SSO 700 IWAP
Task 2.4 Inventory and Gap Analysis

PREPARED FOR:	Andrew Spurgeon, MSDGC
PREPARED BY:	CH2M HILL
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Section 1.0 - Introduction

A number of background datasets were sought and collected for the purpose of delineating and characterizing the SSO 700 Integrated Watershed Action Plan (IWAP) study area and its associated stream network, supporting water quality and hydraulic modeling, and informing future identification of infrastructure solutions. Data targets were summarized in the Data Request Technical Memo, last updated on December 12, 2014. Several datasets were collected through Metropolitan Sewer District of Greater Cincinnati (MSDGC), while others were available from other data sources, such as the United States Geologic Survey (USGS), and United States Department of Agriculture (USDA). The purpose of this technical memorandum is to summarize and analyze the collected data, to identify gaps in the data that impact the development of the SSO 700 IWAP, and to recommend a plan to fill the data gaps.

Section 2.0 - Project Boundary

The SSO 700 IWAP study area boundary was refined utilizing the data received from MSDGC and USGS. The study area was conceptually defined as the sewershed and watershed bound at the downstream end by the West Galbraith Road crossing of Mill Creek and bound at the upstream end by the Hamilton County/Butler County line. While Mill Creek receives flow from Butler County and a small portion of Warren County, the SSO 700 IWAP will only focus on the tributary area within Hamilton County. The conceptual study area was further refined as described below via an independent evaluation of the MSDGC East Branch Mill Creek (EBMC) sewershed and the Hamilton County portion of the watershed tributary to Mill Creek within the East Branch Mill Creek Basin.

Sewershed Boundary

The sewershed boundary for the SSO 700 IWAP represents the area contributing flow to MSDGC's collection system within the East Branch Mill Creek Basin. The foundation for the sewershed boundary is the East Branch Mill Creek sewershed boundary from the CAGIS shapefile (Original Shapefile from MSDGC: Watershed.shp). This sewershed boundary delineation was reviewed for accuracy primarily using the MSDGC sewers shapefile (msdsewer.shp) and the Mill Creek System-Wide Model catchments shapefile (swm_catchments.shp), along with topographic feature data, such as buildings and roads. Minor refinements were made throughout the sewershed boundary in response to this evaluation; however, the primary modifications to the sewershed boundary were the following: (1) removal of Glendale from the sewershed and (2) adjustment of the boundary near the I-71/I-275 interchange to omit sewers directed to the Polk Run Wastewater Treatment Plant or to Butler County. Glendale owns and maintains its own wastewater treatment plant and therefore does not contribute to MSDGC's collection system. See Figure 2.1 for a map of the refined East Branch Mill Creek sewershed boundary;

the shapefile, EBMC_Sewershed.shp, was previously provided to MSDGC as part of Task 2.1, Watershed Selection and Delineation.

Watershed Boundary

The watershed boundary for the SSO 700 IWAP project represents the drainage area contributing stormwater runoff to Mill Creek within MSDGC's East Branch Mill Creek Basin in Hamilton County. The foundation for the watershed boundary for this project is the set of USGS 12-digit hydrologic unit boundaries: Sharon Creek-Mill Creek and East Fork-Mill Creek. See Figure 2.2 for a map of these 12-digit hydrologic unit codes (HUCs). The watershed boundary was reviewed for accuracy using the available storm sewer data and contour data from the Cincinnati Area Geographic Information System (CAGIS). The watershed boundary was clipped at the Hamilton County limits; however, it was also refined to omit any drainage area that generates runoff that flows northward into Butler County. See Figure 2.3 for a map of the refined watershed boundary; the shapefile, EBMC_Watershed.shp, was previously provided to MSDGC as part of Task 2.1, Watershed Selection and Delineation.

SSO 700 Study Area Boundary

While the sewershed boundary and the watershed boundary primarily overlap, their limits do not match. Therefore, the SSO 700 IWAP study area boundary is established as the outer limits of the combination of the sewershed boundary and the watershed boundary. See Figure 2.4 for a map of the SSO 700 IWAP study area boundary. The SSO 700 IWAP study area is approximately 35 square miles and comprises approximately 12% of MSDGC's service area.

FIGURE 2.1
Sewershed Boundary Map

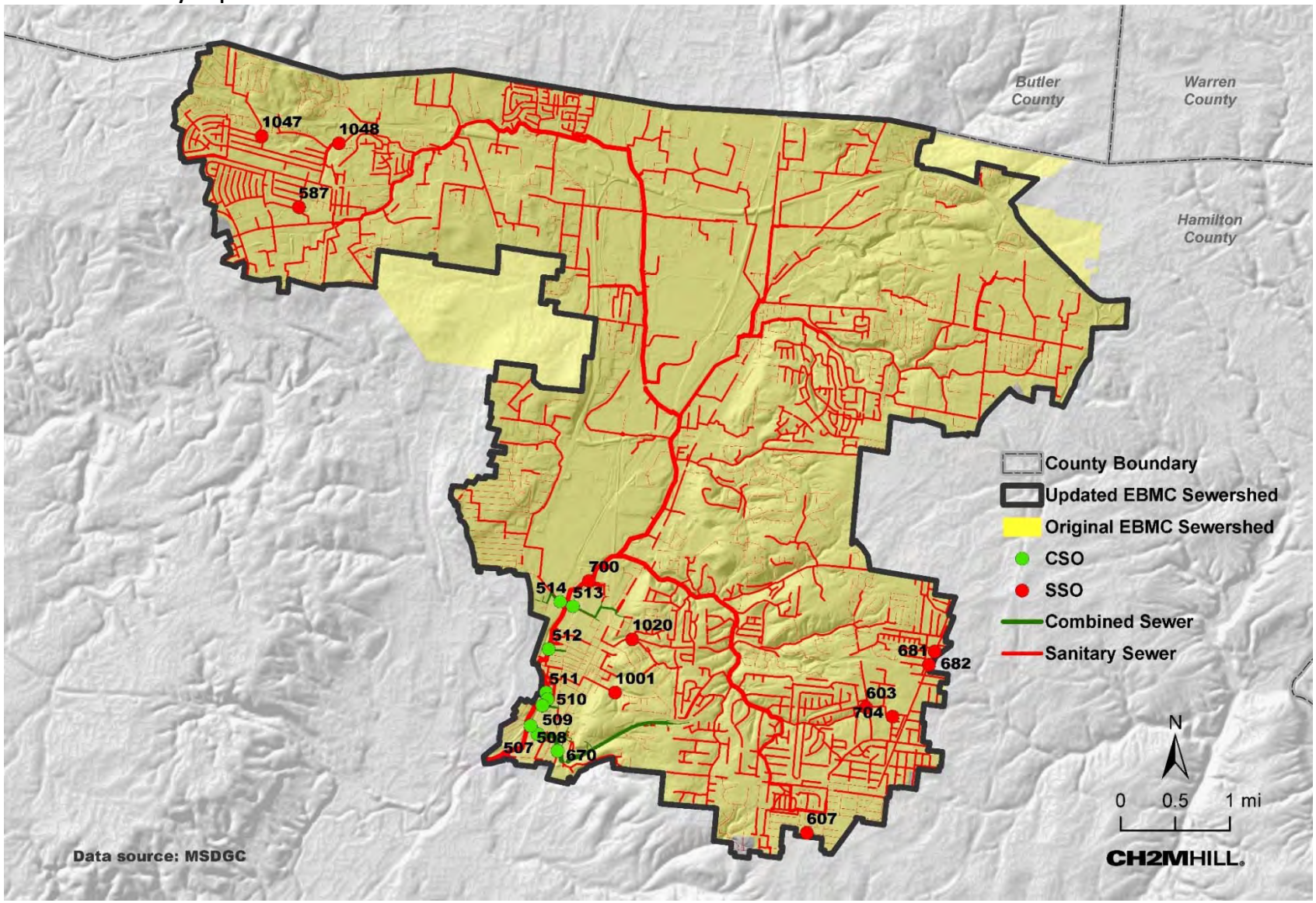


FIGURE 2.2
USGS HUC-12 Map

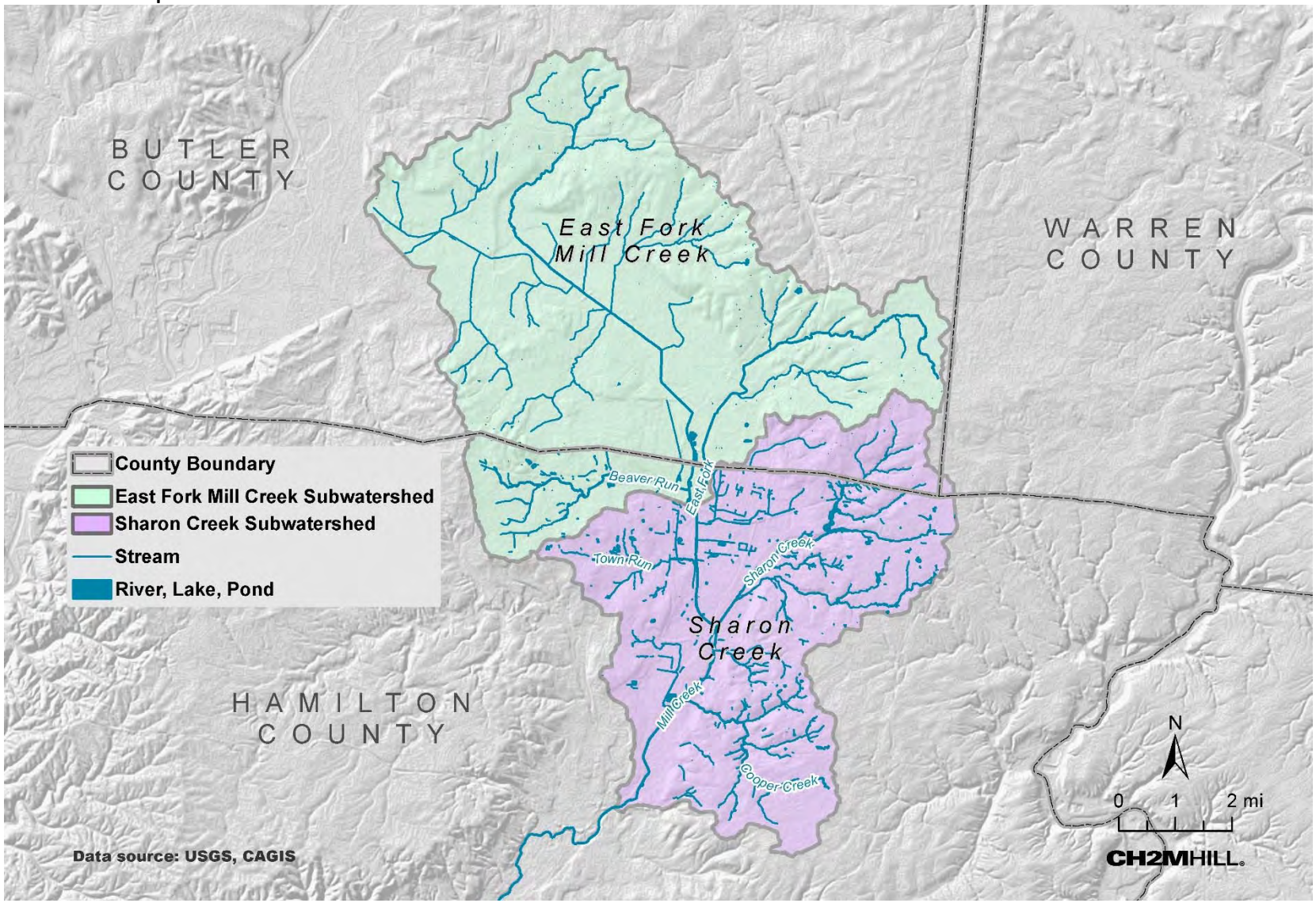


FIGURE 2.3
Watershed Boundary Map

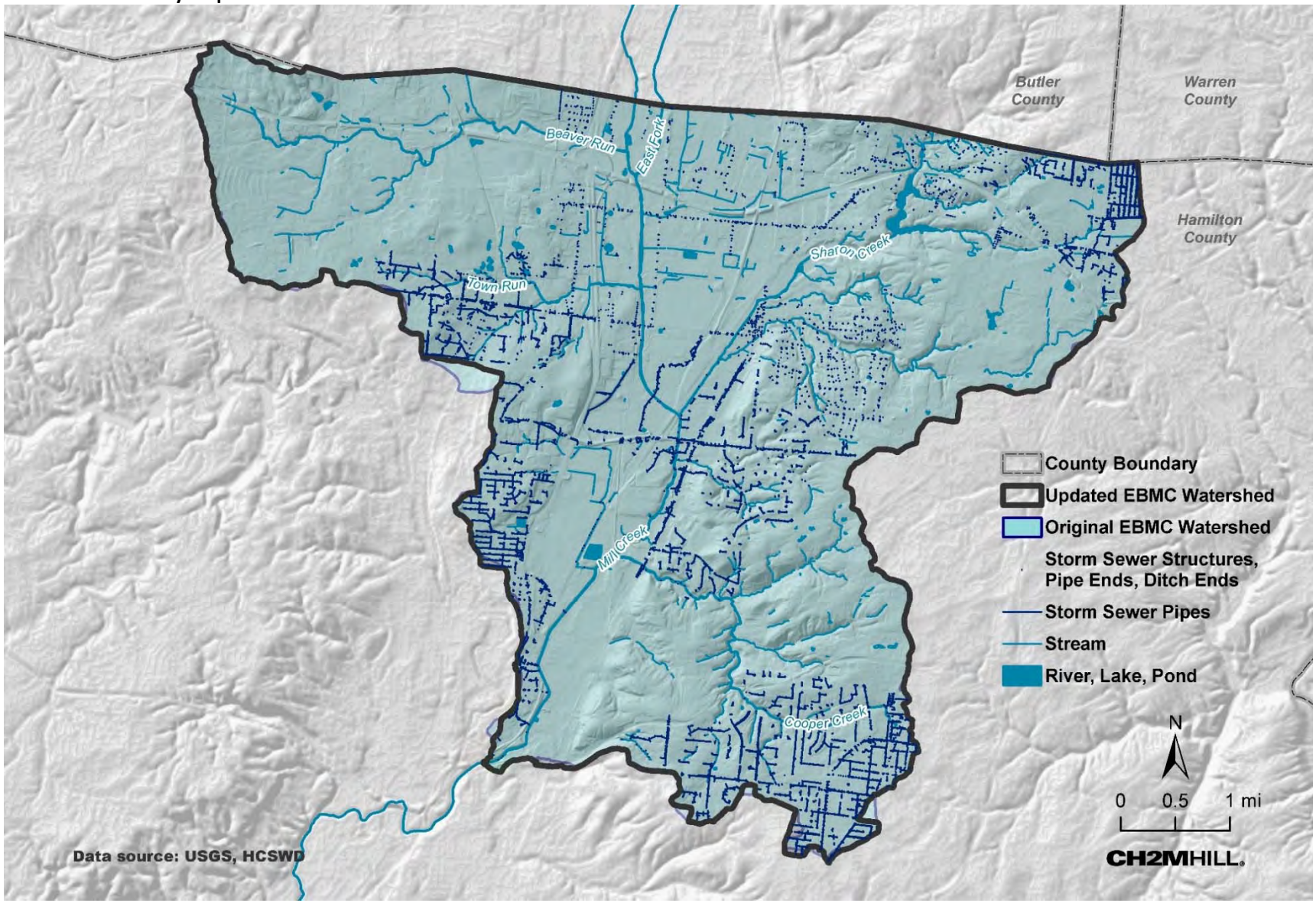
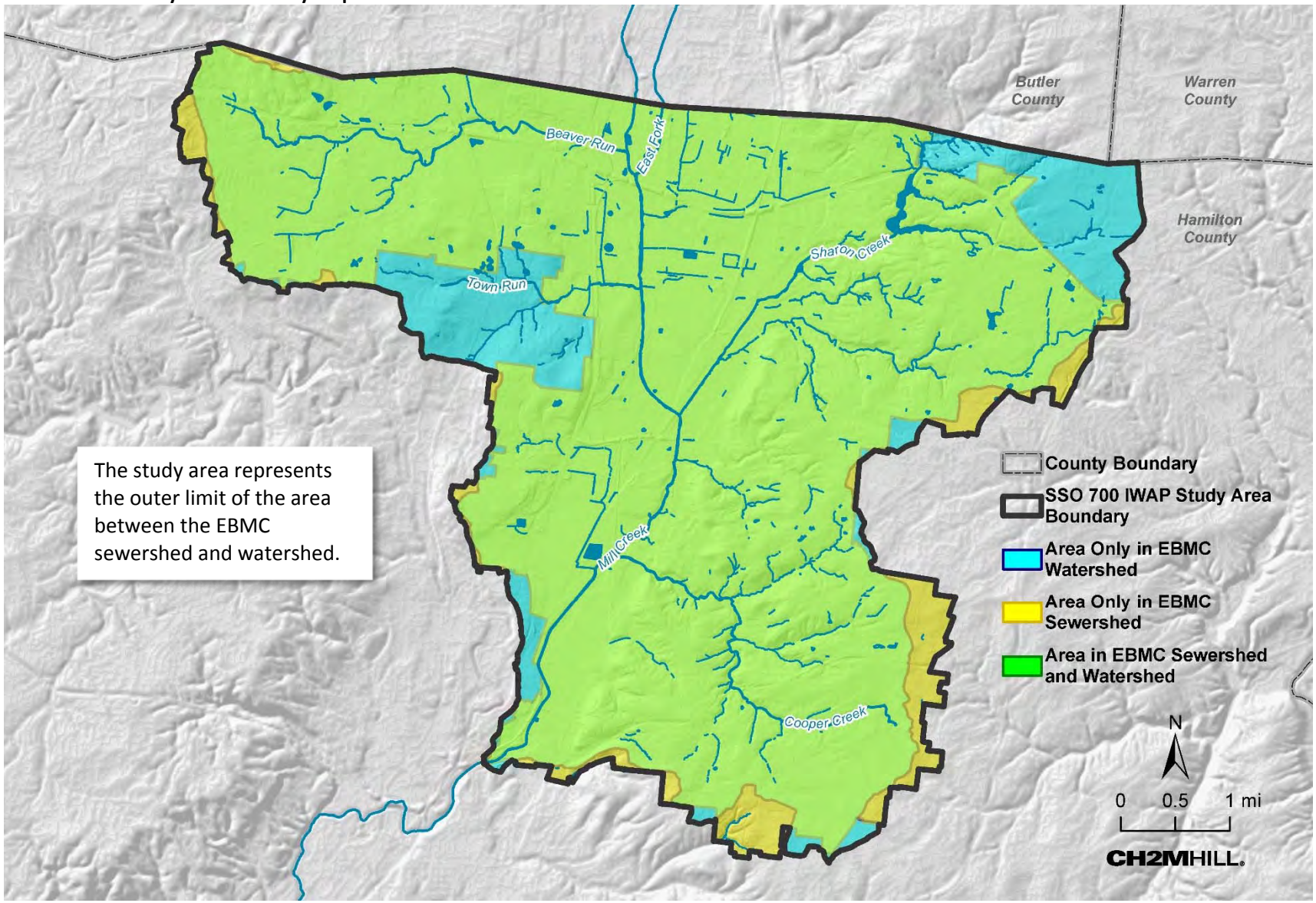


