



**WALESBORO AIRPORT TRIBUTARY
FLOOD REDUCTION ALTERNATIVES
STUDY**

Bartholomew County, Indiana

(Revised February 19, 2013)

Prepared for

Columbus Redevelopment Commission

123 Washington Street
Columbus, Indiana 47201

February 2013

Prepared by

**Christopher B. Burke Engineering, LLC
115 West Washington Street, Suite 1368 South
Indianapolis, Indiana 46204**

CBBEL Project No. 11-0264.0001

TABLE OF CONTENTS

Table of Contents..... i

List of Exhibits..... ii

List of Figures..... ii

Chapter 1 Introduction..... 1

Chapter 2 Background And A Description Of The Issue..... 2

 2.1 Background..... 2

 2.2 The Issue..... 2

Chapter 3 Evaluation of Alternatives 3

 3.1 Alternative 1 – Diversion Channel 3

 3.2 Alternative 2 – Overflow Channel..... 4

 3.3 Alternative 3 – Culvert and Bridge Replacements..... 4

 3.4 Alternative 4 – Floodwall / Levee 5

 3.5 Alternative 5 – Bypass Channel 6

 3.6 Alternative 6 – Detention Pond(s) 6

 3.7 Alternative 7– Detention Pond(s) With Larger Ditch..... 7

Chapter 4 Recommendations 9

LIST OF EXHIBITS

- Exhibit 1 Topographic Workmap (Shows Floodplain Limits)
- Exhibit 2 Watershed Map

LIST OF FIGURES

Figure 1-1 Site Location Map.....	1
Figure 3-1 Diversion Channel	3
Figure 3-2 Secondary Channel.....	4
Figure 3-3 Floodwall / Levee	5
Figure 3-4 Bypass Channel	6
Figure 3-5 Detention Pond Locations	7
Figure 3-6 Detention Pond Locations with Proposed Channel Improvements	8
Figure 3-7 Typical 2-Stage Ditch Cross Section.....	8

CHAPTER 1 INTRODUCTION

This report presents the results of a preliminary feasibility level investigation of flood control project alternatives that could remove the FEMA Flood Insurance Study (FIS) flood hazard designation from most of the site that is bounded by County Roads 350S, 450S, 175W and 50W. This investigation was prompted by interest in understanding the issues that would be associated with the development of the former airport property for commercial and industrial uses, with a specific goal of maximizing the developable area. The study area is shown below.

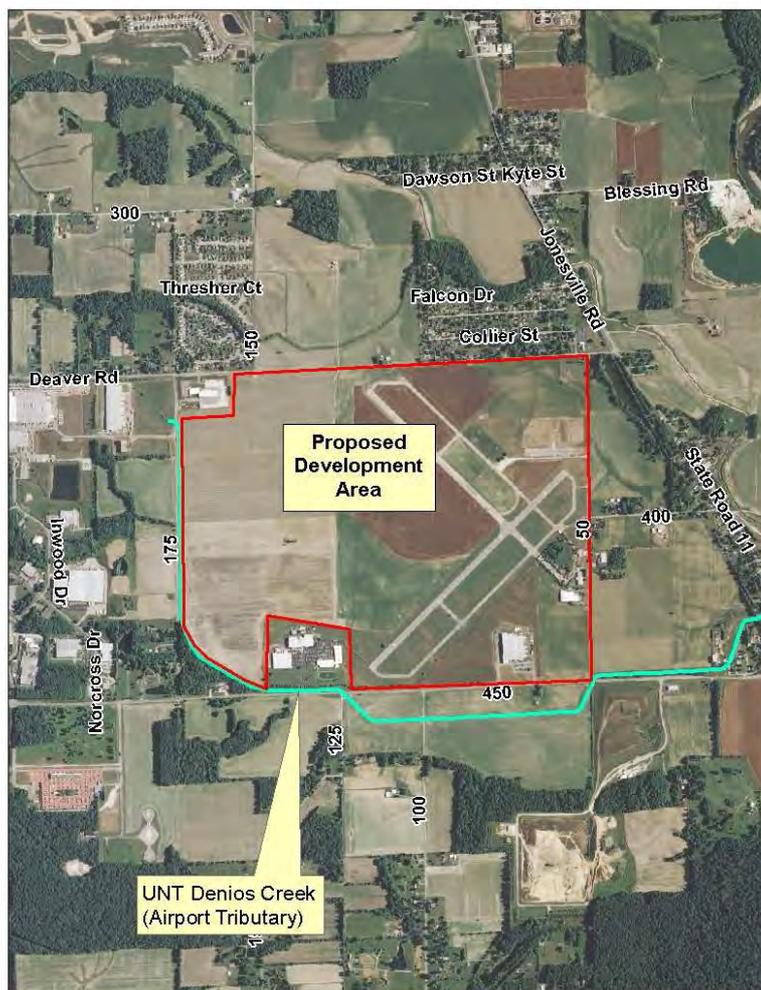


Figure 1-1 Site Location Map

CHAPTER 2**BACKGROUND AND A DESCRIPTION OF THE ISSUE****2.1 BACKGROUND**

Christopher B. Burke Engineering, LLC (CBBEL) previously completed a detailed hydrologic and hydraulic analysis to support a Redevelopment Commission appeal of the proposed Preliminary FEMA FIS. Unfortunately, although the analyses showed some revisions are appropriate, nearly all of the former airport property would remain within the Special Flood Hazard Area (SFHA) shown on Flood Insurance Rate Maps.

2.2 THE ISSUE

The main issue is that the site is shown on the preliminary FEMA map as a SFHA. In order to develop the site, large quantities of fill would be required to meet the requirements for building elevations in a SFHA.

The FEMA-designated flood elevations across the site are higher than what would actually be expected to occur because they were assumed to be the same as the flood elevations within the ditch. This assumption is used for most SFHA delineations because it is appropriate in most riverine flood situations. It does not, however, represent true flood risk for the topography along this ditch. One alternative for reducing the delineated SFHA and potentially increasing developable area would be revising the floodplain analysis through the use of more complex modeling methodologies to more accurately determine flood elevations. Calculating more accurate flood elevations across the property would require the following actions:

1. Determination of the volume of flow leaving the ditch during the 10, 50, 100 and 500-year flood events,
2. Creation of a hydraulic model across the property to calculate flood elevations for each event, and
3. Coordination with IDNR and FEMA staff to determine an acceptable process for mapping the revised flood hazard area and ensuring future development would not impact the flood elevations.

Although this additional analysis would result in lower flood elevations across the airport property, such a revision would likely result in much of the area being designated as a floodway which would mean additional restrictions for development. The IDNR and FEMA would likely consider the “overflow” route a flood conveyance path whose capacity would need to be protected to prevent flood elevation increases due to development.

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Indiana State Plane East Zone (FIPS zone 1301). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the 2005 Indiana Orthophotography (IndianaMap Framework Data www.indianamap.org). This information was photogrammetrically compiled at a scale of 1:2400 from aerial photography dated spring 2005.

