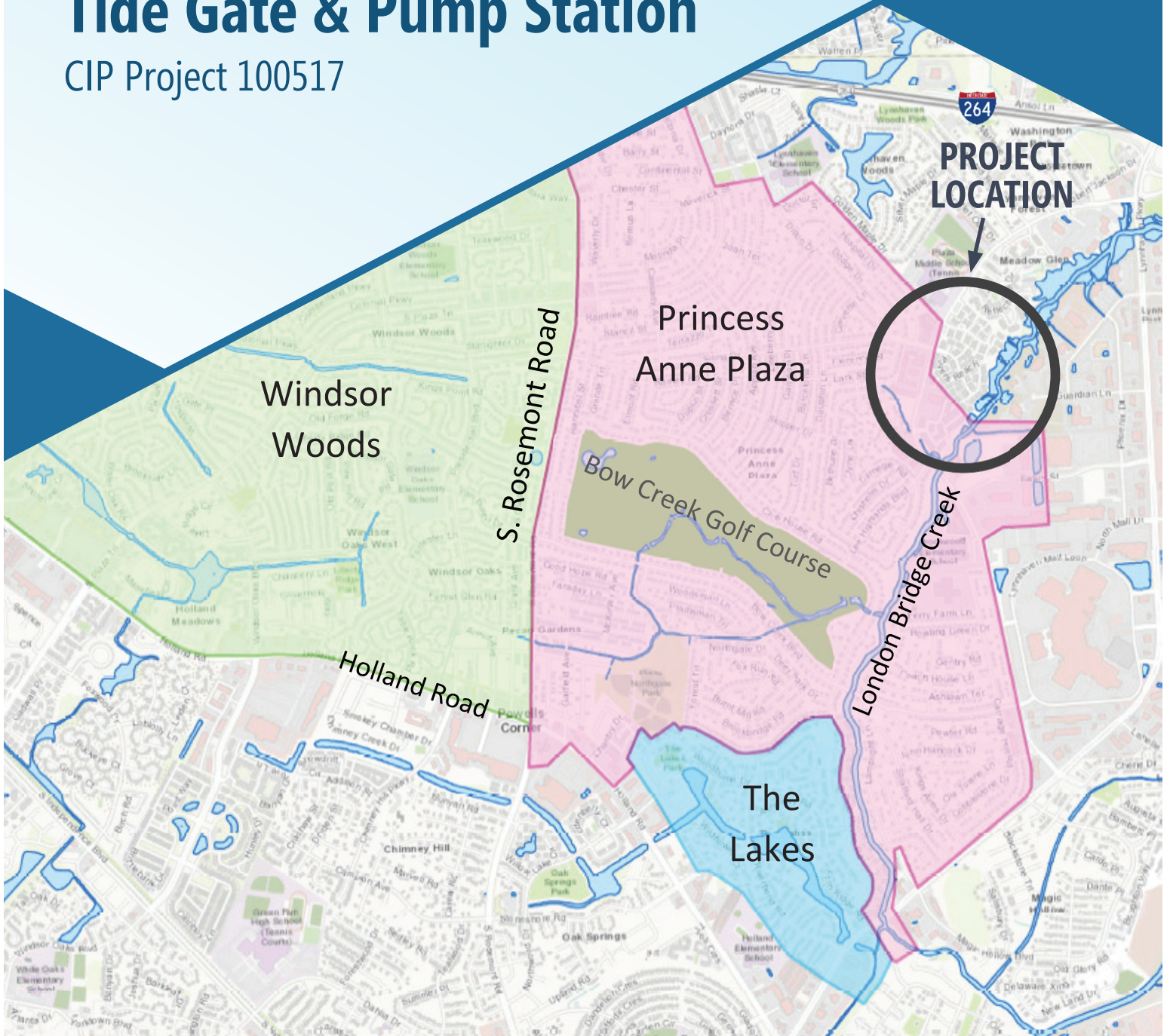


February 2021

The Lakes, Princess Anne Plaza, and Windsor Woods Combined Drainage Improvements

North London Bridge Creek Tide Gate & Pump Station

CIP Project 100517



SIGNIFICANT ISSUES

- The project area is located in what was once the undeveloped headwaters of the Lynnhaven River. Much of the area has low elevations and lies within FEMA's 100-year floodplain.
- The existing drainage system is old, undersized, and lacks the required storage.
- The area is also tidally influenced, which limits available storage capacity during storm events.
- These issues coupled with rising sea levels and increased frequency and severity of storms has resulted in severe flooding during extreme storm events throughout the project area.