FIGURE 2.4
SSO 700 IWAP Study Area Boundary Map



Section 3.0 – Data Inventory

Under this section, the data collected to support the SSO 700 IWAP are summarized and inventoried, and significant gaps in the data are identified and categorized as one of the following:

1. Pending: Data has been requested and is expected to be received.
2. Missing/Essential: Data does not exist or is unavailable, and gap must be filled.
3. Missing/Inessential: Data does not exist or is unavailable, but is not essential to the completion of the IWAP.

Recommendations will be provided in Section 4.0 with respect to how data gaps may be filled. Additional data may become available or be determined necessary during later phases of the IWAP study. These additional data will be managed and inventoried under the individual task that they support.

Requested data have been subdivided into several categories: natural systems, built systems, jurisdictional data, receiving water characteristics, potential pollutant sources, and hydraulic modeling resources. The subsections below summarize and analyze data collected and data gaps under each category.

Natural Systems

Natural systems are systems within the watershed that do not primarily result from human activities. Natural systems inventoried in this technical memorandum are the following:

- Slope and topography
- Soils
- Historic and existing hydrology
- Geology
- Land Cover

Figures 3.1 through 3.7 map these natural systems datasets and summarize their general characteristics relative to the SSO 700 IWAP. Table 3.1 summarizes key statistics extracted from the natural systems data within the study area. These datasets will be used to inform both the hydraulic and water quality modeling components of the SSO 700 IWAP, and they will also be used by future IWAP tasks to identify potential infrastructure solutions that utilize natural hydrologic processes, such as infiltration, and avoid impacting sensitive features, such as steep slopes.

TABLE 3.1
Summary of Key Natural System Data

Parameter	Statistic
Total Study Area	35 Square Miles
Total Length of Historic Streams	271 Miles
Total Length of Existing Streams	64 Miles
Total Area of Existing Wetlands	193 Acres

FIGURE 3.1
Topography and Slope

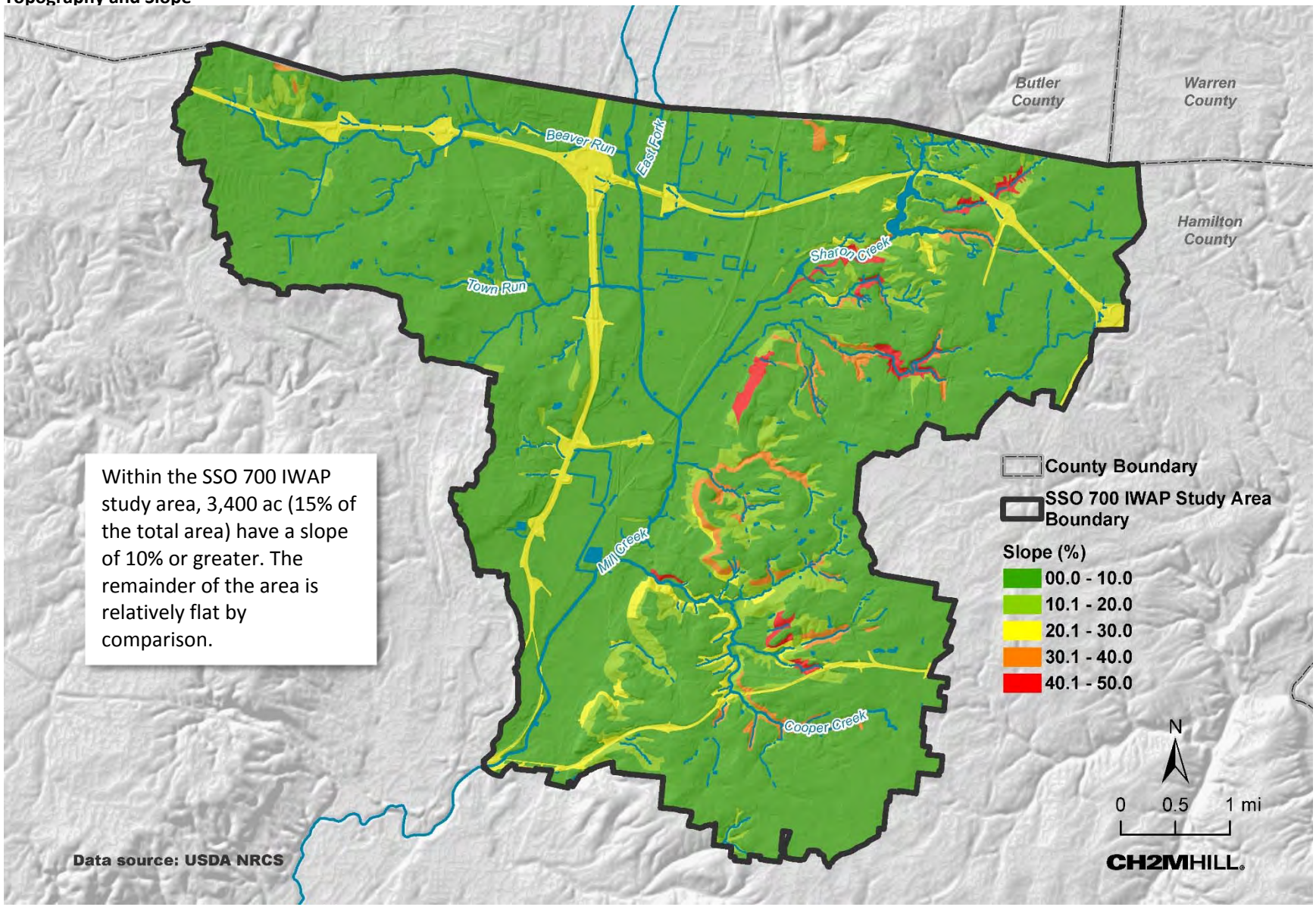
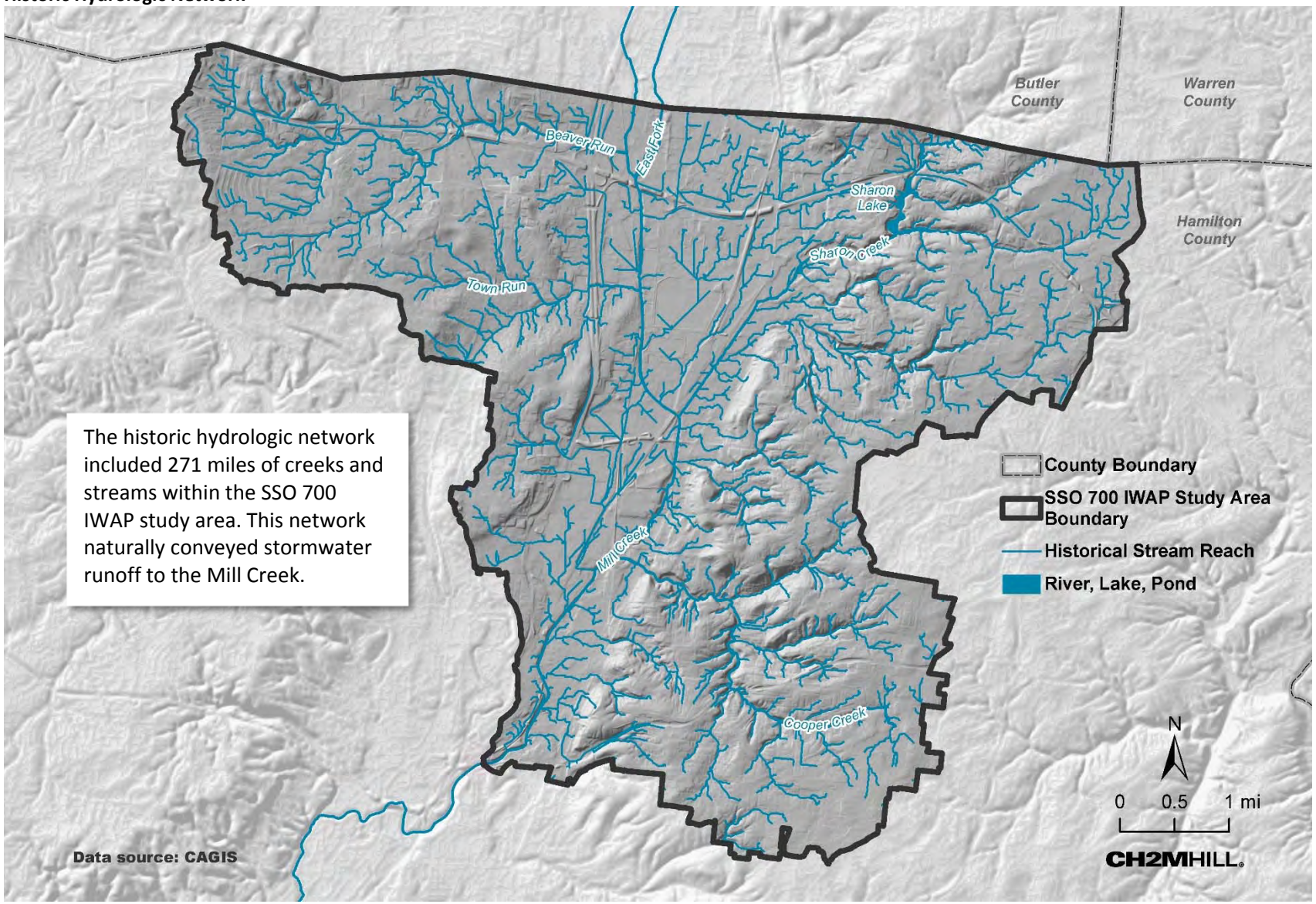
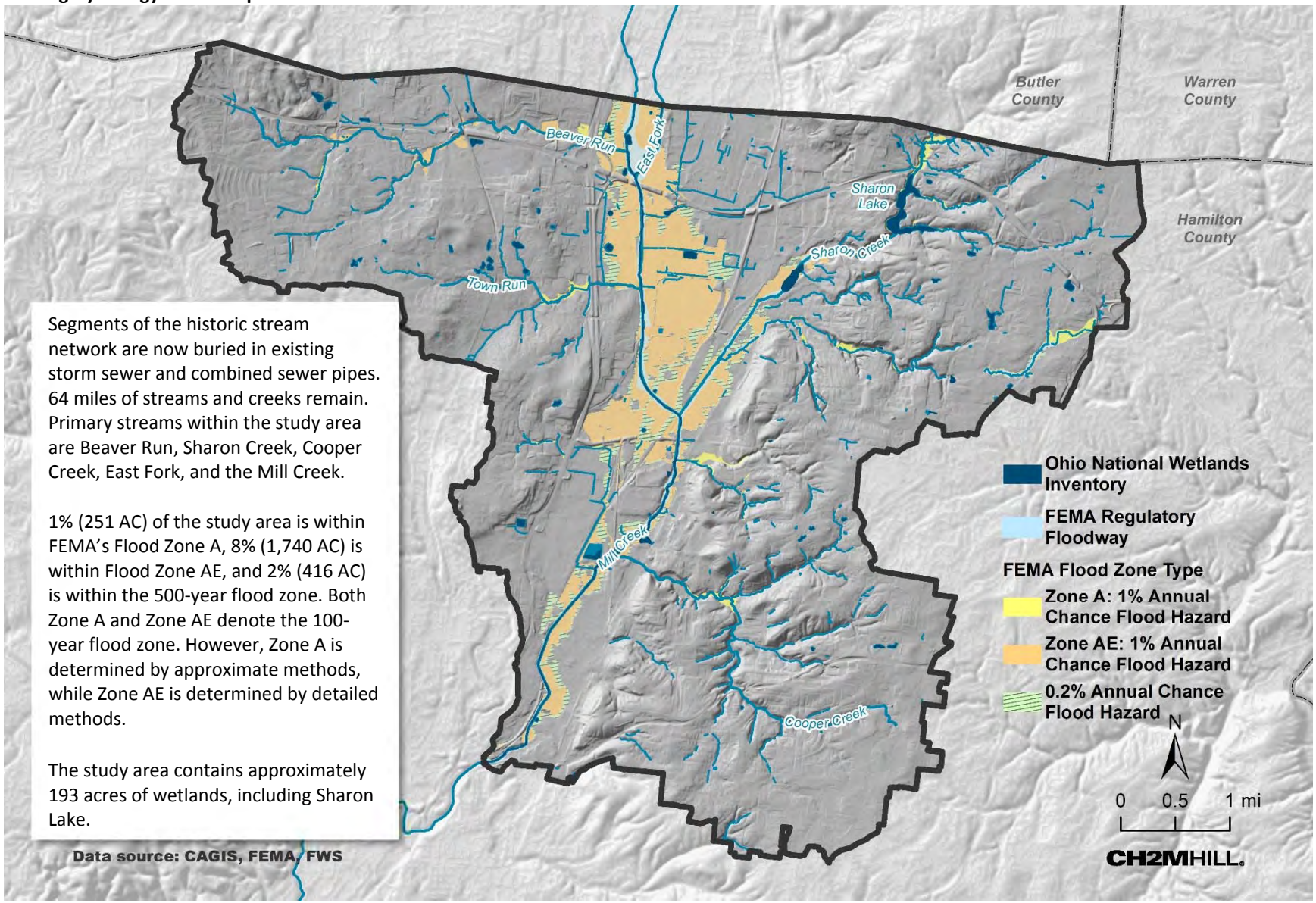


FIGURE 3.2
Historic Hydrologic Network



The historic hydrologic network included 271 miles of creeks and streams within the SSO 700 IWAP study area. This network naturally conveyed stormwater runoff to the Mill Creek.