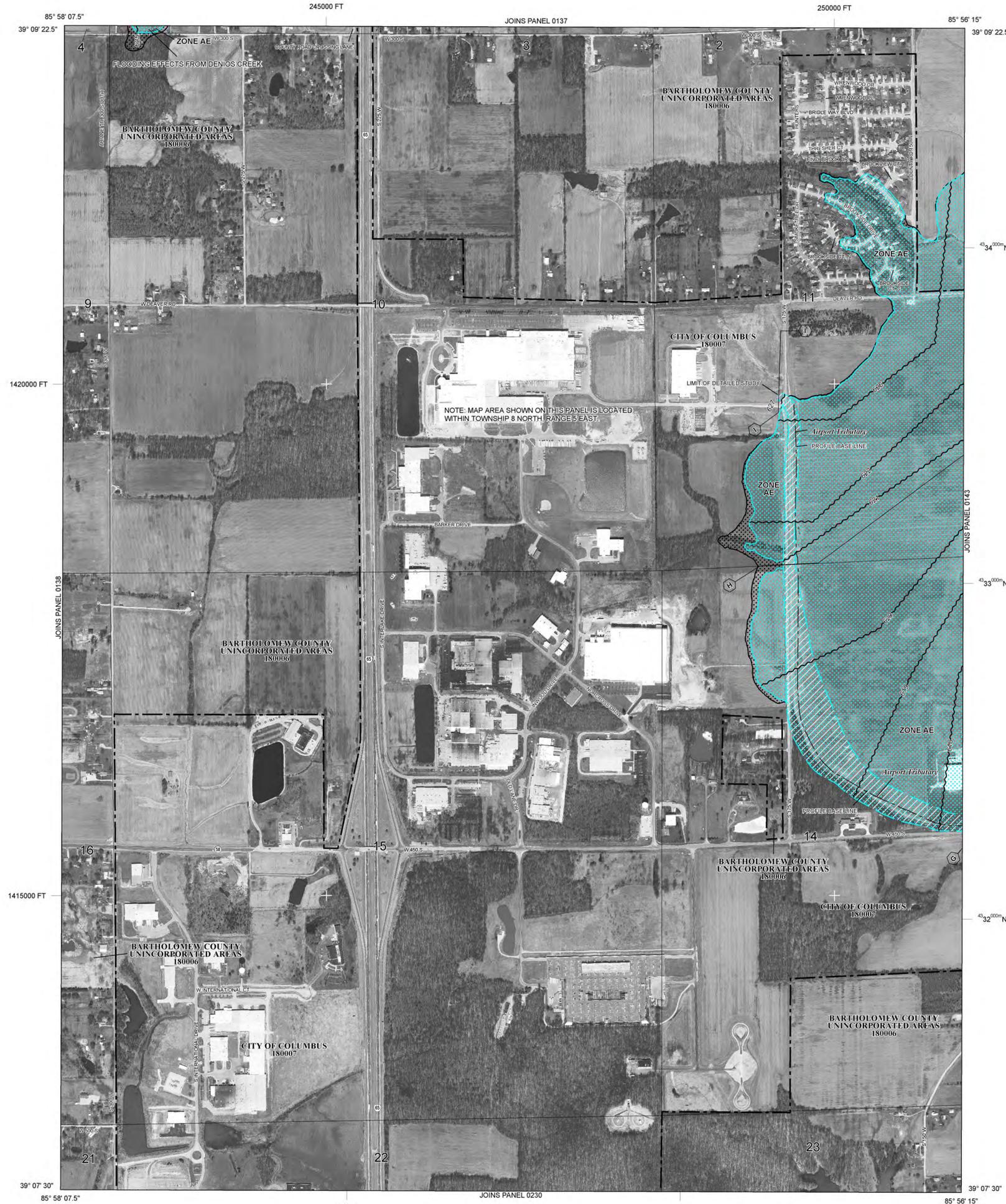
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/infp>.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently described. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
- OTHERWISE PROTECTED AREAS (OPAs)
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
(EL 987)
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- 45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT 5000-foot ticks: Indiana State Plane East Zone (FIPS Zone 1301), Transverse Mercator projection
- 1000-meter Universal Transverse Mercator grid values, zone 16
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile
- MAP REPOSITORIES
Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-435-6500.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0139E

FIRM
FLOOD INSURANCE RATE MAP
BARTHOLEMEW COUNTY,
INDIANA
AND INCORPORATED AREAS

PANEL 139 OF 275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BARTHOLEMEW COUNTY	180006	0139	E
COLUMBUS, CITY OF	180007	0139	E

PRELIMINARY

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
18005C0139E
EFFECTIVE DATE

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Indiana State Plane East Zone (FIPS zone 1301). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSM-C-3 #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from the 2005 Indiana Orthophotography (IndianaMap Framework Data www.indianamap.org). This information was photogrammetrically compiled at a scale of 1:2400 from aerial photography dated spring 2005.

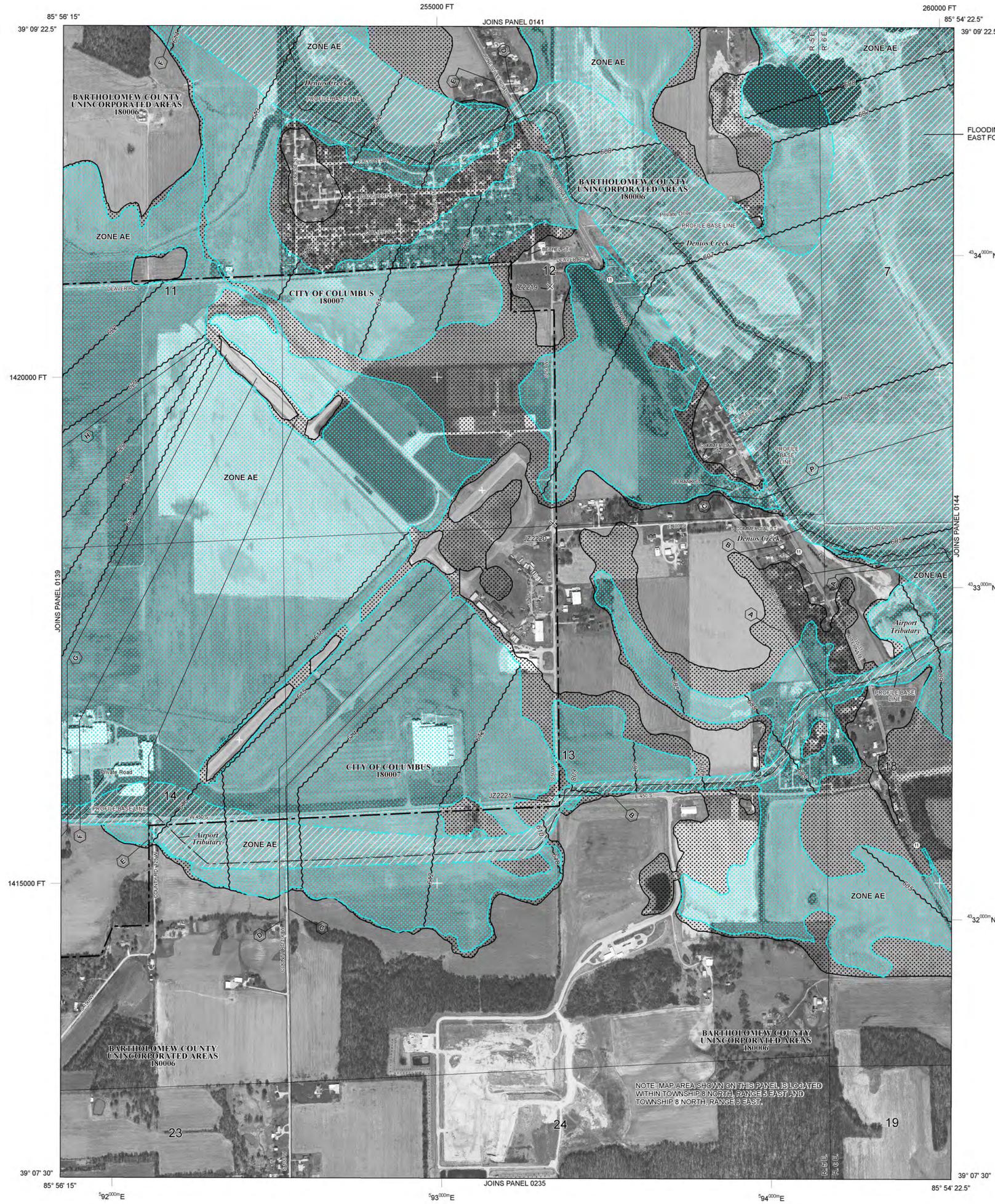
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEWA Map Information eXchange (FMIX)** at 1-877-FEWA-MAP (1-877-336-2627) or visit the FEWA website at <http://www.fema.gov/business/infp>.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, AV, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently described. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE AV** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
- OTHERWISE PROTECTED AREAS (OPAs)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
(EL 987)
Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- 45° 02' 08", 93° 02' 12" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
- 3100000 FT 5000-foot ticks: Indiana State Plane East Zone (FIPS Zone 1301), Transverse Mercator projection
- 1000-meter Universal Transverse Mercator grid values, zone 16
- Bench mark (see explanation in Notes to Users section of this FIRM panel)
- River Mile
- MAP REPOSITORIES
Refer to Map Repositories list on Map Index
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
- EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-435-6500.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0143E

