

D. Drainage Study

Section 1 Background

1.1 Purpose

On November 15, 2005, the Memphis City Council approved the third reading of Ordinance No. 5135 establishing the Memphis Storm Water Enterprise Fund and implementing a storm water fee within the City of Memphis. The goal of the Fund was to provide, in part, "...adequate systems of collection, conveyance, detention, treatment and release of storm water; the reduction of hazard to property and life resulting from storm water runoff and flooding; and improvement in general health and welfare through reduction of undesirable storm water conditions and flooding..." Storm water fees began to be assessed on July 1, 2006. The Storm Water Enterprise Fund is under the direction, management and control of the Director of the Division of Public Works.

Since the implementation of the fund, revenues have been used to fund Operations and Maintenance of the storm water infrastructure within the City, along with implementing storm water capital improvement projects. An assessment of the City's Storm Water Program in 2012 identified long-term measures for the program. One of the recommended measures was the implementation of a "City-Wide Master Planning Program," noting that "Development of a master plan is essential for the long term success and function of the storm water program."

As a result of this recommendation, the Division of Public Works, working closely with the Division of Engineering, identified the areas of the City having a documented history of drainage and flooding problems. These areas were subdivided into drainage basins based on topography, and specific watersheds were targeted for the development of a Storm Water Master Plan. The goal of the City is to initiate seven (7) Storm Water Master Plans each year, starting in fiscal year 2014. Based on these studies, the City will then prioritize the recommended improvements from the Master Plans for implementation under the Storm Water Program.

The purpose of developing this Master Plan is to identify flooding problems within the Whitehaven Basin and recommend solutions with estimated costs. The recommendations will be used to prioritize drainage improvement projects within the City. The plan includes the development of a hydrologic and hydraulic model of the basin based on field survey information and GIS-based topographic information. The model was used to identify problem areas and model potential solutions.

1.2 Team Members

The team selected for the Whitehaven Basin study included:

Powers Hill Design, LLC

80 Monroe Avenue, Suite 420

Memphis, TN 38103

901-543-8000

Nisha Powers, President

Steve Hill, P.E., Project Manager

Smith Seckman Reid, Inc. (SSR)

2650 Thousand Oaks Boulevard, Suite 3200

Memphis, TN 38118

901-683-3900

Ben Ledsinger, P.E., Project Manager

Justin Avent, P.E., Modelling & Analysis

Milestone Land Surveying, Inc.

10360 Highway 70, Suite 1

Lakeland, TN 38002

901-867-8671

Daryl Menard, RLS, Surveyor

1.3 Study Area Overview

The Whitehaven watershed as defined for this study includes two basins historically identified on the City of Memphis drainage maps – Whitehaven and Fontaine. Together, these basins encompass 5.3 square miles or 3,420 acres. The Whitehaven basin falls within the Lower Nonconnah Creek drainage basin. The USGS Hydrologic Unit Code (HUC) for Lower Nonconnah Creek is 0801-0211-0103. The Whitehaven basin discharges into Nonconnah Creek through nine (9) separate outfalls spanning almost 2 miles along Nonconnah Creek.

Figure 1 illustrates the location of the Whitehaven study area.

