Impervious Area Scenario Development and Flood Modeling Scenario Recommendations

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Contents

Attachments

Tables

Figures

Executive Summary

This technical memorandum (TM) documents development of current (2019) and future impervious area (IA) scenarios for hydrologic modeling. A methodology was developed in collaboration with Montgomery County (the County) staff to project reasonable worst-case scenarios for future IA in the County that could occur with no change in land use policy. The methodology was developed and applied to the Sligo Creek watershed and will be applied in future phases to estimate IA in other Tiers 1 through 3 watershed studies and flood risk modeling.

Right-of-Ways (ROW) represent 33 percent of all IA in Tiers 1 through 3 watersheds, followed by R-60 (17 percent), R-200 (12 percent), R-90 (11 percent), and CR (7 percent), with the remainder of IA in multiple other zoning categories. In the Sligo Creek watershed, the top five categories with the most IA are R-60 (41 percent), ROW (34 percent), CR (10 percent), R-10 (4 percent), and R-90 (3 percent).

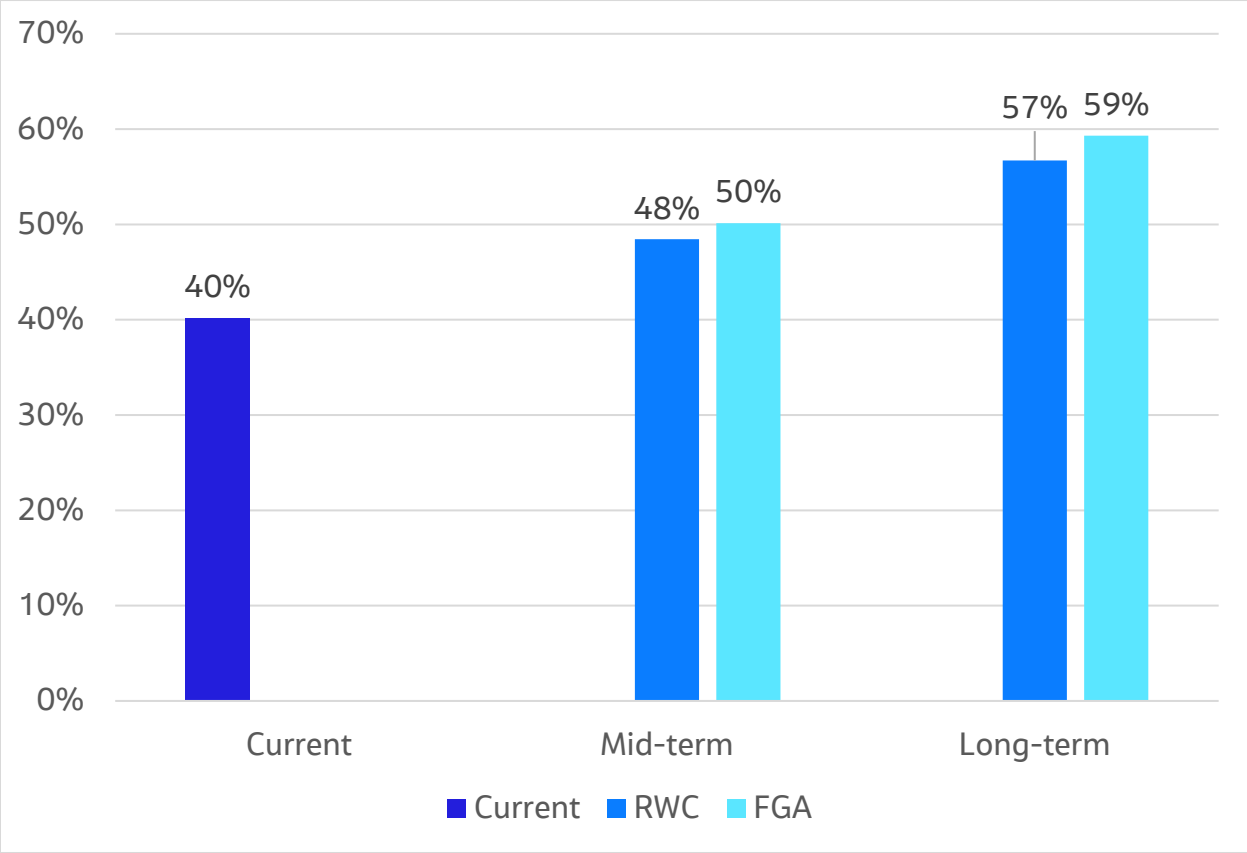
Two different methods were evaluated to project potential future IA scenarios:

1. **Reasonable Worst Case** (RWC) Scenario, which determined the maximum observed IA percentage (% IA) by zone based on observed samples by subdivision or by neighborhood. The RWC %IA was used to estimate the long-term scenario for IA and the mid-term was taken based on the difference between current (2019) % IA and long-term.

2. **Focus Growth Area (FGA)** Scenario, which determined the observed % IA around transit stations and along transit corridors. The maximum observed % IA around transit was then used as a cap on the maximum long-term %IA, with a growth rate from current to future used to estimate mid-term and long-term %IA.

Results for Sligo Creek watershed are illustrated, at a watershed level, on Figure ES-1 and presented in map form in Section 4 of this TM. The RWC Scenario results increase total % IA from 40 percent (2019) to 50 percent at the mid-term and 59 percent at the long-term. The FGA Scenario results increase total % IA from 40 percent (2019) to 51 percent at the mid-term and 64 percent at the long-term.

Figure ES-1. Sligo Creek Watershed Comparison of Total % Impervious Area for All Scenarios



There are several considerations for selection of flood modeling scenarios. Typically, modeling scenario selection is focused on rainfall. However, the scenarios recommendations for this study also include an IA component, as discussed in this TM. The future conditions IA scenarios allow development of a "status quo" worst case flood condition that addresses this important driver of rainfall runoff. Rainfall scenario recommendations for historic events, current rainfall conditions, and future conditions were developed and presented in a workshop and in a separate TM, *Climate Projections and Scenarios* (Jacobs 2023). Recommendations for modeling scenarios were presented and discussed in a workshop. The description of the scenarios provided herein and summary included in Table ES-1 reflect the discussion and conclusions of that workshop.

Table ES-1. Recommended Combined Climate and Impervious Area Scenarios for Flood Modeling*

Storm Recurrence Interval	Historical Events	Updated Atlas14	RCP8.5 / SSP5		
Non-exceedance interval	*N/A*	*N/A*	*50%*		
Impervious Area Condition	*Current*	*Current*	RWC	FGA	Current
Historic 1 July 8, 2019					
	✓	x	x	x	x
Historic 2 September 10, 2020					
	✓	x	x	x	x
Current					
2-year	x	x	x	x	x
10-year	x	✓	x	x	x
25-year	x	✓	x	x	x
50-year	x	✓	x	x	x
100-year	x	✓	x	x	x
500-year	x	✓	x	x	x
2050					
2-year	x	x	x	x	x
10-year	x	x	x	✓	x
25-year	x	x	x	x	x
50-year	x	x	x	x	x
100-year	x	x	x	✓	x
500-year	x	x	x	✓	x
2100					
2-year	x	x	x	x	x
10-year	x	x	x	✓	✓
25-year	x	x	x	✓	x
50-year	x	x	x	✓	x
100-year	x	x	x	✓	✓
500-year	x	x	x	✓	x

* Scope of work calls for selection of 17 climate and impervious area scenarios to be applied for hydrologic modeling. Those selected in this table reflect consensus from workshops with County staff. They were selected to balance a range of different size storms (recurrence intervals from 2- through 500-year), future climate, and future IA. Two future climate scenarios were also selected to be run without projected changes in IA in order to assess impacts of climate change alone.

N/A = not applicable

1. Purpose

This technical memorandum (TM) has been developed as part of Task W-2.2 of the Sligo Creek Pilot Watershed Study, the first watershed study in Phase 2 of Montgomery County's Comprehensive Flood Management Plan (CFMP). The purpose of this TM is to document current and development of future impervious area (IA) scenarios for hydrologic modeling. Catchment delineations are being generated as part of Task W-3 of this study. Once catchment boundaries are available, the methods described in this document will be used to generate catchment level estimates of percent IA (% IA) for the study area, which will then be used for flood modeling. The methodology defined in this TM is intended to be applied to Sligo Creek Pilot Watershed Studies and for subsequent "Tiers 1 through 3" Watershed Studies. Tiers 1 through 3 watersheds include the following:

- Cabin John Creek
- Little Falls
- Lower Rock Creek
- Middle Great Seneca Creek
- Middle Great Seneca Creek – Whetstone Run
- Middle Rock Creek
- Muddy Branch
- Northwest Branch
- Northwest Branch – Bel Pre Creek
- Sligo Creek
- Watts Branch

2. Background

2.1 Why Develop Impervious Area Scenarios?

Montgomery County (the County) aims to understand flood risk for current and future conditions. Future conditions modeling scenarios will span a period of 50-plus years, to ensure that drainage and flood management infrastructure that may be installed to mitigate current or projected future flood risk, which typically has a useful life of 50-100 years, will have adequate capacity to address future increases in stormwater runoff because of increased development and increased rainfall due to climate change.

Hydrologic and hydraulic modeling completed for the CFMP P2 will include consideration of many variables. IA will be one variable that will be used to quantify runoff volume. The percent IA will be summarized at a catchment level (illustrated conceptually on Figure 2-1).

Figure 2-1. Illustration of Resolution of Catchment Level Impervious Area Calculation

2.2 Available Impervious Area Data

Table 2-1 summarizes the available IA data provided by the County's Department of Environmental Protection (DEP) and Maryland-National Capital Park and Planning Commission (MNCPPC). These data were reviewed and documented in Attachment 1. The analysis in this study focused on the data from 2019 imagery from the DEP's Water Quality Protection Charge program (referred to as the "current" condition in this TM), as well as the 2008 IA data due to their comprehensive and consistent information on iIA types. The difference between these two data sets was used to evaluate trends in the increase in IA, but after discussion with County planning staff it was agreed that historical trends would not be used for projecting future IA, as explained later in this TM.

Table 2-1. Comparison of Available Impervious Area Planimetric Data Sets

Year of Issuance	Owner	Year of Source Imagery	Planimetric Source	Includes Buildings	Includes all Pavement Types
2009	DEP	2008	NA	Yes	No
2012	DEP	2008	NA	Yes	Some, Classified
2014	Planning	2014	2014	Yes	No, Classified
2017	Planning	2017	2014	Yes	Some, Not classified
2020	Planning	2020	2017	Yes	Yes, Not classified
2020	DEP	2019	Limited use of MNCPPC 2018	Yes	Yes, Classified

Note: Red outlines denote IA data sets that were used for this analysis.

NA = not available

2.3 Current Impervious Area Conditions

This section summarizes 2019 IA data for Tiers 1 through 3 watersheds and zoning category, to identify zones with high total IA as a proportion of all IA, and zoning categories with high % IA. The summary pie chart (Figure 2-2) illustrates that the majority of IA within Tiers 1 through 3 watersheds originates from the right-of-way (ROW); residential zones like R-60, R-200, R-90; and commercial and residential (CR) zones.

R-60, R-200, and R-90 are small single-family detached home zones with larger lot sizes than townhouses. The CR zones, generalized from the multitude of zones designated by the MNCPPC, have the highest density (% IA), but are typically a smaller fraction of all land area. These main IA zones vary by watershed. For instance, R-60, ROW, and CR are sources of most of the IA for the Sligo Creek Watershed (Figure 2-3). In contrast, R-90 and R-200 zones are predominant for the southwestern county watersheds because of the uneven distribution of zoning categories across Tiers 1 through 3 watersheds. Overall, these four zoning types drive IA growth in Tiers 1 through 3 watersheds.

Figure 2-2. Comparison of the Percentage of Impervious Area by Zoning Category (left) to the Percentage of Total Acreage by Zoning Category (right) in Tiers 1 through 3 Watersheds.

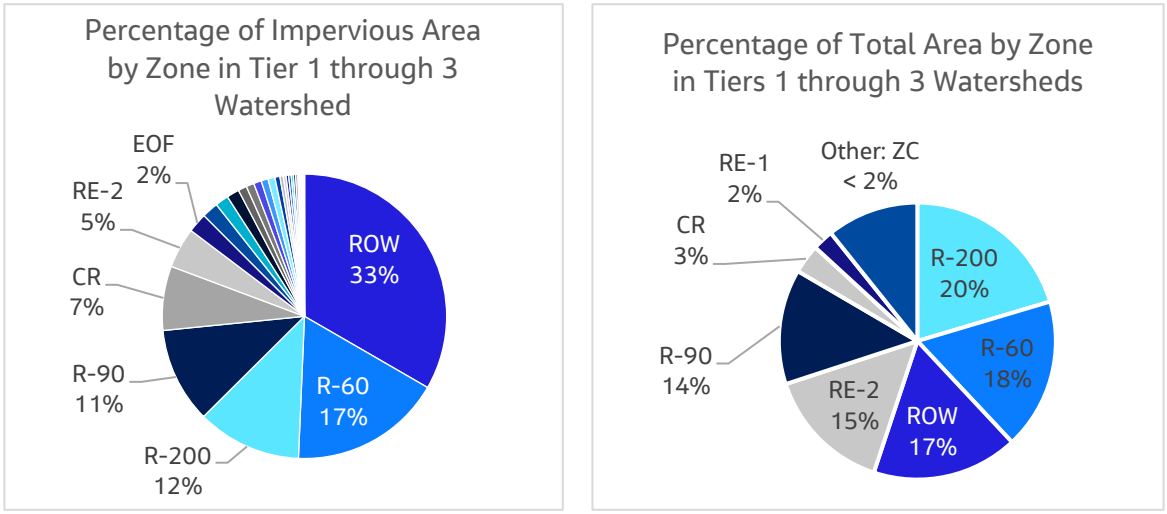
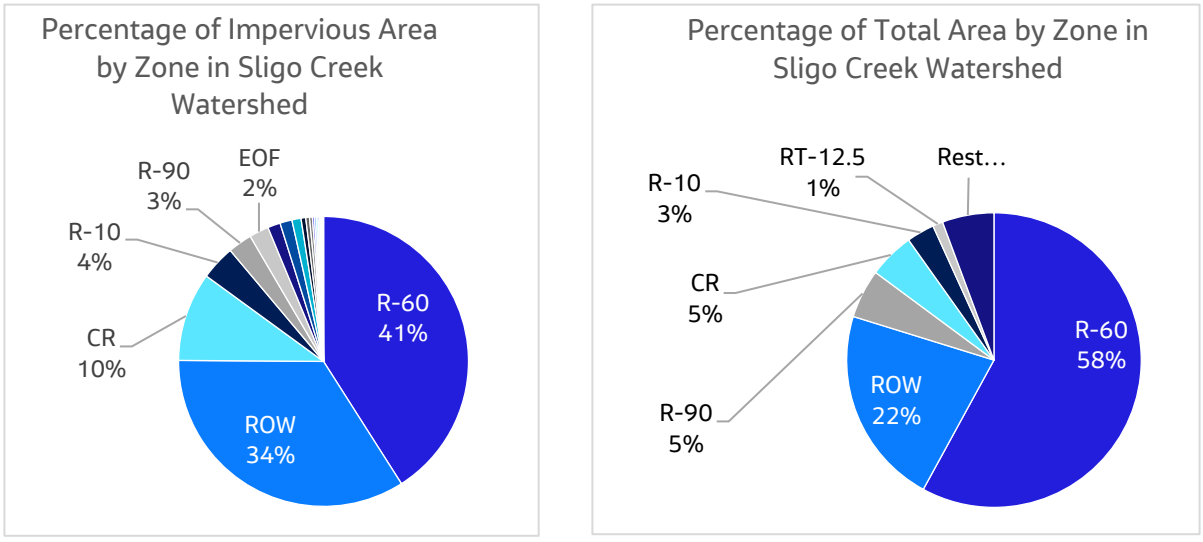


Figure 2-3. Comparison of the Percentage of Impervious Area by Zoning Category (left) to Total Acreage by Zoning Category (right) in Sligo Creek Watershed.



EOF = Employment Office

Historical conditions and changes in IA were examined and details are documented in Attachment 2. Figure 2-4 shows that IA coverage has increased by 1,403 acres Countywide and 660 acres in Tiers 1

through 3 watersheds, solely from increases in building footprint. Building IA coverage varies based on watershed size, development, history, and pattern (Figure 2-5). Cabin John Creek and Lower Rock Creek have the highest Building IA. The development of IA scenario approaches, which will be explained in Chapter 3, does not consider historical conditions.

Figure 2-4. Countywide Building Impervious Area (acres) in 2008 and 2019

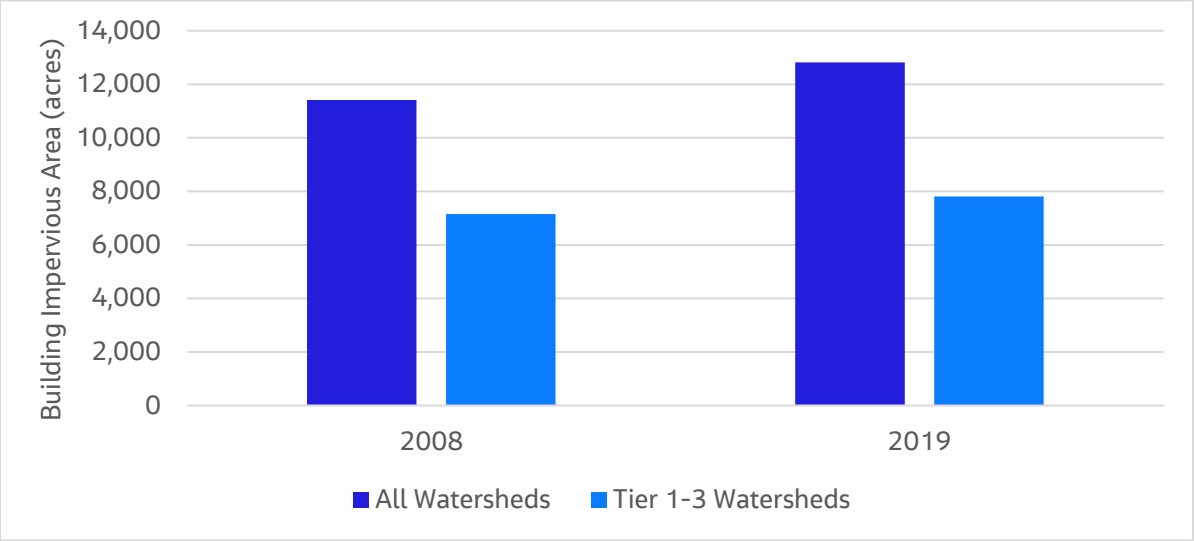
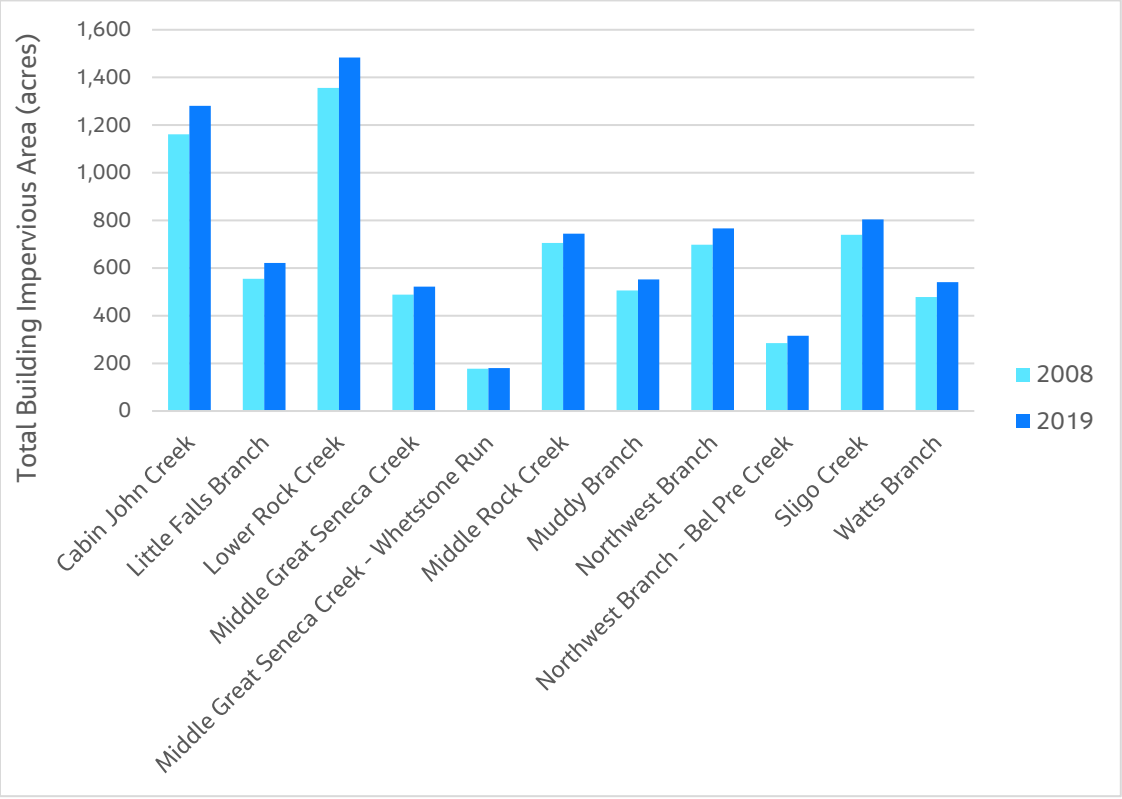


Figure 2-5. Building Impervious Area in 2008 and 2019 for Tiers 1 through 3 Watersheds



2.4 Observed "Reasonable Worst Case" % Impervious Area by Zone

For the purposes of developing future IA scenarios, an analysis was carried out to determine what maximum observed existing conditions % IA were present by zone, referred to as "reasonable worst case %IA". The intent of this analysis was to determine an average and maximum observed Reasonable Worst Case (RWC) by zone, for those zones (CR, R-60, R-90, R-200) that contribute the most impervious area within the Tiers 1 through 3 watersheds. ROW, because it is not a zone tied to parcel boundaries, is summarized differently (see Section 2.6). The following approach was taken to identify and develop the RWC values (see Table 2-2 for a summary of results):

1. Subdivision-level summaries of existing IA (2019) were reviewed and sorted by zone to identify subdivision-level zone area with the highest % IA. *For zones other than CR, R-60, R-90, R-200, this value was used to define the RWC condition.*

2. Using this data, and screening out geographic information system remnants and slivers, a sample of five smaller neighborhood areas that are highly impervious were selected and analyzed to determine % IA. These represent a potential worst-case level of impervious cover that other properties could eventually develop to given existing zoning standards.

3. An average of the five samples was used to define the RWC for CR, R-60, R-90, R-200 zones (representing the majority of IA within Tiers 1 through 3 watersheds); Figure 2-6 provides an example of this process. Values developed using this process are included in Attachment 3.

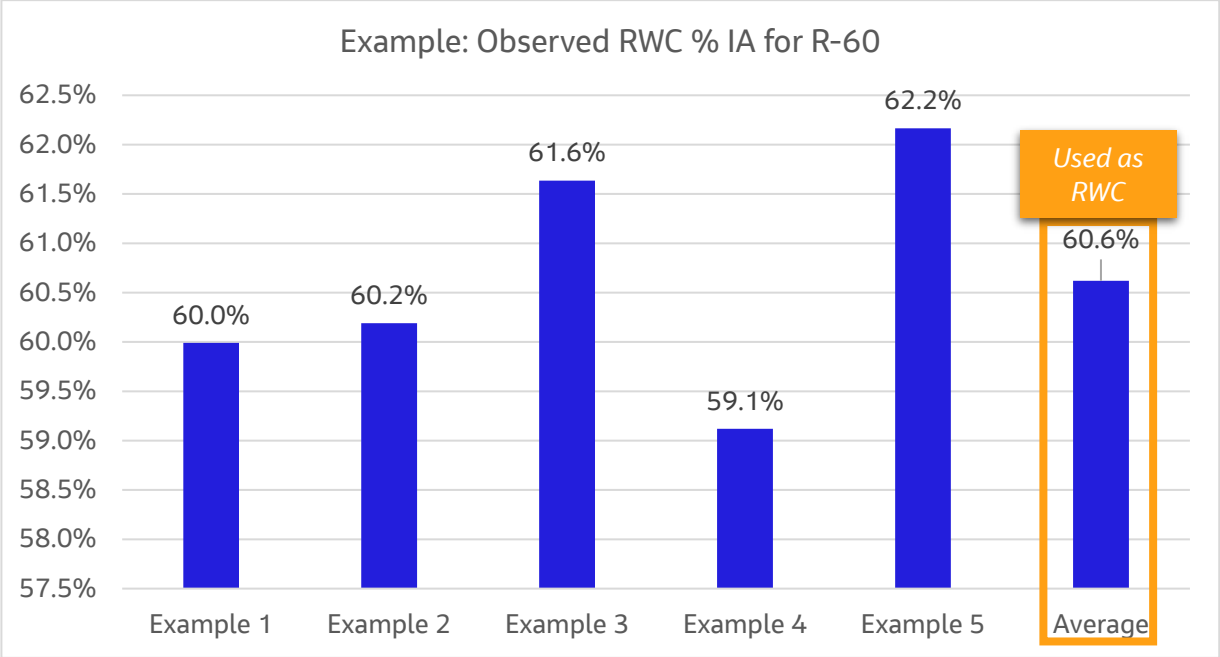
Table 2-2. Reasonable Worst Case% Impervious Area Values by Generalized Zone

Zone	Current Countywide Average IA%	RWC	Methods (Average observation of the sample set versus the highest observed IA% in subdivisions)
CR	64%	94%	Based on the average of 5 RWC examples
EOF	58%	93%	Highest observed subdivision % IA
IL	69%	94%	Highest observed subdivision % IA
IM	50%	94%	Highest observed subdivision % IA
PD-Med	36%	49%	Highest observed subdivision % IA
PD-MedLow	31%	60%	Highest observed subdivision % IA
R-10	51%	70%	Highest observed subdivision % IA
R-20	46%	70%	Highest observed subdivision % IA
R-200	20%	51%	Based on the average of 5 RWC examples
R-30	33%	56%	Highest observed subdivision % IA
R-40	39%	45%	Highest observed subdivision % IA
R-60	31%	61%	Based on the average of 5 RWC examples
R-90	26%	44%	Based on the average of 5 RWC examples
RE-2	11%	37%	Highest observed subdivision % IA
R-H	51%	54%	Highest observed subdivision % IA
ROW	43%	61%	Based on observed % IA
RT-10.0	41%	61%	Highest observed subdivision % IA
RT-12.5	43%	65%	Highest observed subdivision % IA

Zone	Current Countywide Average IA%	RWC	Methods (Average observation of the sample set versus the highest observed IA% in subdivisions)
RT-15.0	46%	63%	Highest observed subdivision % IA
RT-8.0	34%	45%	Highest observed subdivision % IA
TMD	43%	68%	Highest observed subdivision % IA
AR	8%	16%	Highest observed subdivision % IA
IH	26%	44%	Highest observed subdivision % IA
PD-Low	17%	26%	Highest observed subdivision % IA
PRC	33%	50%	Highest observed subdivision % IA
RC	7%	17%	Highest observed subdivision % IA
RE-1	13%	49%	Highest observed subdivision % IA
RE-2C	9%	22%	Highest observed subdivision % IA
RNC	8%	11%	Highest observed subdivision % IA
RT-6.0	32%	50%	Highest observed subdivision % IA
Rural	3%	7%	Highest observed subdivision % IA
TF-12	32%	32%	Highest observed subdivision % IA
THD	41%	75%	Highest observed subdivision % IA
TLD	33%	57%	Highest observed subdivision % IA

Note: RWC data and calculation can be found in Attachment 3.

Figure 2-6. Examples of Reasonable Worst Case Samples for R-60



Battery Park (Lower Rock Creek) 60 percent

Edgemoor (Little Falls) 60 percent

Mary J Boland (Middle Great Seneca Creek) 62 percent

Decoverly Adventure (Muddy Branch) 59 percent

Chevy Chase Terrace (Little Falls) 62 percent

2.5 Observed % Impervious Area within the Public Right-of-Way

The IA within the public Right-of-Way (ROW) was determined by using the subdivision and zoning map. It includes all ROW except roads that are within publicly or privately owned parcels, such as parcels owned by the federal government or Homeowner Associations (see Figure 2-7).

The RWC for the ROW is based on % IA observed in Tiers 1 through 3 watersheds, transit-adjacent corridors, and within 1 mile of Washington Metropolitan Area Transit Authority (WMATA) Metro stations. In general, the percentage of IA observed in the ROW varies between 56 to 75 percent, depending on the summary level. The corridor summary in Table 2-3 shows 59 to 75 percent in the southern MD 97 (Georgia Avenue) and MD 355 (Rockville Pike) areas. The highest percentage of IA observed around the Metro stations is 66 percent IA (Takoma), as shown in Table 2-4, while average ROW % IA within Tiers 1 through 3 watersheds is 56 percent (Table 2-5).

A single roadway expansion project, the MD 97 (Georgia Avenue)/Randolph Road Intersection Expansion, was summarized to understand typical pre- vs. post-project % IA change. The pre-project IA was 59 percent. In comparison, the post-project IA was 74 percent, resulting in a 15 percent IA increase. It is important to note that major intersection expansions are not likely to be representative of smaller road increases.

Overall, the IA in the ROW is likely to increase in the vicinity of intersections, near growth centers, and along arterial roads where bike lanes, pedestrian walkways, and similar infrastructure can be added. However, ROW within neighborhoods is likely to stay fairly consistent.

Figure 2-7. Image of the Right-of-Way and the intersect with the Focus Growth Area Boundary

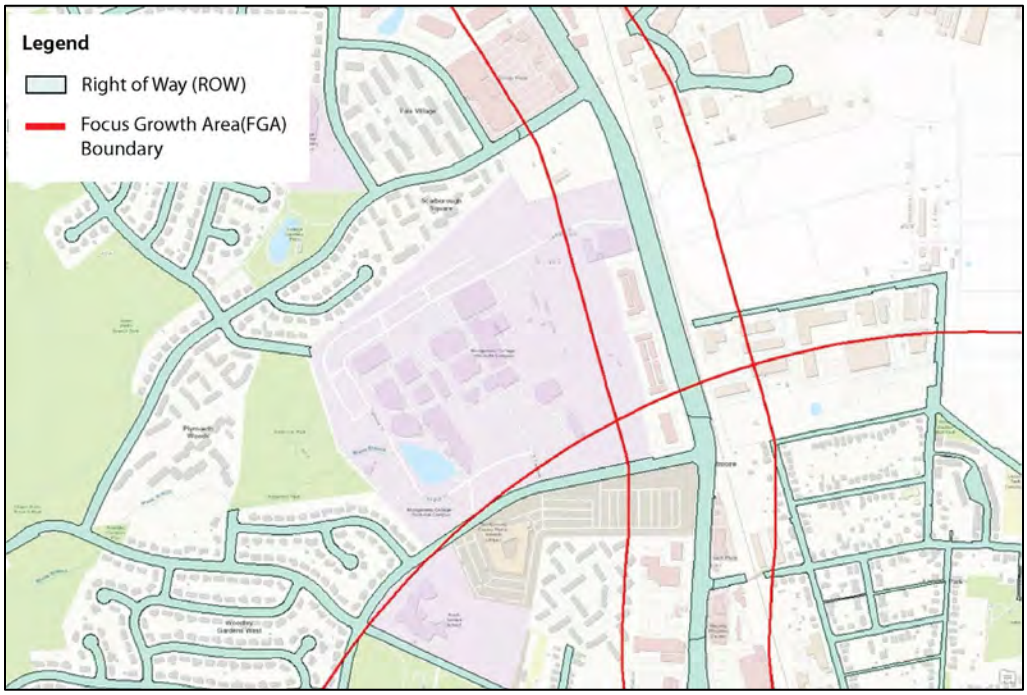


Table 2-3. Summary of Right-of-Way % Impervious Area for Transit-Adjacent Corridors

Corridor	IA (acres)	Total Area (acres)	% IA
MD 355 (Rockville Pike)[a]	6,457	8,569	75%
MD 97 (Georgia Avenue)[b]	494	832	59%
Totals	6,951	9,401	74%

[a] Summary has been pulled using a 500-foot buffer from the southern County boundary northward to Maryland State Route 200.

[b] Summary has been pulled using a 500-foot buffer from the southern County boundary northward to the Glenmont Metro Station.

Table 2-4. Summary of Right-of-Way % Impervious Area for Metro Stations (1-mile radius)

Metro Station Name	IA (acres)	Total Area (acres)	% IA
Bethesda	274	426	64%
Friendship Heights	123	215	57%
Rockville	274	425	65%
Silver Spring	241	380	63%
Wheaton	273	421	65%
White Flint	225	373	60%
Glenmont	246	401	61%

Metro Station Name	IA (acres)	Total Area (acres)	% IA
Grosvenor-Strathmore	211	390	54%
Shady Grove	230	437	53%
Takoma	114	172	66%
Twinbrook	210	333	63%
Forest Glen	265	463	57%
Medical Center	208	324	64%
Totals	2,895	4,760	61%

Table 2-5. Summary of Right-of-Way % Impervious Area for Tiers 1 through 3 Watersheds

Tiers 1 through 3 Watersheds	IA (acres)	Total Area (acres)	% IA
Cabin John Creek	1,443	2,849	51%
Lower Rock Creek	1,444	2,393	60%
Middle Great Seneca Creek	502	923	54%
Middle Great Seneca Creek - Whetstone Run	252	405	62%
Middle Rock Creek	931	1,506	62%
Muddy Branch	810	1,506	54%
Northwest Branch	733	1,403	52%
Northwest Branch - Bel Pre Creek	177	312	57%
Sligo Creek	829	1,342	62%
Watts Branch	861	1,603	54%
Little Falls	519	990	52%
Totals	8,501	15,232	56%

3. Methods for Development of Impervious Area Scenarios

3.1 Overview of Impervious Area Scenarios

Several IA scenarios were developed to provide options for modeling scenarios and described herein, in Table 3-1, and summarized as follows:

- **Current Conditions Scenario:** Scenario developed by summarizing existing (2019) IA by catchment and zone.
- **Future Conditions Scenarios**: Two sets of future conditions scenarios were developed. Both include consideration of preserved areas; areas such as park lands that are not anticipated to be a significant source of new IA. One scenario includes consideration of targeted growth around transit.
  - **RWC Scenario:** Mid-term and long-term IA projections developed by growing existing (2019) IA to observed "reasonable worst case" values by zone.
  - **Focused Growth Area (FGA) Scenario:** Mid-term and Long-term IA projections developed by growing existing (2019) IA to observed RWC values by zone and incorporating increased IA growth around transit areas.

The following sections further described the scenarios.

Table 3-1. Summary of IA Scenarios

Timeframe	Scenario	Source of Base IA Data	RWC Values	Preserved Areas Considered?[a]	Focus Growth Area Considered?[b]
Current	Current	2019	N/A	N/A	N/A
Mid-term	RWC	2019	Average	Yes	N/A
	FGA	2019	Average	Yes	Yes
Long-term	RWC	2019	Average	Yes	N/A
	FGA	2019	Average	Yes	Yes

[a] Preserved areas are areas, such as park lands, that are not anticipated to be a significant source of IA growth.

[b] The FGA is an area that has been defined around transit to show potentially more significant IA growth in these areas.

N/A = not applicable

3.2 Current Conditions Impervious Area Scenario Development

IA scenarios will be developed for current conditions using the latest available (2019) IA planimetric data. The approach for Current Conditions IA Scenarios is to quantify IA and calculate % IA at a catchment level.

