



CITY OF HOMEWOOD

Stormwater Master Plan

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Table of Contents

Executive Summary.....	v
1. Introduction	1
1.1. Background.....	1
2. Methodology	2
2.1. Study limits and Priority Area Selection (Public Engagement and Stakeholders)	2
2.2. Stormwater Ordinance Benchmarking, Revision Recommendations, and Enforcement Recommendations	2
2.1. Map Grade Survey and Condition Assessment Framework.....	4
2.2. Existing Conditions Capacity Assessment	4
2.2.1. Subbasin Delineation	5
2.2.2. Longest Flow Path and Slope	5
2.2.3. Subbasin Width	5
2.2.4. Pervious Curve Number and Percent Imperviousness.....	5
2.2.5. Pervious and Impervious Manning's N values	6
2.2.6. Design Storm Distribution.....	6
2.2.7. Rainfall Depth	6
2.2.8. Stormwater Drainage Network	7
2.2.9. Runoff Hydrograph Routing Method.....	7
2.3. Model Verification and Calibration	7
2.4. Level of Service & Existing Issues	8
3. Project Prioritization.....	9
3.1. Methodology	9
3.2. Project Criteria	9
3.3. Cost Estimates.....	10
4. Alternative Development.....	10
4.1. Kenilworth/Ridge	10
4.1.1. Area Description	10
4.1.2. Project Description	11
4.1.3. Project Benefits	11
4.1.4. Other Alternatives Scored.....	11
4.1.5. Other Alternatives Not Scored.....	11
4.1.6. Project Analysis Summary	11
4.2. Melrose Place	12
4.2.1. Area Description	12

4.2.2.	Project Description	12
4.2.3.	Project Benefits	12
4.2.4.	Other Alternatives Scored.....	12
4.2.5.	Other Alternatives Not Scored.....	12
4.2.6.	Project Analysis Summary	12
4.3.	Edgewood Elementary	13
4.3.1.	Area Description	13
4.3.2.	Project Description	13
4.3.3.	Project Benefits	13
4.3.4.	Other Alternatives Scored.....	13
4.3.5.	Other Alternatives Not Scored.....	14
4.3.6.	Project Analysis Summary	14
4.4.	Oxmoor Road.....	14
4.4.1.	Area Description	14
4.4.2.	Project Description	14
4.4.3.	Project Benefits	14
4.4.4.	Other Alternatives Scored.....	14
4.4.5.	Other Alternatives Not Scored.....	14
4.4.6.	Project Analysis Summary	15
4.5.	Bellview.....	15
4.5.1.	Area Description	15
4.5.2.	Project Description	15
4.5.3.	Project Benefits	15
4.5.4.	Other Alternatives Scored.....	16
4.5.5.	Other Alternatives Not Scored.....	16
4.5.6.	Project Analysis Summary	16
4.6.	Glenwood Drive.....	16
4.6.1.	Area Description	16
4.6.2.	Project Description	17
4.6.3.	Project Benefits	17
4.6.4.	Other Alternatives Scored.....	17
4.6.5.	Other Alternatives Not Scored.....	17
4.6.6.	Project Analysis Summary	17
4.7.	Overton Park.....	17
4.7.1.	Area Description	17

4.7.2.	Project Description	17
4.7.3.	Other Alternatives Scored	18
4.7.4.	Other Alternatives Not Scored.....	18
4.7.5.	Project Analysis Summary	18
4.8.	Homewood Middle School	18
4.8.1.	Area Description	18
4.8.2.	Project Description	19
4.8.3.	Project Benefits	19
4.8.4.	Other Alternatives Scored.....	19
4.8.5.	Other Alternatives Not Scored.....	19
4.8.6.	Project Analysis Summary	19
4.9.	Additional Areas	19
5.	Recommendations and Findings	20
5.1.	Stormwater Infrastructure Improvement Projects	20
5.2.	Ordinance Revisions	20

Appendices

APPENDIX A - Masterplan Overview Figures

Figure 1. Drainage Area Map

Figure 2. FEMA Map

Figure 3. Priority Area Map

Figure 4. "Known Issues" Map

Figure 5. Priority Areas and "Known Issues" Map

Figure 6. FEMA vs SWMM Water Surface Comparison Map

Figure 7. Soils Map

Figure 8. NOAA Atlas 14 Precipitation Data

APPENDIX B – Overview of Recommended Projects

APPENDIX B-1: Kenilworth/Ridge Road

APPENDIX B-2: Melrose Place

APPENDIX B-3: Edgewood Elementary

APPENDIX B-4: Oxmoor Road

APPENDIX B-5: Bellview Circle

APPENDIX B-6: Glenwood Drive

APPENDIX B-7: Overton Park

APPENDIX B-8: Homewood Middle School

APPENDIX C – Overview of Alternatives

APPENDIX D – Standard Operating Procedures

EXECUTIVE SUMMARY

The City of Homewood has contracted Kimley-Horn to complete a stormwater master plan for the 3.7 square mile drainage area for Griffin Brook. The City has experienced both localized and riverine flooding in the wake of significant growth and an aging stormwater management system. The goal of this analysis is to identify priority areas within the drainage area for study, review the City's existing stormwater management regulations and provide recommendations for improvement, quantify existing flooding through hydrologic and hydraulic modeling, develop concept level stormwater infrastructure improvement projects to address flooding, and prioritize stormwater infrastructure improvement projects for implementation. Kimley-Horn partnered with the City to develop a stormwater management plan process that fit the needs of the City.

This analysis utilized public coordination, hydrologic and hydraulic modeling, and project prioritization procedures to develop a list of 7 concept level improvement projects for implementation. A comprehensive SWMM model was built using commissioned survey data from EDT, LiDAR, land use data from the USGS updated using aeriels, and rainfall data from NOAA Atlas 14. The model showed flooding during various storm events in each priority area due to both riverine and localized capacity limitations. Concept level improvement projects were evaluated to improve the performance of the stormwater management system. Full design of these proposed improvement projects will need to be completed. Digital copies of the models completed for this study have been provided to the City of Homewood Department of Engineering and Zoning.

The recommended stormwater improvement projects are as follows:

- Kenilworth and Ridge Road
Replace blocked pipe and install closed drainage system at Hillwood Dr and Edgewood Blvd.
- Melrose Place
Install closed drainage system and install diversion pipe on Primrose.
- Edgewood Elementary Area
Upgrade inlets and pipes down to Griffin Brook.
- Bellview Road
Install closed drainage system to bypass flow along Bellview Circle/Somerset Drive.
- Glenwood Drive
Install closed drainage system to bypass flow through Glenwood Alley.
- Overton Park Area
Install larger box culverts to convey flow downstream to Griffin Brook.
- Homewood Middle School Area
Install detention facility on Valley Avenue.

Each of the above projects has been assigned an overall project score and cost estimate. Prioritization of these projects should be considered in terms of scale of impact, score, and estimated costs. Two lists have been provided that prioritize projects. The first list, Table 1, prioritizes projects according to time to implement, estimated cost, and score. The second list, Table 2, prioritizes projects according to estimated

cost effectiveness and score. "Cost Effectiveness" was approximated by dividing the estimated cost for a project by the number of structures for which flood risk was reduced.

Table 1: Prioritization by score and cost

Rank	Project Area	Improvement Project	Project Score	Project Cost
1	Kenilworth and Ridge Road	Replace blocked pipe and install closed drainage system at Hillwood Dr and Edgewood Blvd	15	\$243,015
2	Edgewood Elementary Area	Upgrade inlets and pipes down to Griffin Brook.	19.4	\$490,015
3	Bellview Road	Install closed drainage system to bypass flow along Bellview Circle/Somerset Drive	14	\$263,987
4	Melrose Place	Install closed drainage system and install diversion pipe on Primrose.	16.4	\$581,776
5	Glenwood Drive	Install closed drainage system to bypass flow through Glenwood Alley	14.6	\$1,040,048
6	Homewood Middle School Area	Install detention facility on Valley Avenue	19.4	\$3,534,174
7	Overton Park Area	Install larger box culverts to convey flow downstream to Griffin Brook	14	\$3,433,599

Table 2: Prioritization by cost effectiveness and score

Rank	Project Area	Improvement Project	Project Score	Project Cost
1	Edgewood Elementary Area	Upgrade inlets and pipes down to Griffin Brook.	19.4	\$490,015
2	Kenilworth and Ridge Road	Replace blocked pipe and install closed drainage system at Hillwood Dr and Edgewood Blvd	15	\$243,015
3	Bellview Road	Install closed drainage system to bypass flow along Bellview Circle/Somerset Drive	14	\$263,987
4	Homewood Middle School Area	Install detention facility on Valley Avenue	19.4	\$3,534,174
5	Melrose Place	Install closed drainage system and install diversion pipe on Primrose.	16.4	\$581,776
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7	Overton Park Area	Install larger box culverts to convey flow downstream to Griffin Brook	14	\$3,433,599

1. INTRODUCTION

1.1. Background

The City of Homewood has experienced rapid and continued growth that has placed an increased burden on the City's aging stormwater management system. Localized drainage issues reported to be related to limited capacity, infrastructure limitations, and redevelopment combined with riverine flooding along Griffin Brook and its tributaries pose a threat to the quality of life currently enjoyed by the citizens of Homewood. Rain events have flooded roadways, causing them to become impassable, and damaged homes and businesses.

To assess the current stormwater issues and develop mitigation strategies, the City of Homewood in partnership with Kimley-Horn, developed an analytical process to develop a Stormwater Master Plan (SWMP). The SWMP identifies stormwater problem areas, establishes a framework for assessing conditions of existing infrastructure for City staff, assesses the current stormwater regulatory practices, establishes goals for mitigation, and prioritizes conceptual stormwater infrastructure improvement projects. This process included four major components: a) public engagement to identify priority areas, b) modeling to assess conveyance capacity, develop concept level projects, and prioritize infrastructure improvement projects, c) ordinance review to improve infrastructure resiliency, and d) map grade inventory and conditions assessment.

The majority of the City (3.7 sq. mi.) outfalls into Griffin Brook and the remainder of the City outfalls further downstream into Shades Creek (Figure 1). This SWMP assess the primary, 3.7 sq. mi. drainage area for the City that outfalls into Griffin Brook.

Griffin Brook bisects the City. Within and bounding Griffin Brook are FEMA Zone A and AE special flood hazard areas (SFHA) along with a designated floodway (Figure 2). FEMA Zone A describes areas with a 1% annual chance of flooding, while FEMA zone AE describes floodplain that FEMA has provided studies and determined base flood elevations. Homewood is relatively hilly and ranges in elevation from under 700 feet to over 800 feet above sea level. Many sections of Griffin Brook are comprised of walled sections that require regular maintenance and either run parallel to private property boundaries, are contained fully on private property, or are within close proximity to habitable structures. During extreme rain events, constrictions along Griffin Brook such as undersized culverts or crossings along with the restricted cross section of the walled segments contribute to riverine related flooding experienced in the city that in turn contributes to localized flooding issues.

Eight priority areas were identified and selected for assessment within the 3.7 sq. mi. drainage area for this SWMP (see Section 2.1): Primrose Melrose, Glenwood, Overton Park, Bellview, Kenilworth and Ridge Road, Oxmoor Avenue, Homewood Middle School, and Edgewood Elementary School (Figure 3). Each of these areas was assessed individually and collectively to develop concept level infrastructure improvement projects. These concept level improvements were developed to address both localized and/or riverine flooding issues and not cause an adverse impact on the downstream stormwater management system.

2.METHODOLOGY

This SWMP was completed by using public engagement, hydrologic and hydraulic modeling, and ordinance benchmarking to develop concept level mitigation projects and provide stormwater ordinance revision recommendations. Additionally map grade survey and a condition assessment was completed to establish a framework for the City to complete a comprehensive inventory of its stormwater assets in the future. A public engagement process along with input from the City Engineer about recurring stormwater issues was used to identify the extent of the drainage area for this study and identify specific focus areas throughout Homewood called priority areas. Hydrologic and hydraulic modeling was then used to assess existing conveyance capacity along Griffin Brook within the subject area, define the level of service provided by the stormwater infrastructure within each priority area, and develop concept level infrastructure improvement projects to improve the level of service where needed. A project ranking system was used along with cost estimates to prioritize these infrastructure improvement projects. Finally, an ordinance benchmarking exercise/review was completed to improve infrastructure resiliency by providing recommendations for ordinance revisions that better align with other local jurisdiction regulations and emphasize the assessment of existing infrastructure capacity during the design of stormwater management systems for significant redevelopment projects.

2.1. Study limits and Priority Area Selection (Public Engagement and Stakeholders)

The limits for this study along with the eight priority areas were identified using feedback from the citizens of Homewood along with input of pertinent stakeholders such as the City Engineering and Zoning Department staff. Data about stormwater issues observed by the Citizens of Homewood was collected via an online public feedback platform developed for the City of Homewood for this SWMP and a public meeting. The platform was live from January 2022 to April 2022. During this timeframe, the public was instructed via email blasts to City Council members that were further disseminated to citizens, notification on the City's Stormwater Program webpage, notifications to the City's Facebook group, and posted flyers to document stormwater issues that they had noticed throughout Homewood via the platform. Documentation included denotation of the type (i.e. clogged inlet, damaged drain, erosion-minor, erosion-severe, inlet flooding, property flooding, street flooding, sinkhole, and miscellaneous), frequency, and location of the issues being seen, along with the opportunity to upload photos and provide additional commentary. A Public meeting was held on February 15, 2022 to collect this same information via roll plots and provide both the citizens of Homewood and Kimley-Horn the opportunity to discuss observed issues in person.

The data collected from the platform and public meeting was combined with historical knowledge about recurring stormwater infrastructure issues from the City Engineering and Zoning Department to select the study limits (Figure 1) and priority areas (Figure 3). The selected study area included a 3.7 sq. mi contributing drainage area to Griffin Brook that featured approximately 65% of all of the drainage issues reported via the platform (Figure 4). A total of eight priority areas were selected based on the density of occurrence of drainage complaints by type and feedback from the City Engineering and Zoning Department (Figure 5).

2.2. Stormwater Ordinance Benchmarking, Revision Recommendations, and Enforcement Recommendations

A benchmarking analysis of the City's Stormwater management ordinance was completed to identify ordinance revision recommendations that implement the same level of stormwater

management requirements that other local municipalities employ, aid in maintaining the level of service for existing stormwater infrastructure and increase the resiliency of future stormwater infrastructure. The benchmarking process began with the acquisition of documents that define the City's stormwater regulations. These documents included the City's MS4 Permit (2021), Subdivision Regulations (2005), and Article X (Post-Construction Stormwater Management) of Chapter 5 of the City of Homewood, Alabama Code of Ordinances (2021). Each document was reviewed, and design standards and specifications were noted.

Next, municipalities or jurisdictions with similar populations, within the same geographical region, and/or with advanced stormwater management techniques were identified as places of comparison. The identified municipalities and jurisdictions included the follow:

1. Birmingham, Alabama
2. Pelham, Alabama
3. Hoover, Alabama
4. Jefferson County, Alabama
5. Mountain Brook, Alabama
6. Northport, Alabama
7. Tuscaloosa, Alabama
8. Vestavia Hills, Alabama
9. Atlanta, Georgia
10. Gwinnett County, Georgia

Publicly available documents containing each municipalities' stormwater regulations were collected and reviewed similarly to that of the City of Homewood's. Specifications and standards were recorded for each jurisdiction. These records were then organized into a regulatory review matrix to allow for a benchmarking analysis (comparison) of the City of Homewood's stormwater and floodplain related ordinances and regulations to those of the previously listed jurisdictions. Stormwater management regulations and practice gaps were then identified using the matrix and considered along with input about historical stormwater issues from the City Engineering and Zoning department to develop revision recommendations. It is recommended that the following thirteen revision recommendations be considered for the stormwater management ordinances:

- Include downstream analysis requirements for all proposed development that increases impervious area by more than 10%.
- Include analysis at all "choke points" or conveyances between site outfall and downstream analysis point.
- Place limits on pre-development curve numbers within certain districts.
- Impose a reduction factor for peak discharges based on the percentage of proposed impervious cover on the site.
- Require energy dissipation measures at outlets.
- Require the 1-, 10-, and 100-year storm to be detained.
- Require the treatment of the 1-year, 24-hour storm, or the Channel Protection Volume (CPv).
- Define the circumstances under which CPv treatment is required.
- Implement a feasibility policy for proposed developments.
- Define freeboard heights.
- Define velocity ranges and design storms used to analyze structures.

- Require a conceptual consultation meeting with the City prior to the final design of a proposed development.
- Require that developers provide justification for not using the SCS method and require that the only acceptable alternative be the Modified Rational Method.

The following actions are also recommended to help the City enforce the stormwater management ordinances and educate owners about stormwater management requirements:

- Create stormwater management site plan review checklists for internal use by reviewers and external use by development permit applicants
- Educate owners about stormwater management requirements during concept consultation
- Educate site plan review team about stormwater management requirements

2.1. Map Grade Survey and Condition Assessment Framework

Collection of map grade survey and an assessment of conditions of limited areas within the City was completed while collecting the needed survey for this SWMP to establish a framework for the City to complete a comprehensive inventory of stormwater assets in the future. The map grade survey included spatial location and basic attribute information for stormwater assets in the priority areas selected for analysis. These basic attributes included the same assets employed in the Jefferson County stormwater database (i.e. asset type, material, and diameter) for seamless transferal of new and updated data into the Jefferson County database. During the collection process, a standard operating procedure (SOP) document was developed. This document outlines the collection procedures that should be employed by City employees to continue with stormwater asset assessment and inventory beyond the priority areas assessed for this study. This SOP is included in Appendix D.

2.2. Existing Conditions Capacity Assessment

A detailed hydrologic and hydraulic model was built using Personal Computer Storm Water Management Model (PCSWMM) 2022 to estimate the capacity of the City's stormwater management system in existing conditions. PCSWMM is a proprietary platform that uses the U.S. Environmental Protection Agency's (EPA) Stormwater Management Model (SWMM) computation engine. EPA SWMM requires the following input parameters:

- Drainage area
- Longest flow path (and basin slope)
- Subbasin width
- Pervious Natural Resources Conservation Service (NRCS) curve number
- Percent imperviousness
- Manning's n values for pervious and impervious areas
- Rainfall data

These parameters were calculated for each existing conditions subbasin within the project drainage area and input along with the existing stormwater drainage network (including both open and closed stormwater conveyances). The 1-, 2-, 5-, 10-, 25-, 50-, 100-, and 500-year peak flows were estimated using NOAA Atlas 14, Volume 9, Version 2 24-hour precipitation frequency

estimates along with the NRCS Type III design storm distribution. The following sections describe the processes used to derive the EPA SWMM model input parameters for this project.

2.2.1. Subbasin Delineation

Existing conditions subbasins were delineated using LiDAR data collected by Jefferson County and survey data for major creek and tributary crossings. Subbasins were delineated at major crossings to account for attenuation caused by the existing structures. Subbasins were also delineated in each priority area as needed to assess the reported issued within the area.

2.2.2. Longest Flow Path and Slope

The existing conditions longest flow paths for each subbasin were estimated from LiDAR data. The longest flow path represents the longest path within each basin that stormwater runoff can travel over before reaching the basin's outlet, which is determined by following natural flow paths denoted by elevation contours. Slope was determined using the elevation change divided by the distance of the longest flow path.

2.2.3. Subbasin Width

The subbasin width for each basin was calculated based on the following formula:

$$W = \frac{A_{sub}}{L_{ov}}$$

where:

W = subbasin width (ft)

A_{sub} = area of subbasin (ft²)

L_{ov} = length of overland sheet flow (Longest Flow Path)

2.2.4. Pervious Curve Number and Percent Imperviousness

To account for infiltration, the SCS Curve Number (CN) loss method was utilized. Land use was delineated for the site based on existing landcover data and aerial photography. Area weighted curve numbers were calculated for pervious areas only within each subbasin. The SWMM model calculates runoff hydrographs for the pervious and impervious areas separately and combines them into a single hydrograph for each subbasin. The pervious curve numbers for each basin were calculated using detailed soils and land use information; the percent imperviousness values for each basin were then calculated using land use information. The Natural Resources Conservation Service (NRCS) Web Soil Survey was used to estimate the hydrologic soil group of the soils underlying the project area. Using this soil data in conjunction with the land use data, weighted pervious curve numbers were calculated for each subbasin. The percentage of imperviousness of each basin for existing conditions was also calculated using the delineated land use layer. Table 1 below lists the curve number values associated with each land use type for this analysis.

Table 1. Curve Number Lookup Table

Land Use Description	Land Use Code	Percent Impervious	Initial Loss Pervious Area (inches)	Manning's n	Curve Number (CN)			
					Hydrologic Soil Group			
					A	B	C	D
Commercial and business	C	85%	0.15	0.03	89	92	94	95
Industrial	I	72%	0.15	0.035	81	88	91	93
Impervious Areas	IMP	100%	0.15	0.03	98	98	98	98
Open Space - Fair Condition	PF	0%	0.15	0.08	49	69	79	84
Open Space - Good Condition	PG	0%	0.20	0.09	39	61	74	80
Water	POND	100%	0.00	0	100	100	100	100
Open Space - Poor Condition	PP	0%	0.15	0.06	68	79	86	89
Residential – 1/2 acre lots	R25	25%	0.15	0.045	54	70	80	85
Residential – 1/3 acre lots	R30	30%	0.15	0.045	57	72	81	86
Residential – 1/4 acre lots	R38	38%	0.15	0.04	61	75	83	87
Residential – 1/8 acre or less (town houses)	R65	65%	0.15	0.035	77	85	90	92
Woods - Fair Condition	WF	0%	0.2	0.1	36	60	73	79
Woods - Good Condition	WG	0%	0.25	0.12	30	55	70	77
Woods/Grass Fair Condition	WGCF	0%	0.2	0.1	35	56	70	77
Woods/Grass – Good Condition	WGCG	0%	0.25	0.12	32	58	72	79
Woods - Poor Condition	WP	0%	0.2	0.08	45	66	77	83

2.2.5. Pervious and Impervious Manning's N values

Manning's n values were assigned based upon the land use that was delineated to calculate curve numbers and percent imperviousness for each basin.

2.2.6. Design Storm Distribution

The NRCS Type III rainfall distribution was used to create the 1-,2-, 5-,10-,25-, 50-, 100-, and 500-year, 24-hour design storms used in both models as designated in the NRCS TR-55 manual.

2.2.7. Rainfall Depth

Rainfall depth was estimated using the NOAA Atlas 14 values listed via the precipitation frequency data server at the project location. **Table 2** provides a summary of the rainfall depths used.

Table 2. 24-hour Rainfall Depths

Return Frequency	Rainfall Depth (in)
1-Year	3.63
2-Year	4.11
5-Year	5.00
10-Year	5.85
25-Year	7.17
50-Year	8.30
100-Year	9.55

2.2.8. Stormwater Drainage Network

The stormwater network for existing conditions was developed using survey, lidar, and data from the Effective FEMA model. The existing stormwater drainage network in the study drainage area is comprised of open channel and closed channel systems. Griffin Brook is the primary conveyance system with segments of walled channels, culvert and bridge crossings, and natural channels. The secondary conveyance system is comprised of pipes, culverts, and open channel segments that tie into Griffin Brook. Survey collected within each priority area of the existing stormwater pipes, inlets, culverts, bridges, swales, and channels was combined with cross section and structure data from the Effective FEMA model and LiDAR to build a comprehensive hydraulic model of the system that allows for both overland flow, closed system, and open channel conveyance as needed. Storage facilities were incorporated and defined using LiDAR data where required.

2.2.9. Runoff Hydrograph Routing Method

Hydrographs developed from the rainfall-to-runoff response of each subbasin were routed downstream via the existing open and closed stormwater drainage network using the Dynamic Wave routing method. These routings account for peak flow attenuation and hydrograph timing. The Dynamic Wave method uses the one-dimensional Saint Venant flow equations, which consist of the continuity and momentum equations for conduits and a volume continuity equation at nodes, to produce more accurate results over the alternative kinematic wave and steady flow routing methods. The Dynamic Wave method is able to account for channel storage, backwater, entrance & exit losses, flow reversal, and pressurized flow.

2.3. Model Verification and Calibration

The developed existing conditions models were verified by comparing the resulting water surface elevations and flows from the SWMM model to the water surface elevations and flows listed in the effective FEMA model for Griffin Brook. The water surface elevation during the 100-year event from the developed model were up to 1 foot lower than the water surface elevations shown in the effective FEMA model. This difference in water surface elevations is minimal due to the difference in the model type used to develop the effective FEMA water surface elevations compared to the model used for this SWMP. Table 3 shows a comparison of the effective FEMA and SWMP existing conditions model water surface elevations and flows. Figure 6 in Appendix A shows the location of each station along Griffin Brook.

Table 3. FEMA vs SWMM Water Surface Elevation (WSE) Comparison

Station	HEC-RAS 100yr WSE	PCSWMM 100yr WSE	HEC-RAS - SWMM Difference (ft)
J17030.89	789.25	788.28	0.97
J15508.15	723.36	722.52	0.84
J12066.02	683.14	682.54	0.6
J11880.23	682.55	681.65	0.9
J10400.04	672.19	671.84	0.35
J9668.15	667.73	668.08	-0.35
J7540.10	656.16	655.44	0.72
J6327.61	649.42	648.79	0.63
J4925.87	641.56	642.75	-1.19
J4257.29	639.29	639.7	-0.41
J3128.15	638.5	637.84	0.66
J2798.37	635.82	636.99	-1.17

2.4. Level of Service & Existing Issues

Upon completion of the existing conditions modeling, the level of service was defined for the stormwater infrastructure within each priority area and an ideal level of service was selected. The level of service describes the design storm event that a stormwater infrastructure system can convey without flooding properties and/or streets. For each priority area, the existing flooding limits were mapped for each design storm event and observed to identify the existing level of service. Then the ideal level of service for each priority area was selected based on the City's design requirements for stormwater infrastructure along with feedback from the City's Zoning and Engineering Department. Table 4 below lists the existing and proposed level of service for each priority area. Alternatives were developed to improve the level of service i.e., increase the storm event magnitude a given area can handle without flooding.

Table 4. Level of Service by Priority Area

Priority Area	Existing LOS	Proposed LOS
Kenilworth/Ridge Road	<1 yr	5yr - 500yr
Melrose Place	<1 yr	5yr - 500yr
Edgewood Elementary	<1 yr	1yr - 500yr
Oxmoor Road		
Bellview	2yr	5yr - 500yr
Glenwood Drive	<1 yr	10yr - 500yr
Overton Park	<1 yr	1yr - 500yr
Homewood Middle School	<1 yr	10yr - 500yr

3.PROJECT PRIORITIZATION

3.1. Methodology

To prioritize infrastructure improvement projects and develop a list of recommended projects for implementation a ranking system was developed based on various criteria and estimated cost. Two major categories of criteria were developed for the City to prioritize factors critical to gauging feasibility of implementation and performance: preliminary selection criteria (PSC) and project performance criteria (PPC). Each of these criteria were assigned a value derived from the summation of scores for individually weighted parameters via a matrix tabulation. The final score from these matrices was considered along with a cost estimate for each project to develop a rank and select a project for implementation within each priority area.

3.2. Project Criteria

Both the PSC and PPC matrices are comprised of smaller parameters that are scored individually, weighted according to importance, and finally tallied by multiplying the initial score by the assigned weighting factor. The PSC parameters considered include residential community disruption (21% weight), non-residential community disruption (18% weight), operation and maintenance (33% weight), and land acquisition/available easements (28% weight) for each proposed improvement project. The PPC parameters considered include flood reports (20% weight), non-structural impacts (5% weight), habitable structure impacted (50% weight), streets impacted (15% weight), additional benefits (5% weight), and level of service improvement (5% weight) for each proposed project. The weighting factors were selected in collaboration with the city. The criteria parameters are described in further detail below:

Preliminary Selection Criteria Parameters:

- Residential community disruption- assesses the magnitude and length of impact that a project has on access to residential neighborhoods or community assets
- Non-residential community disruption- assesses the magnitude and length of impact that a project will have on non-residential streets and access to places of business or other non-residential facilities
- Operation and maintenance- assesses the requirements to maintain successful operation and extend longevity of the proposed infrastructure
- Land acquisition/available easements- assesses the cost and difficulty involved in acquiring land or easements to construct a project

Project Performance Criteria Parameters:

- Flood reports- assesses the extent to which a project directly addresses complaints made about flooding
- Non-structural- assesses whether a project will reduce non-structural flooding
- Habitable structures- assesses whether a project will reduce flooding experience by habitable structures
- Streets- assesses the reduction in flooding experienced by public streets
- Additional benefits- assesses whether a project improves flooding upstream or downstream of the priority area it is being implemented in
- Level of service- assesses the magnitude to which properties have been removed from existing storm floodplains they were previously affected by

After scoring each individual parameter and adding the weighted scores, the total PSC and PPC scores were combined to produce an overall score. These total scores were used in conjunction with cost estimates (described below) to rank projects for each priority area, select a single project for implementation in each priority area, and develop a comprehensive list of improvement projects for the study area.

3.3. Cost Estimates

Cost estimates were determined for each project using RSMeans material cost estimates and the property value listed on the Jefferson County Property Tax Administration Website. For projects involving pipe additions or upgrades RSMeans was referenced for pipe cost in linear feet, pipe backfill in cubic yards, pipe excavation in cubic yards, and asphalt paving in square yards. The measurements for these were determined using the models – i.e. pipe sizes and lengths, invert elevations, and terrain elevations. For easement costs the property value was pulled from the Jefferson County website and divided over the parcel boundary area for an average cost per square foot, and then multiplied by the square footage of easement required. A thirty foot width was used for new pipe construction in areas where easement acquisition is required.

For projects with detention the storage facilities were broken out into a forebay (10% of BMP cost), excavation which was based off of the cubic yards of storage for the facility, a 4' perimeter fence around the perimeter of the facility, sod to cover the square yardage of the facility, an outlet control structure, and an outlet pipe from the facility. In addition to all aforementioned cost components an engineering cost was built in – which was 15% of the sum of materials, as well as contingency – which was 30% of the full sum excluding easement cost.

4. ALTERNATIVE DEVELOPMENT

For each priority area multiple potential improvement projects were modeled in an effort to address the known flooding issues in each area and improve LOS. Each alternative was modeled individually and initially screened for feasibility and level of impact. Then a set of alternatives was chosen from these for further assessment through the development of cost estimates and project scores before selecting a final proposed improvement project for implementation. Upon selection of a single improvement project for each priority area, the proposed projects were modeled together to observe their collective impact downstream. The following sections describe each priority area and the proposed improvement project for the priority areas in detail. A description of each area, description of the proposed improvement project for that area, summary of the benefits of the proposed improvement project, and summary of analysis parameter is provided along with a brief summary of the other alternatives that were considered. A full description of the number of properties removed from each floodplain is listed in a table within the project benefits section. This was done because all solutions presented reduced flooding for multiple properties, but to varying degrees for each property. Figures displaying each project area and existing and proposed conditions are provided in Appendix B.

4.1. Kenilworth/Ridge

4.1.1. Area Description

This priority area is located at the intersection of Kenilworth Drive and Ridge Road, reaching west to Hillwood Drive and Edgewood Boulevard and north up Kenilworth Drive to Melrose Place. In this location there is a pipe leading down from Ridge Road to Hillwood

Drive that was blocked to prevent flooding at Hillwood Drive. Modeling the area verified that while the pipe at Ridge Road is blocked, there is increased flooding along Kenilworth Drive. This priority area contains Hillwood Drive and a stretch of Edgewood Blvd. that leads into Griffin Brook; flooding in this area is largely caused by the backwater effect of riverine flooding in Griffin Brook, though inadequate stormwater infrastructure contributes as well. Portions of the priority area further north on Kenilworth Drive also experience flooding caused by Griffin Brook. Properties within the priority area experience flooding from the 1-yr to the 500-yr storm.

4.1.2. Project Description

This project unblocks the pipe at Ridge Road and creates a closed pipe system along Hillwood Drive (18") and Edgewood Blvd. (36") that outfalls into Griffin Brook.

4.1.3. Project Benefits

The unblocking of the pipe leads to lowering of flooding along Kenilworth and the closed pipe system alleviates flooding for properties adjacent to Hillwood Drive and Edgewood Blvd. Overall, six properties are removed from the 5-yr to the 500-yr storm floodplains (see table below).

Table 5. Kenilworth/Ridge LOS Improvements

New LOS	Number of Properties Removed
10-yr	1
500-yr	6

4.1.4. Other Alternatives Scored

Another alternative scenario considered was the same pipe unblocking and closed pipe system with the substitution of a 24" pipe along Hillwood Drive and a 48" pipe along Edgewood Blvd which outfalls into Griffin Brook. This (as well as other larger upsizing scenarios), while slightly lowering HGL's in some areas, had virtually the same impact as the previous solution in terms of floodplain inundation extents and depths. This scenario leads to the same overall score as the chosen solution but costs over sixty thousand dollars more.

4.1.5. Other Alternatives Not Scored

The first solution modeled was to simply unblock the pipe at Ridge Road. This led to the lowering of flooding along Kenilworth Drive but increased flow over Hillwood Drive

4.1.6. Project Analysis Summary

Table 6 provides a summary of the Kenilworth/Ridge project analysis. Refer to Appendix B-1 for project exhibits and supporting documentation.

Table 6. Kenilworth/Ridge Project Summary

Existing LOS	<1-yr
Project LOS	5yr - 500yr (6 properties)
Selected Alternative	Kenilworth Project A
PSC Score	7.9
PPC Score	7.1
Project Cost	\$243,015

4.2. Melrose Place

4.2.1. Area Description

This priority area includes properties directly adjacent to Melrose Place, Laurel Place, and Primrose Place. In this location flooding complaints were raised by property owners on Laurel Place. The cause for this flooding is mainly inadequate stormwater infrastructure, though flooding that occurs at properties on Primrose Place is a result of the backwater effect of riverine flooding in Griffin Brook. Properties within the priority area experience flooding in the 1-yr to the 500-yr storm.