FIGURE 3.3
Existing Hydrology and Floodplains

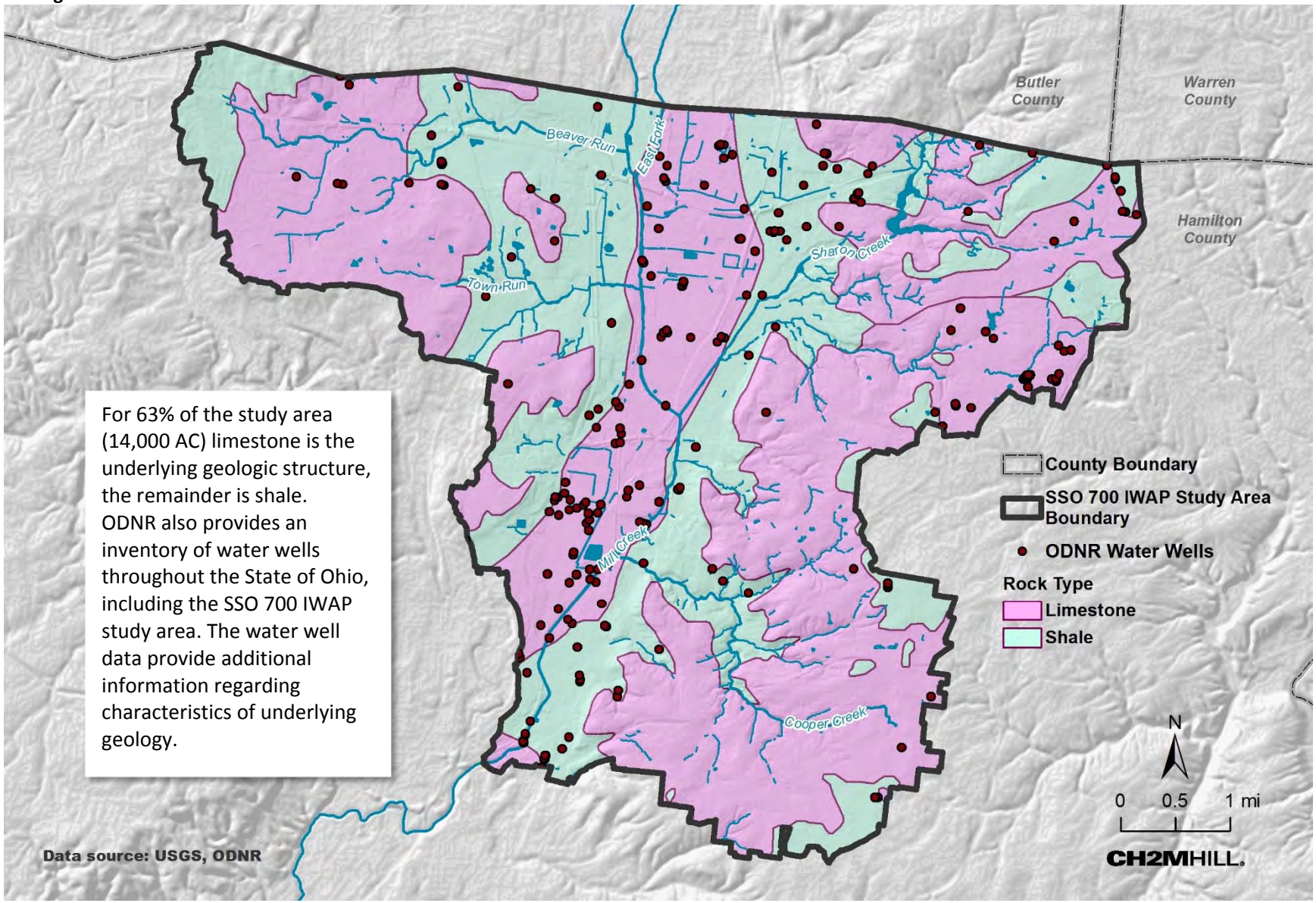


Segments of the historic stream network are now buried in existing storm sewer and combined sewer pipes. 64 miles of streams and creeks remain. Primary streams within the study area are Beaver Run, Sharon Creek, Cooper Creek, East Fork, and the Mill Creek.

1% (251 AC) of the study area is within FEMA's Flood Zone A, 8% (1,740 AC) is within Flood Zone AE, and 2% (416 AC) is within the 500-year flood zone. Both Zone A and Zone AE denote the 100-year flood zone. However, Zone A is determined by approximate methods, while Zone AE is determined by detailed methods.

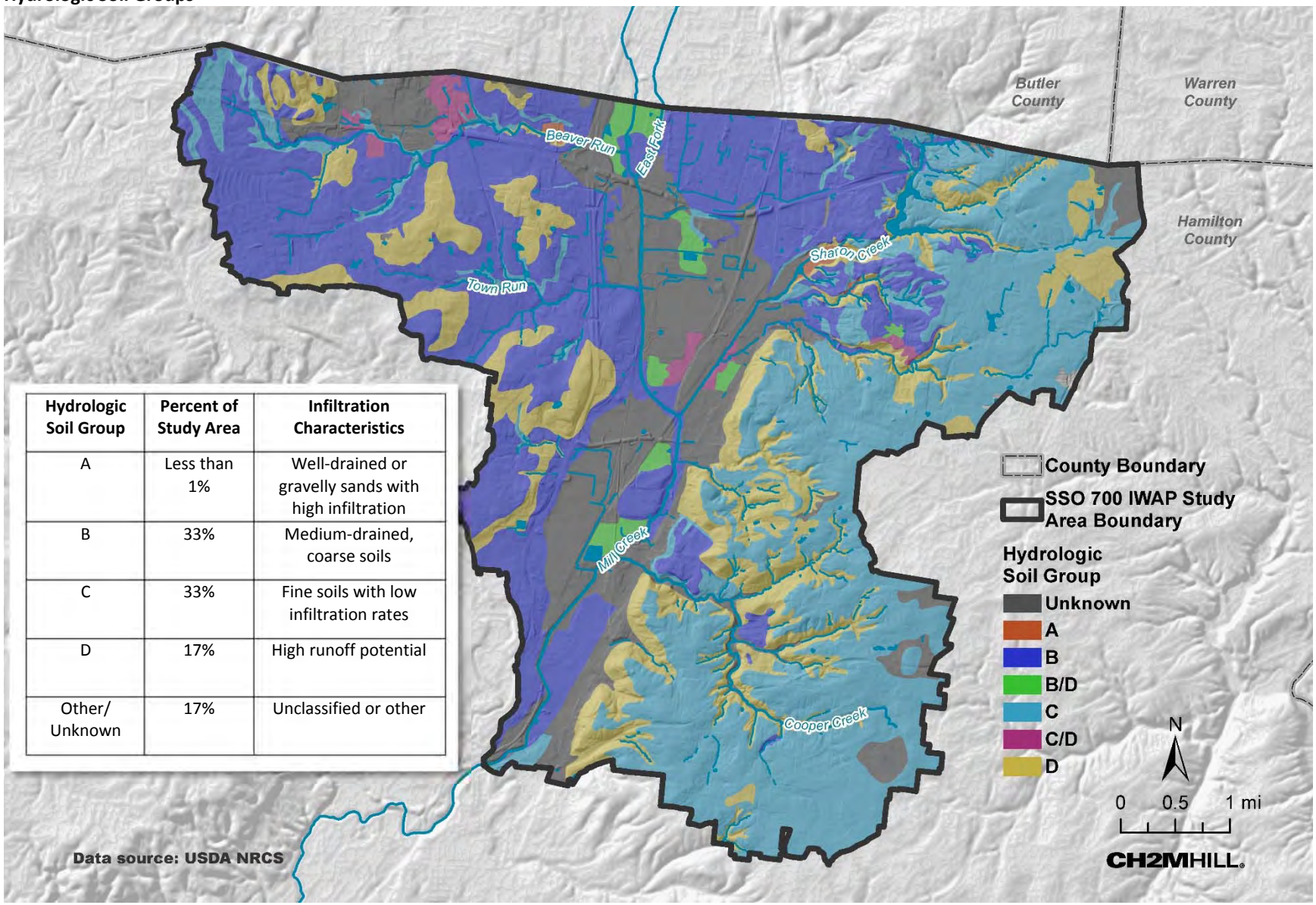
The study area contains approximately 193 acres of wetlands, including Sharon Lake.

FIGURE 3.4
Geological Structure



For 63% of the study area (14,000 AC) limestone is the underlying geologic structure, the remainder is shale. ODNR also provides an inventory of water wells throughout the State of Ohio, including the SSO 700 IWAP study area. The water well data provide additional information regarding characteristics of underlying geology.

FIGURE 3.5
Hydrologic Soil Groups



Hydrologic Soil Group	Percent of Study Area	Infiltration Characteristics
A	Less than 1%	Well-drained or gravelly sands with high infiltration
B	33%	Medium-drained, coarse soils
C	33%	Fine soils with low infiltration rates
D	17%	High runoff potential
Other/ Unknown	17%	Unclassified or other

FIGURE 3.6
Tree Canopy and Impervious Cover

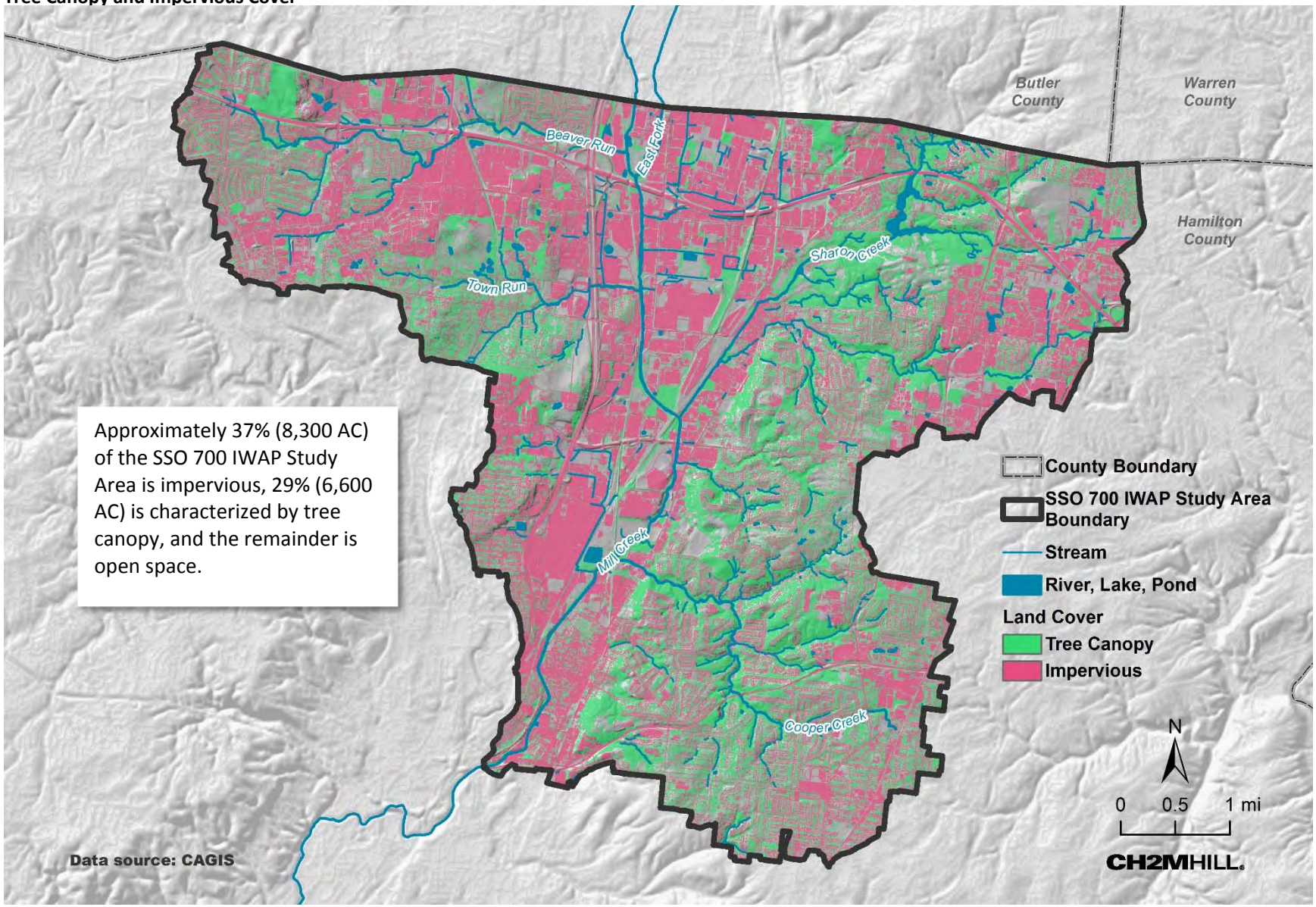
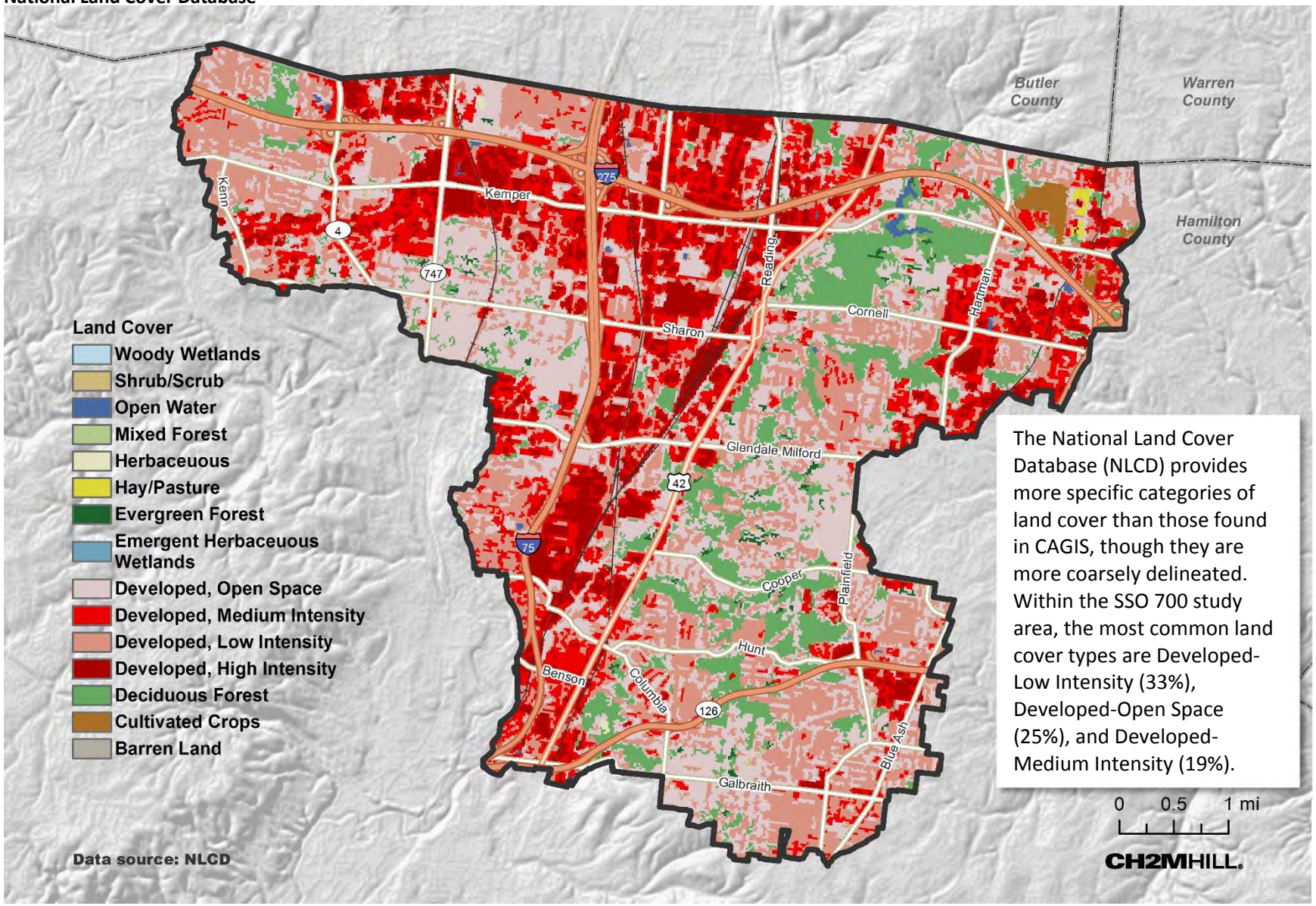


FIGURE 3.7
National Land Cover Database



The National Land Cover Database (NLCD) provides more specific categories of land cover than those found in CAGIS, though they are more coarsely delineated. Within the SSO 700 study area, the most common land cover types are Developed-Low Intensity (33%), Developed-Open Space (25%), and Developed-Medium Intensity (19%).