FIRM
FLOOD INSURANCE RATE MAP
BARTHOLOMEW COUNTY,
INDIANA
AND INCORPORATED AREAS

PANEL 143 OF 275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

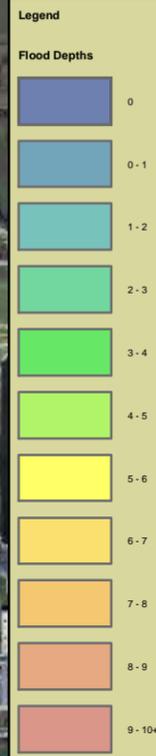
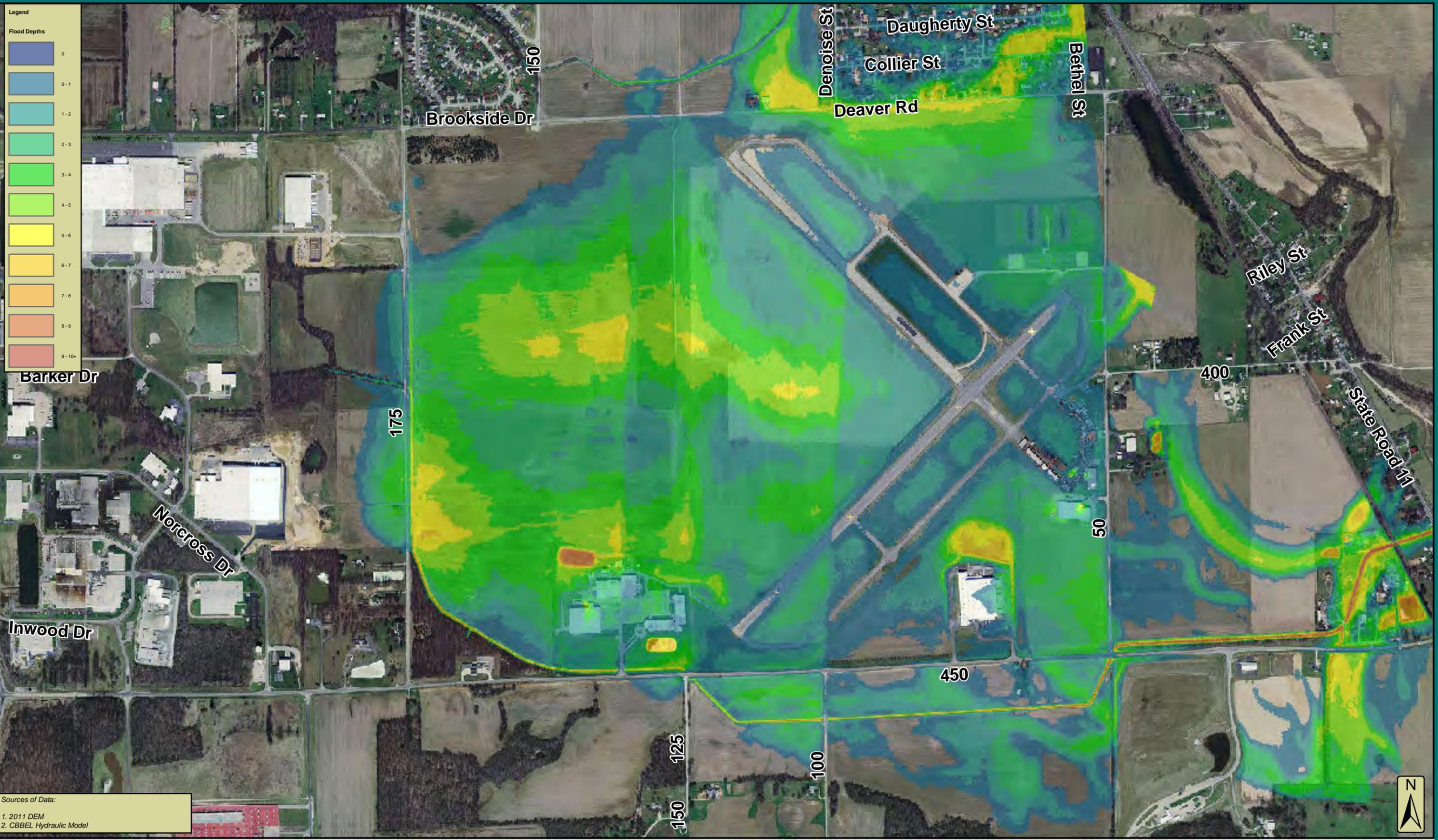
COMMUNITY	NUMBER	PANEL	SUFFIX
BARTHOLOMEW COUNTY	180006	0143	E
COLUMBUS, CITY OF	180007	0143	E

PRELIMINARY

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 18005C0143E
EFFECTIVE DATE

Federal Emergency Management Agency



Sources of Data:

1. 2011 DEM
2. CBBEL Hydraulic Model



 Christopher B. Burke Engineering, Ltd. PNC Center, Suite 1368 South 115 West Washington Street Indianapolis, Indiana 46204 (t) 317.266.8000 (f) 317.632.3306	PROJECT: UNT Denios Creek FIS Challenge	PROJECT NO. 11-264	APPROX. SCALE 1" = 833'
	TITLE: Flood Depth Map	DATE: 07/2012	EXHIBIT X

Proposed Revisions to Preliminary FIS - Airport Tributary CBBEL 11-264 BG1, August 8, 2012

