



## Wildcat Creek in Howard County Stream Stability Assessment

Howard County, IN | November 2017

Prepared for:

**Howard County Stormwater District**

Prepared by:

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## Executive Summary

This report documents the results and methodology used by Christopher B. Burke Engineering, LLC (CBBEL) to assess erosion issues in and along Wildcat Creek in Howard County, Indiana. The river stability assessment was conducted by a team consisting of CBBEL staff and Robert C. Barr, a fluvial geomorphologist, in response to concerns that erosion and flooding was increasing along the creek and threatening homes and infrastructure, particularly in and around Kokomo.

The overall purpose of the study is to show how the quality of life for citizens of Howard County may be improved through adopting appropriate flood resilience strategies and by closely managing and preserving the wonderful resource that is Wildcat Creek.

The study was completed in three successive phases:

- The first phase included significant data gathering and site visits.
- The second phase consisted of assimilation and processing of the data to determine major themes of the current morphologic condition of the stream system. Processed data were then used to identify stressors acting on the streambanks and causing flooding.
- The third phase included development of conceptual strategies for reducing or eliminating the stressors.

The key findings of the Wildcat Creek system assessment were as follows:

- The analyses of the available rainfall and streamflow data for the Wildcat Creek Watershed point to an increasing trend in heaviest rainfalls, an increasing trend in observed flood peaks, an increasing trend in the frequency of bankfull discharges, and an increasing trend in flow volumes.
- Although there are several disturbed stream reaches that act as stressors to the Wildcat Creek system, in every case relatively short reaches of the Creek that have retained their functions, or more of their functions than the disturbed reaches, are buffering the effects of disturbed portions of the stream corridor. These remaining undisturbed reaches with attached floodplains are essential and invaluable in maintaining the overall sustainability and health of the Wildcat Creek system.
- The most obvious issue in Howard County that increases flooding risk along Wildcat Creek is the fact that the natural floodplain has been almost completely filled through the Kokomo city limits. This filling occurred over many decades as the city developed, most of it prior to regulatory officials understanding the negative consequences of filling the floodplain. Nonetheless, this has certainly increased flood elevations along the creek, including upstream of, downstream of, and through Kokomo. Continued filling of the remaining floodplain areas will only exacerbate the negative impacts.
- Another issue impacting flooding within Howard County is channel modifications that have been done in the upper watershed (with over 100 square miles of drainage area) in Tipton County. Most of the creek and tributary ditches in this upper watershed have been modified to support agricultural drainage. This well-drained upper watershed results in fast response of the creek. This means that during larger rainfall events, a large pulse of streamflow is sent downstream into

Howard County, or considered another way – as high as 76 percent of the 1% annual event can be generated upstream of Jerome.

Based on the results of the system assessment, the following are the main concerns with regards to stream stability and flooding:

- Future development within the watershed in Howard County, especially along the river corridor impact areas, is expected to increase flooding in low-lying areas and potentially affect the stability of stream.
- Future development within the watershed outside of Howard County in Tipton County, especially along the river corridor impact areas, is expected to increase flooding in low-lying areas and potentially affect the stability of stream within Howard County.
- The current observed trends in increasing rainfall intensities, average daily flows, and peak annual flows, as well as the forecasted intensification of these trends due to a changing climate, is expected to increase flooding in low-lying areas and potentially affect the stability of stream.
- Unless managed properly, the accumulation of large wood and logjams within the Wildcat Creek channel may result in an increase in flood stages and/or stream instability.
- Current new location of stream corridor along the former quarry on the west side of Kokomo threatens the integrity of the gravel pit levee, with grave consequences on stream stability upstream and downstream of this reach expected should the levee fail and the gravel pit be “captured” by the stream.
- Current severe streambank erosion within the highly-modified river corridor reach in Kokomo is expected to further deteriorate the water quality and stream stability in areas immediately west of Kokomo and require costly frequent ongoing maintenance by the City.

The stream assessment results suggest that multiple mitigation strategies will be most effective in improving the stability of the Wildcat Creek system. The stream suffers from issues that are systemic, or watershed scale, as well as several instances of more acute, site-specific problems.

The following are major recommendations from this study:

1. Implement More Stringent Stormwater Standards
2. Institute Riparian Corridor & Use Restrictions
3. Adopt and Implement Flood Resilience Strategies (especially, the strict preservation of the remaining undisturbed river corridors and floodplain areas)
4. Adopt and Implement a Tree and Large Wood Management Program
5. Update & Expand Hydrologic & Hydraulic Models
6. Provide Additional Flood Storage
7. Reroute the Stream along the Former Quarry to its Original Location
8. Address the Severe Streambank Erosion through the Kokomo Reach

Details regarding the study process, findings of this study, and its recommendations are provided in the report.