OVERALL SOLUTIONS

- The City Public Works Department conducted an extensive engineering analysis to determine the improvements needed to mitigate the flooding issues. It has been determined that a combination of complimentary infrastructure improvements are required to achieve the maximum flood mitigation benefit.
- Infrastructure improvements include tide gates, pump stations, the creation of additional stormwater storage, and storm drain piping improvements.
- The proposed **North London Bridge Creek Tide Gate and Pump Station**, which are the focus of this brochure, are two of the major infrastructure projects planned as part of the overall **The Lakes, Princess Anne Plaza, and Windsor Woods Drainage Improvements**.
- For more information on other major improvements please see the *Overall Project Brochure* located at www.vbgov.com/windsor-woods.

NORTH LONDON BRIDGE CREEK TIDE GATE

- The purpose of the gate is to block the incoming (rising) tide along London Bridge Creek from entering the project area and filling up (i.e. "stealing") the available storage with the drainage system (pipes, canals, and lakes).
- By eliminating the influence of the tide prior to a storm event, storage capacity is created within the drainage system. This additional storage capacity allows the stormwater to be better managed, which results in flood mitigation.
- The tide gate will normally be open so the natural ebb and flow (rise & fall) of the tide will occur within London Bridge Creek. However, when significant storm events are anticipated such as a hurricane, Nor'easter, or extreme tidal event, the gate will be closed at low tide to capture as much storage as possible by utilizing low water levels.

NORTH LONDON BRIDGE CREEK PUMP STATION

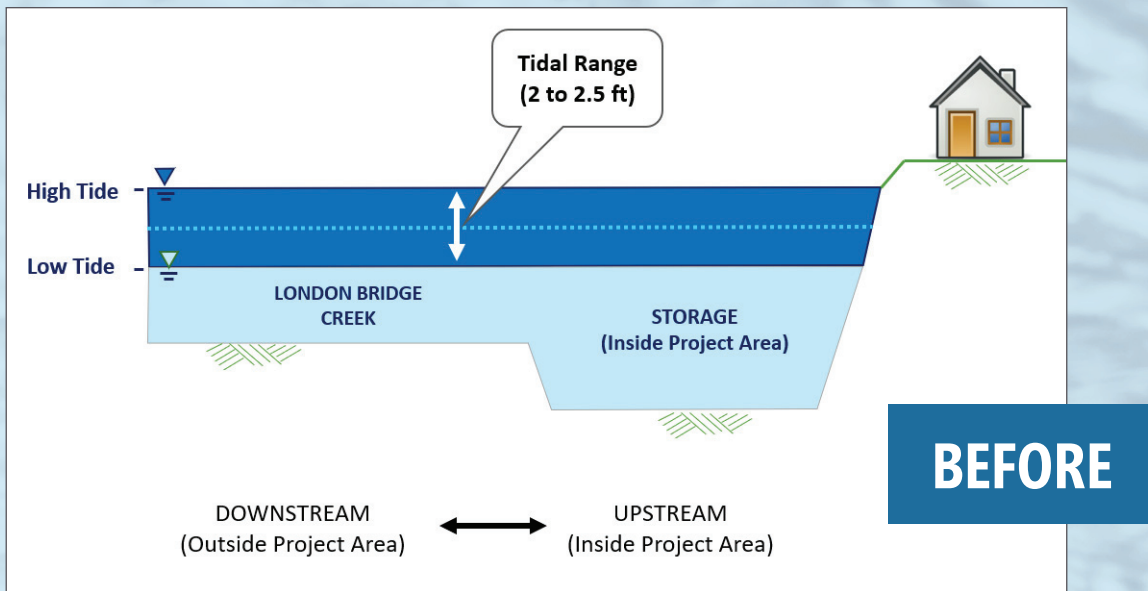
- The pumps work in combination with the tide gate and serve a dual purpose:
 - 1) To draw down water levels within the drainage system prior to a storm event to increase storage capacity (i.e., creating room for the rain within the system) and
 - 2) To manage water levels behind the gate during the storm event while the gate is closed.
- Like the tide gate, the pump station will typically only be operated during extreme storm events (and in advance to prepare the system). Normally, the pumps will remain off and the gate open (other than routine maintenance testing).