-  Proposed Floodway
-  Proposed 100-yr Floodplain

Preliminary FIS

FLD_ZONE, FLOODWAY

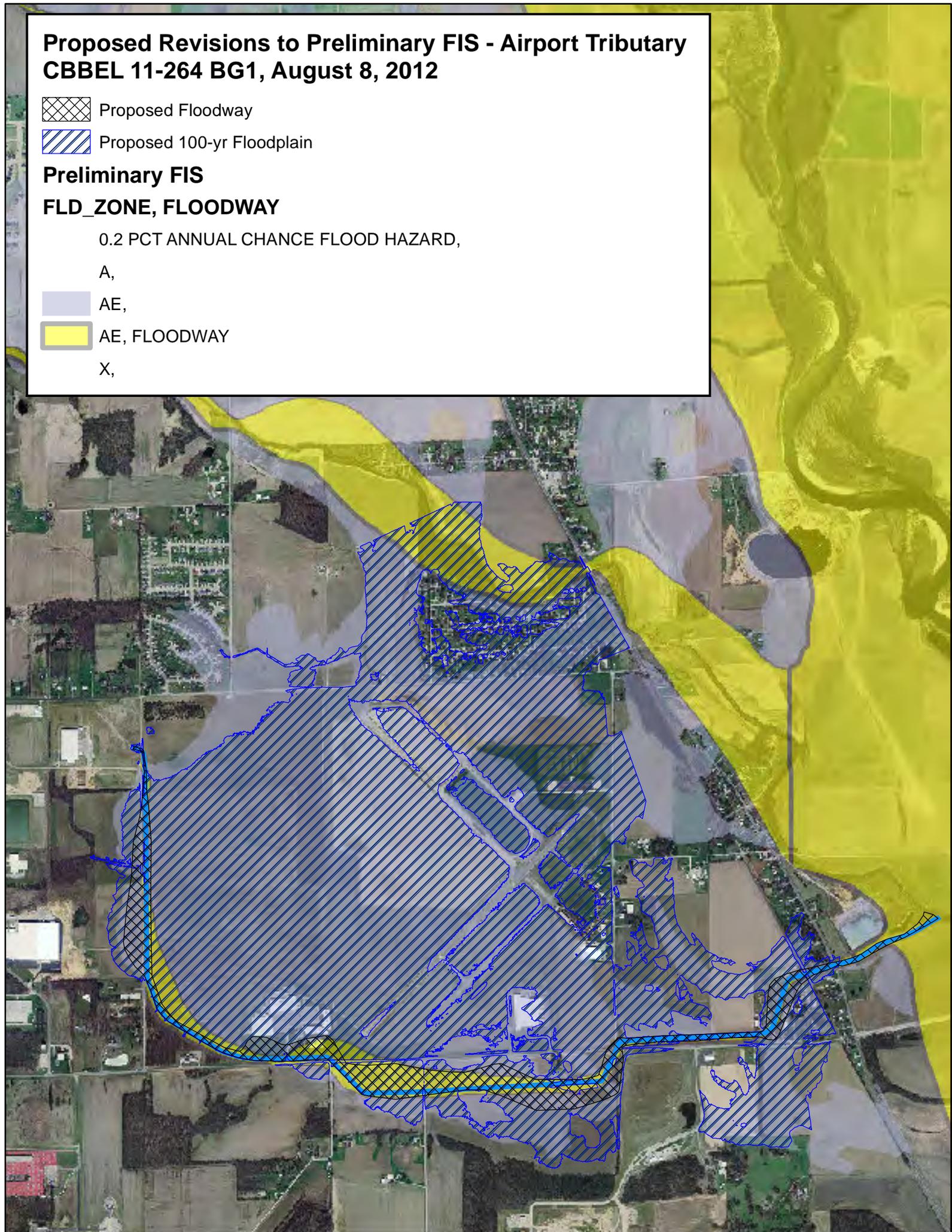
0.2 PCT ANNUAL CHANCE FLOOD HAZARD,

A,

 AE,

 AE, FLOODWAY

X,



CHAPTER 3

EVALUATION OF ALTERNATIVES

3.1 ALTERNATIVE 1 – DIVERSION CHANNEL

The first alternative is a diversion channel that would carry the flow north to the existing ditch located north of Deaver Road as shown in **Figure 3-1**. Although this alternative would appear to have merit based on the existing terrain, such a diversion would impact an existing neighborhood to the north and would also cut across the proposed mixed use commercial area in the northwest corner of the property. Consequently, this alternative was not evaluated further.

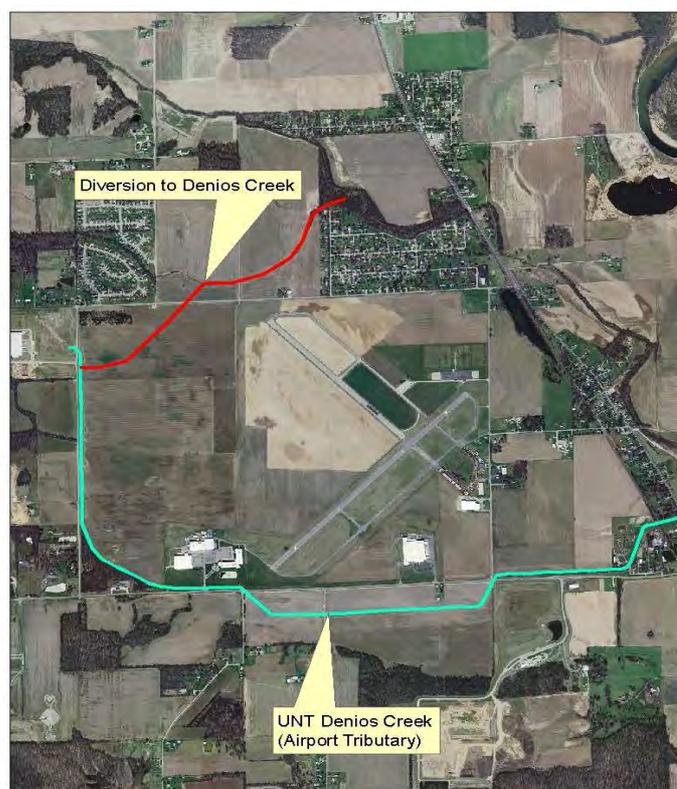


Figure 3-1 Diversion Channel

3.2 ALTERNATIVE 2 – OVERFLOW CHANNEL

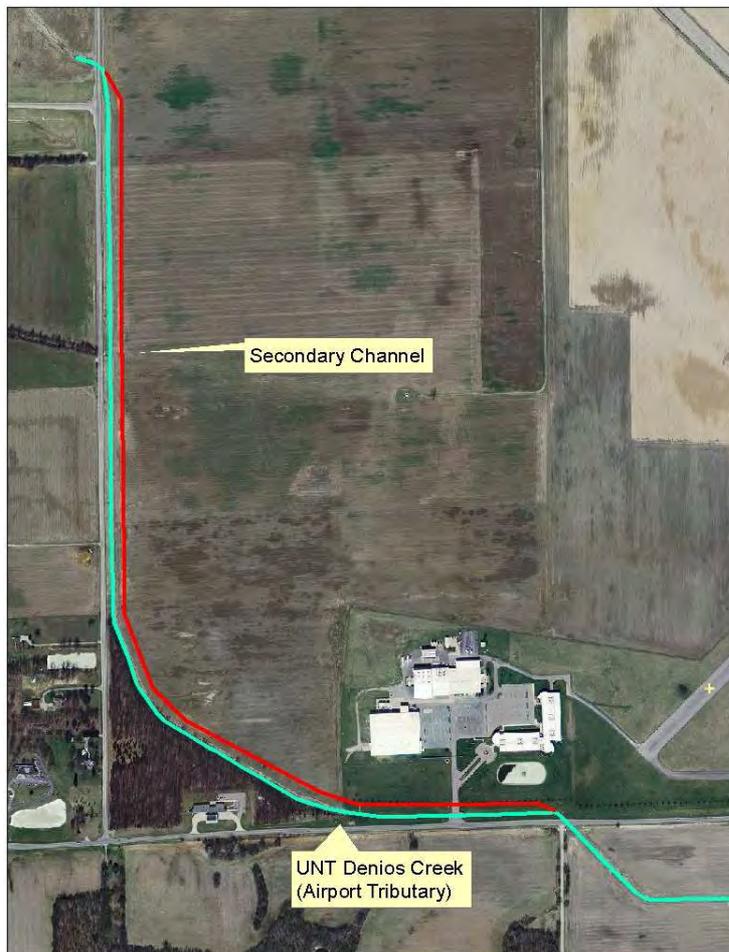


Figure 3-2 Secondary Channel

The second alternative is the construction of a secondary, lower channel parallel to the existing channel that would provide additional flow capacity. The assumed alignment is shown in **Figure 3-2**.

Although this alternative could reduce flood elevations, no reasonable size and configuration was found that would provide enough capacity to remove the Special Flood Hazard Area designation from the airport property. Therefore, this alternative was not evaluated further.

3.3 ALTERNATIVE 3 – CULVERT AND BRIDGE REPLACEMENTS

This alternative would replace the existing culverts and bridges along the ditch to increase their flow capacity as needed to prevent backwater and therefore reduce the upstream flood elevations. The analysis showed that larger crossings would not reduce upstream flood elevations sufficiently to appreciably reduce the SFHA across the airport property. Therefore, this alternative was not evaluated further.