Data Gaps

The vast majority of pursued datasets under Natural Systems were collected. No gaps were identified.

Built Systems

Built systems are systems within the watershed that are man-made or result from human activity. Built systems inventoried in this technical memorandum are the following:

- Existing Land Use
- Land Ownership
- Transportation Infrastructure
- Sanitary and Combined Sewer Infrastructure
- Sewer Issues
- Sewer Back-ups (SBUs)
- Storm Sewer Infrastructure

Figures 3.8 through 3.14 map these built systems and summarize their general characteristics relative to the SSO 700 IWAP. Table 3.2 summarizes key statistics extracted from the built systems data. These datasets will be used to inform both the hydraulic and water quality modeling components of the SSO 700 IWAP, and they will also be used by future tasks to identify potential infrastructure solutions that impact the built environment.

TABLE 3.2
Summary of Key Built System Data

Parameter	Statistic
Total Study Area	35 Square Miles
Miles of Sanitary Sewer	314 Miles
Number of SSOs	11
Miles of Combined Sewer	4.3 Miles
Number of CSOs	9
Miles of Storm Sewer	TBD
Approx. Number of Water-in-Basement Complaints between January 2000 and September 2014 that may be MSDGC Responsibility	5,500
Number of Pumps Installed under Water-in-Basement Prevention Program	145
Municipal Separate Storm Sewer Systems (MS4s) in HCSWD	10
MS4s outside HCSWD	6

Data Gaps

The vast majority of pursued datasets under Built Systems were collected.

FIGURE 3.8
CAGIS Land Use

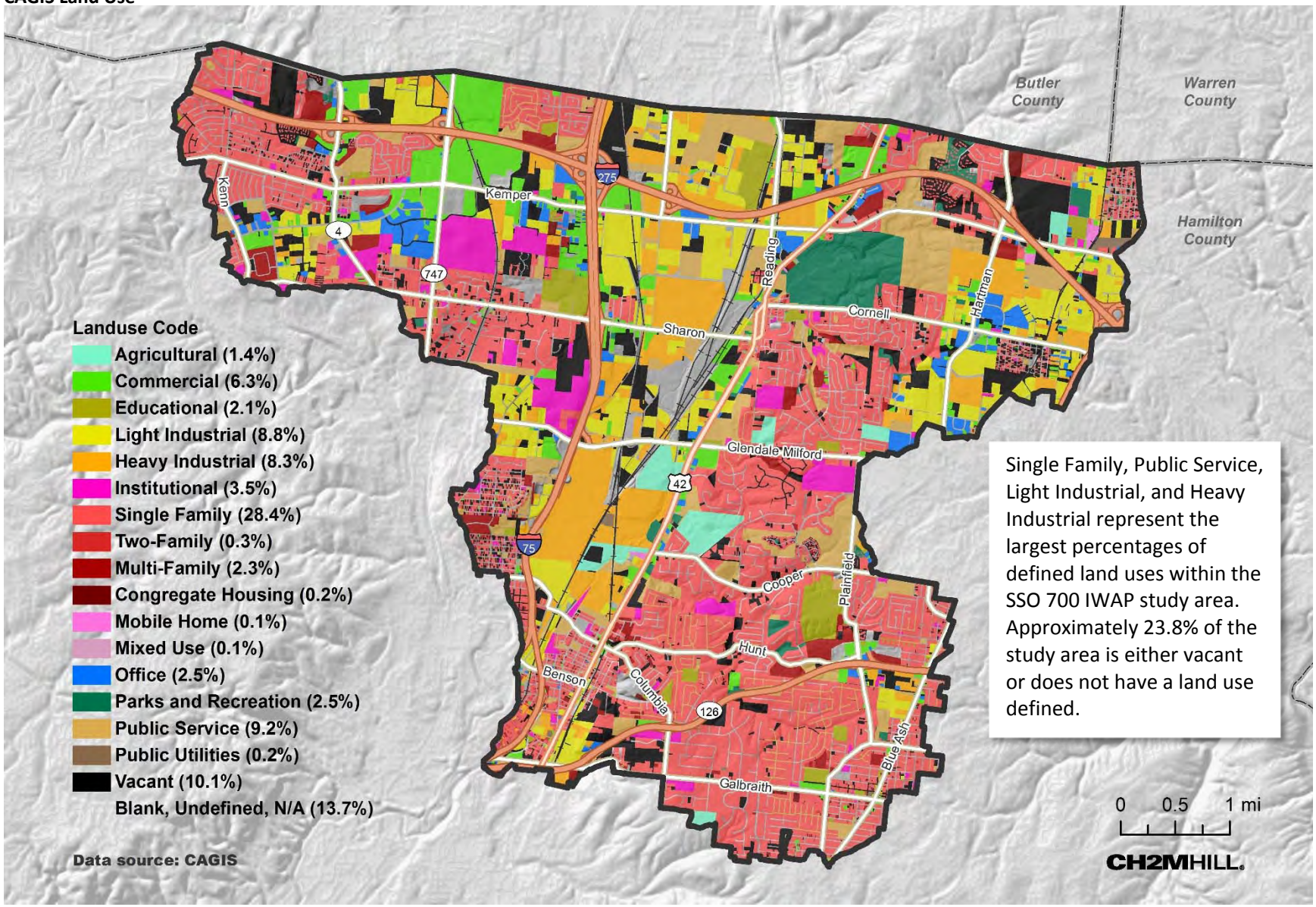


FIGURE 3.9
Public Land Ownership

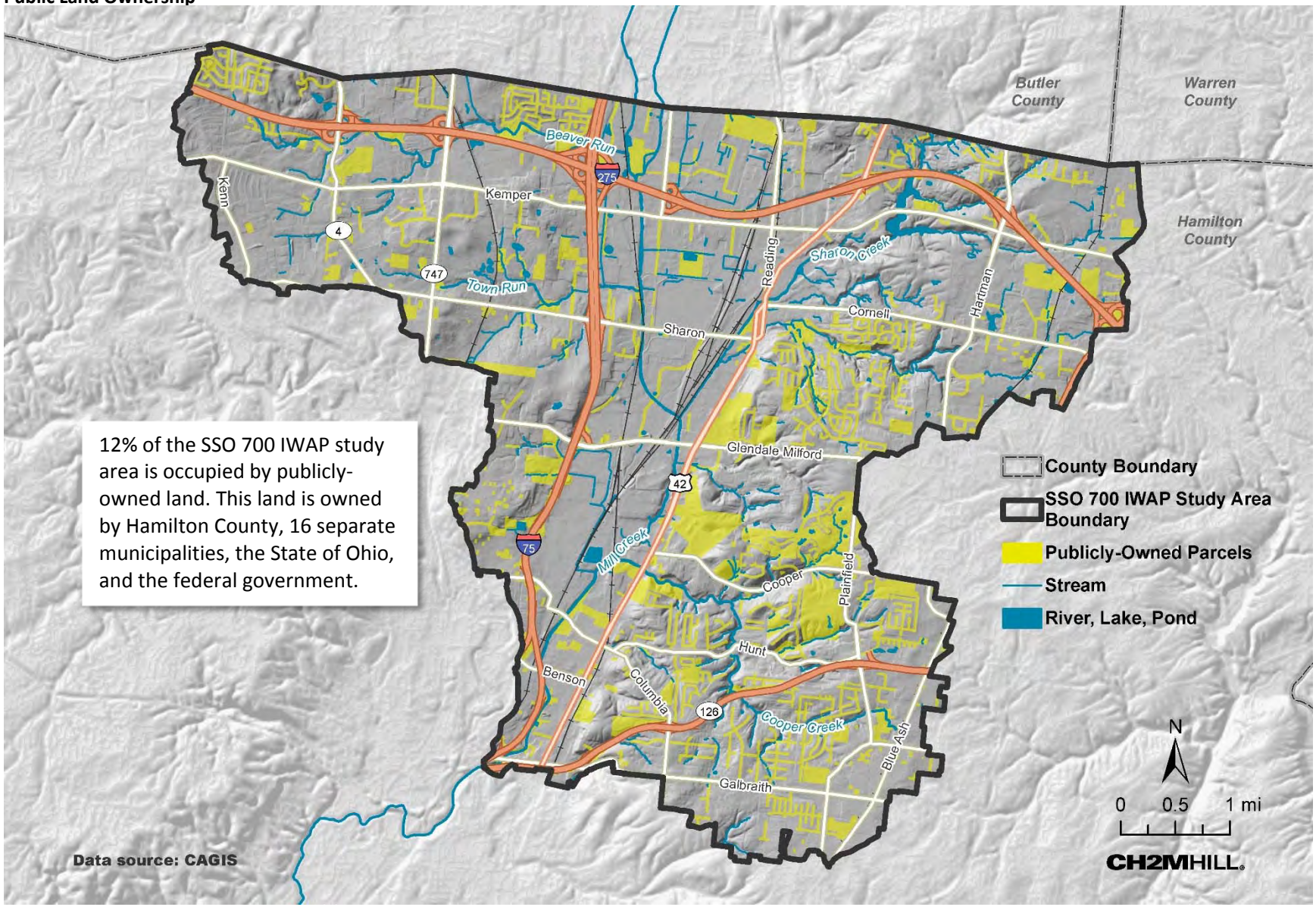
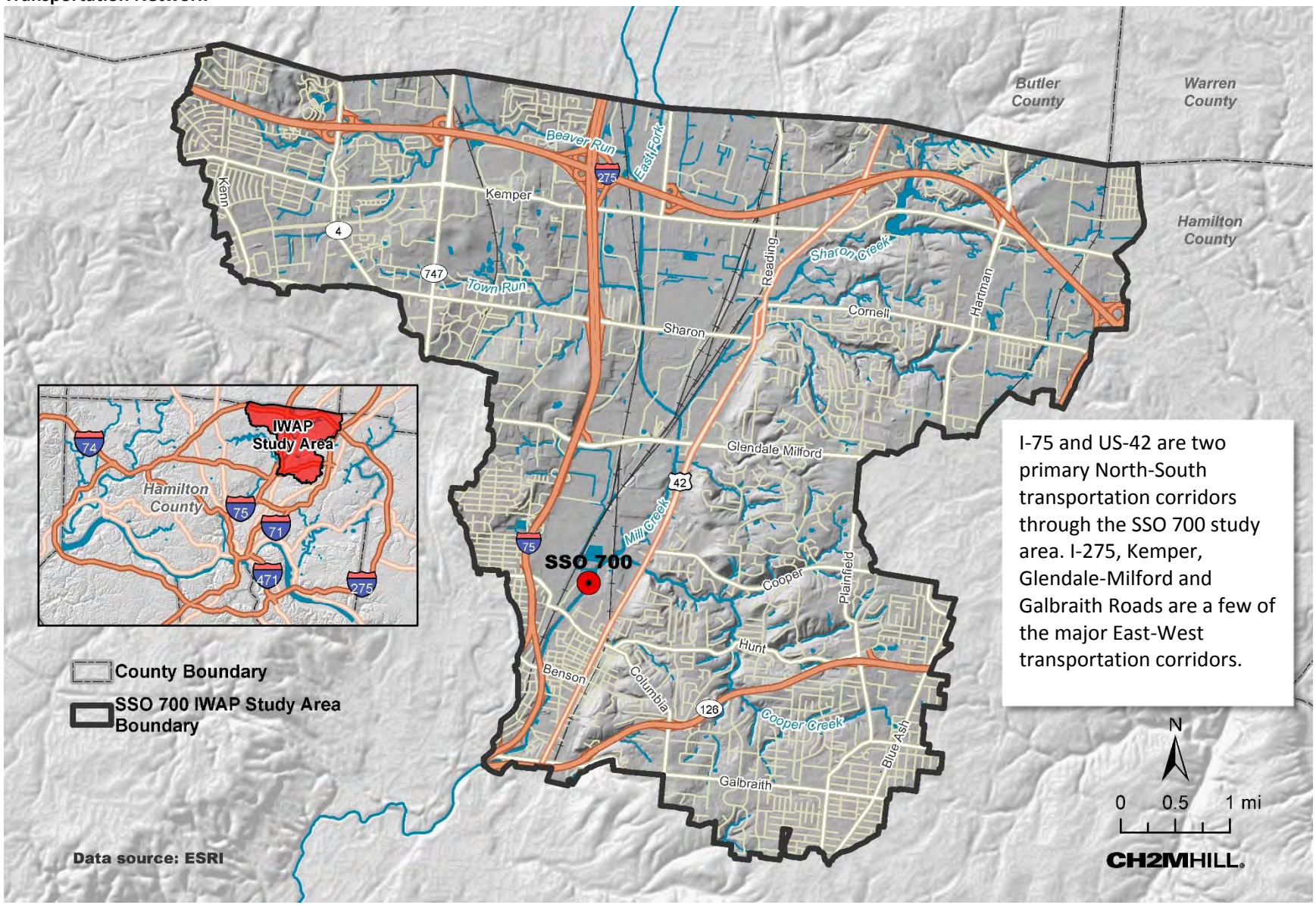
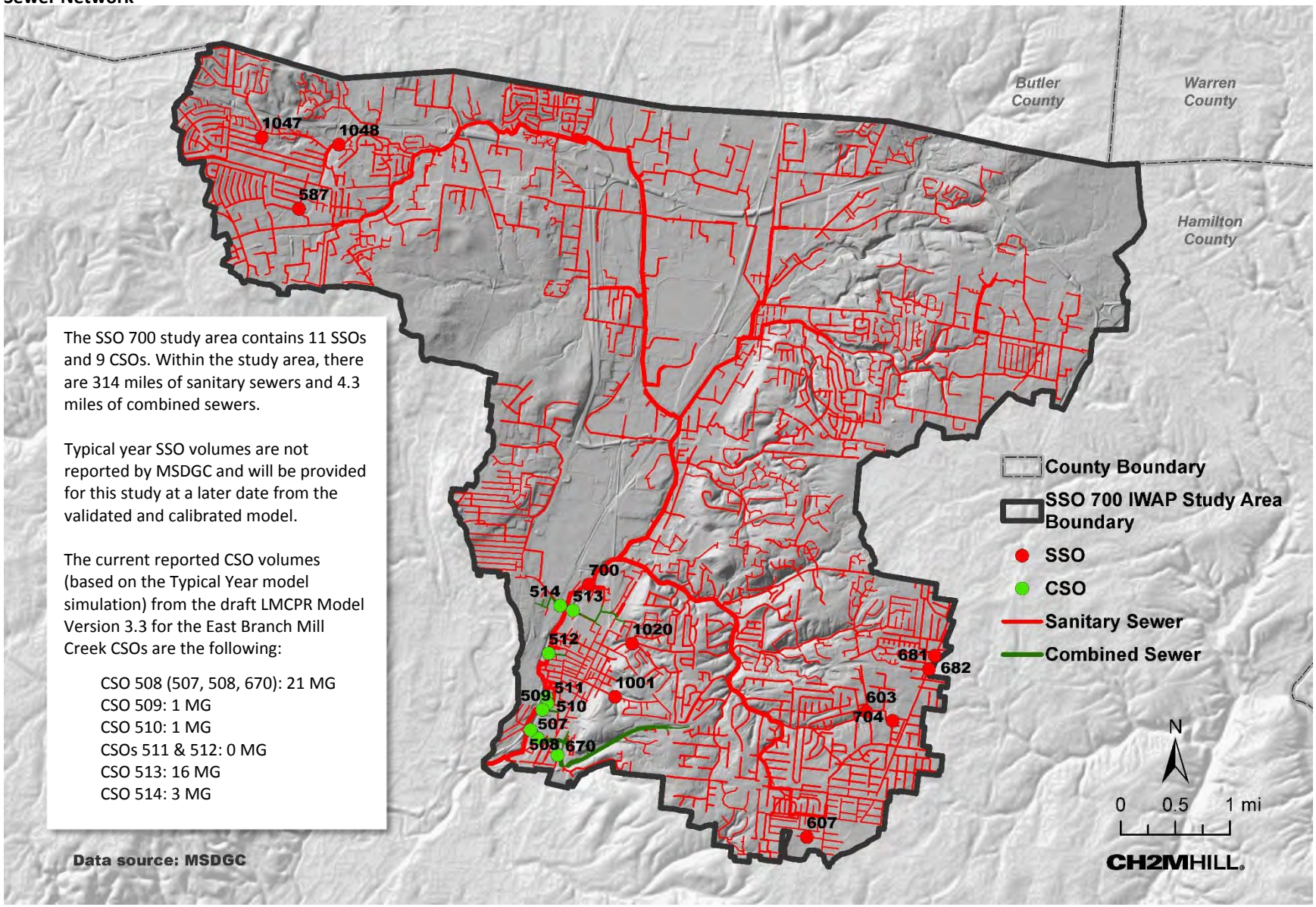


FIGURE 3.10
Transportation Network



I-75 and US-42 are two primary North-South transportation corridors through the SSO 700 study area. I-275, Kemper, Glendale-Milford and Galbraith Roads are a few of the major East-West transportation corridors.