4.2.2. Project Description

This project creates a closed system (24" pipe) through the alley that begins at Laurel Place and will continue until it reaches Primrose Place. Additionally, a diversion pipe (36") is constructed from the intersection of Primrose Place and Linwood Drive to the location the alley pipe first reaches Primrose Place. From the intersection of these two pipes a 48" pipe is constructed along Primrose Place until it outfalls into Griffin Brook at the intersection of Primrose Place and Kenilworth Drive.

4.2.3. Project Benefits

With the addition of the alley pipe, flooding is alleviated from Laurel Place and surrounding properties. The diversion pipe from the intersection of Primrose and Linwood alleviates flooding for some properties north of Primrose Place. In total, seven properties were removed from the 5-yr to the 500-yr storm floodplains (Table 7).

Table 7. Melrose LOS Improvements

New LOS	Number of Properties Removed
5-yr	2
50-yr	1
500-yr	4

4.2.4. Other Alternatives Scored

Both the closed pipe system (24" pipe) and the diversion from the intersection of Linwood and Primrose (36" pipe) were first modeled as their own separate solutions. In favor of combining their separate benefits, they were modeled together. The alley pipe solution removed four properties from the 5-yr to the 500-yr storm event, the diversion solution removed five properties from the 5-yr to the 500-yr storm event. These projects were not selected as they did not remove as many houses from flooding as the combined solution did.

4.2.5. Other Alternatives Not Scored

Another scenario modeled was a closed pipe system running along Laurel Place./Primrose Place/Linwood Drive that outfalls into Griffin brook. This solution, however, had minimal impact in comparison to the alternatives listed above and so was not scored.

4.2.6. Project Analysis Summary

Table 8 below provides a summary of the Melrose Place project analysis. Refer to Appendix B-2 for project exhibits and supporting documentation.

Table 8. Melrose Place Project Summary

Existing LOS	<1-yr
Project LOS	5yr - 500yr (7 properties)
Selected Alternative	Melrose Project C
PSC Score	8.5
PPC Score	7.9
Project Cost	\$581,776

4.3. Edgewood Elementary

4.3.1. Area Description

This priority area is located at Edgewood Elementary school, primarily north of College Avenue. To alleviate flooding in this area, the city installed improved inlets and upsized the pipe running under College Ave to 36". This led to some reduction in flooding for properties north of College Avenue with some increase in flooding just south of College Avenue which did not impact any homes. The flooding in this area is mainly caused by inadequate stormwater infrastructure, and properties north of College Avenue experience flooding in the 2-yr to 500-yr storm.

4.3.2. Project Description

This project upsizes the full stretch of pipes running from College Avenue to Westover Drive to 36", as well as a pinch point crossing Broadway Street to a 60" pipe, and finally adds an additional f12" of depth to the stretch of open rectangular channel from Broadway Street to Griffin Brook.

4.3.3. Project Benefits

Flooding is not only mitigated for properties north of College Avenue, but with the upsizing of pipes along much of the southern stretch to Griffin Brook, reduction in flooding is seen all the way from College Avenue to Westover Drive. Twenty-five properties are removed from the floodplains of storm events ranging from the 1-yr to the 500-yr storm (see table below). In spite of the large increase in conveyance of flow downstream, the model displayed no negative impact on the floodplain of Griffin Brook in any storm event – meaning Griffin Brook does not experience worse flooding downstream of this priority area after implementing the full infrastructure upsize.

Table 9. Edgewood Elementary LOS Improvements

New LOS	Number of Properties Removed
1-yr	1
2-yr	5
5-yr	2
25-yr	2
50-yr	1
100-yr	5
500-yr	9

4.3.4. Other Alternatives Scored

The alternative the city is already implementing was also modeled and scored. This included inlet improvements and the upsizing of the pipe crossing College Ave to 30". This alleviated flooding for four properties, and while increased flooding just south of College Avenue without increasing flooding for any houses. This improvement does have a positive

impact, but even the properties north of College Avenue see greater improvement when implementing further pipe upsizing downstream.

4.3.5. Other Alternatives Not Scored

Before upsizing the two pinch points described above as well as deepening the open rectangular channel, a model was created with just the upsizing of pipe to 30" from College Avenue to Westover Drive. This had a positive impact on many properties within this stretch but increased flooding for at least five properties downstream.

4.3.6. Project Analysis Summary

Table 10 below provides a summary of the Elementary project analysis. Refer to Appendix B-3 for project exhibits and supporting documentation.

Table 10. Elementary Project Summary

Existing LOS	<1-yr
Project LOS	1yr – 500yr (25 properties)
Selected Alternative	Edgewood Elementary Project B
PSC Score	8.4
PPC Score	11
Project Cost	\$490,015

4.4. Oxmoor Road

4.4.1. Area Description

This priority area is located primarily at Acton Avenue, but there have also been complaints of flooding from businesses south of Oxmoor Road and west of Green Springs Highway. The project description that follows is for a flooding mitigation solution for the location businesses have raised complaints. For Acton Avenue, various solutions modeled did not yield much improvement beyond the recent city-implemented culvert upsize, as it sits within a FEMA flood zone and incurs a significant amount of flooding from Griffin Brook.

4.4.2. Project Description

This project creates an inlet on Oxmoor Road just north of the alley that leads to Carr Avenue, as well as a 48" diameter pipe that connects from that inlet to the ALDOT bioswale just south of Oxmoor Road.

4.4.3. Project Benefits

Flooding is mitigated for some of the businesses along the alley between Oxmoor Road and Carr Avenue, but it is also increased just downstream of the alley as more flow is brought through the ALDOT bioswale.

4.4.4. Other Alternatives Scored

No alternatives were scored for this priority area.

4.4.5. Other Alternatives Not Scored

Another scenario modeled was adding detention just upstream of Acton Avenue in the open lot space adjacent to The Salvation Army Family Store & Donation. This did not impact flooding on Acton Avenue. Another scenario was widening the channel upstream of Acton

Avenue before it crosses Columbiana Road. Similarly, this had no impact on flooding. Two other alternatives modeled were two 60" diversion pipes constructed down Carr Avenue and Broadway Street, and one 72" diversion pipe brought down Columbiana Road and across private owned property to connect past Acton Avenue. Both of these solutions were very expensive (without a full cost analysis the Carr Avenue diversion project was approximately 4 million dollars) and had very minimal impact on flooding on properties adjacent to Acton Avenue.

4.4.6. Project Analysis Summary

Table 11 below provides a summary of the Oxmoor project analysis. Due to the increase in flooding downstream, the considered project for this area is infeasible. Therefore, the project was not scored and project exhibits and supporting documentation were not developed.

Table 11. Oxmoor Project Summary

Existing LOS	
Project LOS	
Selected Alternative	Oxmoor Project A
PSC Score	
PPC Score	
Project Cost	\$263,798

4.5. Bellview

4.5.1. Area Description

This priority area is located east of Bellview Circle and north of Somerset Drive. Complaints of flooding were generated from residents along the east side of Bellview Circle. The primary cause of flooding in this area is inadequate stormwater infrastructure, properties experience flooding from the 2-yr storm event to the 500-yr storm event.

4.5.2. Project Description

This project creates a 24" diameter pipe diversion along Bellview Circle starting upstream of the driveway culvert at 1527 Bellview Circle and connecting into Somerset Drive. There is also an upsizing of the pipe along Somerset Drive the diversion pipe is connecting to, the upsizing is to a 24" diameter pipe as well.

4.5.3. Project Benefits

Flooding is mitigated at properties west of Bellview Circle and north of Somerset Drive, and the diversion of flow around these properties does not have any adverse effects on flooding downstream of these properties (i.e. the channel running southwest from Somerset Drive or properties adjacent to it). Four properties are removed from the floodplains of storm events ranging from the 5-yr to the 500-yr storm (see table below).

Table 12. Bellview LOS Improvements

New LOS	Number of Properties Removed
25-yr	1
100-yr	2
500-yr	1

4.5.4. Other Alternatives Scored

No additional alternatives were scored for this priority area.

4.5.5. Other Alternatives Not Scored

At the outset of the project increasing the size of the culvert passing under the garage of 1527 Belview Circle was considered. The 36" culvert was given a second barrel of the same size, unfortunately this only reduced flooding for the garage itself and increased flooding for the actual houses within the priority area. The upsizing of further pipes through existing houses downstream of this culvert upsize would be required to alleviate flooding, but this would prove challenging and led to limited success when modeled. Another scenario involved improvements to the channel running southeast from Somerset Drive. This proved to provide no improvements in level of service as flooding was contained for other projects within the channel as it exists currently and flooding downstream is likely controlled by Griffin Brook. Another scenario entailed continuing the diversion down Bellview Circle all the way through Parkridge Drive, bringing the diversion pipe system directly into Griffin Brook. This solution was considerably more expensive than the selected Bellview Circle diversion and did not result in any apparent or significant improvement over it.

4.5.6. Project Analysis Summary

Table 13 below provides a summary of the Bellview project analysis. Refer to Appendix B-4 for project exhibits and supporting documentation.

Table 13. Bellview Project Summary

Existing LOS	2-yr
Project LOS	5yr - 500yr (5 properties)
Selected Alternative	Bellview Project A
PSC Score	8.7
PPC Score	5.3
Project Cost	\$263,987

4.6. Glenwood Drive

4.6.1. Area Description

This priority area is located on E Glenwood Drive, W Glenwood Drive, and Roseland Drive. Complaints of flooding were generated from residents living between the two Glenwood Drives, and flooding appears to be occurring on all three streets. The main cause for flooding in this area is inadequate stormwater infrastructure, and on Roseland Drive specifically flooding is a result of its intersection with Griffin Brook. Properties experience flooding in the 1-yr to 500-yr storm.

4.6.2. Project Description

This project installs a closed pipe system (30" diameter) through the alley between properties west of E Glenwood Drive. The pipe system is connected to existing pipes.

4.6.3. Project Benefits

Flooding is entirely removed from properties bounded by East and West Glenwood Drive, all in all six properties are removed from the 10-yr to the 500-yr storm (see table below).

Table 14. Glenwood Drive LOS Improvements

New LOS	Number of Properties Removed
100-yr	1
500-yr	5

4.6.4. Other Alternatives Scored

Another scenario modeled was the upsizing of pipes along E Glenwood Drive from 1.5 feet to 3 feet and Roseland Drive from 3 feet to 4.5 feet. This solution mitigated flooding for less properties and most importantly did not entirely eliminate flooding from houses lying between East and West Glenwood Drive.

4.6.5. Other Alternatives Not Scored

No additional alternatives were evaluated for this priority area.

4.6.6. Project Analysis Summary

Table 15 below provides a summary of the Glenwood project analysis. Refer to Appendix B-5 for project exhibits and supporting documentation.

Table 15. Glenwood Project Summary

Existing LOS	<1-yr
Project LOS	10yr - 500yr (8 properties)
Selected Alternative	Glenwood Project B
PSC Score	7.3
PPC Score	7.3
Project Cost	\$1,040,048

4.7. Overton Park

4.7.1. Area Description

This priority area is located at and west of Overton Park. Most flooding complaints in this area have been generated from property owners directly east and west of Ridge Road, north of Kensington Road. The main cause of the reported flooding is the result of inadequate stormwater infrastructure, but properties on E Glenwood Drive experience flooding caused directly by Griffin Brook. Properties experience flooding in the 1-yr to 500-yr storm event.

4.7.2. Project Description

This project adds a 96" by 48" culvert in conjunction with the existing culvert running west from Ridge Road into Griffin Brook. Flooding is mitigated for a host of properties west of Ridge Road, in total thirteen properties are removed from the floodplains of the 5-yr to 500-yr storm events (see table below).

Table 16. Overton Park LOS Improvements

New LOS	Number of Properties Removed
5-yr	3
10-yr	4
25-yr	1
100-yr	2
500-yr	3

4.7.3. Other Alternatives Scored

Another scenario considered was the addition of a 176,600 cubic foot detention facility in Overton Park. This solution produced similar results to the addition of the secondary culvert and costs approximately \$700,000. However, installation of inline detention is not a commonly accepted practice by the Army Corp in the state of Alabama. Two other scenarios modeled were creating a second upsized outlet from E Edgewood Dr directly into Griffin Brook – instead of the existing pipe there connecting to the large culvert running west from Overton Park – and creating that same outlet as well as upsizing the same pipes along Kensington Road and Ridge Road that was implemented in the selected solution. These solutions alleviated some flooding west of Mayfair Drive to Griffin Brook that was otherwise unimproved in the selected solution, but due to the high property value in Homewood and easement costs both solutions had cost estimates around 2 million dollars and neither alleviated flooding from the main stretch of properties generating complaints.

4.7.4. Other Alternatives Not Scored

No additional alternatives were evaluated for this priority area.

4.7.5. Project Analysis Summary

Table 17 below provides a summary of the Overton Park project analysis. Refer to Appendix B-6 for project exhibits and supporting documentation.

Table 17. Overton Park Project Summary

Existing LOS	<1-yr
Project LOS	5yr - 500yr (13 properties)
Selected Alternative	Overton Project A
PSC Score	6.6
PPC Score	7.4
Project Cost	\$3,636,724

4.8. Homewood Middle School

4.8.1. Area Description

This priority area contains properties south of Grace Street and the Homewood Board of Education. Most flooding complaints in this area were generated from property owners south of Grace Street and adjacent to Dale Avenue. The main cause of flooding in this area is inadequate stormwater infrastructure. Properties experience flooding in the 1-yr to the 500-yr storm.

4.8.2. Project Description

This project creates a 324,676 cubic foot detention facility just northeast of Honey Locust Ln, as well as weirs/control structures to create connections with existing stormwater infrastructure.

4.8.3. Project Benefits

Flooding is mitigated for a large number of properties south of Grace Street as well as a large number of properties south of Palmetto Street and north of Griffin Brook. In total forty-five properties were removed from the floodplains of storm events ranging from the 1-yr to the 500-yr storm (see table below).

Table 18. Homewood Middle School LOS Improvements

New LOS	Number of Properties Removed
10-yr	2
50-yr	5
100-yr	5
500-yr	33

4.8.4. Other Alternatives Scored

Another alternative that was considered was the upsizing of pipes along Dale Avenue from a 24" diameter to a 42" diameter. This had a similar impact on properties south of Grace Street but did not alleviate flooding for as many properties downstream, removing thirty-one properties in total.

4.8.5. Other Alternatives Not Scored

Another scenario modeled was increasing the storage of the existing detention facility just north of Grace Street, this unfortunately had very minimal impact on flooding.

4.8.6. Project Analysis Summary

Table 19 below provides a summary of the Homewood Middle project analysis. Refer to Appendix B-8 for project exhibits and supporting documentation.

Table 19. Homewood Middle Project Summary

Existing LOS	<1-yr
Project LOS	10yr - 500yr (45 properties)
Selected Alternative	Homewood Middle Project A
PSC Score	8.8
PPC Score	10.6
Project Cost	\$43,534,174

4.9. Additional Areas

Some additional solutions of note that were tested include the widening of Griffin Brook past the intersection of Primrose Place. and Kenilworth Drive, and the widening of Saulter Bridge. No feasible excavation of these areas produced significant improvement to the floodplain in the area or upstream.

5. RECOMMENDATIONS AND FINDINGS

5.1. Stormwater Infrastructure Improvement Projects

Hydrologic and hydraulic analysis showed segments of the stormwater management system in Homewood have limited conveyance capacity. To improve and maintain the quality of the stormwater management system, 7 total improvement projects are recommended for implementation within seven of the eight priority areas studied. The following stormwater infrastructure improvement projects are recommended to both address existing issues and increase capacity:

- Kenilworth and Ridge Road
Replace blocked pipe and install closed drainage system at Hillwood Dr and Edgewood Blvd.
- Edgewood Elementary Area
Upgrade inlets and pipes down to Griffin Brook.
- Bellview Road
Install closed drainage system to bypass flow along Bellview Circle/Somerset Drive.
- Melrose Place
Install closed drainage system and install diversion pipe on Primrose.
- Glenwood Drive
Install closed drainage system to bypass flow through Glenwood Alley.
- Homewood Middle School Area
Install detention facility on Valley Avenue.
- Overton Park Area
Install larger box culverts to convey flow downstream to Griffin Brook.

These improvement projects provide an increase in level of service and/or address an existing issue within the city. When ranked with other alternatives within each priority area, these improvements yielded the highest benefit per the established prioritization system for this study for the estimated cost. Table C-1 in Appendix C provides an overview of all of the proposed improvement projects assessed for this study. The projects highlighted in bold are the projects recommended.

5.2. Ordinance Revisions

Review of the City's stormwater management regulations revealed several opportunities for strengthening the City's stormwater regulations. Kimley-Horn recommends that the City consider the following recommended ordinance revisions:

- Include downstream analysis requirements for all proposed development that increases impervious area by more than 10%.
- Include analysis at all "choke points" or conveyances between site outfall and downstream analysis point.
- Place limits on pre-development curve numbers within certain districts.

- Impose a reduction factor for peak discharges based on the percentage of proposed impervious cover on the site.
- Require energy dissipation measures at outlets.
- Require the 1-, 10-, and 100-year storm to be detained.
- Require the treatment of the 1-year, 24-hour storm, or the Channel Protection Volume (CPv).
- Define the circumstances under which CPv treatment is required.
- Implement a feasibility policy for proposed developments.
- Define freeboard heights.
- Define velocity ranges and design storms used to analyze structures.
- Require a conceptual consultation meeting with the City prior to the final design of a proposed development.
- Require that developers provide justification for not using the SCS method and require that the only acceptable alternative be the Modified Rational Method.

The following actions are also recommended to help the City enforce the stormwater management ordinances and educate owners about stormwater management requirements:

- Create stormwater management site plan review checklists for internal use by reviewers and external use by development permit applicants
- Educate owners about stormwater management requirements during concept consultation
- Educate site plan review team about stormwater management requirements

APPENDIX A

Masterplan Overview Figures



CITY OF HOMESWOOD SWMP

FIGURE 1:
DRAINAGE AREA MAP

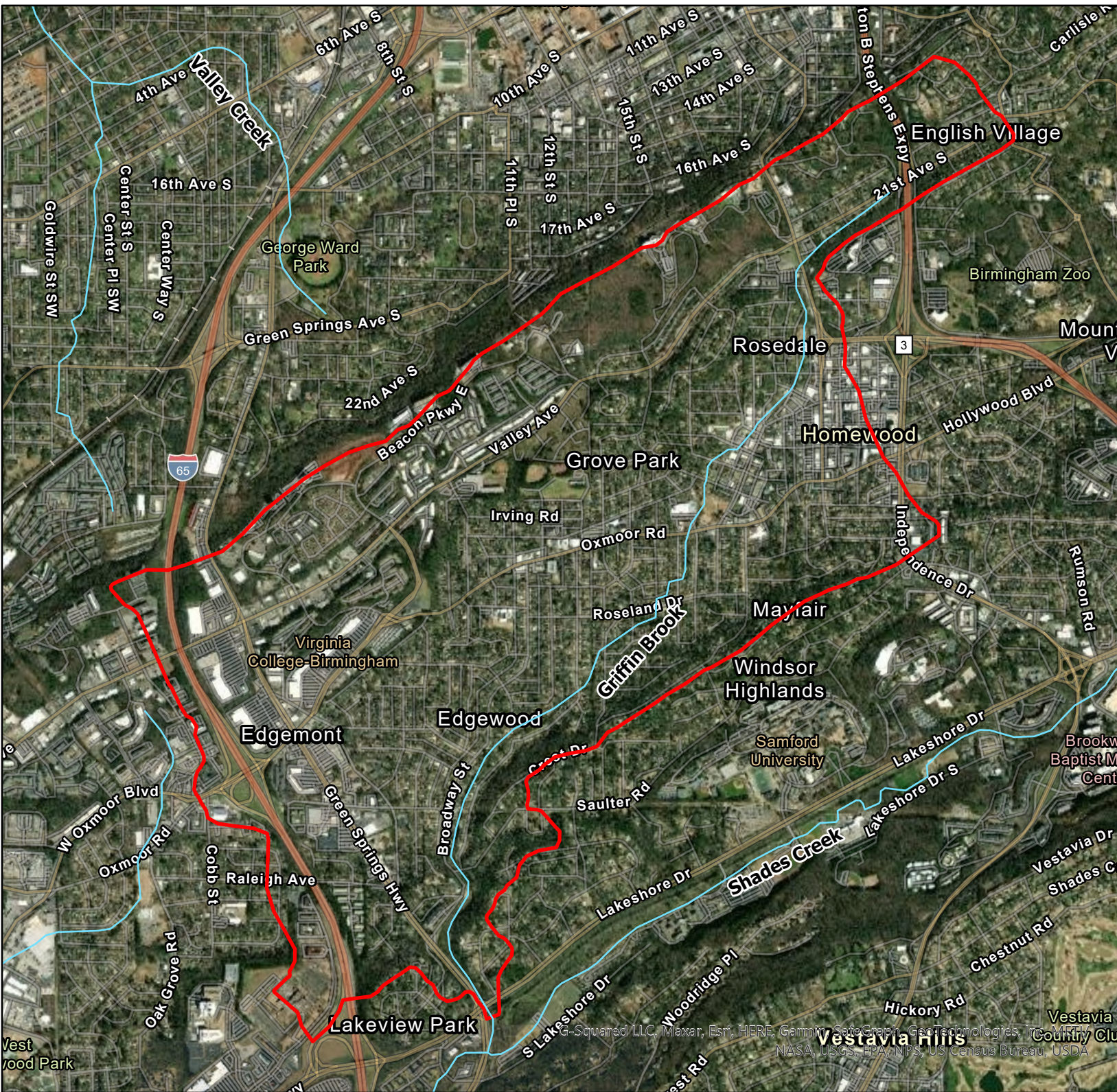
Legend

-  Drainage Area
-  Flowlines
- Area - 3.7 Square Miles

Kimley»Horn



0 0.35 0.7
Miles



CITY OF HOMEWOOD SWMP

FIGURE 2:
FEMA FLOOD ZONE
MAP

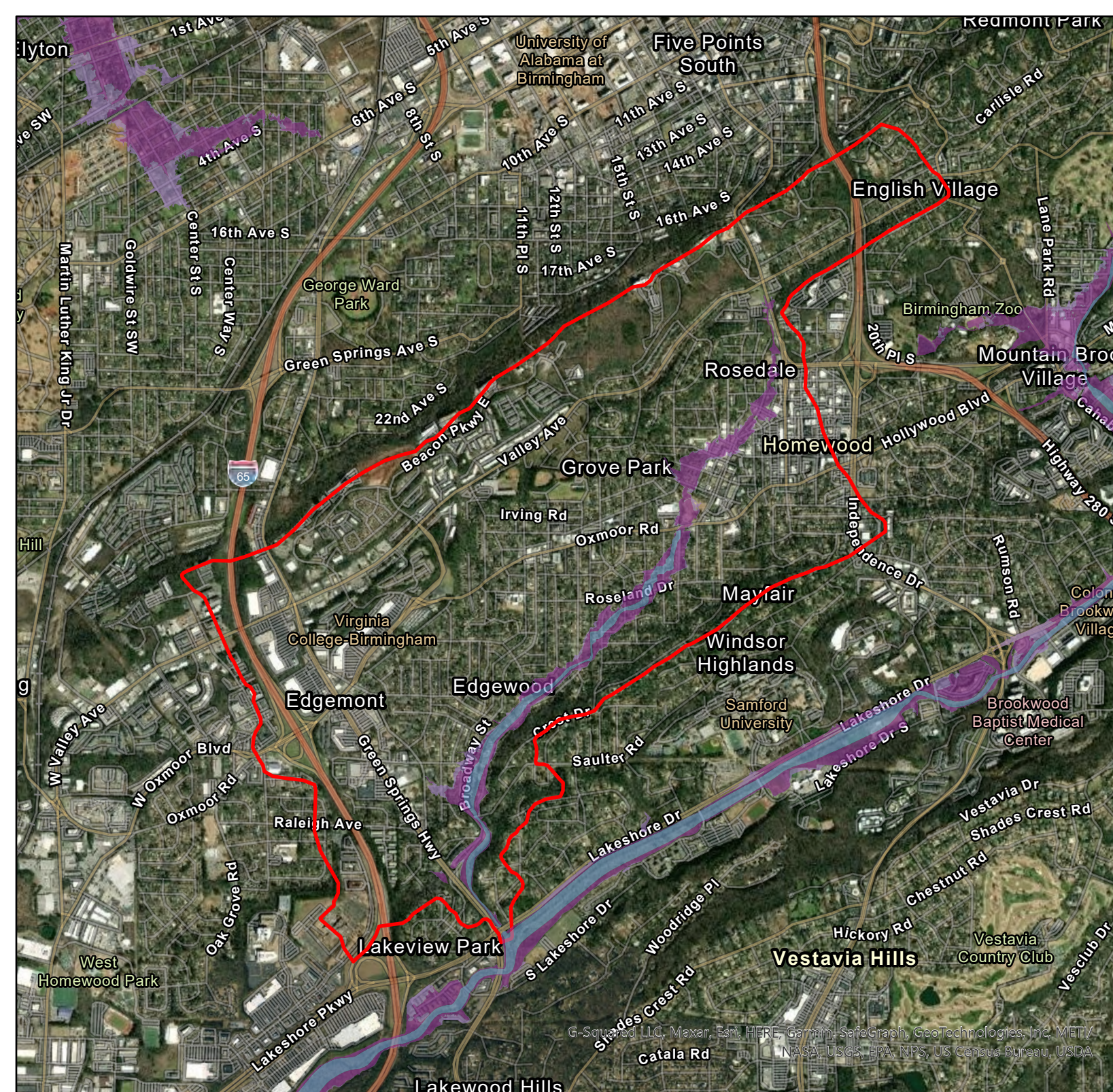
Legend

-  Drainage Area
-  1% Annual Chance Flood Hazard
-  0.2% Annual Chance Flood Hazard
-  Regulatory Floodway

Kimley»Horn



0 0.4 0.8
Miles



CITY OF HOMESWOOD SWMP

FIGURE 3:
PRIORITY AREA MAP

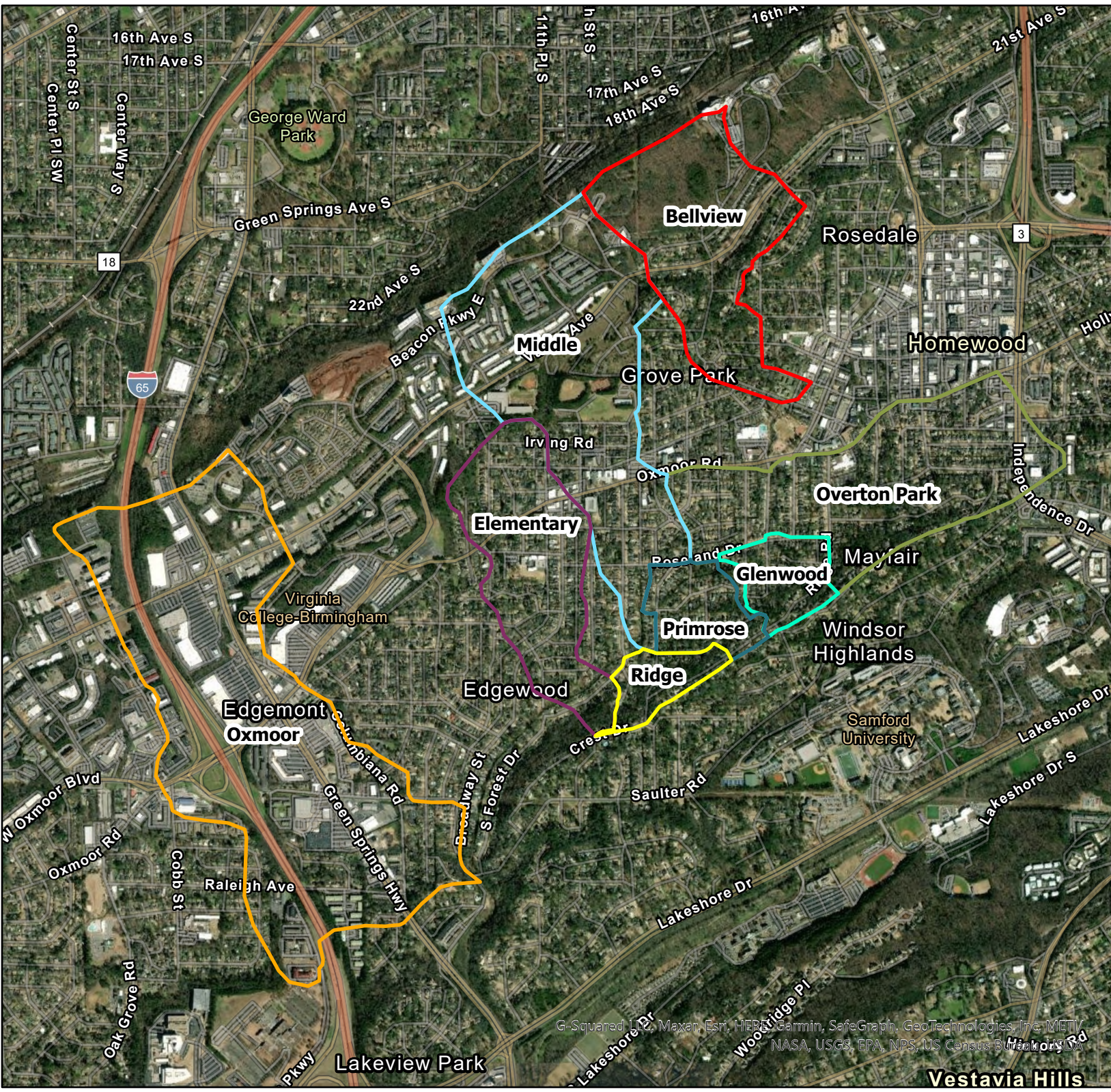
Legend

- Kenilworth/Ridge
- Primrose
- Homewood Elementary School
- Bellview
- Glenwood Drive
- Overton Park
- Homewood Middle School
- Oxmoor

Kimley»Horn



0 0.25 0.5
Miles



CITY OF HOMEWOOD SWMP

FIGURE 4:
KNOWN ISSUES

Legend

-  Drainage Area
-  Public Complaints
-  Municipality's Input

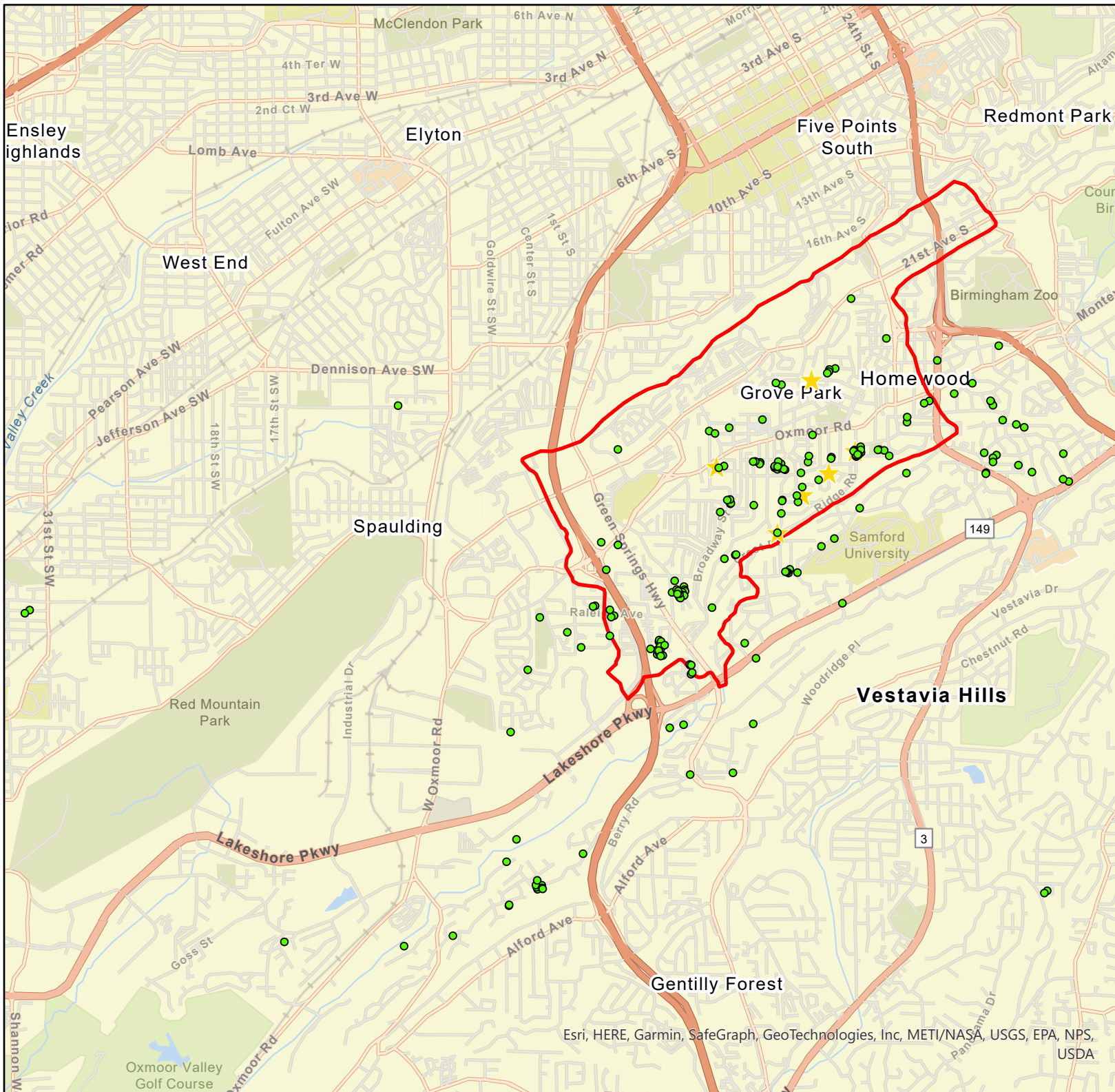
The drainage/model area covers
65% of all recorded complaints