TIDE GATE AND PUMP OPERATION

The exhibits below graphically illustrate conditions along London Bridge Creek and how the proposed tide gate and pump station work together to create stormwater storage within the drainage system.

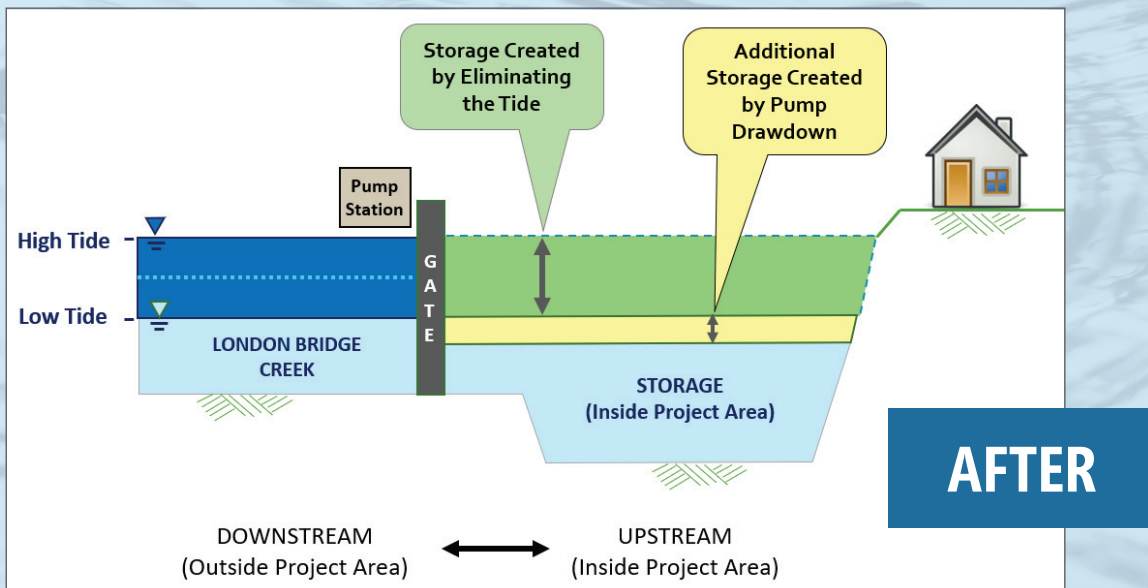
The first exhibit shows **current (today's) conditions** prior to the installation of the proposed tide gate and pump station ("before").

- The water levels within the project area are impacted by the tide, which ranges from 2 to 2.5 feet. Water levels are continually fluctuating based on the daily tide cycle, which includes two-high and two-low tides each day (known as a semidiurnal tide cycle).
- Today, during a high-tide cycle, all the storage within the project area is taken up (i.e. "stolen") by the tide.



The exhibit below illustrates conditions **after** installation of the tide gate and pump station while both are in use.