FIGURE 3.11
Sewer Network



The SSO 700 study area contains 11 SSOs and 9 CSOs. Within the study area, there are 314 miles of sanitary sewers and 4.3 miles of combined sewers.

Typical year SSO volumes are not reported by MSDGC and will be provided for this study at a later date from the validated and calibrated model.

The current reported CSO volumes (based on the Typical Year model simulation) from the draft LMCPR Model Version 3.3 for the East Branch Mill Creek CSOs are the following:

- CSO 508 (507, 508, 670): 21 MG
- CSO 509: 1 MG
- CSO 510: 1 MG
- CSOs 511 & 512: 0 MG
- CSO 513: 16 MG
- CSO 514: 3 MG

FIGURE 3.12

MSDGC Complaints Related to Wet Weather and Water-in-Basements, January 2000 – September 2014

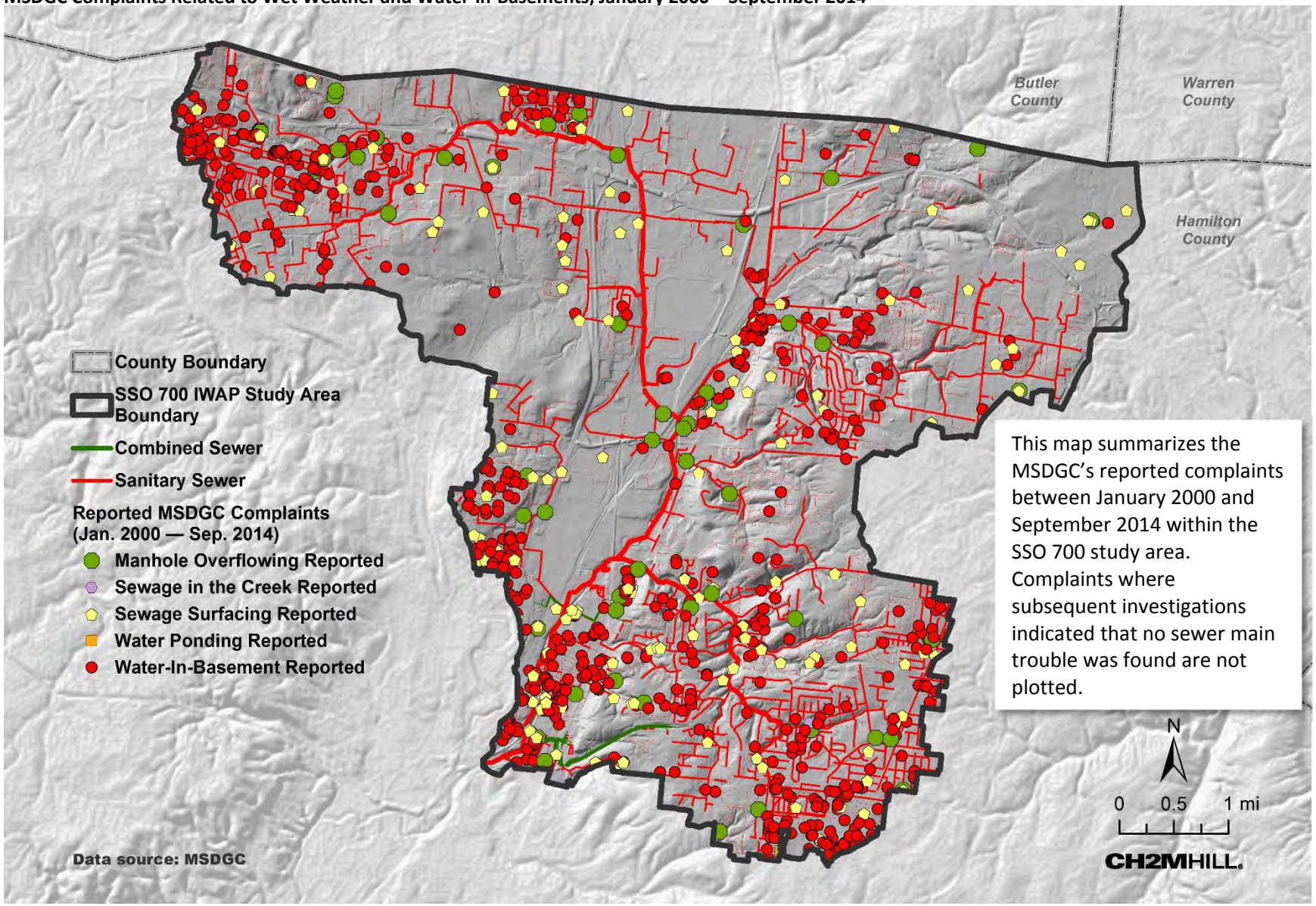


FIGURE 3.13
Water-In-Basement Prevention Program Participants (SBU LOCATIONS)

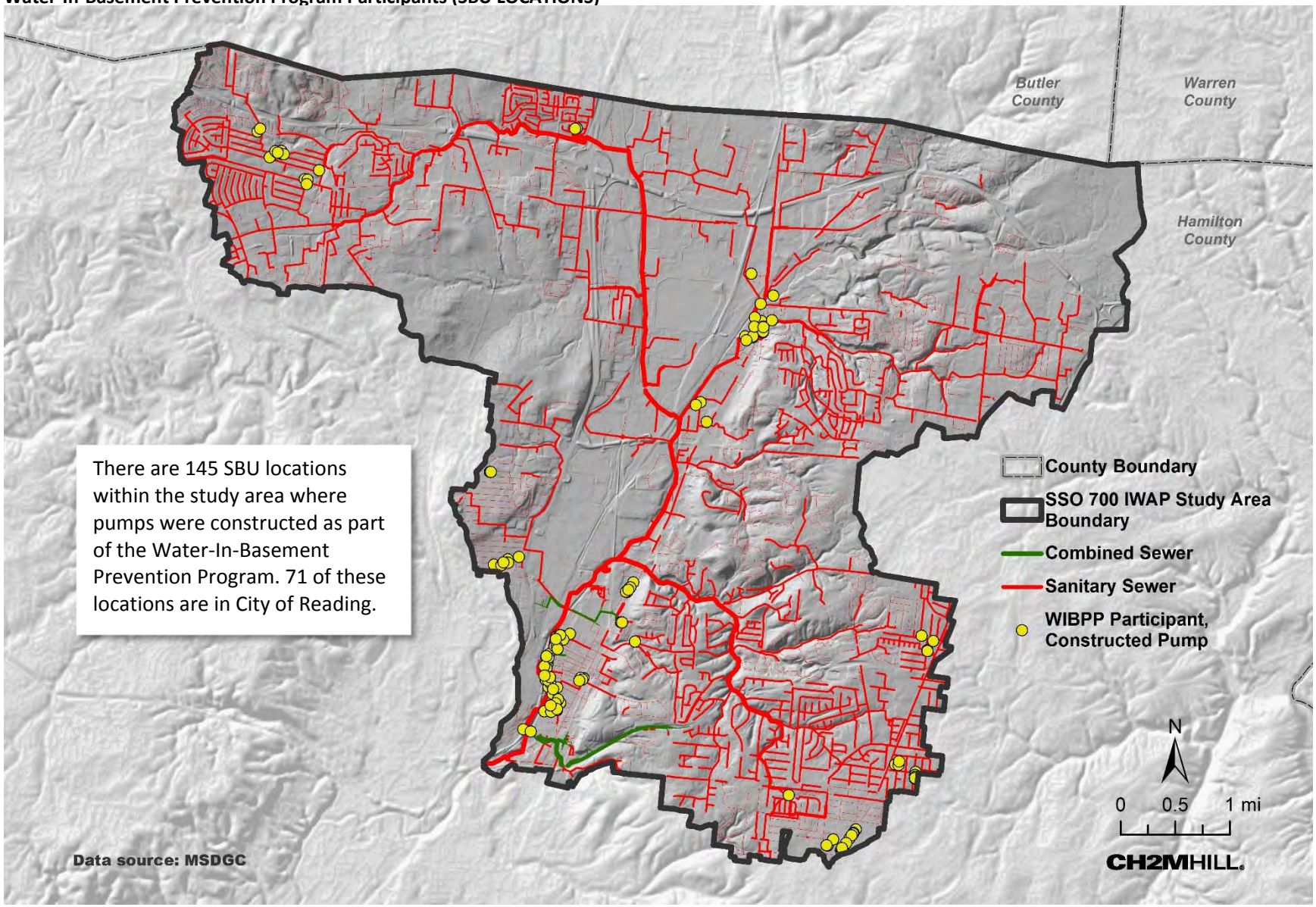
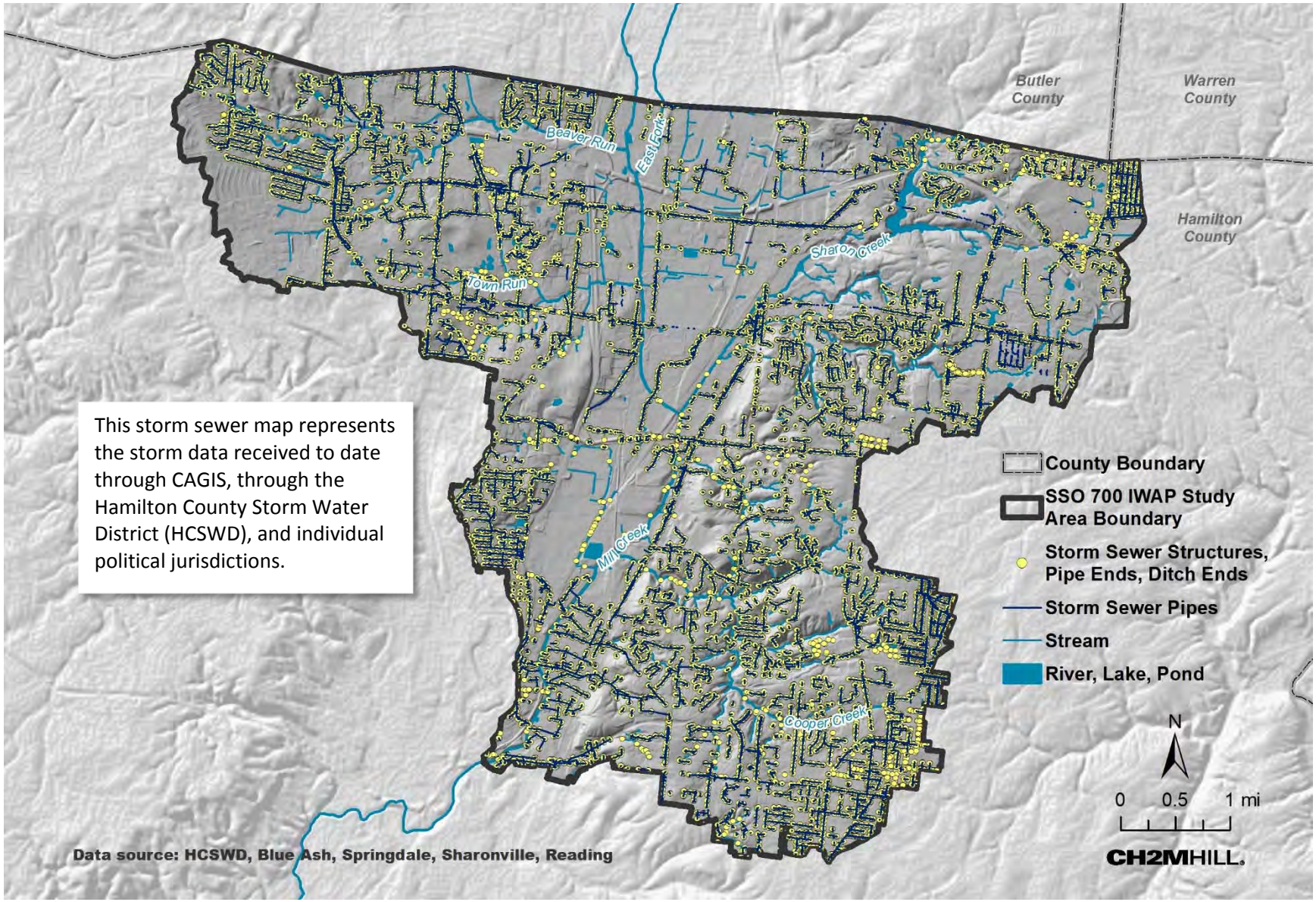


Figure 3.14
Storm Sewer Network



Jurisdictional Data

The SSO 700 IWAP is comprised of all or parts of 16 political jurisdictions in Hamilton County, Ohio. See Figure 3.15 for a map of the political jurisdictions. Data has been sought from each of these political jurisdictions to contribute to the project. A list of the data requested from each political jurisdiction is provided below:

1. Storm Sewer System Data (e.g. storm sewer, detention basins, stormwater BMPs)
2. Water Quality Sampling Data
3. Master Planning Data (e.g. future land use plans, proposed or planned developments, etc.)
4. Locations and Descriptions of Known Wet Weather Issues (e.g. flooding, erosion, water quality issues, etc.)
5. Locations and Descriptions of Ongoing or Planned Capital Infrastructure Work
6. Police/Fire Reports Relating to Flooding
7. Stormwater Rules/Regulations

The scheduling of meetings with the political jurisdictions through the Hamilton County Board of County Commissioners' Office is ongoing. At this time, the Project Team has met with 6 of the 16 political jurisdictions, which in total account for 75% of the land area within the study boundary. These 6 jurisdictions are the following: Blue Ash, Evendale, Reading, Sharonville, Springdale, and Woodlawn.

The data obtained to date is summarized in Table 3.4. No water quality sampling data was received from individual political jurisdictions. All political jurisdictions deferred to the Hamilton County Public Health (HCPH) Department for water quality sampling data related to NPDES permit compliance. The HCPH data has already been collected and summarized elsewhere in this technical memorandum. Additionally, most jurisdictions do collect records on flooding events. Requests for data associated with specific events or time periods can be made to the individual police departments.

Some data have been obtained from other sources, such as Hamilton County Planning & Development Department (HCPDD) and the Hamilton County Stormwater District (HCSWD). Table 3.3 summarizes planning documents received from HCPDD. These documents may inform the future development of potential infrastructure solutions for the IWAP.