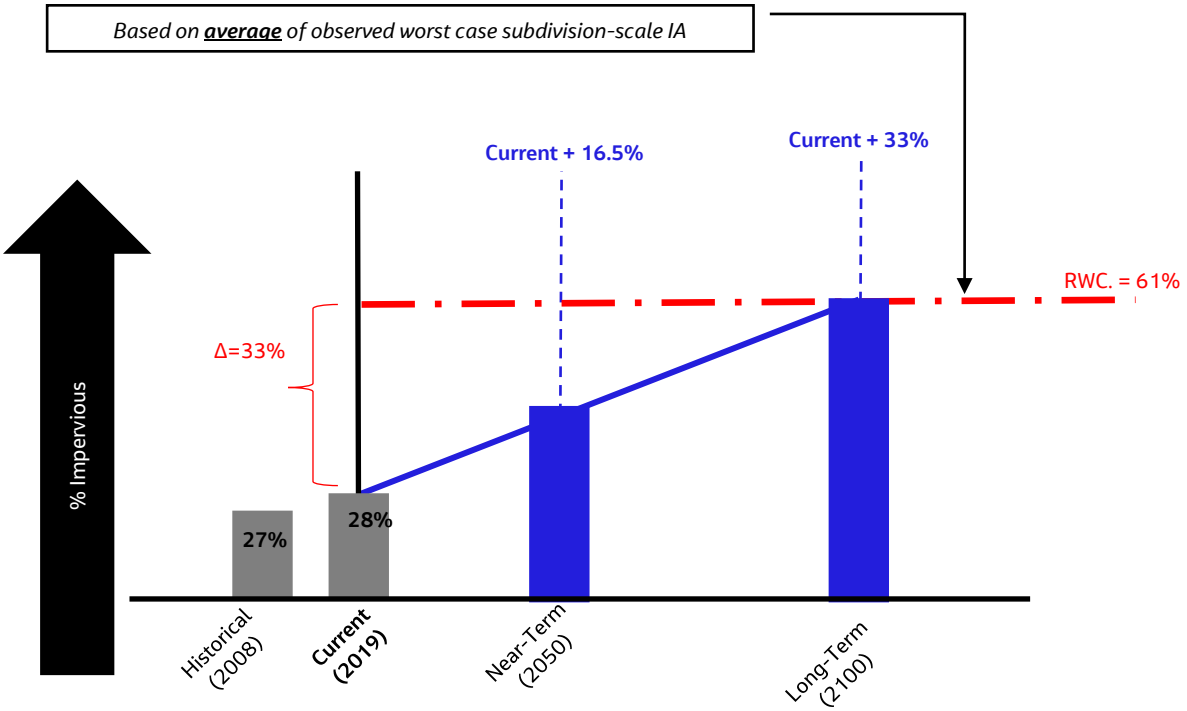
3.3 Future Conditions Impervious Area Scenario Development

Two scenarios for future (2050, 2100) IA conditions have been developed with the following general approach parameters. The following sections provide more discussion of the parameters.

- RWC Scenario:
  - Current Conditions % IA is grown within each catchment by zone using the RWC % IA by zone
  - Preserved areas are kept at Current Conditions % IA (not grown)
- FGA Scenario:
  - Current Conditions % IA is grown within each catchment by zone using the RWC % IA by zone
  - Preserved areas are kept at Current Conditions % IA (not grown)
  - Current Conditions % IA within the identified FGA are grown using % growth rates and capped using the maximum observed FGA % IA total.

Figure 3-1 demonstrates how the RWC is used to develop a projected future % IA by zone for the RWC Scenario. The example included on Figure 3-1 is for the R60 zone within the Sligo Creek Watershed. The chart displays a modest increase in historical trends from 27 percent in 2008, to 28 percent in 2019. The horizontal red line represents the RWC (61 percent IA) with a 33 percent variance from the current condition. The near-term (2050) scenario divided the variance in half, adding 16.5 percent to the current condition % IA. The long-term (2100) scenario applied the RWC % IA. The same approach will be used in the FGA Scenarios for all areas outside of the FGA boundary.

Figure 3-1. Example (R-60 Zone) of "Average Reasonable Worst Case " and "Maximum Reasonable Worst Case " Scenarios within Sligo Creek Watershed



3.3.1 Development of Focus Growth Area Boundary for Future Impervious Area Scenarios

To develop a future conditions IA projection that incorporated potential density increases around transit stations (an objective of the County's Comprehensive Plan update Thrive Montgomery 2050 [MNCPPC Montgomery Planning 2022]), an FGA boundary was developed with Montgomery Planning staff using the following geospatial extents (see Table 3-2 and Figure 3-2):

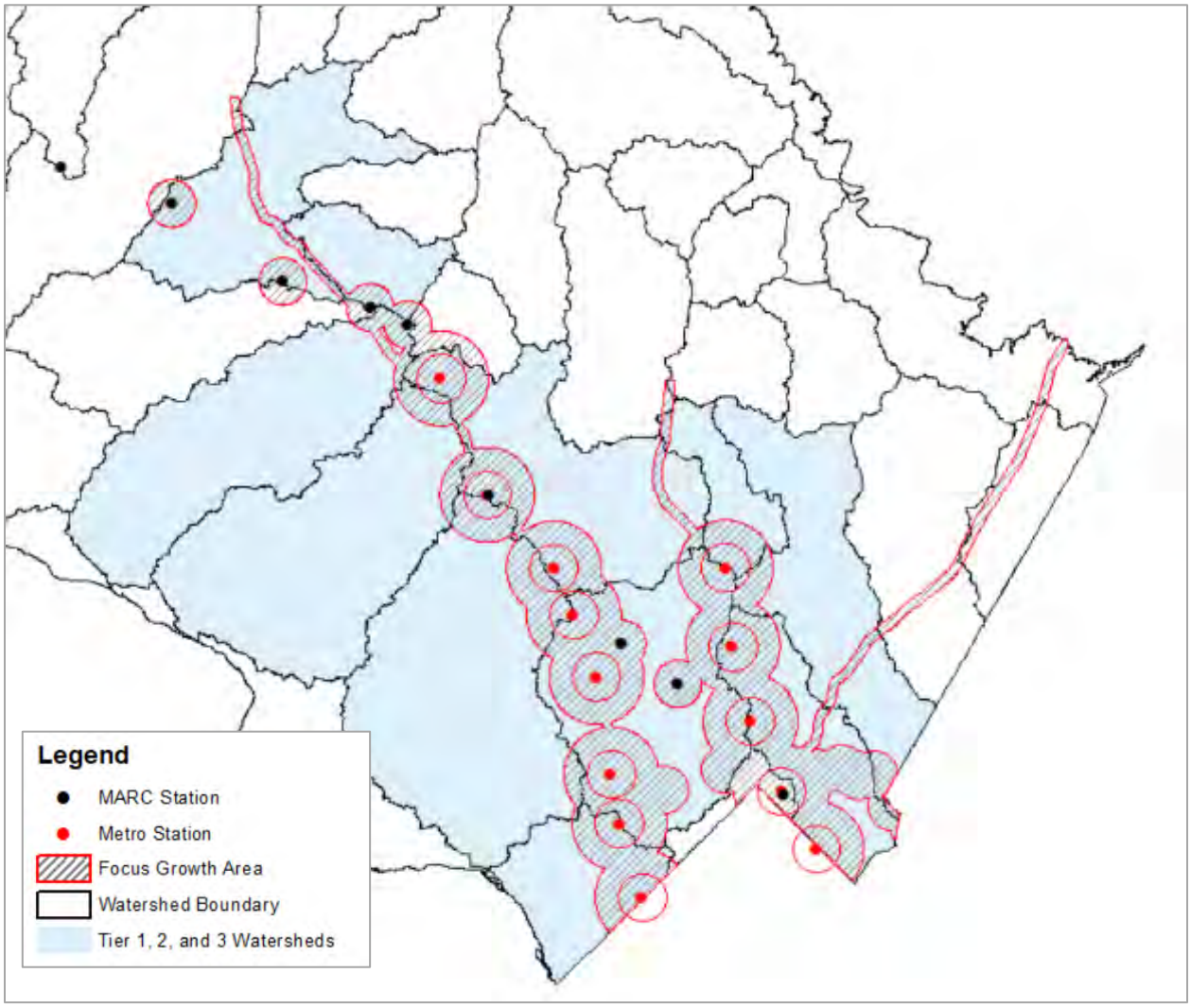
- Half-mile radius around Metro stations
- Mile radius around Metro stations
- Half-mile radius around Maryland Area Regional Commuter (MARC) stations
- Half-mile radius around future Purple Line stations
- 500-foot buffer around MD 355 (Rockville Pike), MD 97 (Georgia Avenue), and US 29 (Colesville Road) corridors

Existing IA within the Metro Station FGA Subareas were summarized to understand the range of total % IA in these areas. This summary did not include future Purple Line stations since any development and associated IA changes are not anticipated to have occurred yet.

Table 3-2. Components/Subareas of the Focus Growth Area

FGA Subarea	Extent	FGA Subarea Name
Metro Station	Half-mile radius around Metro stations	FGA_Metro_0.5
	1-mile radius around Metro stations	FGA_Metro_1.0
MARC Station	Half-mile radius around MARC stations	FGA_MARC_0.5
Future Purple Line Station	Half-mile radius around future Purple Line stations	FGA_Purple_0.5
Corridor Areas	500-foot buffer around MD 355 (Rockville Pike), MD 97 (Georgia Avenue), and US 29 (Colesville Road) corridors	FGA_Corridor_500

Figure 3-2. Focus Growth Area for Future Conditions Focus Growth Area Impervious Area Scenario Development



3.3.1.1 Observed Existing Conditions % Impervious Area within the Focus Growth Area

A summary of existing % IA within the FGA Subareas was completed. The results of this assessment are included in Table 3-3. Summaries around the future Purple Line stations were not included since any transit-related development intensity would not yet be observed in the IA data. Summaries around the MARC stations were also not completed because these overlapped, in large part, with existing Metro and Corridor summaries.

It was noted that there are more CR zones within a half-mile radius of Metro stations, with an increase in residential(R) zones like R-60, R-90, and R-200 within a 1-mile radius of Metro stations. The maximum observed % IA within a half-mile radius of Metro was 73 percent at Silver Spring station. In comparison, the maximum % IA within a 1-mile radius of Metro was 47 percent at North Bethesda station. Presently, the % IA within the corridor buffer ranges from 59 to 75 percent, with the MD 355 (Rockville Pike) corridor exhibiting the highest % IA.

Table 3-3. Summary of Existing Maximum Total % Impervious Area for Various Focus Growth Area Metro Subareas

FGA Subarea	Station/Corridor Name	2019 Total % IA – Half-mile Radius	2019 Total % IA – 1-Mile Radius
Metro Stations	Bethesda	66%	38%
	Friendship Heights	49%	35%
	Rockville	57%	41%
	Silver Spring	73%	41%
	Wheaton	61%	35%
	North Bethesda	66%	47%
	Glenmont	41%	33%
	Grosvenor-Strathmore	35%	34%
	Shady Grove	51%	42%
	Takoma	38%	40%
	Twinbrook	69%	38%
	Forest Glen	44%	34%
	Medical Center	52%	40%
Corridor 500-foot Buffer	MD 97 (Georgia Avenue)	59%	
	MD 355 (Rockville Pike)	75%	

3.3.1.2 Focused Growth Area Scenario Growth Rates and % Impervious Area Cap within the Focused Growth Area

Based on the observed current conditions % IA within the various FGA Subareas, a set of subarea maximum % IA caps were developed (Table 3-4). The intent of the growth rates is to achieve % IA growth that will result in higher % IA in transit-adjacent areas compared with the RWC Scenario. The IA growth is capped using maximum observed % IA multiplied by a % uplift, which reflects the possibility that the current observed maximum % IA (73 percent for half-mile around the Silver Spring Station) could increase with densification around transit stations. The % uplift was determined by professional

judgement to generate an overall increase in watershed % IA compared to the RWC method. For the "FGA_Purple_0.5" (half-mile radius of future Purple Line stations) and for "FGA_MARC_0.5" (half-mile radius of MARC stations), the Metro 1.0 mile values were used.

Table 3-4. Growth Rates and Maximum % Impervious Area Caps for Focused Growth Area Subareas

FGA Subarea Name	% Growth Rate		Maximum Observed % IA	% Uplift for Cap	FGA Subarea Cap
	Future Mid-term	Future Long-term (% above mid-term)			
FGA_Metro_0.5	50%	40%	73% (Silver Spring)	25%	85%
FGA_Metro_1.0	50%	40%	47% (North Bethesda)	40%	65%
FGA_Purple_0.5	50%	40%	Metro 1.0 Mile used - 52% (North Bethesda)	40%	65%
FGA_MARC_0.5	50%	40%	Metro 1.0 Mile used - 52% (North Bethesda)	40%	65%
FGA_Corridor_500	50%	40%	75% (MD 355)	20%	90%

3.3.2 Exceptions and Other Special Areas

3.3.2.1 Preserved Areas

For the purposes of this study, MNCPPC Montgomery Planning has provided a set of "Preserved Areas" layers. These layers are the result of pulling numerous local, state, and federal geospatial layers into a database that represents areas of land that are regulated or otherwise developmentally constrained. Selected contributing layers were incorporated in this study to help define preserved areas that will not see future IA growth, including the following:

- MNCPPC Regulated Areas
- MNCPPC Parks Natural Areas
- MNCPPC Parks Biodiversity Areas
- MNCPPC Parks Stream Valley Areas
- MNCPPC Parks Neighborhood Conservation Areas
- MNCPPC Parks Managed Open Natural Areas
- MNCPPC Parkland (non-parkland parcels excluded)
- Federal Parkland (non-parkland parcels excluded)
- State Parkland (non-parkland parcels excluded)
- FEMA Preliminary Flood Insurance Rate Map (FIRM) 2023
- Washington Suburban Sanitary Commission Source Water Protection Lands (non-source water protection lands excluded)
- Major electric transmission line ROWs

Further information on the MNCPPC Preserved Areas layers and mapping of all preserved areas is contained in Attachment 4.

For future conditions scenarios, imperviousness in areas defined as "Preserved Areas" using this boundary will not be modified. That is, IA within the "Preserved Areas" boundary will be maintained at 2019 levels to prevent overestimation of IA in these areas. Table 3-5 provides a summary of the percentage of preserved areas for Tiers 1 through 3 watersheds.

Table 3-5. Summary of Percentage Preserved Area for Tiers 1 through 3 Watersheds

Tiers 1 through 3 Watersheds	Preserved Area (acres)	Total Watershed Area (acres)	% Preserved Area
Cabin John Creek	2,604.0	16,320.1	16.0%
Lower Rock Creek	1,824.9	12,032.5	15.2%
Middle Great Seneca Creek	2,527.3	9,028.9	28.0%
Middle Great Seneca Creek - Whetstone Run	428.8	3,054.3	14.0%
Middle Rock Creek	2,425.2	10,790.7	22.5%
Muddy Branch	2,554.6	12,560.8	20.3%
Northwest Branch	2,670.2	9,800.8	27.2%
Northwest Branch - Bel Pre Creek	438.0	2,873.5	15.2%
Sligo Creek	969.3	6,838.2	14.2%
Watts Branch	2,597.1	14,240.8	18.2%
Little Falls	879.1	4,830.1	18.2%
Totals	8,675	102,355	85.4%

3.3.2.2 Areas with Impervious Area Limitations

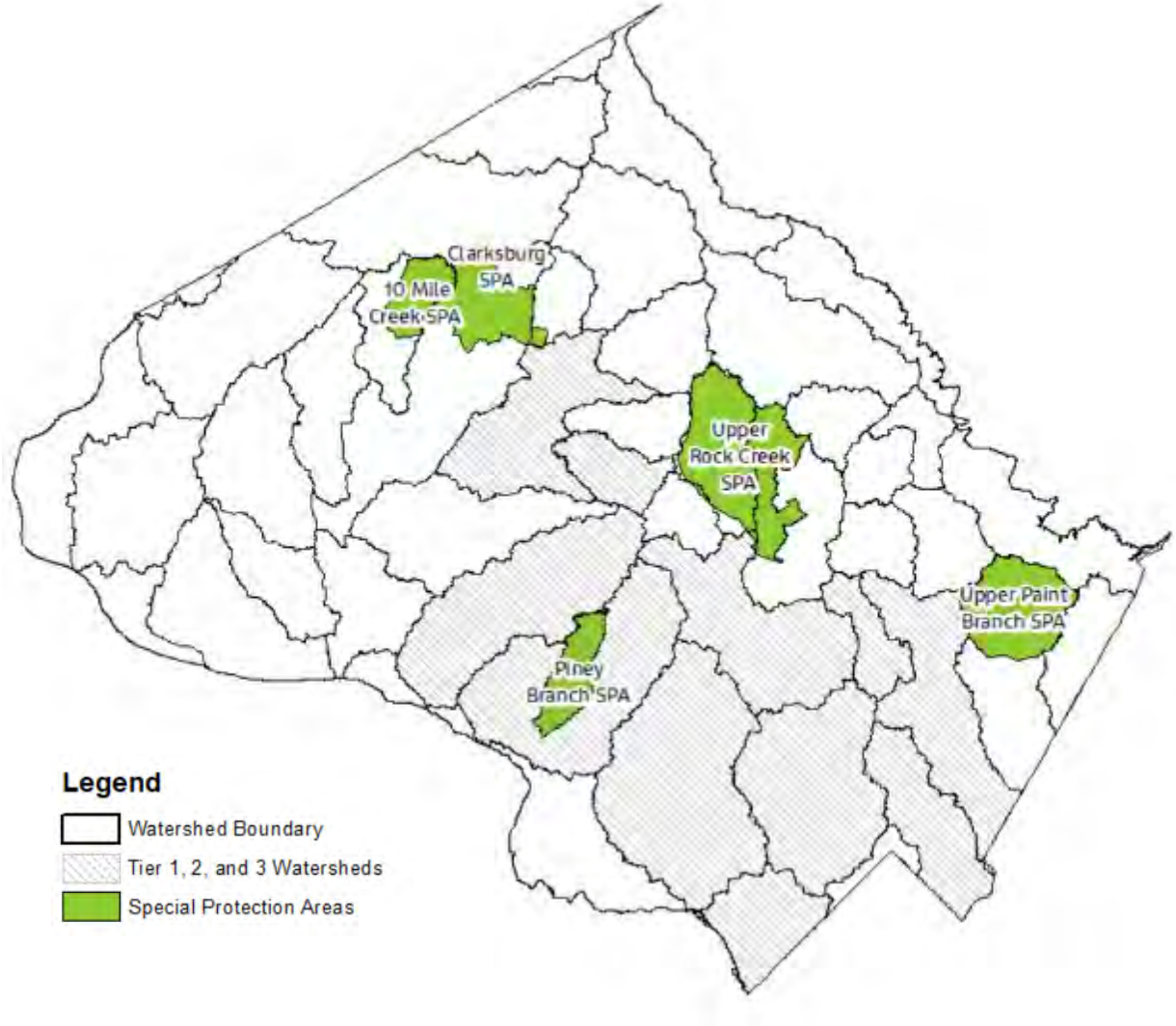
The County defines several Special Protection Areas (SPAs) for purposes of protecting water quality in areas with sensitive water resources and/or proposed land uses that may threaten quality preservation (Montgomery County 2023a). The SPAs are as follows:

- Ten Mile Creek
- Upper Pain Branch
- Upper Rock Creek
- Clarksburg
- Piney Branch

Three of the five SPAs in the County have imperviousness limitations associated with them. The imperviousness limitations are described in the Guidelines for Environmental Management of Development in Montgomery County (MNCPPC Montgomery Planning 2021) and are established by overlay zones described in detail in Chapter 59 Division 4.9 Overlay Zones (Montgomery County 2023b). For these areas the imperviousness limits are applied on an individual development site basis. However, in each case, the impervious limitations are established by environmental overlay zones that may not cover the entire SPA. In the case of the Ten Mile Creek SPA, two separate overlay zones together cover most of the SPA, but each of these overlay zones have different imperviousness limitations. In both the Upper Paint Branch and the Upper Rock Creek SPAs, the associated overlay zones cover the entire SPA. The Clarksburg SPA and the Piney Branch SPA do not have imperviousness limitations and are not included in the geodatabase.

The overlay zones were overlaid on the Tiers 1 through 3 watersheds to understand whether the IA limitations were relevant for future conditions projections. Because of the very limited overlay of these zones on the watersheds planned for detailed study (see Figure 3-3), the SPA-based imperviousness limitations are not incorporated in the future conditions scenarios.

Figure 3-3. Special Protection Areas Proximity to Tiers 1 through 3 Watersheds



3.3.2.3 Growth of Impervious Area Within the Public Right-of-Way

As noted in Section 2.6, existing conditions % IA within the public ROW is anticipated to vary depending on the function of the space. ROW IA is likely to increase in vicinity of intersections, near growth centers, and along arterial roads that provide an opportunity to add items such as bike lanes and pedestrian walkways. But ROW within neighborhoods is unlikely to change significantly. However, leaving the ROW areas no-growth was viewed by stakeholders as not adequately conservative given the push to increase pedestrian and bicycle pavement surfaces. Based on the summaries provided in Section 2.6, the current average ROW % IA is 56 percent. To indicate modest growth, the RWC for ROW was set as 61 percent, which is the average ROW % IA adjacent to Metro station.

3.4 Summary of Scenarios

Table 3-6 summarizes methods for developing impervious areas for current and future conditions using RWC and FGA scenarios, including relevant data.

Table 3-6. Impervious Area Scenario Development Methods Summary

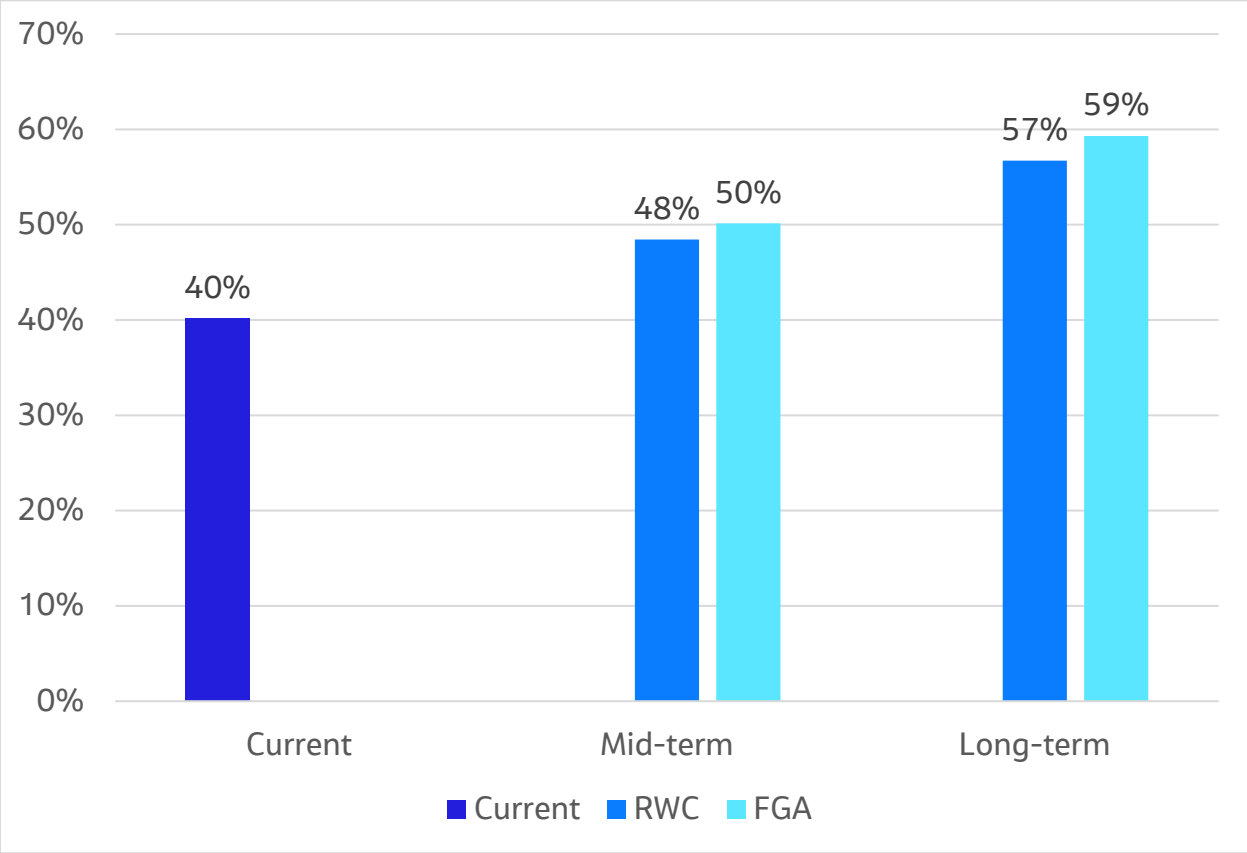
Current Scenario	Reasonable Worst-Case Scenario	Focus Growth Area Scenario
Scenario developed by summarizing existing (2019) impervious area by catchment and zone. ▪ Based on existing (2019) IA data	Mid- and Long-term IA projections developed by growing existing (2019) IA to observed RWC values by zone. ▪ Current Conditions % IA (2019) is grown within each catchment by zone using the RWC % IA by zone. ▪ Preserved areas are kept at Current Conditions % IA (not grown). ▪ Areas already exceeding the RWC % IA are kept at existing % IA (no growth projected).	Mid- and Long-term IA projections developed by growing existing (2019) IA to observed RWC values by zone and incorporating increased IA growth around transit areas using percent growth rates and caps based on maximum observed % IA plus a percent growth factor. ▪ Current Conditions % IA (2019) is grown within each catchment by zone using the RWC % IA by zone. ▪ Preserved areas are kept at Current Conditions % IA (not grown). ▪ Current Conditions % IA within the identified FGA are grown using % growth rates and capped using the maximum observed FGA % IA plus a percent growth factor. ▪ Areas already exceeding the cap % IA are kept at existing % IA (no growth projected).

4. Results

The results included in this section are for Sligo Creek Watershed. Tabular results of Tiers 1 through 3 watersheds are included in Attachment 5. The approach and results of the IA projection methodology were reviewed and adjusted based on input from two County workshops held on September 26, 2023 (Attachment 6) and November 28, 2023 (Attachment 7).

Results for Sligo Creek Watershed are illustrated, at a watershed level, in Figure 4-1. The RWC Scenario results increase total % IA from 40 percent (2019) to 48 percent at the mid-term and 57 percent at the long-term. The FGA Scenario results increase total % IA from 40 percent (2019) to 50 percent at the mid-term and 59 percent at the long-term.

Figure 4-1. Sligo Creek Watershed Comparison of Total % Impervious Area for All Scenarios



The intent of the FGA Scenario is to show slightly higher % IA growth compared with the RWC Scenario, and to locate this growth around the transit areas. By applying a set % IA growth rate in the transit areas, this goal is achieved. But for a given zone within the transit area, the results may be somewhat lower than the RWC Scenario (Figure 4-2) because of the high RWC values for CR, EOF, Industrial-High (IH), and Industrial-Medium (IM) zones. The RWC cap, based on existing conditions, is higher for these zones than the FGA Scenario cap based on "maximum observed % IA". While not impactful when summarizing total % IA at a watershed scale, the significance of this will need to be quantified once catchment boundaries are finalized. Results for each scenario are mapped on Figure 4-3 (Existing and RWC Scenario) and Figure 4-4 (Existing and FGA Scenario).

Figure 4-2. Sligo Creek Watershed Long-term Results for Future Impervious Area Scenarios

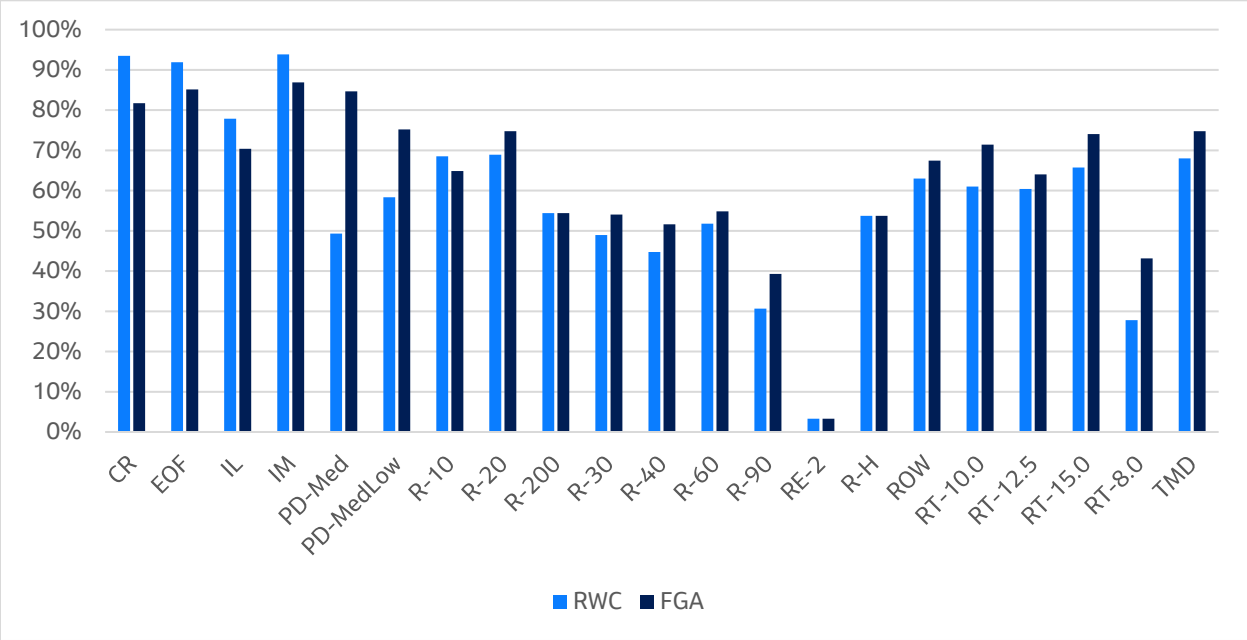


Figure 4-3. Comparison of Existing % Impervious Area to Reasonable Worst Case Scenario Mid-term and Reasonable Worst Case Scenario Long-term % Impervious Area Projections for Sligo Creek Watershed

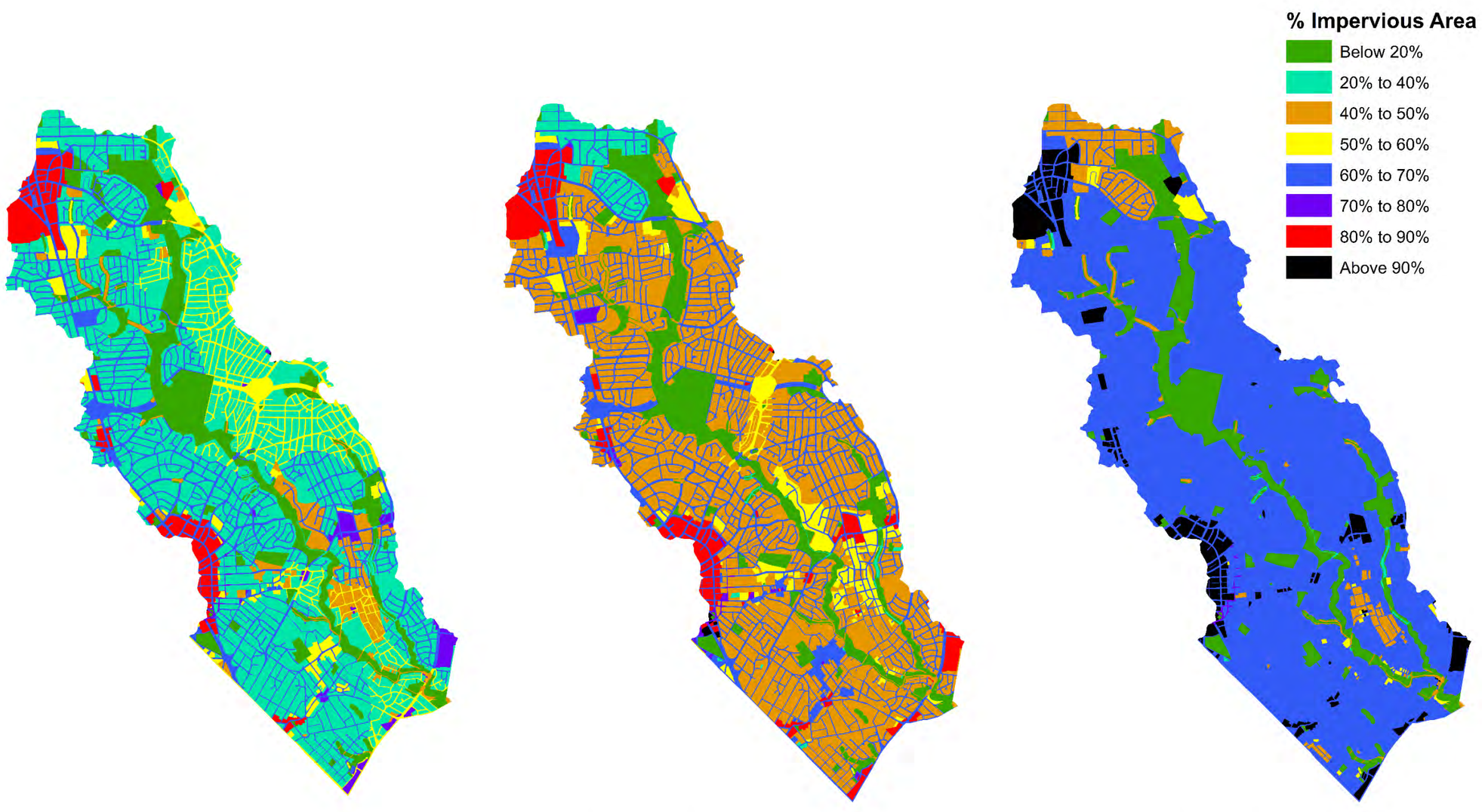
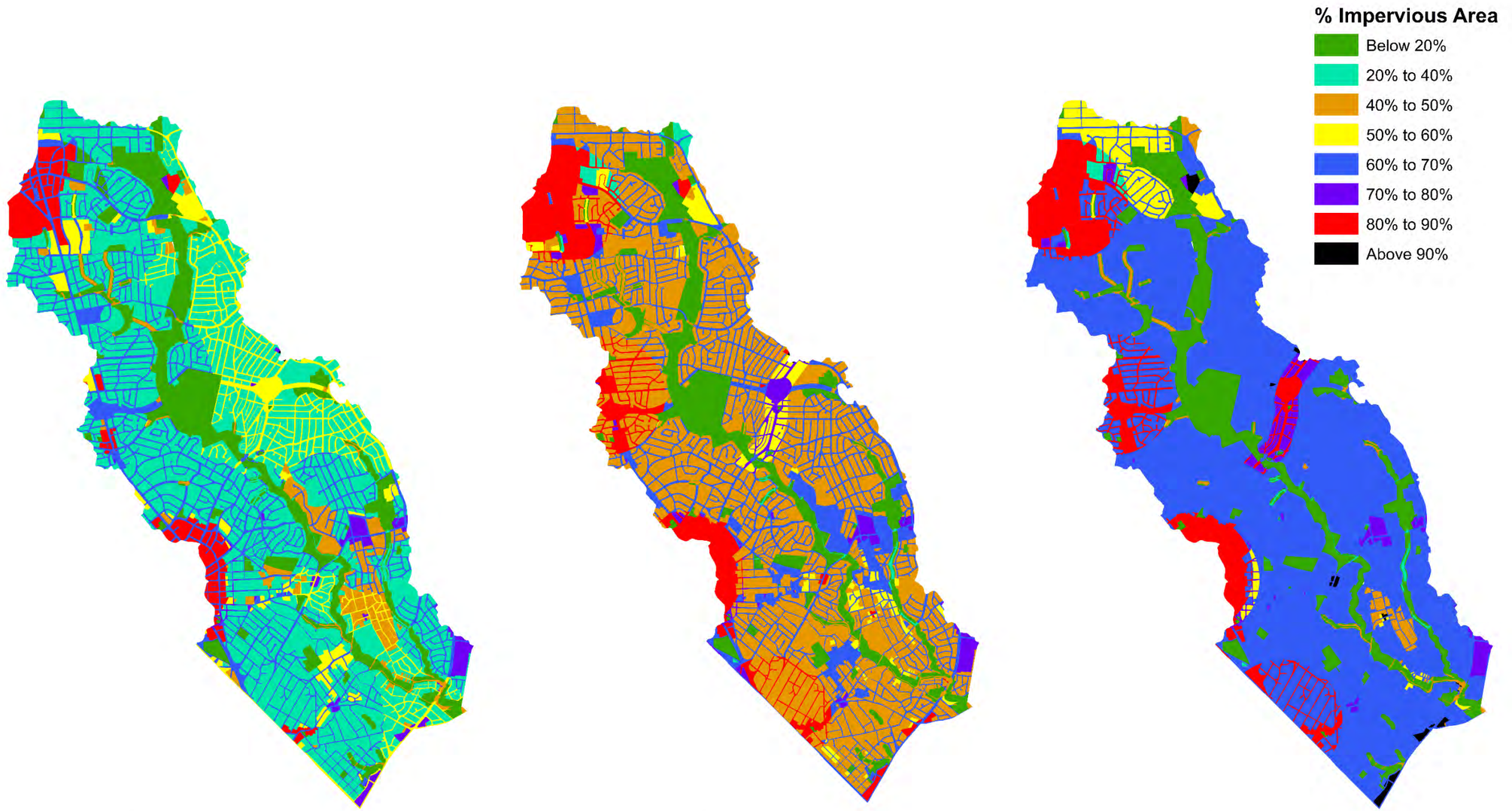


Figure 4-4. Comparison of Existing % Impervious Area to Focused Growth Area Scenario Mid-term and Focused Growth Area Scenario Long-term % Impervious Area Projections for Sligo Creek Watershed



5. Recommendations for Flood Modeling Scenarios

There are several considerations for selection of flood modeling scenarios. Rainfall scenario recommendations for historic events, updated IDF rainfall current conditions, and future conditions were developed and presented in a workshop held on September 26, 2023 (Attachment 6) and documented in a Draft TM, *Climate Projections and Scenarios* (Jacobs 2023). While IDF return-interval rainfall totals were developed for six return periods (2-, 10-, 25-, 50-, 100-, and 500-year annual recurrence interval), it was suggested that only the larger, conveyance-type design storms be included for modeling (10 year and larger) since stormwater management infrastructure is not intended to reduce flooding. Adequate capacity for these periodic and more extreme events are tied to flood management.