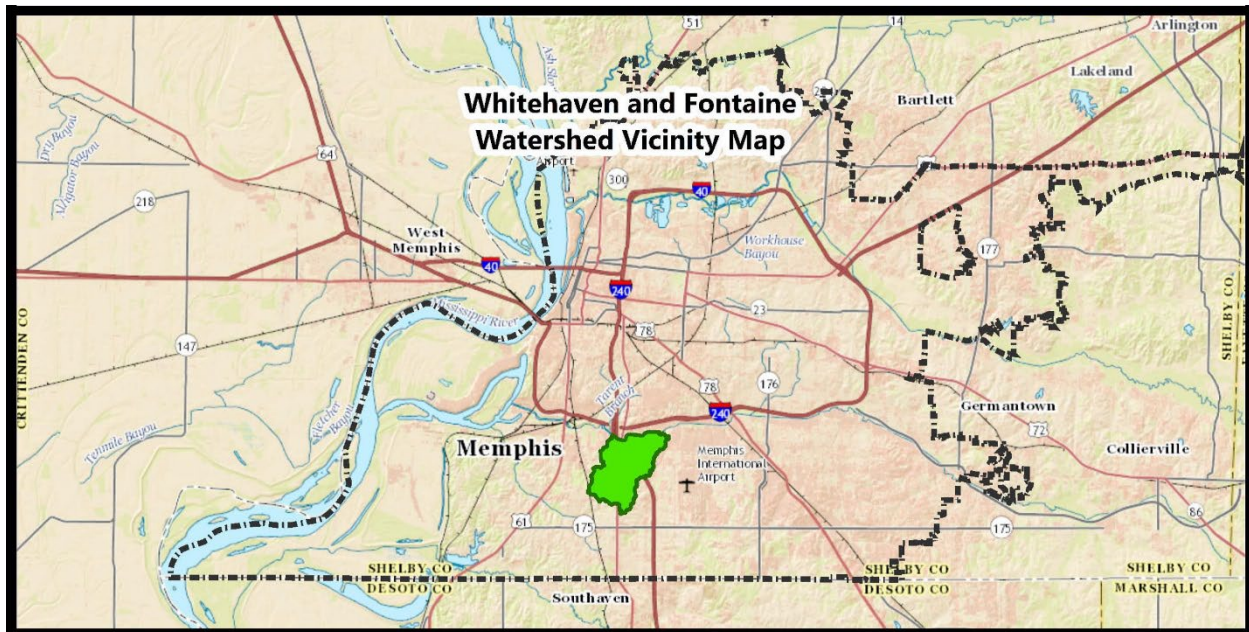
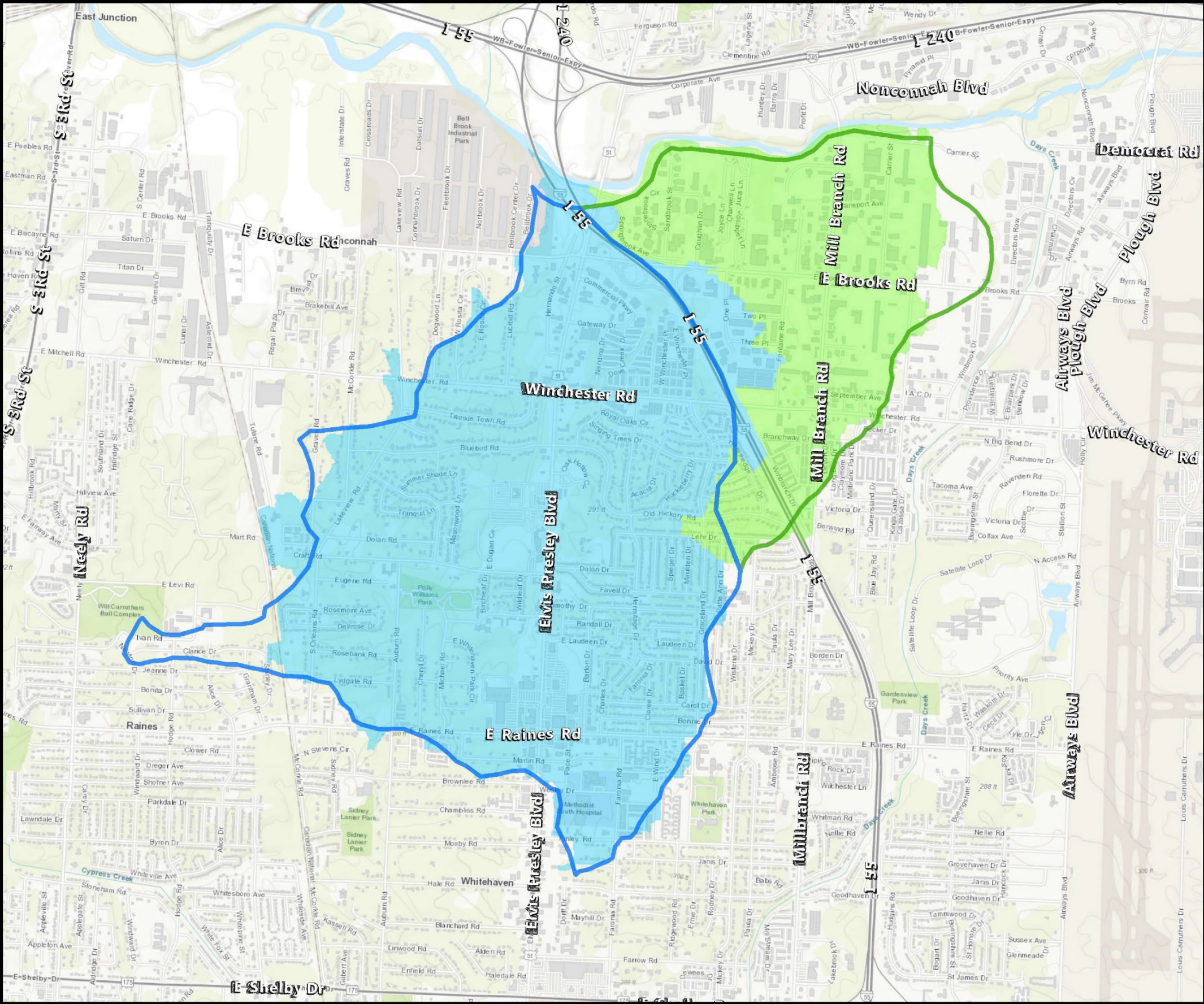