Kimley»Horn

N



0 0.7 1.4
Miles



CITY OF HOMESWOOD SWMP

FIGURE 5:
PRIORITY AREAS AND
KNOWN ISSUES

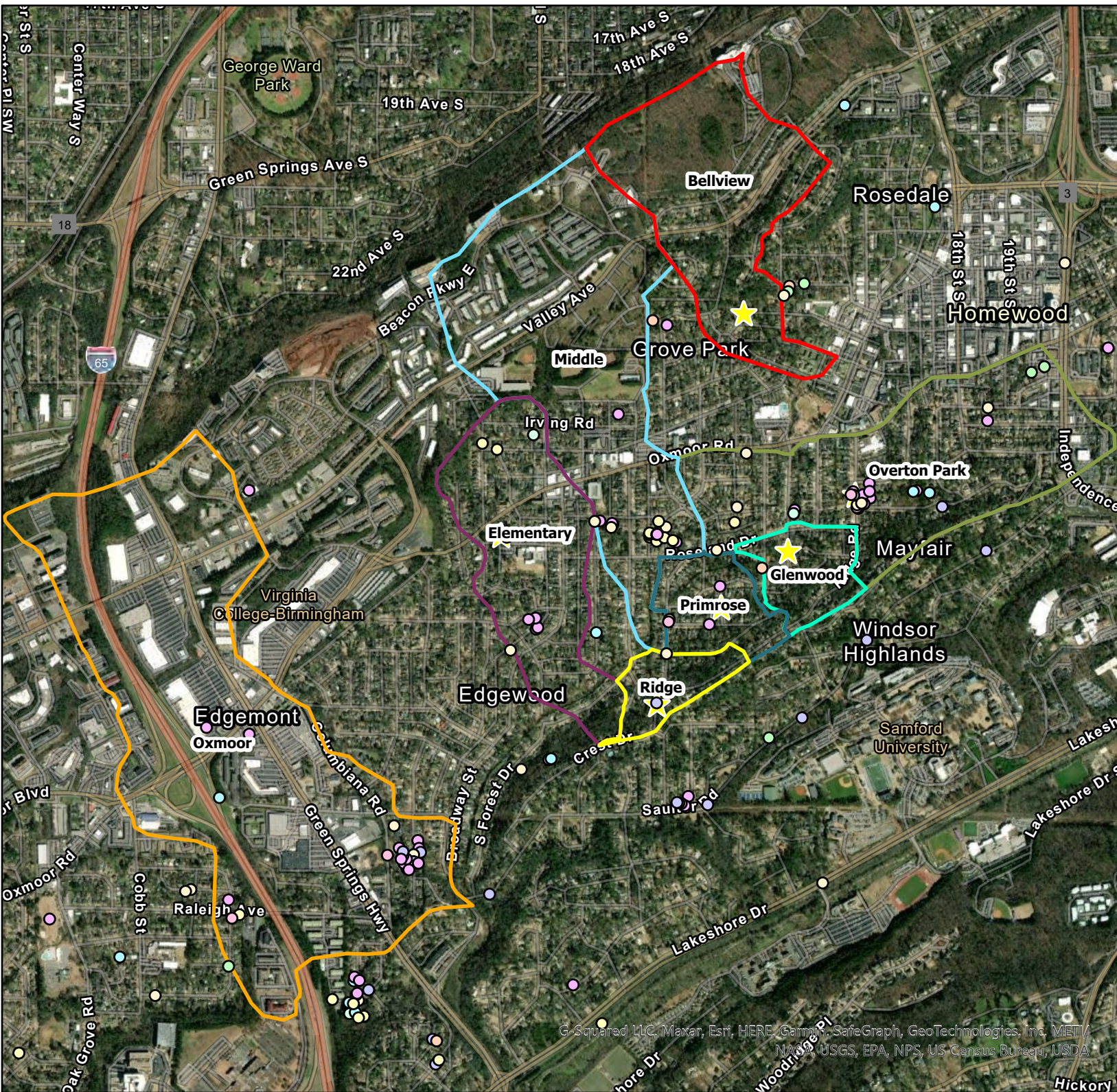
Legend

- Oxmoor
- Overton Park
- Homewood Middle School
- Glenwood Drive
- Bellview
- Homewood Elementary School
- Primrose
- Kenilworth/Ridge
- Clogged Inlet
- Damaged Drain
- Erosion - Minor
- Erosion - Severe
- Inlet Flooding (Depth/Frequency)
- Miscellaneous
- Property Flooding (Depth/Frequency)
- Sinkhole
- Street Flooding (Depth/Frequency)
- Other
- Municipality's Input

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0 0.25 0.5
Miles



CITY OF HOMESWOOD SWMP

FIGURE 6:
FEMA vs SWMM Water
Surface Comparison
Locations

Legend

- Griffin Brook
- WSE Comparison Locations

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0 0.1 0.2 0.4
Miles

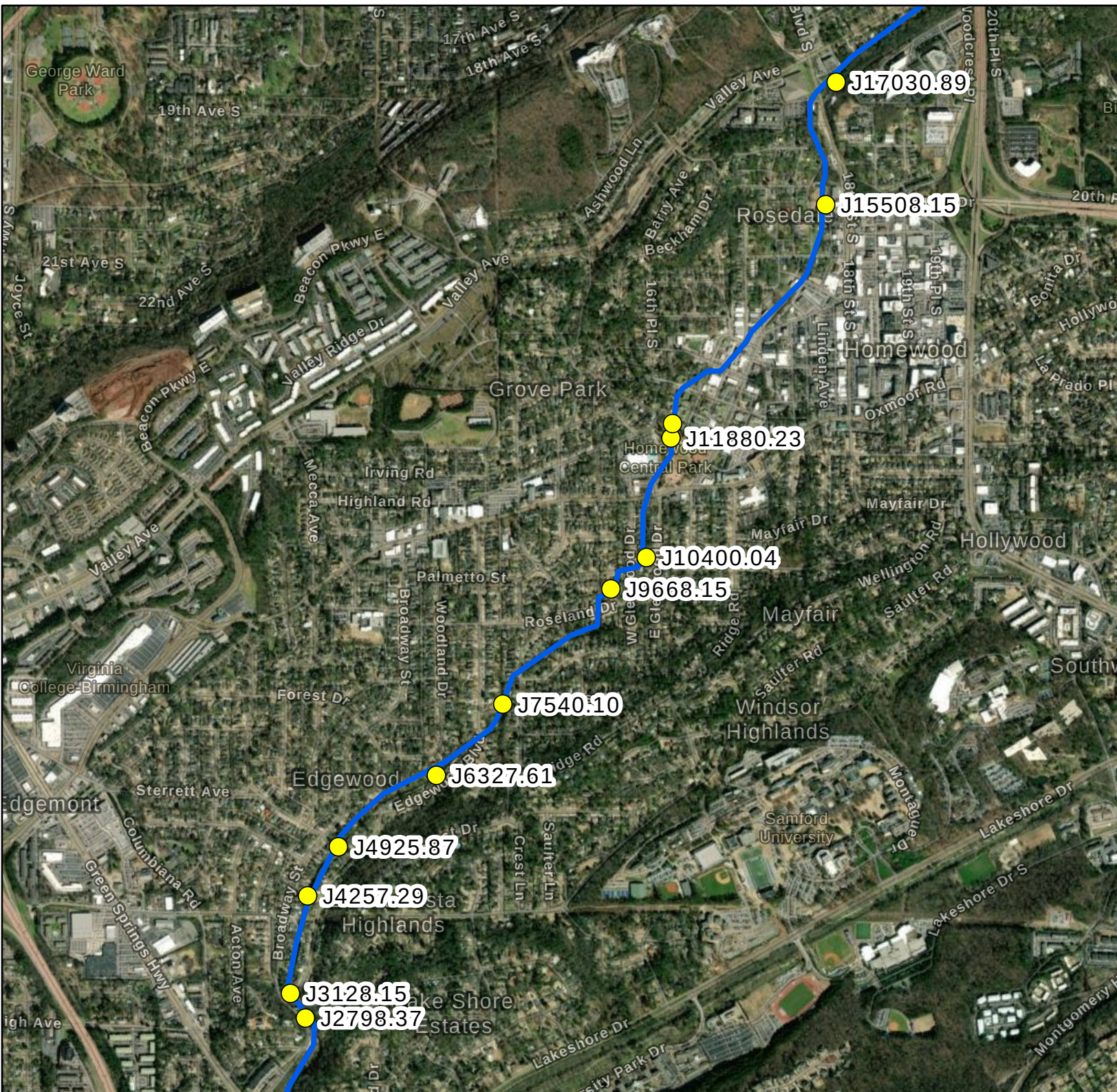
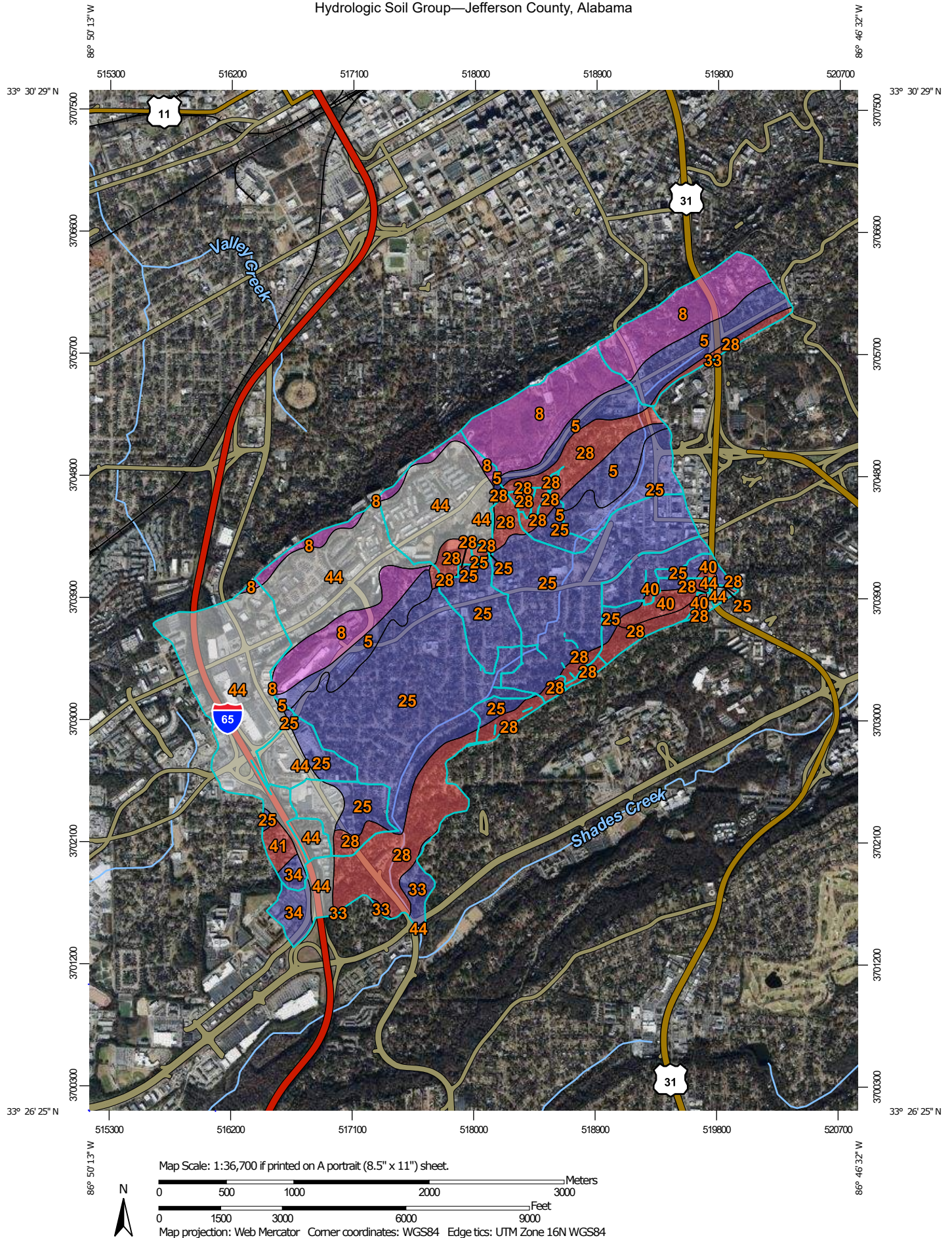


Figure 7:

Hydrologic Soil Group—Jefferson County, Alabama



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features

-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

-  Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jefferson County, Alabama

Survey Area Data: Version 15, Sep 14, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 8, 2020—Mar 8, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5	Allen-Urban land complex, 8 to 15 percent slopes	B	194.8	8.3%
8	Bodine-Birmingham association, steep	A	322.0	13.7%
25	Holston-Urban land complex, 2 to 8 percent slopes	B	829.0	35.3%
28	Montevallo-Nauvoo-Urban land complex, 10 to 40 percent slopes	D	318.6	13.6%
33	Nauvoo-Urban land complex, 8 to 15 percent slopes	B	19.2	0.8%
34	Nauvoo-Montevallo association, 10 to 40 percent slopes	B	32.7	1.4%
39	Sullivan-State complex, 0 to 2 percent slopes	B	0.5	0.0%
40	Townley-Nauvoo complex, 8 to 15 percent slopes	D	27.0	1.1%
41	Townley-Urban land complex, 8 to 15 percent slopes	D	14.6	0.6%
44	Urban land		589.1	25.1%
Totals for Area of Interest			2,348.0	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Figure 8: Precipitation Frequency Data Server



NOAA Atlas 14, Volume 9, Version 2
Location name: Birmingham, Alabama, USA*
Latitude: 33.4734°, Longitude: -86.8061°
Elevation: 688 ft**

* source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

PF tabular

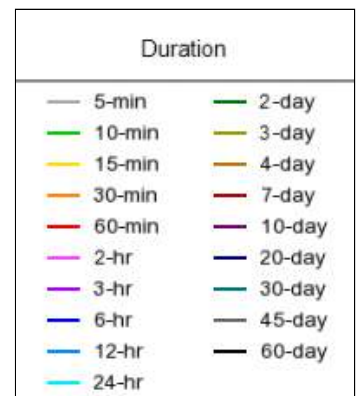
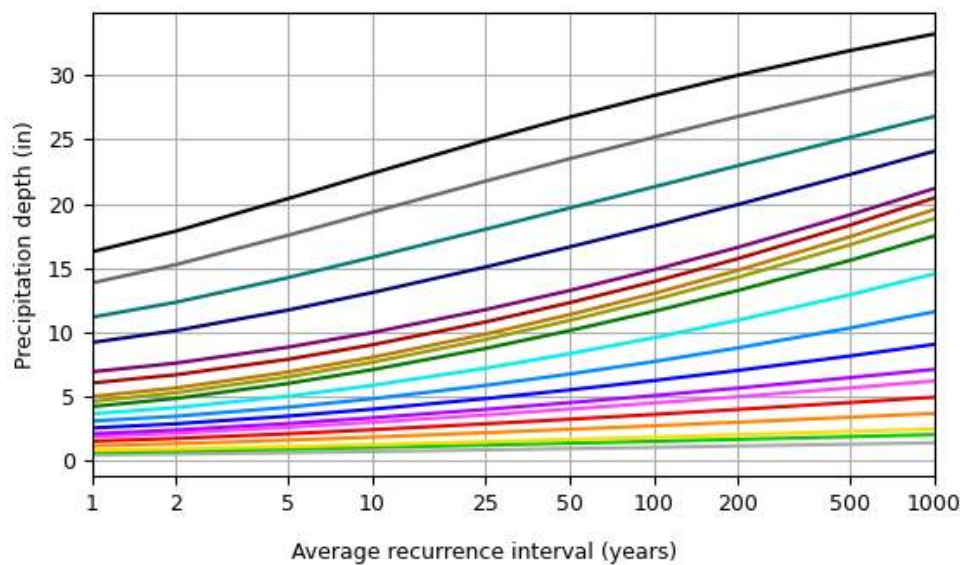
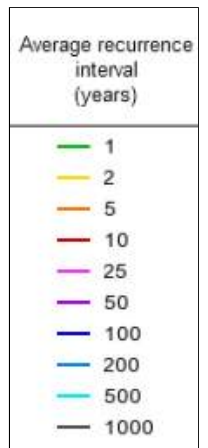
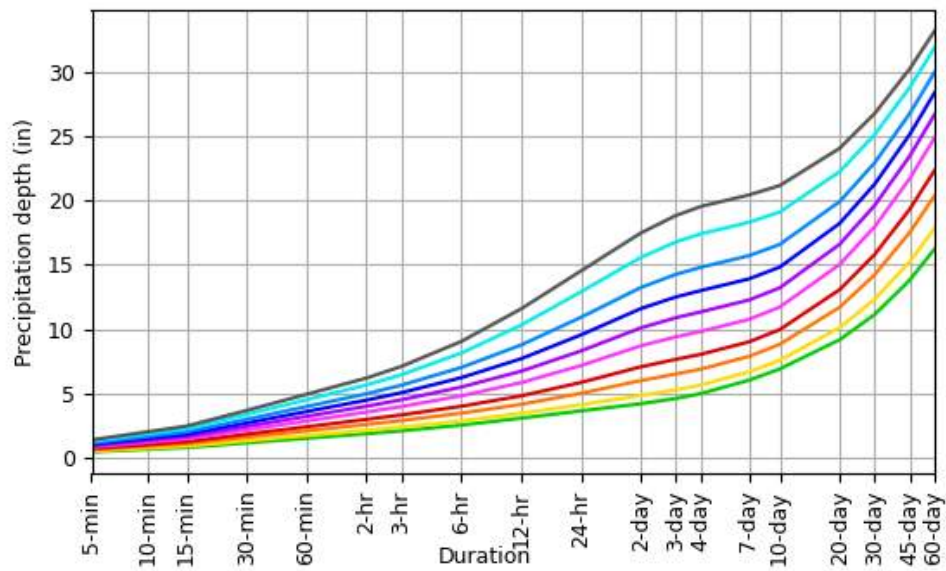
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.432 (0.346-0.542)	0.495 (0.395-0.621)	0.599 (0.477-0.753)	0.688 (0.544-0.868)	0.813 (0.621-1.06)	0.912 (0.679-1.20)	1.01 (0.727-1.36)	1.12 (0.767-1.54)	1.26 (0.829-1.78)	1.37 (0.876-1.96)
10-min	0.633 (0.506-0.794)	0.724 (0.579-0.909)	0.877 (0.698-1.10)	1.01 (0.796-1.27)	1.19 (0.909-1.55)	1.34 (0.994-1.76)	1.48 (1.06-1.99)	1.64 (1.12-2.25)	1.85 (1.21-2.60)	2.01 (1.28-2.87)
15-min	0.772 (0.617-0.968)	0.884 (0.706-1.11)	1.07 (0.851-1.34)	1.23 (0.971-1.55)	1.45 (1.11-1.89)	1.63 (1.21-2.14)	1.81 (1.30-2.43)	2.00 (1.37-2.75)	2.25 (1.48-3.17)	2.45 (1.56-3.50)
30-min	1.14 (0.909-1.42)	1.30 (1.04-1.63)	1.58 (1.26-1.98)	1.81 (1.44-2.29)	2.15 (1.64-2.80)	2.42 (1.80-3.18)	2.69 (1.93-3.62)	2.97 (2.04-4.10)	3.36 (2.21-4.74)	3.66 (2.34-5.23)
60-min	1.49 (1.19-1.87)	1.71 (1.36-2.14)	2.07 (1.65-2.61)	2.39 (1.89-3.02)	2.84 (2.17-3.70)	3.20 (2.39-4.22)	3.58 (2.57-4.81)	3.97 (2.72-5.47)	4.50 (2.96-6.36)	4.92 (3.14-7.03)
2-hr	1.85 (1.49-2.30)	2.12 (1.71-2.63)	2.57 (2.07-3.20)	2.96 (2.37-3.70)	3.53 (2.73-4.56)	3.99 (3.00-5.21)	4.46 (3.24-5.96)	4.96 (3.44-6.78)	5.64 (3.75-7.91)	6.18 (3.99-8.76)
3-hr	2.07 (1.68-2.56)	2.37 (1.92-2.92)	2.87 (2.32-3.55)	3.32 (2.66-4.12)	3.96 (3.08-5.10)	4.49 (3.40-5.84)	5.04 (3.68-6.71)	5.63 (3.93-7.67)	6.45 (4.31-9.00)	7.09 (4.60-10.0)
6-hr	2.52 (2.07-3.08)	2.85 (2.34-3.48)	3.45 (2.81-4.22)	3.99 (3.23-4.90)	4.80 (3.79-6.15)	5.48 (4.21-7.10)	6.22 (4.59-8.22)	7.01 (4.95-9.50)	8.13 (5.50-11.3)	9.04 (5.92-12.6)
12-hr	3.06 (2.54-3.70)	3.44 (2.84-4.16)	4.14 (3.41-5.01)	4.80 (3.93-5.84)	5.83 (4.66-7.44)	6.72 (5.22-8.65)	7.69 (5.75-10.1)	8.76 (6.26-11.8)	10.3 (7.06-14.2)	11.6 (7.66-16.1)
24-hr	3.63 (3.04-4.34)	4.11 (3.43-4.91)	5.00 (4.16-5.99)	5.84 (4.84-7.04)	7.16 (5.79-9.06)	8.30 (6.51-10.6)	9.55 (7.21-12.5)	10.9 (7.88-14.6)	12.9 (8.92-17.7)	14.5 (9.70-20.0)
2-day	4.19 (3.54-4.95)	4.83 (4.08-5.71)	5.99 (5.04-7.11)	7.06 (5.91-8.42)	8.70 (7.09-10.9)	10.1 (7.99-12.7)	11.6 (8.84-15.0)	13.2 (9.63-17.5)	15.6 (10.9-21.1)	17.5 (11.8-23.9)
3-day	4.59 (3.91-5.40)	5.27 (4.48-6.20)	6.50 (5.50-7.66)	7.64 (6.43-9.05)	9.40 (7.70-11.7)	10.9 (8.67-13.7)	12.5 (9.58-16.0)	14.3 (10.4-18.8)	16.8 (11.8-22.7)	18.8 (12.8-25.6)
4-day	4.97 (4.25-5.82)	5.64 (4.82-6.61)	6.88 (5.85-8.07)	8.04 (6.79-9.47)	9.82 (8.09-12.1)	11.3 (9.08-14.2)	13.0 (10.0-16.6)	14.8 (10.9-19.4)	17.4 (12.3-23.4)	19.6 (13.3-26.5)
7-day	6.02 (5.19-6.98)	6.67 (5.74-7.74)	7.87 (6.75-9.16)	9.01 (7.67-10.5)	10.8 (8.94-13.2)	12.3 (9.90-15.2)	13.9 (10.8-17.6)	15.7 (11.7-20.5)	18.3 (13.0-24.5)	20.5 (14.0-27.5)
10-day	6.90 (5.97-7.95)	7.58 (6.56-8.74)	8.82 (7.60-10.2)	9.96 (8.54-11.6)	11.7 (9.78-14.2)	13.2 (10.7-16.2)	14.8 (11.6-18.7)	16.6 (12.4-21.5)	19.1 (13.7-25.4)	21.2 (14.6-28.4)
20-day	9.18 (8.04-10.5)	10.1 (8.85-11.5)	11.7 (10.2-13.4)	13.1 (11.3-15.0)	15.0 (12.6-17.9)	16.6 (13.6-20.0)	18.2 (14.3-22.6)	19.9 (15.0-25.4)	22.3 (16.0-29.1)	24.1 (16.8-32.0)
30-day	11.1 (9.82-12.6)	12.3 (10.8-14.0)	14.2 (12.5-16.2)	15.8 (13.8-18.1)	18.0 (15.1-21.1)	19.6 (16.1-23.4)	21.3 (16.8-26.1)	23.0 (17.3-28.9)	25.2 (18.2-32.6)	26.8 (18.8-35.4)
45-day	13.8 (12.3-15.5)	15.3 (13.5-17.2)	17.5 (15.5-19.8)	19.3 (17.0-21.9)	21.7 (18.3-25.2)	23.5 (19.3-27.7)	25.2 (19.9-30.5)	26.8 (20.3-33.4)	28.8 (20.9-37.1)	30.3 (21.4-39.8)
60-day	16.2 (14.5-18.2)	17.9 (15.9-20.0)	20.4 (18.1-22.9)	22.4 (19.7-25.2)	24.9 (21.0-28.7)	26.7 (22.1-31.4)	28.4 (22.6-34.2)	30.0 (22.8-37.2)	31.9 (23.2-40.8)	33.2 (23.5-43.5)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

PF graphical

PDS-based depth-duration-frequency (DDF) curves

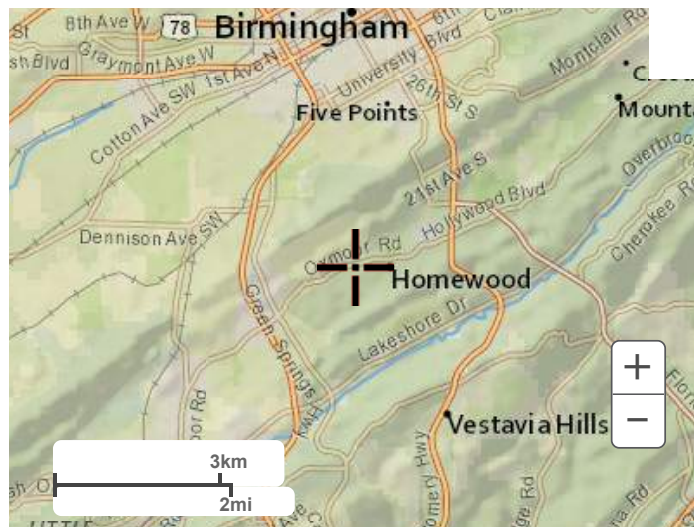
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NOAA Atlas 14, Volume 9, Version 2

Maps & aerials

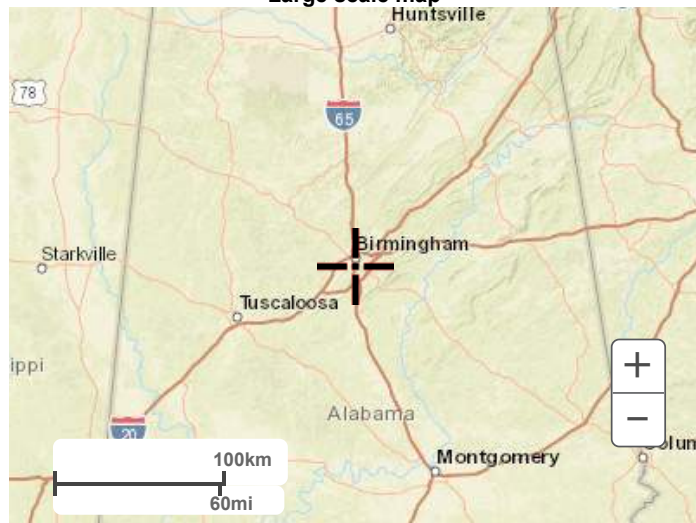
Small scale terrain



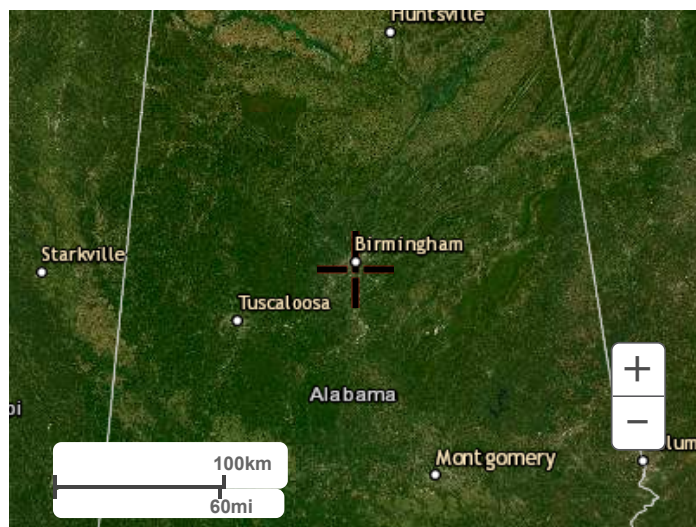
Large scale terrain



Large scale map



Large scale aerial



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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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APPENDIX B

Overview of Recommended Projects



APPENDIX B-1

Kenilworth/Ridge Road



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

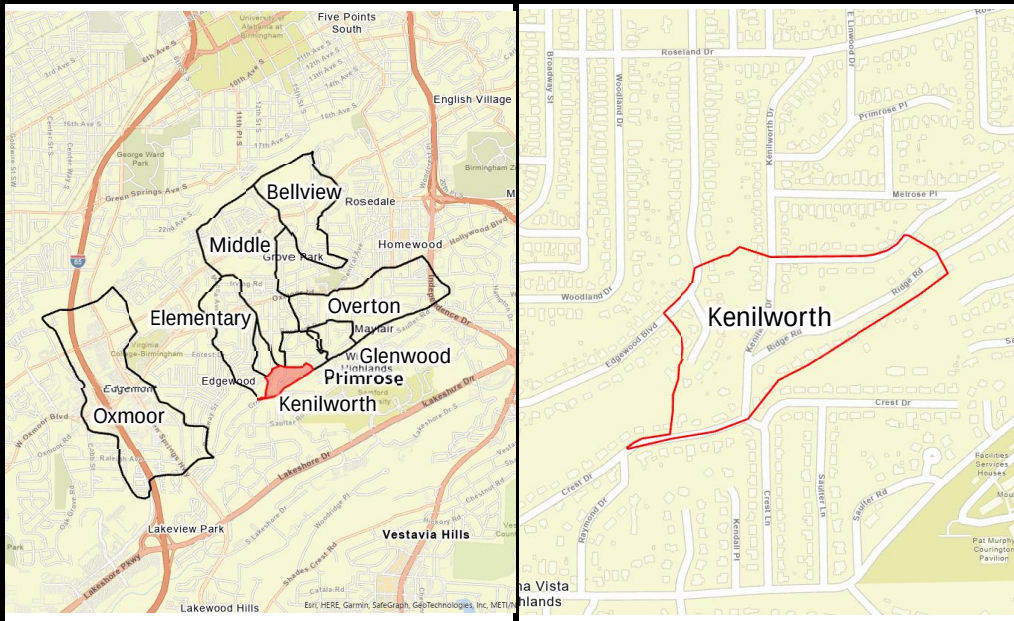
Kenilworth/Ridge Priority Area: Selected Alternative - Project A

Description and Scope

Project Type:	Pipe Installation and Rehabilitation	Preliminary Selection Criteria (PSC):	7.9/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	7.1/10
Proposed Level of Service:	5-Year to 500-Year Storm		

This project unblocks the pipe at Ridge Rd. and creates a closed pipe system down Hillwood Dr. (18") and Edgewood Blvd. (36") into Griffin Brook.