3.4 ALTERNATIVE 4 – FLOODWALL / LEVEE

This alternative is a floodwall or levee that would prevent flood waters from leaving the existing ditch area. No additional modeling was needed for this alternative since the floodwall/levee would be placed along the floodway line. Floodway extents are shown in **Exhibit 1**.

The assumed floodwall/levee alignment and extents are shown in **Figure 3-3**. This proposed structure would be approximately 9,600 feet long and approximately 6 feet tall to provide the freeboard required for levee/floodwall certification. Floodgates or other protection measures would be needed to fill in the openings at each road and driveway.

This alternative is estimated to cost approximately \$10 million for 100-year protection and \$14 million for 500-year protection. Since neither geotechnical analysis nor anything beyond a conceptual layout of the structure has been completed, the cost estimates are very approximate and likely to increase as more detailed information would be developed.

FEMA approval of floodplain revisions resulting from a floodwall/levee includes the requirement that the levee/floodwall be owned and maintained by a governmental entity. This means that the City of Columbus would be required to own and maintain this structure, something the City leaders would have to approve. Additionally, a levee/floodwall would likely result in adverse impacts (increased flood elevations) off-site. These adverse impacts should be carefully evaluated if this alternative is pursued further.



Figure 3-3 Floodwall / Levee

3.5 ALTERNATIVE 5 – BYPASS CHANNEL

This alternative would replace the existing ditch with a new channel through the southwest portion of the site (conceptual test track and parcels 11 and 12). The existing ditch would be backfilled. A proposed layout is shown in **Figure 3-4**.

This alternative could reduce 100-year flood depths on the property at the upstream end of the channel to about one foot. However, the flood elevations in the lower reach of the bypass channel would still be controlled by downstream water surface elevations and most of the airport property would still be shown in the SFHA.

This alternative is not recommended since most of the airport property would remain in the SFHA.



Figure 3-4 Bypass Channel

3.6 ALTERNATIVE 6 – DETENTION POND(S)

Analysis shows that the existing ditch can convey approximately 100 cfs without overtopping. Therefore, this alternative would provide one or more stormwater detention ponds that would reduce peak flow rates from the 100-year or 500-year events to a maximum of 100 cfs. The assumption is that the ponds would be adjacent to the ditch as shown below in **Figure 3-5**.

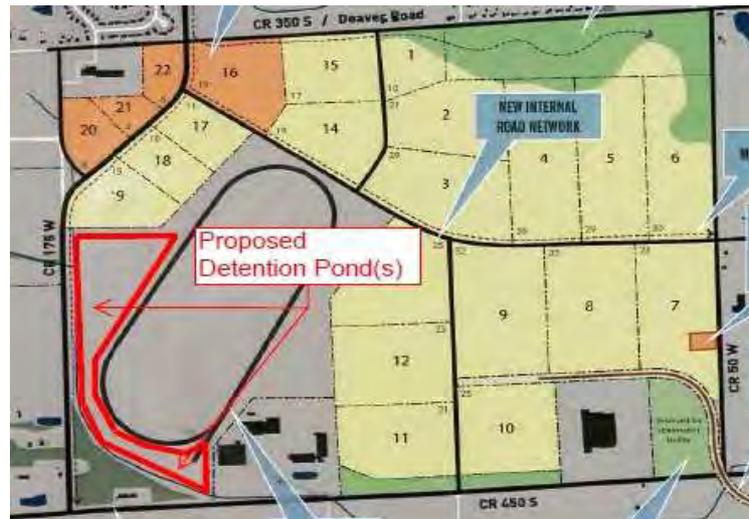


Figure 3-5 Detention Pond Locations

Preliminary modeling shows the total volume of storage required would be approximately 320 acre-feet for the 100-year event and 615 acre-feet for the 500-year event. The watershed delineation is shown in **Exhibit 2** with the area that would be partially diverted to the storage noted. The storage could be provided in two or more ponds, or one large pond, depending on the site constraints. The estimated planning-level cost for this alternative is \$4.8 million for 100-year protection and \$9.2 million for 500-year protection. In order to be accepted by IDNR and FEMA, the pond(s) would need to be approved by the IDNR as a flood control facility, requiring easements and commitment by the local government to maintain the function of the pond(s) in perpetuity. This alternative would remove the SFHA designation from most of the property.

3.7 ALTERNATIVE 7– DETENTION POND(S) WITH LARGER DITCH

This alternative would add a larger ditch with higher flow capacity to Alternative 7, reducing the required volume of flood storage. Preliminary analysis shows that the capacity of the existing ditch could be increased to 200 cfs without needing to enlarge the existing culvert crossings. For this alternative, it was assumed the ditch would be enlarged by adding a 50 foot wide “shelf” to create a 2-stage ditch. The approximate extents of the channel improvements are shown in **Figure 3-6** and a typical cross section of the proposed channel is shown in **Figure 3-7**. This increased ditch capacity would reduce the required storage volume to a total of approximately 170 acre-feet and 325 acre-feet for the 100-year and 500-year storm events, respectively. The corresponding estimated construction costs would be approximately \$2.6 million and \$4.9 million, plus approximately \$150,000 for the ditch excavation. Similar to Alternative 6, the pond(s) and the widened channel would need to be approved by the IDNR as flood control

facilities and maintained in perpetuity by the City or other governmental entity. This alternative would remove the SFHA designation from most of the property.

