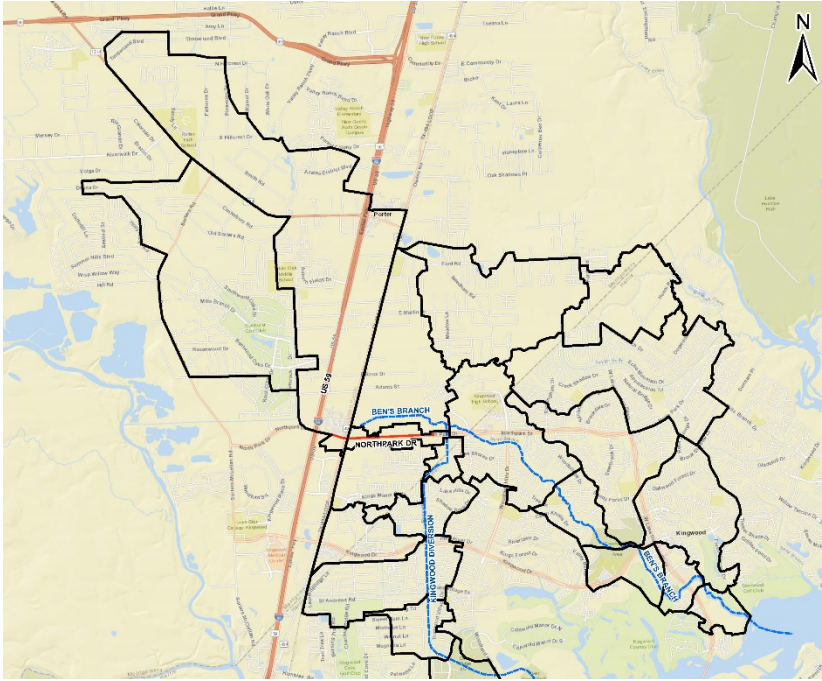


HOW WILL DRAINAGE BE IMPROVED ON NORTHPARK DRIVE?



Regional Watersheds in Harris and Montgomery Counties near Northpark Drive

The Kingwood area needs an evacuation route during major storm events. The Ben's Branch watershed, including the Kingwood Diversion Channel, has not been studied comprehensively to investigate opportunities for improving the existing drainage patterns in the region.

Engineers will both develop a new, more current baseline for the watershed and design drainage improvements against it to develop drainage improvement alternatives for both Northpark Drive and the region.

REGIONAL COMPREHENSIVE DRAINAGE ANALYSIS

Step 1: Update, Model and Analyze Existing Conditions

Baseline flows and water surface elevations will be updated for Ben's Branch and Kingwood Diversion Channel. The effective hydrologic model for Ben's Branch will need to be updated to new Atlas 14 rainfall depths as required by Harris County Flood Control District methodology.

Step 2: Model and Analyze Proposed Conditions

The Northpark Drive Overpass Project will require changes to the updated existing roadway drainage system, as well as the updated watershed drainage system for Ben's Branch. The increased runoff from the proposed wider roadway will then be incorporated into the updated existing hydraulic and hydrologic models to create a proposed drainage model.

Step 3: Design and Compare Regional Watershed Mitigation and Improvement Alternatives

The proposed conditions will be compared against the updated existing conditions to determine impacts. In order to mitigate adverse impacts to adjacent properties, engineers will develop alternatives to improve drainage in the area and to address the flooding impacts.

ANALYZE AND UPDATE EXISTING MODELS

Ben's Branch Hydraulic Model Update

The proposed project will require modifications to the existing Northpark Drive culvert crossings at Ben's Branch.

Kingwood Diversion Channel Hydraulic Model

The proposed project will require modifications to the existing Northpark Drive bridge at the Kingwood Diversion Channel. Currently, there is no hydraulic model for this non-FEMA studied stream. A new hydraulic model will be developed. This stream is located in both Montgomery and Harris Counties.

Hydrologic Model Update

The hydrology of the Ben's Branch watershed, which includes the Kingwood Diversion Channel and the FEMA Effective model for Ben's Branch, will need to be updated to reflect the updated hydraulic models on Ben's Branch and the Kingwood Diversion Channel.

HOW WILL DRAINAGE BE IMPROVED ON NORTHPARK DRIVE?

DEVELOP REGIONAL WATERSHED IMPROVEMENT ALTERNATIVES

Alternative 1: Proposed Storm Sewer System (With and Without Inline Storage)

Alternative 2: Detention along Kingwood Diversion Channel (Inline and Offline)

Alternative 3: Diversion Modifications to Kingwood Diversion Channel

Alternative 4: Bridge and Culvert Modifications

Four alternatives for mitigation of impacts from the project to the watershed will be developed and the chosen alternative will then be optimized, where possible.

NORTHPARK DRIVE-SPECIFIC DRAINAGE IMPROVEMENTS

Step 1: Update, Model and Analyze Existing Conditions on Northpark Drive

Today, Northpark Drive drains mostly to a large median ditch with outfalls at Ben's Branch and the Kingwood Diversion Channel. New

baseline flows and water surface elevations will be quantified for Northpark Drive's drainage system based on the updated hydraulic and hydrologic models.

Step 2: Model and Analyze Proposed Drainage Conditions on Northpark Drive

Starting with the new baseline model, engineers will then model the drainage impacts from site conditions the additional impervious cover due to the proposed expansion of Northpark Drive. These will be used to measure flow or water surface elevation impacts from the proposed project on the updated existing conditions.

Step 3: Design and Compare Drainage Mitigation and Improvement Alternatives on Northpark Drive

The proposed conditions will be compared against the updated existing conditions and two alternatives for mitigation of impacts from the project will be developed. The chosen alternative will then be optimized, where possible, and implemented in the reconstruction of Northpark Drive.

DEVELOP NORTHPARK DRIVE-SPECIFIC DRAINAGE IMPROVEMENT ALTERNATIVES

Alternative 1: Proposed Storm Sewer System (without inline storage)

Alternative 2: Proposed Storm Sewer System (inline storage)



Proposed Northpark-Specific Drainage Improvement Concept