Project Maps



Budgetary Cost Estimate

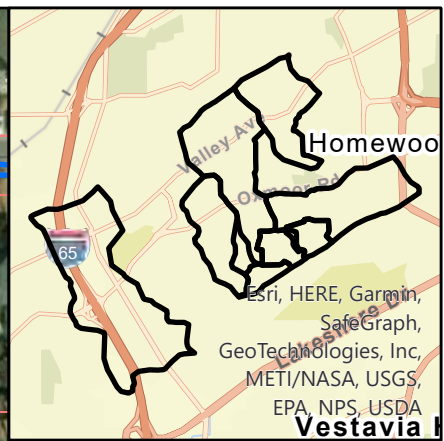
Project Activity	Duration	Amount
Construction		\$ 162,551.99
Site Acquisition/ Easements		-
Engineering Costs		\$ 24,382.80
Contingency		\$ 56,080.44
Total Budgetary Cost Estimate		\$ 243,015.22

Purpose and Need

The major benefits of this project is the alleviation of flooding on Kenilworth Drive as well as Hillwood Drive and Edgewood Boulevard. This project addresses concerns raised by the municipality and improves the level of service of six properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Kenilworth Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets - includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will be temporarily impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe improvement and construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	7	2.0	Easement may be required up to Hillwood Dr.
TOTAL PSC SCORE		100%				7.9/10		



Legend

- Parcels
- Conduits**
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Infrastructure Updates

SELECTED ALTERNATIVE

KENILWORTH/RIDGE PROJECT A

Kimley»Horn

N

0 0.02 0.04 Miles

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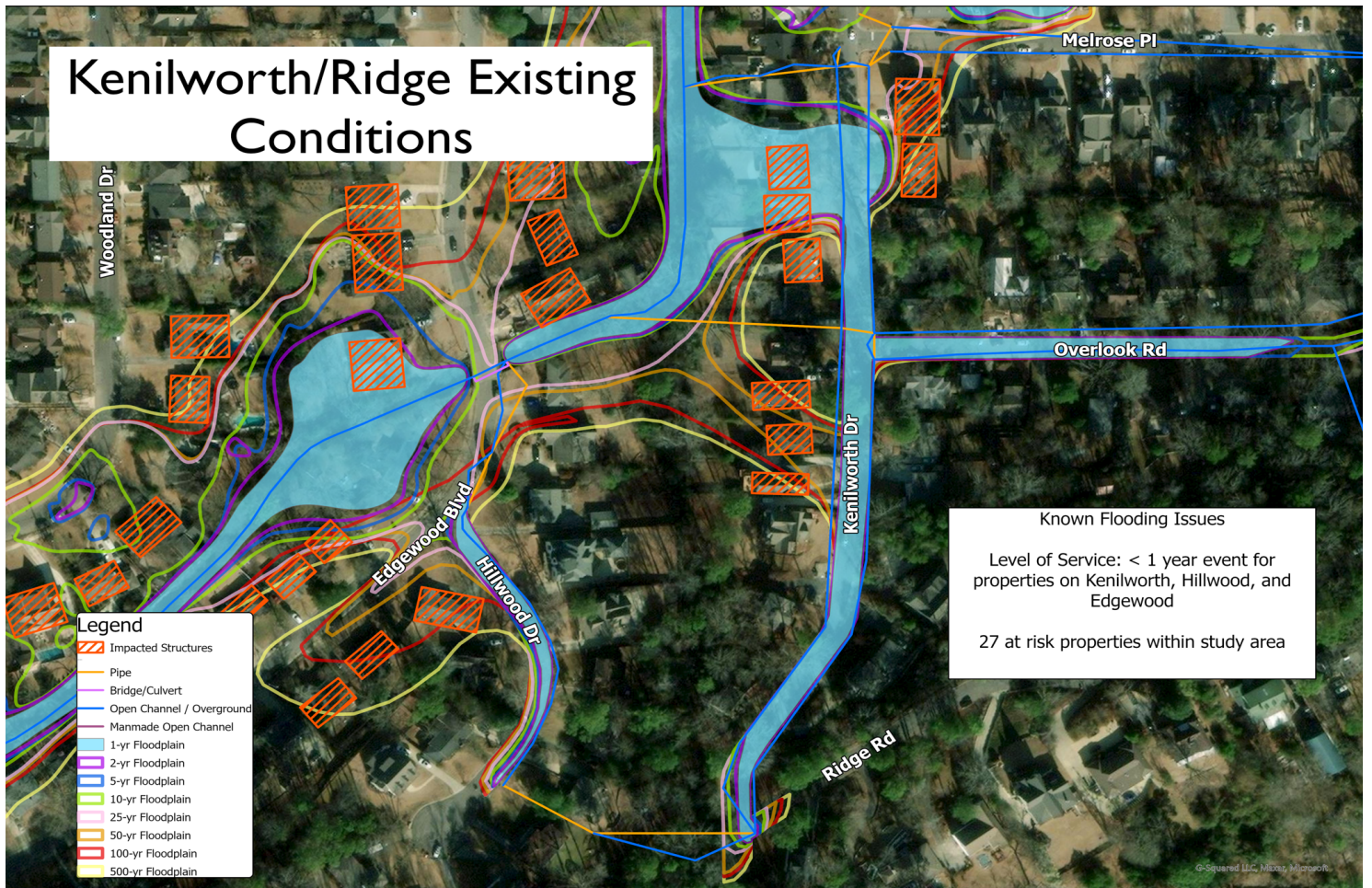
PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Selected Alternative - Kenilworth Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	8	2	Alleviates flooding around Hillwood Dr and Kenilworth Dr.
FLOOD MITIGATION		80%			5.1	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	8	0	Flooding occurring around unblocked inlet is alleviated through 25 year storm. Flooding occurring towards top of Hillwood Dr is alleviated for all storm events.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	6	3	2 properties removed from 5yr, 1 removed from 100yr, 3 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	9	1.4	Flooding is reduced along Kenilworth Dr up to the 100 year storm and a portion of Hillwood Dr through all storm events. Flooding for a small portion of Edgewood Blvd is reduced through the 25 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	7	0.4	2 properties removed from 5yr, 1 removed from 100yr, 3 removed from 500yr
TOTAL PPC SCORE		100%			7.1/10	

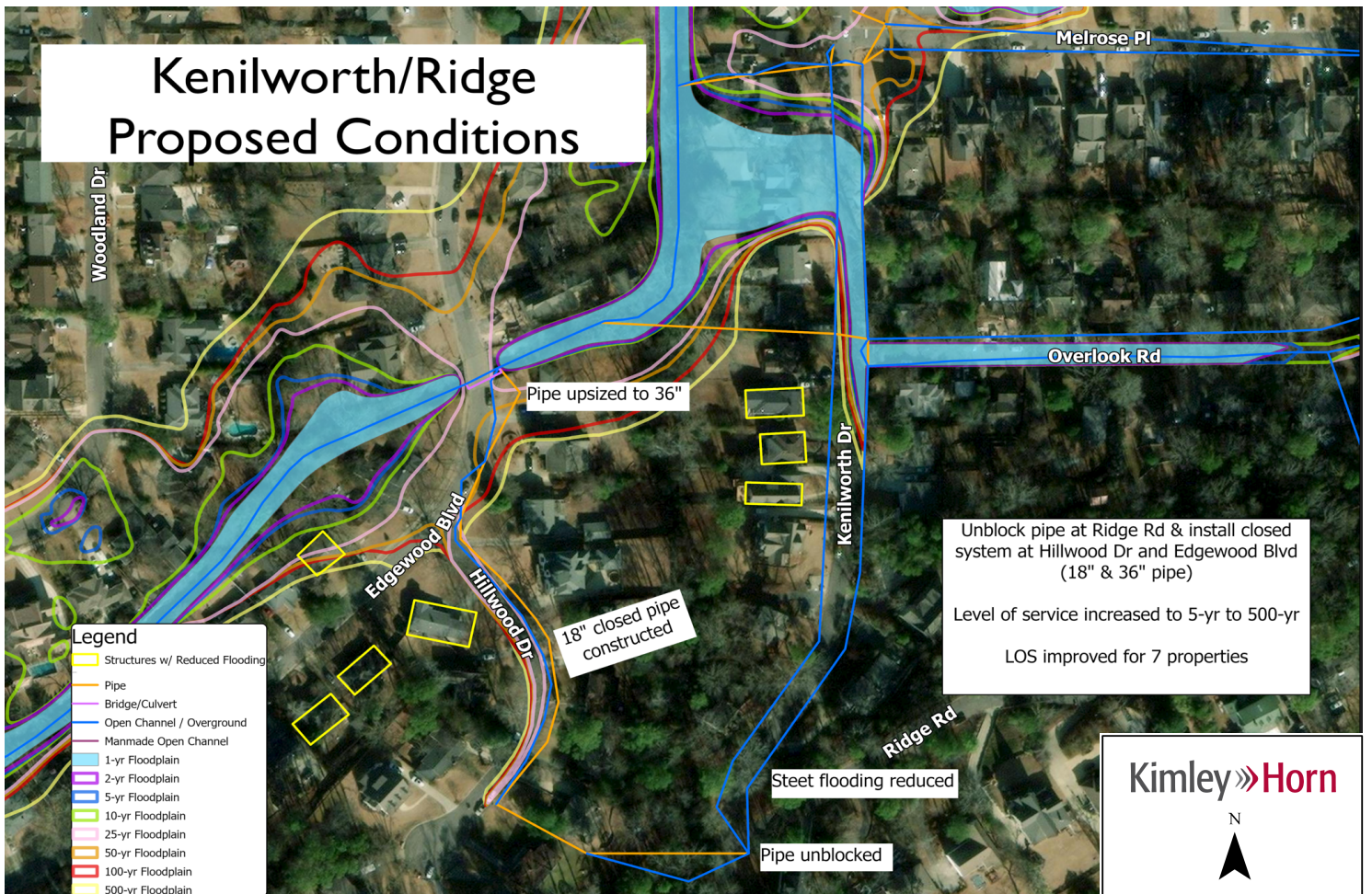
TOTAL COMBINED SCORE
(PSC + PPC)

= 15/20

Kenilworth/Ridge Existing Conditions



Kenilworth/Ridge Proposed Conditions



City of Homewood
Opinion of Probable Construction Costs
Selected Alternative- Kenilworth Project A

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
18" Diameter Concrete Pipe, Class 3, w/ Gaskets	420	LF	\$ 120.00	\$ 50,400.00
36" Diameter Concrete Pipe, Class 2, w/ Gaskets	160	LF	\$ 280.00	\$ 44,800.00
Pipe Backfill, 3/4" Gravel Fill in Trench	493	CY	\$ 58.12	\$ 28,640.24
Pipe Excavation, 1-4' Depth	493	BCY	\$ 10.28	\$ 5,065.76
Asphalt Paving, Replacement Over Trench 4" Thick	318	SY	\$ 105.80	\$ 33,645.99
Engineering Costs	15%	-	-	\$ 24,382.80
Contingency	30%	-	-	\$ 56,080.44
TOTAL COST				\$ 243,015.23

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
18"	54	4.5	4.5	420	315	1	-	2
36"	72	6	5	160	177.8	2	-	2

APPENDIX B-2

Melrose Place



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

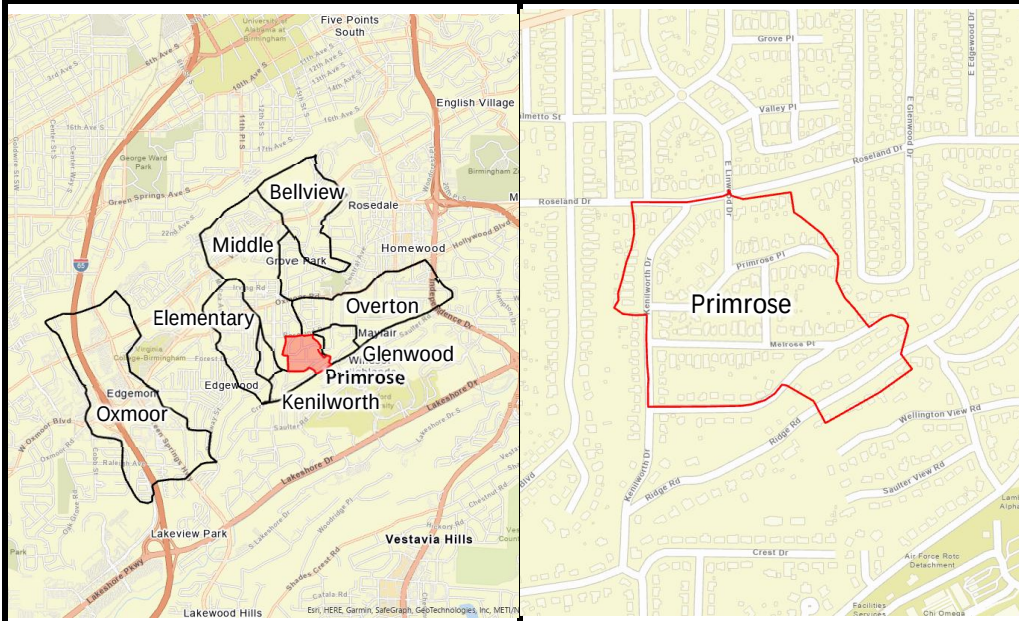
Melrose Place Priority Area: Selected Alternative- Project C

Description and Scope

Project Type:	Pipe Installation	Preliminary Selection Criteria (PSC):	8.5/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	7.9/10
Proposed Level of Service:	5-Year to 500-Year Storm		

This project creates a closed system (24" pipe) through the alley that follows Primrose Melrose down through Primrose Pl. to Griffin Brook. It also adds a diversion pipe (36") from the intersection of Primrose Pl. and Linwood Drive down to the point the alley pipe reaches Primrose Pl. From the intersection of these two pipes a 48" pipe is placed the rest of the way down Primrose Pl. until it reaches Griffin Brook.

Project Maps



Budgetary Cost Estimate

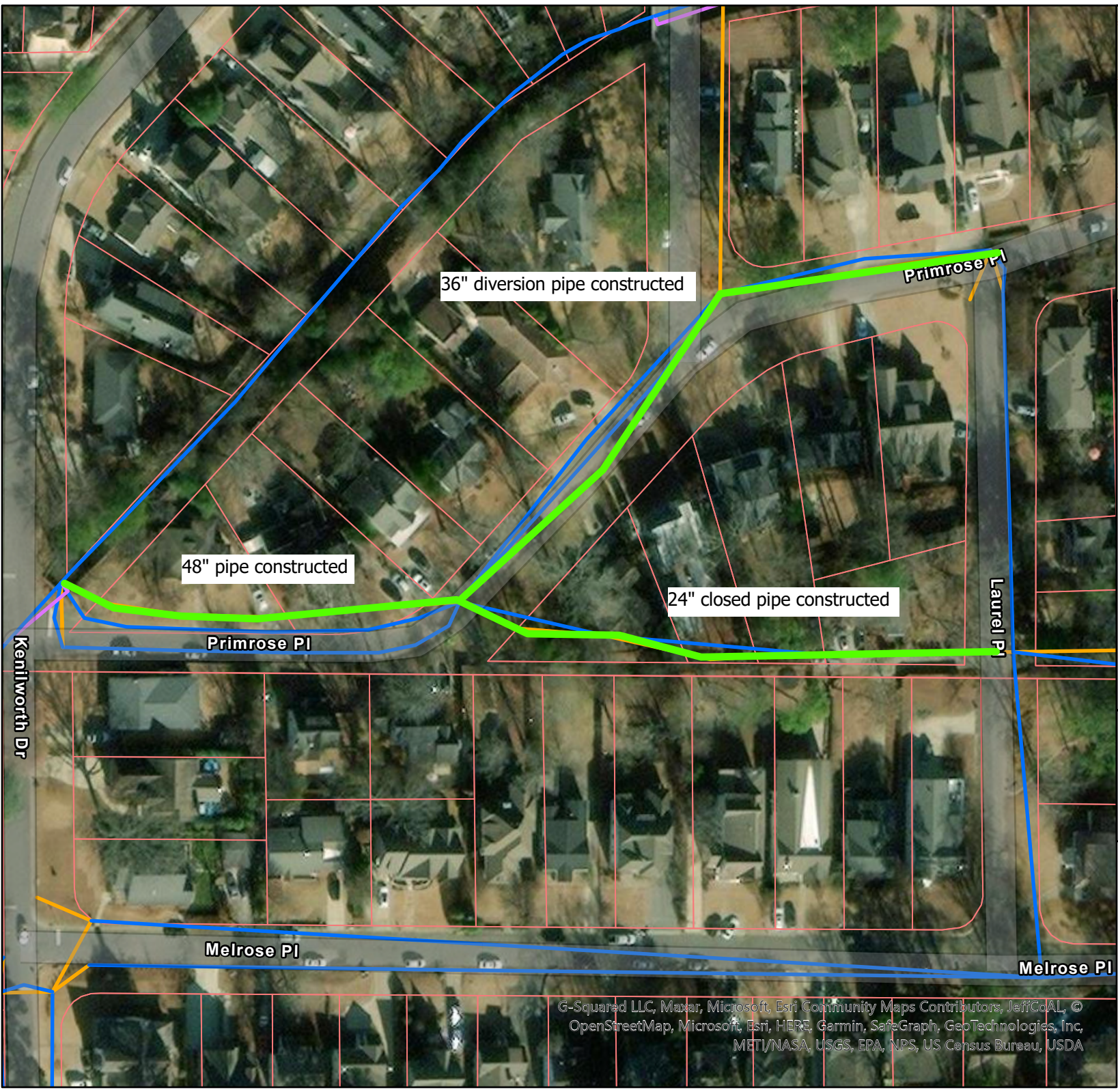
Project Activity	Duration	Amount
Construction		\$ 389,148.04
Site Acquisition/ Easements		-
Engineering Costs		\$ 58,372.21
Contingency		\$ 134,256.07
Total Budgetary Cost Estimate		\$ 581,776.32

Purpose and Need

The major benefits of this project is the alleviation of flooding on Laurel Place and the properties adjacent to Laurel, as well as properties north of Primrose Pl. This project addresses concerns raised by the municipality and improves the level of service of seven properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Primrose Project C

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets - includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	3	0.6	Access to residential property will temporarily be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	10	2.8	Easement needed to install pipe from Laurel Pl to Primrose Pl, and from there to Griffin Brook, as well as down Primrose Pl from the Linwood intersection.
TOTAL PSC SCORE		100%				8.5/10		



Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

SELECTED ALTERNATIVE

PRIMROSE PROJECT C

Kimley»Horn

N

0 0.01 0.03 Miles

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City of Homewood



PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Selected Alternative - Primrose Project C

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	9	2	
FLOOD MITIGATION		80%			5.9	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	10	1	Flooding occurring around the intersection of Laurel Pl and the Primrose Melrose alley is eliminated through the 500 year storm. Flooding around the intersection of E Linwood Dr and Primrose Pl is eliminated through the 5 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	7	4	2 properties removed from 5yr, 1 removed from 50yr, 4 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	10	1.5	Flooding occurring on Laurel Pl north of the Primrose Melrose alley is eliminated up to the 500 year storm, as well as through the 10 year storm on portions of E Linwood Dr and Primrose Pl.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	7	0.4	2 properties removed from 5yr, 1 removed from 50yr, 4 removed from 500yr
TOTAL PPC SCORE		100%			7.9/10	

**TOTAL COMBINED SCORE
(PSC + PPC)**

= 16.4/20

Primrose Existing Conditions

Known Flooding Issues on Laurel Pl and downstream

Level of Service: < 1 year event for properties on Laurel Pl, Primrose Pl, and Linwood Dr

31 at risk properties within study area

Legend

- Impacted Structures
- Pipe
- Bridge/Culvert
- Open Channel / Overground
- Manmade Open Channel
- 1-yr Floodplain
- 2-yr Floodplain
- 5-yr Floodplain
- 10-yr Floodplain
- 25-yr Floodplain
- 50-yr Floodplain
- 100-yr Floodplain
- 500-yr Floodplain

Map labels: Roseland Crst, Kenilworth Dr, Primrose Pl, Linwood Dr, Laurel Pl, Primrose Melrose, Melrose Pl.

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City of Homewood
Opinion of Probable Construction Costs
Selected Alternative - Melrose Project C

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
24" Concrete Pipe	400	LF	\$ 170.00	\$ 68,000.00
36" Diameter Concrete Pipe, Class 2, w/ Gaskets	300	LF	\$ 280.00	\$ 84,000.00
48" Diameter Concrete Pipe, Class 3, w/ Gaskets	300	LF	\$ 398.00	\$ 119,400.00
Pipe Backfill, 3/4" Gravel Fill in Trench	1,093	CY	\$ 58.12	\$ 63,501.48
Pipe Excavation, 4-6' Depth	1,093	BCY	\$ 7.73	\$ 8,445.74
Asphalt Paving, Replacement Over Trench 4" Thick	433	SY	\$ 105.80	\$ 45,800.82
Engineering Costs	15%	-	-	\$ 58,372.21
Contingency	30%	-	-	\$ 134,256.07
TOTAL COST				\$ 581,776.32

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
24" Double	60	5	5	400	370.4	1	-	-
36" Double	72	6	5	300	333.3	1	-	-
48" Double	84	7	5	300	388.9	1	-	-

APPENDIX B-3

Edgewood Elementary



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

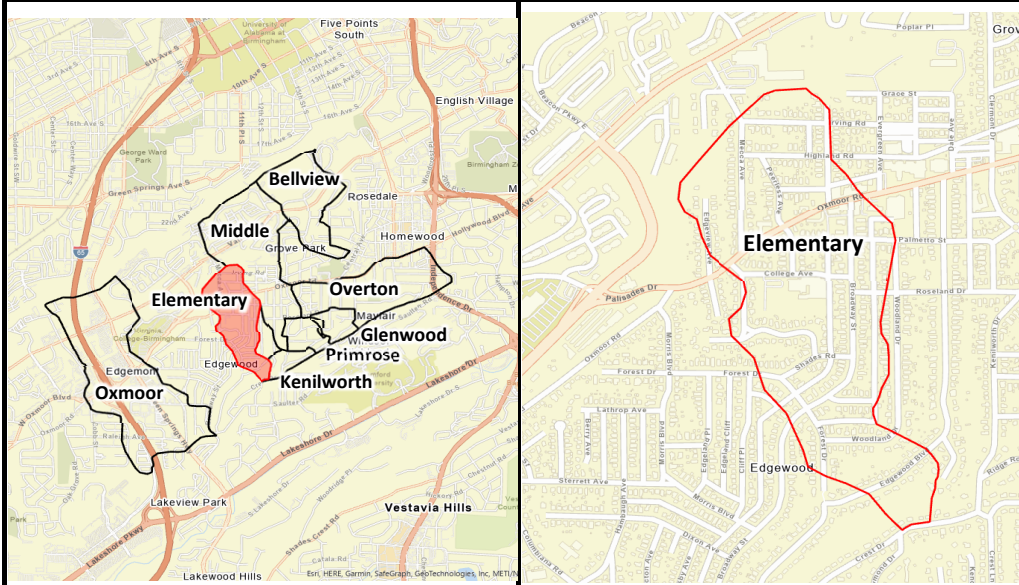
Edgewood Elementary Priority Area: Selected Alternative - Project B

Description and Scope

Project Type:	Inlet and Pipe Installation	Preliminary Selection Criteria (PSC):	8.4/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	11.0/10
Proposed Level of Service:	1-Year to 500-Year Storm		

This project upsizes the full stretch of pipes running from College Ave to Westover Drive to 36", as well as a pinch point crossing Broadway Street to a 60" pipe, and finally adds an additional foot of depth to the stretch of open rectangular channel from Broadway Street to Griffin Brook.

Project Maps



Budgetary Cost Estimate

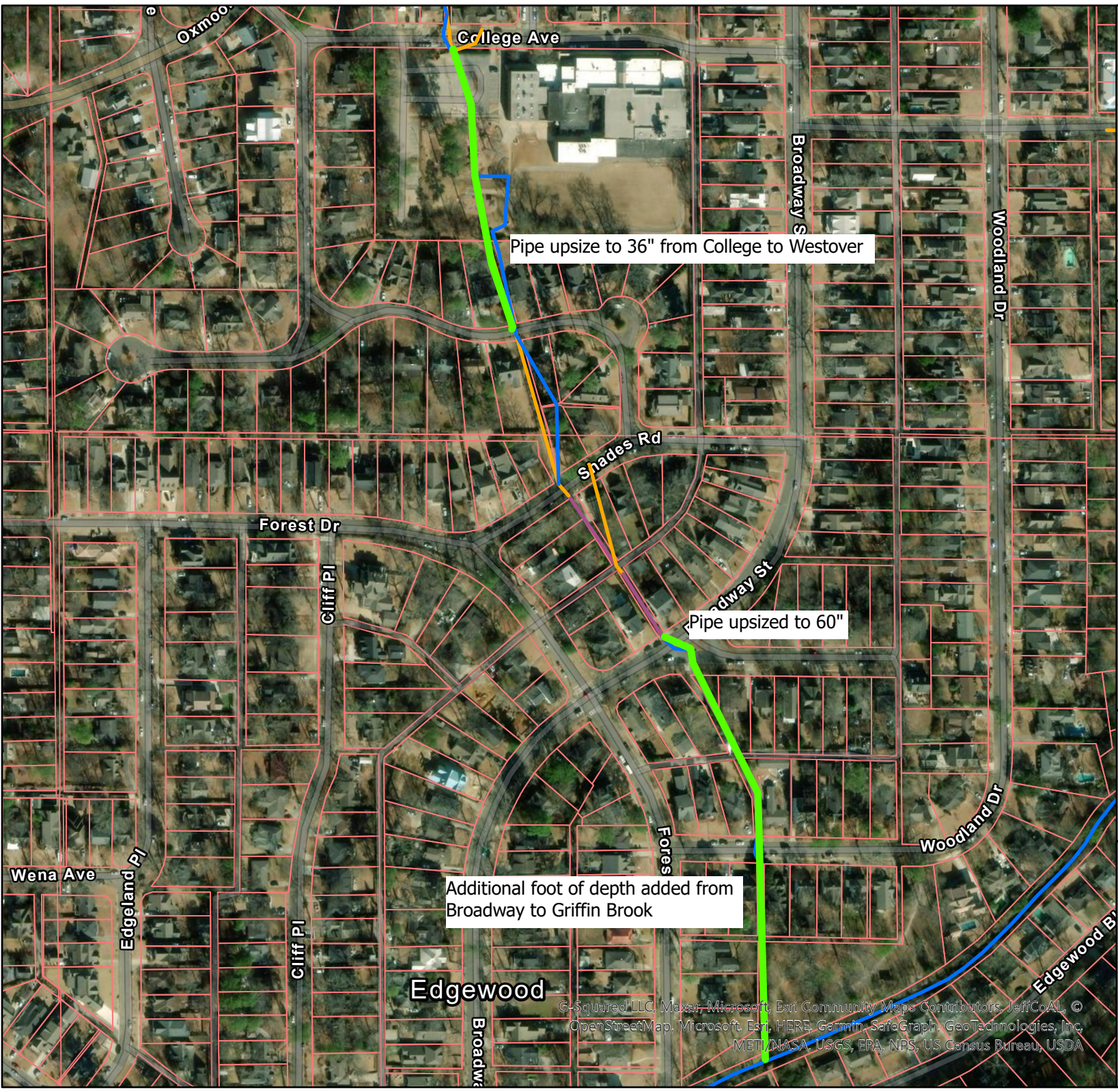
Project Activity	Duration	Amount
Construction		\$ 327,769.46
Site Acquisition/ Easements		-
Engineering Costs		\$ 49,165.42
Contingency		\$ 113,080.46
Total Budgetary Cost Estimate		\$ 490,015.35

Purpose and Need

The major benefits of this project is the alleviation of flooding on properties stretching south from College Ave to Griffin Brook. This project addresses concerns raised by the municipality and improves the level of service of twenty-five properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Elementary Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets - includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will be temporarily impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	8	1.4	Access to non-residential streets will be impacted in limited capacity.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe improvement, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	10	2.8	Alley of right of way exists through area improvements are being made.
TOTAL PSC SCORE		100%				8.4/10		



Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel / Overground
 - Manmade Open Channel
 - Updated Infrastructure

SELECTED ALTERNATIVE ELEMENTARY PROJECT B

Kimley»Horn

N

0 0.04 0.07 Miles

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PROJECT PERFORMANCE CRITERIA (PPC)
HOMWOOD STORMWATER EVALUATION
 Selected Alternative - Elementary Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
CIVIC IMPACT		20%					2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.			8	2	Alleviates flooding south of Edgewood Elementary.
FLOOD MITIGATION		80%					9.0	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.			10	1	Flooding occurring on property south of Edgewood Elementary is eliminated through the 500 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 20 properties - allowing for a possible total PPC score above 10.			12	6	1 property removed from 1yr, 5 removed from 2yr, 2 removed from 5yr, 2 removed from 25yr, 1 removed from 50yr, 5 removed from 100yr, 9 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.			10	1.5	Flooding is reduced along Broadway St, Shades Rd, and Westover Dr through the 500 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.			10	0.5	This project impacts many properties downstream of initial extents of proposed project.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement			10	0.5	1 property removed from 1yr, 5 removed from 2yr, 2 removed from 5yr, 2 removed from 25yr, 1 removed from 50yr, 5 removed from 100yr, 9 removed from 500yr
TOTAL PPC SCORE		100%					11/10	

TOTAL COMBINED SCORE
(PSC + PPC)

= 19.4/20

Edgewood Elementary Existing Conditions

Known Flooding Issues on College Ave and downstream

Level of Service: < 1 year event for properties north of College Ave stretching south to Griffin Brook

39 at risk properties within study area

Legend

- Impacted Structures
- Pipe
- Bridge/Culvert
- Open Channel / Overground
- Manmade Open Channel
- 1-yr Floodplain
- 2-yr Floodplain
- 5-yr Floodplain
- 10-yr Floodplain
- 25-yr Floodplain
- 50-yr Floodplain
- 100-yr Floodplain
- 500-yr Floodplain

Forest Lathrop

Lathrop Ave

Wena Aly

Wingate Forrest

Forest Dr

Edgeland Cliff

Cliff Pl

Forrest Morris

Shades Rd

Broadway Cliff

Melrose Roseland

Melrose Pl

Woodland Dr

Forrest Woodland

Palmetto St

Roseland Dr

Broadway Woodland

Woodland Dr

Edgewood Elementary Proposed Conditions

Inlet installation and pipe upsizing downstream

Level of service increased to 1-yr to 500-yr

25 properties LOS improved

Legend

- Structures w/ Reduced Flooding
- Pipe
- Bridge/Culvert
- Open Channel / Overground
- Manmade Open Channel
- 1-yr Floodplain
- 2-yr Floodplain
- 5-yr Floodplain
- 10-yr Floodplain
- 25-yr Floodplain
- 50-yr Floodplain
- 100-yr Floodplain
- 500-yr Floodplain

KimleyHorn



Pipe upsize to 36" from College to Westover

Pipe upsized to 60"

Additional foot of depth added from Broadway to Griffin Brook

Palmetto St

Roseland Dr

Broadway Woodland

Woodland Dr

Forrest Woodland

Palmetto St

Roseland Dr

Broadway Woodland

Woodland Dr

Forrest Woodland

Palmetto St

Roseland Dr

Broadway Woodland

Woodland Dr

Forrest Woodland

Palmetto St

Roseland Dr

Broadway Woodland

Woodland Dr

City of Homewood
Opinion of Probable Construction Costs
Selected Alternative- Edgewood Elementary Project B

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
60" Concrete Pipe	84	LF	\$ 523.00	\$ 43,932.00
36" Diameter Concrete Pipe, Class 2, w/ Gaskets	685	LF	\$ 280.00	\$ 191,800.00
Pipe Backfill, 3/4" Gravel Fill in Trench	910	CY	\$ 58.12	\$ 52,915.03
Pipe Excavation, 1-4' Depth	425	BCY	\$ 10.28	\$ 4,364.63
Pipe Excavation, 6-10' Depth	910	BCY	\$ 10.29	\$ 4,393.20
Asphalt Paving, Replacement Over Trench 4" Thick	287	SY	\$ 105.80	\$ 30,364.60
Engineering Costs	15%	-	-	\$ 49,165.42
Contingency	30%	-	-	\$ 113,080.46
TOTAL COST				\$ 490,015.34

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
24"	60	5	6	685	761.1	-	-	-
60"	96	8	6	84	149.3	1	-	-

APPENDIX B-4

Bellview



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

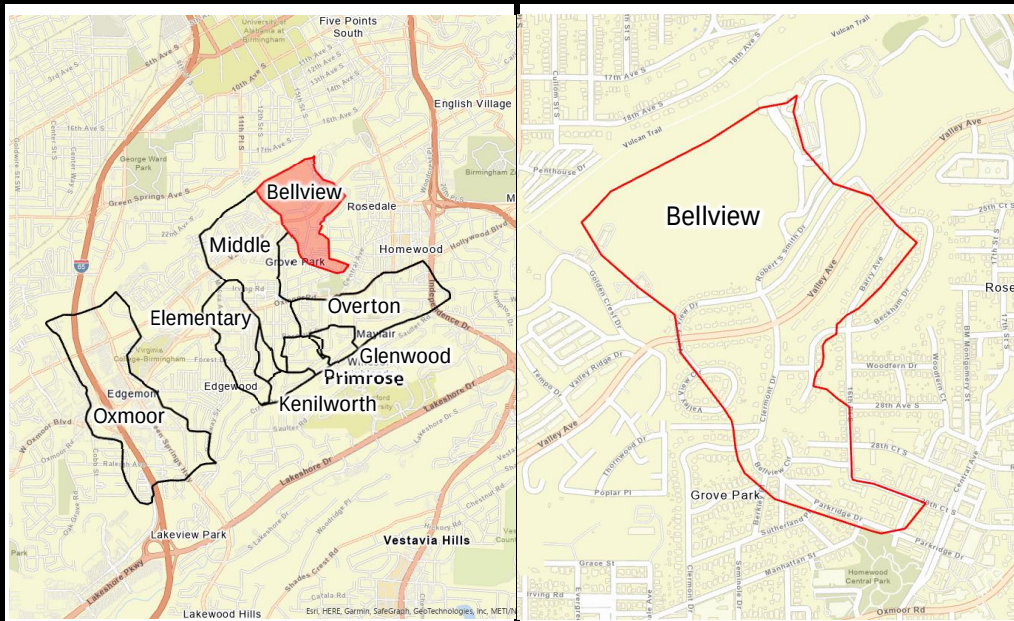
Bellview Priority Area: Selected Alternative- Project A

Description and Scope

Project Type:	Pipe Installation	Preliminary Selection Criteria (PSC):	8.7/10
Existing Level of Service:	2-Year Storm	Project Performance Criteria (PPC):	5.3/10
Proposed Level of Service:	5-Year to 500-Year Storm		

This project creates a 24" diameter pipe diversion along Bellview Circle starting upstream of the driveway culvert at 1527 Bellview Circle and connecting into Somerset Drive. There is also an upsizing of the pipe running down Somerset Drive the diversion pipe would otherwise be connected to, the upsizing is to a 24" diameter pipe as well.