Figure 1. Whitehaven Vicinity Map

Study area basin boundaries were provided by the City of Memphis. While these boundaries were a good starting point, it soon became apparent that they were not 100% accurate. Through analysis using Arc Hydro Tools (detailed below), new basin boundaries were established which reflected the current topography obtained from LiDAR data. These refined basin boundaries are shown in Figure 2.



Legend

- Refined Fontaine Basin
- Original Fontaine Basin
- Original Whitehaven Basin
- Refined Whitehaven Basin

City of Memphis
Stormwater Master Plan
Whitehaven and Fontaine Basins
Refined Basin Boundaries

Figure 2. Refined Basin Boundaries

1.4 InfoSWMM Software

After extensive research and analysis of available software for the modeling of storm water systems, City staff selected InfoSWMM software for use on all Storm Water Master Plans under the City's Storm Water Program.

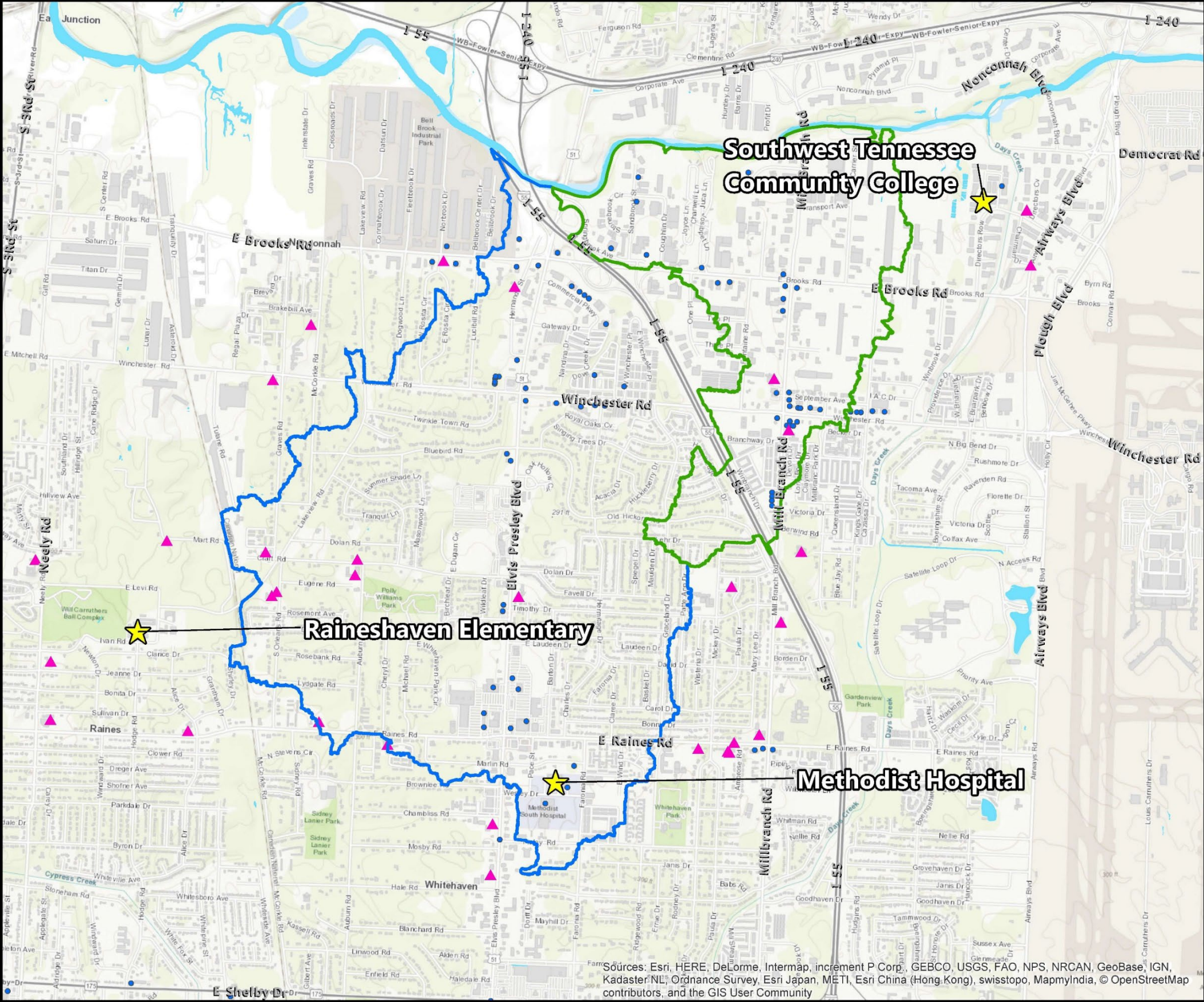
InfoSWMM is an ArcGIS integrated comprehensive hydrologic and hydraulic simulation model for the effective management of urban storm water collection systems. It is a fully dynamic, geospatial storm water modeling software, and is used to model the entire land phase of the hydrologic cycle as applied to urban storm water. The model performs either single event or long-term (continuous) rainfall-runoff simulations, accounting for climate, soil, land use, and topographic conditions of the watershed. It can use either steady routing, kinematic wave routing or dynamic wave routing to model the flow through a conveyance system of pipes, channels, storage/treatment devices, pumps, and hydraulic regulators such as weirs and orifices.


