

Resilience Planning and Adaptation Training for Water and Wastewater Utilities

Adaptation Planning Exercise Instructions

Objective

The purpose of this exercise is to identify potential adaptive measures that can help protect critical assets from specific threats. In addition, we will be designing adaptation plans for Binghamton-Johnson City Joint Sewage Treatment Plant (BJCJSTP). The total cost to implement the adaptation plan can be compared to the monetized risk reduction achieved by implementing the plan in the next CREAT module.

Background

Review BJCJSTP's existing adaptive measures to protect the treatment plant from high flow events:

- Emergency Response Plan for flooding events
- Sand bags as temporary flood barriers
- System performance models
- Weather forecast monitoring

BJCJSTP now needs to identify potential adaptive measures that can be implemented to provide greater protection from future environmental conditions, increasing their overall resilience. Potential adaptive measures under consideration are listed in the table on the following page.

Small Group Discussion Instructions

Break into groups of 4 to 5 people. On your name tent, you will find a colored dot, which will indicate your small group placement. Review the potential adaptive measures in the table on the following page that BJCJSTP might want to consider implementing with your group.

- 1) Choose **five** potential measures that your group thinks should be considered based on the risk reduction achieved by implementing the measure.
- 2) Rank each of your selected measures from 1 to 5, with 1 being the highest priority for implementation. Discuss with your group members the reasoning or justification for prioritizing each measure and record any notes on the flip chart provided.

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- 3) During the report out, nominate someone from your group to explain your results and reasoning.
- 4) As a larger group, we will discuss prioritization and pick **five** measures that we all agree should be considered for future implementation.
- 5) In CREAT, we will select from the list of Potential Measures those measures that were agreed upon by the larger group.

Potential Adaptive Measures for Binghamton-Johnson City Joint Sewage Treatment Plant

Adaptive Measure	Description	Estimated Cost
Back-up power	Three (3) back-up generators and diesel storage tanks to provide power for the entire plant and related processes during future power outages.	300 kW \$75,000 - \$240,000
Alternate wastewater capabilities	Develop redundant treatment processes. Development or replacement could include entire facility or just critical portions to support operations when damage or loss occurs.	\$5,000,000 - \$20,000,000
Flood wall	Construct a flood wall for protection against high flow events. Construction and design is 1.5 feet of freeboard above the 2011 storm event level.	\$1,750,000 - \$4,000,000
Submersible pumps	Install submersible pumps that will not be significantly impacted by flood waters entering the plant.	\$1,500,000 - \$3,000,000
Raise electrical equipment	Raise electrical equipment above the 2011 flood level.	\$100,000 - \$200,000
Raise VFDs	Raise the Variable Frequency Drives (VFDs) at least one foot above the 2011 flood level.	\$50,000 - \$100,000
Flood risk management plan	Develop phased, adaptive risk management plan for urban flood risks and treatment requirements that will prioritize the ability to limit or prevent damage to the facility during floods. Integrating observations, process models and decision frameworks provides a powerful suite of tools to anticipate potential flood scenarios and deal with flood damage.	\$7,500 - \$10,000
Water tight doors	Install water tight doors at critical infiltration points to mitigate impacts of flood waters on plant and equipment.	\$200,000 - \$500,000
Permeable pavement	Install permeable pavement at the facility to allow for infiltration of stormwater through the pavement surface reducing runoff (and localized flooding). Could be constructed from porous asphalt, porous concrete, and interlocking pavers.	\$100,000 - \$350,000
Flood models	Build integrated flood models for catchments and urban drainage. Beyond many current hydrologic and flood models, these new models should ensure that changing climate conditions can be accommodated in models and that these models include topographic information (GIS) and risk assessment components.	\$35,000 - \$75,000
Quick disassembly pumps	Retrofit existing pumps to make it easier to disassemble them and remove them in advance of a flooding event. Costs include the retrofitting and the cost to remove them for one event.	\$50,000 - \$100,000