Project Maps



Budgetary Cost Estimate

Project Activity	Duration	Amount
Construction		\$ 176,111.50
Site Acquisition/ Easements		-
Engineering Costs		\$ 26,416.73
Contingency		\$ 60,758.47
Total Budgetary Cost Estimate		\$ 263,286.70

Purpose and Need

The major benefits of this project is the alleviation of flooding on properties east of Bellview Cir and north of Somerset Drive. This project addresses concerns raised by the municipality and improves the level of service of five properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Bellview Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will temporarily be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	10	2.8	Improvements take place along public roads.
TOTAL PSC SCORE		100%				8.7/10		



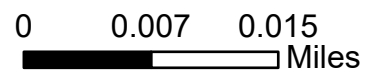
Legend

- Parcels
- Conduits**
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Infrastructure Updates

SELECTED ALTERNATIVE

BELLVIEW PROJECT A

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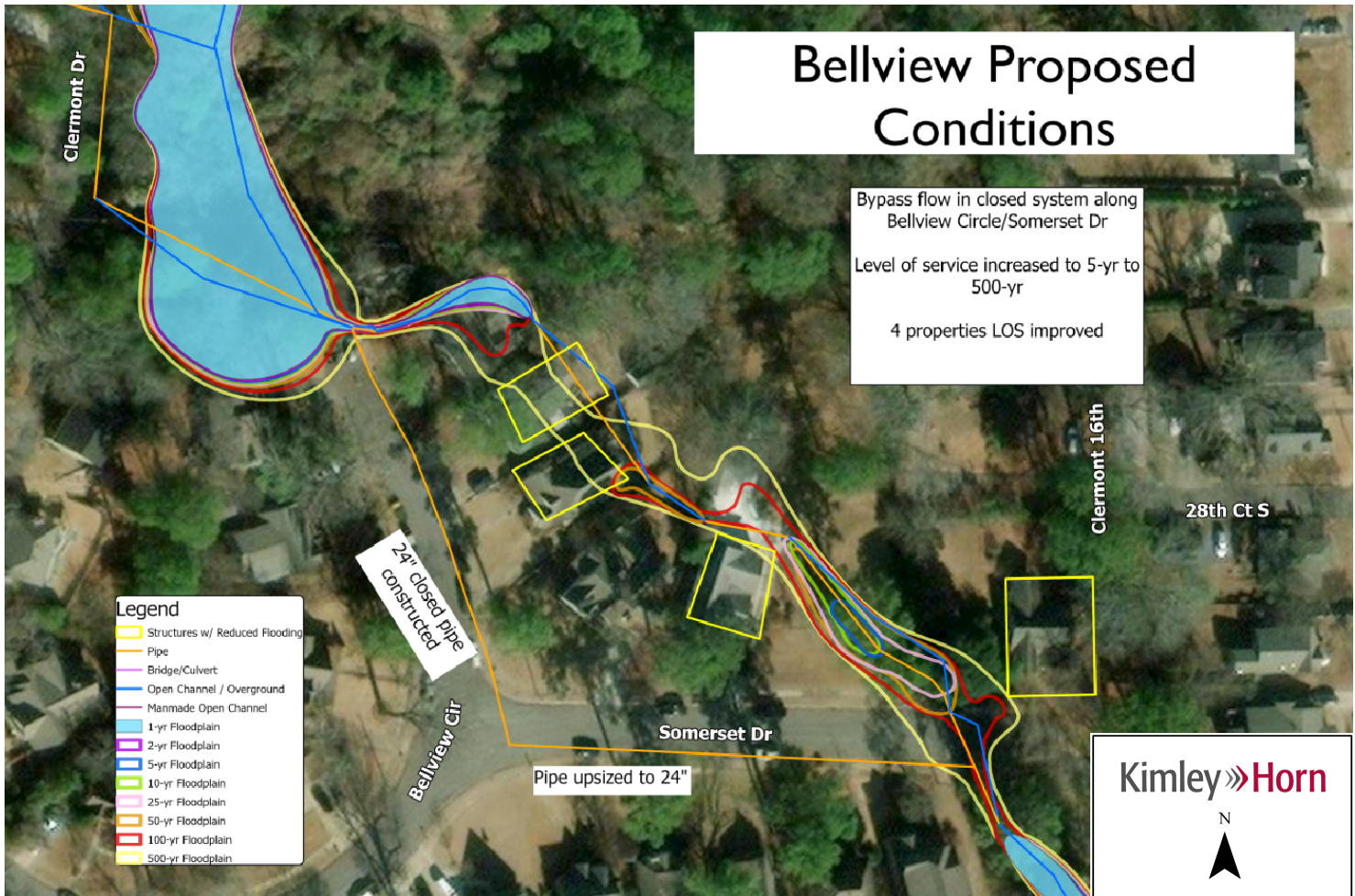
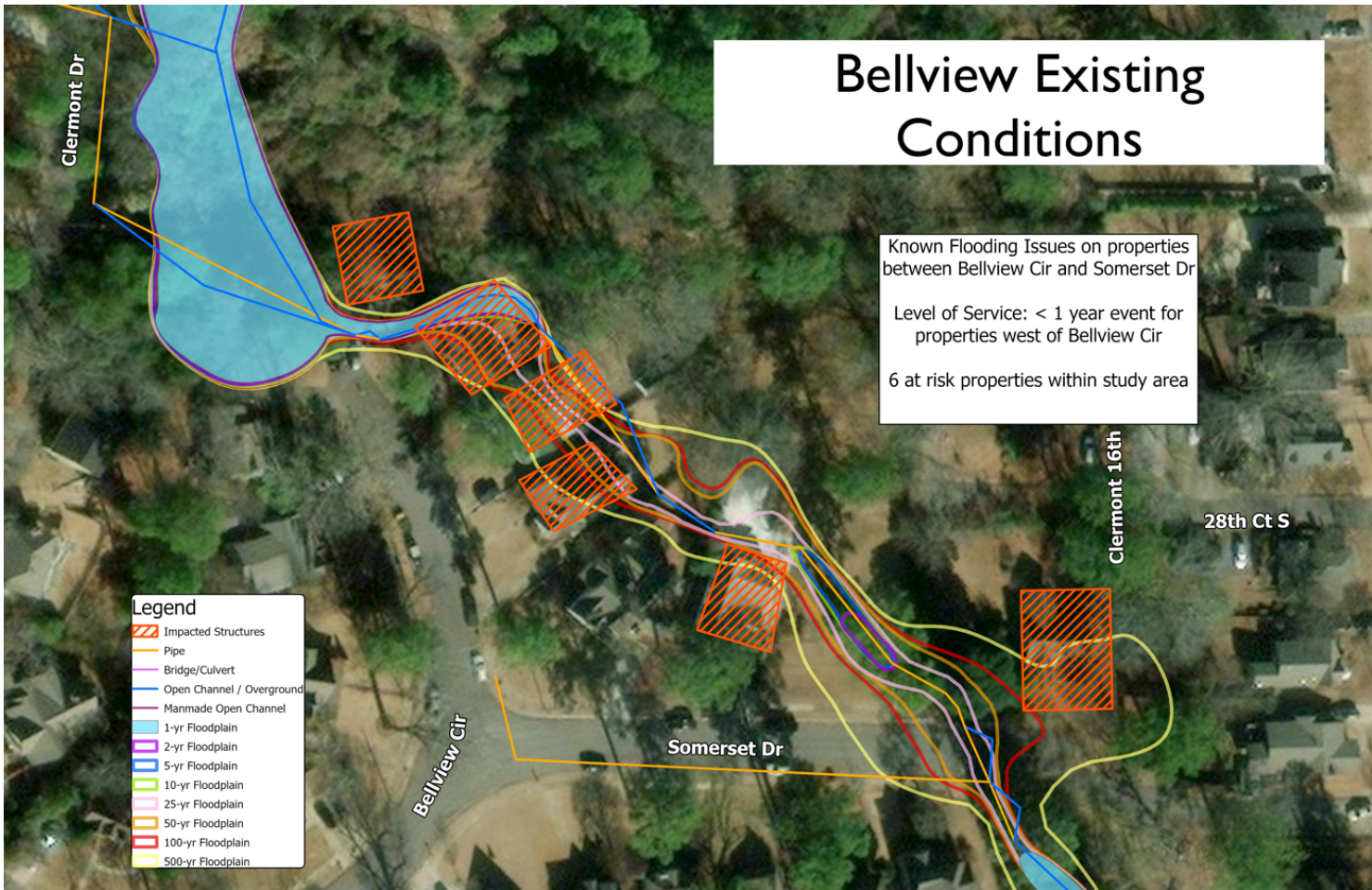
PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Selected Alternative - Bellview Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	10	2	Alleviates flooding around Travel Inn/Exxon area.
FLOOD MITIGATION		80%			3.3	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	10	1	Flooding occurring west of Bellview Circle is alleviated through the 50 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	5	3	2 properties removed from 10yr, 1 removed from 100yr, 2 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	0	0.0	Flooding is not reduced along the road
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	6	0.3	2 properties removed from 10yr, 1 removed from 100yr, 2 removed from 500yr
TOTAL PPC SCORE		100%			5.3/10	

TOTAL COMBINED SCORE
(PSC + PPC)

=

14/20



City of Homewood
Opinion of Probable Construction Costs
Selected Alternative - Bellview Project A

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
24" Concrete Pipe	582	LF	\$ 170.00	\$ 98,940.00
Pipe Backfill, 3/4" Gravel Fill in Trench	647	CY	\$ 58.12	\$ 37,584.27
Pipe Excavation, 4-6' Depth	225	BCY	\$ 7.73	\$ 1,739.25
Pipe Excavation, 6-10' Depth	357	BCY	\$ 10.29	\$ 3,673.53
Asphalt Paving, Replacement Over Trench 4" Thick	323	SY	\$ 105.80	\$ 34,174.46
Engineering Costs	15%	-	-	\$ 26,416.73
Contingency	30%	-	-	\$ 60,758.47
TOTAL COST				\$ 263,286.71

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
24"	60	5	6	582	646.7	1	-	-

APPENDIX B-5

Glenwood Drive



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

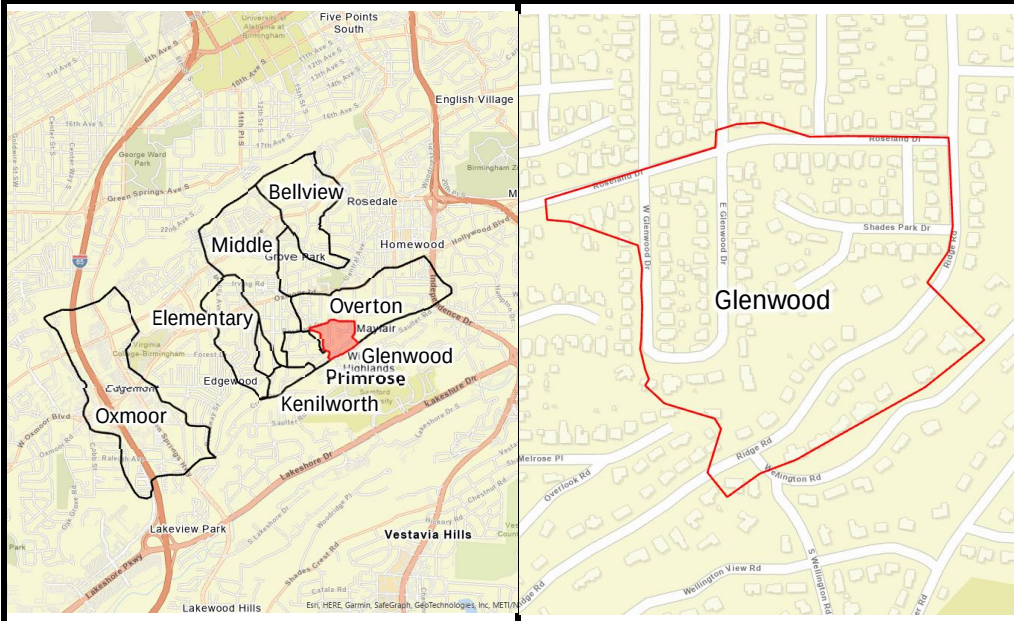
Glenwood Drive Priority Area: Selected Alternative - Project B

Description and Scope

Project Type:	Pipe Installation	Preliminary Selection Criteria (PSC):	7.3/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	7.7/10
Proposed Level of Service:	1-Year to 500-Year Storm		

This project installs a closed pipe system (30" diameter) through the alley between properties west of E Glenwood Drive. The pipe system is connected to existing pipes

Project Maps



Budgetary Cost Estimate

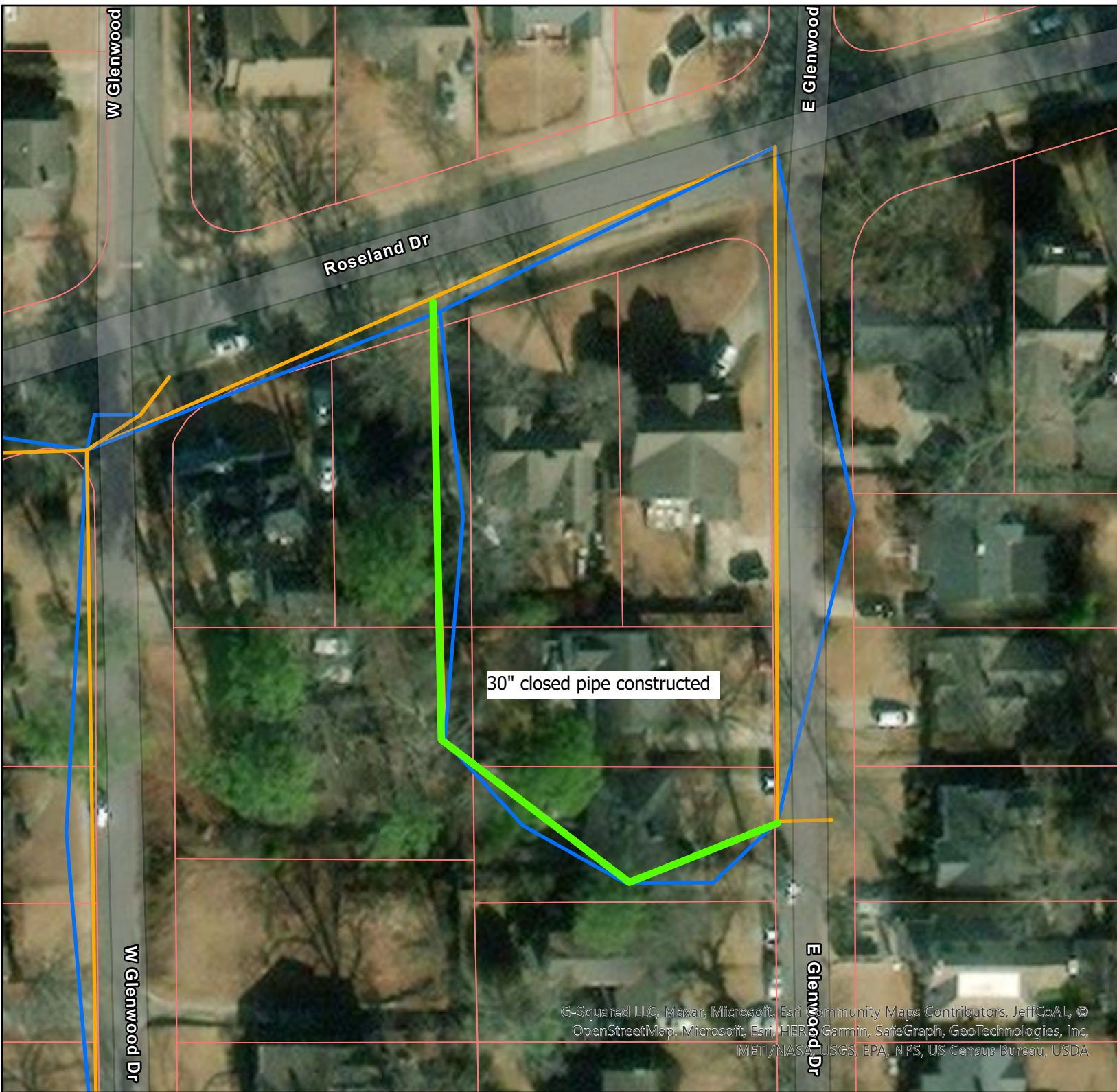
Project Activity	Duration	Amount
Construction		\$ 113,745.00
Site Acquisition/ Easements		\$ 870,000.00
Engineering Costs		\$ 17,061.75
Contingency		\$ 39,242.03
Total Budgetary Cost Estimate		\$ 1,040,048.78

Purpose and Need

The major benefits of this project is the alleviation of flooding between E Glenwood Dr and W Glenwood Dr as well as flooding along E Glenwood Dr. This project addresses concerns raised by the municipality and improves the level of service of seven properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Glenwood Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets - includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will be temporarily impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	5	1.4	Easement may be required to construct pipes along alley from E Glenwood Dr to Roseland Dr - though an alley of right of way may exist.
TOTAL PSC SCORE		100%				7.3/10		



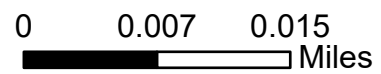
Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

SELECTED ALTERNATIVE

GLENWOOD PROJECT B

Kimley»Horn



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City of Homewood

PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Selected Alternative - Glenwood Project B

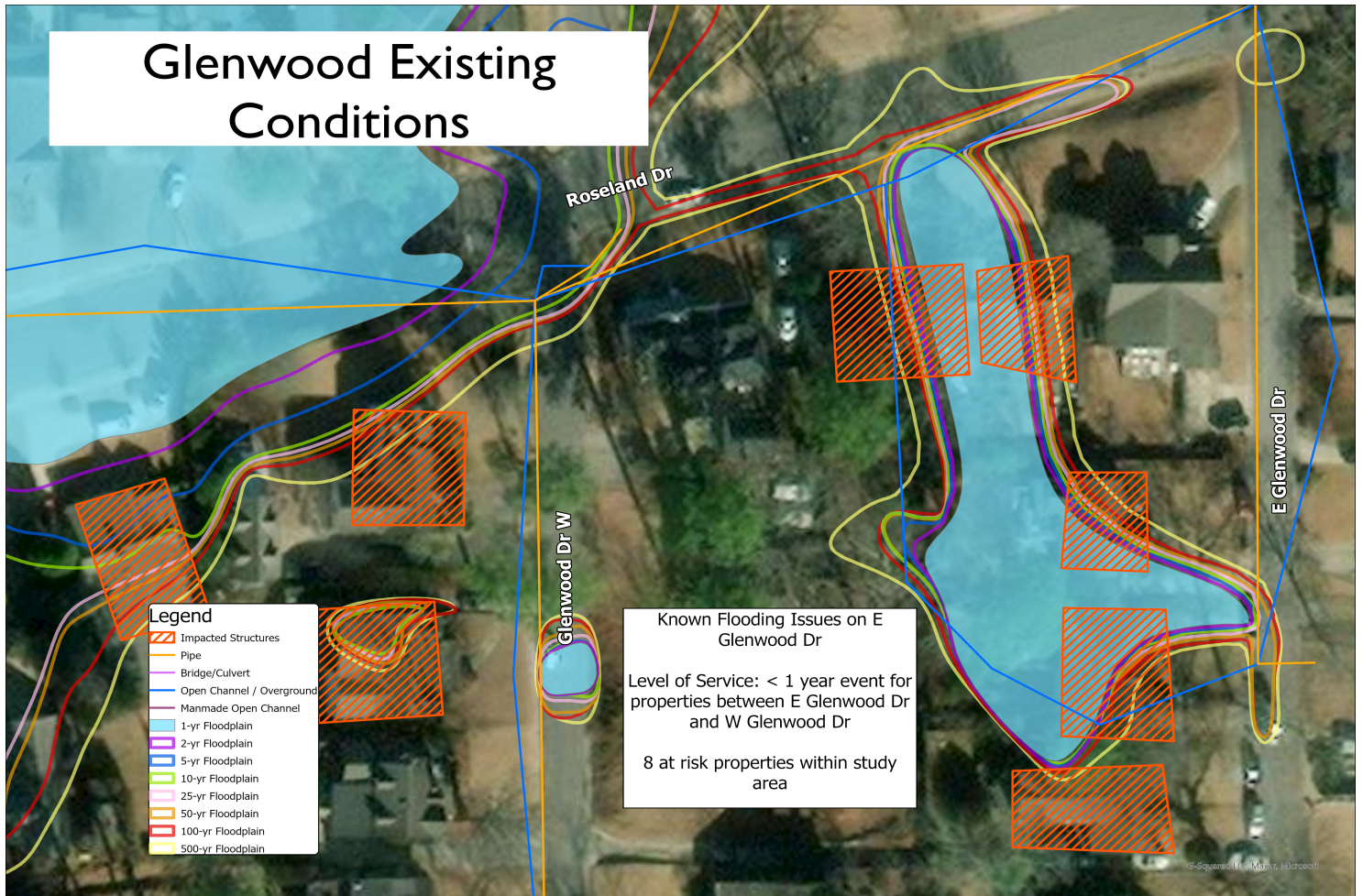
CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	10	2	Alleviates flooding between E Glenwood Dr to W Glenwood Dr.
FLOOD MITIGATION		80%			5.7	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	10	1	Flooding occurring between E Glenwood Dr and W Glenwood Dr is reduced through all storm events.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	8	4	1 property removed from 25yr, 1 removed from 50yr, 6 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	5	0.8	Flooding is reduced along E Glenwood Dr around .25-1 feet.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	9	0.5	1 property removed from 25yr, 1 removed from 50yr, 6 removed from 500yr
TOTAL PPC SCORE		100%			7.7/10	

TOTAL COMBINED SCORE
(PSC + PPC)

=

15/20

Glenwood Existing Conditions



Glenwood Proposed Conditions



City of Homewood
Opinion of Probable Construction Costs
Selected Alternative- Glenwood Project A

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
30" Diameter Concrete Pipe, Class 3, w/ Gaskets	400	LF	\$ 224.00	\$ 89,600.00
Pipe Backfill, 3/4" Gravel Fill in Trench	367	CY	\$ 58.12	\$ 21,330.04
Pipe Excavation, 4-6' Depth	367	BCY	\$ 7.73	\$ 2,836.91
Easement Acquisition	12,000	SF	\$ 72.50	\$ 870,000.00
Engineering Costs	15%	-	-	\$ 17,065.04
Contingency	30%	-	-	\$ 39,249.60
TOTAL COST				\$ 1,040,081.59

EASEMENT ACQUISITION			
ADDRESS	PROPERTY LAND VALUE	SQUARE FEET	COST PER SQUARE FOOT
304 E Glenwood Dr, Birmingham, AL 35209	\$ 290,000.00	4000	\$ 72.50

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
30"	54	4.5	4.5	400	367	1	-	3

APPENDIX B-6

Overton Park



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

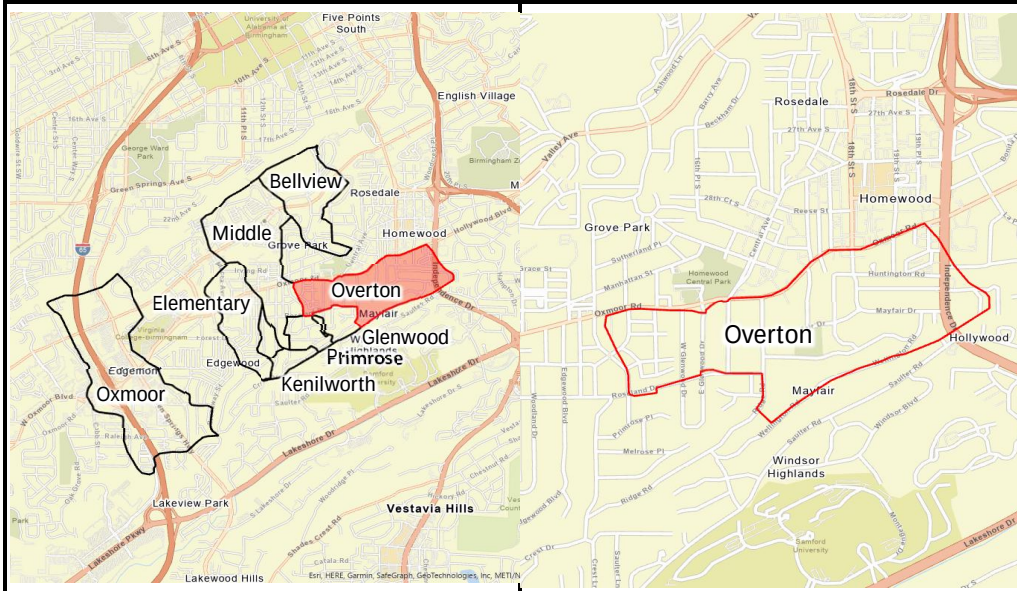
Overton Park Priority Area: Selected Alternative - Project A

Description and Scope

Project Type:	Culvert Installation	Preliminary Selection Criteria (PSC):	6.6/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	7.4/10
Proposed Level of Service:	1-Year Storm to 500-Year Storm		

This project creates an 96"x48" box culvert from Ridge Road (downstream of Overton Park) to Griffin Brook.

Project Maps



Budgetary Cost Estimate

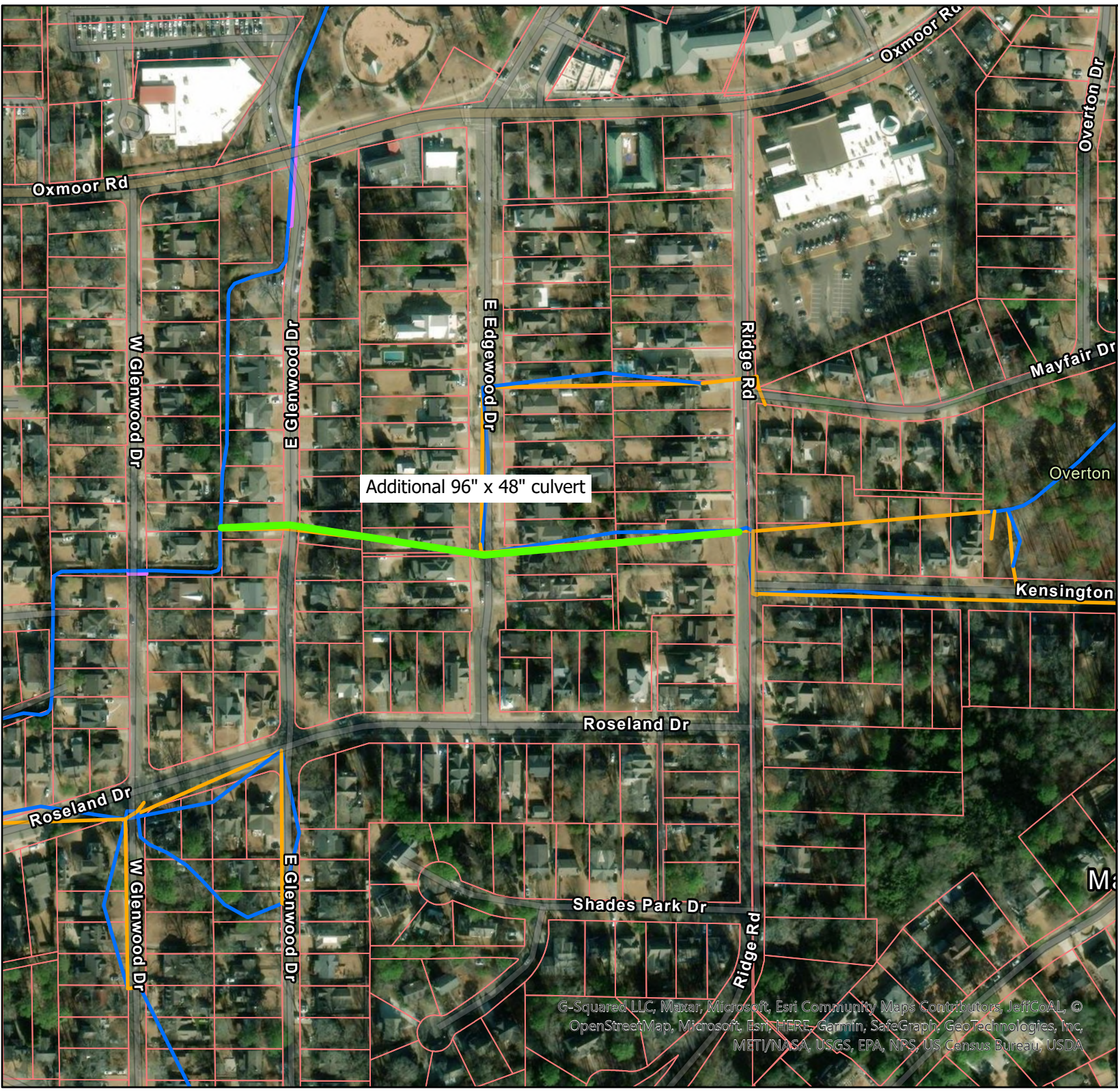
Project Activity	Duration	Amount
Construction		\$ 994,607.51
Site Acquisition/ Easements		\$ 1,798,984.51
Engineering Costs		\$ 419,038.80
Contingency		\$ 424,093.89
Total Budgetary Cost Estimate		\$ 3,636,724.71

Purpose and Need

The major benefits of this project is the alleviation of flooding on properties stretching from Overton Park to E Edgewood Dr. This project addresses concerns raised by the municipality and improves the level of service of fourteen properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Overton Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	3	0.6	Access to residential property will temporarily be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve culvert improvements, which is a potential maintenance item. Culverts will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	3	0.8	Easement needed to install culverts from Ridge Rd to E Glendwood Dr.
TOTAL PSC SCORE		100%				6.6/10		



Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

OVERTON

PROJECT A

N

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Miles

G-Squared LLC, Maxar, Microsoft, Esri Community Maps Contributors, JeffCoAL, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Selected Alternative - Overton Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
CIVIC IMPACT		20%					2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.			8	2	Alleviates flooding around Ridge Rd and E Edgewood Dr.
FLOOD MITIGATION		80%					5.4	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.			8	0	Flooding occurring around Ridge Rd north of Roseland Dr is partially eliminated through the 5 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	If the project is anticipated to reduce known flooding experienced by habitable structures, it receives 10 points. If the project does not reduce flooding experienced by habitable structures, it receives 0 points.			6	3	1 removed from 1-yr, 2 removed up to 2-yr, 5 up to 10-yr, 1 up to 100-yr, 5 up to 500-yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.			10	1.5	Flooding occurring along part of Ridge Rd is eliminated through the 500 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.			0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement			9	0.5	1 removed from 1-yr, 2 removed up to 2-yr, 5 up to 10-yr, 1 up to 100-yr, 5 up to 500-yr
TOTAL PPC SCORE		100%					7.4/10	

TOTAL COMBINED SCORE
(PSC + PPC)

= 14/20

[illegible]

City of Homewood
Opinion of Probable Construction Costs
Overton Project D

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
36" Diameter Concrete Pipe, Class 2, w/ Gaskets	386	LF	\$ 280.00	\$ 108,080.00
54" Reinforced Culvert, Class 3, No Gaskets	115	LF	\$ 460.00	\$ 52,900.00
Pipe Backfill, 3/4" Gravel Fill in Trench	637	CY	\$ 58.12	\$ 36,994.99
Pipe Excavation, 4-6' Depth	637	BCY	\$ 7.73	\$ 4,920.36
Asphalt Paving, Replacement Over Trench 4" Thick	278	SY	\$ 105.80	\$ 29,412.40
Detention Pond	-	-	-	-
Forebay (10% of BMP Cost)	1	EA	\$ 20,107.00	\$ 20,107.00
Excavation, 300' Haul, Common Earth	6540	BCY	\$ 16.33	\$ 106,791.34
Storm Drain Pipe, 60"	100	LF	\$ 523.00	\$ 52,300.00
Perimeter Fence, 4' High	1000	LF	\$ 14.82	\$ 14,820.00
Sod	4440	SY	\$ 7.37	\$ 32,722.80
Outlet Control Structure	1	EA	\$ 10,000.00	\$ 10,000.00
Engineering Costs	15%	-	-	\$ 70,357.33
Contingency	30%	-	-	\$ 161,821.87
TOTAL COST				\$ 701,228.09

Over								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
36"	72	6	5	386	428.9	1	-	-
54"	90	7.5	6.5	115	207.6	1	-	-
24"x36" Squashed, Double	102	8.5	5	468	736.7	-	-	-

APPENDIX B-7
Homewood Middle School



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

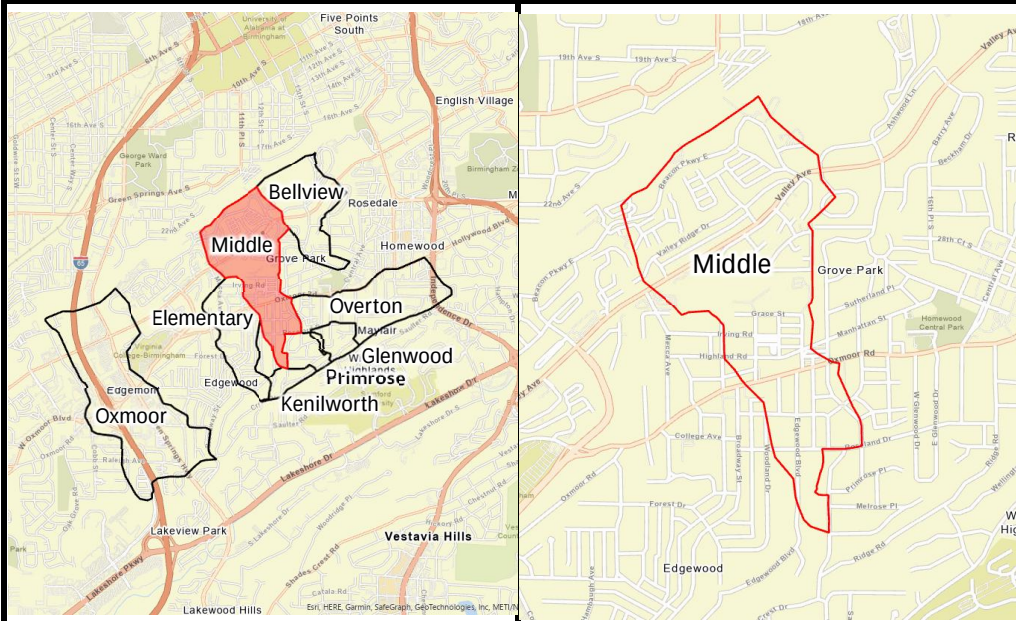
Homewood Middle School Priority Area: Selected Alternative - Project A

Description and Scope

Project Type:	Detention Facility Installation	Preliminary Selection Criteria (PSC):	8.8/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	10.6/10
Proposed Level of Service:	10-Year to 500-Year Storm		

This project creates a 324,676 cubic foot detention facility just northeast of Honey Locust Ln, as well as weirs/control structures to create connections with existing stormwater infrastructure.