Typically, modeling scenario selection is focused on rainfall. However, the scenarios recommendations for this study also include an impervious area component. The future conditions IA scenarios allow development of a "status quo" worst case flood condition that addresses this important driver of rainfall runoff. However, it is also useful to include a scenario that includes future rainfall without IA changes. This scenario would help illustrate the relative impact of IA on flood extent and depth.

Based on the discussion provided herein, Table 5-1 includes the recommended combined rainfall and IA scenarios for flood modeling, and are summarized as follows:

- Two **historic events** (July 8, 2019 and September 10, 2020) are included to understand the potential Countywide impacts of events observed in the recent record. The July 8, 2019 event is included because of it being the most severe event observed in recent record. The September 10, 2020 event is included because it is fairly local to Sligo and may be helpful for model validation purposes.
- For analysis of **current/existing conditions**, five return-interval scenarios (10-, 25-, 50-, 100-, and 500-year) are recommended using the Updated Atlas 14 rainfall totals.
- For analysis of **mid-term (2050) future conditions**, three return-interval scenarios (10-, 100-, and 500-year) are recommended using RCP 8.5/SSP5 50 percentile non-exceedance interval projections for 2050, and future conditions IA using the Maximum RWC + FGA Scenario results.
- For analysis of **long-term (2100) future conditions**, five return-interval scenarios (10-, 25-, 50-, 100-, and 500-year) are recommended using RCP 8.5/SSP5 50 percentile non-exceedance interval projections for 2100, and future conditions IA using the Maximum RWC + FGA Scenario results. It is also recommended that two long-term scenarios (10- and 100-year return intervals) be included that reference current IA data.

Recommendations for modeling scenarios were presented and discussed in a workshop documented in Attachment 6. The description of the scenarios provided herein and summary included in Table 5-1, reflect the discussion and conclusions of that workshop.

Table 5-1. Recommended Combined Climate and Impervious Area Scenarios for Flood Modeling

Storm Recurrence Interval		Historical Events	Updated Atlas14	RCP8.5 / SSP5		
Non-exceedance interval		*N/A*	*N/A*	*50%*		
Impervious Area Condition		*Current*	*Current*	RWC	FGA	Current
Historic 1	**July 8, 2019**					
		✓	x	x	x	x
Historic 2	**September 10, 2020**					
		✓	x	x	x	x
Current						
2-year		x	x	x	x	x
10-year		x	✓	x	x	x
25-year		x	✓	x	x	x
50-year		x	✓	x	x	x
100-year		x	✓	x	x	x
500-year		x	✓	x	x	x
2050						
2-year		x	x	x	x	x
10-year		x	x	x	✓	x
25-year		x	x	x	x	x
50-year		x	x	x	x	x
100-year		x	x	x	✓	x
500-year		x	x	x	✓	x
2100						
2-year		x	x	x	x	x
10-year		x	x	x	✓	✓
25-year		x	x	x	✓	x
50-year		x	x	x	✓	x
100-year		x	x	x	✓	✓
500-year		x	x	x	✓	x

6. References

Jacobs. 2023. *Climate Projections and Scenarios.* Technical Memorandum. November 14.

The Maryland-National Capital Park and Planning Commission (MNCPPC) Montgomery Planning. 2021. Guidelines for Environmental Management of Development in Montgomery County. https://montgomeryplanning.org/planning/environment/environmental-guidelines-reports/environmental-guidelines/

The Maryland-National Capital Park and Planning Commission (MNCPPC) Montgomery Planning. 2022. Thrive Montgomery 2050. October 2022. https://montgomeryplanning.org/wp-content/uploads/2023/06/THRIVE-Approved-Adopted-Final.pdf

Montgomery County. 2023a. Montgomery County Zoning Ordinance 20-05, Chapter 59, Division 4.9 Overlay Zone. October

Montgomery County. 2023b. Code of Montgomery County Regulations (COMCOR) Chapter 19.67.01, Regulations for Water Quality Review – Special Protection Areas. October.

Montgomery County Department of Environmental Protection (DEP). MS4_Impervious_2009. Shapefile. 2009.

Montgomery County Department of Environmental Protection (DEP). Planimetric2020_Impervious. Shapefile. 2020.

Attachment 1. Available Impervious Area Data

Task W-2.2 TM Attachment 1: Available Impervious Area Data

Date: February 9, 2024
Project name: Sligo Creek PWS
Project no: E4X56706
Prepared by: Y. Giltinan

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1. Purpose

Attachment 1 provides documentation of the available impervious area data from the Montgomery County Department of Environmental Protection (MCDEP) and Maryland-National Capital Park and Planning Commission (MNCPPC) for the development of impervious area scenarios.

2. Available Impervious Area Data

Existing IA has been determined based on available detailed planimetric IA data used by the County's Department of Environmental Protection (DEP) to administer the Water Quality Protection Charge (WQPC) program. The data, available as a geospatial layer (.shp), were generated using planimetric data from various permitting databases and building outlines (DEP 2020). The data include detailed classification of IA types (for example, building, parking lot, parking garage, pad, and shed). Table 1 lists all the available impervious datasets and provides a comparison of those datasets.

Historical IA (Building historical IA) has been determined using 2009 planimetric IA data (DEP 2009). As documented in Attachment 2, these data were compared to current (2019) data to determine trends in IA increases. After discussion with County Planning Staff, those trends and rates of growth in IA were not used for projecting future % IA.

DEP also has planimetric IA data from 2012. The data cover the full County but does not have the same level of detail as the 2020 data. In particular, pavement areas are not consistently represented in the 2009 and 2012 IA data. Note, reportedly The Maryland-National Capital Park and Planning Commission (MNCPPC) has several years of IA data, but this data has not been used for WQPC administration. In 2014 and 2016, the MNCPPC conducted two analyses of impervious areas and projections using county zoning categories from the past and present. However, the data used in these studies was considered outdated, and the findings were not taken into account for this study (MNCPPC Montgomery Planning 2014 and 2016).

Current (2019) IA (and % IA) was used to summarize by zoning category and watershed boundary by overlaying the MNCPPC Planning Zoning geospatial layer (MNCPPC Montgomery Planning 2022). This layer provides horizontal extent of various zoning categories across the County. Notable exceptions are the cities of Rockville and Gaithersburg, which maintain their own zoning layers.

Table 1. Comparison of Available Impervious Area Planimetric Data Sets

Year of Issuance	Owner	Year of Source Imagery	Planimetric Source	Includes Buildings	Includes all Pavement Types
2009	DEP	2008	NA	Yes	No
2012	DEP	2008	NA	Yes	Some, Classified
2014	Planning	2014	2014	Yes	No, Classified
2017	Planning	2017	2014	Yes	Some, Not classified
2020	Planning	2020	2017	Yes	Yes, Not classified
2020	DEP	2019	Limited use of MNCPPC 2018	Yes	Yes, Classified

Note: Red outlines denote IA data sets that were used for this analysis.

NA = not available

3. References

The Maryland-National Capital Park and Planning Commission (MNCPPC) Montgomery Planning. 2014. Old code imperviousness analysis. Microsoft Excel.

The Maryland-National Capital Park and Planning Commission (MNCPPC) Montgomery Planning. 2016. New Code Impervious Analysis Final Recommendations. Microsoft Power Point Presentation.

Attachment 2. Historical Conditions and Change in Impervious Area

Task W-2.2 TM Attachment 2: Historical Conditions and Change in Impervious Area

Date: February 9, 2024
Project name: Sligo Creek PWS
Project no: E4X56706
Prepared by: Y. Giltinan

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1. Purpose

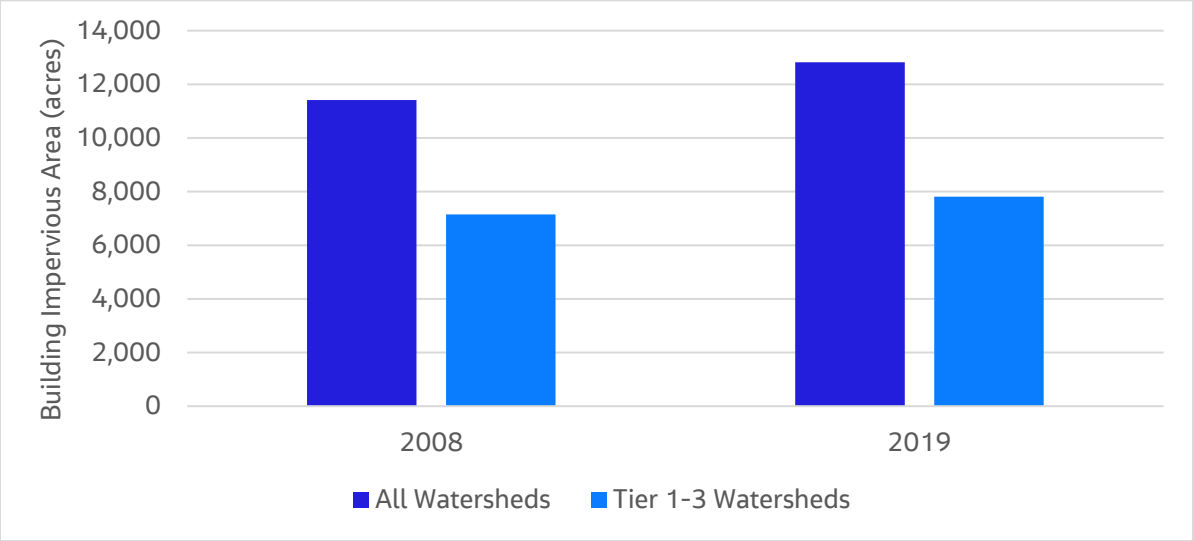
Attachment 2 documents the comparison of building impervious area (IA) data from 2008 to 2019 to understand the historical increase in IA by watersheds.

2. Historical Conditions and Change in Impervious Area

This section compares Building IA historical data from 2008 to 2019 planimetric IA data to determine historical conditions and IA rate of change. Building footprints are the only consistent land use category in both datasets.

Based on work completed during the CFMP P1, the County understands that IA has been increasing over time for various reasons. As Figure 2-1 illustrates, the coverage of IA from building footprint alone had increased by 1,403 acres countywide and 660 acres in the Tiers 1 through 3 watersheds, representing 12% and 9%, respectively. These IA increases vary geographically within the County. There is also a perception that IA increases are most impactful in areas already dealing with pluvial flooding issues. With anticipated increases in precipitation due to changing climatic conditions, there is concern that IA increases, allowable through unregulated activities and permitted development, may continue to exacerbate existing flooding issues.

Figure 2-1. Countywide Building Impervious Area (acres) in 2008 and 2019



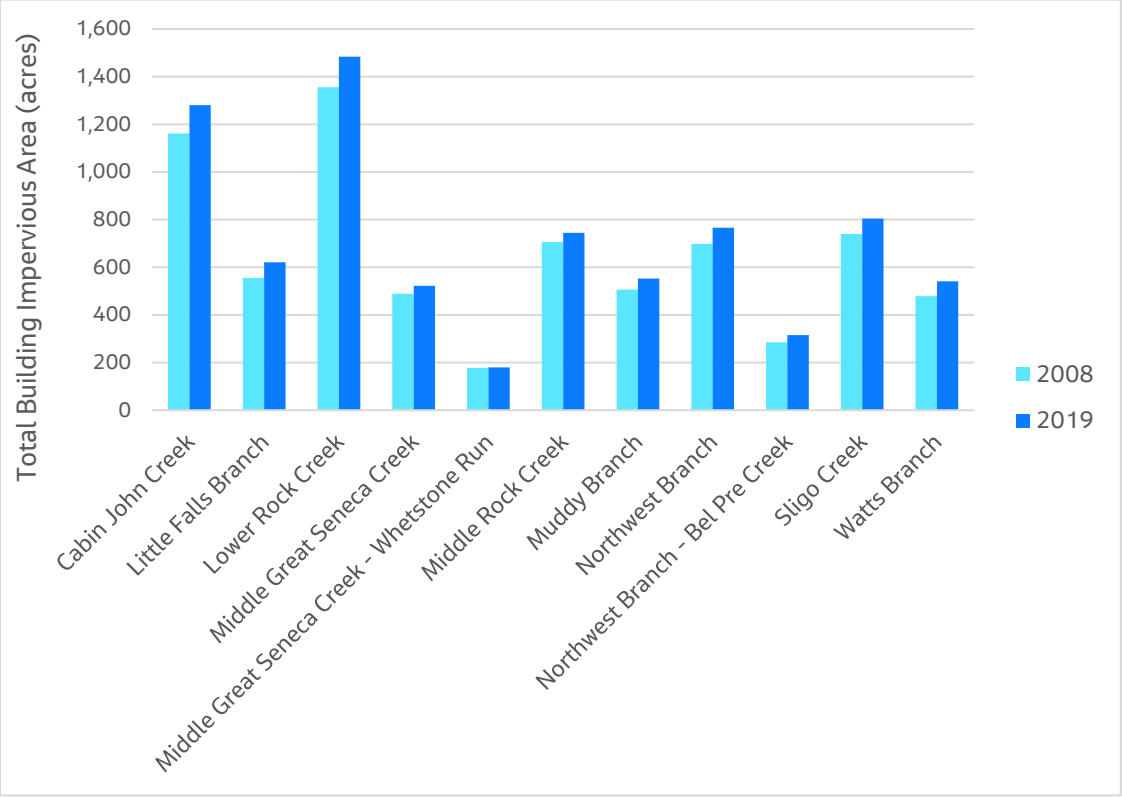
The chart (Figure 2-2) shows that building IA coverage varies based on watershed size, development level, pattern, and history. Cabin John Creek and Lower Rock Creek watersheds have the highest total Building IA in acres among the nine watersheds.

The average annual rate of change in building IA for the four main zones in each Tier 1 through 3 watershed was calculated by dividing the total increase in building IA from 2008 to 2019 in each zone. For example, a 17 percent increase in R-60 in Cabin John Creek was observed. The range of the average annual rate of change in each zone was:

- R-60 varies from 0.2 (Muddy Branch) to 1.5% per year (Cabin John Creek)
- R-90 varies from 0.1 (Middle Great Seneca – Whetstone Run) to 1.5% per year (Little Falls)
- CR varies from -0.6 (Middle Rock Creek) to 2.3% per year (Muddy Branch)
- R-200 varies from 0.5 (Middle Rock Creek) to 3.4% per year (Northwest Branch – Bel Pre Creek)

These observed rates of change are not used to project future conditions because they are highly variable and not necessarily a prediction of future growth.

Figure 2-2. Building Impervious Area in 2008 and 2019 for Tiers 1 through 3 Watersheds



Attachment 3. Reasonable Worst Case Values for Selected Zones

Jacobs

Task W-2.2 TM Attachment 3: Reasonable Worst Case

Date: February 9, 2024
Project name: Sligo Creek PWS
Project no: E4X56706
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1. Purpose

This Appendix A provides documentation of the calculation of observed "reasonable worst case" (RWC) % impervious area for generalized Commercial Residential (CR) and Residential (R-60, R-90, and R-200) zones.

2. Commercial Residential

	Subdivision	Watershed	Area (Acres)	Impervious Area (Acres)	% Impervious Area
1	Wheaton Knolls	Sligo Creek	6.60	6.10	92.4%
2	Woodmont**	Lower Rock Creek/Little Falls	4.74	4.74	100.0%
3	Woodmoor	Northwest Branch	3.72	3.72	100.0%
4	Pike & Rose	Cabin John Creek	27.3	21.3	78.0%
5	Edgemoor	Little Falls Branch	0.66	0.66	100.0%
Average			8.60	7.30	94.1%

3. Residential

3.1 R-60

	Subdivision	Watershed	Area (Acres)	Impervious Area (Acres)	% Impervious Area
1	Battery Park	Lower Rock Creek	4.03	2.42	60.0%
2	Edgemoor	Little Falls	4.84	2.91	60.2%
3	Mary J Boland	Middle Great Seneca Creek	18.23	11.24	61.6%
4	Decloverly Adventure	Muddy Branch	22.69	13.42	59.1%
5	Chevy Chase Terrace	Little Falls	4.06	2.52	62.2%
Average			10.77	6.50	60.6%

3.2 R-90

	Subdivision	Watershed	Area (Acres)	Impervious Area (Acres)	% Impervious Area
1	Crestdale Dr, Potomac	Cabin John Creek	8.32	3.50	42.1%
2	Roman Way, Montgomery Village	Middle Great Seneca Creek	14.51	7.04	48.5%
3	Plainview Road, Bethesda	Little Falls Branch	5.91	2.70	45.8%
4	Legato Way, Silver Spring	Northwest Branch	6.70	2.64	39.4%
5	Nordic Hill Cir, Wheaton-Glenmont	Northwest Branch Ben Bel Pre	7.73	3.32	42.9%
Average			8.63	3.84	43.7%

3.3 R-200

	Subdivision	Watershed	Area (Acres)	Impervious Area (Acres)	% Impervious Area
1	Clagett Farm	Watts Branch	4.53	2.45	54.0%
2	Wheaton Outside**	Northwest Branch	3.58	1.92	53.6%
3	Wheaton Outside**	Northwest Branch - Bel Pre Creek	2.10	1.18	56.3%
4	Potomac Country Corner	Muddy Branch	3.62	1.92	52.9%
5	Willows Of Potomac	Watts Branch	18.99	7.39	38.9%
Average			6.56	2.97	51.1%

Attachment 4. MNCPPC Preserved and Conserved Areas

Protected Natural Lands on a Whole Parcel Basis in Montgomery County, MD (as of 5/19)

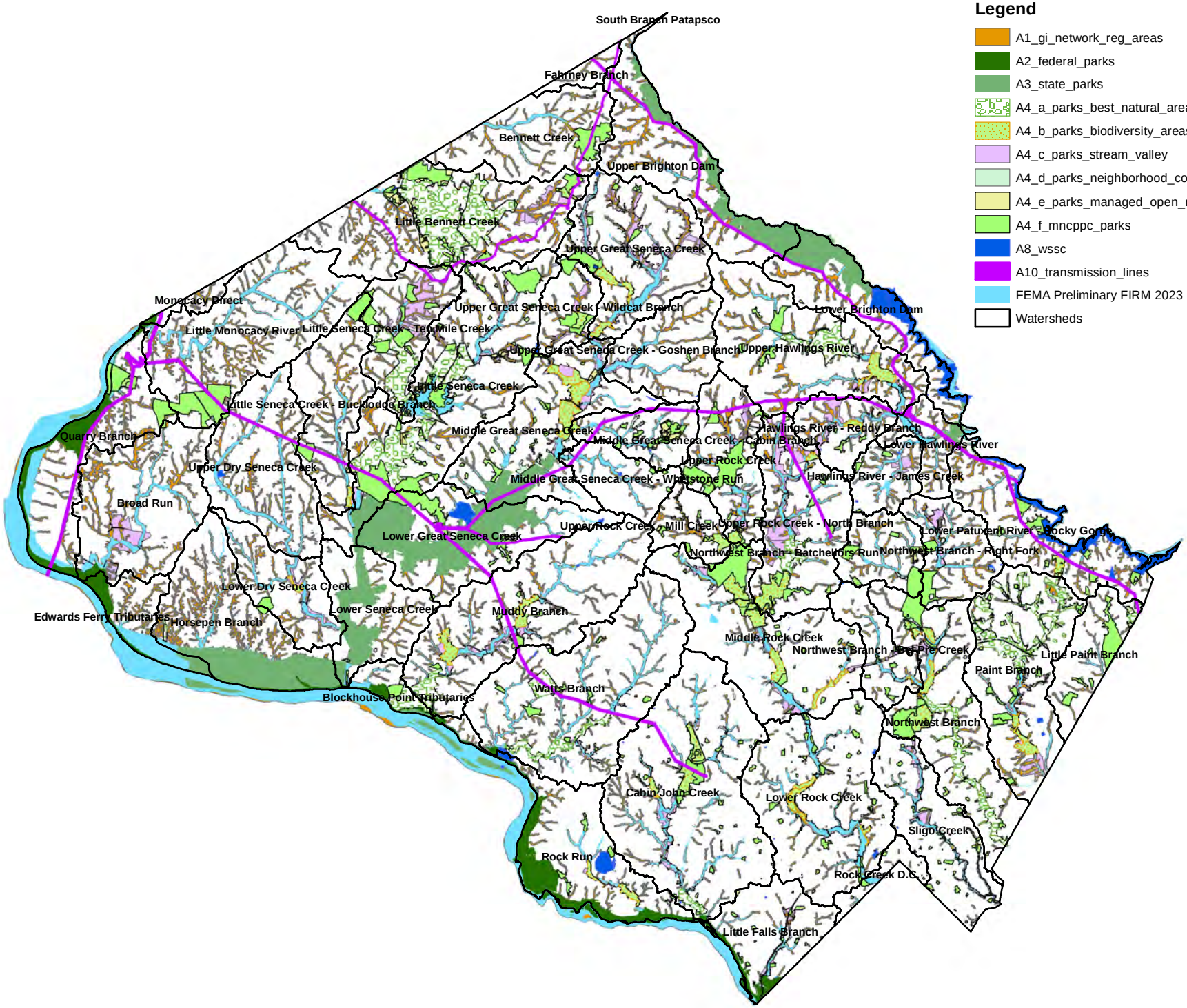
This map was created to show lands (on a whole parcel basis) in a predominantly natural or other vegetated condition in Montgomery County that are protected from residential, commercia, and industrial development as of May 2019. These areas include federal, State, and M-NCPPC parklands, WSSC lands that are areas used for source water protection, and major electric transmission line ROWs.

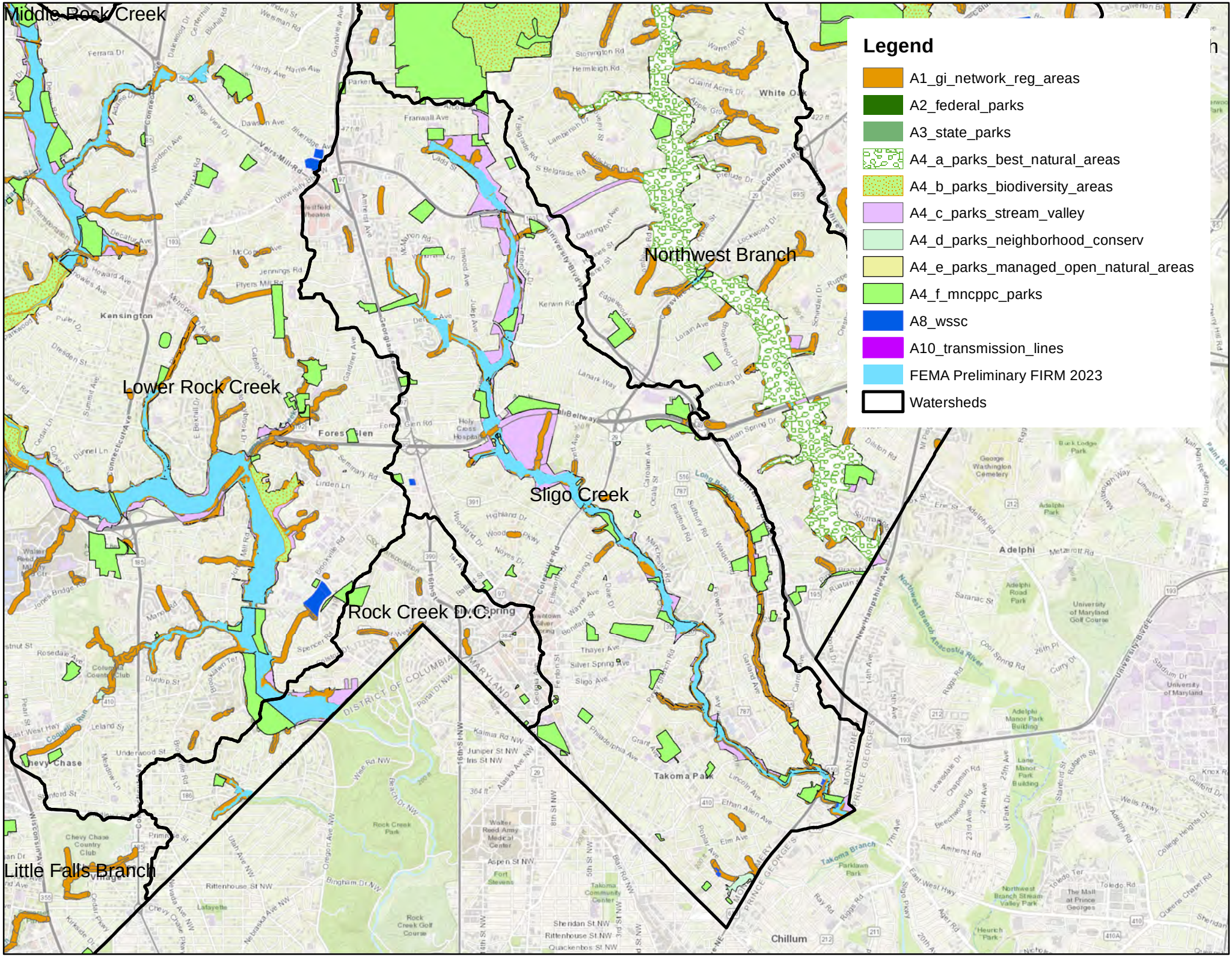
This map is a revised version of an earlier layer called Protected Natural and Agricultural Lands in Montgomery County (as of 5/19) that eliminates various categories of protected land that do not cover entire parcels and refines other categories to exclude non-parkland federal and State lands, developed or other non-source water protection WSSC parcels, and non-parkland parcels that were incorrectly included in the M-NCPPC parkland layer. To avoid confusion with the earlier version of this layer, the categories retained or revised in this version were not renumbered but retain their earlier numbering designations. An additional new protected land category was included that covers major electric transmission line ROWs (A. 10).

https://mcatlas.org/filetransfer/GIS/forMiranda/Protected%20Natural%20Lands%20on%20a%20Whole%20Parcel%20Basis%20in%20Montgomery%20County.zip

A. Preserved Lands in Predominantly Natural or other Vegetated Condition that are Protected from Residential, Commercial, and Industrial Development (some minor park-related development can occur in some of the parkland areas)

2. Federal Parkland (non-parkland parcels excluded)
3. State Parkland (non-parkland parcels excluded)
4. M-NCPPC Parkland (Existing and Proposed)
    a) Best Natural Areas
    b) Biodiversity Areas
    c) Stream Valley Parks
    d) Neighborhood Conservation Parks
    e) Managed Open Natural Areas within these Parks, such as meadows
    f) Other M-NCPPC Parkland (non-parkland parcels excluded)
    (Some of this parkland may have some future additional recreational facilities added, but no residential, commercial, or industrial development, regardless of the underlying zoning.)
8. WSSC Source Water Protection Lands (non-source water protection lands excluded)
10. Pepco Major Transmission Lines Rights of Ways (ROWs)


Legend
A1_gi_network_reg_areas
A2_federal_parks
A3_state_parks
A4_a_parks_best_natural_areas
A4_b_parks_biodiversity_areas
A4_c_parks_stream_valley
A4_d_parks_neighborhood_conserv
A4_e_parks_managed_open_natural_areas
A4_f_mncppc_parks
A8_wssc
A10_transmission_lines
FEMA Preliminary FIRM 2023
Watersheds
South Branch Patapsco
Fahrney Branch
Bennett Creek
Upper Brighton Dam
Little Bennett Creek
Upper Great Seneca Creek
Monocacy Direct
Upper Great Seneca Creek - Wildcat Branch
Lower Brighton Dam
Little Monocacy River
Little Seneca Creek - Ten Mile Creek
Upper Great Seneca Creek - Goshen Branch
Upper Hawlings River
Little Seneca Creek
Little Seneca Creek - Bucklodge Branch
Middle Great Seneca Creek
Hawlings River - Reddy Branch
Middle Great Seneca Creek - Cabin Branch
Lower Hawlings River
Quarry Branch
Upper Rock Creek
Upper Dry Seneca Creek
Middle Great Seneca Creek - Whetstone Run
Hawlings River - James Creek
Broad Run
Upper Rock Creek - Mill Creek
Upper Rock Creek - North Branch
Lower Patuxent River - Rocky Gorge
Lower Great Seneca Creek
Northwest Branch - Batchellors Run
Northwest Branch - Right Fork
Lower Dry Seneca Creek
Lower Seneca Creek
Muddy Branch
Edwards Ferry Tributaries
Horsepen Branch
Middle Rock Creek
Northwest Branch - Paint Creek
Little Paint Branch
Paint Branch
Watts Branch
Blockhouse Point Tributaries
Northwest Branch
Cabin John Creek
Lower Rock Creek
Sligo Creek
Rock Run
Rock Creek D.C.
Little Falls Branch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Lower Rock Creek
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Little Falls Branch
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FEMA Preliminary FIRM 2023
Watersheds

Attachment 5. Current (2019) and Projected Future % Impervious Area Results for Tiers 1 through 3 Watersheds

Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Cabin John Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	36,115	72,385	50%	36,115	50%	36,115	50%
Cabin John Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	3,739,566	5,194,372	72%	4,311,138	83%	4,882,710	94%
Cabin John Creek	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	5,053	361,620	1%	5,053	1%	5,053	1%
Cabin John Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2,173,578	3,719,623	58%	2,835,012	76%	3,496,445	94%
Cabin John Creek	CR	No	NA	Yes	CR_NA_PA	120,051	961,728	12%	120,051	12%	120,051	12%
Cabin John Creek	CR	No	NA	No	CR_NA_NOTPA	5,915,052	10,575,925	56%	7,928,211	75%	9,941,370	94%
Cabin John Creek	EOF	Yes	Metro_0.5	No	EOF_Metro_0.5_NOTPA	81,776	120,845	68%	97,093	80%	112,409	93%
Cabin John Creek	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	357,735	487,665	73%	405,678	83%	453,621	93%
Cabin John Creek	EOF	No	NA	Yes	EOF_NA_PA	23,133	84,323	27%	23,133	27%	23,133	27%
Cabin John Creek	EOF	No	NA	No	EOF_NA_NOTPA	3,939,878	5,829,097	68%	4,681,026	80%	5,422,174	93%
Cabin John Creek	PD-MedLow	Yes	Metro_0.5	Yes	PD-MedLow_Metro_0.5_PA	81,631	277,787	29%	81,631	29%	81,631	29%
Cabin John Creek	PD-MedLow	Yes	Metro_0.5	No	PD-MedLow_Metro_0.5_NOTPA	44,516	134,774	33%	62,690	47%	80,864	60%
Cabin John Creek	PD-MedLow	Yes	Metro_1.0	No	PD-MedLow_Metro_1.0_NOTPA	84,153	265,751	32%	121,802	46%	159,451	60%
Cabin John Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA		9,322	0%	2,797	30%	5,593	60%
Cabin John Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	371,121	614,111	60%	400,064	65%	429,008	70%
Cabin John Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	242,439	453,307	53%	279,556	62%	316,672	70%
Cabin John Creek	R-20	No	NA	Yes	R-20_NA_PA	2,827	6,443	44%	2,827	44%	2,827	44%
Cabin John Creek	R-20	No	NA	No	R-20_NA_NOTPA	366,736	730,501	50%	438,526	60%	510,315	70%
Cabin John Creek	R-200	Yes	Metro_0.5	Yes	R-200_Metro_0.5_PA	142	11,532	1%	142	1%	142	1%
Cabin John Creek	R-200	Yes	Metro_0.5	No	R-200_Metro_0.5_NOTPA	212,905	555,816	38%	248,464	45%	284,022	51%
Cabin John Creek	R-200	Yes	Metro_1.0	Yes	R-200_Metro_1.0_PA	147,109	969,471	15%	147,109	15%	147,109	15%
Cabin John Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	2,758,202	7,753,090	36%	3,360,016	43%	3,961,829	51%
Cabin John Creek	R-200	No	NA	Yes	R-200_NA_PA	1,483,554	41,019,366	4%	1,483,554	4%	1,483,554	4%
Cabin John Creek	R-200	No	NA	No	R-200_NA_NOTPA	34,234,297	144,538,929	24%	54,046,845	37%	73,859,393	51%
Cabin John Creek	R-30	No	NA	Yes	R-30_NA_PA	69,523	446,106	16%	69,523	16%	69,523	16%
Cabin John Creek	R-30	No	NA	No	R-30_NA_NOTPA	653,212	1,528,335	43%	754,540	49%	855,868	56%
Cabin John Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	42,232	200,925	21%	42,232	21%	42,232	21%
Cabin John Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	2,679,379	7,362,623	36%	3,585,290	49%	4,491,200	61%
Cabin John Creek	R-60	No	NA	Yes	R-60_NA_PA	413,754	4,432,261	9%	413,754	9%	413,754	9%
Cabin John Creek	R-60	No	NA	No	R-60_NA_NOTPA	9,987,618	30,824,392	32%	14,395,249	47%	18,802,879	61%
Cabin John Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	43	3,476	1%	43	1%	43	1%
Cabin John Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	397,271	1,171,326	34%	454,570	39%	511,870	44%
Cabin John Creek	R-90	No	NA	Yes	R-90_NA_PA	1,818,939	34,508,842	5%	1,818,939	5%	1,818,939	5%
Cabin John Creek	R-90	No	NA	No	R-90_NA_NOTPA	31,427,381	107,447,439	29%	39,190,956	36%	46,954,531	44%
Cabin John Creek	RE-1	No	NA	Yes	RE-1_NA_PA	4,743	158,204	3%	4,743	3%	4,743	3%
Cabin John Creek	RE-1	No	NA	No	RE-1_NA_NOTPA	567,875	2,255,865	25%	836,624	37%	1,105,374	49%
Cabin John Creek	RE-2	No	NA	Yes	RE-2_NA_PA	556,318	12,186,385	5%	556,318	5%	556,318	5%
Cabin John Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	12,272,689	68,441,729	18%	18,798,065	27%	25,323,440	37%
Cabin John Creek	RE-2C	No	NA	Yes	RE-2C_NA_PA		5,537	0%	0	0%	0	0%
Cabin John Creek	RE-2C	No	NA	No	RE-2C_NA_NOTPA	400,686	2,358,891	17%	459,821	19%	518,956	22%
Cabin John Creek	R-H	No	NA	Yes	R-H_NA_PA		3	0%	0	0%	0	0%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Cabin John Creek	R-H	No	NA	No	R-H_NA_NOTPA	507,489	926,155	55%	507,489	55%	507,489	55%
Cabin John Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	2	1,563	0%	2	0%	2	0%
Cabin John Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	3,443,913	4,532,296	76%	3,443,913	76%	3,443,913	76%
Cabin John Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	194,979	663,394	29%	194,979	29%	194,979	29%
Cabin John Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	6,808,209	11,107,933	61%	6,808,209	61%	6,808,209	61%
Cabin John Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	11,690	16,160	72%	11,690	72%	11,690	72%
Cabin John Creek	ROW	No	NA	Yes	ROW_NA_PA	3,448,515	10,067,736	34%	3,448,515	34%	3,448,515	34%
Cabin John Creek	ROW	No	NA	No	ROW_NA_NOTPA	49,414,513	98,733,616	50%	54,821,009	56%	60,227,506	61%
Cabin John Creek	RT-10.0	No	NA	Yes	RT-10.0_NA_PA		7,149	0%	0	0%	0	0%
Cabin John Creek	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	333,505	593,576	56%	347,793	59%	362,081	61%
Cabin John Creek	RT-12.5	Yes	Metro_1.0	Yes	RT-12.5_Metro_1.0_PA	60,929	221,720	27%	60,929	27%	60,929	27%
Cabin John Creek	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	245,161	499,825	49%	285,024	57%	324,886	65%
Cabin John Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	552	7,908	7%	552	7%	552	7%
Cabin John Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	549,690	1,195,787	46%	663,476	55%	777,261	65%
Cabin John Creek	RT-15.0	No	NA	No	RT-15.0_NA_NOTPA	53,601	120,267	45%	64,662	54%	75,723	63%
Cabin John Creek	RT-6.0	No	NA	Yes	RT-6.0_NA_PA		19	0%	0	0%	0	0%
Cabin John Creek	RT-6.0	No	NA	No	RT-6.0_NA_NOTPA	52,007	134,315	39%	59,448	44%	66,889	50%
Cabin John Creek	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	371,236	877,091	42%	382,963	44%	394,691	45%
Cabin John Creek	THD	No	NA	No	THD_NA_NOTPA	269,244	392,545	69%	280,985	72%	292,726	75%
Little Falls Branch	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	27,039	46,515	58%	27,039	58%	27,039	58%
Little Falls Branch	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	5,427,560	6,738,049	81%	5,880,663	87%	6,333,767	94%
Little Falls Branch	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	14,598	27,127	54%	14,598	54%	14,598	54%
Little Falls Branch	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	475,314	623,570	76%	530,735	85%	586,156	94%
Little Falls Branch	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	173,398	233,493	74%	196,441	84%	219,483	94%
Little Falls Branch	CR	No	NA	Yes	CR_NA_PA	234,171	370,450	63%	234,171	63%	234,171	63%
Little Falls Branch	CR	No	NA	No	CR_NA_NOTPA	1,236,979	1,512,547	82%	1,329,387	88%	1,421,794	94%
Little Falls Branch	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	9,076	12,475	73%	10,340	83%	11,604	93%
Little Falls Branch	EOF	No	NA	Yes	EOF_NA_PA		33,822	0%	0	0%	0	0%
Little Falls Branch	EOF	No	NA	No	EOF_NA_NOTPA	391,341	506,489	77%	431,236	85%	471,132	93%
Little Falls Branch	IM	Yes	Metro_1.0	Yes	IM_Metro_1.0_PA	78,308	85,704	91%	78,308	91%	78,308	91%
Little Falls Branch	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	313,653	334,201	94%	313,653	94%	313,653	94%
Little Falls Branch	IM	No	NA	Yes	IM_NA_PA	181,077	256,800	71%	181,077	71%	181,077	71%
Little Falls Branch	IM	No	NA	No	IM_NA_NOTPA	204,869	260,280	79%	224,556	86%	244,243	94%
Little Falls Branch	R-10	Yes	Metro_0.5	No	R-10_Metro_0.5_NOTPA	230,060	353,621	65%	238,471	67%	246,882	70%
Little Falls Branch	R-10	Yes	Metro_1.0	Yes	R-10_Metro_1.0_PA	8,568	11,324	76%	8,568	76%	8,568	76%
Little Falls Branch	R-10	Yes	Metro_1.0	No	R-10_Metro_1.0_NOTPA	102,383	176,986	58%	112,973	64%	123,563	70%
Little Falls Branch	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	103,435	192,934	54%	119,066	62%	134,697	70%
Little Falls Branch	R-10	No	NA	Yes	R-10_NA_PA	7,419	22,744	33%	7,419	33%	7,419	33%
Little Falls Branch	R-10	No	NA	No	R-10_NA_NOTPA	36,837	49,910	74%	36,837	74%	36,837	74%
Little Falls Branch	R-20	No	NA	No	R-20_NA_NOTPA	218,274	419,082	52%	255,519	61%	292,764	70%
Little Falls Branch	R-200	No	NA	No	R-200_NA_NOTPA	57,044	632,213	9%	190,053	30%	323,061	51%
Little Falls Branch	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	149,172	342,749	44%	170,556	50%	191,939	56%
Little Falls Branch	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	4,360	19,407	22%	4,360	22%	4,360	22%
Little Falls Branch	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	264,114	567,940	47%	291,080	51%	318,046	56%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Little Falls Branch	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	99,489	237,125	42%	116,139	49%	132,790	56%
Little Falls Branch	R-30	No	NA	Yes	R-30_NA_PA	15,567	67,723	23%	15,567	23%	15,567	23%
Little Falls Branch	R-30	No	NA	No	R-30_NA_NOTPA	757,861	1,663,236	46%	844,637	51%	931,412	56%
Little Falls Branch	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	91,331	848,835	11%	91,331	11%	91,331	11%
Little Falls Branch	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	3,319,546	8,199,321	40%	4,160,566	51%	5,001,586	61%
Little Falls Branch	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	723,467	5,409,950	13%	723,467	13%	723,467	13%
Little Falls Branch	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	7,423,208	25,461,938	29%	11,477,495	45%	15,531,782	61%
Little Falls Branch	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	85,163	643,024	13%	85,163	13%	85,163	13%
Little Falls Branch	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	188,222	627,995	30%	285,650	45%	383,077	61%
Little Falls Branch	R-60	No	NA	Yes	R-60_NA_PA	1,490,867	18,813,354	8%	1,490,867	8%	1,490,867	8%
Little Falls Branch	R-60	No	NA	No	R-60_NA_NOTPA	12,913,236	38,942,243	33%	18,334,002	47%	23,754,768	61%
Little Falls Branch	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	50,334	314,900	16%	50,334	16%	50,334	16%
Little Falls Branch	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	2,586,831	7,568,021	34%	2,947,028	39%	3,307,225	44%
Little Falls Branch	R-90	No	NA	Yes	R-90_NA_PA	585,687	6,747,478	9%	585,687	9%	585,687	9%
Little Falls Branch	R-90	No	NA	No	R-90_NA_NOTPA	10,729,699	35,689,098	30%	13,162,917	37%	15,596,136	44%
Little Falls Branch	R-H	Yes	Metro_0.5	No	R-H_Metro_0.5_NOTPA	257,926	604,004	43%	291,173	48%	324,420	54%
Little Falls Branch	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	40,633	135,248	30%	40,633	30%	40,633	30%
Little Falls Branch	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	4,037,010	5,604,743	72%	4,037,010	72%	4,037,010	72%
Little Falls Branch	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	315,749	972,503	32%	315,749	32%	315,749	32%
Little Falls Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	5,102,208	9,201,235	55%	5,357,481	58%	5,612,753	61%
Little Falls Branch	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	6,679	28,530	23%	6,679	23%	6,679	23%
Little Falls Branch	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	281,345	380,687	74%	281,345	74%	281,345	74%
Little Falls Branch	ROW	No	NA	Yes	ROW_NA_PA	921,937	3,363,919	27%	921,937	27%	921,937	27%
Little Falls Branch	ROW	No	NA	No	ROW_NA_NOTPA	12,367,213	24,570,121	50%	13,677,494	56%	14,987,774	61%
Little Falls Branch	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	72,300	132,783	54%	79,304	60%	86,309	65%
Little Falls Branch	THD	Yes	Metro_1.0	Yes	THD_Metro_1.0_PA	8,634	14,967	58%	8,634	58%	8,634	58%
Little Falls Branch	THD	Yes	Metro_1.0	No	THD_Metro_1.0_NOTPA	40	40	99%	40	99%	40	99%
Little Falls Branch	THD	No	NA	Yes	THD_NA_PA	16,602	21,804	76%	16,602	76%	16,602	76%
Little Falls Branch	THD	No	NA	No	THD_NA_NOTPA	34,289	43,065	80%	34,289	80%	34,289	80%
Little Falls Branch	TLD	No	NA	Yes	TLD_NA_PA	20,204	37,339	54%	20,204	54%	20,204	54%
Little Falls Branch	TMD	No	NA	Yes	TMD_NA_PA		535	0%	0	0%	0	0%
Little Falls Branch	TMD	No	NA	No	TMD_NA_NOTPA	129,358	223,006	58%	140,501	63%	151,644	68%
Lower Rock Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	2	3	83%	3	89%	3	94%
Lower Rock Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	46,846	416,455	11%	46,846	11%	46,846	11%
Lower Rock Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	10,991,054	15,265,207	72%	12,670,174	83%	14,349,295	94%
Lower Rock Creek	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	23,843	121,096	20%	23,843	20%	23,843	20%
Lower Rock Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2,288,636	4,251,924	54%	3,142,722	74%	3,996,808	94%
Lower Rock Creek	CR	Yes	MRAC_0.5	Yes	CR_MRAC_0.5_PA	20,220	79,504	25%	20,220	25%	20,220	25%
Lower Rock Creek	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	2,276,545	2,858,949	80%	2,481,978	87%	2,687,412	94%
Lower Rock Creek	CR	Yes	Purple_0.5	Yes	CR_Purple_0.5_PA	326,146	674,103	48%	326,146	48%	326,146	48%
Lower Rock Creek	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	1,448,096	2,687,302	54%	1,987,080	74%	2,526,064	94%
Lower Rock Creek	CR	No	NA	Yes	CR_NA_PA		2,733	0%	0	0%	0	0%
Lower Rock Creek	CR	No	NA	No	CR_NA_NOTPA	1,079,092	1,606,127	67%	1,294,426	81%	1,509,759	94%
Lower Rock Creek	EOF	Yes	Metro_0.5	Yes	EOF_Metro_0.5_PA	1,062	3,719	29%	1,062	29%	1,062	29%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Lower Rock Creek	EOF	Yes	Metro_0.5	No	EOF_Metro_0.5_NOTPA	845,598	1,055,832	80%	913,862	87%	982,126	93%
Lower Rock Creek	EOF	Yes	Metro_1.0	Yes	EOF_Metro_1.0_PA		39,429	0%	0	0%	0	0%
Lower Rock Creek	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	307,161	399,016	77%	339,161	85%	371,161	93%
Lower Rock Creek	EOF	Yes	MRAC_0.5	No	EOF_MRAC_0.5_NOTPA	7,471	8,818	85%	7,837	89%	8,203	93%
Lower Rock Creek	EOF	Yes	Purple_0.5	No	EOF_Purple_0.5_NOTPA	501,620	1,755,138	29%	1,067,117	61%	1,632,614	93%
Lower Rock Creek	IL	Yes	Metro_0.5	Yes	IL_Metro_0.5_PA	4,857	9,171	53%	4,857	53%	4,857	53%
Lower Rock Creek	IL	Yes	Metro_0.5	No	IL_Metro_0.5_NOTPA	1,132,897	1,458,354	78%	1,249,237	86%	1,365,577	94%
Lower Rock Creek	IL	Yes	Metro_1.0	Yes	IL_Metro_1.0_PA	3,489	7,206	48%	3,489	48%	3,489	48%
Lower Rock Creek	IL	Yes	Metro_1.0	No	IL_Metro_1.0_NOTPA	2,047,599	2,348,916	87%	2,123,542	90%	2,199,484	94%
Lower Rock Creek	IL	Yes	MRAC_0.5	Yes	IL_MRAC_0.5_PA	173	2,704	6%	173	6%	173	6%
Lower Rock Creek	IL	Yes	MRAC_0.5	No	IL_MRAC_0.5_NOTPA	160,311	172,489	93%	160,913	93%	161,516	94%
Lower Rock Creek	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	475,903	570,453	83%	505,604	89%	535,306	94%
Lower Rock Creek	IM	Yes	MRAC_0.5	Yes	IM_MRAC_0.5_PA	891	4,142	22%	891	22%	891	22%
Lower Rock Creek	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	5,111	41,785	12%	22,161	53%	39,211	94%
Lower Rock Creek	IM	Yes	Purple_0.5	Yes	IM_Purple_0.5_PA	2,031	82,528	2%	2,031	2%	2,031	2%
Lower Rock Creek	IM	Yes	Purple_0.5	No	IM_Purple_0.5_NOTPA	2,039,280	2,885,533	71%	2,373,514	82%	2,707,748	94%
Lower Rock Creek	IM	No	NA	Yes	IM_NA_PA	19,229	22,698	85%	19,229	85%	19,229	85%
Lower Rock Creek	IM	No	NA	No	IM_NA_NOTPA	404,839	454,241	89%	415,547	91%	426,254	94%
Lower Rock Creek	PD-Med	Yes	Metro_0.5	Yes	PD-Med_Metro_0.5_PA	1,239	158,573	1%	1,239	1%	1,239	1%
Lower Rock Creek	PD-Med	Yes	Metro_0.5	No	PD-Med_Metro_0.5_NOTPA	395,864	1,067,159	37%	459,386	43%	522,908	49%
Lower Rock Creek	PD-Med	Yes	Metro_1.0	Yes	PD-Med_Metro_1.0_PA	41,513	437,788	9%	41,513	9%	41,513	9%
Lower Rock Creek	PD-Med	Yes	Metro_1.0	No	PD-Med_Metro_1.0_NOTPA	481,501	913,525	53%	481,501	53%	481,501	53%
Lower Rock Creek	PD-MedLow	Yes	Metro_0.5	Yes	PD-MedLow_Metro_0.5_PA	152,498	395,423	39%	152,498	39%	152,498	39%
Lower Rock Creek	PD-MedLow	Yes	Metro_0.5	No	PD-MedLow_Metro_0.5_NOTPA	549,196	1,044,085	53%	587,823	56%	626,451	60%
Lower Rock Creek	PD-MedLow	Yes	Metro_1.0	Yes	PD-MedLow_Metro_1.0_PA	205,551	1,417,114	15%	205,551	15%	205,551	15%
Lower Rock Creek	PD-MedLow	Yes	Metro_1.0	No	PD-MedLow_Metro_1.0_NOTPA	2,445,466	4,856,027	50%	2,679,541	55%	2,913,616	60%
Lower Rock Creek	PD-MedLow	No	NA	Yes	PD-MedLow_NA_PA	6,831	244,234	3%	6,831	3%	6,831	3%
Lower Rock Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	143,823	305,858	47%	163,669	54%	183,515	60%
Lower Rock Creek	R-10	Yes	Metro_0.5	Yes	R-10_Metro_0.5_PA	159,657	817,219	20%	159,657	20%	159,657	20%
Lower Rock Creek	R-10	Yes	Metro_0.5	No	R-10_Metro_0.5_NOTPA	1,319,445	2,176,238	61%	1,419,395	65%	1,519,346	70%
Lower Rock Creek	R-10	Yes	Metro_1.0	Yes	R-10_Metro_1.0_PA	12,024	64,355	19%	12,024	19%	12,024	19%
Lower Rock Creek	R-10	Yes	Metro_1.0	No	R-10_Metro_1.0_NOTPA	308,018	503,853	61%	329,892	65%	351,766	70%
Lower Rock Creek	R-10	Yes	MRAC_0.5	Yes	R-10_MRAC_0.5_PA	18,694	43,718	43%	18,694	43%	18,694	43%
Lower Rock Creek	R-10	Yes	MRAC_0.5	No	R-10_MRAC_0.5_NOTPA	64,631	87,553	74%	64,631	74%	64,631	74%
Lower Rock Creek	R-10	Yes	Purple_0.5	Yes	R-10_Purple_0.5_PA	8,777	188,068	5%	8,777	5%	8,777	5%
Lower Rock Creek	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	65,173	156,324	42%	87,155	56%	109,138	70%
Lower Rock Creek	R-20	Yes	Metro_0.5	Yes	R-20_Metro_0.5_PA	2	200,315	0%	2	0%	2	0%
Lower Rock Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	290,069	756,123	38%	409,142	54%	528,215	70%
Lower Rock Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	286,534	558,166	51%	338,230	61%	389,925	70%
Lower Rock Creek	R-20	Yes	MRAC_0.5	Yes	R-20_MRAC_0.5_PA	5,156	10,906	47%	5,156	47%	5,156	47%
Lower Rock Creek	R-20	Yes	MRAC_0.5	No	R-20_MRAC_0.5_NOTPA	70,275	129,845	54%	80,491	62%	90,707	70%
Lower Rock Creek	R-20	Yes	Purple_0.5	Yes	R-20_Purple_0.5_PA	26,561	322,316	8%	26,561	8%	26,561	8%
Lower Rock Creek	R-20	Yes	Purple_0.5	No	R-20_Purple_0.5_NOTPA	260,984	588,004	44%	335,877	57%	410,770	70%
Lower Rock Creek	R-20	No	NA	Yes	R-20_NA_PA		1	0%	0	0%	0	0%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Lower Rock Creek	R-20	No	NA	No	R-20_NA_NOTPA	117,748	242,211	49%	143,476	59%	169,205	70%
Lower Rock Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	3,355	6,220	54%	3,355	54%	3,355	54%
Lower Rock Creek	R-200	No	NA	Yes	R-200_NA_PA	33,040	530,911	6%	33,040	6%	33,040	6%
Lower Rock Creek	R-200	No	NA	No	R-200_NA_NOTPA	15,423	73,416	21%	26,469	36%	37,516	51%
Lower Rock Creek	R-30	Yes	Metro_0.5	Yes	R-30_Metro_0.5_PA	93,264	695,553	13%	93,264	13%	93,264	13%
Lower Rock Creek	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	908,991	2,361,032	38%	1,115,585	47%	1,322,178	56%
Lower Rock Creek	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	18,173	175,188	10%	18,173	10%	18,173	10%
Lower Rock Creek	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	751,327	1,923,749	39%	914,313	48%	1,077,300	56%
Lower Rock Creek	R-30	Yes	MRAC_0.5	No	R-30_MRAC_0.5_NOTPA	20,668	64,288	32%	28,335	44%	36,001	56%
Lower Rock Creek	R-30	Yes	Purple_0.5	Yes	R-30_Purple_0.5_PA	3,939	17,375	23%	3,939	23%	3,939	23%
Lower Rock Creek	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	298,553	642,954	46%	329,304	51%	360,054	56%
Lower Rock Creek	R-30	No	NA	Yes	R-30_NA_PA		2	0%	0	0%	0	0%
Lower Rock Creek	R-30	No	NA	No	R-30_NA_NOTPA	456,984	1,042,993	44%	520,530	50%	584,076	56%
Lower Rock Creek	R-40	Yes	Metro_1.0	No	R-40_Metro_1.0_NOTPA	497,711	1,365,347	36%	556,059	41%	614,406	45%
Lower Rock Creek	R-40	No	NA	Yes	R-40_NA_PA	6,265	21,680	29%	6,265	29%	6,265	29%
Lower Rock Creek	R-40	No	NA	No	R-40_NA_NOTPA	689,999	1,984,998	35%	791,624	40%	893,249	45%
Lower Rock Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	3,680	14,446	25%	3,680	25%	3,680	25%
Lower Rock Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	131,340	309,529	42%	160,076	52%	188,813	61%
Lower Rock Creek	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	870,657	6,108,743	14%	870,657	14%	870,657	14%
Lower Rock Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	15,792,622	37,590,879	42%	19,361,529	52%	22,930,436	61%
Lower Rock Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	1,778,075	14,365,026	12%	1,778,075	12%	1,778,075	12%
Lower Rock Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	28,434,193	86,053,918	33%	40,463,541	47%	52,492,890	61%
Lower Rock Creek	R-60	Yes	MRAC_0.5	Yes	R-60_MRAC_0.5_PA	303,332	5,346,058	6%	303,332	6%	303,332	6%
Lower Rock Creek	R-60	Yes	MRAC_0.5	No	R-60_MRAC_0.5_NOTPA	4,878,436	17,008,126	29%	7,626,696	45%	10,374,957	61%
Lower Rock Creek	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	201,694	1,728,675	12%	201,694	12%	201,694	12%
Lower Rock Creek	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	1,061,487	3,514,973	30%	1,602,810	46%	2,144,134	61%
Lower Rock Creek	R-60	No	NA	Yes	R-60_NA_PA	1,177,633	13,870,769	8%	1,177,633	8%	1,177,633	8%
Lower Rock Creek	R-60	No	NA	No	R-60_NA_NOTPA	17,543,939	56,213,276	31%	25,917,019	46%	34,290,099	61%
Lower Rock Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	46,893	279,345	17%	46,893	17%	46,893	17%
Lower Rock Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	934,692	3,072,585	30%	1,138,706	37%	1,342,720	44%
Lower Rock Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	373,940	5,403,173	7%	373,940	7%	373,940	7%
Lower Rock Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	5,520,777	20,061,052	28%	7,143,728	36%	8,766,680	44%
Lower Rock Creek	R-90	Yes	MRAC_0.5	Yes	R-90_MRAC_0.5_PA	39,240	347,688	11%	39,240	11%	39,240	11%
Lower Rock Creek	R-90	Yes	MRAC_0.5	No	R-90_MRAC_0.5_NOTPA	1,608,120	6,341,218	25%	2,189,616	35%	2,771,112	44%
Lower Rock Creek	R-90	Yes	Purple_0.5	Yes	R-90_Purple_0.5_PA	132,199	3,859,034	3%	132,199	3%	132,199	3%
Lower Rock Creek	R-90	Yes	Purple_0.5	No	R-90_Purple_0.5_NOTPA	3,214,348	10,794,396	30%	3,965,750	37%	4,717,151	44%
Lower Rock Creek	R-90	No	NA	Yes	R-90_NA_PA	1,443,587	12,955,435	11%	1,443,587	11%	1,443,587	11%
Lower Rock Creek	R-90	No	NA	No	R-90_NA_NOTPA	9,593,710	34,551,144	28%	12,346,280	36%	15,098,850	44%
Lower Rock Creek	R-H	Yes	Corridor	No	R-H_Corridor_NOTPA	24,319	38,104	64%	24,319	64%	24,319	64%
Lower Rock Creek	R-H	Yes	Metro_1.0	Yes	R-H_Metro_1.0_PA	21,555	177,779	12%	21,555	12%	21,555	12%
Lower Rock Creek	R-H	Yes	Metro_1.0	No	R-H_Metro_1.0_NOTPA	678,252	1,365,075	50%	705,728	52%	733,204	54%
Lower Rock Creek	R-H	No	NA	Yes	R-H_NA_PA		3	0%	0	0%	0	0%
Lower Rock Creek	R-H	No	NA	No	R-H_NA_NOTPA	142,628	254,663	56%	142,628	56%	142,628	56%
Lower Rock Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	75,331	111,819	67%	75,331	67%	75,331	67%

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Lower Rock Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	301,404	680,800	44%	301,404	44%	301,404	44%
Lower Rock Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	11,452,310	16,673,386	69%	11,452,310	69%	11,452,310	69%
Lower Rock Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	924,104	2,503,843	37%	924,104	37%	924,104	37%
Lower Rock Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	22,078,782	37,344,875	59%	22,429,578	60%	22,780,374	61%
Lower Rock Creek	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	299,075	798,948	37%	299,075	37%	299,075	37%
Lower Rock Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	5,326,736	9,326,546	57%	5,507,964	59%	5,689,193	61%
Lower Rock Creek	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	123,256	287,169	43%	123,256	43%	123,256	43%
Lower Rock Creek	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	2,663,589	4,555,420	58%	2,721,198	60%	2,778,806	61%
Lower Rock Creek	ROW	No	NA	Yes	ROW_NA_PA	1,177,859	3,281,844	36%	1,177,859	36%	1,177,859	36%
Lower Rock Creek	ROW	No	NA	No	ROW_NA_NOTPA	19,931,120	34,218,102	58%	20,402,081	60%	20,873,042	61%
Lower Rock Creek	RT-10.0	No	NA	Yes	RT-10.0_NA_PA		2,557	0%	0	0%	0	0%
Lower Rock Creek	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	26,742	80,636	33%	37,965	47%	49,188	61%
Lower Rock Creek	RT-12.5	Yes	Metro_0.5	No	RT-12.5_Metro_0.5_NOTPA	179,654	447,295	40%	235,198	53%	290,742	65%
Lower Rock Creek	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	230,315	545,753	42%	292,527	54%	354,740	65%
Lower Rock Creek	RT-12.5	Yes	MRAC_0.5	Yes	RT-12.5_MRAC_0.5_PA	5,264	10,479	50%	5,264	50%	5,264	50%
Lower Rock Creek	RT-12.5	Yes	MRAC_0.5	No	RT-12.5_MRAC_0.5_NOTPA	32,355	77,512	42%	41,369	53%	50,383	65%
Lower Rock Creek	RT-12.5	Yes	Purple_0.5	Yes	RT-12.5_Purple_0.5_PA	1,585	5,941	27%	1,585	27%	1,585	27%
Lower Rock Creek	RT-12.5	Yes	Purple_0.5	No	RT-12.5_Purple_0.5_NOTPA	109,643	203,270	54%	120,884	59%	132,125	65%
Lower Rock Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	20,409	127,899	16%	20,409	16%	20,409	16%
Lower Rock Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	670,795	1,229,683	55%	735,045	60%	799,294	65%
Lower Rock Creek	RT-15.0	Yes	Metro_0.5	Yes	RT-15.0_Metro_0.5_PA	1	205	0%	1	0%	1	0%
Lower Rock Creek	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA	36,134	120,374	30%	55,962	46%	75,791	63%
Lower Rock Creek	RT-15.0	Yes	Metro_1.0	No	RT-15.0_Metro_1.0_NOTPA	81	2,148	4%	717	33%	1,353	63%
Lower Rock Creek	RT-8.0	Yes	Metro_0.5	No	RT-8.0_Metro_0.5_NOTPA	29,884	71,173	42%	30,956	43%	32,028	45%
Lower Rock Creek	RT-8.0	Yes	Metro_1.0	No	RT-8.0_Metro_1.0_NOTPA	48,107	110,705	43%	48,962	44%	49,817	45%
Lower Rock Creek	TF-12	No	NA	Yes	TF-12_NA_PA		5,675	0%	0	0%	0	0%
Lower Rock Creek	TF-12	No	NA	No	TF-12_NA_NOTPA	15,610	55,688	28%	16,715	30%	17,820	32%
Lower Rock Creek	THD	Yes	Metro_0.5	No	THD_Metro_0.5_NOTPA	15,672	32,355	48%	19,900	62%	24,127	75%
Lower Rock Creek	THD	Yes	Metro_1.0	No	THD_Metro_1.0_NOTPA	125,797	377,526	33%	203,662	54%	281,527	75%
Lower Rock Creek	TMD	Yes	Metro_0.5	Yes	TMD_Metro_0.5_PA	10,406	91,245	11%	10,406	11%	10,406	11%
Lower Rock Creek	TMD	Yes	Metro_0.5	No	TMD_Metro_0.5_NOTPA	414,704	800,315	52%	479,459	60%	544,214	68%
Lower Rock Creek	TMD	Yes	Metro_1.0	Yes	TMD_Metro_1.0_PA		12	0%	0	0%	0	0%
Lower Rock Creek	TMD	Yes	Metro_1.0	No	TMD_Metro_1.0_NOTPA	172,324	394,082	44%	220,150	56%	267,976	68%
Lower Rock Creek	TMD	No	NA	Yes	TMD_NA_PA	21,049	34,075	62%	21,049	62%	21,049	62%
Lower Rock Creek	TMD	No	NA	No	TMD_NA_NOTPA	13,132	24,046	55%	14,741	61%	16,351	68%
Middle Great Seneca Creek	AR	No	NA	Yes	AR_NA_PA		628,171	0%	0	0%	0	0%
Middle Great Seneca Creek	AR	No	NA	No	AR_NA_NOTPA	38,338	6,243,751	1%	522,562	8%	1,006,786	16%
Middle Great Seneca Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	669,899	987,741	68%	799,188	81%	928,476	94%
Middle Great Seneca Creek	CR	Yes	MRAC_0.5	Yes	CR_MRAC_0.5_PA	4,173	50,545	8%	4,173	8%	4,173	8%
Middle Great Seneca Creek	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	2,497,895	5,047,053	49%	3,621,063	72%	4,744,230	94%
Middle Great Seneca Creek	CR	No	NA	Yes	CR_NA_PA		65,231	0%	0	0%	0	0%
Middle Great Seneca Creek	CR	No	NA	No	CR_NA_NOTPA	1,292,676	2,386,136	54%	1,767,822	74%	2,242,967	94%
Middle Great Seneca Creek	EOF	Yes	Corridor	Yes	EOF_Corridor_PA		19,740	0%	0	0%	0	0%
Middle Great Seneca Creek	EOF	Yes	Corridor	No	EOF_Corridor_NOTPA	642,162	948,618	68%	762,279	80%	882,396	93%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Middle Great Seneca Creek	EOF	Yes	MRAC_0.5	Yes	EOF_MRAC_0.5_PA	1,933	207,056	1%	1,933	1%	1,933	1%
Middle Great Seneca Creek	EOF	Yes	MRAC_0.5	No	EOF_MRAC_0.5_NOTPA	16,350	419,423	4%	203,247	48%	390,143	93%
Middle Great Seneca Creek	EOF	No	NA	Yes	EOF_NA_PA	47,261	2,389,266	2%	47,261	2%	47,261	2%
Middle Great Seneca Creek	EOF	No	NA	No	EOF_NA_NOTPA	3,985,533	14,046,896	28%	8,525,916	61%	13,066,298	93%
Middle Great Seneca Creek	IM	No	NA	Yes	IM_NA_PA	28,352	508,233	6%	28,352	6%	28,352	6%
Middle Great Seneca Creek	IM	No	NA	No	IM_NA_NOTPA	1,049,112	1,592,022	66%	1,271,523	80%	1,493,933	94%
Middle Great Seneca Creek	PD-Med	Yes	MRAC_0.5	No	PD-Med_MRAC_0.5_NOTPA	170,939	376,785	45%	177,782	47%	184,624	49%
Middle Great Seneca Creek	PD-Med	No	NA	Yes	PD-Med_NA_PA	13,093	557,069	2%	13,093	2%	13,093	2%
Middle Great Seneca Creek	PD-Med	No	NA	No	PD-Med_NA_NOTPA	1,951,006	3,687,666	53%	1,951,006	53%	1,951,006	53%
Middle Great Seneca Creek	PD-MedLow	Yes	MRAC_0.5	Yes	PD-MedLow_MRAC_0.5_PA	40,408	239,391	17%	40,408	17%	40,408	17%
Middle Great Seneca Creek	PD-MedLow	Yes	MRAC_0.5	No	PD-MedLow_MRAC_0.5_NOTPA	99,610	249,937	40%	124,786	50%	149,962	60%
Middle Great Seneca Creek	PD-MedLow	No	NA	Yes	PD-MedLow_NA_PA	238,136	5,650,033	4%	238,136	4%	238,136	4%
Middle Great Seneca Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	5,084,600	12,323,778	41%	6,239,433	51%	7,394,267	60%
Middle Great Seneca Creek	R-10	No	NA	Yes	R-10_NA_PA		3	0%	0	0%	0	0%
Middle Great Seneca Creek	R-10	No	NA	No	R-10_NA_NOTPA	228,223	402,859	57%	254,740	63%	281,257	70%
Middle Great Seneca Creek	R-20	Yes	Corridor	Yes	R-20_Corridor_PA	21,287	101,007	21%	21,287	21%	21,287	21%
Middle Great Seneca Creek	R-20	Yes	Corridor	No	R-20_Corridor_NOTPA	153,273	241,561	63%	161,012	67%	168,751	70%
Middle Great Seneca Creek	R-20	Yes	MRAC_0.5	No	R-20_MRAC_0.5_NOTPA	103	2,761	4%	1,016	37%	1,929	70%
Middle Great Seneca Creek	R-20	No	NA	Yes	R-20_NA_PA	18,286	220,213	8%	18,286	8%	18,286	8%
Middle Great Seneca Creek	R-20	No	NA	No	R-20_NA_NOTPA	1,663,405	2,966,387	56%	1,867,836	63%	2,072,267	70%
Middle Great Seneca Creek	R-200	Yes	Corridor	Yes	R-200_Corridor_PA	18,482	864,016	2%	18,482	2%	18,482	2%
Middle Great Seneca Creek	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	471,200	2,681,220	18%	920,651	34%	1,370,103	51%
Middle Great Seneca Creek	R-200	Yes	MRAC_0.5	Yes	R-200_MRAC_0.5_PA	6,773	343,242	2%	6,773	2%	6,773	2%
Middle Great Seneca Creek	R-200	Yes	MRAC_0.5	No	R-200_MRAC_0.5_NOTPA	1,605,511	4,051,231	40%	1,837,845	45%	2,070,179	51%
Middle Great Seneca Creek	R-200	No	NA	Yes	R-200_NA_PA	308,541	45,395,123	1%	308,541	1%	308,541	1%
Middle Great Seneca Creek	R-200	No	NA	No	R-200_NA_NOTPA	10,284,935	59,783,896	17%	20,417,253	34%	30,549,571	51%
Middle Great Seneca Creek	R-30	Yes	MRAC_0.5	No	R-30_MRAC_0.5_NOTPA	6,098	17,695	34%	8,003	45%	9,909	56%
Middle Great Seneca Creek	R-30	No	NA	Yes	R-30_NA_PA	13,070	282,743	5%	13,070	5%	13,070	5%
Middle Great Seneca Creek	R-30	No	NA	No	R-30_NA_NOTPA	1,270,713	2,377,199	53%	1,300,972	55%	1,331,231	56%
Middle Great Seneca Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	66,502	330,339	20%	66,502	20%	66,502	20%
Middle Great Seneca Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	459,010	776,735	59%	466,409	60%	473,808	61%
Middle Great Seneca Creek	R-60	Yes	MRAC_0.5	Yes	R-60_MRAC_0.5_PA	1,937	172,882	1%	1,937	1%	1,937	1%
Middle Great Seneca Creek	R-60	Yes	MRAC_0.5	No	R-60_MRAC_0.5_NOTPA	121,465	388,405	31%	179,196	46%	236,927	61%
Middle Great Seneca Creek	R-60	No	NA	Yes	R-60_NA_PA	173,790	4,727,864	4%	173,790	4%	173,790	4%
Middle Great Seneca Creek	R-60	No	NA	No	R-60_NA_NOTPA	5,295,664	16,232,637	33%	7,598,787	47%	9,901,909	61%
Middle Great Seneca Creek	R-90	Yes	Corridor	Yes	R-90_Corridor_PA	58	250,535	0%	58	0%	58	0%
Middle Great Seneca Creek	R-90	Yes	Corridor	No	R-90_Corridor_NOTPA	193,445	819,203	24%	275,718	34%	357,992	44%
Middle Great Seneca Creek	R-90	Yes	MRAC_0.5	No	R-90_MRAC_0.5_NOTPA	483	9,049	5%	2,219	25%	3,954	44%
Middle Great Seneca Creek	R-90	No	NA	Yes	R-90_NA_PA	198,882	5,725,896	3%	198,882	3%	198,882	3%
Middle Great Seneca Creek	R-90	No	NA	No	R-90_NA_NOTPA	5,924,107	20,128,646	29%	7,360,162	37%	8,796,218	44%
Middle Great Seneca Creek	RE-1	No	NA	Yes	RE-1_NA_PA	44,653	3,197,798	1%	44,653	1%	44,653	1%
Middle Great Seneca Creek	RE-1	No	NA	No	RE-1_NA_NOTPA	871,958	6,779,168	13%	2,096,875	31%	3,321,792	49%
Middle Great Seneca Creek	RE-2	No	NA	Yes	RE-2_NA_PA	229,378	31,532,688	1%	229,378	1%	229,378	1%
Middle Great Seneca Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	2,842,098	32,088,802	9%	7,357,477	23%	11,872,857	37%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Middle Great Seneca Creek	R-H	Yes	Corridor	No	R-H_Corridor_NOTPA	17,500	101,452	17%	35,996	35%	54,492	54%
Middle Great Seneca Creek	R-H	No	NA	No	R-H_NA_NOTPA	189,980	346,166	55%	189,980	55%	189,980	55%
Middle Great Seneca Creek	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	168,577	323,306	52%	168,577	52%	168,577	52%
Middle Great Seneca Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	2,891,413	4,232,403	68%	2,891,413	68%	2,891,413	68%
Middle Great Seneca Creek	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	94,282	373,287	25%	94,282	25%	94,282	25%
Middle Great Seneca Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	2,506,117	4,272,185	59%	2,556,075	60%	2,606,033	61%
Middle Great Seneca Creek	ROW	No	NA	Yes	ROW_NA_PA	918,076	2,721,507	34%	918,076	34%	918,076	34%
Middle Great Seneca Creek	ROW	No	NA	No	ROW_NA_NOTPA	15,432,292	29,707,026	52%	16,776,789	56%	18,121,286	61%
Middle Great Seneca Creek	RT-12.5	Yes	Corridor	Yes	RT-12.5_Corridor_PA		2,618	0%	0	0%	0	0%
Middle Great Seneca Creek	RT-12.5	Yes	Corridor	No	RT-12.5_Corridor_NOTPA	712,939	1,567,829	45%	866,014	55%	1,019,089	65%
Middle Great Seneca Creek	RT-12.5	Yes	MRAC_0.5	Yes	RT-12.5_MRAC_0.5_PA	9,593	91,930	10%	9,593	10%	9,593	10%
Middle Great Seneca Creek	RT-12.5	Yes	MRAC_0.5	No	RT-12.5_MRAC_0.5_NOTPA	141,020	508,068	28%	235,632	46%	330,244	65%
Middle Great Seneca Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	12,207	296,446	4%	12,207	4%	12,207	4%
Middle Great Seneca Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	2,831,013	6,321,002	45%	3,469,832	55%	4,108,651	65%
Middle Great Seneca Creek	RT-15.0	No	NA	No	RT-15.0_NA_NOTPA	139,949	373,930	37%	187,692	50%	235,436	63%
Middle Great Seneca Creek	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	83,607	232,403	36%	94,094	40%	104,581	45%
Middle Great Seneca Creek	THD	No	NA	No	THD_NA_NOTPA	821,592	1,601,421	51%	1,007,898	63%	1,194,203	75%
Middle Great Seneca Creek	TLD	Yes	MRAC_0.5	No	TLD_MRAC_0.5_NOTPA	80,964	318,911	25%	131,372	41%	181,779	57%
Middle Great Seneca Creek	TLD	No	NA	Yes	TLD_NA_PA	1,900	31,589	6%	1,900	6%	1,900	6%
Middle Great Seneca Creek	TLD	No	NA	No	TLD_NA_NOTPA	1,371,859	3,015,801	45%	1,545,433	51%	1,719,006	57%
Middle Great Seneca Creek	TMD	Yes	MRAC_0.5	Yes	TMD_MRAC_0.5_PA	13,760	140,803	10%	13,760	10%	13,760	10%
Middle Great Seneca Creek	TMD	Yes	MRAC_0.5	No	TMD_MRAC_0.5_NOTPA	463,963	1,003,890	46%	573,304	57%	682,645	68%
Middle Great Seneca Creek	TMD	No	NA	Yes	TMD_NA_PA	9,044	45,907	20%	9,044	20%	9,044	20%
Middle Great Seneca Creek	TMD	No	NA	No	TMD_NA_NOTPA	1,771,664	3,914,759	45%	2,216,850	57%	2,662,036	68%
Middle Great Seneca Creek - Whetstone Run	CR	No	NA	No	CR_NA_NOTPA	3,032,492	4,546,544	67%	3,653,122	80%	4,273,751	94%
Middle Great Seneca Creek - Whetstone Run	EOF	No	NA	Yes	EOF_NA_PA		2,485	0%	0	0%	0	0%
Middle Great Seneca Creek - Whetstone Run	EOF	No	NA	No	EOF_NA_NOTPA	206,125	341,928	60%	262,092	77%	318,058	93%
Middle Great Seneca Creek - Whetstone Run	IL	No	NA	No	IL_NA_NOTPA	699,813	940,293	74%	790,144	84%	880,474	94%
Middle Great Seneca Creek - Whetstone Run	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	20,846	22,391	93%	20,928	93%	21,011	94%
Middle Great Seneca Creek - Whetstone Run	R-10	No	NA	No	R-10_NA_NOTPA	467,338	707,629	66%	480,685	68%	494,033	70%
Middle Great Seneca Creek - Whetstone Run	R-20	No	NA	Yes	R-20_NA_PA	185,288	387,899	48%	185,288	48%	185,288	48%
Middle Great Seneca Creek - Whetstone Run	R-20	No	NA	No	R-20_NA_NOTPA	2,351,126	4,175,057	56%	2,633,874	63%	2,916,622	70%
Middle Great Seneca Creek - Whetstone Run	R-200	Yes	MRAC_0.5	No	R-200_MRAC_0.5_NOTPA	12,256	61,519	20%	21,846	36%	31,436	51%
Middle Great Seneca Creek - Whetstone Run	R-200	No	NA	Yes	R-200_NA_PA	92,255	3,083,466	3%	92,255	3%	92,255	3%
Middle Great Seneca Creek - Whetstone Run	R-200	No	NA	No	R-200_NA_NOTPA	1,784,266	7,242,265	25%	2,742,532	38%	3,700,797	51%
Middle Great Seneca Creek - Whetstone Run	R-30	No	NA	Yes	R-30_NA_PA	9,767	330,920	3%	9,767	3%	9,767	3%
Middle Great Seneca Creek - Whetstone Run	R-30	No	NA	No	R-30_NA_NOTPA	741,694	1,718,683	43%	852,078	50%	962,462	56%
Middle Great Seneca Creek - Whetstone Run	R-60	No	NA	Yes	R-60_NA_PA	54,338	1,201,982	5%	54,338	5%	54,338	5%
Middle Great Seneca Creek - Whetstone Run	R-60	No	NA	No	R-60_NA_NOTPA	1,330,956	5,527,425	24%	2,351,343	43%	3,371,729	61%
Middle Great Seneca Creek - Whetstone Run	R-90	No	NA	Yes	R-90_NA_PA	224,960	2,339,416	10%	224,960	10%	224,960	10%
Middle Great Seneca Creek - Whetstone Run	R-90	No	NA	No	R-90_NA_NOTPA	6,212,650	18,278,033	34%	7,100,075	39%	7,987,500	44%
Middle Great Seneca Creek - Whetstone Run	RE-1	No	NA	Yes	RE-1_NA_PA	103,980	3,583,108	3%	103,980	3%	103,980	3%
Middle Great Seneca Creek - Whetstone Run	RE-1	No	NA	No	RE-1_NA_NOTPA	207,412	1,023,419	20%	354,444	35%	501,475	49%
Middle Great Seneca Creek - Whetstone Run	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	1,596	2,839	56%	1,596	56%	1,596	56%