The hydrologic system operates by applying precipitation across user-defined hydrologic units, and then routing flow through both overland flow and infiltration to loading points on the user-defined storm water system. Runoff hydrographs for these loading points provide input for hydraulic routing in the downstream system. The hydraulic flow routing routine of InfoSWMM uses a series of links and nodes to represent the storm water system. It dynamically routes storm water flow by continuously solving the complete one-dimensional Saint-Venant flow equations. The dynamic flow routing allows for representation of channel storage, branched or looped networks, backwater effects, free surface flow, pressure flow, entrance and exit losses, weirs, orifices, pumping facilities, rating curves, and other special structures or links.

1.5 Public Involvement and Outreach


The public outreach effort for the Whitehaven basin focused on: (a) informing the public of the impending drainage study, and (b) providing a platform for citizens to inform the City of existing drainage-related issues. Based on discussions with City staff, it was determined that a total of six (6) public meetings would be held in the Whitehaven Basin to insure that citizens would have an opportunity to attend a meeting near them.

To increase knowledge of and attendance at all of the public meetings, our team distributed meeting information and flyers. While distributing this information, the team talked with as many area residents as possible in an attempt to gather specific concerns that could be voiced during the public meetings. Our team decided to target area businesses and churches for distribution of public meeting information. An area map showing meeting locations, church and business contacts, and the study area is shown in Figure 3.