TABLE 3.3
Summary of Political Jurisdiction Data Received from Other Sources

Jurisdiction	Planning Document
Amberley Village	Vision Pillars (2009)
Blue Ash	Draft Comprehensive Land Use Plan (2015)
	Summit Park Master Plan (2012)
Deer Park	Deer Park Vision 2028 Plan (2008)
Evendale	Bike Master Plan (2013)
	Business Ready Strategy (2010)
	Comprehensive Master Plan (2009)
Forest Park	2013 Annual Report
	2013 State of the City and 2012 Annual Report
	Redevelopment Plan (2007)
Glendale	Glendale Village Plan (2000)
Montgomery	2012 Housing Report
Sharonville	Downtown Strategic Master Plan (2010)
Springdale	Progress Place Business Park Plan
Woodlawn	Master Plan (2007)

Data Gaps

All data critical to the progress of the IWAP have been received. However, future meetings with political jurisdictions may yield additional data that may be summarized in an update or addendum to this technical memorandum.

FIGURE 3.15
Map of Political Jurisdictions

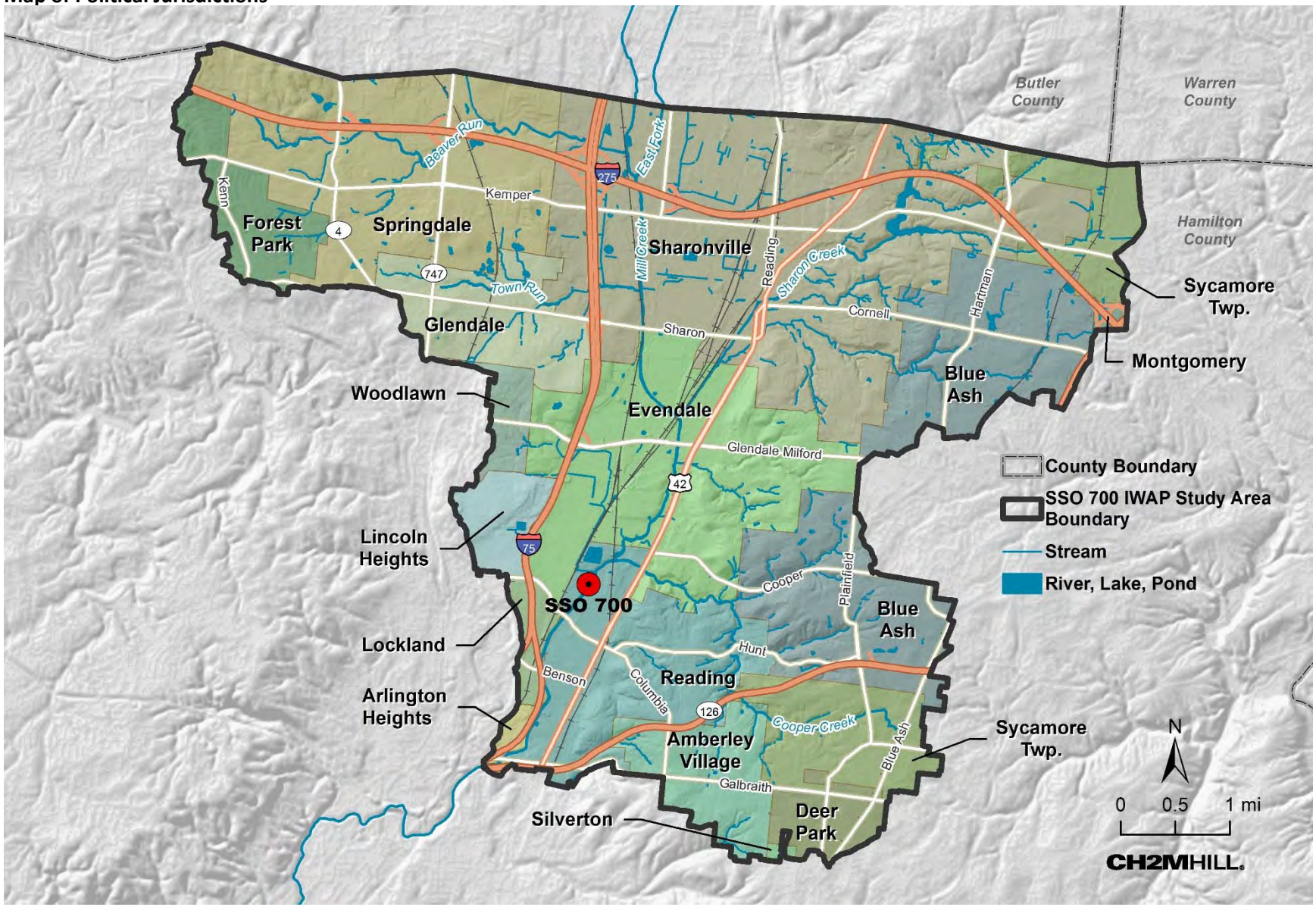


TABLE 3.4

Summary of Political Jurisdiction Data

Political Jurisdiction	Meeting Held with IWAP Team	HCSWD Member	Storm Sewer (source of data in parentheses)	Detention Basins/ Stormwater BMPs	Wet Weather Issues	Infrastructure Opportunities	Stormwater Regulations	Master Planning Efforts	Other Information Provided
Amberley Village	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received	HCSWD	Yes	N/A
Arlington Heights	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received	HCSWD		N/A
Blue Ash	Yes	Yes	Yes (Blue Ash)	Detention Basins provided. No BMP inventory available.	Localized flooding. Isolated infrastructure issues. *See Meeting Summary.*	Planned roadway improvements. Planned private developments. Potential stream corridor improvements. *See Meeting Summary.*	Hamilton County Stormwater Regulations	Blue Ash is currently working on an update to the City's land use plan, which will be followed by a zoning code update.	Long-term maintenance of property and infrastructure is major issue for Blue Ash.
Deer Park	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received	HCSWD		N/A

TABLE 3.4

Summary of Political Jurisdiction Data

Political Jurisdiction	Meeting Held with IWAP Team	HCSWD Member	Storm Sewer (source of data in parentheses)	Detention Basins/ Stormwater BMPs	Wet Weather Issues	Infrastructure Opportunities	Stormwater Regulations	Master Planning Efforts	Other Information Provided
Evendale	Yes	Yes	Yes (HCSWD/CAGIS)	Evendale owns one detention basin serving Carpenters Creek and Park Hills subdivisions. Evendale does not maintain a list of private detention basins or BMPS.	Surcharging and flooding manholes particularly near Exon Avenue. Flashy high flows and velocities in Cooper Creek result in loss of property. Rise in groundwater table due to conversion of municipalities to GCWW. *See Meeting Summary*.	ODOT's Thru the Valley project. Potential redevelopment projects. *See Meeting Summary.*	Evendale maintains its own stormwater regulations.	No data provided.	One street in Evendale is on septic: Plauteau Place.
Forest Park	No	No	Not Received	Not Received	Not Received	Not Received	Forest Park Stormwater Utility	Not Received	N/A
Glendale	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received		Not Received	N/A
Lincoln Heights	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received		Not Received	N/A
Lockland	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received		Not Received	N/A
Montgomery	No	No	Not Received	Not Received	Not Received	Not Received		Not Received	N/A

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Political Jurisdiction	Meeting Held with IWAP Team	HCSWD Member	Storm Sewer (source of data in parentheses)	Detention Basins/ Stormwater BMPs	Wet Weather Issues	Infrastructure Opportunities	Stormwater Regulations	Master Planning Efforts	Other Information Provided
Reading	Yes	No	Yes (Reading)	Reading does not maintain mapping of detention basins or BMPs. Reading verbally provided the locations of key basins and BMPs. *See Meeting Summary.*	Flooding Erosion along Hunt road Slump failure along east bank of Mill Creek Outfalls to Mill Creek in disrepair	Koenig Park and Haffey Fields (opportunities for flood control and stormwater management). GE lagoons New potential development at PMC Chemical property *See Meeting Summary.*	City of Reading Code of Ordinances	Comprehensive Plan completed in 2006.	Reading would like to see projects that would improve flooding and relieve residents of need for flood insurance.
Sharonville	Yes	No	Yes (Sharonville)	Sharonville provided a list of detention basins. Sharonville does not maintain a list of BMPs.	Flooding of several locations along the Mill Creek. Erosion issues along Kemper Road. Landslide issues on Creekview Drive.	Several potential locations for stormwater detention. Ford is potential partner. Planned or ongoing roadway projects. *See Meeting Summary.*	Hamilton County Stormwater Regulations	Comprehensive Plan update scheduled for 2015.	Hamilton County has recently taken over management of Sharonville's septic systems. Sharonville would like the Mill Creek bike trail to be extended through City.
Silverton	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received		Not Received	N/A

TABLE 3.4

Summary of Political Jurisdiction Data

Political Jurisdiction	Meeting Held with IWAP Team	HCSWD Member	Storm Sewer (source of data in parentheses)	Detention Basins/ Stormwater BMPs	Wet Weather Issues	Infrastructure Opportunities	Stormwater Regulations	Master Planning Efforts	Other Information Provided
Springdale	Yes	No	Yes (Springdale)	A detention basins database was provided. Data includes detention location and frequency of inspection. Springdale does not maintain a record of BMPs.	Street flooding. Structure flooding. Sanitary sewer overflows. Water quality concern at John Morrell. *See Meeting Summary.*	Proposed developments in early stages of approval. Potential water quality features adjacent to roadways. Redevelopment of former hotel. *See Meeting Summary.*	City of Springdale Code of Ordinances	Springdale provided the City's 2015 budget that includes anticipated 5-year capital improvements. *See Meeting Summary.*	Springdale completed an outfall inventory and stream assessment study in 2014. Provided in Meeting Summary.
Sycamore Township	No	Yes	Yes (HCSWD/CAGIS)	Not Received	Not Received	Not Received	Hamilton County Stormwater Regulations	Not Received	N/A
Woodlawn	Yes	Yes	Yes (HCSWD/CAGIS)	Woodlawn does not maintain a list of detention basins or BMPs.	Woodlawn's primary wet weather issues occur in the West Fork watershed and not in the SSO 700 IWAP study area.	Woodlawn's primary opportunities are located in the West Fork watershed and not in the SSO 700 IWAP study area.	Village of Woodlawn Stormwater Regulations	Current land use plan available on Village website.	N/A

Receiving Water Characteristics

The East Branch Mill Creek begins in Butler County and flows through the study area for approximately 6.5 miles. A number of large tributaries, including Beaver Run, Town Run, and Sharon Creek, are within the study area. See Figure 3.3 for a map of the stream network.

Designated Uses

As part of the Clean Water Act (CWA), surface waters are categorized based on the uses (e.g. recreation, aquatic life, drinking water supply) that the waterbody should be able to support. Attainment of these designated uses are then assessed by the state using biological and chemical monitoring to determine whether the designated use is being met. Under current interpretation of the CWA, the waters under consideration typically include relatively permanent standing or flowing waters and exclude intermittent or ephemeral waterbodies. Information related to the designated uses of the waterbodies within the study area was obtained from the Ohio EPA (OEPA). All streams within the study area have recreation as a designated use. All streams in the study area are either designated as the warm water habitat (WWH) or are undesignated. The waterbodies with specified aquatic life designated uses are shown in Figure 3.16.

The Midwest Biodiversity Institute's (MBI's) *Biological and Water Quality Study of Mill Creek and Tributaries 2011* extended the evaluation of designated uses to a number of tributaries of Mill Creek that are undesignated by OEPA. Of the streams evaluated in the study, MBI determined they all either support or are recommended to support the WWH aquatic life use (ALU) with the exception of a tributary to Sharon Creek, which is recommended as a Primary Headwater Habitat (PWHIIIA) based on the 39 locations evaluated. Figure 3.16 identifies which stream segments have existing designated uses per OEPA and which have recommended designations per MBI's study.

Use Attainment

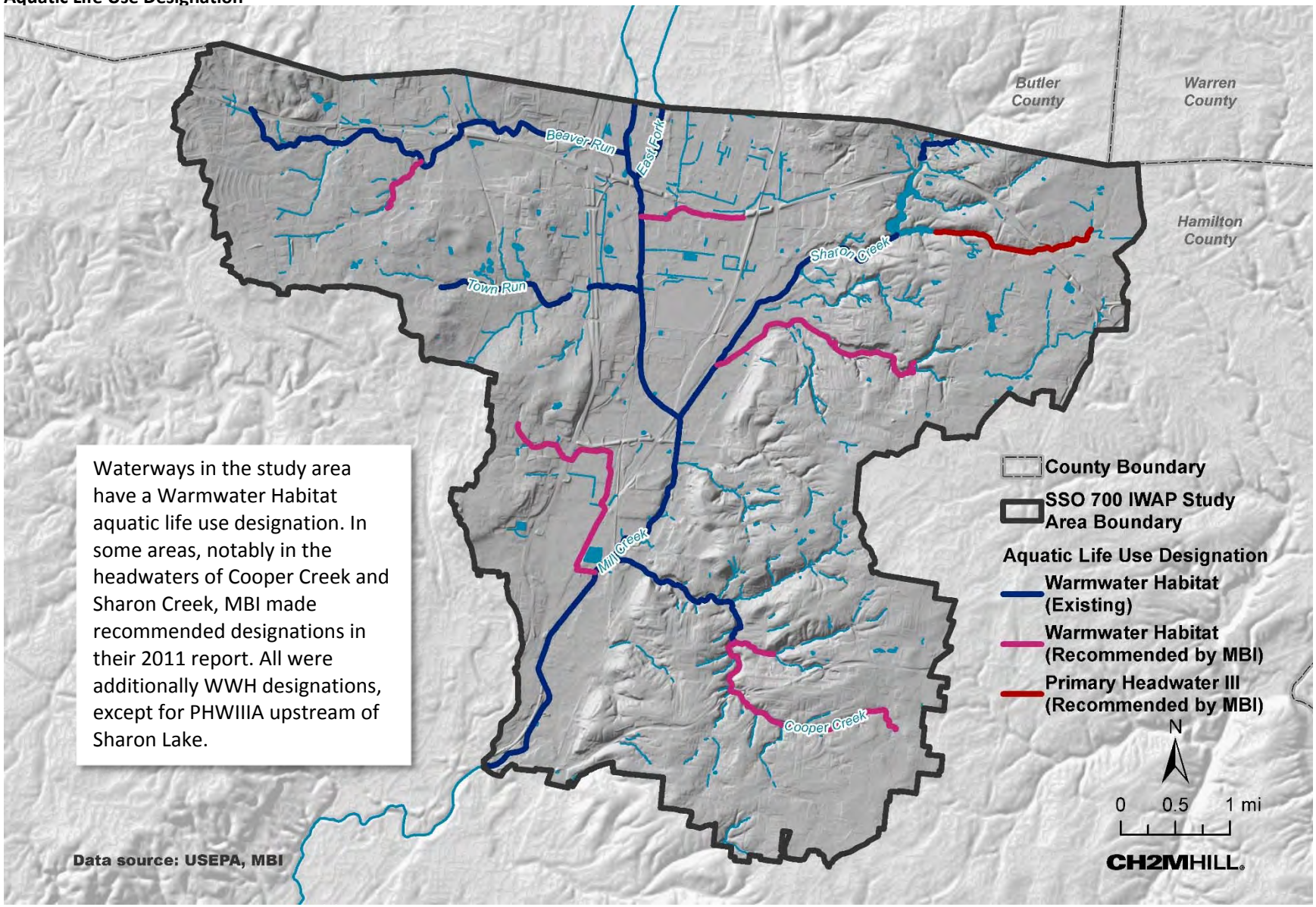
MBI's *Biological and Water Quality Study of Mill Creek and Tributaries 2011* reviewed conditions at numerous locations within the Mill Creek watershed. The report concludes that many of the streams are not meeting or are only partially meeting their ALU criteria. See Figure 3.17 for a map of the summary of stream attainment. The causes of the biological impairments, as described by the MBI report, are sedimentation, low flow, chlorides, nutrients, and dissolved oxygen. Copper, lead, and pH levels are also outside of the desired ranges at five stations. Almost all segments do not meet the recreational standard for bacteria. The data included in the MBI report are sufficient for determining use attainment in the study area. The MBI report also provides some indication of causes of impairment, but this information is limited. A supplemental analysis linking impairment to potential sources of pollution is being developed. This tool, called the Integrated Prioritization System (IPS), will provide a critical link between impairment and parameters which can be quantified by a model. This tool has been made available to the project team for beta testing, and will be released for general use in the fourth quarter of 2015. The project team is coordinating with MBI to use the tool to evaluate the SSO 700 IWAP study area.