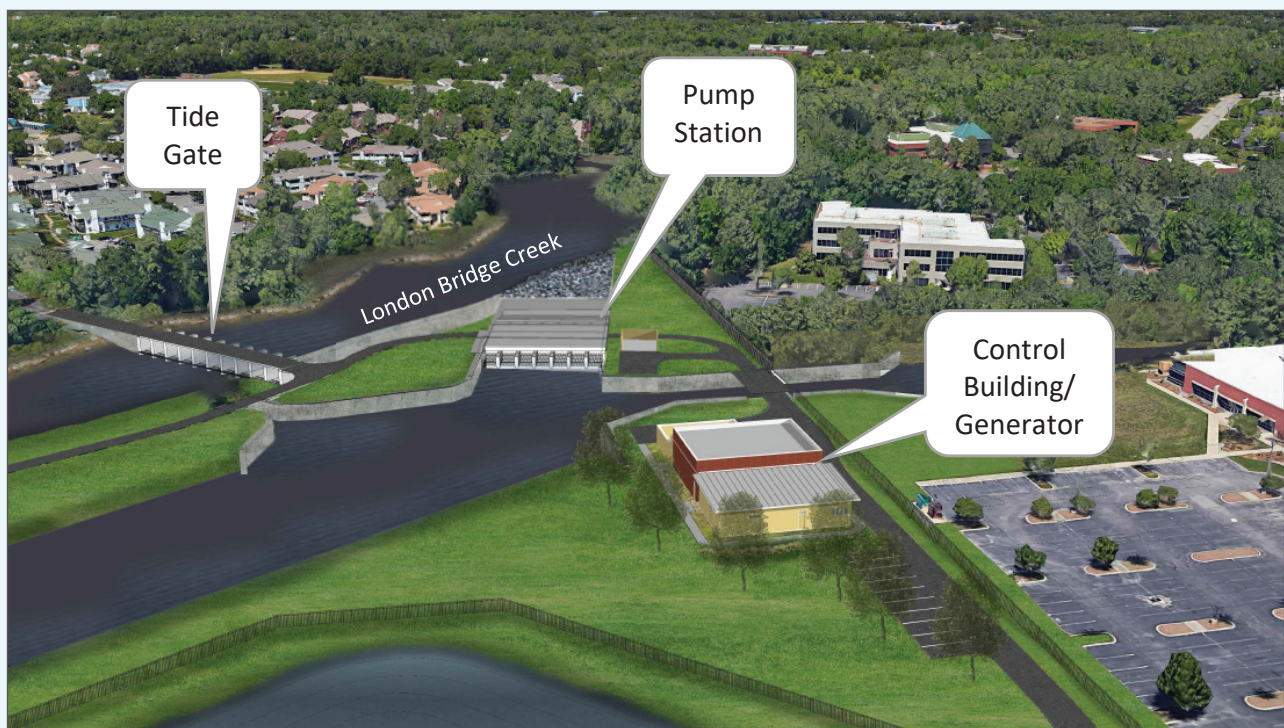
- By closing the gate at low tide, storage is created within the project area by blocking the rising tide cycle from entering the project area. This storage is represented in green below.
- Additional storage will then be created (prior to an impending storm event) by using the pumps to further draw down water levels within the drainage system. This is represented by the yellow shading.
- The storage created by the tide gate and pump station is key to managing the stormwater within this area and mitigating the flooding.



DOWNSTREAM CONSIDERATIONS

The closing of the tide gate and operation of the pump station **WILL NOT** increase water levels downstream or cause adverse impacts (or additional flooding) along London Bridge Creek. The additional storage capacity created by the tide gate and pump station allows the stormwater to be detained and slowly released downstream. Extensive hydraulic modeling and analysis has been performed in regard to this matter that demonstrates water levels after proposed improvements are less than or equal to water levels before improvements.

Additionally, water levels will continually be monitored both downstream and upstream of the tide gate with water level sensors to ensure there are no adverse impacts. For more information please see the *Downstream Considerations Brochure* located at www.vbgov.com/windsor-woods.



Rendering of North London Bridge Creek Pump Station and Tide Gate

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For more information, hover over the QR code with your smartphone camera.