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Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Middle Great Seneca Creek - Whetstone Run	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	308,420	469,556	66%	308,420	66%	308,420	66%
Middle Great Seneca Creek - Whetstone Run	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	1,196,713	2,494,252	48%	1,359,104	54%	1,521,494	61%
Middle Great Seneca Creek - Whetstone Run	ROW	No	NA	Yes	ROW_NA_PA	635,660	1,381,648	46%	635,660	46%	635,660	46%
Middle Great Seneca Creek - Whetstone Run	ROW	No	NA	No	ROW_NA_NOTPA	8,590,981	13,670,292	63%	8,590,981	63%	8,590,981	63%
Middle Great Seneca Creek - Whetstone Run	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	36,599	89,392	41%	45,564	51%	54,529	61%
Middle Great Seneca Creek - Whetstone Run	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	316,102	695,655	45%	384,139	55%	452,176	65%
Middle Great Seneca Creek - Whetstone Run	RT-8.0	No	NA	Yes	RT-8.0_NA_PA		19,757	0%	0	0%	0	0%
Middle Great Seneca Creek - Whetstone Run	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	63,132	143,965	44%	63,958	44%	64,784	45%
Middle Great Seneca Creek - Whetstone Run	THD	No	NA	No	THD_NA_NOTPA	255,343	503,500	51%	315,405	63%	375,468	75%
Middle Great Seneca Creek - Whetstone Run	TLD	No	NA	Yes	TLD_NA_PA	6,881	66,241	10%	6,881	10%	6,881	10%
Middle Great Seneca Creek - Whetstone Run	TLD	No	NA	No	TLD_NA_NOTPA	1,317,583	3,305,981	40%	1,600,996	48%	1,884,409	57%
Middle Great Seneca Creek - Whetstone Run	TMD	No	NA	Yes	TMD_NA_PA	768	28,313	3%	768	3%	768	3%
Middle Great Seneca Creek - Whetstone Run	TMD	No	NA	No	TMD_NA_NOTPA	311,258	659,768	47%	379,950	58%	448,642	68%
Muddy Branch	CR	Yes	Corridor	No	CR_Corridor_NOTPA	327,688	371,654	88%	338,521	91%	349,355	94%
Muddy Branch	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	7,248	18,754	39%	7,248	39%	7,248	39%
Muddy Branch	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	29,274	286,422	10%	149,255	52%	269,236	94%
Muddy Branch	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	29,770	90,051	33%	57,209	64%	84,648	94%
Muddy Branch	CR	No	NA	Yes	CR_NA_PA	19,121	252,608	8%	19,121	8%	19,121	8%
Muddy Branch	CR	No	NA	No	CR_NA_NOTPA	4,401,254	7,937,753	55%	5,931,371	75%	7,461,488	94%
Muddy Branch	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	74,542	104,116	72%	85,695	82%	96,848	93%
Muddy Branch	EOF	Yes	MRAC_0.5	Yes	EOF_MRAC_0.5_PA	8,980	8,980	100%	8,980	100%	8,980	100%
Muddy Branch	EOF	Yes	MRAC_0.5	No	EOF_MRAC_0.5_NOTPA	12,289	14,877	83%	13,064	88%	13,839	93%
Muddy Branch	EOF	No	NA	Yes	EOF_NA_PA	58,086	1,314,933	4%	58,086	4%	58,086	4%
Muddy Branch	EOF	No	NA	No	EOF_NA_NOTPA	5,460,979	14,721,212	37%	9,577,261	65%	13,693,542	93%
Muddy Branch	IH	No	NA	No	IH_NA_NOTPA	208,999	676,514	31%	253,033	37%	297,066	44%
Muddy Branch	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	127,118	182,921	69%	149,384	82%	171,650	94%
Muddy Branch	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	491,895	567,509	87%	512,219	90%	532,543	94%
Muddy Branch	IM	No	NA	No	IM_NA_NOTPA	3,259,776	4,050,819	80%	3,530,506	87%	3,801,236	94%
Muddy Branch	PD-Low	No	NA	Yes	PD-Low_NA_PA	120,315	4,939,547	2%	120,315	2%	120,315	2%
Muddy Branch	PD-Low	No	NA	No	PD-Low_NA_NOTPA	2,675,411	13,019,252	21%	3,030,208	23%	3,385,006	26%
Muddy Branch	R-10	No	NA	No	R-10_NA_NOTPA	153,092	290,186	53%	177,843	61%	202,594	70%
Muddy Branch	R-20	No	NA	No	R-20_NA_NOTPA	574,636	1,083,838	53%	665,893	61%	757,151	70%
Muddy Branch	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	52,475	235,604	22%	86,434	37%	120,394	51%
Muddy Branch	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	100	3,281	3%	888	27%	1,676	51%
Muddy Branch	R-200	Yes	MRAC_0.5	Yes	R-200_MRAC_0.5_PA	40,888	473,521	9%	40,888	9%	40,888	9%
Muddy Branch	R-200	Yes	MRAC_0.5	No	R-200_MRAC_0.5_NOTPA	610,674	2,671,197	23%	987,828	37%	1,364,982	51%
Muddy Branch	R-200	No	NA	Yes	R-200_NA_PA	604,230	31,368,656	2%	604,230	2%	604,230	2%
Muddy Branch	R-200	No	NA	No	R-200_NA_NOTPA	22,958,502	113,729,490	20%	40,537,136	36%	58,115,770	51%
Muddy Branch	R-60	No	NA	Yes	R-60_NA_PA	15,450	647,494	2%	15,450	2%	15,450	2%
Muddy Branch	R-60	No	NA	No	R-60_NA_NOTPA	1,316,109	2,665,025	49%	1,470,887	55%	1,625,665	61%
Muddy Branch	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	10,040	62,207	16%	18,612	30%	27,185	44%
Muddy Branch	R-90	Yes	MRAC_0.5	Yes	R-90_MRAC_0.5_PA	15	6,927	0%	15	0%	15	0%
Muddy Branch	R-90	Yes	MRAC_0.5	No	R-90_MRAC_0.5_NOTPA	284,450	1,051,059	27%	371,882	35%	459,313	44%
Muddy Branch	R-90	No	NA	Yes	R-90_NA_PA	5,156	16,923	30%	5,156	30%	5,156	30%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Muddy Branch	R-90	No	NA	No	R-90_NA_NOTPA	164,295	613,653	27%	216,231	35%	268,166	44%
Muddy Branch	RC	No	NA	Yes	RC_NA_PA	40,624	15,153,461	0%	40,624	0%	40,624	0%
Muddy Branch	RC	No	NA	No	RC_NA_NOTPA	1,504,126	19,042,289	8%	2,370,658	12%	3,237,189	17%
Muddy Branch	RE-1	No	NA	No	RE-1_NA_NOTPA	82,731	358,888	23%	129,293	36%	175,855	49%
Muddy Branch	RE-2	No	NA	Yes	RE-2_NA_PA	162,815	38,017,454	0%	162,815	0%	162,815	0%
Muddy Branch	RE-2	No	NA	No	RE-2_NA_NOTPA	7,984,627	85,148,794	9%	19,744,841	23%	31,505,054	37%
Muddy Branch	RE-2C	No	NA	Yes	RE-2C_NA_PA	904	393,662	0%	904	0%	904	0%
Muddy Branch	RE-2C	No	NA	No	RE-2C_NA_NOTPA	270,657	1,852,371	15%	339,089	18%	407,522	22%
Muddy Branch	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	37,345	50,365	74%	37,345	74%	37,345	74%
Muddy Branch	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	606,837	798,269	76%	606,837	76%	606,837	76%
Muddy Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	927,378	2,269,237	41%	1,155,806	51%	1,384,235	61%
Muddy Branch	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	73,536	144,207	51%	73,536	51%	73,536	51%
Muddy Branch	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	1,475,055	2,736,710	54%	1,572,224	57%	1,669,393	61%
Muddy Branch	ROW	No	NA	Yes	ROW_NA_PA	1,123,525	3,117,659	36%	1,123,525	36%	1,123,525	36%
Muddy Branch	ROW	No	NA	No	ROW_NA_NOTPA	31,481,013	57,670,245	55%	33,329,931	58%	35,178,850	61%
Muddy Branch	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	108,783	287,012	38%	141,930	49%	175,077	61%
Muddy Branch	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	208,349	480,094	43%	212,196	44%	216,042	45%
Northwest Branch	CR	Yes	Corridor	Yes	CR_Corridor_PA	13,636	25,630	53%	13,636	53%	13,636	53%
Northwest Branch	CR	Yes	Corridor	No	CR_Corridor_NOTPA	854,176	1,071,330	80%	930,613	87%	1,007,050	94%
Northwest Branch	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	63,813	85,270	75%	71,984	84%	80,154	94%
Northwest Branch	CR	Yes	Purple_0.5	Yes	CR_Purple_0.5_PA		279	0%	0	0%	0	0%
Northwest Branch	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	1,977,603	2,295,292	86%	2,067,589	90%	2,157,574	94%
Northwest Branch	CR	No	NA	Yes	CR_NA_PA	48,257	576,397	8%	48,257	8%	48,257	8%
Northwest Branch	CR	No	NA	No	CR_NA_NOTPA	1,731,203	3,331,993	52%	2,431,638	73%	3,132,074	94%
Northwest Branch	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	152,694	177,217	86%	158,770	90%	164,845	93%
Northwest Branch	EOF	No	NA	No	EOF_NA_NOTPA	102,469	134,582	76%	113,828	85%	125,187	93%
Northwest Branch	PD-Low	No	NA	No	PD-Low_NA_NOTPA	5,171	114,016	5%	17,408	15%	29,644	26%
Northwest Branch	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	66,926	237,798	28%	104,802	44%	142,679	60%
Northwest Branch	PRC	No	NA	Yes	PRC_NA_PA	25,038	596,341	4%	25,038	4%	25,038	4%
Northwest Branch	PRC	No	NA	No	PRC_NA_NOTPA	2,532,179	6,236,892	41%	2,825,312	45%	3,118,446	50%
Northwest Branch	R-10	Yes	Corridor	No	R-10_Corridor_NOTPA	266,474	483,773	55%	302,111	62%	337,747	70%
Northwest Branch	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	231,088	435,283	53%	267,491	61%	303,894	70%
Northwest Branch	R-10	No	NA	Yes	R-10_NA_PA		389	0%	0	0%	0	0%
Northwest Branch	R-10	No	NA	No	R-10_NA_NOTPA	456,250	964,600	47%	564,844	59%	673,438	70%
Northwest Branch	R-20	Yes	Metro_1.0	Yes	R-20_Metro_1.0_PA	16,589	34,178	49%	16,589	49%	16,589	49%
Northwest Branch	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	358,133	737,562	49%	436,691	59%	515,248	70%
Northwest Branch	R-20	No	NA	Yes	R-20_NA_PA	8,920	148,014	6%	8,920	6%	8,920	6%
Northwest Branch	R-20	No	NA	No	R-20_NA_NOTPA	1,251,567	3,071,957	41%	1,698,791	55%	2,146,016	70%
Northwest Branch	R-200	No	NA	Yes	R-200_NA_PA	806,206	39,714,360	2%	806,206	2%	806,206	2%
Northwest Branch	R-200	No	NA	No	R-200_NA_NOTPA	21,119,400	103,557,033	20%	37,018,522	36%	52,917,644	51%
Northwest Branch	R-30	Yes	Metro_0.5	Yes	R-30_Metro_0.5_PA	180	1,399	13%	180	13%	180	13%
Northwest Branch	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	533,972	1,144,999	47%	587,585	51%	641,199	56%
Northwest Branch	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	37,226	146,060	25%	37,226	25%	37,226	25%
Northwest Branch	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	129,551	308,530	42%	151,164	49%	172,777	56%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Northwest Branch	R-30	Yes	Purple_0.5	Yes	R-30_Purple_0.5_PA	118,949	635,080	19%	118,949	19%	118,949	19%
Northwest Branch	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	683,740	1,408,024	49%	736,116	52%	788,493	56%
Northwest Branch	R-30	No	NA	Yes	R-30_NA_PA	997	66,791	1%	997	1%	997	1%
Northwest Branch	R-30	No	NA	No	R-30_NA_NOTPA	195,127	554,618	35%	252,856	46%	310,586	56%
Northwest Branch	R-40	Yes	Purple_0.5	No	R-40_Purple_0.5_NOTPA	565,798	1,247,459	45%	565,798	45%	565,798	45%
Northwest Branch	R-40	No	NA	No	R-40_NA_NOTPA	8,830	18,073	49%	8,830	49%	8,830	49%
Northwest Branch	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	27,060	602,671	4%	27,060	4%	27,060	4%
Northwest Branch	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	644,923	2,317,713	28%	1,029,364	44%	1,413,805	61%
Northwest Branch	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	8,062	74,001	11%	8,062	11%	8,062	11%
Northwest Branch	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	103,296	215,650	48%	117,421	54%	131,547	61%
Northwest Branch	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	7,208	255,984	3%	7,208	3%	7,208	3%
Northwest Branch	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	2,015,777	5,223,677	39%	2,601,110	50%	3,186,443	61%
Northwest Branch	R-60	No	NA	Yes	R-60_NA_PA	590,292	18,157,668	3%	590,292	3%	590,292	3%
Northwest Branch	R-60	No	NA	No	R-60_NA_NOTPA	12,727,157	40,929,284	31%	18,847,010	46%	24,966,863	61%
Northwest Branch	R-90	Yes	Corridor	Yes	R-90_Corridor_PA	46,748	308,691	15%	46,748	15%	46,748	15%
Northwest Branch	R-90	Yes	Corridor	No	R-90_Corridor_NOTPA	732,574	2,584,704	28%	931,045	36%	1,129,516	44%
Northwest Branch	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	14,966	52,698	28%	18,998	36%	23,029	44%
Northwest Branch	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	770,317	8,126,352	9%	770,317	9%	770,317	9%
Northwest Branch	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	1,695,331	5,970,500	28%	2,152,220	36%	2,609,109	44%
Northwest Branch	R-90	No	NA	Yes	R-90_NA_PA	1,104,025	25,167,582	4%	1,104,025	4%	1,104,025	4%
Northwest Branch	R-90	No	NA	No	R-90_NA_NOTPA	9,094,121	33,544,696	27%	11,876,577	35%	14,659,032	44%
Northwest Branch	RE-1	No	NA	Yes	RE-1_NA_PA	121,437	3,357,984	4%	121,437	4%	121,437	4%
Northwest Branch	RE-1	No	NA	No	RE-1_NA_NOTPA	1,864,694	12,835,632	15%	4,077,077	32%	6,289,460	49%
Northwest Branch	RE-2	No	NA	Yes	RE-2_NA_PA	218,783	11,739,714	2%	218,783	2%	218,783	2%
Northwest Branch	RE-2	No	NA	No	RE-2_NA_NOTPA	668,831	4,021,556	17%	1,078,403	27%	1,487,976	37%
Northwest Branch	RE-2C	No	NA	No	RE-2C_NA_NOTPA	34,765	297,702	12%	50,130	17%	65,495	22%
Northwest Branch	R-H	Yes	Purple_0.5	No	R-H_Purple_0.5_NOTPA	75,447	143,121	53%	76,160	53%	76,873	54%
Northwest Branch	R-H	No	NA	No	R-H_NA_NOTPA	219,766	409,702	54%	219,912	54%	220,057	54%
Northwest Branch	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	169,432	229,635	74%	169,432	74%	169,432	74%
Northwest Branch	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	1,566,626	2,439,713	64%	1,566,626	64%	1,566,626	64%
Northwest Branch	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	251,152	306,065	82%	251,152	82%	251,152	82%
Northwest Branch	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	78,432	289,445	27%	78,432	27%	78,432	27%
Northwest Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	906,848	1,576,866	58%	934,368	59%	961,888	61%
Northwest Branch	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	21,591	42,647	51%	21,591	51%	21,591	51%
Northwest Branch	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	2,571,527	3,606,668	71%	2,571,527	71%	2,571,527	71%
Northwest Branch	ROW	No	NA	Yes	ROW_NA_PA	1,445,994	4,774,541	30%	1,445,994	30%	1,445,994	30%
Northwest Branch	ROW	No	NA	No	ROW_NA_NOTPA	28,464,860	57,700,394	49%	31,831,050	55%	35,197,241	61%
Northwest Branch	RT-12.5	Yes	Purple_0.5	No	RT-12.5_Purple_0.5_NOTPA	75,056	150,153	50%	86,328	57%	97,600	65%
Northwest Branch	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	165,486	303,485	55%	181,376	60%	197,265	65%
Northwest Branch	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA	4,929	7,907	62%	4,953	63%	4,978	63%
Northwest Branch	RT-15.0	Yes	Metro_1.0	Yes	RT-15.0_Metro_1.0_PA	18,028	49,298	37%	18,028	37%	18,028	37%
Northwest Branch	RT-15.0	Yes	Metro_1.0	No	RT-15.0_Metro_1.0_NOTPA	237,632	450,388	53%	260,604	58%	283,576	63%
Northwest Branch	RT-8.0	Yes	Metro_1.0	No	RT-8.0_Metro_1.0_NOTPA	112,925	345,827	33%	134,274	39%	155,622	45%
Northwest Branch	RT-8.0	Yes	Purple_0.5	No	RT-8.0_Purple_0.5_NOTPA	51,194	115,937	44%	51,683	45%	52,172	45%

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Northwest Branch	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	9	26	33%	10	39%	12	45%
Northwest Branch	Rural	No	NA	Yes	Rural_NA_PA	15,727	1,193,718	1%	15,727	1%	15,727	1%
Northwest Branch	Rural	No	NA	No	Rural_NA_NOTPA	487,372	6,531,766	7%	487,372	7%	487,372	7%
Northwest Branch	THD	Yes	Corridor	No	THD_Corridor_NOTPA	175,160	332,591	53%	211,589	64%	248,018	75%
Northwest Branch	THD	No	NA	No	THD_NA_NOTPA	73,694	142,465	52%	89,966	63%	106,238	75%
Northwest Branch	TLD	Yes	Corridor	No	TLD_Corridor_NOTPA	47,280	150,466	31%	66,523	44%	85,766	57%
Northwest Branch	TLD	No	NA	No	TLD_NA_NOTPA	83,662	193,400	43%	96,950	50%	110,238	57%
Northwest Branch	TMD	No	NA	No	TMD_NA_NOTPA	46,067	89,792	51%	53,563	60%	61,059	68%
Northwest Branch - Bel Pre Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	11,913	11,913	100%	11,913	100%	11,913	100%
Northwest Branch - Bel Pre Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	55,047	288,596	19%	55,047	19%	55,047	19%
Northwest Branch - Bel Pre Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	1,358,755	2,187,910	62%	1,707,695	78%	2,056,635	94%
Northwest Branch - Bel Pre Creek	EOF	No	NA	No	EOF_NA_NOTPA	633,020	738,461	86%	659,965	89%	686,910	93%
Northwest Branch - Bel Pre Creek	PD-Low	No	NA	Yes	PD-Low_NA_PA	4,916	163,105	3%	4,916	3%	4,916	3%
Northwest Branch - Bel Pre Creek	PD-Low	No	NA	No	PD-Low_NA_NOTPA	302,994	1,504,080	20%	347,027	23%	391,061	26%
Northwest Branch - Bel Pre Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	485,053	1,212,121	40%	606,163	50%	727,272	60%
Northwest Branch - Bel Pre Creek	PRC	Yes	Corridor	No	PRC_Corridor_NOTPA	893,476	1,592,319	56%	893,476	56%	893,476	56%
Northwest Branch - Bel Pre Creek	PRC	No	NA	Yes	PRC_NA_PA	156,714	2,094,884	7%	156,714	7%	156,714	7%
Northwest Branch - Bel Pre Creek	PRC	No	NA	No	PRC_NA_NOTPA	9,987,870	23,412,420	43%	10,847,040	46%	11,706,210	50%
Northwest Branch - Bel Pre Creek	R-20	Yes	Metro_0.5	Yes	R-20_Metro_0.5_PA	60	6,025	1%	60	1%	60	1%
Northwest Branch - Bel Pre Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	387,192	799,797	48%	472,958	59%	558,725	70%
Northwest Branch - Bel Pre Creek	R-20	No	NA	No	R-20_NA_NOTPA	622	14,608	4%	5,413	37%	10,205	70%
Northwest Branch - Bel Pre Creek	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	103,500	608,833	17%	207,307	34%	311,114	51%
Northwest Branch - Bel Pre Creek	R-200	Yes	Metro_1.0	Yes	R-200_Metro_1.0_PA	94	569,093	0%	94	0%	94	0%
Northwest Branch - Bel Pre Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	70,987	202,711	35%	87,286	43%	103,585	51%
Northwest Branch - Bel Pre Creek	R-200	No	NA	Yes	R-200_NA_PA	354,446	7,192,112	5%	354,446	5%	354,446	5%
Northwest Branch - Bel Pre Creek	R-200	No	NA	No	R-200_NA_NOTPA	6,584,045	24,706,681	27%	9,604,580	39%	12,625,114	51%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_0.5	Yes	R-30_Metro_0.5_PA	3,523	88,666	4%	3,523	4%	3,523	4%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	357,596	882,623	41%	425,932	48%	494,269	56%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	3,526	8,219	43%	3,526	43%	3,526	43%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	102,071	175,989	58%	102,071	58%	102,071	58%
Northwest Branch - Bel Pre Creek	R-30	No	NA	Yes	R-30_NA_PA	6,191	9,218	67%	6,191	67%	6,191	67%
Northwest Branch - Bel Pre Creek	R-30	No	NA	No	R-30_NA_NOTPA	492,567	955,044	52%	513,696	54%	534,825	56%
Northwest Branch - Bel Pre Creek	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	4,106	11,302	36%	4,106	36%	4,106	36%
Northwest Branch - Bel Pre Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	53,322	204,393	26%	89,001	44%	124,680	61%
Northwest Branch - Bel Pre Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	71	110	64%	71	64%	71	64%
Northwest Branch - Bel Pre Creek	R-60	No	NA	No	R-60_NA_NOTPA	208,277	641,334	32%	299,745	47%	391,214	61%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	243,959	1,666,036	15%	243,959	15%	243,959	15%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	640,936	2,753,211	23%	922,044	33%	1,203,153	44%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	133,435	1,706,413	8%	133,435	8%	133,435	8%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	3,490,412	13,825,007	25%	4,765,970	34%	6,041,528	44%
Northwest Branch - Bel Pre Creek	R-90	No	NA	Yes	R-90_NA_PA	91,085	3,253,660	3%	91,085	3%	91,085	3%
Northwest Branch - Bel Pre Creek	R-90	No	NA	No	R-90_NA_NOTPA	1,622,733	5,508,820	29%	2,015,044	37%	2,407,354	44%
Northwest Branch - Bel Pre Creek	RE-2	No	NA	Yes	RE-2_NA_PA	55,512	1,502,488	4%	55,512	4%	55,512	4%
Northwest Branch - Bel Pre Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	1,056,064	8,562,018	12%	2,112,005	25%	3,167,947	37%

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Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Northwest Branch - Bel Pre Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	580,576	1,099,760	53%	625,715	57%	670,853	61%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	23,132	37,875	61%	23,132	61%	23,132	61%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	916,732	1,302,333	70%	916,732	70%	916,732	70%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	80,501	157,310	51%	80,501	51%	80,501	51%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	2,255,193	3,971,048	57%	2,338,766	59%	2,422,339	61%
Northwest Branch - Bel Pre Creek	ROW	No	NA	Yes	ROW_NA_PA	123,084	264,520	47%	123,084	47%	123,084	47%
Northwest Branch - Bel Pre Creek	ROW	No	NA	No	ROW_NA_NOTPA	4,622,582	8,290,262	56%	4,839,821	58%	5,057,060	61%
Northwest Branch - Bel Pre Creek	RT-12.5	Yes	Corridor	No	RT-12.5_Corridor_NOTPA	189,014	297,944	63%	191,339	64%	193,663	65%
Northwest Branch - Bel Pre Creek	RT-12.5	Yes	Metro_0.5	Yes	RT-12.5_Metro_0.5_PA	17,035	59,406	29%	17,035	29%	17,035	29%
Northwest Branch - Bel Pre Creek	RT-12.5	Yes	Metro_0.5	No	RT-12.5_Metro_0.5_NOTPA	259,500	521,788	50%	299,331	57%	339,162	65%
Northwest Branch - Bel Pre Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	71,844	108,508	66%	71,844	66%	71,844	66%
Northwest Branch - Bel Pre Creek	RT-15.0	Yes	Metro_0.5	Yes	RT-15.0_Metro_0.5_PA		9	0%	0	0%	0	0%
Northwest Branch - Bel Pre Creek	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA		49	0%	16	31%	31	63%
Sligo Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	13,153	14,427	91%	13,357	93%	13,562	94%
Sligo Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	60,619	87,551	69%	60,619	69%	60,619	69%
Sligo Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	7,450,923	9,246,365	81%	8,071,253	87%	8,691,583	94%
Sligo Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	717,015	1,092,482	66%	871,974	80%	1,026,933	94%
Sligo Creek	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	102,533	171,024	60%	131,648	77%	160,763	94%
Sligo Creek	CR	Yes	Purple_0.5	Yes	CR_Purple_0.5_PA	89	54,019	0%	89	0%	89	0%
Sligo Creek	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	4,204,416	5,297,100	79%	4,591,845	87%	4,979,274	94%
Sligo Creek	CR	No	NA	Yes	CR_NA_PA	16,357	33,732	48%	16,357	48%	16,357	48%
Sligo Creek	CR	No	NA	No	CR_NA_NOTPA	733,743	942,630	78%	809,907	86%	886,072	94%
Sligo Creek	EOF	Yes	Metro_0.5	Yes	EOF_Metro_0.5_PA	5,778	36,233	16%	5,778	16%	5,778	16%
Sligo Creek	EOF	Yes	Metro_0.5	No	EOF_Metro_0.5_NOTPA	1,765,803	2,041,233	87%	1,832,270	90%	1,898,737	93%
Sligo Creek	EOF	Yes	Metro_1.0	Yes	EOF_Metro_1.0_PA	61	3,021	2%	61	2%	61	2%
Sligo Creek	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	196,503	263,689	75%	220,892	84%	245,281	93%
Sligo Creek	EOF	Yes	Purple_0.5	No	EOF_Purple_0.5_NOTPA	34,316	39,933	86%	35,730	89%	37,145	93%
Sligo Creek	EOF	No	NA	Yes	EOF_NA_PA	49	499	10%	49	10%	49	10%
Sligo Creek	EOF	No	NA	No	EOF_NA_NOTPA	300,141	347,922	86%	311,888	90%	323,634	93%
Sligo Creek	IL	Yes	Metro_0.5	No	IL_Metro_0.5_NOTPA	1,582	1,582	100%	1,582	100%	1,582	100%
Sligo Creek	IL	Yes	Metro_1.0	No	IL_Metro_1.0_NOTPA	68,171	83,918	81%	73,375	87%	78,579	94%
Sligo Creek	IL	Yes	MRAC_0.5	Yes	IL_MRAC_0.5_PA	2,906	31,687	9%	2,906	9%	2,906	9%
Sligo Creek	IL	Yes	MRAC_0.5	No	IL_MRAC_0.5_NOTPA	45,629	51,039	89%	46,710	92%	47,792	94%
Sligo Creek	IL	Yes	Purple_0.5	No	IL_Purple_0.5_NOTPA	515	515	100%	515	100%	515	100%
Sligo Creek	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	177,038	201,783	88%	183,194	91%	189,350	94%
Sligo Creek	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	36,413	43,012	85%	38,388	89%	40,362	94%
Sligo Creek	IM	Yes	Purple_0.5	No	IM_Purple_0.5_NOTPA	4,999	6,675	75%	5,631	84%	6,263	94%
Sligo Creek	PD-Med	Yes	Metro_0.5	No	PD-Med_Metro_0.5_NOTPA	183,555	372,275	49%	183,555	49%	183,555	49%
Sligo Creek	PD-MedLow	Yes	Metro_0.5	Yes	PD-MedLow_Metro_0.5_PA	1,102	20,193	5%	1,102	5%	1,102	5%
Sligo Creek	PD-MedLow	Yes	Metro_0.5	No	PD-MedLow_Metro_0.5_NOTPA	236,374	640,319	37%	310,283	48%	384,192	60%
Sligo Creek	PD-MedLow	Yes	Metro_1.0	No	PD-MedLow_Metro_1.0_NOTPA	21	1,065	2%	330	31%	639	60%
Sligo Creek	R-10	Yes	Metro_0.5	No	R-10_Metro_0.5_NOTPA	76,401	160,993	47%	94,400	59%	112,398	70%
Sligo Creek	R-10	Yes	Metro_1.0	Yes	R-10_Metro_1.0_PA	15,970	46,327	34%	15,970	34%	15,970	34%
Sligo Creek	R-10	Yes	Metro_1.0	No	R-10_Metro_1.0_NOTPA	782,951	1,355,934	58%	864,800	64%	946,648	70%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Sligo Creek	R-10	Yes	Purple_0.5	Yes	R-10_Purple_0.5_PA	57,967	290,362	20%	57,967	20%	57,967	20%
Sligo Creek	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	4,834,361	9,785,317	49%	5,833,002	60%	6,831,642	70%
Sligo Creek	R-10	No	NA	Yes	R-10_NA_PA	2,602	5,583	47%	2,602	47%	2,602	47%
Sligo Creek	R-10	No	NA	No	R-10_NA_NOTPA	433,448	887,637	49%	526,577	59%	619,706	70%
Sligo Creek	R-20	Yes	Metro_0.5	Yes	R-20_Metro_0.5_PA	14,209	42,436	33%	14,209	33%	14,209	33%
Sligo Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	803,489	1,482,231	54%	919,475	62%	1,035,461	70%
Sligo Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	420,371	781,277	54%	483,079	62%	545,787	70%
Sligo Creek	R-20	Yes	Purple_0.5	Yes	R-20_Purple_0.5_PA		3,870	0%	0	0%	0	0%
Sligo Creek	R-20	Yes	Purple_0.5	No	R-20_Purple_0.5_NOTPA	118,797	357,636	33%	184,318	52%	249,838	70%
Sligo Creek	R-20	No	NA	Yes	R-20_NA_PA	58	13,606	0%	58	0%	58	0%
Sligo Creek	R-20	No	NA	No	R-20_NA_NOTPA	93,610	221,607	42%	124,210	56%	154,811	70%
Sligo Creek	R-200	No	NA	No	R-200_NA_NOTPA	14,806	27,212	54%	14,806	54%	14,806	54%
Sligo Creek	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	14,170	31,812	45%	15,993	50%	17,815	56%
Sligo Creek	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	604	23,386	3%	604	3%	604	3%
Sligo Creek	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	77,167	219,026	35%	99,911	46%	122,655	56%
Sligo Creek	R-30	Yes	Purple_0.5	Yes	R-30_Purple_0.5_PA		208	0%	0	0%	0	0%
Sligo Creek	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	73,758	185,024	40%	88,685	48%	103,613	56%
Sligo Creek	R-30	No	NA	Yes	R-30_NA_PA	21,078	131,955	16%	21,078	16%	21,078	16%
Sligo Creek	R-30	No	NA	No	R-30_NA_NOTPA	158,187	334,473	47%	172,746	52%	187,305	56%
Sligo Creek	R-40	Yes	Metro_0.5	No	R-40_Metro_0.5_NOTPA	29,272	89,906	33%	34,865	39%	40,458	45%
Sligo Creek	R-40	Yes	Metro_1.0	Yes	R-40_Metro_1.0_PA	1,773	15,238	12%	1,773	12%	1,773	12%
Sligo Creek	R-40	Yes	Metro_1.0	No	R-40_Metro_1.0_NOTPA	104,046	292,396	36%	117,812	40%	131,578	45%
Sligo Creek	R-40	Yes	Purple_0.5	No	R-40_Purple_0.5_NOTPA	210,582	590,941	36%	238,252	40%	265,923	45%
Sligo Creek	R-40	No	NA	Yes	R-40_NA_PA	1,797	8,755	21%	1,797	21%	1,797	21%
Sligo Creek	R-40	No	NA	No	R-40_NA_NOTPA	801,015	1,952,386	41%	839,794	43%	878,574	45%
Sligo Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	52,639	386,524	14%	52,639	14%	52,639	14%
Sligo Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	1,053,678	2,870,664	37%	1,402,391	49%	1,751,105	61%
Sligo Creek	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	127,262	699,283	18%	127,262	18%	127,262	18%
Sligo Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	5,562,138	16,892,076	33%	7,933,152	47%	10,304,167	61%
Sligo Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	1,512,491	13,068,505	12%	1,512,491	12%	1,512,491	12%
Sligo Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	13,865,464	44,519,402	31%	20,511,150	46%	27,156,835	61%
Sligo Creek	R-60	Yes	MRAC_0.5	No	R-60_MRAC_0.5_NOTPA	232,740	825,394	28%	368,115	45%	503,491	61%
Sligo Creek	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	1,083,770	9,689,562	11%	1,083,770	11%	1,083,770	11%
Sligo Creek	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	10,929,927	35,310,454	31%	16,234,652	46%	21,539,377	61%
Sligo Creek	R-60	No	NA	Yes	R-60_NA_PA	828,366	7,670,205	11%	828,366	11%	828,366	11%
Sligo Creek	R-60	No	NA	No	R-60_NA_NOTPA	11,818,320	37,213,893	32%	17,259,397	46%	22,700,475	61%
Sligo Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	208,181	1,124,321	19%	349,755	31%	491,328	44%
Sligo Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	91,891	3,631,586	3%	91,891	3%	91,891	3%
Sligo Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	2,272,190	7,971,271	29%	2,877,818	36%	3,483,446	44%
Sligo Creek	R-90	No	NA	Yes	R-90_NA_PA	23,462	909,272	3%	23,462	3%	23,462	3%
Sligo Creek	R-90	No	NA	No	R-90_NA_NOTPA	250,712	711,440	35%	280,806	39%	310,899	44%
Sligo Creek	RE-2	Yes	Metro_1.0	Yes	RE-2_Metro_1.0_PA	409	51,113	1%	409	1%	409	1%
Sligo Creek	RE-2	Yes	Purple_0.5	Yes	RE-2_Purple_0.5_PA	5,039	206,303	2%	5,039	2%	5,039	2%
Sligo Creek	RE-2	No	NA	Yes	RE-2_NA_PA	41,008	1,143,271	4%	41,008	4%	41,008	4%