Total Maximum Daily Load; 303(d) List

As part of the Clean Water Act, all waterbodies not meeting their use must be identified and included on the 303(d) list of impaired waters. The State must then determine what measures are required to remove the impairment. This is commonly done through the development of a Total Maximum Daily Load (TMDL). The state develops a 303(d) list on a two year cycle. Ohio does this as part of an integrated report, combining the requirements of sections 303 and 305 of the Clean Water Act. Currently the 2012 Ohio 303(d) list has been approved and the 2014 list has been developed and is in the draft phase. Both the 2012 and 2014 integrated reports have been obtained and reviewed.

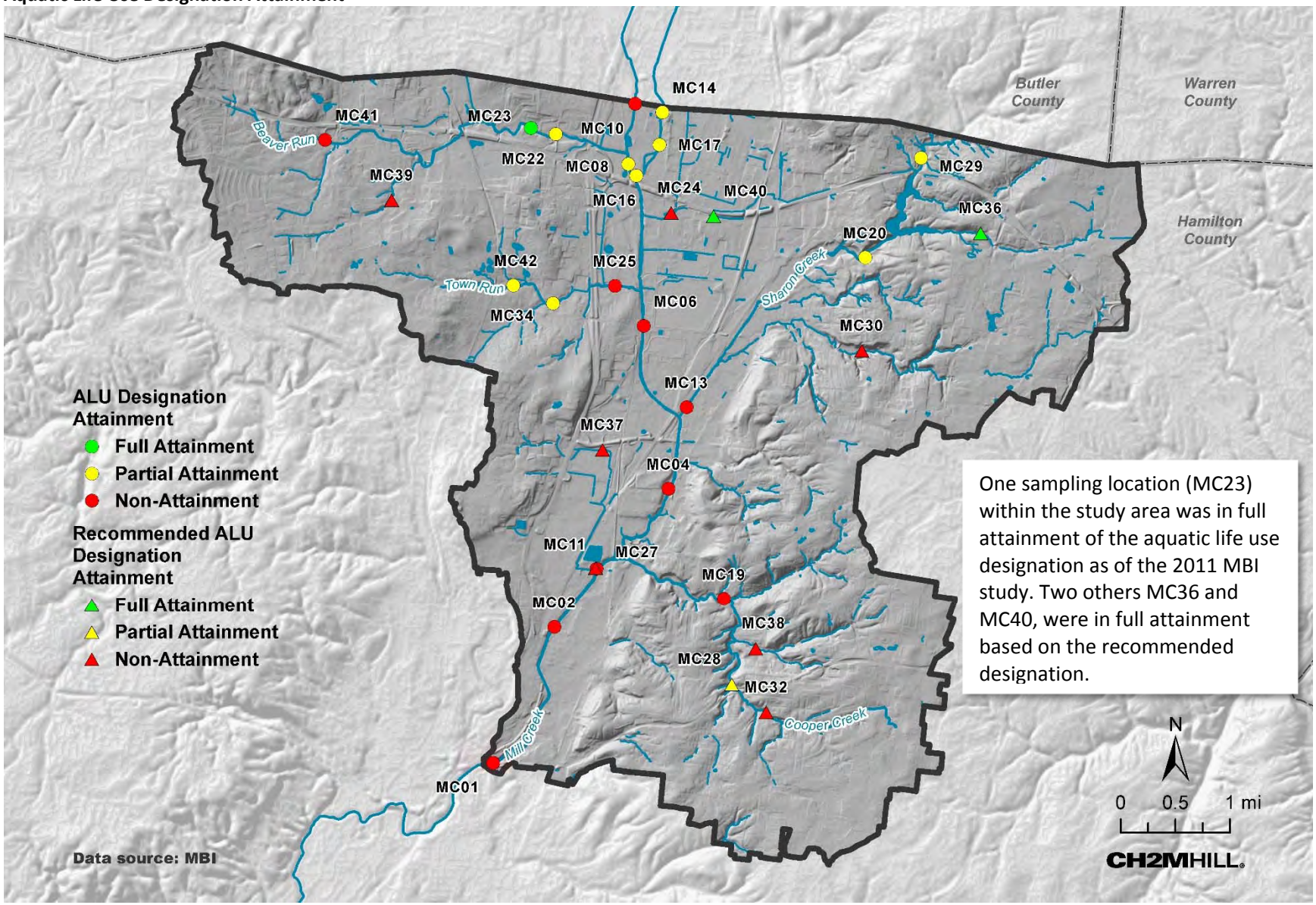
Ohio EPA completed a TMDL for Mill Creek, including the study area, in 2004. The causes for impairment were elevated nutrients and habitat alteration. The TMDL report for this effort has been obtained and reviewed.

FIGURE 3.16
Aquatic Life Use Designation



Waterways in the study area have a Warmwater Habitat aquatic life use designation. In some areas, notably in the headwaters of Cooper Creek and Sharon Creek, MBI made recommended designations in their 2011 report. All were additionally WWH designations, except for PHWIIIA upstream of Sharon Lake.

FIGURE 3.17
Aquatic Life Use Designation Attainment



Water Quality Monitoring Data

Collected water quality monitoring data has been summarized and analyzed, along with data gaps identified, in the *Watershed Water Quality Models Gap Analysis and Update Assessment Technical Memorandum*.

Data Gaps

The vast majority of pursued datasets under Receiving Waters were collected. No gaps have been identified.

Potential Pollutant Sources

The SSO 700 IWAP seeks to identify the sources of pollutants within the study area and characterize their relative contribution to water quality degradation and stream impairment. This section summarizes potential sources of pollutants within the SSO 700 IWAP study area.

Land Uses

Stormwater runoff picks up and carries pollutants generated from the various land uses through which it flows. For example, excess fertilizers or herbicides may be generated from agricultural lands and residential communities. Oil, grease, salt and other chemicals may be generated from urban land uses. Stormwater runoff from any land use, if improperly managed, may be a potential source of pollution. Data regarding locations of landfills, hazardous waste sites and facilities, surface mines, land application sites, septic systems, and animal operations were sought. See Figure 3.8 for a map of land uses within the study area. These land uses can be evaluated in combination with estimates of concentrations of pollutants, referred to as event mean concentrations (EMCs), in stormwater runoff categorized by land use to project where higher concentrations of various pollutants in runoff may be generated.

Figure 3.18 shows data provided by USEPA and the Hamilton County Public Health (HCPH) Department. Data from the USEPA includes Superfund sites, Toxic Release Inventory (TRI) Sites, and Resource Conservation and Recovery Act (RCRA) locations. These datasets were accessed online via USEPA's Envirofacts (http://www.epa.gov/enviro/index.html). The TRI follows the handling of hundreds of toxic chemicals that can threaten human health and the environment. Industries that utilize toxic chemicals tracked by TRI are required to report to the USEPA how these chemicals are managed. The TRI database tracks when these chemicals are released to the environment, either through emission to the air or water or when placed into land disposal. Figure 3.18 identifies the locations of facilities that are in the TRI for 2014. The shapefile downloaded from Envirofacts provides links to additional information regarding each identified release. Through the RCRA Information System (RCRAInfo), the USEPA tracks hazardous waste generators, transporters, treaters, storers and disposers of hazardous waste and their activities. RCRA sites identified in Figure 3.18 represent facilities that meet this definition. Activities that result in a release of hazardous materials to the water, air or land must be reported through RCRAInfo.

Data shown from HCPH include locations handling solid waste, such as materials recovery facilities (MRFs), municipal solid waste (MSW) transfers, compost piles, recycling centers, and recycling drop-offs. These locations may be sources of specific types of non-point source pollution.

Discharges

Point source discharges are discrete, identifiable points at which water discharges to the stream network within the SSO 700 study area. These point source discharges are regulated under the National Pollutant Discharge Elimination System (NPDES) permit program of the USEPA and OEPA. Data regarding point sources within the SSO 700 IWAP study area were sought. In Figure 3.18, NPDES permitees are shown, along with locations of household sewage treatment (septic) systems provided by HCPH. MSDGC Department of Industrial Water (DIW) monitors industrial discharges. Figure 3.19 is a map of permitted industrial users monitored by MSDGC DIW within the SSO 700 IWAP study area.

Overflows and Outfalls

CSOs and SSOs within MSDGC's sewer system and Municipal Separate Storm Sewer System (MS4) storm outfalls are additional point source discharges that contribute to water quality issues and stream impairment. See Figure 3.20 for a map of the 11 SSOs, 9 CSOs, and various storm outfalls located within the SSO 700 IWAP study area. Because not all storm sewer system data have been received from the local political jurisdictions, Figure 3.20 represents most, but not all, of the storm sewer outfalls to the stream network. Additionally, the available storm sewer data does not always distinguish between inlets and outfalls. Therefore, all headwalls are shown in Figure 3.20, though some may be upstream headwalls.