City of
Memphis




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CIVIL ENGINEERING. CIVIL RESPONSIBILITY.





SSR Smith
Seckman
Reid, Inc.





Legend

 Fontaine Basin

 Whitehaven Basin

 Church Contacts

 Business Contacts

 Public Meeting Location

0 1,000 2,000 4,000

Feet

0 0.25 0.5 1

Miles

City of Memphis

Stormwater Master Plan

Whitehaven and Fontaine Basins

Public Involvement

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Figure 3. Public Involvement

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Three (3) initial public meetings were held to explain the purpose of the study and to solicit input from the public about any drainage or flooding problems they have experienced. These meetings were held on the following locations and dates:

- A. Raineshaven Elementary School – July 29, 2014
- B. Methodist South Hospital – July 30, 2014
- C. Southwest Tennessee Community College – July 31, 2014

Public notification about the meetings consisted of the following efforts:

- Posting of flyers at over 50 businesses and churches in the Whitehaven basin. Figure 4 is the flyer that was posted.
- Posting of the meeting notice on the Whitehaven drainage study website.
- Sending meeting notices to the Daily News and Tri-State Defender.
- Email the meeting flyers to Memphis City Council, Shelby County Commission and local agencies. The Memphis Office of Sustainability posted the information to their website.
- Nisha Powers appeared on Fox13 television station the morning of July 29, 2014 to discuss the storm water program and notify Whitehaven residents of the public meetings.

In spite of the extensive public notice, no one from the public attended any of the three public meetings.

A web site was created to provide another avenue for informing the public and to solicit further input on drainage issues. A questionnaire was prepared and posted on-line (see Figure 5 and Figure 6) asking residents to detail their drainage issues in the Whitehaven basin. No one submitted a questionnaire for this basin. All information that was available at the public meetings, along with basin maps and the questionnaire, were posted to the web site for the duration of the study and 2 years thereafter. No public input was received during that time. The website was discontinued.

Three (3) more public meetings were planned at the conclusion of the project to inform the public of the results of the study. However, the City elected to cancel these meetings.

City of Memphis
Division of Engineering

Stormwater Master Plan for Whitehaven

The purpose of the Master Plan is to identify potential solutions for flooding and drainage issues

Neighborhood Meetings

Meeting Goals

- (1) Provide information about the project
- (2) Gather input about drainage and flooding problems you experience

See Map on back for Study Area.

Meeting Times & Locations

Tuesday, July 29, 2014

6:00 - 8:00 pm
Raineshaven Elementary School
430 Ivan Road, Memphis, TN

Wednesday, July 30, 2014

6:00 - 8:00 pm
Methodist South Hospital
1300 Wesley Drive, Memphis, TN

Thursday, July 31, 2014

6:00 - 8:00 pm
Southwest Tennessee Community College
3035 Directors Row, Building 6, Memphis, TN

