormwater system?
5. Which city or county department manages the stormwater system? How does the municipal stormwater system relate to local flood control management – is there a separate flood control district?
6. Are any critical components of the municipal stormwater system located in a state mandated "Zone of Required Investigation" due to proximity to an earthquake fault zone, liquefaction seismic hazard zone, tsunami inundation zone, or earthquake-induced landslide zone?
7. Has the stormwater system 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 system able to continue functioning either partially or fully?
8. Is the stormwater system currently under consideration for capital improvement or investment? Is the system serving an area that is planned for future development or redevelopment?
9. Are there any existing or planned Low-Impact Development (LID) or green infrastructure programs or policies in place?

Information Vulnerabilities

1. Is planning-level or project-level information available to assess vulnerability, e.g., existing conditions reports, as-built drawings? In particular, are the connections to flood control channels and creeks and locations of the gravity drained and pumped stormwater systems that discharge into them identified and mapped?
2. Is there up-to-date elevation, location, and condition data for the stormwater system inlets, outlets, pipelines, basins, pump stations, and other components? What format (e.g. GIS, engineering specs) is the information in? Are there places where stormwater pipe sizes decrease in area or diameter compared to what is upstream?
3. Are there maintenance records indicating past stormwater conveyance blockages including location, date/time and cause? Reported instances of "sunny-day" flooding occurring from backups through the stormwater system?
4. Is there any information regarding groundwater and how it could potentially increase risk of flooding from stormwater? Does the city or flood control district have a hydraulic

model for runoff accounting for impervious area, soil moisture, etc. that could inform municipal stormwater management?

5. 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?

6. Is the local hazard mitigation plan up to date, and is stormwater infrastructure considered?

Governance Vulnerabilities

1. Is stormwater managed to achieve multiple goals or objectives e.g., water retention, reuse and recharge in addition to water quality and flood control standards? If yes, are their conflicts among them?

2. 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. Is there a Master Stormwater Management Plan?

4. If the stormwater system connects to flood control systems owned and operated by others, what is the relationship between the municipality and these entities? Do they coordinate information, funding or decision-making?

5. What types of permits (and from which agencies) are necessary to maintain, repair or improve the asset? Are there special processes for emergency repairs?

6. What funding sources currently exist that can be used to assess hazard risk or vulnerability to climate change? To improve asset resilience?

Physical Vulnerabilities

1. Which stormwater outlets are exposed to current or future flooding from high water levels due to SLR? What is the slope gradient or diameter of stormwater conveyance pipes feeding into exposed outlets? Do any outfalls have mechanisms to control inflow from the Bay such as a check or duckbill valve?

2. What water or salt sensitive components of the municipal stormwater system are at-grade or below-grade, e.g., mechanical or electrical equipment, pumps, utilities, building heat, ventilation or power systems?

3. What is the deferred maintenance level? Are there “turn-key” contracts for backup power supplies? Are there portable pumps, sandbags, etc. on hand?

Functional Vulnerabilities

1. How much urban development and growth (in particular increase in impermeable surfaces) has occurred recently? How much is projected to occur in the future? Has the municipal stormwater system components (pump stations, detention basins, etc.) and capacity been evaluated in light of recent changes and future plans?

2. If the municipal stormwater system were overwhelmed, how would that impact sewage/wastewater systems? Flood control systems?

3. What external services, such as power and roads do stormwater system components (e.g. pump stations) rely on? Are there stormwater pump stations located near roads that flood? Is there any alternate access? Do pump stations have a source of backup power?

4. For municipal stormwater outfall draining to flood control channels and creeks, how close are the outfalls to the head of tide? How elevated are the outfalls closest to the extent of tidal influence in the channel/creek?

Consequences

1. What degree and scale of economic disruption would occur if the municipal stormwater system was damaged, disrupted, or failed? If based on a past weather event or an unplanned disruption, describe the type and duration of that disruption.

2. What would the water quality impacts be if the municipal stormwater system was damaged, disrupted, or failed (e.g., sewage overflows and release untreated into receiving waters or potential for mobilization of hazardous materials)?

3. Where are the lowest areas that currently poorly drain stormwater? What would be the impact to these areas and residents if the municipal stormwater system failed?

4. Are there any sensitive systems (e.g. electrical) or flood-sensitive assets close to exposed stormwater components that could be impacted by flooding due to tidal backup through the stormwater system?