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Sligo Creek	RE-2	No	NA	No	RE-2_NA_NOTPA		0	0%	0	19%	0	37%
Sligo Creek	R-H	No	NA	Yes	R-H_NA_PA		5	0%	0	0%	0	0%
Sligo Creek	R-H	No	NA	No	R-H_NA_NOTPA	554,049	1,045,479	53%	557,796	53%	561,544	54%
Sligo Creek	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	79,993	126,400	63%	79,993	63%	79,993	63%
Sligo Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	1,151,908	2,221,510	52%	1,253,514	56%	1,355,121	61%
Sligo Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	71,527	135,145	53%	71,527	53%	71,527	53%
Sligo Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	7,874,128	11,335,567	69%	7,874,128	69%	7,874,128	69%
Sligo Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	578,777	1,392,900	42%	578,777	42%	578,777	42%
Sligo Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	10,001,828	16,094,771	62%	10,001,828	62%	10,001,828	62%
Sligo Creek	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	774	5,650	14%	774	14%	774	14%
Sligo Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	250,016	345,391	72%	250,016	72%	250,016	72%
Sligo Creek	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	326,300	930,410	35%	326,300	35%	326,300	35%
Sligo Creek	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	10,874,553	16,638,773	65%	10,874,553	65%	10,874,553	65%
Sligo Creek	ROW	No	NA	Yes	ROW_NA_PA	359,063	725,835	49%	359,063	49%	359,063	49%
Sligo Creek	ROW	No	NA	No	ROW_NA_NOTPA	9,260,051	15,605,238	59%	9,389,623	60%	9,519,195	61%
Sligo Creek	RT-10.0	Yes	Metro_0.5	No	RT-10.0_Metro_0.5_NOTPA	46,065	107,773	43%	55,903	52%	65,742	61%
Sligo Creek	RT-10.0	Yes	Metro_1.0	Yes	RT-10.0_Metro_1.0_PA		18	0%	0	0%	0	0%
Sligo Creek	RT-10.0	Yes	Metro_1.0	No	RT-10.0_Metro_1.0_NOTPA	79,017	179,505	44%	94,258	53%	109,498	61%
Sligo Creek	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	9,010	34,439	26%	15,009	44%	21,008	61%
Sligo Creek	RT-12.5	Yes	Metro_0.5	Yes	RT-12.5_Metro_0.5_PA	13,038	41,233	32%	13,038	32%	13,038	32%
Sligo Creek	RT-12.5	Yes	Metro_0.5	No	RT-12.5_Metro_0.5_NOTPA	336,124	636,698	53%	374,989	59%	413,854	65%
Sligo Creek	RT-12.5	Yes	Metro_1.0	Yes	RT-12.5_Metro_1.0_PA		164	0%	0	0%	0	0%
Sligo Creek	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	415,105	758,629	55%	454,107	60%	493,109	65%
Sligo Creek	RT-12.5	Yes	Purple_0.5	Yes	RT-12.5_Purple_0.5_PA	19,704	265,373	7%	19,704	7%	19,704	7%
Sligo Creek	RT-12.5	Yes	Purple_0.5	No	RT-12.5_Purple_0.5_NOTPA	786,489	1,469,979	54%	870,988	59%	955,486	65%
Sligo Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA		10,161	0%	0	0%	0	0%
Sligo Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	290,577	600,233	48%	340,365	57%	390,152	65%
Sligo Creek	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA	220,338	318,744	69%	220,338	69%	220,338	69%
Sligo Creek	RT-15.0	Yes	Metro_1.0	No	RT-15.0_Metro_1.0_NOTPA	222,645	394,070	56%	235,381	60%	248,116	63%
Sligo Creek	RT-8.0	Yes	Metro_0.5	No	RT-8.0_Metro_0.5_NOTPA	57,553	145,147	40%	61,435	42%	65,316	45%
Sligo Creek	RT-8.0	Yes	Metro_1.0	Yes	RT-8.0_Metro_1.0_PA	2,659	168,131	2%	2,659	2%	2,659	2%
Sligo Creek	RT-8.0	Yes	Metro_1.0	No	RT-8.0_Metro_1.0_NOTPA	13,569	24,083	56%	13,569	56%	13,569	56%
Sligo Creek	RT-8.0	Yes	MRAC_0.5	No	RT-8.0_MRAC_0.5_NOTPA	5,918	12,095	49%	5,918	49%	5,918	49%
Sligo Creek	RT-8.0	Yes	Purple_0.5	No	RT-8.0_Purple_0.5_NOTPA	73,709	234,569	31%	89,633	38%	105,556	45%
Sligo Creek	RT-8.0	No	NA	Yes	RT-8.0_NA_PA	1,811	117,353	2%	1,811	2%	1,811	2%
Sligo Creek	TMD	Yes	Metro_0.5	No	TMD_Metro_0.5_NOTPA	92,818	190,872	49%	111,305	58%	129,793	68%
Sligo Creek	TMD	Yes	Purple_0.5	No	TMD_Purple_0.5_NOTPA	116,182	203,785	57%	127,378	63%	138,574	68%
Watts Branch	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	42,241	56,454	75%	47,654	84%	53,067	94%
Watts Branch	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	2,716	23,648	11%	2,716	11%	2,716	11%
Watts Branch	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2,769	40,701	7%	20,514	50%	38,259	94%
Watts Branch	CR	No	NA	Yes	CR_NA_PA	13,913	2,207,098	1%	13,913	1%	13,913	1%
Watts Branch	CR	No	NA	No	CR_NA_NOTPA	2,112,095	6,041,797	35%	3,895,692	64%	5,679,289	94%
Watts Branch	EOF	No	NA	No	EOF_NA_NOTPA	2,763,435	5,391,844	51%	3,889,441	72%	5,015,446	93%
Watts Branch	IH	No	NA	Yes	IH_NA_PA		12,676	0%	0	0%	0	0%
Watts Branch	IH	No	NA	No	IH_NA_NOTPA	168,843	11,905,466	1%	2,698,344	23%	5,227,845	44%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Watts Branch	IM	Yes	Corridor	No	IM_Corridor_NOTPA	448	1,559	29%	956	61%	1,463	94%
Watts Branch	IM	Yes	Metro_0.5	No	IM_Metro_0.5_NOTPA	14,702	18,763	78%	16,154	86%	17,607	94%
Watts Branch	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	33,160	40,443	82%	35,556	88%	37,952	94%
Watts Branch	IM	No	NA	No	IM_NA_NOTPA	10,193	66,570	15%	36,331	55%	62,469	94%
Watts Branch	PD-Low	No	NA	Yes	PD-Low_NA_PA	98	2,588	4%	98	4%	98	4%
Watts Branch	PD-Low	No	NA	No	PD-Low_NA_NOTPA	421,868	1,649,987	26%	425,432	26%	428,997	26%
Watts Branch	R-200	No	NA	Yes	R-200_NA_PA	451,146	17,362,905	3%	451,146	3%	451,146	3%
Watts Branch	R-200	No	NA	No	R-200_NA_NOTPA	18,934,456	72,488,965	26%	27,988,159	39%	37,041,861	51%
Watts Branch	R-90	No	NA	No	R-90_NA_NOTPA	94,644	328,445	29%	119,087	36%	143,530	44%
Watts Branch	RE-1	No	NA	Yes	RE-1_NA_PA	132,116	12,910,133	1%	132,116	1%	132,116	1%
Watts Branch	RE-1	No	NA	No	RE-1_NA_NOTPA	6,081,837	43,550,958	14%	13,710,903	31%	21,339,969	49%
Watts Branch	RE-2	No	NA	Yes	RE-2_NA_PA	1,059,146	57,252,253	2%	1,059,146	2%	1,059,146	2%
Watts Branch	RE-2	No	NA	No	RE-2_NA_NOTPA	21,278,506	174,906,581	12%	42,996,970	25%	64,715,435	37%
Watts Branch	RE-2C	No	NA	Yes	RE-2C_NA_PA	192	888,162	0%	192	0%	192	0%
Watts Branch	RE-2C	No	NA	No	RE-2C_NA_NOTPA	284,304	1,321,271	22%	287,492	22%	290,680	22%
Watts Branch	RNC	No	NA	Yes	RNC_NA_PA	24,792	3,778,435	1%	24,792	1%	24,792	1%
Watts Branch	RNC	No	NA	No	RNC_NA_NOTPA	564,366	2,225,943	25%	564,366	25%	564,366	25%
Watts Branch	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	247,428	349,926	71%	247,428	71%	247,428	71%
Watts Branch	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	156,004	246,787	63%	156,004	63%	156,004	63%
Watts Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	3,593,633	5,357,141	67%	3,593,633	67%	3,593,633	67%
Watts Branch	ROW	No	NA	Yes	ROW_NA_PA	1,274,960	2,543,884	50%	1,274,960	50%	1,274,960	50%
Watts Branch	ROW	No	NA	No	ROW_NA_NOTPA	32,567,348	62,127,074	52%	35,232,432	57%	37,897,515	61%
Watts Branch	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	393	6,869	6%	2,291	33%	4,190	61%
Middle Rock Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	537901.2429	678319.0089	79%	587,761	87%	637,620	94%
Middle Rock Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	323231.4593	574164.3349	56%	323,231	56%	323,231	56%
Middle Rock Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	7262269.757	11289627.34	64%	8,937,260	79%	10,612,250	94%
Middle Rock Creek	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	113266.99	544311.2689	21%	113,267	21%	113,267	21%
Middle Rock Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2433631.217	4742353.669	51%	3,445,722	73%	4,457,812	94%
Middle Rock Creek	CR	No	NA	No	CR_NA_NOTPA	1969013.719	2559882.563	77%	2,187,652	85%	2,406,290	94%
Middle Rock Creek	EOF	Yes	Corridor	No	EOF_Corridor_NOTPA	363155.418	490812.5376	74%	409,852	84%	456,549	93%
Middle Rock Creek	EOF	No	NA	No	EOF_NA_NOTPA	1309214.347	1535768.47	85%	1,368,886	89%	1,428,558	93%
Middle Rock Creek	IH	Yes	Metro_1.0	Yes	IH_Metro_1.0_PA	61572.88543	81908.65432	75%	61,573	75%	61,573	75%
Middle Rock Creek	IH	Yes	Metro_1.0	No	IH_Metro_1.0_NOTPA	169235.7766	390704.8477	43%	170,400	44%	171,564	44%
Middle Rock Creek	IH	No	NA	Yes	IH_NA_PA	172731.1193	1081019.18	16%	172,731	16%	172,731	16%
Middle Rock Creek	IH	No	NA	No	IH_NA_NOTPA	1993846.571	3735441.245	53%	1,993,847	53%	1,993,847	53%
Middle Rock Creek	IL	Yes	Metro_0.5	No	IL_Metro_0.5_NOTPA	728106.2011	807724.6363	90%	742,223	92%	756,339	94%
Middle Rock Creek	IL	Yes	Metro_1.0	No	IL_Metro_1.0_NOTPA	1387535.426	1625393.423	85%	1,454,763	90%	1,521,990	94%
Middle Rock Creek	IL	No	NA	Yes	IL_NA_PA		36705.35464	0%	0	0%	0	0%
Middle Rock Creek	IL	No	NA	No	IL_NA_NOTPA	103971.6736	162935.4828	64%	128,271	79%	152,570	94%
Middle Rock Creek	IM	Yes	Corridor	No	IM_Corridor_NOTPA	458322.6845	1177510.924	39%	781,642	66%	1,104,961	94%
Middle Rock Creek	IM	Yes	Metro_0.5	No	IM_Metro_0.5_NOTPA	2236904.021	4404888.237	51%	3,185,197	72%	4,133,491	94%
Middle Rock Creek	IM	Yes	Metro_1.0	Yes	IM_Metro_1.0_PA	83.54051088	289011.5938	0%	84	0%	84	0%
Middle Rock Creek	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	3860079.792	7026335.269	55%	5,226,752	74%	6,593,423	94%
Middle Rock Creek	IM	No	NA	Yes	IM_NA_PA	45947.75557	1006437.813	5%	45,948	5%	45,948	5%
Middle Rock Creek	IM	No	NA	No	IM_NA_NOTPA	5009910.55	9676481.686	52%	7,045,099	73%	9,080,287	94%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Middle Rock Creek	PD-Low	Yes	Metro_0.5	Yes	PD-Low_Metro_0.5_PA	1938.272657	320929.1332	1%	1,938	1%	1,938	1%
Middle Rock Creek	PD-Low	Yes	Metro_0.5	No	PD-Low_Metro_0.5_NOTPA		0.782327254	0%	0	13%	0	26%
Middle Rock Creek	PD-Low	Yes	Metro_1.0	Yes	PD-Low_Metro_1.0_PA	49.00236581	2064754.905	0%	49	0%	49	0%
Middle Rock Creek	PD-Low	No	NA	Yes	PD-Low_NA_PA	1128.627654	1546639.272	0%	1,129	0%	1,129	0%
Middle Rock Creek	PRC	Yes	Corridor	No	PRC_Corridor_NOTPA	194198.2922	481608.1758	40%	217,501	45%	240,804	50%
Middle Rock Creek	PRC	No	NA	Yes	PRC_NA_PA		476766.7329	0%	0	0%	0	0%
Middle Rock Creek	PRC	No	NA	No	PRC_NA_NOTPA	2092243.135	4313420.144	49%	2,124,477	49%	2,156,710	50%
Middle Rock Creek	R-10	No	NA	Yes	R-10_NA_PA	134140.6545	322223.232	42%	134,141	42%	134,141	42%
Middle Rock Creek	R-10	No	NA	No	R-10_NA_NOTPA	314330.5657	451163.311	70%	314,656	70%	314,981	70%
Middle Rock Creek	R-20	Yes	Corridor	Yes	R-20_Corridor_PA	40114.65988	109978.513	36%	40,115	36%	40,115	36%
Middle Rock Creek	R-20	Yes	Corridor	No	R-20_Corridor_NOTPA	655345.9729	1217431.565	54%	752,911	62%	850,477	70%
Middle Rock Creek	R-20	Yes	Metro_1.0	Yes	R-20_Metro_1.0_PA	23373.40735	85716.02336	27%	23,373	27%	23,373	27%
Middle Rock Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	1018634.84	2139380.909	48%	1,256,585	59%	1,494,534	70%
Middle Rock Creek	R-20	No	NA	Yes	R-20_NA_PA	74293.42245	352571.544	21%	74,293	21%	74,293	21%
Middle Rock Creek	R-20	No	NA	No	R-20_NA_NOTPA	4405531.334	8681758.536	51%	5,235,229	60%	6,064,926	70%
Middle Rock Creek	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	159721.0334	978948.6931	16%	329,982	34%	500,243	51%
Middle Rock Creek	R-200	Yes	Metro_0.5	Yes	R-200_Metro_0.5_PA	116.5244644	188852.7524	0%	117	0%	117	0%
Middle Rock Creek	R-200	Yes	Metro_0.5	No	R-200_Metro_0.5_NOTPA	48963.68109	287277.7701	17%	97,881	34%	146,799	51%
Middle Rock Creek	R-200	Yes	Metro_1.0	Yes	R-200_Metro_1.0_PA	129007.2038	5722425.116	2%	129,007	2%	129,007	2%
Middle Rock Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	644342.4085	4979082.019	13%	1,594,327	32%	2,544,311	51%
Middle Rock Creek	R-200	No	NA	Yes	R-200_NA_PA	398764.5432	21087208.91	2%	398,765	2%	398,765	2%
Middle Rock Creek	R-200	No	NA	No	R-200_NA_NOTPA	4298336.647	25368240.44	17%	8,630,754	34%	12,963,171	51%
Middle Rock Creek	R-30	No	NA	No	R-30_NA_NOTPA	190633.0985	479532.6143	40%	229,586	48%	268,538	56%
Middle Rock Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	42021.30113	606343.6261	7%	42,021	7%	42,021	7%
Middle Rock Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	267621.0562	907503.4673	29%	410,599	45%	553,577	61%
Middle Rock Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	24422.61414	81373.8016	30%	37,030	46%	49,638	61%
Middle Rock Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	1255.528889	4099.619908	31%	1,256	31%	1,256	31%
Middle Rock Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	1179214.641	3646481.04	32%	1,701,784	47%	2,224,353	61%
Middle Rock Creek	R-60	No	NA	Yes	R-60_NA_PA	255243.7993	6209127.232	4%	255,244	4%	255,244	4%
Middle Rock Creek	R-60	No	NA	No	R-60_NA_NOTPA	11152807.19	34509032.08	32%	16,101,658	47%	21,050,510	61%
Middle Rock Creek	R-90	Yes	Corridor	Yes	R-90_Corridor_PA	87854.66838	407993.4687	22%	87,855	22%	87,855	22%
Middle Rock Creek	R-90	Yes	Corridor	No	R-90_Corridor_NOTPA	528029.7069	1650913.697	32%	624,739	38%	721,449	44%
Middle Rock Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	6184.026045	962801.7093	1%	6,184	1%	6,184	1%
Middle Rock Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	207092.8969	1103095.427	19%	344,573	31%	482,053	44%
Middle Rock Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	6916.630518	877150.7882	1%	6,917	1%	6,917	1%
Middle Rock Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	821090.8478	3865526.848	21%	1,255,163	32%	1,689,235	44%
Middle Rock Creek	R-90	No	NA	Yes	R-90_NA_PA	366697.2086	11577579.67	3%	366,697	3%	366,697	3%
Middle Rock Creek	R-90	No	NA	No	R-90_NA_NOTPA	12145581.46	43240376.2	28%	15,520,813	36%	18,896,044	44%
Middle Rock Creek	RE-1	Yes	Metro_0.5	Yes	RE-1_Metro_0.5_PA	3043.858694	8961.7793	34%	3,044	34%	3,044	34%
Middle Rock Creek	RE-1	Yes	Metro_0.5	No	RE-1_Metro_0.5_NOTPA	33963.39006	149578.7198	23%	53,628	36%	73,294	49%
Middle Rock Creek	RE-1	Yes	Metro_1.0	Yes	RE-1_Metro_1.0_PA	2616.064014	1071749.912	0%	2,616	0%	2,616	0%
Middle Rock Creek	RE-1	Yes	Metro_1.0	No	RE-1_Metro_1.0_NOTPA	534984.442	2671039.154	20%	921,897	35%	1,308,809	49%
Middle Rock Creek	RE-1	No	NA	Yes	RE-1_NA_PA		89703.02043	0%	0	0%	0	0%
Middle Rock Creek	RE-1	No	NA	No	RE-1_NA_NOTPA	228400.6044	713866.4662	32%	289,098	40%	349,795	49%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									RWC Scenario **All areas grown using Average RWC**			
Watershed (MD12DIG_N)	Generalized ZONE	Within Focus Growth Area (FGA)?	FGA SubArea	Within Preserved Area?	FGA Subarea name	Impervious Area (Sqft)	Total Area (Sqft)	2019 %IA	RWC -Midterm Total IA (SF)	RWC - Midterm % IA	RWC - Longterm Total IA (SF)	RWC - Longterm % IA
Middle Rock Creek	RE-2	Yes	Corridor	No	RE-2_Corridor_NOTPA	184613.0959	929614.246	20%	264,285	28%	343,957	37%
Middle Rock Creek	RE-2	No	NA	Yes	RE-2_NA_PA	1094126.144	37274926.39	3%	1,094,126	3%	1,094,126	3%
Middle Rock Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	1300339.002	13626581.19	10%	3,171,087	23%	5,041,835	37%
Middle Rock Creek	RNC	No	NA	Yes	RNC_NA_PA	490.270997	414422.8317	0%	490	0%	490	0%
Middle Rock Creek	RNC	No	NA	No	RNC_NA_NOTPA	106265.5729	1047407.254	10%	110,740	11%	115,215	11%
Middle Rock Creek	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	48556.21154	106671.273	46%	48,556	46%	48,556	46%
Middle Rock Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	2355901.353	4054504.807	58%	2,414,575	60%	2,473,248	61%
Middle Rock Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	119811.7862	189875.2124	63%	119,812	63%	119,812	63%
Middle Rock Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	5770061.044	8138260.15	71%	5,770,061	71%	5,770,061	71%
Middle Rock Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	234648.1648	596466.2753	39%	234,648	39%	234,648	39%
Middle Rock Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	9063877.228	14593294.04	62%	9,063,877	62%	9,063,877	62%
Middle Rock Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	80703.51956	122551.8516	66%	80,704	66%	80,704	66%
Middle Rock Creek	ROW	No	NA	Yes	ROW_NA_PA	570606.6122	1506777.375	38%	570,607	38%	570,607	38%
Middle Rock Creek	ROW	No	NA	No	ROW_NA_NOTPA	23496469.24	40799390.8	58%	24,192,049	59%	24,887,628	61%
Middle Rock Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	2492.138686	274144.7892	1%	2,492	1%	2,492	1%
Middle Rock Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	263189.6894	627659.3648	42%	335,584	53%	407,979	65%
Middle Rock Creek	RT-8.0	No	NA	Yes	RT-8.0_NA_PA		4569.782409	0%	0	0%	0	0%
Middle Rock Creek	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	76566.00503	227605.2245	34%	89,494	39%	102,422	45%
Middle Rock Creek	TLD	Yes	Metro_0.5	Yes	TLD_Metro_0.5_PA	2916.891508	53525.9378	5%	2,917	5%	2,917	5%
Middle Rock Creek	TLD	Yes	Metro_0.5	No	TLD_Metro_0.5_NOTPA	134483.3327	411793.2003	33%	184,603	45%	234,722	57%
Middle Rock Creek	TLD	Yes	Metro_1.0	Yes	TLD_Metro_1.0_PA	0.043849674	38750.66247	0%	0	0%	0	0%
Middle Rock Creek	TLD	Yes	Metro_1.0	No	TLD_Metro_1.0_NOTPA	192857.1189	538563.9313	36%	249,919	46%	306,981	57%
Middle Rock Creek	TMD	Yes	Metro_0.5	No	TMD_Metro_0.5_NOTPA	27955.0844	70087.43881	40%	37,807	54%	47,659	68%
Middle Rock Creek	TMD	Yes	Metro_1.0	No	TMD_Metro_1.0_NOTPA	512966.2115	1290305.11	40%	695,187	54%	877,407	68%

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									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Cabin John Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	36,115	72,385	50%	36,115	50%	36,115	50%
Cabin John Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	3,739,566	5,194,372	72%	4,398,594	85%	4,398,594	85%
Cabin John Creek	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	5,053	361,620	1%	5,053	1%	5,053	1%
Cabin John Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2,173,578	3,719,623	58%	2,435,469	65%	2,435,469	65%
Cabin John Creek	CR	No	NA	Yes	CR_NA_PA	120,051	961,728	12%	120,051	12%	120,051	12%
Cabin John Creek	CR	No	NA	No	CR_NA_NOTPA	5,915,052	10,575,925	56%	7,928,211	75%	9,941,370	94%
Cabin John Creek	EOF	Yes	Metro_0.5	No	EOF_Metro_0.5_NOTPA	81,776	120,845	68%	102,332	85%	102,332	85%
Cabin John Creek	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	357,735	487,665	73%	357,735	73%	357,735	73%
Cabin John Creek	EOF	No	NA	Yes	EOF_NA_PA	23,133	84,323	27%	23,133	27%	23,133	27%
Cabin John Creek	EOF	No	NA	No	EOF_NA_NOTPA	3,939,878	5,829,097	68%	4,681,026	80%	5,422,174	93%
Cabin John Creek	PD-MedLow	Yes	Metro_0.5	Yes	PD-MedLow_Metro_0.5_PA	81,631	277,787	29%	81,631	29%	81,631	29%
Cabin John Creek	PD-MedLow	Yes	Metro_0.5	No	PD-MedLow_Metro_0.5_NOTPA	44,516	134,774	33%	66,774	50%	93,484	69%
Cabin John Creek	PD-MedLow	Yes	Metro_1.0	No	PD-MedLow_Metro_1.0_NOTPA	84,153	265,751	32%	126,229	47%	174,004	65%
Cabin John Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA		9,322	0%	2,797	30%	5,593	60%
Cabin John Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	371,121	614,111	60%	520,030	85%	520,030	85%
Cabin John Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	242,439	453,307	53%	296,808	65%	296,808	65%
Cabin John Creek	R-20	No	NA	Yes	R-20_NA_PA	2,827	6,443	44%	2,827	44%	2,827	44%
Cabin John Creek	R-20	No	NA	No	R-20_NA_NOTPA	366,736	730,501	50%	438,526	60%	510,315	70%
Cabin John Creek	R-200	Yes	Metro_0.5	Yes	R-200_Metro_0.5_PA	142	11,532	1%	142	1%	142	1%
Cabin John Creek	R-200	Yes	Metro_0.5	No	R-200_Metro_0.5_NOTPA	212,905	555,816	38%	319,358	57%	447,101	80%
Cabin John Creek	R-200	Yes	Metro_1.0	Yes	R-200_Metro_1.0_PA	147,109	969,471	15%	147,109	15%	147,109	15%
Cabin John Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	2,758,202	7,753,090	36%	4,137,303	53%	5,076,432	65%
Cabin John Creek	R-200	No	NA	Yes	R-200_NA_PA	1,483,554	41,019,366	4%	1,483,554	4%	1,483,554	4%
Cabin John Creek	R-200	No	NA	No	R-200_NA_NOTPA	34,234,297	144,538,929	24%	54,046,845	37%	73,859,393	51%
Cabin John Creek	R-30	No	NA	Yes	R-30_NA_PA	69,523	446,106	16%	69,523	16%	69,523	16%
Cabin John Creek	R-30	No	NA	No	R-30_NA_NOTPA	653,212	1,528,335	43%	754,540	49%	855,868	56%
Cabin John Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	42,232	200,925	21%	42,232	21%	42,232	21%
Cabin John Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	2,679,379	7,362,623	36%	4,019,069	55%	4,820,768	65%
Cabin John Creek	R-60	No	NA	Yes	R-60_NA_PA	413,754	4,432,261	9%	413,754	9%	413,754	9%
Cabin John Creek	R-60	No	NA	No	R-60_NA_NOTPA	9,987,618	30,824,392	32%	14,395,249	47%	18,802,879	61%
Cabin John Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	43	3,476	1%	43	1%	43	1%
Cabin John Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	397,271	1,171,326	34%	595,906	51%	766,940	65%
Cabin John Creek	R-90	No	NA	Yes	R-90_NA_PA	1,818,939	34,508,842	5%	1,818,939	5%	1,818,939	5%
Cabin John Creek	R-90	No	NA	No	R-90_NA_NOTPA	31,427,381	107,447,439	29%	39,190,956	36%	46,954,531	44%
Cabin John Creek	RE-1	No	NA	Yes	RE-1_NA_PA	4,743	158,204	3%	4,743	3%	4,743	3%
Cabin John Creek	RE-1	No	NA	No	RE-1_NA_NOTPA	567,875	2,255,865	25%	836,624	37%	1,105,374	49%
Cabin John Creek	RE-2	No	NA	Yes	RE-2_NA_PA	556,318	12,186,385	5%	556,318	5%	556,318	5%
Cabin John Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	12,272,689	68,441,729	18%	18,798,065	27%	25,323,440	37%
Cabin John Creek	RE-2C	No	NA	Yes	RE-2C_NA_PA		5,537	0%	0	0%	0	0%
Cabin John Creek	RE-2C	No	NA	No	RE-2C_NA_NOTPA	400,686	2,358,891	17%	459,821	19%	518,956	22%
Cabin John Creek	R-H	No	NA	Yes	R-H_NA_PA		3	0%	0	0%	0	0%
Cabin John Creek	R-H	No	NA	No	R-H_NA_NOTPA	507,489	926,155	55%	507,489	55%	507,489	55%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Cabin John Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	2	1,563	0%	2	0%	2	0%
Cabin John Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	3,443,913	4,532,296	76%	3,837,948	85%	3,837,948	85%
Cabin John Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	194,979	663,394	29%	194,979	29%	194,979	29%
Cabin John Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	6,808,209	11,107,933	61%	7,273,057	65%	7,273,057	65%
Cabin John Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	11,690	16,160	72%	11,690	72%	11,690	72%
Cabin John Creek	ROW	No	NA	Yes	ROW_NA_PA	3,448,515	10,067,736	34%	3,448,515	34%	3,448,515	34%
Cabin John Creek	ROW	No	NA	No	ROW_NA_NOTPA	49,414,513	98,733,616	50%	54,821,009	56%	60,227,506	61%
Cabin John Creek	RT-10.0	No	NA	Yes	RT-10.0_NA_PA		7,149	0%	0	0%	0	0%
Cabin John Creek	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	333,505	593,576	56%	347,793	59%	362,081	61%
Cabin John Creek	RT-12.5	Yes	Metro_1.0	Yes	RT-12.5_Metro_1.0_PA	60,929	221,720	27%	60,929	27%	60,929	27%
Cabin John Creek	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	245,161	499,825	49%	327,267	65%	327,267	65%
Cabin John Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	552	7,908	7%	552	7%	552	7%
Cabin John Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	549,690	1,195,787	46%	663,476	55%	777,261	65%
Cabin John Creek	RT-15.0	No	NA	No	RT-15.0_NA_NOTPA	53,601	120,267	45%	64,662	54%	75,723	63%
Cabin John Creek	RT-6.0	No	NA	Yes	RT-6.0_NA_PA		19	0%	0	0%	0	0%
Cabin John Creek	RT-6.0	No	NA	No	RT-6.0_NA_NOTPA	52,007	134,315	39%	59,448	44%	66,889	50%
Cabin John Creek	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	371,236	877,091	42%	382,963	44%	394,691	45%
Cabin John Creek	THD	No	NA	No	THD_NA_NOTPA	269,244	392,545	69%	280,985	72%	292,726	75%
Little Falls Branch	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	27,039	46,515	58%	27,039	58%	27,039	58%
Little Falls Branch	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	5,427,560	6,738,049	81%	5,705,780	85%	5,705,780	85%
Little Falls Branch	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	14,598	27,127	54%	14,598	54%	14,598	54%
Little Falls Branch	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	475,314	623,570	76%	475,314	76%	475,314	76%
Little Falls Branch	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	173,398	233,493	74%	173,398	74%	173,398	74%
Little Falls Branch	CR	No	NA	Yes	CR_NA_PA	234,171	370,450	63%	234,171	63%	234,171	63%
Little Falls Branch	CR	No	NA	No	CR_NA_NOTPA	1,236,979	1,512,547	82%	1,329,387	88%	1,421,794	94%
Little Falls Branch	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	9,076	12,475	73%	9,076	73%	9,076	73%
Little Falls Branch	EOF	No	NA	Yes	EOF_NA_PA		33,822	0%	0	0%	0	0%
Little Falls Branch	EOF	No	NA	No	EOF_NA_NOTPA	391,341	506,489	77%	431,236	85%	471,132	93%
Little Falls Branch	IM	Yes	Metro_1.0	Yes	IM_Metro_1.0_PA	78,308	85,704	91%	78,308	91%	78,308	91%
Little Falls Branch	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	313,653	334,201	94%	313,653	94%	313,653	94%
Little Falls Branch	IM	No	NA	Yes	IM_NA_PA	181,077	256,800	71%	181,077	71%	181,077	71%
Little Falls Branch	IM	No	NA	No	IM_NA_NOTPA	204,869	260,280	79%	224,556	86%	244,243	94%
Little Falls Branch	R-10	Yes	Metro_0.5	No	R-10_Metro_0.5_NOTPA	230,060	353,621	65%	299,447	85%	299,447	85%
Little Falls Branch	R-10	Yes	Metro_1.0	Yes	R-10_Metro_1.0_PA	8,568	11,324	76%	8,568	76%	8,568	76%
Little Falls Branch	R-10	Yes	Metro_1.0	No	R-10_Metro_1.0_NOTPA	102,383	176,986	58%	115,884	65%	115,884	65%
Little Falls Branch	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	103,435	192,934	54%	126,326	65%	126,326	65%
Little Falls Branch	R-10	No	NA	Yes	R-10_NA_PA	7,419	22,744	33%	7,419	33%	7,419	33%
Little Falls Branch	R-10	No	NA	No	R-10_NA_NOTPA	36,837	49,910	74%	36,837	74%	36,837	74%
Little Falls Branch	R-20	No	NA	No	R-20_NA_NOTPA	218,274	419,082	52%	255,519	61%	292,764	70%
Little Falls Branch	R-200	No	NA	No	R-200_NA_NOTPA	57,044	632,213	9%	190,053	30%	323,061	51%
Little Falls Branch	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	149,172	342,749	44%	223,759	65%	290,240	85%
Little Falls Branch	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	4,360	19,407	22%	4,360	22%	4,360	22%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Little Falls Branch	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	264,114	567,940	47%	371,866	65%	371,866	65%
Little Falls Branch	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	99,489	237,125	42%	149,233	63%	155,260	65%
Little Falls Branch	R-30	No	NA	Yes	R-30_NA_PA	15,567	67,723	23%	15,567	23%	15,567	23%
Little Falls Branch	R-30	No	NA	No	R-30_NA_NOTPA	757,861	1,663,236	46%	844,637	51%	931,412	56%
Little Falls Branch	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	91,331	848,835	11%	91,331	11%	91,331	11%
Little Falls Branch	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	3,319,546	8,199,321	40%	4,979,319	61%	6,943,185	85%
Little Falls Branch	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	723,467	5,409,950	13%	723,467	13%	723,467	13%
Little Falls Branch	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	7,423,208	25,461,938	29%	11,134,812	44%	15,588,737	61%
Little Falls Branch	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	85,163	643,024	13%	85,163	13%	85,163	13%
Little Falls Branch	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	188,222	627,995	30%	282,334	45%	395,267	63%
Little Falls Branch	R-60	No	NA	Yes	R-60_NA_PA	1,490,867	18,813,354	8%	1,490,867	8%	1,490,867	8%
Little Falls Branch	R-60	No	NA	No	R-60_NA_NOTPA	12,913,236	38,942,243	33%	18,334,002	47%	23,754,768	61%
Little Falls Branch	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	50,334	314,900	16%	50,334	16%	50,334	16%
Little Falls Branch	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	2,586,831	7,568,021	34%	3,880,247	51%	4,955,255	65%
Little Falls Branch	R-90	No	NA	Yes	R-90_NA_PA	585,687	6,747,478	9%	585,687	9%	585,687	9%
Little Falls Branch	R-90	No	NA	No	R-90_NA_NOTPA	10,729,699	35,689,098	30%	13,162,917	37%	15,596,136	44%
Little Falls Branch	R-H	Yes	Metro_0.5	No	R-H_Metro_0.5_NOTPA	257,926	604,004	43%	386,889	64%	511,471	85%
Little Falls Branch	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	40,633	135,248	30%	40,633	30%	40,633	30%
Little Falls Branch	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	4,037,010	5,604,743	72%	4,746,097	85%	4,746,097	85%
Little Falls Branch	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	315,749	972,503	32%	315,749	32%	315,749	32%
Little Falls Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	5,102,208	9,201,235	55%	6,024,622	65%	6,024,622	65%
Little Falls Branch	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	6,679	28,530	23%	6,679	23%	6,679	23%
Little Falls Branch	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	281,345	380,687	74%	281,345	74%	281,345	74%
Little Falls Branch	ROW	No	NA	Yes	ROW_NA_PA	921,937	3,363,919	27%	921,937	27%	921,937	27%
Little Falls Branch	ROW	No	NA	No	ROW_NA_NOTPA	12,367,213	24,570,121	50%	13,677,494	56%	14,987,774	61%
Little Falls Branch	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	72,300	132,783	54%	86,941	65%	86,941	65%
Little Falls Branch	THD	Yes	Metro_1.0	Yes	THD_Metro_1.0_PA	8,634	14,967	58%	8,634	58%	8,634	58%
Little Falls Branch	THD	Yes	Metro_1.0	No	THD_Metro_1.0_NOTPA	40	40	99%	40	99%	40	99%
Little Falls Branch	THD	No	NA	Yes	THD_NA_PA	16,602	21,804	76%	16,602	76%	16,602	76%
Little Falls Branch	THD	No	NA	No	THD_NA_NOTPA	34,289	43,065	80%	34,289	80%	34,289	80%
Little Falls Branch	TLD	No	NA	Yes	TLD_NA_PA	20,204	37,339	54%	20,204	54%	20,204	54%
Little Falls Branch	TMD	No	NA	Yes	TMD_NA_PA		535	0%	0	0%	0	0%
Little Falls Branch	TMD	No	NA	No	TMD_NA_NOTPA	129,358	223,006	58%	140,501	63%	151,644	68%
Lower Rock Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	2	3	83%	3	90%	3	90%
Lower Rock Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	46,846	416,455	11%	46,846	11%	46,846	11%
Lower Rock Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	10,991,054	15,265,207	72%	12,926,577	85%	12,926,577	85%
Lower Rock Creek	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	23,843	121,096	20%	23,843	20%	23,843	20%
Lower Rock Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2,288,636	4,251,924	54%	2,784,000	65%	2,784,000	65%
Lower Rock Creek	CR	Yes	MRAC_0.5	Yes	CR_MRAC_0.5_PA	20,220	79,504	25%	20,220	25%	20,220	25%
Lower Rock Creek	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	2,276,545	2,858,949	80%	2,276,545	80%	2,276,545	80%
Lower Rock Creek	CR	Yes	Purple_0.5	Yes	CR_Purple_0.5_PA	326,146	674,103	48%	326,146	48%	326,146	48%
Lower Rock Creek	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	1,448,096	2,687,302	54%	1,759,544	65%	1,759,544	65%