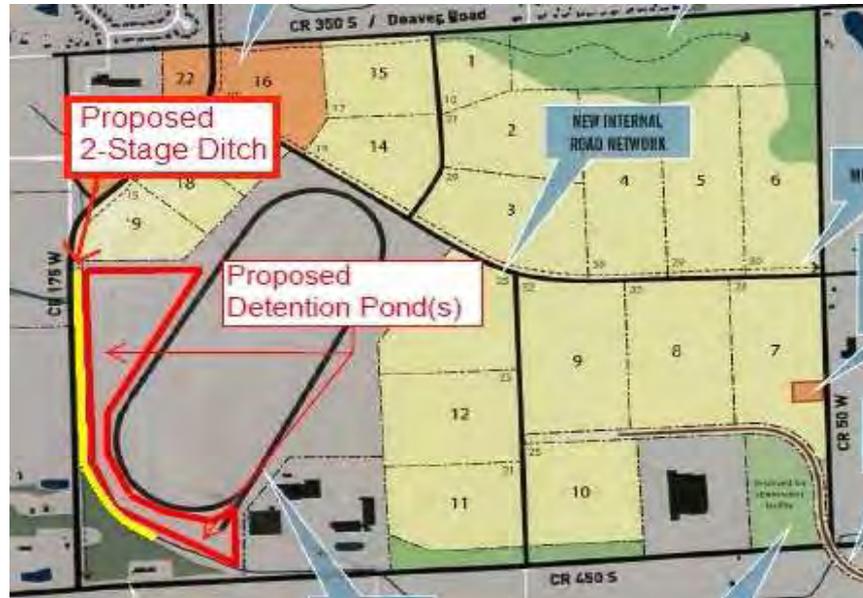


Figure 3-6 Detention Pond Locations with Proposed Channel Improvements

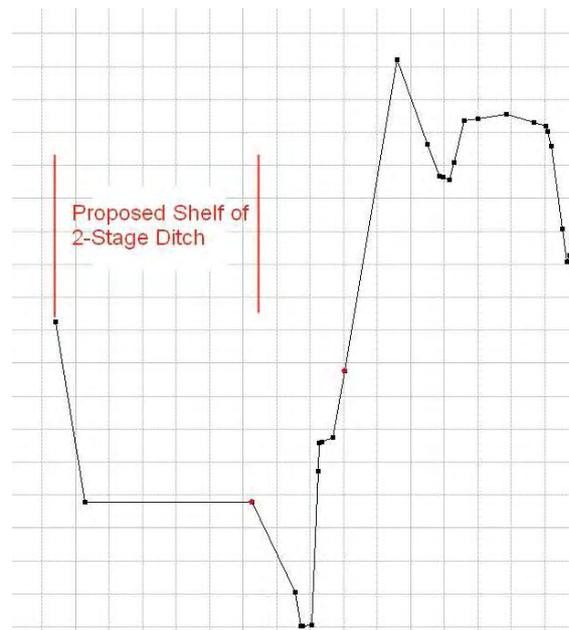
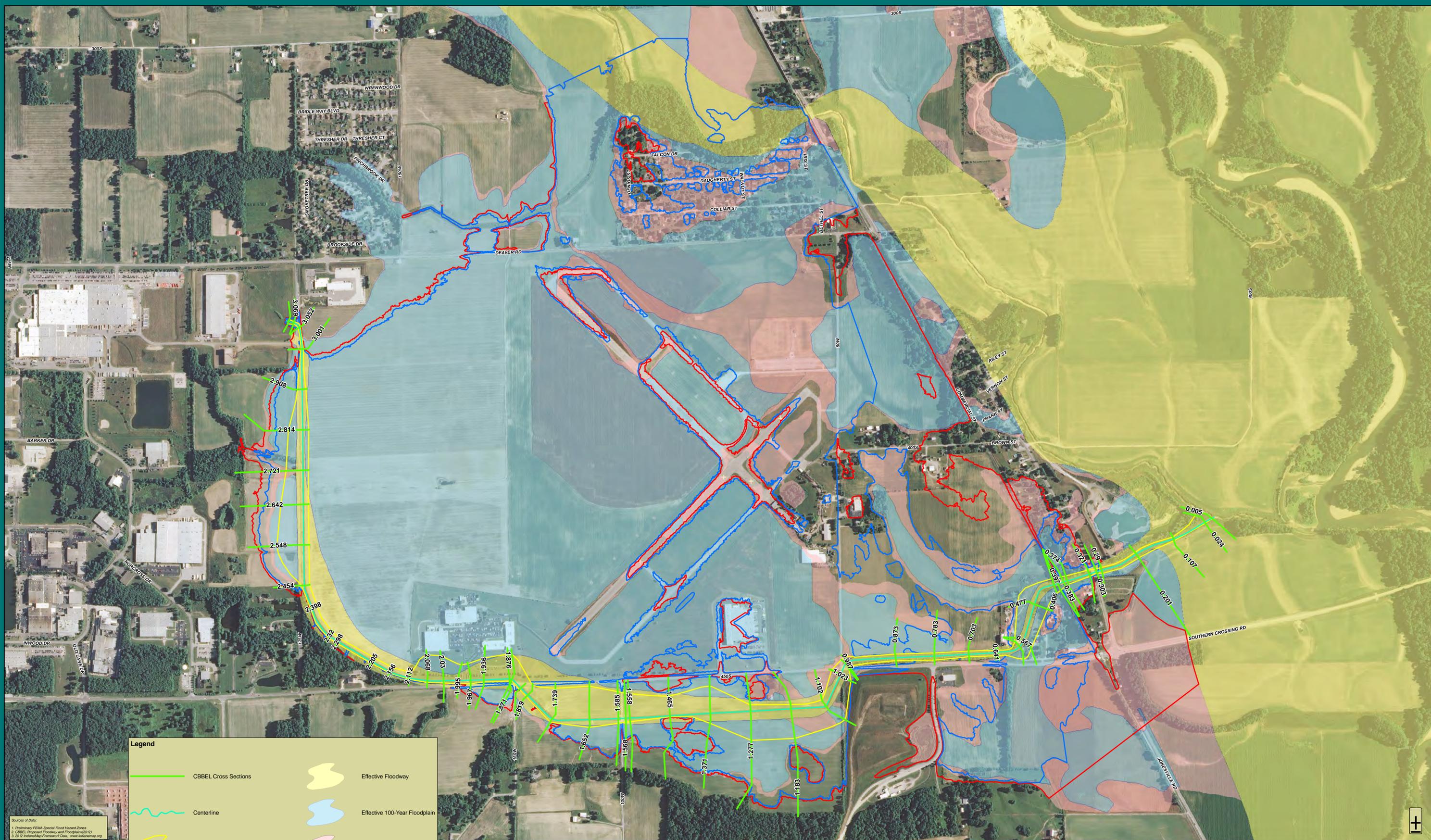


Figure 3-7 Typical 2-Stage Ditch Cross Section

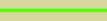
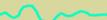
CHAPTER 4**RECOMMENDATIONS**

Of the alternatives investigated, two could allow removal of the Special Flood Hazard Area designation from most of the airport property. Alternative 4 (levee/floodwall) and Alternative 6 or 7 (detention pond(s) either alone or with larger ditch) would accomplish the objective. Of these alternatives, Alternative 7 may have the most merit since it would not cause adverse impacts on off-site properties and its estimated construction cost is significantly less than the other alternatives. Additionally, the excavated materials could likely be used to fill low areas on the site which would offset at least some of the construction cost. However, the Columbus Redevelopment Commission should evaluate the various alternatives to determine which, if any, would best meet their needs.



Sources of Data:
 1. Preliminary FEMA Special Flood Hazard Zones
 2. CBEL Proposed Floodway and Floodplains (2012)
 3. 2012 IndianaMap Framework Data, www.indianamap.org

Legend

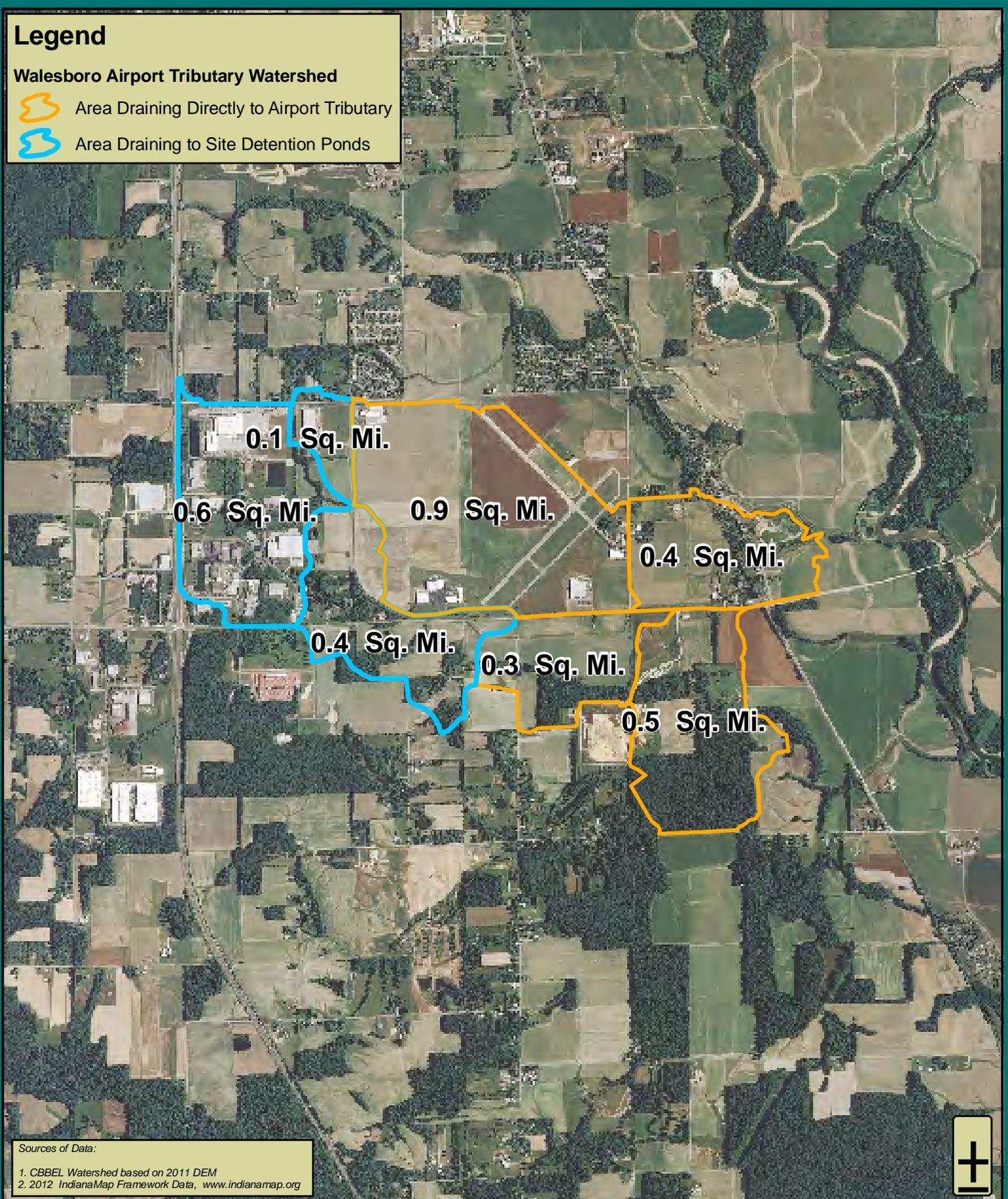
	CBEL Cross Sections		Effective Floodway
	Centerline		Effective 100-Year Floodplain
	CBEL Proposed Floodway		Effective 500-Year Floodplain
	CBEL Proposed 100-Year Floodplain		Effective Zone A Floodplain
	CBEL Proposed 500-Year Floodplain		