Project Maps



Budgetary Cost Estimate

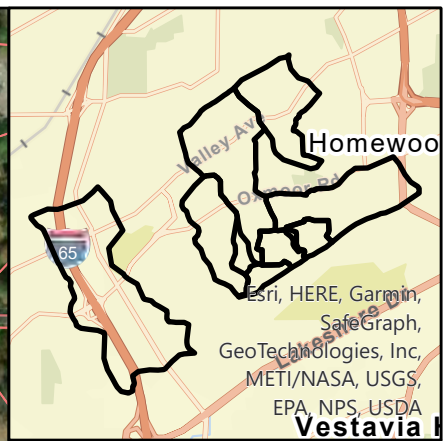
Project Activity	Duration	Amount
Construction		\$ 407,206.63
Site Acquisition/ Easements		\$ 2,925,400.00
Engineering Costs		\$ 61,080.99
Contingency		\$ 140,486.29
Total Budgetary Cost Estimate		\$ 3,534,173.91

Purpose and Need

The major benefits of this project is the alleviation of flooding south of Grace Street and along Edgewood Boulevard north of Griffin Brook. This project improves the level of service of forty-five properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Homewood Middle Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets - includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	10	2.1	Access to residential property will not be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	8	1.4	Access to non-residential streets will be partially and temporarily impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve the addition of a detention facility as well as pipe construction, which is a potential maintenance item. The detention facility and pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	7	2.0	Use of property south of Valley Ave will be required, property not privately owned.
TOTAL PSC SCORE		100%				8.8/10		



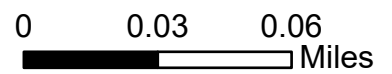
Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
- Detention Facility

SELECTED ALTERNATIVE

MIDDLE PROJECT A

Kimley»Horn



G-Squared LLC, Maxar, Microsoft, Esri Community Maps Contributors, JeffCoAL, OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

PROJECT PERFORMANCE CRITERIA (PPC)
HOMWOOD STORMWATER EVALUATION
 Selected Alternative - Homewood Middle Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	10	2	Alleviates flooding south of Homewood Board of Education.
FLOOD MITIGATION		80%			8.6	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	10	1	Flooding occurring south of Homewood Board of Education is eliminated up to the 500 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	12	6	2 properties removed from 10yr, 5 removed from 50yr, 5 removed from 100yr, 33 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	9	1.4	Flooding is reduced along Irving Rd and Evergreen Ave in the 500 year storm
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	4	0.2	This project reduces flooding for properties downstream of main project's extents.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	10	0.5	2 properties removed from 10yr, 5 removed from 50yr, 5 removed from 100yr, 33 removed from 500yr
TOTAL PPC SCORE		100%			10.6/10	

TOTAL COMBINED SCORE (PSC + PPC)	=	19.4/20
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Homewood Middle School Existing Conditions

Known Flooding Issues

Level of Service: < 1 year for properties south of Grace Street

69 at risk properties within study area

Legend

- Impacted Structures
- Detention Facility
- Pipe
- Bridge/Culvert
- Open Channel / Overground
- Manmade Open Channel
- 1-yr Floodplain
- 2-yr Floodplain
- 5-yr Floodplain
- 10-yr Floodplain
- 25-yr Floodplain
- 50-yr Floodplain
- 100-yr Floodplain
- 500-yr Floodplain

**Homewood Middle School
Proposed Conditions**

Detention facility on valley avenue
Level of service increased to 10-yr
to 500-yr
45 properties LOS improved

Legend

- Structures w/ Reduced Flooding
- Detention Facility
- Pipe
- Bridge/Culvert
- Open Channel / Overground
- Manmade Open Channel
- Weirs
- Orifices
- 1-yr Floodplain
- 2-yr Floodplain
- 5-yr Floodplain
- 10-yr Floodplain
- 25-yr Floodplain
- 50-yr Floodplain
- 100-yr Floodplain
- 500-yr Floodplain

Kimley»Horn

N

The map displays an aerial view of the Homewood Middle School area. A large white box at the top left contains the title 'Homewood Middle School Proposed Conditions'. Below it, a smaller white box lists key project details: 'Detention facility on valley avenue', 'Level of service increased to 10-yr to 500-yr', and '45 properties LOS improved'. A legend box on the left side of the map lists various infrastructure elements and floodplain return periods, each associated with a specific color. The map itself shows a network of streets, including Nob Hill Dr, Beacon Pkwy W, Temple Crest Dr, Palisades Blvd, Morris Blvd, Havenwood Ct, Irving Highland, Highland Stuart, Stuart St, Palmetto St, Broadway St, Broadway Woodland, Woodland Dr, Edgewood Blvd, Edgewood Edgewood, Edgewood W Hawthorne, Dale Clermont, Edgewood Dr W, Linwood Dr, Kenilworth Dr, Roseland Dr, Primrose Pl, Valley Pl, Grove Pl, Hawthorne W Glen, Hanover Rd, Hanover 1st, Bridge Ln, Sutherland Manhattan, Sutherland Pl, Ardsley Sutherland, Ardsley Pl, Clermont Dr, Bellview Ct, Parkridge Dr, Willow Run Rd, Honey Locust Ln, Thornwood Dr, Poplar Pl, and Dale Clermont. A detention facility is marked with a green square on Valley Avenue. Various floodplains are outlined in different colors, and several structures are highlighted with yellow squares. A north arrow and the Kimley»Horn logo are located at the bottom center of the map.

City of Homewood
Opinion of Probable Construction Costs
Selected Alternative- Homewood Middle Project A

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
24" Concrete Pipe	150	LF	\$ 170.00	\$ 25,500.00
Pipe Backfill, 3/4" Gravel Fill in Trench	111	CY	\$ 58.12	\$ 6,457.78
Pipe Excavation, 4-6' Depth	111	BCY	\$ 7.73	\$ 858.89
Detention Pond	-	-	-	-
Forebay (10% of BMP Cost)	1	EA	\$ 26,556.00	\$ 26,556.00
Excavation, 300' Haul, Common Earth	12,025	BCY	\$ 16.33	\$ 196,368.25
Storm Drain Pipe, 24"	600	LF	\$ 170.00	\$ 102,000.00
Perimeter Fence, 4' High	729	LF	\$ 14.82	\$ 10,803.78
Sod	3,889	SY	\$ 7.37	\$ 28,661.93
Outlet Control Structure	1	EA	\$ 10,000.00	\$ 10,000.00
Engineering Costs	15%	-	-	\$ 61,080.99
Easement Acquisition		SF		\$ 2,925,400.00
Contingency	30%	-	-	\$ 140,486.29
TOTAL COST				\$ 3,534,173.91

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
24"	60	5	4	150	111.1	-	-	-
24"x36" Squashed, Double	102	8.5	5	34	53.5	-	-	-
24"x36" Squashed, Double	102	8.5	5	468	736.7	-	-	-

APPENDIX C

Overview of Alternatives



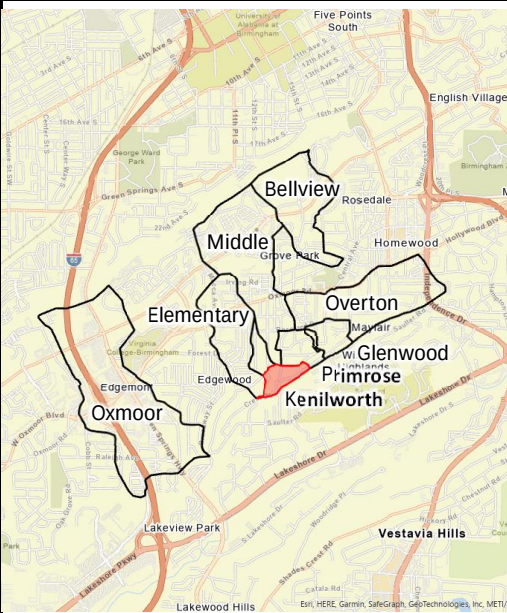
Priority Area	Project	Project Description	PSC	PPC	Total Score	Cost	Rank
Kenilworth/Ridge Road	Kenilworth Project A	Unblock Pipe at Ridge Rd and Kenilworth Rd and closed system at Hillwood Dr and Edgwood Blvd (18" and 36" pipe)	7.9	7.1	15	\$243,015	1
	Kenilworth Project B	Unblock Pipe at Ridge Rd and Kenilworth Rd and closed system at Hillwood Dr and Edgwood Blvd (48" and 24" pipe)	7.9	7.1	15	\$244,584	2
Melrose Place	Melrose Project A	Closed system through alley down to Griffin Brook (24" pipe)	8.7	5.3	14	\$163,251	3
	Melrose Project B	Diversion pipe on Primrose (36" pipe)	8.7	5.7	14.4	\$308,298	2
	Melrose Project C	Close system through alley and diversion pipe on Primrose (24" pipe and 36" pipe)	8.5	7.9	16.4	\$581,776	1
Edgwood Elementary	Edgwood Elementary Project A	Inlet and pipe upgrades	9	4.7	13.7	n/a	n/a
	Edgwood Elementary Project B	Inlet and pipe upgrades further downstream	8.4	11	19.4	\$490,015	1
Oxmoor Road	Oxmoor Project A	Inlet installation on Oxmoor Road			N/A	\$263,987	n/a
	Oxmoor Project B	Pipe system along Carr Ave/Broadway Street + Bridge Widening				Over 3.5 mil	n/a
Bellview	Bellview Project A	Bypass flow in closed system along Bellview Circle/Somerset Dr	8.7	5.3	14	\$263,287	1
	Bellview Project B	Add culvert under driveway at 1527 Bellview Circle	n/a	n/a	n/a	n/a	2
Glenwood Drive	Glenwood Project A	Increase Pipe Size along Glenwood and Roseland (36" and 60")	8.2	6.1	14.3	\$589,948	2
	Glenwood Project B	Construct 2.5' pipe through Glenwood Alley	7.3	7.3	14.6	\$1,040,048	1
Overton Park	Overton Project A	Upsize existing box culvert (add box culvert)	6.6	7.4	14	\$3,636,724	1
	Overton Project B	Add additional culvert to Creek from Edgwood	7.1	5.4	12.5	\$2,053,048	3
	Overton Project C	Add additional culvert to Creek from Edgwood and upsize pipes (24" pipe to 48" pipe)	6.9	6.4	13.3	\$2,269,592	2
	Overton Project D	Detention Facility in Overton park	6.8	9.1	15.9	\$701,228	4
Homewood Middle School	Homewood Middle Project A	Detention Facility on Valley Avenue	8.8	10.6	19.4	\$3,534,174	1

APPENDIX C-1

Kenilworth/Ridge Road Project B

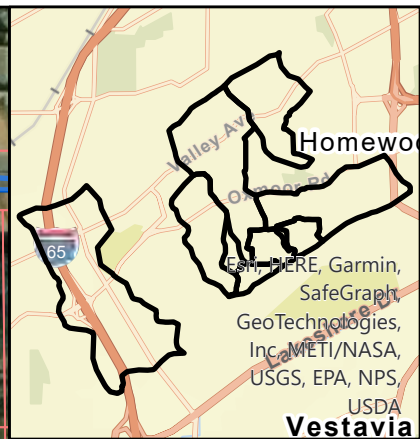


City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

Kenilworth/Ridge Priority Area: Project B				
Description and Scope				
Project Type:	Pipe Installation and Rehabilitation	Preliminary Selection Criteria (PSC):	7.9/10	
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	7.1/10	
Proposed Level of Service:	5-Year to 500-Year Storm			
This project unblocks the pipe at Ridge Rd. and creates a closed pipe system down Hillwood Dr. (24”) and Edgewood Blvd. (48”) into Griffin Brook.				
Project Maps		Budgetary Cost Estimate		
		Project Activity	Duration	Amount
		Construction		\$ 229,118.04
		Site Acquisition/ Easements		-
		Engineering Costs		\$ 34,367.71
		Contingency		\$ 79,045.73
		Total Budgetary Cost Estimate		\$ 342,531.48
Purpose and Need				
The major benefits of this project is the alleviation of flooding on Kenilworth Drive as well as Hillwood Drive and Edgewood Boulevard. This project addresses concerns raised by the municipality and improves the level of service of six properties.				

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Kenilworth Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will be temporarily impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe improvement and construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	7	2.0	Easement may be required up to Hillwood Dr.
TOTAL PSC SCORE		100%				7.9/10		



Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Infrastructure Updates

KENILWORTH/RIDGE

PROJECT B

Kimley»Horn



0 0.02 0.04
Miles

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PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Kenilworth Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	8	2	Alleviates flooding around Hillwood Dr and Kenilworth Dr.
FLOOD MITIGATION		80%			5.1	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	8	0	Flooding occurring around unblocked inlet is alleviated through 25 year storm. Flooding occurring towards top of Hillwood Dr is alleviated for all storm events.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	6	3	2 properties removed from 5yr, 1 removed from 100yr, 3 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	9	1.4	Flooding is reduced along Kenilworth Dr up to the 100 year storm and a portion of Hillwood Dr through all storm events. Flooding for a small portion of Edgewood Blvd is reduced through the 25 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	7	0.4	2 properties removed from 5yr, 1 removed from 100yr, 3 removed from 500yr
TOTAL PPC SCORE		100%			7.1/10	

TOTAL COMBINED SCORE
(PSC + PPC)

= 15/20

City of Homewood
Opinion of Probable Construction Costs
Kenilworth Project B

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
24" Concrete Pipe	420	LF	\$ 170.00	\$ 71,400.00
54" Reinforced Culvert, Class 3, No Gaskets	160	LF	\$ 460.00	\$ 73,600.00
Pipe Backfill, 3/4" Gravel Fill in Trench	678	CY	\$ 58.12	\$ 5,530.67
Pipe Excavation, 4-6' Depth	678	BCY	\$ 8.16	\$ 39,392.44
Asphalt Paving, Replacement Over Trench 4" Thick	370	SY	\$ 105.80	\$ 39,194.93
Engineering Costs	15%	-	-	\$ 34,367.71
Contingency	30%	-	-	\$ 79,045.72
TOTAL COST				\$ 342,531.47

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
24"	60	5	5	420	388.9	1	-	2
54"	90	7.5	6.5	160	288.9	2	-	2

APPENDIX C-2

Melrose Project A



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

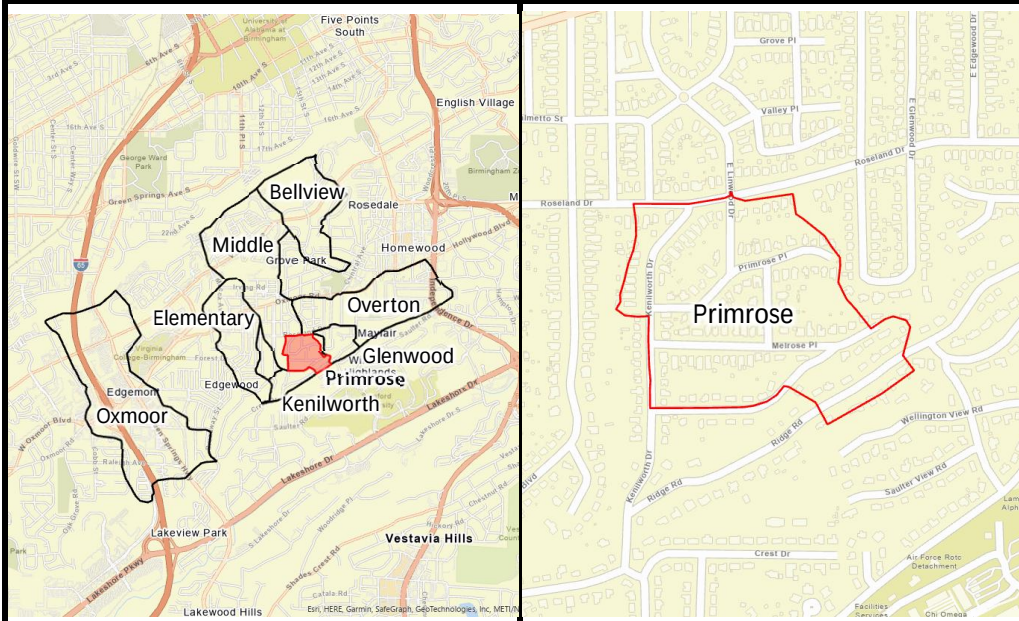
Melrose Place Priority Area: Project A

Description and Scope

Project Type:	Pipe Installation	Preliminary Selection Criteria (PSC):	8.7/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	5.3/10
Proposed Level of Service:	5-Year to 500-Year Storm		

This project creates a closed system (24" pipe) through the alley that follows Primrose Melrose down through Primrose Pl. to Griffin Brook.

Project Maps



Budgetary Cost Estimate

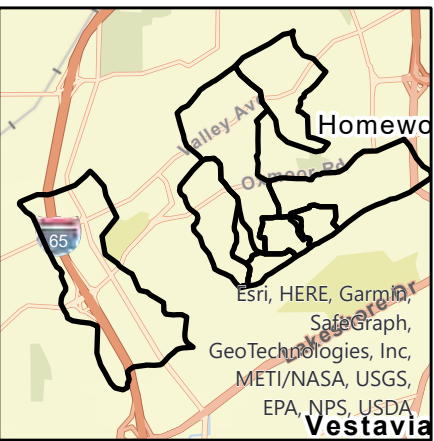
Project Activity	Duration	Amount
Construction		\$ 179,296.26
Site Acquisition/ Easements		-
Engineering Costs		\$ 26,894.44
Contingency		\$ 61,857.21
Total Budgetary Cost Estimate		\$ 268,047.90

Purpose and Need

The major benefits of this project is the alleviation of flooding on Laurel Place and the properties adjacent to Laurel. This project addresses concerns raised by the municipality and improves the level of service of four properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Melrose Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will temporarily be impacted. Disruption adjacent to residential backyards will also occur.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	10	2.8	In addition to public streets there is an alley of right of way with which implementation of this project will take place.
TOTAL PSC SCORE		100%				8.7/10		

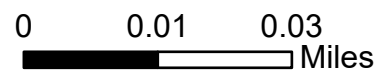


Legend

- Parcels
- Conduits**
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

PRIMROSE PROJECT A

Kimley»Horn



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PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Melrose Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			1	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	7	1	
FLOOD MITIGATION		80%			4.3	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	8	0	Flooding occurring around the intersection of Laurel PI and the Primrose Melrose alley is eliminated through the 500 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	4	2	1 property removed from 50yr, 3 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	10	1.5	Flooding occurring on Laurel PI north of the Primrose Melrose alley is eliminated up to the 500 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	7	0.4	1 property removed from 50yr, 3 removed from 500yr
TOTAL PPC SCORE		100%			5.3/10	

TOTAL COMBINED SCORE
(PSC + PPC)

= 14/20

City of Homewood
Opinion of Probable Construction Costs
Melrose Project A

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
24" Concrete Pipe	700	LF	\$ 170.00	\$ 119,000.00
Pipe Backfill, 3/4" Gravel Fill in Trench	648	CY	\$ 58.12	\$ 37,670.37
Pipe Excavation 4-6' Depth	648	BCY	\$ 7.73	\$ 5,010.19
Asphalt Paving, Replacement Over Trench 4" Thick	167	SY	\$ 105.80	\$ 17,615.70
Engineering Costs	15%	-	-	\$ 26,894.44
Contingency	30%	-	-	\$ 61,857.21
TOTAL COST				\$ 268,047.91

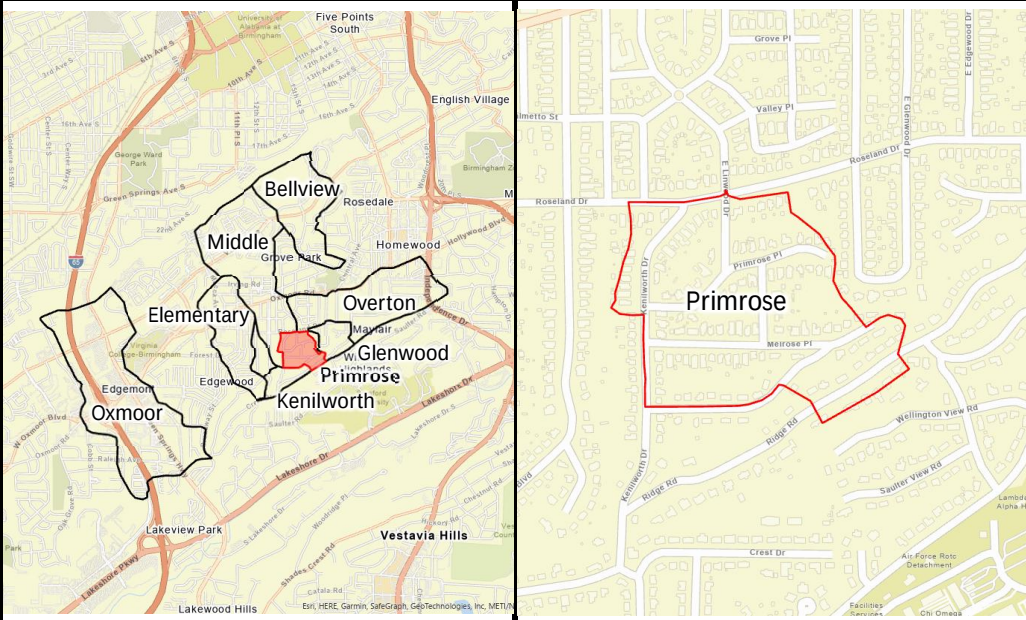
PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
24"	60	5	5	700	648.1	2	-	3

APPENDIX C-3

Melrose Project B



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

Melrose Place Priority Area: Project B			
Description and Scope			
Project Type:	Pipe Installation	Preliminary Selection Criteria (PSC):	8.7/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	5.7/10
Proposed Level of Service:	5-Year to 500-Year Storm		
This project creates a diversion pipe (36”) from the intersection of Primrose Pl and Linwood Drive down Primrose Pl. that outfalls into Griffin Brook.			
Project Maps		Budgetary Cost Estimate	
	Project Activity	Duration	Amount
	Construction		\$ 254,177.68
	Site Acquisition/ Easements		-
	Engineering Costs		\$ 38,126.65
	Contingency		\$ 87,691.30
	Total Budgetary Cost Estimate		\$ 379,995.63
	Purpose and Need		
	The major benefit of this project is the reduction of flooding for properties north of Primrose Pl. as well as properties adjacent to Laurel Pl. The level of service of five properties is improved.		

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Melrose Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will temporarily be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	10	2.8	The project will be implemented on public road.
TOTAL PSC SCORE		100%				8.7/10		



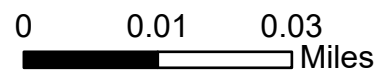
Legend

- Parcels
- Conduits**
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

Melrose

PROJECT B

Kimley»Horn



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PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Melrose Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			1	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	7	1	
FLOOD MITIGATION		80%			4.7	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	8	0	Flooding occurring around the intersection of E Linwood Dr and Primrose Pl is eliminated through the 5 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	5	3	2 properties removed from 5yr, 1 removed from 50yr, 2 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	10	1.5	Flooding is reduced through the 10 year storm on portions of E Linwood Dr and Primrose Pl.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm. and 1 to 2 for any improvement	6	0.3	2 properties removed from 5yr, 1 removed from 50yr, 2 removed from 500yr
TOTAL PPC SCORE		100%			5.7/10	

TOTAL COMBINED SCORE (PSC + PPC)	=	14.4/20
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City of Homewood
Opinion of Probable Construction
Costs Melrose Project B

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
36" Diameter Concrete Pipe, Class 2, w/ Gaskets	600	LF	\$ 280.00	\$ 168,000.00
Pipe Backfill, 3/4" Gravel Fill in Trench	667	CY	\$ 58.12	\$ 38,746.67
Pipe Excavation, 4-6' Depth	667	BCY	\$ 7.73	\$ 5,153.33
Asphalt Paving, Replacement Over Trench 4" Thick	400	SY	\$ 105.80	\$ 42,277.68
Engineering Costs	15%	-	-	\$ 38,126.65
Contingency	30%	-	-	\$ 87,691.30
TOTAL COST				\$ 379,995.63

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
36"	72	6	5	600	666.7	1	-	-

APPENDIX C-4

Edgewood Elementary Alternative 1



PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Elementary Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	7	1.5	Access to residential property will be temporarily impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	8	1.4	Access to non-residential streets will be impacted in limited capacity.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe improvement, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	10	2.8	Alley of right of way exists through area improvements are being made.
TOTAL PSC SCORE		100%				9.0/10		

PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
Elementary Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			1	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	5	1	Alleviates flooding north of College Ave
FLOOD MITIGATION		80%			3.7	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0	2	0	Flooding occurring north of College Ave is reduced.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 20 properties - allowing for a possible total PPC score above 10.	4	2	3 properties removed from 1yr, 1 removed from 100yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	10	1.5	Flooding is reduced along Broadway St, Shades Rd, and Westover Dr through the 500 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	This project has a slightly negative impact just downstream of the pipe improvement - no new houses flooding.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	2	0.1	3 properties removed from 1yr, 1 removed from 100yr
TOTAL PPC SCORE		100%			4.7/10	

**TOTAL COMBINED SCORE
(PSC + PPC)**

= 13.7/20

APPENDIX C-6

Oxmoor Road Project A



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

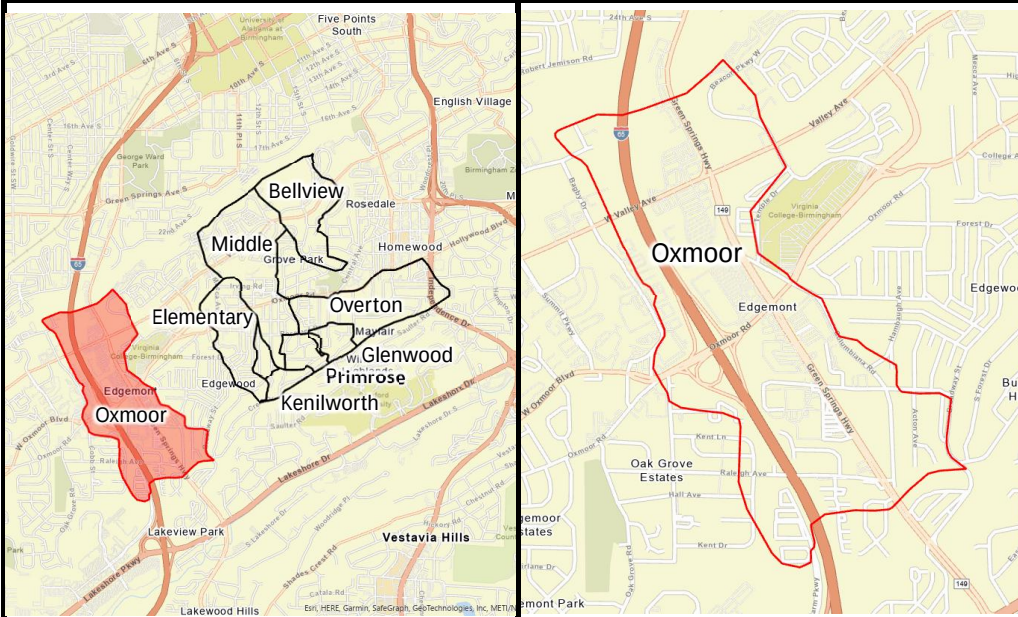
Oxmoor Priority Area: Project A

Description and Scope

Project Type:	Inlet Installation	Preliminary Selection Criteria (PSC):	7.6/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	8.0/10
Proposed Level of Service:	1-Year to 500-Year Storm		

This project creates an inlet on Oxmoor Road just north of the alley that leads to Carr Avenue, as well as a 48" diameter pipe that connects from that inlet to the ALDOT bioswale just south of Oxmoor Road.

Project Maps



Budgetary Cost Estimate

Project Activity	Duration	Amount
Construction		\$ 176,580.07
Site Acquisition/ Easements		-
Engineering Costs		\$ 26,487.01
Contingency		\$ 60,920.13
Total Budgetary Cost Estimate		\$ 263,987.21

Purpose and Need

The major benefits of this project is the alleviation of flooding for private properties along the alley running from Oxmoor Road to Carr Avenue.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Oxmoor Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	10	2.1	Access to residential property will not be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility - includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	6	1.1	Access to non-residential streets will be impacted in limited capacity.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	4	1.1	Easement needed to install pipe along section of Oxmoor Rd. Stated by city to be tricky location to undergo construction.
TOTAL PSC SCORE		100%				7.6/10		

PROJECT PERFORMANCE CRITERIA (PPC)
HOMWOOD STORMWATER EVALUATION
 Oxmoor Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	8	2	Alleviates flooding around Travel Inn/Exxon area.
FLOOD MITIGATION		80%			6.0	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	8	0	Flooding occurring around Travel Inn/Exxon area is eliminated through the 500 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	If the project is anticipated to reduce known flooding experienced by habitable structures, it receives 10 points. If the project does not reduce flooding experienced by habitable structures, it receives 0 points.	8	4	Flooding occurring on nearly entirety of Travel Inn is eliminated through the 500 year storm.
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	7	1.1	Flooding occurring on a portion of Oxmoor Rd is eliminated through the 100 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Floodplain	Location of property relative to floodplain.	5%	If the project does not fall within the floodplain for the 100-year event it receives 10 points. Otherwise it receives 0 points.	10	0.5	The project does not fall within the floodplain for the 100-year event.
TOTAL PPC SCORE		100%			8/10	

TOTAL COMBINED SCORE (PSC + PPC)	=	15.6/20
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City of Homewood
Opinion of Probable Construction Costs
Oxmoor Project A

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
48" Diameter Concrete Pipe, Class 3, w/ Gaskets	340	LF	\$ 398.00	\$ 135,320.00
Pipe Backfill, 3/4" Gravel Fill in Trench	441	CY	\$ 58.12	\$ 25,615.85
Pipe Excavation, 6-10' Depth	441	BCY	\$ 10.29	\$ 4,535.22
Asphalt Paving, Replacement Over Trench 4" Thick	105	SY	\$ 105.80	\$ 11,109.00
Engineering Costs	15%	-	-	\$ 26,487.01
Contingency	30%	-	-	\$ 60,920.12
TOTAL COST				\$ 263,987.20

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
48"	84	7	5	340	440.7	1	1	-

APPENDIX C-7

Oxmoor Road Project B



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

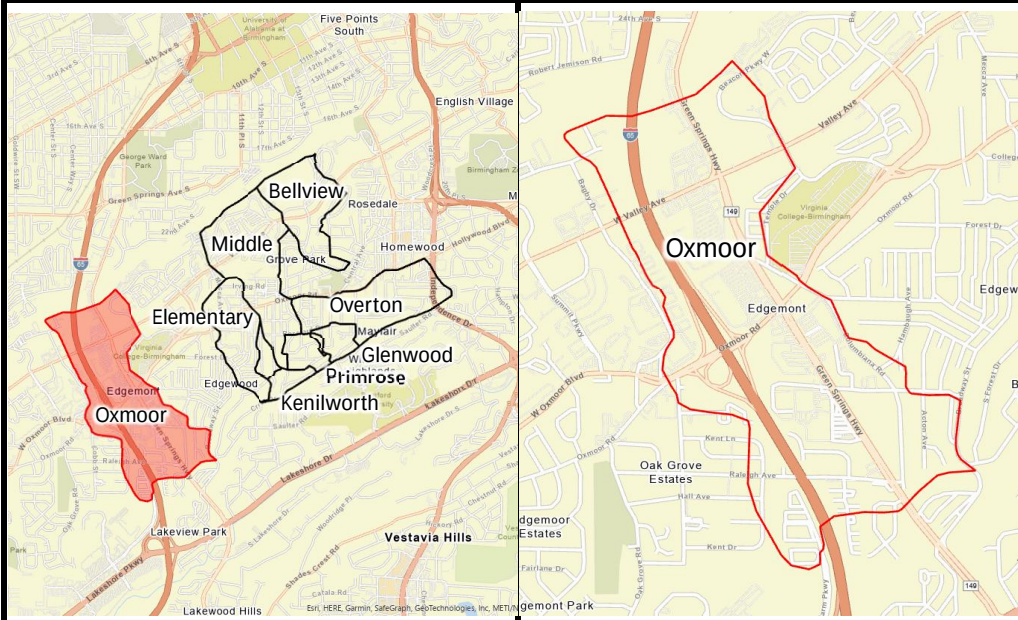
Oxmoor Priority Area: Project B

Description and Scope

Project Type:	Pipe and Bridge Installation	Preliminary Selection Criteria (PSC):	7.0/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	4.1/10
Proposed Level of Service:	1-Year Storm		

This project creates multiple five foot pipes along Carr Avenue and Broadway Street that outfall at the channel where Saulter Road and Broadway Street intersect.

