HAW CREEK FLOOD MITIGATION PLAN

EXECUTIVE SUMMARY

In June 2008, the residents, businesses, and municipal assets along the Haw Creek corridor in Columbus, Indiana sustained enormous economic damage as a result of significant rainfall and flooding in the watershed. In 2010, Christopher B. Burke Engineering, Ltd. (CBBEL) was retained separately by two of the most affected entities, Cummins, Inc and the Columbus Regional Hospital, to develop detailed hydrologic and hydraulic modeling of the watershed along with a recommended plan for permanent mitigation of future flood damages both for their specific sites and for the overall flood risk areas within the Haw Creek flooding corridor. Detailed reports of findings were generated for both entities in late 2010 and early 2011. This document provides a summary of CBBEL findings and recommendations.

As part of CBBEL studies, a detailed hydrologic model of the watershed was developed, utilizing the US Army Corps of Engineers (USACE) computer program HEC-HMS, to simulate the flow hydrograph (discharge versus time) at various points in the watershed for various storm events. CBBEL also developed a detailed unsteady-state hydraulic model of a 9-mile reach of Haw Creek from its mouth at East Fork of White River to County Road 550 North, utilizing the USACE computer program HEC-RAS, to simulate the water surface elevation changes with time at various locations along the Creek as a result of various storm events. Both of these models were calibrated to historical storms, including the June 2008 storm event.

The detailed modeling showed that starting at rainfall events as small/frequent as the 25-year level, the channel of Haw Creek in portions of Columbus cannot contain the runoff so flow paths outside of the channel are used and overbank flooding occurs, becoming significant at several sites by the 100-year flood event. The modeling also shows the significant role that the existing floodplain storage and out of bank conveyance paths play in keeping flood stages from becoming even higher during significant storm events.

As potential flood mitigation measures, an array of promising alternatives were analyzed, costs estimated, and results compared. These alternatives ranged from major structural solutions, such as diversion of Haw Creek flood flows to another stream and/or detaining the flow in multiple large flood control facilities, to light structural/non-structural solutions, such as buyout/floodproofing of individual structures and regulatory restraints. Based on these detailed analyses, the following components, **in the order of priority and importance**, were recommended:

1. **PREPARE FOR FLOODING**: Flooding is a natural and recurring phenomenon. We must do the best we can to prepare for dealing with the flooding and its aftermath. **The following actions are the most needed and beneficial** for the Haw Creek Watershed to help save lives and minimize property damage:

    a. **Ensure that existing USGS stream gauges on Haw Creek are sustained** and pursue installation of **additional rainfall gages** within the watershed.

b. **Develop a comprehensive Flood Response Plan** (FRP) for the Haw Creek corridor at-risk flood prone areas (from approximately CR 350 North downstream to the L&I Railroad). The plan should detail the 4-step response process that includes Event Detection and Level Determination; Notifications and Communications; Expected Actions; and Termination and Follow-up. The detailed modeling and depth grid mapping developed by CBBEL along with the alert notification capabilities of the USGS Haw Creek near Clifford gauge should be used as the basis for such an FRP.

c. **Develop a flood forecasting model** as a tool to allow more time for activation of the Flood Response Plan. The proposed model will use the detailed modeling developed by CBBEL in combination with radar-based precipitation forecasts to predict potential flood flow hydrographs at the USGS Haw Creek near Clifford gauge in advance of an upcoming storm event.

d. Develop and **distribute public education/public outreach material** regarding what to do before, during, and after major flooding.

2. **PREVENT AN INCREASE IN FLOODING:** CBBEL detailed modeling shows that eliminating existing floodplain storage and/or changing/blocking existing flow paths (within or outside the regulatory floodway) will have a significant impact on flood stages along the creek. These impacts are occurring every day despite existing required permitting constraints by the IDNR or other state and federal agencies because the minimum regulations and evaluation methods imposed by these agencies are not adequate for the type and severity of flooding issues being experienced within Haw Creek corridor. In addition to activities within the Haw Creek flooding corridor, future development or re-development activities within the watershed located in the City of Columbus, Bartholomew County, and Shelby County may inadvertently and cumulatively increase the runoff to a degree that such increased runoff will exacerbate the flooding problems within the Haw Creek flooding corridor. In order to prevent the existing flood potential from becoming worse, **the following actions must be taken immediately by the City of Columbus and Bartholomew County:**

a. **Immediately designate and declare the Haw Creek Watershed as an "Impacted Watershed"** by resolution. This would allow the County and the City to immediately establish requirements for this particular watershed above and beyond present requirements.

b. **Require that every proposed grading project within the Haw Creek flooding corridor (based on map of June 2008 inundation limits developed by CBBEL) be evaluated, through simulations of the CBBEL detailed hydrologic and hydraulic models**, for potential impacts of such proposed work on the property of others. Such an evaluation is necessary for "temporary" emergency flood fight berms/sandbagging, etc. as well.

c. **Prohibit placing fill in or eliminating floodplain storage** within the Haw Creek Watershed. When this is not practical, allow variance to such prohibition only if satisfactory compensatory measures are to be implemented in advance.

d. **Assign**, based on results of detailed hydrologic modeling by CBBEL for 10-year and 2-year storm events, **maximum allowable release rates for post-development 100-year and 10-year storm events** for any proposed new development or re-development within the Haw Creek Watershed.

e. **Require** the permanent retention or, if not practical, extended detention of 1-year, 24-hour rainfall as **"Chanel Protection Volume"** for all proposed new development and redevelopment within the Haw Creek Watershed.

f. **Strictly enforce the requirements of floodplain and stormwater ordinances**, standards, and policies applicable to the Haw Creek Watershed.

g. **Consider updating the City's and County's stormwater ordinances and technical standards** by adding the requirements noted in Items "c" through "e" (above) so that it can apply to all new developments and redevelopments within the City and County.

h. **Pursue sustainable funding** (perhaps through regulated drain assessment mechanism) **for on-going stream maintenance and debris removal on an annual basis** within the Columbus reach of Haw Creek to prevent increased flood stages due to logjams and other obstructions during flooding events.

3. **REDUCE VULNERABILITY TO FLOODING**: Based on detailed evaluation and comparison of promising alternatives, **the following actions are recommended**:

a. Work with the Indiana Department of Homeland Security and FEMA to **obtain funding and offer voluntary buyout to residential and small commercial property owners** within the Haw Creek Flood Corridor so that they are removed from harms way.

b. **Encourage/allow/undertake floodproofing/flood protection of existing individual buildings associated with large industries or lifeline entities** such as Cummins, Inc. and Columbus Regional Hospital, while assuring no adverse impacts on property owned by others.

c. **Pursue funding and remove debris and woody vegetation from the Haw Creek Channel** from a point downstream of L&I Railroad to Rocky Ford Road. Although the impact of such work is expected to be very limited and would not resolve the exiting flooding problems, it does have some measurable flood stage reduction benefits for smaller floods. If funding under Item 2.h. (above) is put in place in a timely manner, this effort can be funded as the initial (however, more extensive) debris removal activity discussed under that item.