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MEMORANDUM

TO: Hingham Sewer Commission

FROM: Weston & Sampson

DATE: May 3, 2016

SUBJECT: Climate Change Vulnerability

CC: Steve Dempsey, Randy Sylvester

As requested, Weston & Sampson has reviewed the June 29, 2015 Climate Change Vulnerability, Risk Assessment and Adaptation Study prepared for the Town of Hingham as it relates to the Town's sanitary sewer infrastructure and roadway assets. The report identifies assets vulnerable to flooding and provides recommended actions in three timeframes:

1. Present action necessary
2. Action recommended by 2030
3. Action recommended by 2070

Please see the summary below regarding recommended sanitary sewer infrastructure and roadway improvements in the three timeframes as identified in the report.

Municipally-owned sanitary sewer infrastructure assets

Present Action Necessary – None Recommended

Action Recommended by 2030 – Total Estimated Cost = $74,500

- West Corner Pump Station - $6,500
  - Install water-tight manhole covers over the wet well and others to prevent above ground flood waters from entering the well and others. (Approximate cost = $4,500)
  - Seal underground utility connections and other conduits for water entry. (Approximate cost = $2,000)
- Mill St. Pump Station - $68,000
  - Purchase and have ready to deploy a 5 ft. high temporary flood barrier (approximately 160 ft. long) around perimeter of pump station and generator. (Approximate cost = $56,000)
  - Seal interior conduits for water entry (e.g., through-floor/wall pipes, utility conduits) to 14.0 ft NAVD88. (Approximate cost = $2,000)

- Install a high level water alarm and sump pump system tied to the emergency generator to allow for monitoring of and pumping out of any water that leaks through the temporary flood barrier. (Approximate cost = $10,000)
- It should be noted that by raising Route 3A as described later in the roadway adaptation section, the potential flooding at the Mill Street Pump Station can be mitigated and the adaption measures described above would not be required.

Action Recommended by 2070 – Total Estimated Cost = $198,000

- West Corner Pump Station - $5,000
  - Raise/relocate utility meters on building exterior to 13.9 ft NAVD88. (Approximate cost = $5,000)
- Broad Cove Pump Station - $69,000
  - Seal interior conduits for water entry (e.g., through-floor/wall pipes, utility conduits) to 14 ft NAVD88. (Approximate cost = $2,000)
  - Install drop-in flood panels on doorways. (Approximate cost = $6,000)
  - Raise or enclose utility boxes on the building exterior. (Approximate cost = $5,000)
  - Alternative: Purchase and have ready to deploy a temporary flood barrier around the pump station and purchase portable fuel-powered pumping system to pump out any leakage through the temporary barrier (Approximate cost = $56,000).
- Bel Air Pump Station - $124,000
  - Construct a low flood wall inside the perimeter fence with a temporary access closure for drop-in flood panels at the gate. (Approximate cost = $120,000)
  - Seal interior conduits for water entry (e.g., through-floor/wall pipes, utility conduits) to 14.0 ft NAVD88. (Approximate cost = $2,000)
  - Purchase portable fuel-powered pumping system. (Approximate cost = $2,000)

Roadway Assets

Present Action Necessary – Total Estimated Cost = $515,000

- Sections of Route 3A - $515,000
  - Prepare evacuation planning and education for floodplain residents, businesses, and institutions.
  - Purchase electronic warning signs for road closures / evacuation if none already available. (Approximate cost = $40,000)
  - Identify alternate heliport location for use during flooding events.
  - Carry out planning, engineering design, environmental assessment on options to raise ~1,880 linear feet of Route 3A and/or the right-of-way to minimum elevation of 10.2 ft NAVD88 (Approximate cost in today's dollars = $475,000)
- George Washington Boulevard – (Establish inspection protocol and coordination with Hull)
  - Coordinate closely with Hull on road closures / evacuations through Hingham.
  - Establish a debris management and roadway/bridge inspection protocol to re-establish access to Hull via Hingham roads after a flooding event.

Action Recommended by 2030 – Total Estimated Cost = $19,140,500

- Sections of Route 3A - $6,500
  - Prior to 2030, as soon as funding becomes available, implement the preferred alternatives described above for raising Route 3A. (Approximate cost in today's dollars = $4,750,000)
- George Washington Boulevard – $2,448,000
  - Design, permit, and implement a roadway improvement project to raise approximately 850 ft. of George Washington Boulevard at low-lying sections to a minimum elevation of 10.2 ft NAVD88
  - Approximate cost in today's dollars to raise the roadway to elevation 10.2 ft. NAVD88, including engineering costs, is $2,448,000
- Rockland Street to Hull Street - $16,686,000
  - Design, permit and raise the roadway to a minimum elevation of 10.2 NAVD88 over an approximate length of 6,000 ft. (Approximate cost = $16,686,000)

Action Recommended by 2070 – Total Estimated Cost = $6,737,000

- Sections of Route 3A - $2,337,000
  - If needed, raise ~4,250 ft of right-of-way incrementally to a minimum of 14 ft NAVD88. This can be achieved by raising the roadway, or by more likely adding permanent and/or temporary flood barriers. Assuming a representative flood barrier cost of $500 per foot, an approximate cost to construct a flood barrier to bridge the gap between elevation 10.2 and 14 NAVD88, including 10% for engineering, would be $2,337,000 in today's dollars. Where space permits, such as at the bathing beach area, options exist for either "gray" infrastructure such as vertical concrete or glass barriers, or more "green" infrastructure such as landscaped berms. Unfortunately, in developed areas, such as much of the Route 3A corridor where there is limited Right of Way to work with, opportunities for "green" flood barriers are somewhat limited.
- George Washington Boulevard - $1,100,000
  - If needed, raise the roadway and/or right-of-way incrementally over a total distance of approximately 2,000 ft. to a minimum elevation of 14 ft NAVD88. This can be achieved by raising the roadway, or by more likely adding permanent and/or temporary flood barriers. Where space permits, "green" flood barriers such as landscaped berms can be utilized. Assuming a representative flood barrier cost of $500 per foot, an approximate cost to construct a flood barrier to bridge the gap between elevation 10.2 and 14 NAVD88, including 10% for engineering, would be $1,100,000 in today's dollars.
- Rockland Street to Hull Street - $3,300,000
  - If needed, raise the roadway and/or right-of-way incrementally over a total distance of approximately 6,000 ft. to a minimum elevation of 14 ft NAVD88. This can be achieved by raising the roadway, or by more likely adding permanent and/or temporary flood barriers.
  - Assuming a representative flood barrier cost of $500 per foot, an approximate cost to construct a flood barrier to bridge the gap between elevation 10.2 and 14 NAVD88, including 10% for engineering, would be $3,300,000 in today's dollars.
  - *(Alternative Recommendation) Allow the roadway to flood until the nature of development along the corridor changes to better accommodate raising the roadway or otherwise protecting the roadway and properties on the landward side of the road.*

Summary

Based on the report, there is no present action required on the sanitary sewer infrastructure assets as it relates to climate change vulnerability. Improvements at the West Corner and Mill Street pump stations totaling approximately $150,000 are recommended prior to 2030. Improvements at the West Corner, Broad Cove, and Bel Air pump stations totaling approximately $200,000 are recommended prior to 2070.

Let us know if you have any questions or you require additional assistance on this issue.

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