Project Maps



Budgetary Cost Estimate

Project Activity	Duration	Amount
Construction		\$ 3,346,598.86
Site Acquisition/ Easements		-
Engineering Costs		\$ 501,989.83
Contingency		\$ 1,154,576.61
Total Budgetary Cost Estimate		\$ 5,003,165.30

Purpose and Need

This project leads to minimal improvement in flooding for a few properties on Acton Avenue.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Oxmoor Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	2	0.4	Access to residential property will be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	6	1.1	Access to non-residential streets will be impacted in limited capacity.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction and bridge widening, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	8	2.2	Project would largely take place along public roads.
TOTAL PSC SCORE		100%				7.0/10		

PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Oxmoor Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	8	2	Alleviates flooding along Acton Ave.
FLOOD MITIGATION		80%			2.1	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	3	0	Flooding occurring around Acton is lowered around 1-2 feet through the 500 year storm, this does not prevent flooding from occurring.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	If the project is anticipated to reduce known flooding experienced by habitable structures, it receives 10 points. If the project does not reduce flooding experienced by habitable structures, it receives 0 points.	2	1	It is unlikely to show improvements beyond the 1yr or 2yr storm in a few properties.
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	3	0.5	Flooding occurring along Acton is lowered 1-2 feet, this doesn't alleviate flooding outside of the 1-2 year storm in the low portion of Acton.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Floodplain	Location of property relative to floodplain.	5%	If the project does not fall within the floodplain for the 100-year event it receives 10 points. Otherwise it receives 0 points.	10	0.5	The project does not fall within the floodplain for the 100-year event.
TOTAL PPC SCORE		100%			4.1/10	

**TOTAL COMBINED SCORE
(PSC + PPC)**

= 11.1/20

City of Homewood
Opinion of Probable Construction Costs
Oxmoor Project B

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
60" Concrete Pipe	4,500	LF	\$ 523.00	\$ 2,353,500.00
Pipe Backfill, 3/4" Gravel Fill in Trench	8,000	CY	\$ 58.12	\$ 464,960.00
Pipe Excavation, 6-10' Depth	8,000	BCY	\$ 10.29	\$ 82,320.00
Asphalt Paving, Replacement Over Trench 4" Thick	3,996	SY	\$ 105.80	\$ 422,776.80
Double 48" Headwall	1	EA	\$ 23,042.06	\$ 23,042.06
Engineering Costs	15%	-	-	\$ 501,989.83
Contingency	30%	-	-	\$ 1,154,576.61
TOTAL COST				\$ 5,003,165.30

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
60"	96	8	6	4500	8000	-	-	12

APPENDIX C-8

Glenwood Drive Project A



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

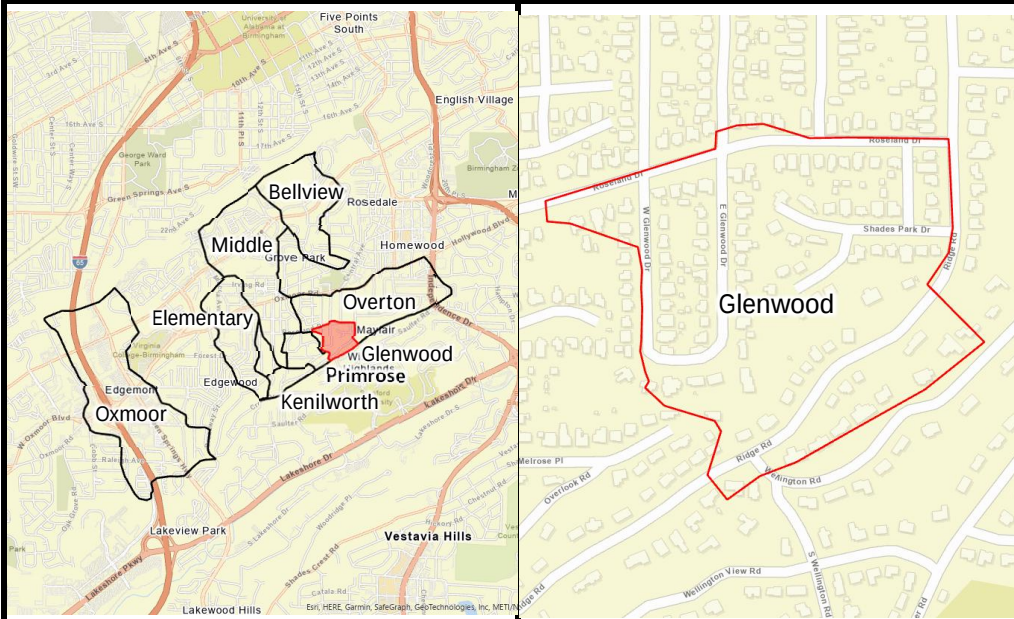
Glenwood Drive Priority Area: Project A

Description and Scope

Project Type:	Pipe Installation	Preliminary Selection Criteria (PSC):	8.2/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	6.1/10
Proposed Level of Service:	10-Year to 500-Year Storm		

This project upsizes the pipe along E Glenwood Drive up to Roseland Drive to 36" as well as the pipe along Roseland Drive from W Glenwood Dr outfalling to Griffin Brook to 60".

Project Maps



Budgetary Cost Estimate

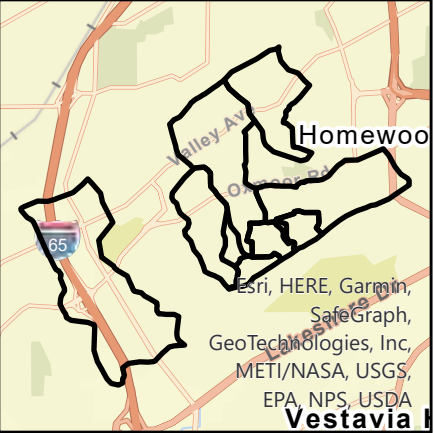
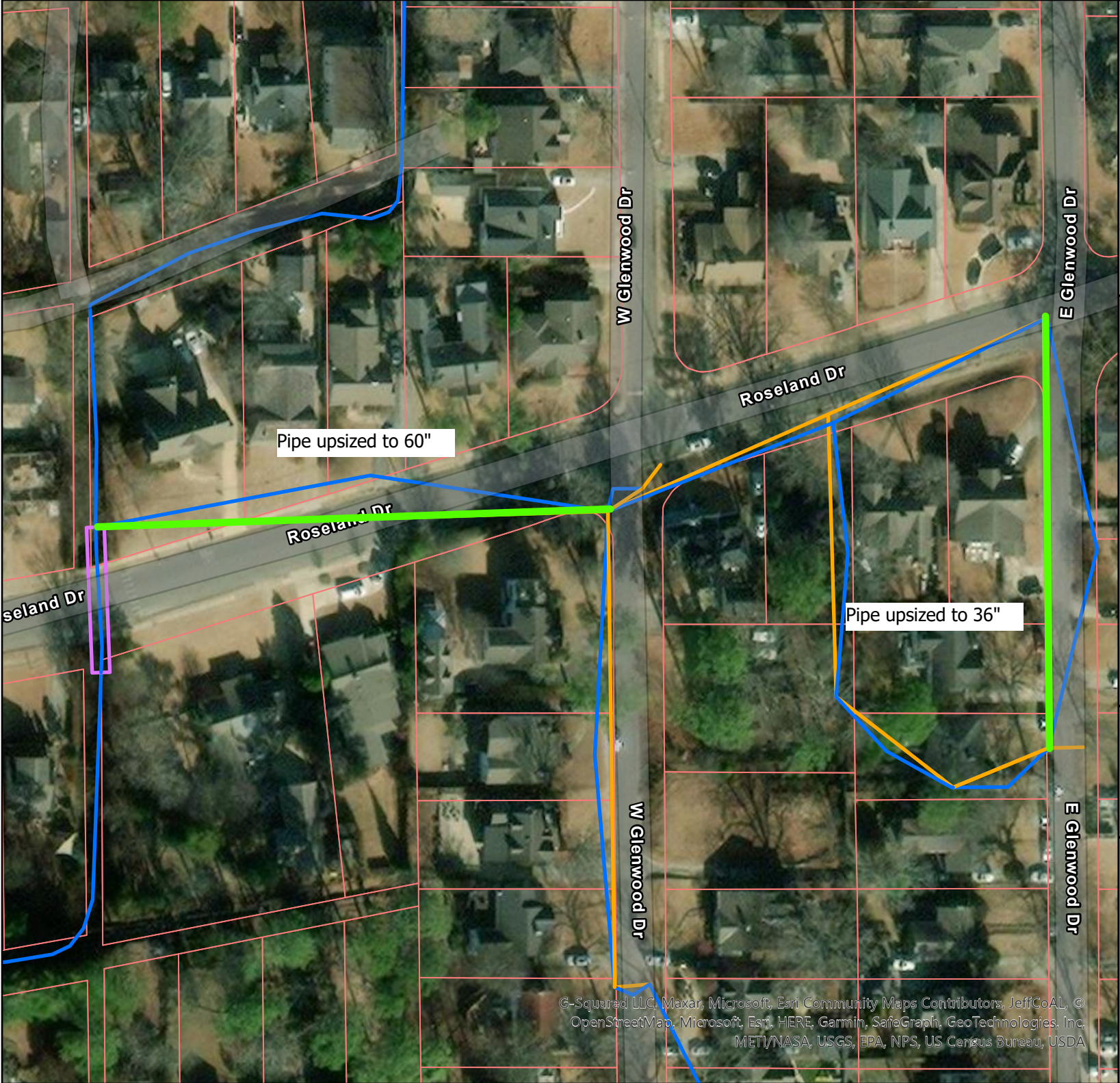
Project Activity	Duration	Amount
Construction		\$ 461,895.14
Site Acquisition/ Easements		-
Engineering Costs		\$ 69,284.27
Contingency		\$ 159,353.82
Total Budgetary Cost Estimate		\$ 690,533.24

Purpose and Need

The major benefits of this project is the alleviation of flooding between E Glenwood Dr and W Glenwood Dr as well as flooding along E Glenwood Dr. This project addresses concerns raised by the municipality and improves the level of service of four properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Glenwood Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will be temporarily impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe improvement, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	8	2.2	The project takes place on public roads, but the land itself will be tricky to work with as bucking grade will have to occur.
TOTAL PSC SCORE		100%				8.2/10		



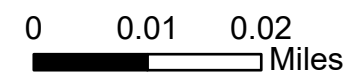
Legend

- Parcels
- Conduits**
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

GLENWOOD

PROJECT A

Kimley»Horn



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City of Homewood

PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
Glenwood Project A

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	10	2	Alleviates flooding between E Glenwood Dr to W Glenwood Dr.
FLOOD MITIGATION		80%			4.1	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	10	1	Flooding occurring between E Glenwood Dr and W Glenwood Dr is reduced for multiple properties.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	5	3	1 property removed from 25yr, 1 removed from 50yr, 1 removed from 100yr, 2 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	5	0.8	Flooding is reduced along E Glenwood Dr around .25-1 feet.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	7	0.4	1 property removed from 25yr, 1 removed from 50yr, 1 removed from 100yr, 2 removed from 500yr
TOTAL PPC SCORE		100%			6.1/10	

TOTAL COMBINED SCORE
(PSC + PPC) = 14.5/20

City of Homewood
Opinion of Probable Construction Costs
Glenwood Project A

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
36" Diameter Concrete Pipe, Class 2, w/ Gaskets	300	LF	\$ 280.00	\$ 84,000.00
72" Diameter Concrete Pipe, Class 3, w/ Gaskets	350	LF	\$ 653.00	\$ 228,550.00
Pipe Backfill, 3/4" Gravel Fill in Trench	1,333	CY	\$ 58.12	\$ 77,493.33
Pipe Excavation, 6-10' Depth	1,333	BCY	\$ 10.29	\$ 13,720.00
Asphalt Paving, Replacement Over Trench 4" Thick	549	SY	\$ 105.80	\$ 58,131.81
Engineering Costs	15%	-	-	\$ 69,284.27
Contingency	30%	-	-	\$ 159,353.82
TOTAL COST				\$ 690,533.23

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
36"	72	6	6	300	400	1	-	1
72"	108	9	8	350	933.3	1	-	1

APPENDIX C-9

Overton Park Project C

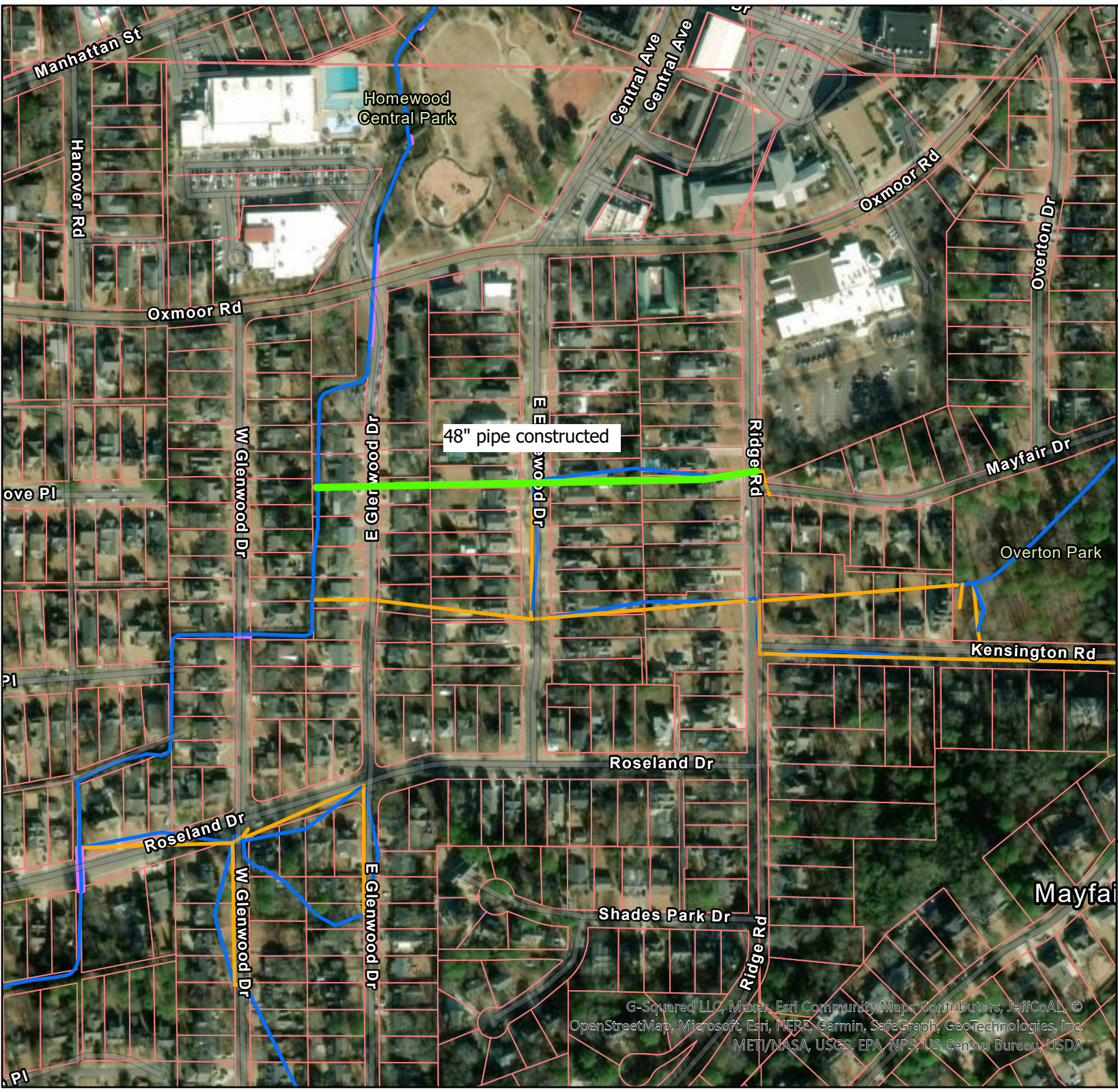


City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

Overton Park Priority Area: Project B					
Description and Scope					
Project Type:	Culvert Installation	Preliminary Selection Criteria (PSC):	7.1/10		
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	5.4/10		
Proposed Level of Service:	1-Year to 500-Year Storm				
This project creates a 48" pipe that outfalls directly to Griffin Brook beginning at Mayfair Drive.					
Project Maps		Budgetary Cost Estimate			
		Project Activity	Duration	Amount	
		Construction		\$	453,352.40
		Site Acquisition/ Easements		\$	1,375,286.40
		Engineering Costs		\$	68,002.86
		Contingency		\$	156,406.58
		Total Budgetary Cost Estimate		\$	2,053,048.24
		Purpose and Need			
		The major benefits of this project is the alleviation of flooding on properties stretching from Overton Park to E Edgewood Dr.			

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Overton Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets - includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	7	1.5	Access to residential property will temporarily be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non- residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	2	0.6	Easement needed to install/upsized pipe from Ridge Rd to Griffin Brook.
TOTAL PSC SCORE		100%				7.1/10		



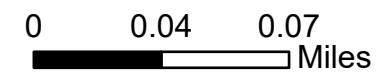
Legend

- Parcels
- Conduits**
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

OVERTON

PROJECT B

Kimley»Horn



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PROJECT PERFORMANCE CRITERIA (PPC)
HOMWOOD STORMWATER EVALUATION
 Kenilworth Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	8	2	Alleviates flooding around Hillwood Dr and Kenilworth Dr.
FLOOD MITIGATION		80%			5.1	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	8	0	Flooding occurring around unblocked inlet is alleviated through 25 year storm. Flooding occurring towards top of Hillwood Dr is alleviated for all storm events.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	6	3	2 properties removed from 5yr, 1 removed from 100yr, 3 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	9	1.4	Flooding is reduced along Kenilworth Dr up to the 100 year storm and a portion of Hillwood Dr through all storm events. Flooding for a small portion of Edgewood Blvd is reduced through the 25 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	7	0.4	2 properties removed from 5yr, 1 removed from 100yr, 3 removed from 500yr
TOTAL PPC SCORE		100%			7.1/10	

TOTAL COMBINED SCORE (PSC + PPC)	=	15/20
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City of Homewood
Opinion of Probable Construction Costs
Overton Project B

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
48" Diameter Concrete Pipe, Class 3, w/ Gaskets	900	LF	\$ 398.00	\$ 358,200.00
Pipe Backfill, 3/4" Gravel Fill in Trench	1,400	CY	\$ 58.12	\$ 81,368.00
Pipe Excavation, 4-6' Depth	1,400	BCY	\$ 7.73	\$ 10,822.00
Asphalt Paving, Replacement Over Trench 4" Thick	28	SY	\$ 105.80	\$ 2,962.40
Easement Acquisition	27,030	SF	\$ 50.88	\$ 1,375,286.40
Engineering Costs	15%	-	-	\$ 68,002.86
Contingency	30%	-	-	\$ 156,406.58
TOTAL COST				\$ 2,053,048.24

EASEMENT ACQUISITION			
ADDRESS	PROPERTY LAND VALUE	SQUARE FEET	COST PER SQUARE FOOT
907 Westover Dr, Birmingham, AL 35209	\$ 290,000.00	5700	\$ 50.88

Over								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
48"	84	7	6	900	1400	2	1	-

APPENDIX C-10

Overton Park Project D

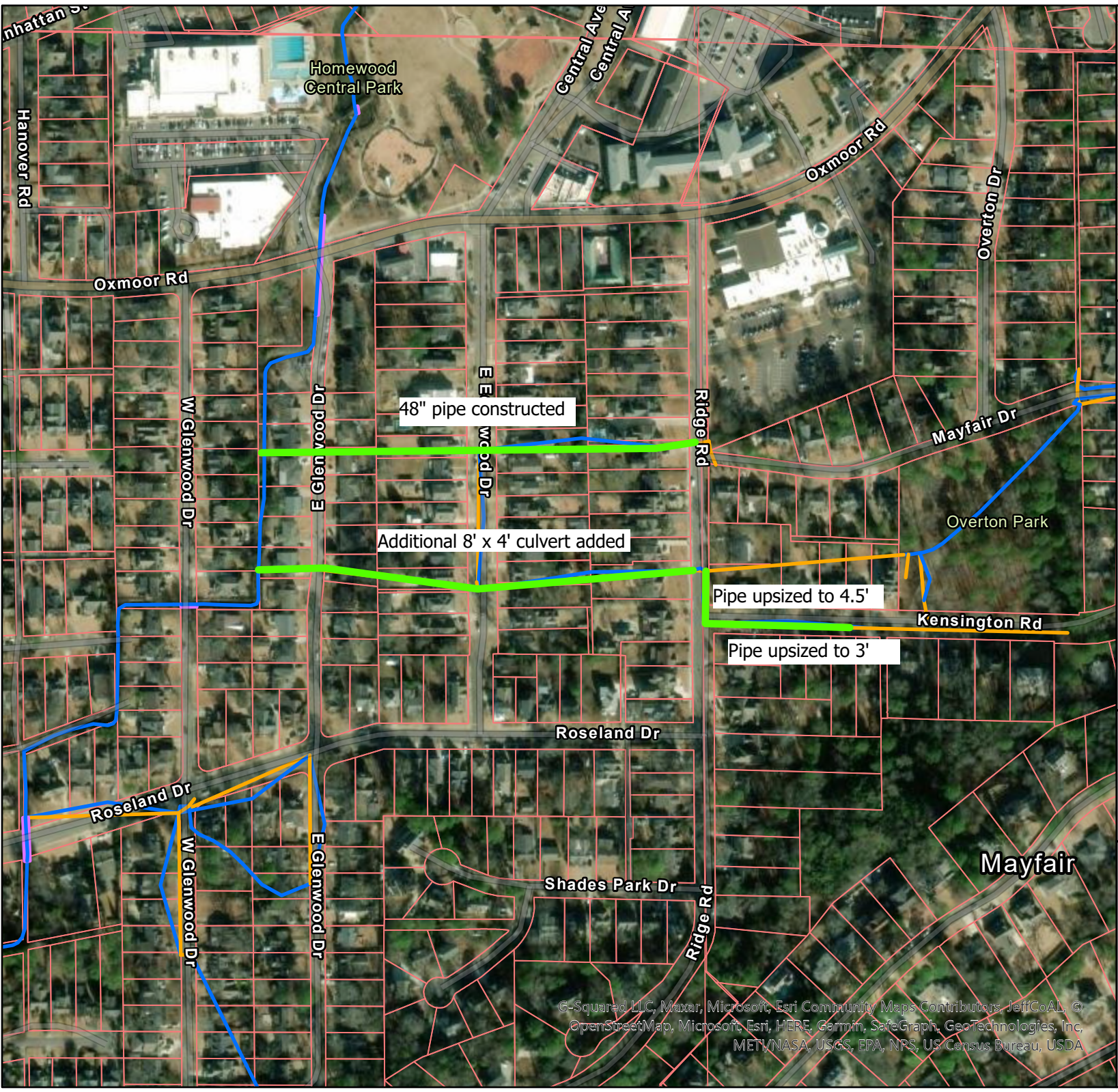


City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

Overton Park Priority Area: Project C				
Description and Scope				
Project Type:	Culvert and Pipe Installation	Preliminary Selection Criteria (PSC):	6.9/10	
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	6.4/10	
Proposed Level of Service:	1-Year to 500-Year			
This project creates a 48" pipe that outfalls directly to Griffin Brook beginning at Mayfair Drive. In addition, the 18" diameter pipes along Kensington Road and Ridge Road that start from near 1708 Kensington Road and end at the connection to the culvert running west from Ridge Road were upsized. Along Kensington this was to a 36" diameter, and along Ridge this was to a 45" diameter.				
Project Maps		Budgetary Cost Estimate		
		Project Activity	Duration	Amount
		Construction		\$ 598,198.01
		Site Acquisition/ Easements		\$ 1,375,286.40
		Design		\$ 89,729.70
		Contingency		\$ 206,378.31
		Total Budgetary Cost Estimate		\$ 2,269,592.43
		Purpose and Need		
		The major benefits of this project is the alleviation of flooding on properties stretching from Overton Park to E Edgewood Dr.		

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Overton Project C

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	6	1.3	Access to residential property will temporarily be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe construction and improvement, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/private owned land.	2	0.6	Easement needed to install/upsized pipe from Ridge Rd to Griffin Brook and upsized pipes along Kensington Rd.
TOTAL PSC SCORE		100%				6.9/10		

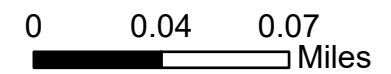


Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

OVERTON PROJECT C

Kimley»Horn



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PROJECT PERFORMANCE CRITERIA (PPC)
HOMWOOD STORMWATER EVALUATION
 Overton Project C

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	10	2	Alleviates flooding around Ridge Rd and E Edgewood Dr.
FLOOD MITIGATION		80%			4.4	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	7	0	Flooding occurring around Ridge Rd and E Edgewood Dr north of Roseland Dr is partially eliminated up to the 100 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	If the project is anticipated to reduce known flooding experienced by habitable structures, it receives 10 points. If the project does not reduce flooding experienced by habitable structures, it receives 0 points.	5	3	Flooding occurring on three properties between Ridge Rd and E Edgewood Dr is reduced through the 100 year storm.
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	7	1.1	Flooding occurring along part of Ridge Rd and E Edgewood Dr is eliminated through the 25 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Floodplain	Location of property relative to floodplain.	5%	If the project does not fall within the floodplain for the 100-year event it receives 10 points. Otherwise it receives 0 points.	10	0.5	The project does not fall within the floodplain for the 100-year event.
TOTAL PPC SCORE		100%			6.4/10	

TOTAL COMBINED SCORE (PSC + PPC)	=	10.8/20
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City of Homewood
Opinion of Probable Construction Costs
Overton Project C

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
48" Diameter Concrete Pipe, Class 3, w/ Gaskets	900	LF	\$ 398.00	\$ 358,200.00
24" Concrete Pipe	500	LF	\$ 170.00	\$ 85,000.00
Pipe Backfill, 3/4" Gravel Fill in Trench	1863	CY	\$ 58.12	\$ 108,275.41
Pipe Excavation, 4-6' Depth	1863	BCY	\$ 7.73	\$ 14,400.70
Asphalt Paving, Replacement Over Trench 4" Thick	306	SY	\$ 105.80	\$ 32,321.90
Easement Acquisition	27030	SF	\$ 50.88	\$ 1,375,286.40
Engineering Costs	15%	-	-	\$ 89,729.70
Contingency	30%	-	-	\$ 206,378.31
TOTAL COST				\$ 2,269,592.42

EASEMENT ACQUISITION			
ADDRESS	PROPERTY LAND VALUE	SQUARE FEET	COST PER SQUARE FOOT
907 Westover Dr, Birmingham, AL 35209	\$ 290,000.00	5700	\$ 50.88

Over								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
48"	84	7	6	900	1400	2	1	-
24"	60	5	6	500	463	2	-	1

APPENDIX C-11

Overton Park Project D

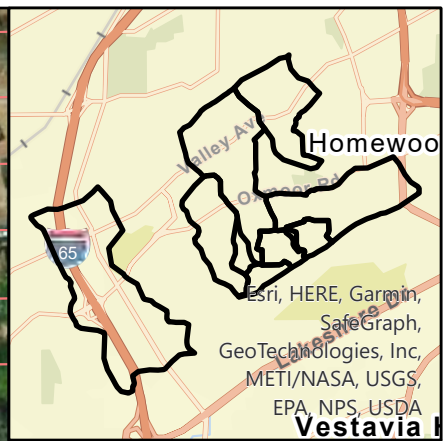


City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

Overton Park Priority Area: Project D				
Description and Scope				
Project Type:	Detention Facility Installation	Preliminary Selection Criteria (PSC):	6.8/10	
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	9.1/10	
Proposed Level of Service:	5-Year to 500-Year Storm			
This project creates a 176,580 cubic foot detention facility in Overton Park as well as weirs/control structures to maintain connection with existing stormwater infrastructure. In addition to this detention facility the 18" diameter pipes along Kensington Road and Ridge Road that start from near 1708 Kensington Road and end at the connection to the culvert running west from Ridge Road were upsized. Along Kensington this was to a 36" diameter, and along Ridge this was to a 54" diameter.				
Project Maps		Budgetary Cost Estimate		
		Project Activity	Duration	Amount
		Construction		\$ 469,048.90
		Site Acquisition/ Easements		-
		Engineering Costs		\$ 70,357.33
		Contingency		\$ 161,821.87
		Total Budgetary Cost Estimate		\$ 701,228.10
Purpose and Need		The major benefits of this project is the alleviation of flooding on properties stretching from Overton Park to E Edgewood Dr. This project addresses concerns raised by the municipality and improves the level of service of thirteen properties.		

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Selected Alternative - Overton Project D

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	4	0.8	Access to residential property will temporarily be impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	10	1.8	Access to non-residential streets will not be impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve the addition of a detention facility, the detention facility will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	3	0.8	In-line detention feasibility in question.
TOTAL PSC SCORE		100%				6.8/10		



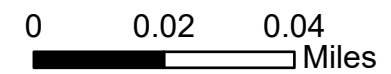
Legend

- Parcels
- Pipe
- Bridge/Culvert
- Open Channel/Overground
- Man-made Open Channel
- Detention Facility
- Updated Infrastructure

SELECTED ALTERNATIVE

OVERTON PROJECT D

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City of Homewood



PROJECT PERFORMANCE CRITERIA (PPC)
HOMEWOOD STORMWATER EVALUATION
 Selected Alternative - Overton Project D

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	8	2	Alleviates flooding around Ridge Rd and E Edgewood Dr.
FLOOD MITIGATION		80%			7.1	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	8	0	Flooding occurring around Ridge Rd and E Edgewood Dr north of Roseland Dr is partially eliminated through the 25 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	If the project is anticipated to reduce known flooding experienced by habitable structures, it receives 10 points. If the project does not reduce flooding experienced by habitable structures, it receives 0 points.	10	5	3 properties removed from up to 5 yr, 4 up to 10-yr, 1 up to 25-yr, 2 up to 100-yr, 3 up to 500-yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	8	1.2	Flooding occurring along Ridge Rd and E Edgewood Dr is eliminated through the 10 year storm.
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	0	0.0	The project does not noticeably improve upstream or downstream priority areas.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	9	0.5	3 properties removed from up to 5 yr, 4 up to 10-yr, 1 up to 25-yr, 2 up to 100-yr, 3 up to 500-yr
TOTAL PPC SCORE		100%			9.1/10	

TOTAL COMBINED SCORE (PSC + PPC)	=	15.9/20
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City of Homewood
Opinion of Probable Construction Costs
Overton Project D

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
36" Diameter Concrete Pipe, Class 2, w/ Gaskets	386	LF	\$ 280.00	\$ 108,080.00
54" Reinforced Culvert, Class 3, No Gaskets	115	LF	\$ 460.00	\$ 52,900.00
Pipe Backfill, 3/4" Gravel Fill in Trench	637	CY	\$ 58.12	\$ 36,994.99
Pipe Excavation, 4-6' Depth	637	BCY	\$ 7.73	\$ 4,920.36
Asphalt Paving, Replacement Over Trench 4" Thick	278	SY	\$ 105.80	\$ 29,412.40
Detention Pond	-	-	-	-
Forebay (10% of BMP Cost)	1	EA	\$ 20,107.00	\$ 20,107.00
Excavation, 300' Haul, Common Earth	6540	BCY	\$ 16.33	\$ 106,791.34
Storm Drain Pipe, 60"	100	LF	\$ 523.00	\$ 52,300.00
Perimeter Fence, 4' High	1000	LF	\$ 14.82	\$ 14,820.00
Sod	4440	SY	\$ 7.37	\$ 32,722.80
Outlet Control Structure	1	EA	\$ 10,000.00	\$ 10,000.00
Engineering Costs	15%	-	-	\$ 70,357.33
Contingency	30%	-	-	\$ 161,821.87
TOTAL COST				\$ 701,228.09

Over								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
36"	72	6	5	386	428.9	1	-	-
54"	90	7.5	6.5	115	207.6	1	-	-
24"x36" Squashed, Double	102	8.5	5	468	736.7	-	-	-

APPENDIX C-12

Homewood Middle School Project A



City of Homewood
Homewood Stormwater Master Plan
Project Detail Sheet

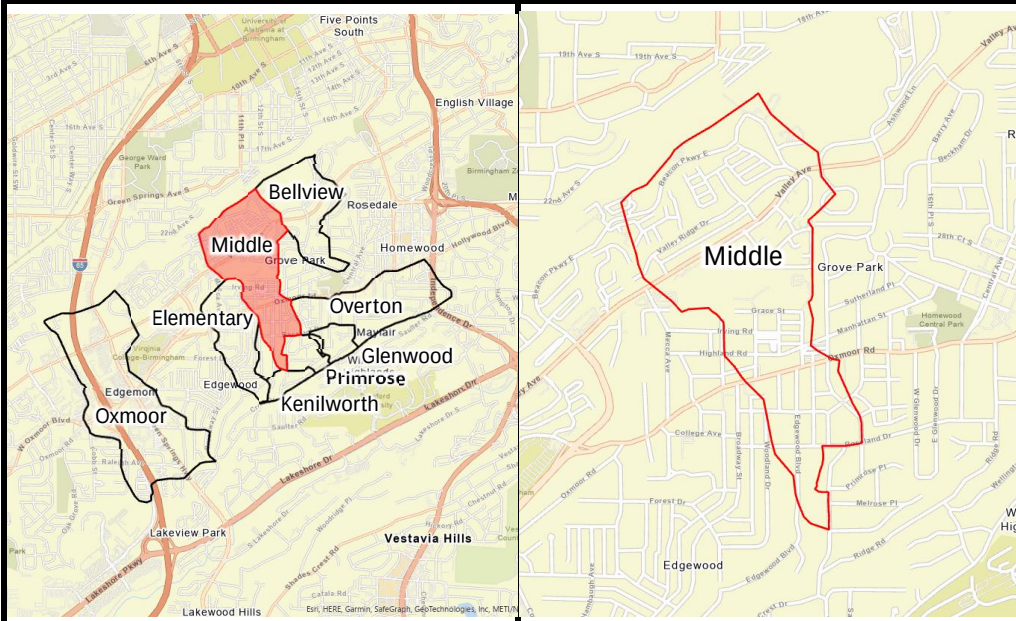
Homewood Middle School Priority Area: Project B

Description and Scope

Project Type:	Pipe Installation	Preliminary Selection Criteria (PSC):	8.0/10
Existing Level of Service:	<1-Year Storm	Project Performance Criteria (PPC):	10.6/10
Proposed Level of Service:	2-Year to 500-Year Storm		

This project upsizes pipes along Dale Avenue from Grace Street to Oxmoor Road to 42".