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Lower Rock Creek	CR	No	NA	Yes	CR_NA_PA		2,733	0%	0	0%	0	0%
Lower Rock Creek	CR	No	NA	No	CR_NA_NOTPA	1,079,092	1,606,127	67%	1,294,426	81%	1,509,759	94%
Lower Rock Creek	EOF	Yes	Metro_0.5	Yes	EOF_Metro_0.5_PA	1,062	3,719	29%	1,062	29%	1,062	29%
Lower Rock Creek	EOF	Yes	Metro_0.5	No	EOF_Metro_0.5_NOTPA	845,598	1,055,832	80%	894,079	85%	894,079	85%
Lower Rock Creek	EOF	Yes	Metro_1.0	Yes	EOF_Metro_1.0_PA		39,429	0%	0	0%	0	0%
Lower Rock Creek	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	307,161	399,016	77%	307,161	77%	307,161	77%
Lower Rock Creek	EOF	Yes	MRAC_0.5	No	EOF_MRAC_0.5_NOTPA	7,471	8,818	85%	7,471	85%	7,471	85%
Lower Rock Creek	EOF	Yes	Purple_0.5	No	EOF_Purple_0.5_NOTPA	501,620	1,755,138	29%	752,429	43%	1,053,401	60%
Lower Rock Creek	IL	Yes	Metro_0.5	Yes	IL_Metro_0.5_PA	4,857	9,171	53%	4,857	53%	4,857	53%
Lower Rock Creek	IL	Yes	Metro_0.5	No	IL_Metro_0.5_NOTPA	1,132,897	1,458,354	78%	1,234,934	85%	1,234,934	85%
Lower Rock Creek	IL	Yes	Metro_1.0	Yes	IL_Metro_1.0_PA	3,489	7,206	48%	3,489	48%	3,489	48%
Lower Rock Creek	IL	Yes	Metro_1.0	No	IL_Metro_1.0_NOTPA	2,047,599	2,348,916	87%	2,047,599	87%	2,047,599	87%
Lower Rock Creek	IL	Yes	MRAC_0.5	Yes	IL_MRAC_0.5_PA	173	2,704	6%	173	6%	173	6%
Lower Rock Creek	IL	Yes	MRAC_0.5	No	IL_MRAC_0.5_NOTPA	160,311	172,489	93%	160,311	93%	160,311	93%
Lower Rock Creek	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	475,903	570,453	83%	475,903	83%	475,903	83%
Lower Rock Creek	IM	Yes	MRAC_0.5	Yes	IM_MRAC_0.5_PA	891	4,142	22%	891	22%	891	22%
Lower Rock Creek	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	5,111	41,785	12%	7,667	18%	10,734	26%
Lower Rock Creek	IM	Yes	Purple_0.5	Yes	IM_Purple_0.5_PA	2,031	82,528	2%	2,031	2%	2,031	2%
Lower Rock Creek	IM	Yes	Purple_0.5	No	IM_Purple_0.5_NOTPA	2,039,280	2,885,533	71%	2,039,280	71%	2,039,280	71%
Lower Rock Creek	IM	No	NA	Yes	IM_NA_PA	19,229	22,698	85%	19,229	85%	19,229	85%
Lower Rock Creek	IM	No	NA	No	IM_NA_NOTPA	404,839	454,241	89%	415,547	91%	426,254	94%
Lower Rock Creek	PD-Med	Yes	Metro_0.5	Yes	PD-Med_Metro_0.5_PA	1,239	158,573	1%	1,239	1%	1,239	1%
Lower Rock Creek	PD-Med	Yes	Metro_0.5	No	PD-Med_Metro_0.5_NOTPA	395,864	1,067,159	37%	593,795	56%	831,314	78%
Lower Rock Creek	PD-Med	Yes	Metro_1.0	Yes	PD-Med_Metro_1.0_PA	41,513	437,788	9%	41,513	9%	41,513	9%
Lower Rock Creek	PD-Med	Yes	Metro_1.0	No	PD-Med_Metro_1.0_NOTPA	481,501	913,525	53%	598,142	65%	598,142	65%
Lower Rock Creek	PD-MedLow	Yes	Metro_0.5	Yes	PD-MedLow_Metro_0.5_PA	152,498	395,423	39%	152,498	39%	152,498	39%
Lower Rock Creek	PD-MedLow	Yes	Metro_0.5	No	PD-MedLow_Metro_0.5_NOTPA	549,196	1,044,085	53%	823,793	79%	884,131	85%
Lower Rock Creek	PD-MedLow	Yes	Metro_1.0	Yes	PD-MedLow_Metro_1.0_PA	205,551	1,417,114	15%	205,551	15%	205,551	15%
Lower Rock Creek	PD-MedLow	Yes	Metro_1.0	No	PD-MedLow_Metro_1.0_NOTPA	2,445,466	4,856,027	50%	3,179,543	65%	3,179,543	65%
Lower Rock Creek	PD-MedLow	No	NA	Yes	PD-MedLow_NA_PA	6,831	244,234	3%	6,831	3%	6,831	3%
Lower Rock Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	143,823	305,858	47%	163,669	54%	183,515	60%
Lower Rock Creek	R-10	Yes	Metro_0.5	Yes	R-10_Metro_0.5_PA	159,657	817,219	20%	159,657	20%	159,657	20%
Lower Rock Creek	R-10	Yes	Metro_0.5	No	R-10_Metro_0.5_NOTPA	1,319,445	2,176,238	61%	1,842,838	85%	1,842,838	85%
Lower Rock Creek	R-10	Yes	Metro_1.0	Yes	R-10_Metro_1.0_PA	12,024	64,355	19%	12,024	19%	12,024	19%
Lower Rock Creek	R-10	Yes	Metro_1.0	No	R-10_Metro_1.0_NOTPA	308,018	503,853	61%	329,904	65%	329,904	65%
Lower Rock Creek	R-10	Yes	MRAC_0.5	Yes	R-10_MRAC_0.5_PA	18,694	43,718	43%	18,694	43%	18,694	43%
Lower Rock Creek	R-10	Yes	MRAC_0.5	No	R-10_MRAC_0.5_NOTPA	64,631	87,553	74%	64,631	74%	64,631	74%
Lower Rock Creek	R-10	Yes	Purple_0.5	Yes	R-10_Purple_0.5_PA	8,777	188,068	5%	8,777	5%	8,777	5%
Lower Rock Creek	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	65,173	156,324	42%	97,760	63%	102,355	65%
Lower Rock Creek	R-20	Yes	Metro_0.5	Yes	R-20_Metro_0.5_PA	2	200,315	0%	2	0%	2	0%
Lower Rock Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	290,069	756,123	38%	435,104	58%	609,145	81%
Lower Rock Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	286,534	558,166	51%	365,466	65%	365,466	65%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Lower Rock Creek	R-20	Yes	MRAC_0.5	Yes	R-20_MRAC_0.5_PA	5,156	10,906	47%	5,156	47%	5,156	47%
Lower Rock Creek	R-20	Yes	MRAC_0.5	No	R-20_MRAC_0.5_NOTPA	70,275	129,845	54%	85,017	65%	85,017	65%
Lower Rock Creek	R-20	Yes	Purple_0.5	Yes	R-20_Purple_0.5_PA	26,561	322,316	8%	26,561	8%	26,561	8%
Lower Rock Creek	R-20	Yes	Purple_0.5	No	R-20_Purple_0.5_NOTPA	260,984	588,004	44%	385,003	65%	385,003	65%
Lower Rock Creek	R-20	No	NA	Yes	R-20_NA_PA		1	0%	0	0%	0	0%
Lower Rock Creek	R-20	No	NA	No	R-20_NA_NOTPA	117,748	242,211	49%	143,476	59%	169,205	70%
Lower Rock Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	3,355	6,220	54%	4,072	65%	4,072	65%
Lower Rock Creek	R-200	No	NA	Yes	R-200_NA_PA	33,040	530,911	6%	33,040	6%	33,040	6%
Lower Rock Creek	R-200	No	NA	No	R-200_NA_NOTPA	15,423	73,416	21%	26,469	36%	37,516	51%
Lower Rock Creek	R-30	Yes	Metro_0.5	Yes	R-30_Metro_0.5_PA	93,264	695,553	13%	93,264	13%	93,264	13%
Lower Rock Creek	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	908,991	2,361,032	38%	1,363,487	58%	1,908,882	81%
Lower Rock Creek	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	18,173	175,188	10%	18,173	10%	18,173	10%
Lower Rock Creek	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	751,327	1,923,749	39%	1,126,990	59%	1,259,599	65%
Lower Rock Creek	R-30	Yes	MRAC_0.5	No	R-30_MRAC_0.5_NOTPA	20,668	64,288	32%	31,003	48%	42,094	65%
Lower Rock Creek	R-30	Yes	Purple_0.5	Yes	R-30_Purple_0.5_PA	3,939	17,375	23%	3,939	23%	3,939	23%
Lower Rock Creek	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	298,553	642,954	46%	420,982	65%	420,982	65%
Lower Rock Creek	R-30	No	NA	Yes	R-30_NA_PA		2	0%	0	0%	0	0%
Lower Rock Creek	R-30	No	NA	No	R-30_NA_NOTPA	456,984	1,042,993	44%	520,530	50%	584,076	56%
Lower Rock Creek	R-40	Yes	Metro_1.0	No	R-40_Metro_1.0_NOTPA	497,711	1,365,347	36%	746,566	55%	893,978	65%
Lower Rock Creek	R-40	No	NA	Yes	R-40_NA_PA	6,265	21,680	29%	6,265	29%	6,265	29%
Lower Rock Creek	R-40	No	NA	No	R-40_NA_NOTPA	689,999	1,984,998	35%	791,624	40%	893,249	45%
Lower Rock Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	3,680	14,446	25%	3,680	25%	3,680	25%
Lower Rock Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	131,340	309,529	42%	197,010	64%	275,814	89%
Lower Rock Creek	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	870,657	6,108,743	14%	870,657	14%	870,657	14%
Lower Rock Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	15,792,622	37,590,879	42%	23,688,933	63%	31,831,956	85%
Lower Rock Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	1,778,075	14,365,026	12%	1,778,075	12%	1,778,075	12%
Lower Rock Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	28,434,193	86,053,918	33%	42,651,289	50%	56,344,867	65%
Lower Rock Creek	R-60	Yes	MRAC_0.5	Yes	R-60_MRAC_0.5_PA	303,332	5,346,058	6%	303,332	6%	303,332	6%
Lower Rock Creek	R-60	Yes	MRAC_0.5	No	R-60_MRAC_0.5_NOTPA	4,878,436	17,008,126	29%	7,317,654	43%	10,244,715	60%
Lower Rock Creek	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	201,694	1,728,675	12%	201,694	12%	201,694	12%
Lower Rock Creek	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	1,061,487	3,514,973	30%	1,592,231	45%	2,229,123	63%
Lower Rock Creek	R-60	No	NA	Yes	R-60_NA_PA	1,177,633	13,870,769	8%	1,177,633	8%	1,177,633	8%
Lower Rock Creek	R-60	No	NA	No	R-60_NA_NOTPA	17,543,939	56,213,276	31%	25,917,019	46%	34,290,099	61%
Lower Rock Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	46,893	279,345	17%	46,893	17%	46,893	17%
Lower Rock Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	934,692	3,072,585	30%	1,402,038	46%	1,962,853	64%
Lower Rock Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	373,940	5,403,173	7%	373,940	7%	373,940	7%
Lower Rock Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	5,520,777	20,061,052	28%	8,281,165	41%	11,593,632	58%
Lower Rock Creek	R-90	Yes	MRAC_0.5	Yes	R-90_MRAC_0.5_PA	39,240	347,688	11%	39,240	11%	39,240	11%
Lower Rock Creek	R-90	Yes	MRAC_0.5	No	R-90_MRAC_0.5_NOTPA	1,608,120	6,341,218	25%	2,412,180	38%	3,377,051	53%
Lower Rock Creek	R-90	Yes	Purple_0.5	Yes	R-90_Purple_0.5_PA	132,199	3,859,034	3%	132,199	3%	132,199	3%
Lower Rock Creek	R-90	Yes	Purple_0.5	No	R-90_Purple_0.5_NOTPA	3,214,348	10,794,396	30%	4,821,522	45%	6,750,131	63%
Lower Rock Creek	R-90	No	NA	Yes	R-90_NA_PA	1,443,587	12,955,435	11%	1,443,587	11%	1,443,587	11%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Lower Rock Creek	R-90	No	NA	No	R-90_NA_NOTPA	9,593,710	34,551,144	28%	12,346,280	36%	15,098,850	44%
Lower Rock Creek	R-H	Yes	Corridor	No	R-H_Corridor_NOTPA	24,319	38,104	64%	34,294	90%	34,294	90%
Lower Rock Creek	R-H	Yes	Metro_1.0	Yes	R-H_Metro_1.0_PA	21,555	177,779	12%	21,555	12%	21,555	12%
Lower Rock Creek	R-H	Yes	Metro_1.0	No	R-H_Metro_1.0_NOTPA	678,252	1,365,075	50%	893,800	65%	893,800	65%
Lower Rock Creek	R-H	No	NA	Yes	R-H_NA_PA		3	0%	0	0%	0	0%
Lower Rock Creek	R-H	No	NA	No	R-H_NA_NOTPA	142,628	254,663	56%	142,628	56%	142,628	56%
Lower Rock Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	75,331	111,819	67%	100,637	90%	100,637	90%
Lower Rock Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	301,404	680,800	44%	301,404	44%	301,404	44%
Lower Rock Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	11,452,310	16,673,386	69%	14,119,023	85%	14,119,023	85%
Lower Rock Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	924,104	2,503,843	37%	924,104	37%	924,104	37%
Lower Rock Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	22,078,782	37,344,875	59%	24,452,019	65%	24,452,019	65%
Lower Rock Creek	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	299,075	798,948	37%	299,075	37%	299,075	37%
Lower Rock Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	5,326,736	9,326,546	57%	6,106,671	65%	6,106,671	65%
Lower Rock Creek	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	123,256	287,169	43%	123,256	43%	123,256	43%
Lower Rock Creek	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	2,663,589	4,555,420	58%	2,982,717	65%	2,982,717	65%
Lower Rock Creek	ROW	No	NA	Yes	ROW_NA_PA	1,177,859	3,281,844	36%	1,177,859	36%	1,177,859	36%
Lower Rock Creek	ROW	No	NA	No	ROW_NA_NOTPA	19,931,120	34,218,102	58%	20,402,081	60%	20,873,042	61%
Lower Rock Creek	RT-10.0	No	NA	Yes	RT-10.0_NA_PA		2,557	0%	0	0%	0	0%
Lower Rock Creek	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	26,742	80,636	33%	37,965	47%	49,188	61%
Lower Rock Creek	RT-12.5	Yes	Metro_0.5	No	RT-12.5_Metro_0.5_NOTPA	179,654	447,295	40%	269,482	60%	377,274	84%
Lower Rock Creek	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	230,315	545,753	42%	345,472	63%	357,339	65%
Lower Rock Creek	RT-12.5	Yes	MRAC_0.5	Yes	RT-12.5_MRAC_0.5_PA	5,264	10,479	50%	5,264	50%	5,264	50%
Lower Rock Creek	RT-12.5	Yes	MRAC_0.5	No	RT-12.5_MRAC_0.5_NOTPA	32,355	77,512	42%	48,533	63%	50,752	65%
Lower Rock Creek	RT-12.5	Yes	Purple_0.5	Yes	RT-12.5_Purple_0.5_PA	1,585	5,941	27%	1,585	27%	1,585	27%
Lower Rock Creek	RT-12.5	Yes	Purple_0.5	No	RT-12.5_Purple_0.5_NOTPA	109,643	203,270	54%	133,093	65%	133,093	65%
Lower Rock Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	20,409	127,899	16%	20,409	16%	20,409	16%
Lower Rock Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	670,795	1,229,683	55%	735,045	60%	799,294	65%
Lower Rock Creek	RT-15.0	Yes	Metro_0.5	Yes	RT-15.0_Metro_0.5_PA	1	205	0%	1	0%	1	0%
Lower Rock Creek	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA	36,134	120,374	30%	54,201	45%	75,881	63%
Lower Rock Creek	RT-15.0	Yes	Metro_1.0	No	RT-15.0_Metro_1.0_NOTPA	81	2,148	4%	121	6%	170	8%
Lower Rock Creek	RT-8.0	Yes	Metro_0.5	No	RT-8.0_Metro_0.5_NOTPA	29,884	71,173	42%	44,826	63%	60,270	85%
Lower Rock Creek	RT-8.0	Yes	Metro_1.0	No	RT-8.0_Metro_1.0_NOTPA	48,107	110,705	43%	72,160	65%	72,486	65%
Lower Rock Creek	TF-12	No	NA	Yes	TF-12_NA_PA		5,675	0%	0	0%	0	0%
Lower Rock Creek	TF-12	No	NA	No	TF-12_NA_NOTPA	15,610	55,688	28%	16,715	30%	17,820	32%
Lower Rock Creek	THD	Yes	Metro_0.5	No	THD_Metro_0.5_NOTPA	15,672	32,355	48%	23,508	73%	27,398	85%
Lower Rock Creek	THD	Yes	Metro_1.0	No	THD_Metro_1.0_NOTPA	125,797	377,526	33%	188,695	50%	247,190	65%
Lower Rock Creek	TMD	Yes	Metro_0.5	Yes	TMD_Metro_0.5_PA	10,406	91,245	11%	10,406	11%	10,406	11%
Lower Rock Creek	TMD	Yes	Metro_0.5	No	TMD_Metro_0.5_NOTPA	414,704	800,315	52%	622,056	78%	677,707	85%
Lower Rock Creek	TMD	Yes	Metro_1.0	Yes	TMD_Metro_1.0_PA		12	0%	0	0%	0	0%
Lower Rock Creek	TMD	Yes	Metro_1.0	No	TMD_Metro_1.0_NOTPA	172,324	394,082	44%	258,030	65%	258,030	65%
Lower Rock Creek	TMD	No	NA	Yes	TMD_NA_PA	21,049	34,075	62%	21,049	62%	21,049	62%
Lower Rock Creek	TMD	No	NA	No	TMD_NA_NOTPA	13,132	24,046	55%	14,741	61%	16,351	68%