FIGURE 3.18
Potential Pollutant Sources

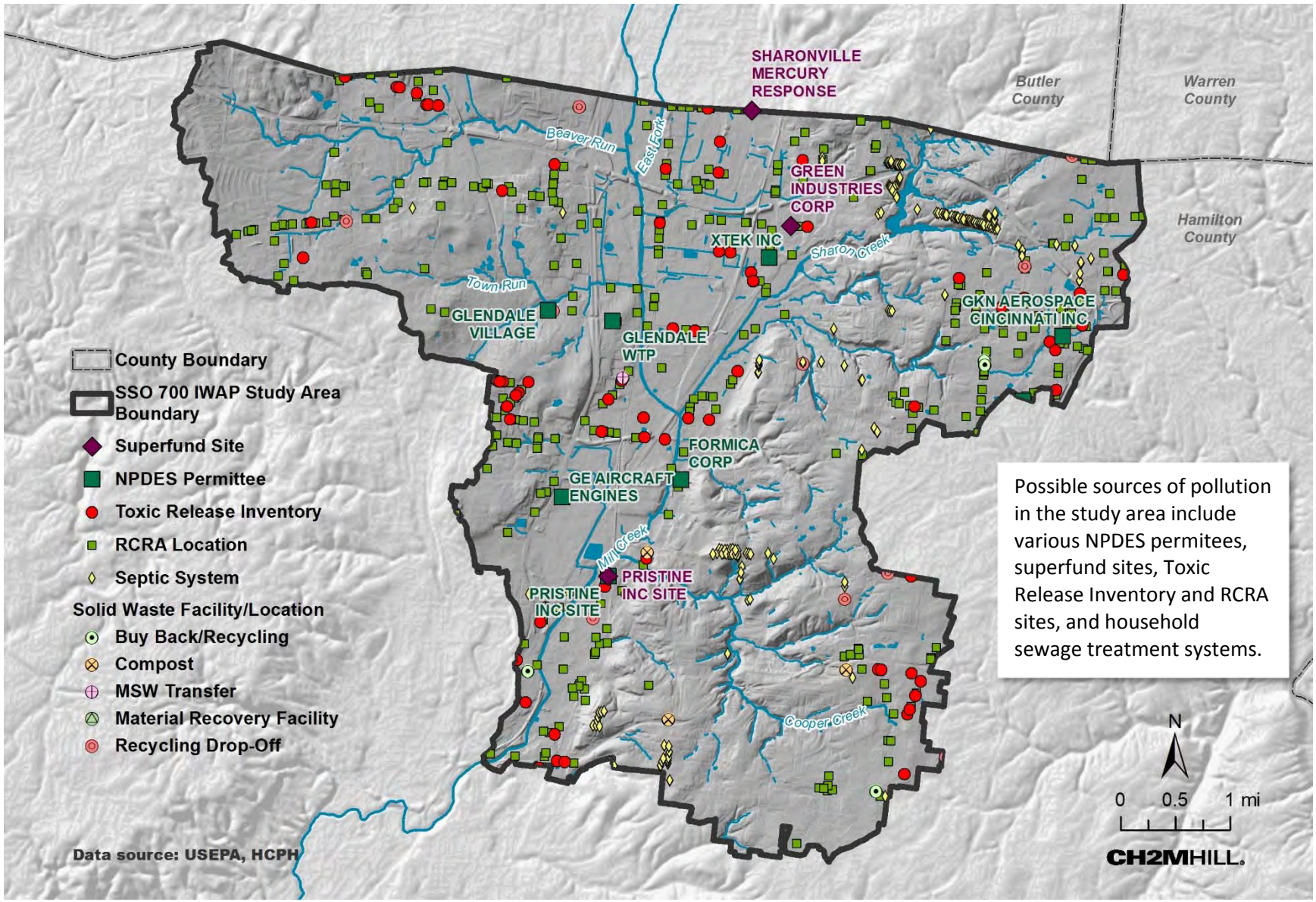


FIGURE 3.19
MSDGC's Permitted Industrial Users

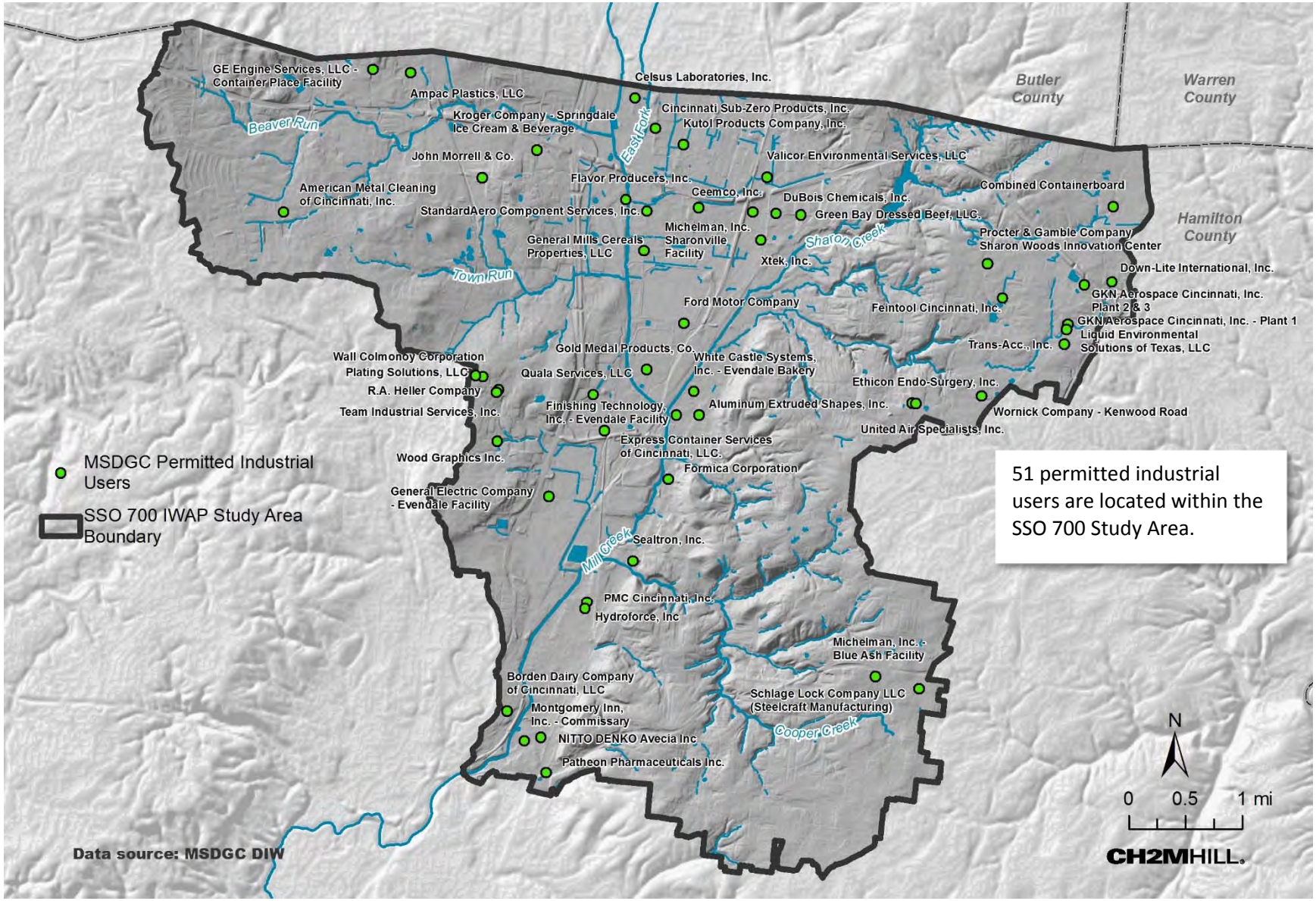
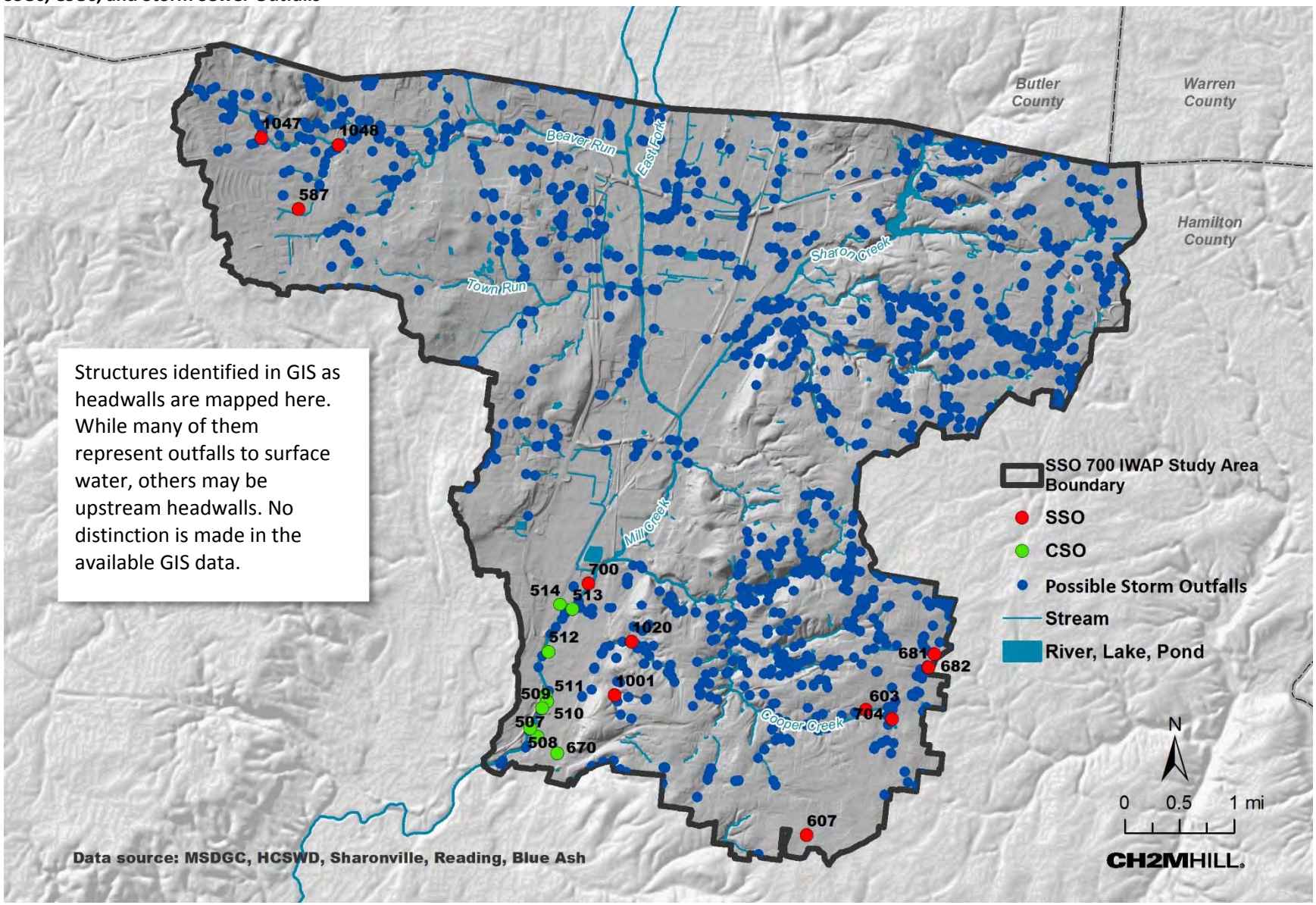


FIGURE 3.20
SSOs, CSOs, and Storm Sewer Outfalls



Data Gaps

The vast majority of pursued datasets under Potential Pollutant Sources were collected. Table 3.5 summarizes data the remaining minor data gaps.

TABLE 3.5
Summary of Potential Pollutant Sources Data Gaps

Gap	Category
HCPH Nuisance Data	Missing/Inessential
Additional Storm Sewer System Data	Missing/Inessential

Hydraulic Modeling Resources

The scope of Task 2.7.1 of the SSO 700 IWAP project includes review and assessment of the current Mill Creek System-Wide Model, provided by MSDGC, to evaluate its representation of the SSO 700 watershed and its applicability to support development of the IWAP. A validated and calibrated hydraulic model is required to support the IWAP. This section summarizes the data collected to assess MSDGC's collection system model, supporting Task 2.7.1.

Collection System Model

The current Mill Creek System Wide Model (Mill Creek.inp) was provided by MSDGC to the project team on January 15, 2015. No version number or version date accompanied the input file.

Flow Data

Flow data, held by MSDGC, are available for 78 monitor locations throughout the EBMC sewershed over varying time periods. Most flow data were collected from the FlowWorks website (www.flowworks.com) and MSDGC directly, while some data were previously obtained for the Rainfall Dependent Inflow and Infiltration (RDII) Pilot Study performed in 2011. Table 3.6 summarizes the available flow data for the EBMC per the 'Permanent_Monitors' shapefile received January 22, 2015, provided by MSDGC as part of the SSO 700 IWAP data request. Figure 3.21 provides a map of the flow monitor locations. See the *Task 2.7.1 Hydraulic Model Gap Analysis: Model Validation Period Selection Technical Memorandum*, dated February 27, 2015, for a summary of the rainfall periods and associated flow data selected for use in model validation.

Rainfall Data

The rainfall data, corresponding to the flow monitor collection periods, were collected for this analysis from both the Vieux Inc. website (http://www.vieuxinc.com/rainvieux.html) and MSDGC directly. Historical gauge-adjusted radar rainfall data (GARR) is available for 2006 and later. GARR data for January 2012 through December 2014 is available in 5-minute time steps from the Vieux, Inc. website dashboard by sewershed and by radar cell. These data were downloaded from the website in text and shapefile format for each sewer basin. For all rainfall events between January 2006 and December 2011, GARR data was provided by MSDGC. GARR data in 5-minute time steps were provided by MSDGC for all rainfall events from January 2006 through December 2011. These data were provided in shapefile format.

SSO 700 Storage and Treatment Facility Data

To validate the functionality of the SSO 700 Storage and Treatment Facility (STF), it is necessary to have data documenting how the facility was operated during the selected validation periods. These data were provided by Black and Veatch.

FIGURE 3.21
Flow Monitor Locations

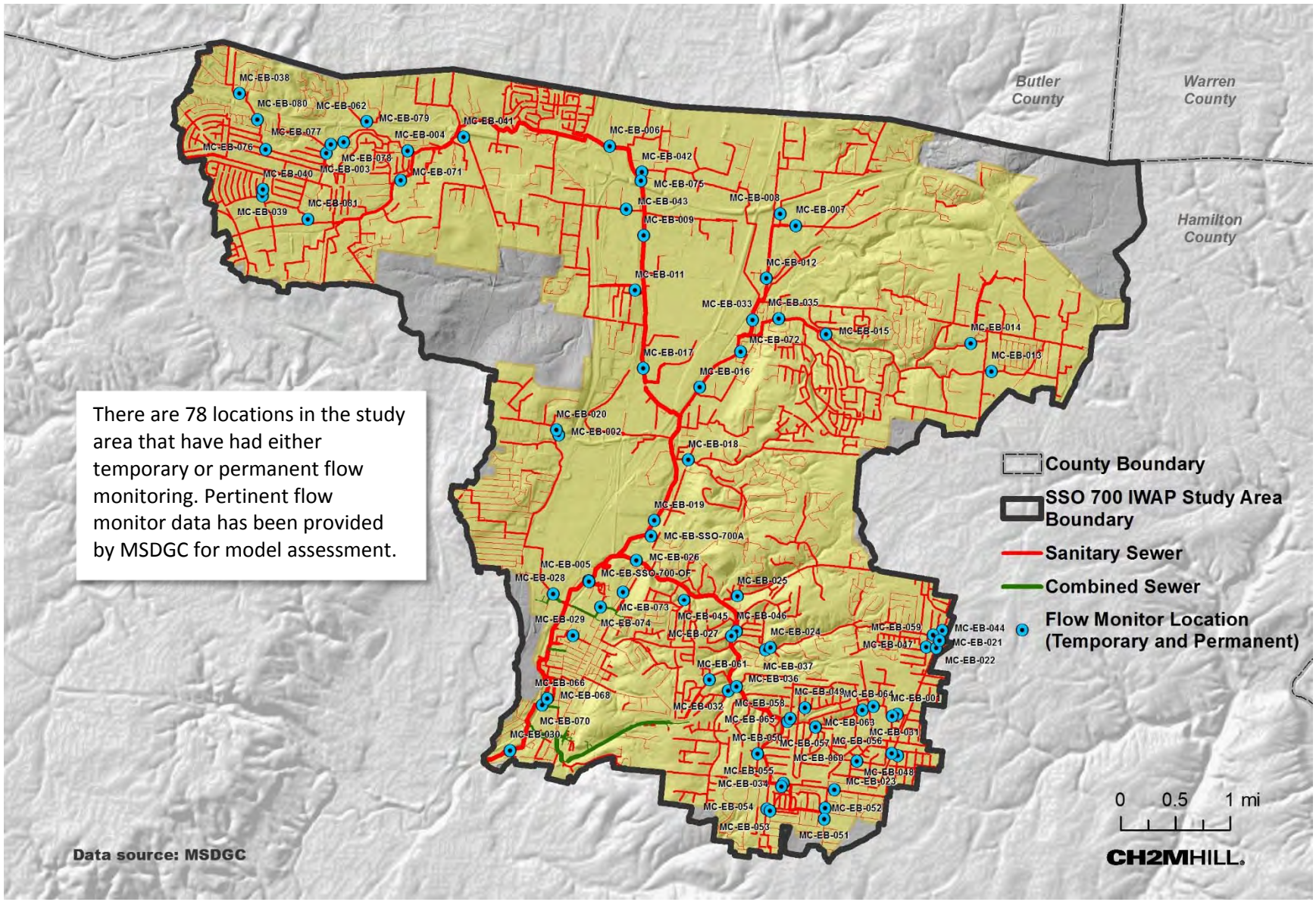


TABLE 3.6

SSO 700 Available Flow Monitors

SITE ID	AVAILABLE DATA	SITE ID	AVAILABLE DATA	SITE ID	AVAILABLE DATA	SITE ID	AVAILABLE DATA
MC-EB-001	10/00 – 2/01	MC-EB-022	01/01 – 03/01	MC-EB-042	04/08 – 08/08	MC-EB-062	04/08 – 08/08
MC-EB-002	12/00 – 3/01	MC-EB-023	01/01 – 07/01	MC-EB-043	04/08 – 08/08	MC-EB-063	12/08 – 02/10
MC-EB-003	01/01 – 08/05	MC-EB-024	01/01 – 07/01	MC-EB-044	04/08 – 08/08	MC-EB-064	12/08 – 02/10
MC-EB-004	01/01 – 11/13	MC-EB-025	01/01 – 07/01	MC-EB-045	04/08 – 08/08	MC-EB-065	12/08 – 02/10
MC-EB-005	03/01 – PRES	MC-EB-026	01/01 – PRES	MC-EB-046	04/08 – 08/08	MC-EB-066	06/09 – 08/09
MC-EB-006	01/01 – 03/06	MC-EB-027	01/01 – 11/13	MC-EB-047	04/08 – 08/08	MC-EB-068	06/09 – 08/09
MC-EB-007	01/01 – 07/01	MC-EB-028	01/01 – 07/01	MC-EB-048	04/08 – 08/08	MC-EB-070	06/09 – 05/11
MC-EB-008	01/01 – 07/01	MC-EB-029	01/01 – 07/01	MC-EB-049	04/08 – 08/08	MC-EB-071	09/11 – 11/13
MC-EB-009	01/01 – 07/01	MC-EB-030	01/01 – PRES	MC-EB-050	04/08 – 08/08	MC-EB-072	09/11 – 01/12
MC-EB-011	01/01 – 07/01	MC-EB-031	02/01 – 11/13	MC-EB-051	04/08 – 08/08	MC-EB-073	09/11 – 01/12
MC-EB-012	01/01 – 07/01	MC-EB-032	02/01 – 11/13	MC-EB-052	04/08 – 08/08	MC-EB-074	09/11 – 01/12
MC-EB-013	01/01 – 07/01	MC-EB-033	03/04 – 11/13	MC-EB-053	04/08 – 08/08	MC-EB-075	10/11 – 11/13
MC-EB-014	01/01 – 07/01	MC-EB-034	07/05 – 06/06	MC-EB-054	04/08 – 08/08	MC-EB-076	12/11 – 05/12
MC-EB-015	01/01 – 07/01	MC-EB-035	02/06 – PRES	MC-EB-055	04/08 – 08/08	MC-EB-077	12/11 – 05/12

TABLE 3.6

SSO 700 Available Flow Monitors

SITE ID	AVAILABLE DATA	SITE ID	AVAILABLE DATA	SITE ID	AVAILABLE DATA	SITE ID	AVAILABLE DATA
MC-EB-016	01/01 – 11/13	MC-EB-036	02/06 – 11/13	MC-EB-056	04/08 – 08/08	MC-EB-078	12/11 – 05/12
MC-EB-017	01/01 – 11/13	MC-EB-037	04/08 – 08/08	MC-EB-057	04/08 – 08/08	MC-EB-079	12/11 – 05/12
MC-EB-018	01/01 – 07/01	MC-EB-038	04/08 – 08/08	MC-EB-058	04/08 – 08/08	MC-EB-080	12/11 – 05/12
MC-EB-019	01/01 – PRES	MC-EB-039	04/08 – 08/08	MC-EB-059	04/08 – 08/08	MC-EB-081	12/11 – 05/12
MC-EB-020	01/01 – 07/01	MC-EB-040	04/08 – 08/08	MC-EB-060	04/08 – 08/08		
MC-EB-021	01/01 – 07/01	MC-EB-041	04/08 – 08/08	MC-EB-061	04/08 – 08/08		

Data Gaps

Detailed review of flow monitoring data and rain data was performed under Task 2.7.1 and recommendations for use of the data were provided in the *Model Validation Period Selection Technical Memorandum*, draft dated February 27, 2015. No additional data gaps have been identified.

Additional assessment of the collection system model has been done under Task 2.7.1. See the *Watershed Collection System Hydraulic Models Gap Analysis and Update Assessment Technical Memorandum* for gaps and recommendations associated with the collection system hydraulic model.

Watershed and Surface Water Quality Modeling Resources

Evaluation of data and data gaps related to the watershed and surface water quality modeling resources have been addressed in the *Watershed Water Quality Models Gap Analysis and Update Assessment Technical Memorandum*.

Section 4.0 - Recommendations for Filling Gaps

Table 4.1 summarizes the data gaps identified throughout this technical memorandum and provides brief recommendations for addressing these gaps in pursuit of the development of the SSO 700 IWAP. All of the gaps identified here are at this time considered "Missing/Inessential," meaning the data may or may not exist, but the data is not essential to the completion of the IWAP. Additional data gaps have been identified in the review and analysis of the existing watershed and surface water quality modeling and hydraulic modeling resources. These data gaps and associated recommendations to fill the data gaps have been documented in the following two technical memoranda:

- Task 2.6.1 *Watershed Water Quality Models Gap Analysis and Update Assessment Technical Memorandum*
- Task 2.7.1 *Watershed Collection System Hydraulic Models Gap Analysis and Update Assessment Technical Memorandum*.

TABLE 4.1
Summary of Recommendations for Filling Data Gaps

Data Gap	Gap Category	Recommendation for Addressing Gap
Additional Storm Sewer System Data	Missing/Inessential	Future Meetings with Political Jurisdictions
General Data from Political Jurisdictions	Missing/Inessential	Future Meetings with Political Jurisdictions
HCPH Nuisance Data	Missing/Inessential	Continued coordination with HCPH