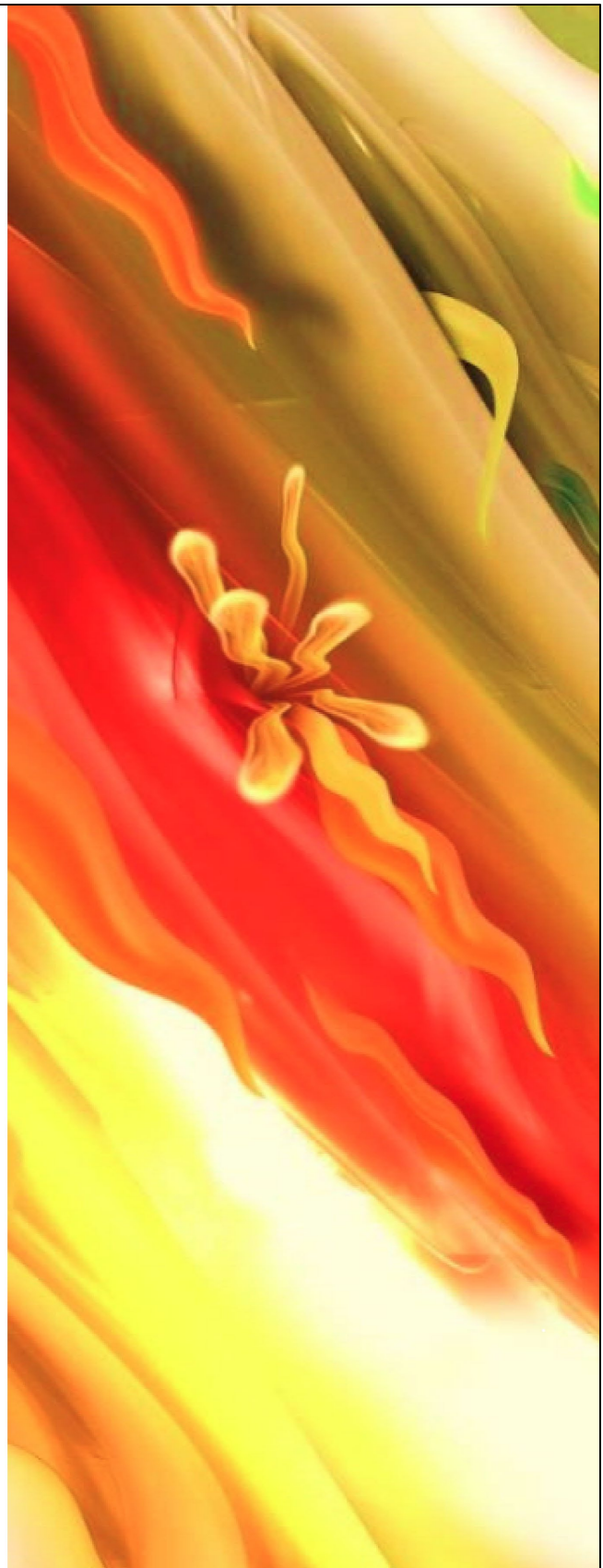


Figure 4. Whitehaven Meeting Announcement



City of Memphis – Stormwater Master Plan
Neighborhood Meeting for Whitehaven
July 2014

QUESTIONNAIRE

The purpose of this Questionnaire is to gather input from you on the flooding and/or drainage conditions in your neighborhood. Please return completed Questionnaires to the Sign-In Desk or mail to the address on the back. **Contact information MUST be provided.**

1. Do you live within the Study Area? Yes ____ No ____ Not Sure ____ (Please ask our team)

2. Do you own property within the Study Area? Yes ____ No ____ Not Sure ____

3. Your property is: A home ____ A business ____ Other _____

4. Do you own or rent your home? Own _____ Rent _____

5. What flooding problems have you experienced around or near your property?

<u>Type of Flooding</u>	<u>How Deep</u>	<u>How Often</u>	<u>Date of Last Occurrence</u>
____ Street Flooding	_____	_____	_____
____ Yard Flooding	_____	_____	_____
____ Garage Flooding	_____	_____	_____
____ Basement Flooding	_____	_____	_____
____ Main Building Flooding	_____	_____	_____

6. Have you ever had property damage (basement, cars, furniture, etc.)? Yes ____ No ____

If so, describe:

7. Do you have documentation of the flooding (high water marks, photos, videos)? Yes ____ No ____

If so, describe:

8. May we contact you to discuss further? Yes ____ No ____

(Please see back for additional information.)

Figure 5. Initial Public Meetings Questionnaire (front)



City of Memphis – Stormwater Master Plan
Neighborhood Meeting for Whitehaven
July 2014

QUESTIONNAIRE (Cont'd)

Additional Comments:

Thank you for your participation!

Personal Information **(REQUIRED)**

Name: _____

Home Address: _____

Phone: _____

Email: _____

Please mail in no later than
August 15, 2014 to:

Powers Hill Design, LLC
80 Monroe Avenue, Suite 420
Memphis, TN 38103
Attn: WHITEHAVEN

If you have questions, please email
whitehaven@phdmemphis.com.

Figure 6. Initial Public Meetings Questionnaire (back)