Legend

Walesboro Airport Tributary Watershed

-  Area Draining Directly to Airport Tributary
-  Area Draining to Site Detention Ponds



Sources of Data:
 1. CBBEL Watershed based on 2011 DEM
 2. 2012 IndianaMap Framework Data, www.indianamap.org



Christopher B. Burke Engineering, LLC
 PNC Center, Suite 1368 South
 115 West Washington Street
 Indianapolis, Indiana 46204
 (t) 317.266.8000 (f) 317.632.3306

PROJECT:
**Walesboro Airport Tributary Flood
 Reduction Alternatives Study**

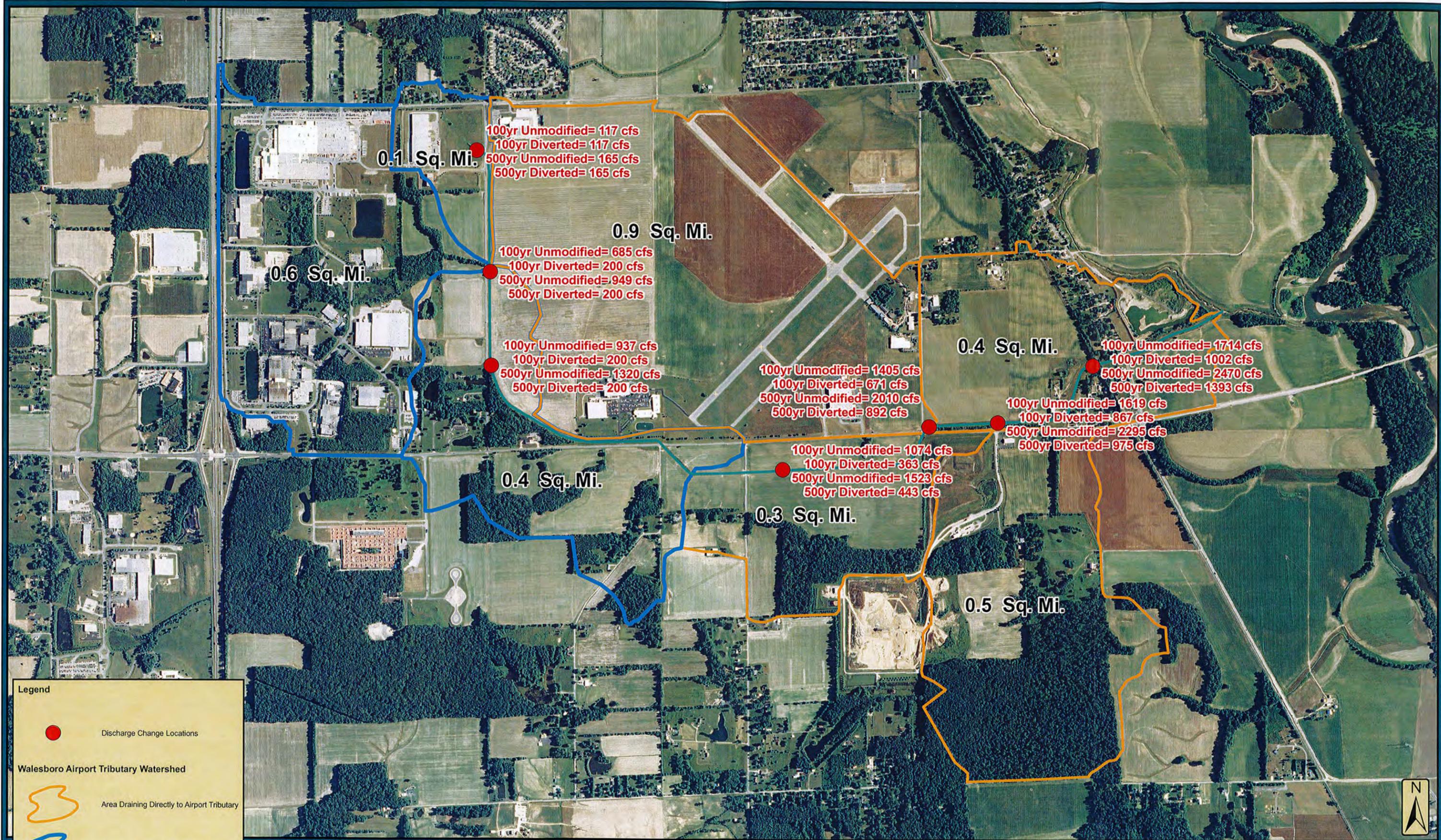
TITLE:
Watershed Map

PROJECT NO.
11-264

APPROX. SCALE
1" = 3,000'

DATE: **02/2013**

EXHIBIT **2**



Legend

- Discharge Change Locations
- ▭ Area Draining Directly to Airport Tributary
- ▭ Area Draining to Site Detention Ponds
- Centerline