Project Maps



Budgetary Cost Estimate

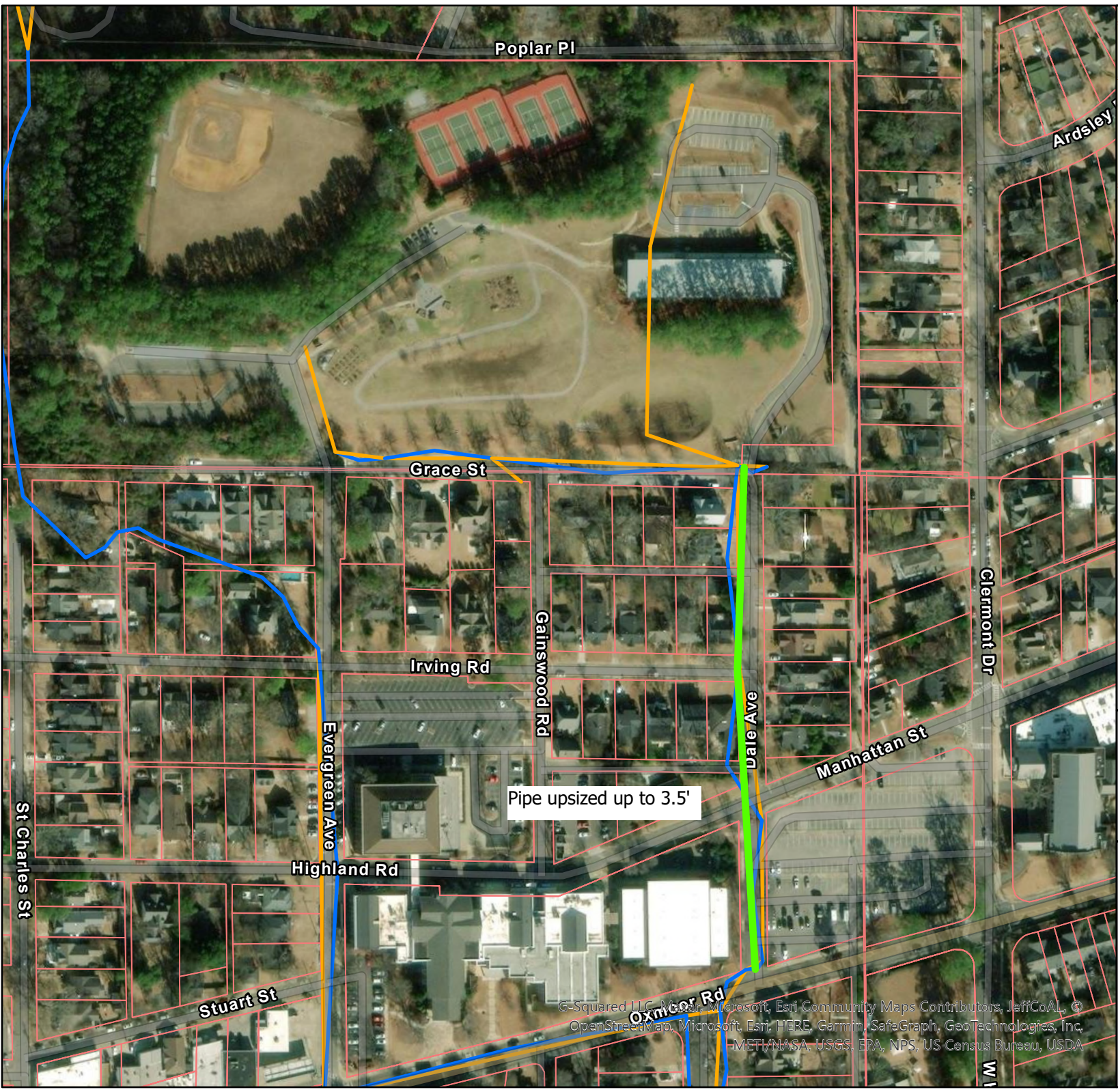
Project Activity	Duration	Amount
Construction		\$ 284,310.99
Site Acquisition/ Easements		-
Engineering Costs		\$ 42,646.65
Contingency		\$ 98,087.29
Total Budgetary Cost Estimate		\$ 425,044.92

Purpose and Need

The major benefits of this project is the alleviation of flooding south of Grace Street and along Edgewood Boulevard north of Griffin Brook. This project improves the level of service of thirty-one properties.

PRELIMINARY SELECTION CRITERIA (PSC)
HOMEWOOD STORMWATER EVALUATION
Homewood Middle Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS			SCORE	W*S	NOTES
			0-3	4-7	8-10			
Residential Community Disruption	Adverse impacts to citizens' access to their neighborhood or community assets -- includes the nature (temporary or permanent) and duration of impacts.	21%	Causes permanent impacts to access of neighborhood or community facility (0 points).	Causes temporary impacts to access of neighborhood or community facility and/or has longer construction duration.	Does not inhibit access to neighborhood or community facility and/or has short construction duration.	3	0.6	Access to residential property will be temporarily impacted.
Non-Residential Community Disruption	Adverse impacts to non-residential streets as well as access to a place of business or other non-residential facility -- includes the nature (temporary or permanent) and duration of impacts.	18%	Causes permanent impacts to non-residential streets, access of business, or non-residential facility (0 points).	Causes temporary impacts to non-residential streets, access of business, or non-residential facility and/or has longer construction duration.	Does not impact non-residential streets nor inhibits access of business or non-residential facility and/or has short construction duration.	7	1.3	Access to non-residential streets will temporarily be minimally impacted.
Operation and Maintenance	O&M requirements of the alternative to maintain successful operation and extend longevity of the proposed infrastructure.	33%	Involves significant maintenance procedures and/or difficult access.		Involves typical maintenance procedures and easy access.	10	3.3	The project will involve pipe improvement, which is a potential maintenance item. Pipes will involve typical maintenance and easy access.
Land Acquisition/ Available Easements	The acquisition of land that is required for implementation of the alternative -- may require standard easements for infrastructure or entire parcels and could include public or private property.	28%	Requires extensive acquisition (entire parcels) from private land owners.	Requires some land acquisition (easements) from public and/or private land owners.	Requires minimal land acquisition from publicly/privately owned land.	10	2.8	The project will take place on public streets.
TOTAL PSC SCORE		100%				7.99/10		



Legend

- Parcels
- Conduits
 - Pipe
 - Bridge/Culvert
 - Open Channel/Overground
 - Man-made Open Channel
 - Updated Infrastructure

MIDDLE

PROJECT B

Kimley»Horn



0 0.03 0.06 Miles

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PROJECT PERFORMANCE CRITERIA (PPC)
HOMWOOD STORMWATER EVALUATION
Homewood Middle Project B

CRITERIA	DEFINITION	WEIGHT	SCORING SCALE DESCRIPTIONS	SCORE	W*S	NOTES
CIVIC IMPACT		20%			2	
Flood Reports	Documented citizen complaints addressed by project. Reports occurring only during a major storm event (i.e. hurricane and/or nor'easter) will not be considered.	20%	If the project resolves flood complaints, it receives 10 points. If the project does not resolve any flood reports, it receives 0 points.	10	2	Alleviates flooding south of Homewood Board of Education.
FLOOD MITIGATION		80%			8.6	
Non-Structural	Reduction in non-structural flooding experienced on private property.	5%	If the project is anticipated to reduce known non-structural flooding, it receives 10 points. If the project does not reduce non-structural flooding, it receives 0 points.	10	1	Flooding occurring south of Homewood Board of Education is eliminated up to the 500 year storm.
Habitable Structure	Reduction in flooding experienced by habitable structures.	50%	Each project will receive 1 point per structure experiencing reduction in flooding up to 10. An additional 2 points will be awarded for projects that reduce flooding for over 10 properties - allowing for a possible total PPC score above 10.	12	6	1 property removed from 2yr, 1 removed from 5yr, 1 removed from 10yr, 1 removed from 25yr, 4 removed from 50yr, 7 removed from 100yr, 16 removed from 500yr
Streets	Reduction in flooding experienced by public streets.	15%	If the project reduces known street flooding, it receives 10 points. If the project does not reduce street flooding, it receives 0 points.	9	1.4	Flooding is reduced along Irving Rd and Evergreen Ave in the 500 year storm
Additional Benefits	Projects that provide improvements to upstream or downstream established Priority Areas.	5%	If the project improves an upstream or downstream Priority Area, it receives 10 points. If the project does not improve any upstream or downstream Priority Area, it receives 0 points.	4	0.2	This project reduces flooding for properties downstream of main project's extents.
Level of Service Improvement	Location of property relative to floodplain.	5%	A score of 9 to 10 will be awarded if 6 or more properties are removed from all storm events through the 25-year, 7 to 8 for 4 properties and at least 2 more showing improvement, 5 to 6 for 3 properties removed and at least 2 more showing improvement, 3 to 4 for at least 4 properties being removed from the 5-year storm, and 1 to 2 for any improvement	10	0.5	1 property removed from 2yr, 1 removed from 5yr, 1 removed from 10yr, 1 removed from 25yr, 4 removed from 50yr, 7 removed from 100yr, 16 removed from 500yr
TOTAL PPC SCORE		100%			10.6/10	

TOTAL COMBINED SCORE
(PSC + PPC)

= 18.6/20

City of Homewood
Opinion of Probable Construction Costs
Middle Project B

COST ESTIMATES				
DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
42" Concrete Pipe	520	LF	\$ 338.00	\$ 175,760.00
Pipe Backfill, 3/4" Gravel Fill in Trench	689	CY	\$ 58.12	\$ 40,016.70
Pipe Excavation, 6-10' Depth	689	BCY	\$ 10.29	\$ 7,084.86
Asphalt Paving, Replacement Over Trench 4" Thick	581	SY	\$ 105.80	\$ 61,449.43
Engineering Costs	15%	-	-	\$ 42,646.65
Contingency	30%	-	-	\$ 98,087.29
TOTAL COST				\$ 425,044.93

PIPES AND VOLUMES								
PIPE SIZE	WIDTH (IN)	WIDTH (FT)	DEPTH*(FT)	LF	VOLUME (CY)	INLETS	HEADWALL	JUNCTION
42" Double	78	6.5	5.5	520	688.5	-	2	-

APPENDIX D

Standard Operating Procedures



STANDARD OPERATING PROCEDURE FOR STORMWATER ASSET COLLECTION

An accurate record of all stormwater features must be maintained by the City of Homewood. Utilization of the ESRI Field Map app and Homewood Field Maps for Stormwater Asset Collection to document stormwater features while in the field allows for accurate and detailed inputs to be recorded. The standard operating procedure for this method is as follows:

1. Open ESRI Field Map app (requires data connection)
2. Open “Homewood Field Maps for Stormwater Asset Collection”
3. Determine location based on GPS in app
4. Find stormwater assets in the field
5. Identify stormwater asset type. Refer to SWMA Stormwater Infrastructure Mapping Resource for identifying and labeling stormwater assets (Appendix A).
6. To add a new asset:
 - a. Click the plus sign in the bottom right corner
 - b. Move circle with plus sign in the middle by dragging finger so plus sign location aligns with location of desired asset to record
 - c. Pick “Asset Type” and click “Add Point”
 - d. Fill in all known attributes for the asset based on the specific asset type as indicated below.
 - e. Add photo of asset when applicable

For Open Channel features, refer to pages 3-4.

For Catch Basin features, refer to pages 5-6.

For Pipe features, refer to pages 7-8.

For Culvert features, refer to pages 9-10.

For Manhole features, refer to pages 11-13.

For Linear Drain features, refer to pages 14-15.

For Outlet features, refer to pages 16-17.

Helpful Tips:

1. Several of the attributes listed are survey level or may not be known and do not need to be entered in the field.
2. The Field Maps for Stormwater Asset Collection has options to record features not mentioned within this document that were not deemed necessary to record.
3. For open channel, pipe, culvert, and linear drain assets, it is easiest to record other features first like catch basins or outlets that are along the line and then connect them using one of the linear assets. You can snap to those features automatically and then connect with a line.

STANDARD OPERATING PROCEDURE FOR
STORMWATER ASSET COLLECTION

Definitions and Standard Units

- Sump – storage in the bottom of a stormwater asset where water collects

Standard Units

Open Channel – Top Width	Feet
Open Channel – Bottom Width	Feet
Open Channel – Depth	Feet
Catch Basin – Width	Inches
Catch Basin – Length	Inches
Pipe – Horizontal Diameter	Inches
Pipe – Vertical Diameter	Inches
Culvert – Width	Inches
Culvert – Height	Inches
Linear Drain – Diameter	Inches
Outlet – Diameter (If Circular)	Inches

Refer to the images in the SWMA Stormwater Infrastructure Mapping Resource (Appendix A) for description of measurements needed from field collection.

OPEN CHANNEL

CancelCollectSubmit

 **Open Channel**

 Take Photo

 Attach

GROUP 1 * 

Asset type *

Unknown Choose asset type observed 

Asset ID

--

Lifecycle Status *

In Service Keep as "In Service" 

Install Date

No Value Keep blank unless known 

Upstream Elevation

Survey level

Downstream Elevation

Survey level

Slope

Survey level

Owned By

Our Agency Keep as "Our Agency" unless known otherwise 

Maintained By

Our Agency Keep as "Our Agency" unless known otherwise 

Spatial Source

Cancel

Collect

Submit

Open Channel

Maintained By

Our Agency

×

Spatial Source

Unknown

Choose GPS/GNSS when recorded in the field

×

Notes

Any comments or notable features

Bed Material

No value

Material of open channel bed

⋮

Side Material

No value

Material of open channel banks

⋮

Condition

No value

Choose from list

⋮

Top Width

Width of open channel top of bank (ft)

Bottom Width

Width of open channel bed (ft)

Depth

Distance from bed to top of bank (ft)

City Name

Adamsville

Change to Homewood

×

CATCH BASIN

CancelCollectSubmit

 **Catch Basin**
No location

Asset type *

UnknownChoose asset type observed

Asset ID

--

Lifecycle Status *

In ServiceKeep as "In Service"

Install Date

No ValueKeep blank unless known

Sump

No valueYes/No; If there is an area for sediment to catch at bottom

Inlet Shape

No valueRefer to SWMA Photobook

Width

Smaller of the two dimensions of inlet shape (inches)

Length

Larger of the two dimensions of inlet shape (inches)

Rim Elevation

Survey level

Invert Elevation

Survey level

Depth

Survey level

Cancel

Collect

Submit

?

Catch Basin

No location

Signage

No value

Yes/No; Is there a sign present

Wall Material

No value

Material inside of catch basin, usually concrete or brick

Catch Basin Material

No value

Material outside of catch basin, as seen from road

Owned By

Our Agency

Keep as "Our Agency" unless known otherwise

Maintained By

Our Agency

Keep as "Our Agency" unless known otherwise

Spatial Source

No value

Choose GPS/GNSS when recorded in the field

Notes

Any comments or notable features

Condition

No value

Choose from list

Manhole Access

No value

Yes/No

City Name

Adamsville

Change to Homewood

PIPE

Cancel

Collect

Submit

Pipe

Asset type *

Unknown

Choose asset type observed



Asset ID

--

Lifecycle Status *

In Service

Keep as "In Service"



Install Date

No Value

Keep blank unless known



Horizontal Diameter (in)

No value

Diameter (in)



Vertical Diameter

No value

Diameter (in)



Material

Unknown

Pick from list



Pipe Shape

Unknown

Pick from list, refer to SWMA Photobook



Upstream Elevation

Survey level

Downstream Elevation

Survey level

Slope

Survey level

CancelCollectSubmit

Pipe

Lined?

Unknown

Yes/No

×

Liner Year

Keep blank unless known

Liner Method

Unknown

Keep blank unless known

×

Owned By

Our Agency

Keep as "Our Agency" unless known otherwise

×

Maintained By

Our Agency

Keep as "Our Agency" unless known otherwise

×

Spatial Source

Unknown

Choose GPS/GNSS when recorded in the field

×

Notes

Any comments or notable features

Barrel Number

1

×

Condition

No value

Choose from list

⋮

City Name

Adamsville

Change to Homewood

×

CULVERT

CancelCollectSubmit

 Culvert

Asset type *

UnknownChoose asset type observed

Asset ID

--

Lifecycle Status *

In ServiceKeep as "In Service"

Install Date

No ValueKeep blank unless known

Diameter

UnknownMeasure if pipe (in)

Material

UnknownChoose from list

Width

Width (in)

Height

Height (in)

Culvert Shape

UnknownRefer to SWMA Photobook

Wall

UnknownYes/No; Presence of retaining wall

Upstream Elevation

Cancel

Collect

Submit

Culvert

Culvert Shape

Unknown

Wall

Unknown

Upstream Elevation

Survey level

Downstream Elevation

Survey level

Slope

Survey level

Owned By

Our Agency

Keep as "Our Agency" unless known otherwise

Maintained By

Our Agency

Keep as "Our Agency" unless known otherwise

Spatial Source

Unknown

Choose GPS/GNSS when recorded in the field

Notes

Any comments or notable features

City Name

Adamsville

Change to Homewood

MANHOLE

CancelCollectSubmit

**Manhole**
No location

Take Photo

Attach

GROUP 1 * 

Asset type *

Shallow ManholeChoose asset type observed

Asset ID

--

Lifecycle Status *

In ServiceKeep as "In Service">

Install Date

No ValueKeep blank unless known

Rim Elevation

Survey level

Invert Elevation

Survey level

Depth

Survey level

High Pipe Elevation

Survey level

Cone Type

No valueStraight if manhole is directly over the ladder

Manhole Location

Cancel
Collect
Submit


Manhole
No location

Manhole Location

No value
Description of location (Road, Woods, etc.)

Manhole Surface Type

No value
Surface around manhole cover

Cover Shape

No value

Cover Type

No value
Choose from list

Frame Material

No value
Material of what is visible from street

Wall Material

No value
Material inside manhole; usually concrete

Number of Steps

Step Material

No value
Choose from list

Owned By

Our Agency
Keep as "Our Agency" unless known otherwise

Maintained By

Our Agency
Keep as "Our Agency" unless known otherwise

Spatial Source

No value

Cancel

Collect

Submit

 **Manhole**
No location

Owned By

Our Agency

Maintained By

Our Agency

Spatial Source

No value

Choose GPS/GNSS when recorded in the field

Notes

Any comments or notable features

Condition

No value

Choose from list

City Name

Adamsville

Change to Homewood

LINEAR DRAIN

CancelCollectSubmit

Linear Drain

 Take Photo

 Attach

GROUP 1 *

Asset type *

Unknown

Choose asset type observed

×

Asset ID

--

Lifecycle Status *

In Service

Keep as "In Service"

×

Install Date

No Value

Keep blank unless known



Diameter

Unknown

Diameter (in)

×

Material

Unknown

Choose from list

×

Upstream Elevation

Survey level

Downstream Elevation

Survey level

Slope

Survey level

Owned By

Cancel

Collect

Submit

Linear Drain

Diameter

Unknown

Material

Unknown

Upstream Elevation

Downstream Elevation

Slope

Owned By

Our Agency

Keep as "Our Agency" unless known otherwise

Maintained By

Our Agency

Keep as "Our Agency" unless known otherwise

Spatial Source

Unknown

Choose GPS/GNSS when recorded in the field

Notes

Any comments or notable features

City Name

Adamsville

Change to Homewood

OUTLET

CancelCollectSubmit

Outlet
No location

 Take Photo

 Attach

Asset type *

Unknown

Choose asset type observed

×

Asset ID

--

Lifecycle Status *

In Service

Keep as "In Service"

×

Install Date

No Value

Keep blank unless known



Outfall

No value

Keep blank



Outfall ID

Keep blank

Diameter

No value

If circular (in)



Outlet Material

No value

Choose from list



Invert Elevation

Survey level

Location

No value

Choose from list



Cancel

Collect

Submit

Outlet

No location

No value

Invert Elevation

Location

No value

Owned By

Our Agency

Keep as "Our Agency" unless known otherwise

×

Maintained By

Our Agency

Keep as "Our Agency" unless known otherwise

×

Spatial Source

No value

Choose GPS/GNSS when recorded in the field

⋮

Notes

Any comments or notable features

Condition

No value

Choose from list

⋮

Side

Downstream side

Outlet Area

Complete if open channel (sq. ft)

City Name

Adamsville

Change to Homewood

×

2021

SWMA Stormwater Infrastructure Mapping Resource



Jefferson County Department of Health

12/7/2021

Amended by Kimley-Horn
August 2023

Kimley»Horn
Expect More. Experience Better.

CATCH BASIN

Attribute Name	JCDH Comment	Visibility
Asset Type	See Photobook	Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Opening Type		Hidden
Sump	Is there an area for sediment, etc., to collect at the bottom of the catch basin	Both
Inlet Shape	Inlet opening shape usually (RECTANGULAR)	Both
Width	Smaller of two dimensions of inlet shape	Both
Length	Larger of two dimensions of inlet shape	Both
Rim Elevation		Survey Grade
Invert Elevation		Survey Grade
Depth		Survey Grade
Signage		Hidden
Wall Material	Wall of the inside of the catch basin (usually CONCRETE or BRICK)	Both
Catch Basin Material	Material of what you see from the road	Both
Receives Surface Water		Hidden
Water Exiting System		Hidden
Owned By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Maintained By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Spatial Source	GPS/GNSS if answered in field	Both
Spatial Confidence		Hidden
Notes	Anything unique	Both
Symbol Rotation		Hidden
Photos And Files	Please take photo far enough back to see whole feature	Both
Global ID		Hidden
Creation Date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Access Diameter		Hidden
Condition	NORMAL/NEEDS REPAIR/NEEDS CLEANOUT	Both
Access Shape		Hidden
Other Description	Move any information in this attribute to notes	Hidden
Access Dimensions		Hidden
External Inlet Type		Hidden
Object ID		Hidden
Manhole Access	If true manhole is part of the catch basin then YES	Both

OUTLETS

Attribute Name	JCDH Comment	Visibility
Asset Type	See Photobook	Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Outfall	No entry	Both
Outfall ID	No entry	Both
Diameter	If circular then complete this (inches)	Both
Area	If open channel, then complete this attribute (feet ²)	Both
Outlet Material		Both
Invert Elevation		Survey Grade
Location	UNKNOWN, CLOSED PIPE, OPEN DRAINAGE	Both
Permit ID		Hidden
Permitted (Yes/No)		Hidden
Receives Surface Water		Hidden
Water Exiting System		Hidden
Maintained By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Owned By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Spatial Source	GPS/GNSS if answered in field	Both
Spatial Confidence		Hidden
Symbol Rotation		Hidden
Notes	Anything unique	Both
Condition	NORMAL/NEEDS REPAIR/NEEDS CLEANOUT	Both
Outlet Shape		Hidden
Top Width		Hidden
Bottom Width		Hidden
Channel Height		Hidden
Horizontal Pipe Diameter		Hidden
Vertical Pipe Diameter		Hidden
Grate Shape		Hidden
Horizontal Diameter		Hidden
Vertical Diameter		Hidden
Side	Downstream side	Both
number of outfalls		Hidden
fulcrum id		Hidden
Photos and Files	Please take photo far enough back to see whole feature	Both
Object ID		Hidden
Global ID		Hidden
Creation Date		Hidden
Creator		Hidden

MANHOLE

Attribute Name	JCDHComment	Visibility
Asset Type	See Photobook	Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Rim Elevation		Survey Grade
Invert Elevation		Survey Grade
Depth		Survey Grade
High Pipe Elevation		Survey Grade
Cone Type	STRAIGHT if manhole directly over ladder	Both
Manhole Location	Description of placement (WOODS, ROAD)	Both
Manhole Surface Type	Surface surrounding manhole	Both
Cover Shape	ROUND/SQUARE	Both
Cover Type	SOLID/BOLTED/VENTED	Both
Channel		Hidden
Bench		Hidden
Frame Material	Material visible from street	Both
Wall Material	Internal wall material (usually CONCRETE)	Both
Number of Steps		Both
Step Material		Both
Receives Surface Water		Hidden
Water Exiting System		Hidden
Maintained By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Owned By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Spatial Source	GPS/GNSS if answered in field	Both
Spatial Confidence		Hidden
Symbol Rotation		Hidden
Notes	Anything unique	Both
Object ID		Hidden
Global ID		Hidden
Creation Date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Other Description		Hidden
Condition	NORMAL/NEEDS REPAIR/NEEDS CLEANOUT	Both
Flow Direction	not applicable	Hidden

PIPE

Attribute Name	JCDHComment	Visibility
Asset Type	See Photobook	Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Diameter		Hidden
Material	Pipe material	Both
Pipe Shape	ROUND/CIRCULAR/PIPE ARCH/ELLIPTICAL (see photobook)	Both
Upstream Elevation		Survey Grade
Downstream Elevation		Survey Grade
Slope		Survey Grade
Lined?	YES/NO	Both
Liner year	Answer if known	Both
Liner method	Answer if known	Both
Maintained By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Owned By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Spatial Source	GPS/GNSS if answered in field	Both
Spatial Confidence		Hidden
Notes	Anything unique	Both
Horizontal Diameter	inches	Both
Vertical Diameter	inches	Both
Condition	NORMAL/NEEDS REPAIR/NEEDS CLEANOUT	Both
Object ID		Hidden
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden

OPEN CHANNEL

Attribute Name	JCDH Comment	Visibility
Asset Type	See Photobook	Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Width		Hidden
Upstream Elevation		Survey Grade
Downstream Elevation		Survey Grade
Slope		Survey Grade
Type		Hidden
Maintained By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Owned By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Spatial Source	GPS/GNSS if answered in field	Both
Spatial Confidence		Hidden
Notes	Anything unique	Both
Object ID		Hidden
Top Width	Width at top of bank (feet)	Both
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Shape Length		Hidden
Bed Material	Material of stream bed	Both
Side Material	Material of stream banks	Both
Condition	NORMAL/NEEDS REPAIR/NEEDS CLEANOUT	Both
Bottom Width	Width of stream bed (feet)	Both
Depth	Distance from stream bed to the top of the bank (feet)	Both

CULVERT

Attribute Name	JCDH Comments	Visibility
Asset Type	See Photobook	Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Diameter	If pipe (inches)	Both
Material	Culvert material	Both
Width	Inches	Both
Height	Inches	Both
Culvert Shape	CIRCULAR/HORSESHOE	Both
Wall	Does it have a retaining wall?	Both
Upstream Elevation		Survey Grade
Downstream Elevation		Survey Grade
Slope		Survey Grade
Maintained By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Owned By	Usually MUNICIPALITY but could be PRIVATE if on private property	Both
Spatial Source	GPS/GNSS if answered in field	Both
Spatial Confidence		Hidden
Notes	Anything unique	Both
Object ID		Hidden
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden

LINEAR DRAIN

Attribute Name	JCDH Comment	Visibility
Asset Type	See Photobook	Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Diameter	Inches	Both
Material		Both
Upstream Elevation		Survey Grade
Downstream Elevation		Survey Grade
Slope		Survey Grade
Owned By		Both
Maintained By		Both
Spatial Source		Both
Spatial Confidence		Hidden
Notes		Both
Object ID		Hidden
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Shape Length		Hidden
Photos And Files		Both

BMP BOUNDARY

Attribute Name	JCDH Comment	Visibility
Asset Type		Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
BMP Class		Both
Spatial Source		Both
Bed Material		Both
Bank Material		Both
Object ID		Hidden
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Shape Length		Hidden
Photos And Files		Both

CATCHMENT BOUNDARY

Attribute Name	JCDH Comment	Visibility
Asset Type		Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Name		Both
Spatial Source		Both
Spatial Confidence		Hidden
Object ID		Hidden
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Shape Length		Hidden
Photos And Files		Both

BMP Point

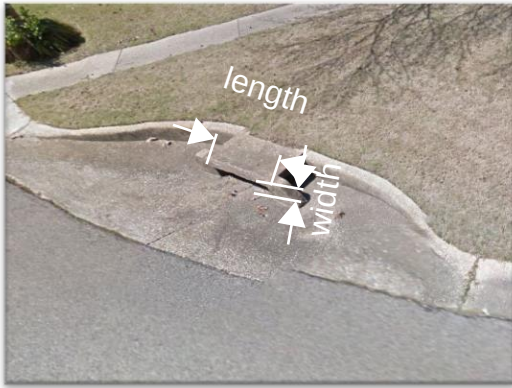
Attribute Name	JCDH Comment	Visibility
Asset Type		Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Number of Inlets		
Number of Outlets		
BMP Class		
BMP Material		
Rim Elevation		Survey Grade
Invert Elevation		Survey Grade
Depth		Survey Grade
Confined Space		
Observation Point		
Storage Volume		
Treatment Rate		
Infiltration Rate		
Capture and Reuse		
Owned By		Both
Maintained By		Both
Spatial Confidence		Hidden
Notes		Both
Object ID		Hidden
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Shape Length		Hidden
Photos And Files		Both

BMP Inlet

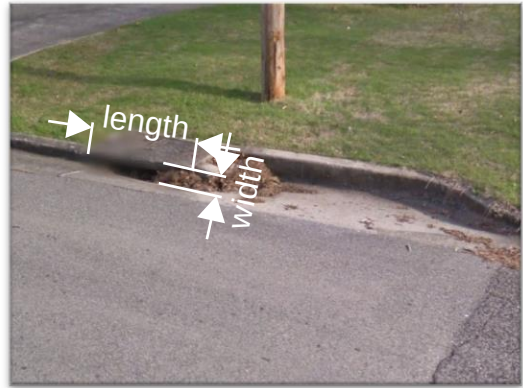
Attribute Name	JCDH Comment	Visibility
Asset Type		Both
Asset ID	No entry	Both
Lifecycle Status	Usually IN SERVICE	Both
Install Date	Complete only if known	Both
Invert Elevation		Survey Grade
Owned By		Both
Maintained By		Both
Spatial Confidence		Hidden
Notes		Both
Object ID		Hidden
Global ID		Hidden
Creation date		Hidden
Creator		Hidden
Last update		Hidden
Updated by		Hidden
Shape Length		Hidden
Photos And Files		Both

PHOTOBOOK

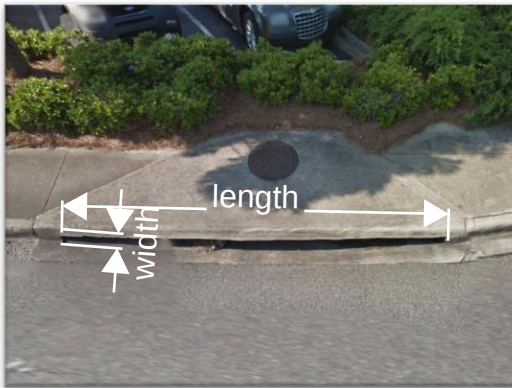
CATCHBASIN



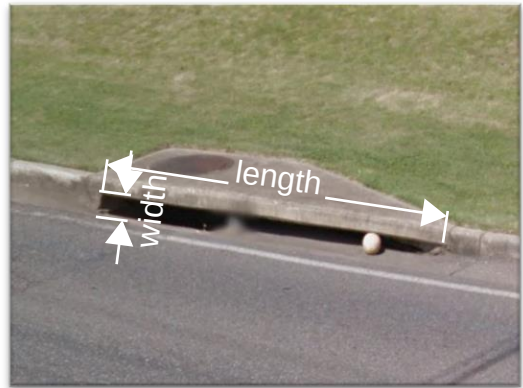
"C" Type Double Wing



"C" Type Single Wing



"S" Type Double Wing (With manhole access)



"S" Type Single Wing (with manhole access)



Combination



Combination (with Manhole Access)



Curb Inlet



Yard Drop

CATCHBASIN (Cont'd)



Flume

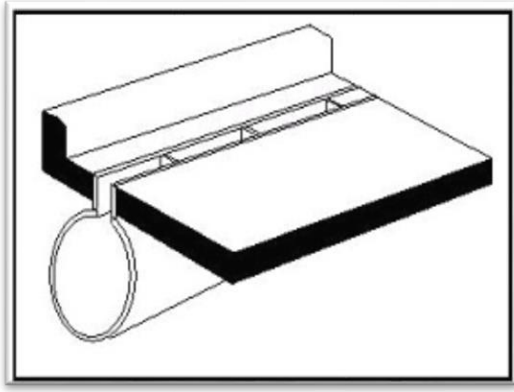


Grate Inlet



Yard Grate

LINEAR DRAIN



Slotted Drain



Trench Drain

Open Channel



Ditch (sides are not earthen)



Natural Channel (bottom and top are natural)

Outlet



Pipe Outlet



Open Channel



Stormdrain Outlet



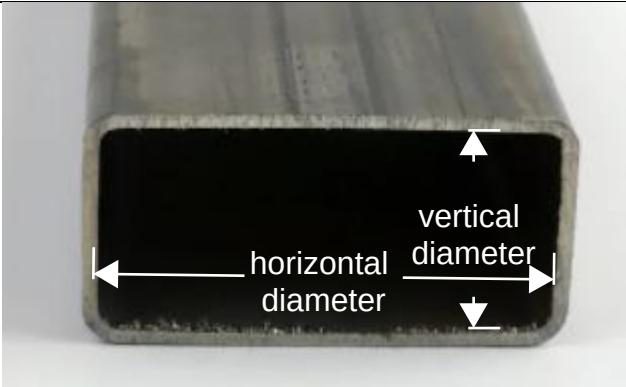
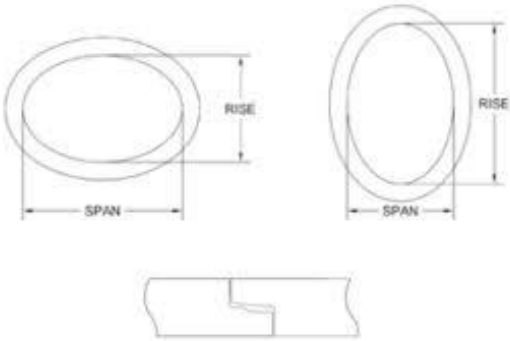
Flume Outlet



Grate Outlet



Flap Gate

PIPE	
ALL OTHER PIPES	
Gravity	Perforated Pipe
PIPE SHAPES	
	
circular	Rectangular
	
Pipe arch or Horseshoe	Elliptical or Oblong

Culvert



Pipe Culvert



Pipe Arch Culvert



Box Culvert



Arch Culvert