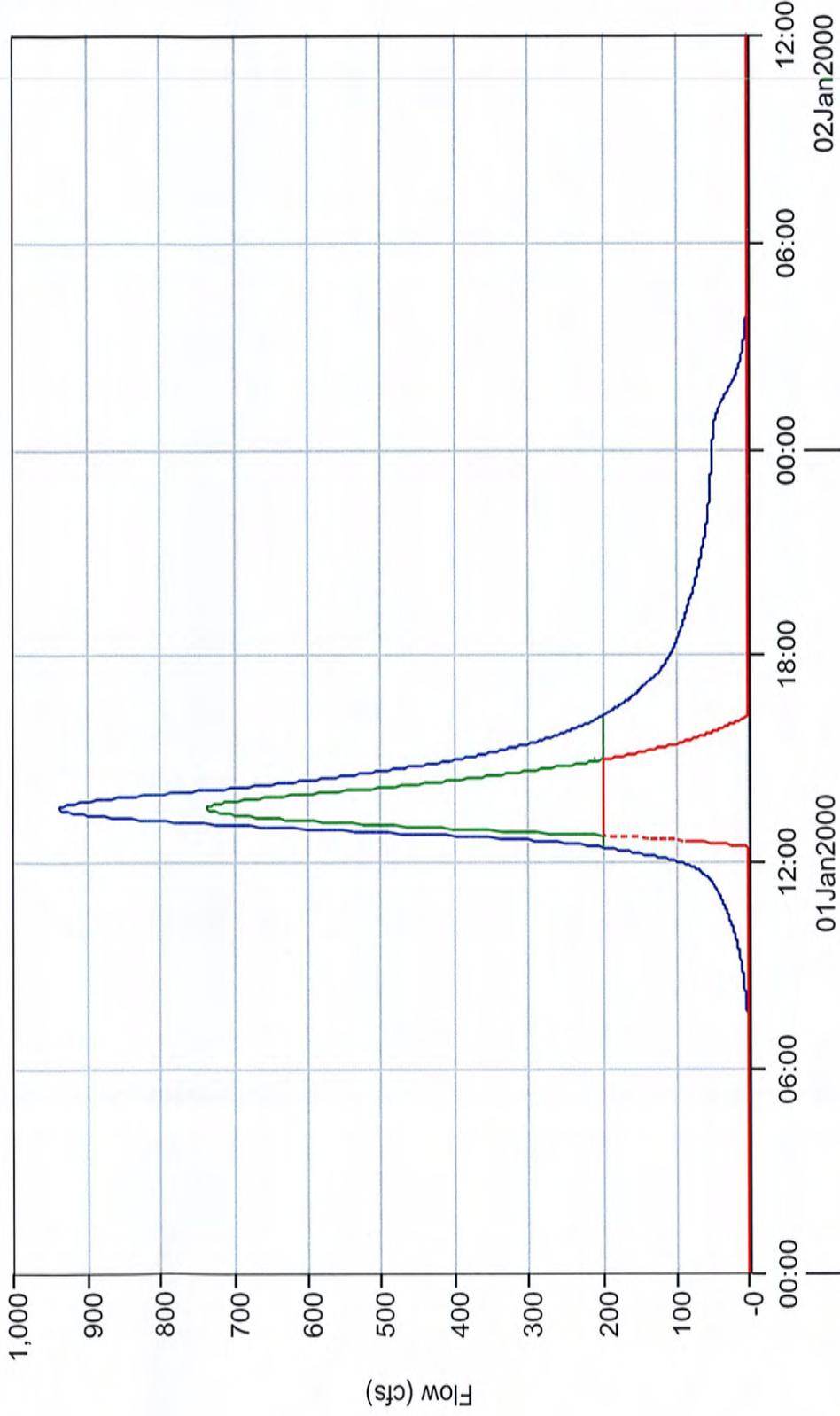
Christopher B. Burke Engineering, Ltd.
 PNC Center, Suite 1368 South
 115 West Washington Street
 Indianapolis, Indiana 46204
 (t) 317.266.8000 (f) 317.632.3306

PROJECT: Walesboro Airport Tributary
 Flood Reduction Alternatives Study
TITLE: Discharge Change Locations

PROJECT NO. 11-264	APPROX. SCALE
DATE: 02/2013	EXHIBIT X

100-year Flood Scenario

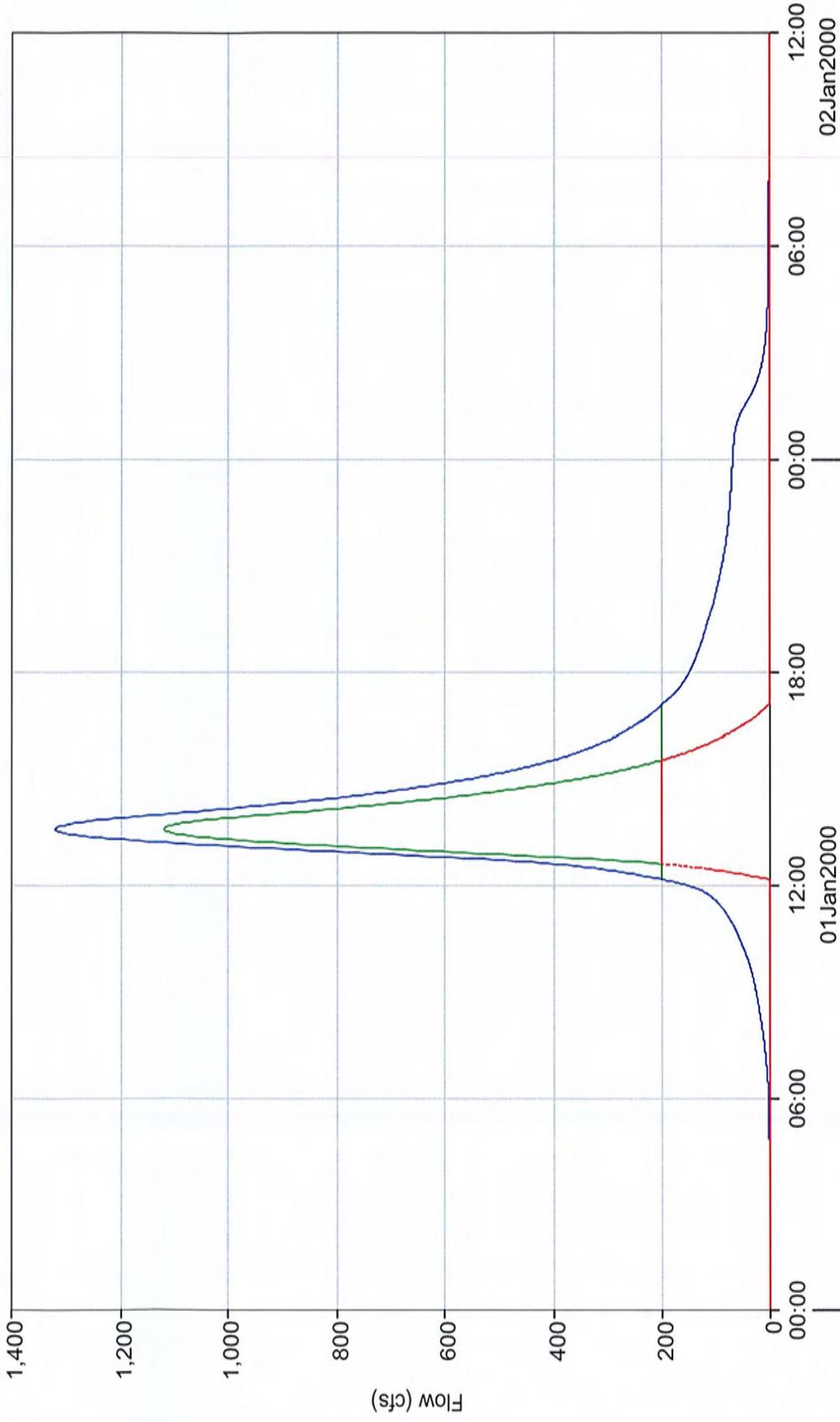
Diversion "Diversion-2" Results for Run "100yr 200cfs diver"



- Run:100YR 200CFS DIVER Element:DIVERSION-2 Result:Outflow (Difference between total flow and channel flow)
- Run:100YR 200CFS DIVER Element:DIVERSION-2 Result:Combined Flow (Total flow)
- - - Run:100YR 200CFS DIVER Element:DIVERSION-2 Result:Diverted Flow (Flow in the channel)

500-year Flood Scenario

Diversion "Diversion-2" Results for Run "500yr diversion"



- Run:500yr diversion Element:DIVERSION-2 Result:Outflow (Difference between total flow and channel flow)
- - - Run:500YR DIVERSION Element:DIVERSION-2 Result:Combined Flow (Total flow)
- · · Run:500yr diversion Element:DIVERSION-2 Result:Diverted Flow (Flow in the channel)