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Middle Great Seneca Creek	AR	No	NA	Yes	AR_NA_PA		628,171	0%	0	0%	0	0%
Middle Great Seneca Creek	AR	No	NA	No	AR_NA_NOTPA	38,338	6,243,751	1%	522,562	8%	1,006,786	16%
Middle Great Seneca Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	669,899	987,741	68%	888,967	90%	888,967	90%
Middle Great Seneca Creek	CR	Yes	MRAC_0.5	Yes	CR_MRAC_0.5_PA	4,173	50,545	8%	4,173	8%	4,173	8%
Middle Great Seneca Creek	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	2,497,895	5,047,053	49%	3,304,620	65%	3,304,620	65%
Middle Great Seneca Creek	CR	No	NA	Yes	CR_NA_PA		65,231	0%	0	0%	0	0%
Middle Great Seneca Creek	CR	No	NA	No	CR_NA_NOTPA	1,292,676	2,386,136	54%	1,767,822	74%	2,242,967	94%
Middle Great Seneca Creek	EOF	Yes	Corridor	Yes	EOF_Corridor_PA		19,740	0%	0	0%	0	0%
Middle Great Seneca Creek	EOF	Yes	Corridor	No	EOF_Corridor_NOTPA	642,162	948,618	68%	853,756	90%	853,756	90%
Middle Great Seneca Creek	EOF	Yes	MRAC_0.5	Yes	EOF_MRAC_0.5_PA	1,933	207,056	1%	1,933	1%	1,933	1%
Middle Great Seneca Creek	EOF	Yes	MRAC_0.5	No	EOF_MRAC_0.5_NOTPA	16,350	419,423	4%	24,525	6%	34,335	8%
Middle Great Seneca Creek	EOF	No	NA	Yes	EOF_NA_PA	47,261	2,389,266	2%	47,261	2%	47,261	2%
Middle Great Seneca Creek	EOF	No	NA	No	EOF_NA_NOTPA	3,985,533	14,046,896	28%	8,525,916	61%	13,066,298	93%
Middle Great Seneca Creek	IM	No	NA	Yes	IM_NA_PA	28,352	508,233	6%	28,352	6%	28,352	6%
Middle Great Seneca Creek	IM	No	NA	No	IM_NA_NOTPA	1,049,112	1,592,022	66%	1,271,523	80%	1,493,933	94%
Middle Great Seneca Creek	PD-Med	Yes	MRAC_0.5	No	PD-Med_MRAC_0.5_NOTPA	170,939	376,785	45%	246,704	65%	246,704	65%
Middle Great Seneca Creek	PD-Med	No	NA	Yes	PD-Med_NA_PA	13,093	557,069	2%	13,093	2%	13,093	2%
Middle Great Seneca Creek	PD-Med	No	NA	No	PD-Med_NA_NOTPA	1,951,006	3,687,666	53%	1,951,006	53%	1,951,006	53%
Middle Great Seneca Creek	PD-MedLow	Yes	MRAC_0.5	Yes	PD-MedLow_MRAC_0.5_PA	40,408	239,391	17%	40,408	17%	40,408	17%
Middle Great Seneca Creek	PD-MedLow	Yes	MRAC_0.5	No	PD-MedLow_MRAC_0.5_NOTPA	99,610	249,937	40%	149,415	60%	163,649	65%
Middle Great Seneca Creek	PD-MedLow	No	NA	Yes	PD-MedLow_NA_PA	238,136	5,650,033	4%	238,136	4%	238,136	4%
Middle Great Seneca Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	5,084,600	12,323,778	41%	6,239,433	51%	7,394,267	60%
Middle Great Seneca Creek	R-10	No	NA	Yes	R-10_NA_PA		3	0%	0	0%	0	0%
Middle Great Seneca Creek	R-10	No	NA	No	R-10_NA_NOTPA	228,223	402,859	57%	254,740	63%	281,257	70%
Middle Great Seneca Creek	R-20	Yes	Corridor	Yes	R-20_Corridor_PA	21,287	101,007	21%	21,287	21%	21,287	21%
Middle Great Seneca Creek	R-20	Yes	Corridor	No	R-20_Corridor_NOTPA	153,273	241,561	63%	217,405	90%	217,405	90%
Middle Great Seneca Creek	R-20	Yes	MRAC_0.5	No	R-20_MRAC_0.5_NOTPA	103	2,761	4%	155	6%	217	8%
Middle Great Seneca Creek	R-20	No	NA	Yes	R-20_NA_PA	18,286	220,213	8%	18,286	8%	18,286	8%
Middle Great Seneca Creek	R-20	No	NA	No	R-20_NA_NOTPA	1,663,405	2,966,387	56%	1,867,836	63%	2,072,267	70%
Middle Great Seneca Creek	R-200	Yes	Corridor	Yes	R-200_Corridor_PA	18,482	864,016	2%	18,482	2%	18,482	2%
Middle Great Seneca Creek	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	471,200	2,681,220	18%	706,799	26%	989,519	37%
Middle Great Seneca Creek	R-200	Yes	MRAC_0.5	Yes	R-200_MRAC_0.5_PA	6,773	343,242	2%	6,773	2%	6,773	2%
Middle Great Seneca Creek	R-200	Yes	MRAC_0.5	No	R-200_MRAC_0.5_NOTPA	1,605,511	4,051,231	40%	2,408,266	59%	2,652,593	65%
Middle Great Seneca Creek	R-200	No	NA	Yes	R-200_NA_PA	308,541	45,395,123	1%	308,541	1%	308,541	1%
Middle Great Seneca Creek	R-200	No	NA	No	R-200_NA_NOTPA	10,284,935	59,783,896	17%	20,417,253	34%	30,549,571	51%
Middle Great Seneca Creek	R-30	Yes	MRAC_0.5	No	R-30_MRAC_0.5_NOTPA	6,098	17,695	34%	9,147	52%	11,586	65%
Middle Great Seneca Creek	R-30	No	NA	Yes	R-30_NA_PA	13,070	282,743	5%	13,070	5%	13,070	5%
Middle Great Seneca Creek	R-30	No	NA	No	R-30_NA_NOTPA	1,270,713	2,377,199	53%	1,300,972	55%	1,331,231	56%
Middle Great Seneca Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	66,502	330,339	20%	66,502	20%	66,502	20%
Middle Great Seneca Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	459,010	776,735	59%	688,516	89%	699,061	90%
Middle Great Seneca Creek	R-60	Yes	MRAC_0.5	Yes	R-60_MRAC_0.5_PA	1,937	172,882	1%	1,937	1%	1,937	1%
Middle Great Seneca Creek	R-60	Yes	MRAC_0.5	No	R-60_MRAC_0.5_NOTPA	121,465	388,405	31%	182,197	47%	254,313	65%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Middle Great Seneca Creek	R-60	No	NA	Yes	R-60_NA_PA	173,790	4,727,864	4%	173,790	4%	173,790	4%
Middle Great Seneca Creek	R-60	No	NA	No	R-60_NA_NOTPA	5,295,664	16,232,637	33%	7,598,787	47%	9,901,909	61%
Middle Great Seneca Creek	R-90	Yes	Corridor	Yes	R-90_Corridor_PA	58	250,535	0%	58	0%	58	0%
Middle Great Seneca Creek	R-90	Yes	Corridor	No	R-90_Corridor_NOTPA	193,445	819,203	24%	290,167	35%	406,233	50%
Middle Great Seneca Creek	R-90	Yes	MRAC_0.5	No	R-90_MRAC_0.5_NOTPA	483	9,049	5%	725	8%	1,015	11%
Middle Great Seneca Creek	R-90	No	NA	Yes	R-90_NA_PA	198,882	5,725,896	3%	198,882	3%	198,882	3%
Middle Great Seneca Creek	R-90	No	NA	No	R-90_NA_NOTPA	5,924,107	20,128,646	29%	7,360,162	37%	8,796,218	44%
Middle Great Seneca Creek	RE-1	No	NA	Yes	RE-1_NA_PA	44,653	3,197,798	1%	44,653	1%	44,653	1%
Middle Great Seneca Creek	RE-1	No	NA	No	RE-1_NA_NOTPA	871,958	6,779,168	13%	2,096,875	31%	3,321,792	49%
Middle Great Seneca Creek	RE-2	No	NA	Yes	RE-2_NA_PA	229,378	31,532,688	1%	229,378	1%	229,378	1%
Middle Great Seneca Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	2,842,098	32,088,802	9%	7,357,477	23%	11,872,857	37%
Middle Great Seneca Creek	R-H	Yes	Corridor	No	R-H_Corridor_NOTPA	17,500	101,452	17%	26,250	26%	36,750	36%
Middle Great Seneca Creek	R-H	No	NA	No	R-H_NA_NOTPA	189,980	346,166	55%	189,980	55%	189,980	55%
Middle Great Seneca Creek	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	168,577	323,306	52%	168,577	52%	168,577	52%
Middle Great Seneca Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	2,891,413	4,232,403	68%	3,809,162	90%	3,809,162	90%
Middle Great Seneca Creek	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	94,282	373,287	25%	94,282	25%	94,282	25%
Middle Great Seneca Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	2,506,117	4,272,185	59%	2,797,266	65%	2,797,266	65%
Middle Great Seneca Creek	ROW	No	NA	Yes	ROW_NA_PA	918,076	2,721,507	34%	918,076	34%	918,076	34%
Middle Great Seneca Creek	ROW	No	NA	No	ROW_NA_NOTPA	15,432,292	29,707,026	52%	16,776,789	56%	18,121,286	61%
Middle Great Seneca Creek	RT-12.5	Yes	Corridor	Yes	RT-12.5_Corridor_PA		2,618	0%	0	0%	0	0%
Middle Great Seneca Creek	RT-12.5	Yes	Corridor	No	RT-12.5_Corridor_NOTPA	712,939	1,567,829	45%	1,069,408	68%	1,411,046	90%
Middle Great Seneca Creek	RT-12.5	Yes	MRAC_0.5	Yes	RT-12.5_MRAC_0.5_PA	9,593	91,930	10%	9,593	10%	9,593	10%
Middle Great Seneca Creek	RT-12.5	Yes	MRAC_0.5	No	RT-12.5_MRAC_0.5_NOTPA	141,020	508,068	28%	211,530	42%	296,142	58%
Middle Great Seneca Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	12,207	296,446	4%	12,207	4%	12,207	4%
Middle Great Seneca Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	2,831,013	6,321,002	45%	3,469,832	55%	4,108,651	65%
Middle Great Seneca Creek	RT-15.0	No	NA	No	RT-15.0_NA_NOTPA	139,949	373,930	37%	187,692	50%	235,436	63%
Middle Great Seneca Creek	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	83,607	232,403	36%	94,094	40%	104,581	45%
Middle Great Seneca Creek	THD	No	NA	No	THD_NA_NOTPA	821,592	1,601,421	51%	1,007,898	63%	1,194,203	75%
Middle Great Seneca Creek	TLD	Yes	MRAC_0.5	No	TLD_MRAC_0.5_NOTPA	80,964	318,911	25%	121,447	38%	170,025	53%
Middle Great Seneca Creek	TLD	No	NA	Yes	TLD_NA_PA	1,900	31,589	6%	1,900	6%	1,900	6%
Middle Great Seneca Creek	TLD	No	NA	No	TLD_NA_NOTPA	1,371,859	3,015,801	45%	1,545,433	51%	1,719,006	57%
Middle Great Seneca Creek	TMD	Yes	MRAC_0.5	Yes	TMD_MRAC_0.5_PA	13,760	140,803	10%	13,760	10%	13,760	10%
Middle Great Seneca Creek	TMD	Yes	MRAC_0.5	No	TMD_MRAC_0.5_NOTPA	463,963	1,003,890	46%	657,309	65%	657,309	65%
Middle Great Seneca Creek	TMD	No	NA	Yes	TMD_NA_PA	9,044	45,907	20%	9,044	20%	9,044	20%
Middle Great Seneca Creek	TMD	No	NA	No	TMD_NA_NOTPA	1,771,664	3,914,759	45%	2,216,850	57%	2,662,036	68%
Middle Great Seneca Creek - Whetstone Run	CR	No	NA	No	CR_NA_NOTPA	3,032,492	4,546,544	67%	3,653,122	80%	4,273,751	94%
Middle Great Seneca Creek - Whetstone Run	EOF	No	NA	Yes	EOF_NA_PA		2,485	0%	0	0%	0	0%
Middle Great Seneca Creek - Whetstone Run	EOF	No	NA	No	EOF_NA_NOTPA	206,125	341,928	60%	262,092	77%	318,058	93%
Middle Great Seneca Creek - Whetstone Run	IL	No	NA	No	IL_NA_NOTPA	699,813	940,293	74%	790,144	84%	880,474	94%
Middle Great Seneca Creek - Whetstone Run	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	20,846	22,391	93%	20,846	93%	20,846	93%
Middle Great Seneca Creek - Whetstone Run	R-10	No	NA	No	R-10_NA_NOTPA	467,338	707,629	66%	480,685	68%	494,033	70%
Middle Great Seneca Creek - Whetstone Run	R-20	No	NA	Yes	R-20_NA_PA	185,288	387,899	48%	185,288	48%	185,288	48%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Middle Great Seneca Creek - Whetstone Run	R-20	No	NA	No	R-20_NA_NOTPA	2,351,126	4,175,057	56%	2,633,874	63%	2,916,622	70%
Middle Great Seneca Creek - Whetstone Run	R-200	Yes	MRAC_0.5	No	R-200_MRAC_0.5_NOTPA	12,256	61,519	20%	18,384	30%	25,738	42%
Middle Great Seneca Creek - Whetstone Run	R-200	No	NA	Yes	R-200_NA_PA	92,255	3,083,466	3%	92,255	3%	92,255	3%
Middle Great Seneca Creek - Whetstone Run	R-200	No	NA	No	R-200_NA_NOTPA	1,784,266	7,242,265	25%	2,742,532	38%	3,700,797	51%
Middle Great Seneca Creek - Whetstone Run	R-30	No	NA	Yes	R-30_NA_PA	9,767	330,920	3%	9,767	3%	9,767	3%
Middle Great Seneca Creek - Whetstone Run	R-30	No	NA	No	R-30_NA_NOTPA	741,694	1,718,683	43%	852,078	50%	962,462	56%
Middle Great Seneca Creek - Whetstone Run	R-60	No	NA	Yes	R-60_NA_PA	54,338	1,201,982	5%	54,338	5%	54,338	5%
Middle Great Seneca Creek - Whetstone Run	R-60	No	NA	No	R-60_NA_NOTPA	1,330,956	5,527,425	24%	2,351,343	43%	3,371,729	61%
Middle Great Seneca Creek - Whetstone Run	R-90	No	NA	Yes	R-90_NA_PA	224,960	2,339,416	10%	224,960	10%	224,960	10%
Middle Great Seneca Creek - Whetstone Run	R-90	No	NA	No	R-90_NA_NOTPA	6,212,650	18,278,033	34%	7,100,075	39%	7,987,500	44%
Middle Great Seneca Creek - Whetstone Run	RE-1	No	NA	Yes	RE-1_NA_PA	103,980	3,583,108	3%	103,980	3%	103,980	3%
Middle Great Seneca Creek - Whetstone Run	RE-1	No	NA	No	RE-1_NA_NOTPA	207,412	1,023,419	20%	354,444	35%	501,475	49%
Middle Great Seneca Creek - Whetstone Run	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	1,596	2,839	56%	1,596	56%	1,596	56%
Middle Great Seneca Creek - Whetstone Run	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	308,420	469,556	66%	422,600	90%	422,600	90%
Middle Great Seneca Creek - Whetstone Run	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	1,196,713	2,494,252	48%	1,633,143	65%	1,633,143	65%
Middle Great Seneca Creek - Whetstone Run	ROW	No	NA	Yes	ROW_NA_PA	635,660	1,381,648	46%	635,660	46%	635,660	46%
Middle Great Seneca Creek - Whetstone Run	ROW	No	NA	No	ROW_NA_NOTPA	8,590,981	13,670,292	63%	8,590,981	63%	8,590,981	63%
Middle Great Seneca Creek - Whetstone Run	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	36,599	89,392	41%	45,564	51%	54,529	61%
Middle Great Seneca Creek - Whetstone Run	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	316,102	695,655	45%	384,139	55%	452,176	65%
Middle Great Seneca Creek - Whetstone Run	RT-8.0	No	NA	Yes	RT-8.0_NA_PA		19,757	0%	0	0%	0	0%
Middle Great Seneca Creek - Whetstone Run	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	63,132	143,965	44%	63,958	44%	64,784	45%
Middle Great Seneca Creek - Whetstone Run	THD	No	NA	No	THD_NA_NOTPA	255,343	503,500	51%	315,405	63%	375,468	75%
Middle Great Seneca Creek - Whetstone Run	TLD	No	NA	Yes	TLD_NA_PA	6,881	66,241	10%	6,881	10%	6,881	10%
Middle Great Seneca Creek - Whetstone Run	TLD	No	NA	No	TLD_NA_NOTPA	1,317,583	3,305,981	40%	1,600,996	48%	1,884,409	57%
Middle Great Seneca Creek - Whetstone Run	TMD	No	NA	Yes	TMD_NA_PA	768	28,313	3%	768	3%	768	3%
Middle Great Seneca Creek - Whetstone Run	TMD	No	NA	No	TMD_NA_NOTPA	311,258	659,768	47%	379,950	58%	448,642	68%
Muddy Branch	CR	Yes	Corridor	No	CR_Corridor_NOTPA	327,688	371,654	88%	334,489	90%	334,489	90%
Muddy Branch	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	7,248	18,754	39%	7,248	39%	7,248	39%
Muddy Branch	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	29,274	286,422	10%	43,911	15%	61,475	21%
Muddy Branch	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	29,770	90,051	33%	44,656	50%	58,962	65%
Muddy Branch	CR	No	NA	Yes	CR_NA_PA	19,121	252,608	8%	19,121	8%	19,121	8%
Muddy Branch	CR	No	NA	No	CR_NA_NOTPA	4,401,254	7,937,753	55%	5,931,371	75%	7,461,488	94%
Muddy Branch	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	74,542	104,116	72%	74,542	72%	74,542	72%
Muddy Branch	EOF	Yes	MRAC_0.5	Yes	EOF_MRAC_0.5_PA	8,980	8,980	100%	8,980	100%	8,980	100%
Muddy Branch	EOF	Yes	MRAC_0.5	No	EOF_MRAC_0.5_NOTPA	12,289	14,877	83%	12,289	83%	12,289	83%
Muddy Branch	EOF	No	NA	Yes	EOF_NA_PA	58,086	1,314,933	4%	58,086	4%	58,086	4%
Muddy Branch	EOF	No	NA	No	EOF_NA_NOTPA	5,460,979	14,721,212	37%	9,577,261	65%	13,693,542	93%
Muddy Branch	IH	No	NA	No	IH_NA_NOTPA	208,999	676,514	31%	253,033	37%	297,066	44%
Muddy Branch	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	127,118	182,921	69%	127,118	69%	127,118	69%
Muddy Branch	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	491,895	567,509	87%	491,895	87%	491,895	87%
Muddy Branch	IM	No	NA	No	IM_NA_NOTPA	3,259,776	4,050,819	80%	3,530,506	87%	3,801,236	94%
Muddy Branch	PD-Low	No	NA	Yes	PD-Low_NA_PA	120,315	4,939,547	2%	120,315	2%	120,315	2%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Muddy Branch	PD-Low	No	NA	No	PD-Low_NA_NOTPA	2,675,411	13,019,252	21%	3,030,208	23%	3,385,006	26%
Muddy Branch	R-10	No	NA	No	R-10_NA_NOTPA	153,092	290,186	53%	177,843	61%	202,594	70%
Muddy Branch	R-20	No	NA	No	R-20_NA_NOTPA	574,636	1,083,838	53%	665,893	61%	757,151	70%
Muddy Branch	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	52,475	235,604	22%	78,713	33%	110,198	47%
Muddy Branch	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	100	3,281	3%	150	5%	209	6%
Muddy Branch	R-200	Yes	MRAC_0.5	Yes	R-200_MRAC_0.5_PA	40,888	473,521	9%	40,888	9%	40,888	9%
Muddy Branch	R-200	Yes	MRAC_0.5	No	R-200_MRAC_0.5_NOTPA	610,674	2,671,197	23%	916,010	34%	1,282,415	48%
Muddy Branch	R-200	No	NA	Yes	R-200_NA_PA	604,230	31,368,656	2%	604,230	2%	604,230	2%
Muddy Branch	R-200	No	NA	No	R-200_NA_NOTPA	22,958,502	113,729,490	20%	40,537,136	36%	58,115,770	51%
Muddy Branch	R-60	No	NA	Yes	R-60_NA_PA	15,450	647,494	2%	15,450	2%	15,450	2%
Muddy Branch	R-60	No	NA	No	R-60_NA_NOTPA	1,316,109	2,665,025	49%	1,470,887	55%	1,625,665	61%
Muddy Branch	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	10,040	62,207	16%	15,060	24%	21,084	34%
Muddy Branch	R-90	Yes	MRAC_0.5	Yes	R-90_MRAC_0.5_PA	15	6,927	0%	15	0%	15	0%
Muddy Branch	R-90	Yes	MRAC_0.5	No	R-90_MRAC_0.5_NOTPA	284,450	1,051,059	27%	426,675	41%	597,346	57%
Muddy Branch	R-90	No	NA	Yes	R-90_NA_PA	5,156	16,923	30%	5,156	30%	5,156	30%
Muddy Branch	R-90	No	NA	No	R-90_NA_NOTPA	164,295	613,653	27%	216,231	35%	268,166	44%
Muddy Branch	RC	No	NA	Yes	RC_NA_PA	40,624	15,153,461	0%	40,624	0%	40,624	0%
Muddy Branch	RC	No	NA	No	RC_NA_NOTPA	1,504,126	19,042,289	8%	2,370,658	12%	3,237,189	17%
Muddy Branch	RE-1	No	NA	No	RE-1_NA_NOTPA	82,731	358,888	23%	129,293	36%	175,855	49%
Muddy Branch	RE-2	No	NA	Yes	RE-2_NA_PA	162,815	38,017,454	0%	162,815	0%	162,815	0%
Muddy Branch	RE-2	No	NA	No	RE-2_NA_NOTPA	7,984,627	85,148,794	9%	19,744,841	23%	31,505,054	37%
Muddy Branch	RE-2C	No	NA	Yes	RE-2C_NA_PA	904	393,662	0%	904	0%	904	0%
Muddy Branch	RE-2C	No	NA	No	RE-2C_NA_NOTPA	270,657	1,852,371	15%	339,089	18%	407,522	22%
Muddy Branch	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	37,345	50,365	74%	37,345	74%	37,345	74%
Muddy Branch	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	606,837	798,269	76%	718,442	90%	718,442	90%
Muddy Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	927,378	2,269,237	41%	1,391,066	61%	1,485,811	65%
Muddy Branch	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	73,536	144,207	51%	73,536	51%	73,536	51%
Muddy Branch	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	1,475,055	2,736,710	54%	1,791,895	65%	1,791,895	65%
Muddy Branch	ROW	No	NA	Yes	ROW_NA_PA	1,123,525	3,117,659	36%	1,123,525	36%	1,123,525	36%
Muddy Branch	ROW	No	NA	No	ROW_NA_NOTPA	31,481,013	57,670,245	55%	33,329,931	58%	35,178,850	61%
Muddy Branch	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	108,783	287,012	38%	141,930	49%	175,077	61%
Muddy Branch	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	208,349	480,094	43%	212,196	44%	216,042	45%
Northwest Branch	CR	Yes	Corridor	Yes	CR_Corridor_PA	13,636	25,630	53%	13,636	53%	13,636	53%
Northwest Branch	CR	Yes	Corridor	No	CR_Corridor_NOTPA	854,176	1,071,330	80%	964,197	90%	964,197	90%
Northwest Branch	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	63,813	85,270	75%	72,207	85%	72,207	85%
Northwest Branch	CR	Yes	Purple_0.5	Yes	CR_Purple_0.5_PA		279	0%	0	0%	0	0%
Northwest Branch	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	1,977,603	2,295,292	86%	1,977,603	86%	1,977,603	86%
Northwest Branch	CR	No	NA	Yes	CR_NA_PA	48,257	576,397	8%	48,257	8%	48,257	8%
Northwest Branch	CR	No	NA	No	CR_NA_NOTPA	1,731,203	3,331,993	52%	2,431,638	73%	3,132,074	94%
Northwest Branch	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	152,694	177,217	86%	152,694	86%	152,694	86%
Northwest Branch	EOF	No	NA	No	EOF_NA_NOTPA	102,469	134,582	76%	113,828	85%	125,187	93%
Northwest Branch	PD-Low	No	NA	No	PD-Low_NA_NOTPA	5,171	114,016	5%	17,408	15%	29,644	26%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Northwest Branch	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	66,926	237,798	28%	104,802	44%	142,679	60%
Northwest Branch	PRC	No	NA	Yes	PRC_NA_PA	25,038	596,341	4%	25,038	4%	25,038	4%
Northwest Branch	PRC	No	NA	No	PRC_NA_NOTPA	2,532,179	6,236,892	41%	2,825,312	45%	3,118,446	50%
Northwest Branch	R-10	Yes	Corridor	No	R-10_Corridor_NOTPA	266,474	483,773	55%	399,712	83%	435,395	90%
Northwest Branch	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	231,088	435,283	53%	285,007	65%	285,007	65%
Northwest Branch	R-10	No	NA	Yes	R-10_NA_PA		389	0%	0	0%	0	0%
Northwest Branch	R-10	No	NA	No	R-10_NA_NOTPA	456,250	964,600	47%	564,844	59%	673,438	70%
Northwest Branch	R-20	Yes	Metro_1.0	Yes	R-20_Metro_1.0_PA	16,589	34,178	49%	16,589	49%	16,589	49%
Northwest Branch	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	358,133	737,562	49%	482,928	65%	482,928	65%
Northwest Branch	R-20	No	NA	Yes	R-20_NA_PA	8,920	148,014	6%	8,920	6%	8,920	6%
Northwest Branch	R-20	No	NA	No	R-20_NA_NOTPA	1,251,567	3,071,957	41%	1,698,791	55%	2,146,016	70%
Northwest Branch	R-200	No	NA	Yes	R-200_NA_PA	806,206	39,714,360	2%	806,206	2%	806,206	2%
Northwest Branch	R-200	No	NA	No	R-200_NA_NOTPA	21,119,400	103,557,033	20%	37,018,522	36%	52,917,644	51%
Northwest Branch	R-30	Yes	Metro_0.5	Yes	R-30_Metro_0.5_PA	180	1,399	13%	180	13%	180	13%
Northwest Branch	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	533,972	1,144,999	47%	800,957	70%	969,585	85%
Northwest Branch	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	37,226	146,060	25%	37,226	25%	37,226	25%
Northwest Branch	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	129,551	308,530	42%	194,326	63%	202,014	65%
Northwest Branch	R-30	Yes	Purple_0.5	Yes	R-30_Purple_0.5_PA	118,949	635,080	19%	118,949	19%	118,949	19%
Northwest Branch	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	683,740	1,408,024	49%	921,921	65%	921,921	65%
Northwest Branch	R-30	No	NA	Yes	R-30_NA_PA	997	66,791	1%	997	1%	997	1%
Northwest Branch	R-30	No	NA	No	R-30_NA_NOTPA	195,127	554,618	35%	252,856	46%	310,586	56%
Northwest Branch	R-40	Yes	Purple_0.5	No	R-40_Purple_0.5_NOTPA	565,798	1,247,459	45%	816,789	65%	816,789	65%
Northwest Branch	R-40	No	NA	No	R-40_NA_NOTPA	8,830	18,073	49%	8,830	49%	8,830	49%
Northwest Branch	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	27,060	602,671	4%	27,060	4%	27,060	4%
Northwest Branch	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	644,923	2,317,713	28%	967,385	42%	1,354,339	58%
Northwest Branch	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	8,062	74,001	11%	8,062	11%	8,062	11%
Northwest Branch	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	103,296	215,650	48%	141,200	65%	141,200	65%
Northwest Branch	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	7,208	255,984	3%	7,208	3%	7,208	3%
Northwest Branch	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	2,015,777	5,223,677	39%	3,023,665	58%	3,420,267	65%
Northwest Branch	R-60	No	NA	Yes	R-60_NA_PA	590,292	18,157,668	3%	590,292	3%	590,292	3%
Northwest Branch	R-60	No	NA	No	R-60_NA_NOTPA	12,727,157	40,929,284	31%	18,847,010	46%	24,966,863	61%
Northwest Branch	R-90	Yes	Corridor	Yes	R-90_Corridor_PA	46,748	308,691	15%	46,748	15%	46,748	15%
Northwest Branch	R-90	Yes	Corridor	No	R-90_Corridor_NOTPA	732,574	2,584,704	28%	1,098,861	43%	1,538,406	60%
Northwest Branch	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	14,966	52,698	28%	22,449	43%	31,429	60%
Northwest Branch	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	770,317	8,126,352	9%	770,317	9%	770,317	9%
Northwest Branch	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	1,695,331	5,970,500	28%	2,542,997	43%	3,560,195	60%
Northwest Branch	R-90	No	NA	Yes	R-90_NA_PA	1,104,025	25,167,582	4%	1,104,025	4%	1,104,025	4%
Northwest Branch	R-90	No	NA	No	R-90_NA_NOTPA	9,094,121	33,544,696	27%	11,876,577	35%	14,659,032	44%
Northwest Branch	RE-1	No	NA	Yes	RE-1_NA_PA	121,437	3,357,984	4%	121,437	4%	121,437	4%
Northwest Branch	RE-1	No	NA	No	RE-1_NA_NOTPA	1,864,694	12,835,632	15%	4,077,077	32%	6,289,460	49%
Northwest Branch	RE-2	No	NA	Yes	RE-2_NA_PA	218,783	11,739,714	2%	218,783	2%	218,783	2%
Northwest Branch	RE-2	No	NA	No	RE-2_NA_NOTPA	668,831	4,021,556	17%	1,078,403	27%	1,487,976	37%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Northwest Branch	RE-2C	No	NA	No	RE-2C_NA_NOTPA	34,765	297,702	12%	50,130	17%	65,495	22%
Northwest Branch	R-H	Yes	Purple_0.5	No	R-H_Purple_0.5_NOTPA	75,447	143,121	53%	93,710	65%	93,710	65%
Northwest Branch	R-H	No	NA	No	R-H_NA_NOTPA	219,766	409,702	54%	219,912	54%	220,057	54%
Northwest Branch	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	169,432	229,635	74%	169,432	74%	169,432	74%
Northwest Branch	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	1,566,626	2,439,713	64%	2,195,742	90%	2,195,742	90%
Northwest Branch	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	251,152	306,065	82%	259,176	85%	259,176	85%
Northwest Branch	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	78,432	289,445	27%	78,432	27%	78,432	27%
Northwest Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	906,848	1,576,866	58%	1,032,473	65%	1,032,473	65%
Northwest Branch	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	21,591	42,647	51%	21,591	51%	21,591	51%
Northwest Branch	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	2,571,527	3,606,668	71%	2,571,527	71%	2,571,527	71%
Northwest Branch	ROW	No	NA	Yes	ROW_NA_PA	1,445,994	4,774,541	30%	1,445,994	30%	1,445,994	30%
Northwest Branch	ROW	No	NA	No	ROW_NA_NOTPA	28,464,860	57,700,394	49%	31,831,050	55%	35,197,241	61%
Northwest Branch	RT-12.5	Yes	Purple_0.5	No	RT-12.5_Purple_0.5_NOTPA	75,056	150,153	50%	98,315	65%	98,315	65%
Northwest Branch	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	165,486	303,485	55%	181,376	60%	197,265	65%
Northwest Branch	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA	4,929	7,907	62%	6,695	85%	6,695	85%
Northwest Branch	RT-15.0	Yes	Metro_1.0	Yes	RT-15.0_Metro_1.0_PA	18,028	49,298	37%	18,028	37%	18,028	37%
Northwest Branch	RT-15.0	Yes	Metro_1.0	No	RT-15.0_Metro_1.0_NOTPA	237,632	450,388	53%	294,897	65%	294,897	65%
Northwest Branch	RT-8.0	Yes	Metro_1.0	No	RT-8.0_Metro_1.0_NOTPA	112,925	345,827	33%	169,388	49%	226,435	65%
Northwest Branch	RT-8.0	Yes	Purple_0.5	No	RT-8.0_Purple_0.5_NOTPA	51,194	115,937	44%	75,911	65%	75,911	65%
Northwest Branch	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	9	26	33%	10	39%	12	45%
Northwest Branch	Rural	No	NA	Yes	Rural_NA_PA	15,727	1,193,718	1%	15,727	1%	15,727	1%
Northwest Branch	Rural	No	NA	No	Rural_NA_NOTPA	487,372	6,531,766	7%	487,372	7%	487,372	7%
Northwest Branch	THD	Yes	Corridor	No	THD_Corridor_NOTPA	175,160	332,591	53%	262,739	79%	299,332	90%
Northwest Branch	THD	No	NA	No	THD_NA_NOTPA	73,694	142,465	52%	89,966	63%	106,238	75%
Northwest Branch	TLD	Yes	Corridor	No	TLD_Corridor_NOTPA	47,280	150,466	31%	70,920	47%	99,288	66%
Northwest Branch	TLD	No	NA	No	TLD_NA_NOTPA	83,662	193,400	43%	96,950	50%	110,238	57%
Northwest Branch	TMD	No	NA	No	TMD_NA_NOTPA	46,067	89,792	51%	53,563	60%	61,059	68%
Northwest Branch - Bel Pre Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	11,913	11,913	100%	11,913	100%	11,913	100%
Northwest Branch - Bel Pre Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	55,047	288,596	19%	55,047	19%	55,047	19%
Northwest Branch - Bel Pre Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	1,358,755	2,187,910	62%	1,852,722	85%	1,852,722	85%
Northwest Branch - Bel Pre Creek	EOF	No	NA	No	EOF_NA_NOTPA	633,020	738,461	86%	659,965	89%	686,910	93%
Northwest Branch - Bel Pre Creek	PD-Low	No	NA	Yes	PD-Low_NA_PA	4,916	163,105	3%	4,916	3%	4,916	3%
Northwest Branch - Bel Pre Creek	PD-Low	No	NA	No	PD-Low_NA_NOTPA	302,994	1,504,080	20%	347,027	23%	391,061	26%
Northwest Branch - Bel Pre Creek	PD-MedLow	No	NA	No	PD-MedLow_NA_NOTPA	485,053	1,212,121	40%	606,163	50%	727,272	60%
Northwest Branch - Bel Pre Creek	PRC	Yes	Corridor	No	PRC_Corridor_NOTPA	893,476	1,592,319	56%	1,340,213	84%	1,433,087	90%
Northwest Branch - Bel Pre Creek	PRC	No	NA	Yes	PRC_NA_PA	156,714	2,094,884	7%	156,714	7%	156,714	7%
Northwest Branch - Bel Pre Creek	PRC	No	NA	No	PRC_NA_NOTPA	9,987,870	23,412,420	43%	10,847,040	46%	11,706,210	50%
Northwest Branch - Bel Pre Creek	R-20	Yes	Metro_0.5	Yes	R-20_Metro_0.5_PA	60	6,025	1%	60	1%	60	1%
Northwest Branch - Bel Pre Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	387,192	799,797	48%	580,787	73%	677,268	85%
Northwest Branch - Bel Pre Creek	R-20	No	NA	No	R-20_NA_NOTPA	622	14,608	4%	5,413	37%	10,205	70%
Northwest Branch - Bel Pre Creek	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	103,500	608,833	17%	155,250	25%	217,350	36%
Northwest Branch - Bel Pre Creek	R-200	Yes	Metro_1.0	Yes	R-200_Metro_1.0_PA	94	569,093	0%	94	0%	94	0%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Northwest Branch - Bel Pre Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	70,987	202,711	35%	106,480	53%	132,727	65%
Northwest Branch - Bel Pre Creek	R-200	No	NA	Yes	R-200_NA_PA	354,446	7,192,112	5%	354,446	5%	354,446	5%
Northwest Branch - Bel Pre Creek	R-200	No	NA	No	R-200_NA_NOTPA	6,584,045	24,706,681	27%	9,604,580	39%	12,625,114	51%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_0.5	Yes	R-30_Metro_0.5_PA	3,523	88,666	4%	3,523	4%	3,523	4%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	357,596	882,623	41%	536,394	61%	747,405	85%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	3,526	8,219	43%	3,526	43%	3,526	43%
Northwest Branch - Bel Pre Creek	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	102,071	175,989	58%	115,231	65%	115,231	65%
Northwest Branch - Bel Pre Creek	R-30	No	NA	Yes	R-30_NA_PA	6,191	9,218	67%	6,191	67%	6,191	67%
Northwest Branch - Bel Pre Creek	R-30	No	NA	No	R-30_NA_NOTPA	492,567	955,044	52%	513,696	54%	534,825	56%
Northwest Branch - Bel Pre Creek	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	4,106	11,302	36%	4,106	36%	4,106	36%
Northwest Branch - Bel Pre Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	53,322	204,393	26%	79,983	39%	111,976	55%
Northwest Branch - Bel Pre Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	71	110	64%	72	65%	72	65%
Northwest Branch - Bel Pre Creek	R-60	No	NA	No	R-60_NA_NOTPA	208,277	641,334	32%	299,745	47%	391,214	61%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	243,959	1,666,036	15%	243,959	15%	243,959	15%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	640,936	2,753,211	23%	961,404	35%	1,345,965	49%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	133,435	1,706,413	8%	133,435	8%	133,435	8%
Northwest Branch - Bel Pre Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	3,490,412	13,825,007	25%	5,235,618	38%	7,329,865	53%
Northwest Branch - Bel Pre Creek	R-90	No	NA	Yes	R-90_NA_PA	91,085	3,253,660	3%	91,085	3%	91,085	3%
Northwest Branch - Bel Pre Creek	R-90	No	NA	No	R-90_NA_NOTPA	1,622,733	5,508,820	29%	2,015,044	37%	2,407,354	44%
Northwest Branch - Bel Pre Creek	RE-2	No	NA	Yes	RE-2_NA_PA	55,512	1,502,488	4%	55,512	4%	55,512	4%
Northwest Branch - Bel Pre Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	1,056,064	8,562,018	12%	2,112,005	25%	3,167,947	37%
Northwest Branch - Bel Pre Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	580,576	1,099,760	53%	870,864	79%	989,784	90%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	23,132	37,875	61%	23,132	61%	23,132	61%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	916,732	1,302,333	70%	1,102,816	85%	1,102,816	85%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	80,501	157,310	51%	80,501	51%	80,501	51%
Northwest Branch - Bel Pre Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	2,255,193	3,971,048	57%	2,600,093	65%	2,600,093	65%
Northwest Branch - Bel Pre Creek	ROW	No	NA	Yes	ROW_NA_PA	123,084	264,520	47%	123,084	47%	123,084	47%
Northwest Branch - Bel Pre Creek	ROW	No	NA	No	ROW_NA_NOTPA	4,622,582	8,290,262	56%	4,839,821	58%	5,057,060	61%
Northwest Branch - Bel Pre Creek	RT-12.5	Yes	Corridor	No	RT-12.5_Corridor_NOTPA	189,014	297,944	63%	268,149	90%	268,149	90%
Northwest Branch - Bel Pre Creek	RT-12.5	Yes	Metro_0.5	Yes	RT-12.5_Metro_0.5_PA	17,035	59,406	29%	17,035	29%	17,035	29%
Northwest Branch - Bel Pre Creek	RT-12.5	Yes	Metro_0.5	No	RT-12.5_Metro_0.5_NOTPA	259,500	521,788	50%	389,250	75%	441,850	85%
Northwest Branch - Bel Pre Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	71,844	108,508	66%	71,844	66%	71,844	66%
Northwest Branch - Bel Pre Creek	RT-15.0	Yes	Metro_0.5	Yes	RT-15.0_Metro_0.5_PA		9	0%	0	0%	0	0%
Northwest Branch - Bel Pre Creek	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA		49	0%	0	0%	0	0%
Sligo Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	13,153	14,427	91%	13,153	91%	13,153	91%
Sligo Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	60,619	87,551	69%	60,619	69%	60,619	69%
Sligo Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	7,450,923	9,246,365	81%	7,829,822	85%	7,829,822	85%
Sligo Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	717,015	1,092,482	66%	717,015	66%	717,015	66%
Sligo Creek	CR	Yes	MRAC_0.5	No	CR_MRAC_0.5_NOTPA	102,533	171,024	60%	111,980	65%	111,980	65%
Sligo Creek	CR	Yes	Purple_0.5	Yes	CR_Purple_0.5_PA	89	54,019	0%	89	0%	89	0%
Sligo Creek	CR	Yes	Purple_0.5	No	CR_Purple_0.5_NOTPA	4,204,416	5,297,100	79%	4,204,416	79%	4,204,416	79%
Sligo Creek	CR	No	NA	Yes	CR_NA_PA	16,357	33,732	48%	16,357	48%	16,357	48%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

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									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Sligo Creek	CR	No	NA	No	CR_NA_NOTPA	733,743	942,630	78%	809,907	86%	886,072	94%
Sligo Creek	EOF	Yes	Metro_0.5	Yes	EOF_Metro_0.5_PA	5,778	36,233	16%	5,778	16%	5,778	16%
Sligo Creek	EOF	Yes	Metro_0.5	No	EOF_Metro_0.5_NOTPA	1,765,803	2,041,233	87%	1,765,803	87%	1,765,803	87%
Sligo Creek	EOF	Yes	Metro_1.0	Yes	EOF_Metro_1.0_PA	61	3,021	2%	61	2%	61	2%
Sligo Creek	EOF	Yes	Metro_1.0	No	EOF_Metro_1.0_NOTPA	196,503	263,689	75%	196,503	75%	196,503	75%
Sligo Creek	EOF	Yes	Purple_0.5	No	EOF_Purple_0.5_NOTPA	34,316	39,933	86%	34,316	86%	34,316	86%
Sligo Creek	EOF	No	NA	Yes	EOF_NA_PA	49	499	10%	49	10%	49	10%
Sligo Creek	EOF	No	NA	No	EOF_NA_NOTPA	300,141	347,922	86%	311,888	90%	323,634	93%
Sligo Creek	IL	Yes	Metro_0.5	No	IL_Metro_0.5_NOTPA	1,582	1,582	100%	1,582	100%	1,582	100%
Sligo Creek	IL	Yes	Metro_1.0	No	IL_Metro_1.0_NOTPA	68,171	83,918	81%	68,171	81%	68,171	81%
Sligo Creek	IL	Yes	MRAC_0.5	Yes	IL_MRAC_0.5_PA	2,906	31,687	9%	2,906	9%	2,906	9%
Sligo Creek	IL	Yes	MRAC_0.5	No	IL_MRAC_0.5_NOTPA	45,629	51,039	89%	45,629	89%	45,629	89%
Sligo Creek	IL	Yes	Purple_0.5	No	IL_Purple_0.5_NOTPA	515	515	100%	515	100%	515	100%
Sligo Creek	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	177,038	201,783	88%	177,038	88%	177,038	88%
Sligo Creek	IM	Yes	MRAC_0.5	No	IM_MRAC_0.5_NOTPA	36,413	43,012	85%	36,413	85%	36,413	85%
Sligo Creek	IM	Yes	Purple_0.5	No	IM_Purple_0.5_NOTPA	4,999	6,675	75%	4,999	75%	4,999	75%
Sligo Creek	PD-Med	Yes	Metro_0.5	No	PD-Med_Metro_0.5_NOTPA	183,555	372,275	49%	275,333	74%	315,242	85%
Sligo Creek	PD-MedLow	Yes	Metro_0.5	Yes	PD-MedLow_Metro_0.5_PA	1,102	20,193	5%	1,102	5%	1,102	5%
Sligo Creek	PD-MedLow	Yes	Metro_0.5	No	PD-MedLow_Metro_0.5_NOTPA	236,374	640,319	37%	354,561	55%	496,385	78%
Sligo Creek	PD-MedLow	Yes	Metro_1.0	No	PD-MedLow_Metro_1.0_NOTPA	21	1,065	2%	32	3%	44	4%
Sligo Creek	R-10	Yes	Metro_0.5	No	R-10_Metro_0.5_NOTPA	76,401	160,993	47%	114,602	71%	136,329	85%
Sligo Creek	R-10	Yes	Metro_1.0	Yes	R-10_Metro_1.0_PA	15,970	46,327	34%	15,970	34%	15,970	34%
Sligo Creek	R-10	Yes	Metro_1.0	No	R-10_Metro_1.0_NOTPA	782,951	1,355,934	58%	887,814	65%	887,814	65%
Sligo Creek	R-10	Yes	Purple_0.5	Yes	R-10_Purple_0.5_PA	57,967	290,362	20%	57,967	20%	57,967	20%
Sligo Creek	R-10	Yes	Purple_0.5	No	R-10_Purple_0.5_NOTPA	4,834,361	9,785,317	49%	6,407,057	65%	6,407,057	65%
Sligo Creek	R-10	No	NA	Yes	R-10_NA_PA	2,602	5,583	47%	2,602	47%	2,602	47%
Sligo Creek	R-10	No	NA	No	R-10_NA_NOTPA	433,448	887,637	49%	526,577	59%	619,706	70%
Sligo Creek	R-20	Yes	Metro_0.5	Yes	R-20_Metro_0.5_PA	14,209	42,436	33%	14,209	33%	14,209	33%
Sligo Creek	R-20	Yes	Metro_0.5	No	R-20_Metro_0.5_NOTPA	803,489	1,482,231	54%	1,205,233	81%	1,255,153	85%
Sligo Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	420,371	781,277	54%	511,551	65%	511,551	65%
Sligo Creek	R-20	Yes	Purple_0.5	Yes	R-20_Purple_0.5_PA		3,870	0%	0	0%	0	0%
Sligo Creek	R-20	Yes	Purple_0.5	No	R-20_Purple_0.5_NOTPA	118,797	357,636	33%	178,196	50%	234,166	65%
Sligo Creek	R-20	No	NA	Yes	R-20_NA_PA	58	13,606	0%	58	0%	58	0%
Sligo Creek	R-20	No	NA	No	R-20_NA_NOTPA	93,610	221,607	42%	124,210	56%	154,811	70%
Sligo Creek	R-200	No	NA	No	R-200_NA_NOTPA	14,806	27,212	54%	14,806	54%	14,806	54%
Sligo Creek	R-30	Yes	Metro_0.5	No	R-30_Metro_0.5_NOTPA	14,170	31,812	45%	21,256	67%	26,938	85%
Sligo Creek	R-30	Yes	Metro_1.0	Yes	R-30_Metro_1.0_PA	604	23,386	3%	604	3%	604	3%
Sligo Creek	R-30	Yes	Metro_1.0	No	R-30_Metro_1.0_NOTPA	77,167	219,026	35%	115,750	53%	143,410	65%
Sligo Creek	R-30	Yes	Purple_0.5	Yes	R-30_Purple_0.5_PA		208	0%	0	0%	0	0%
Sligo Creek	R-30	Yes	Purple_0.5	No	R-30_Purple_0.5_NOTPA	73,758	185,024	40%	110,636	60%	121,147	65%
Sligo Creek	R-30	No	NA	Yes	R-30_NA_PA	21,078	131,955	16%	21,078	16%	21,078	16%
Sligo Creek	R-30	No	NA	No	R-30_NA_NOTPA	158,187	334,473	47%	172,746	52%	187,305	56%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Sligo Creek	R-40	Yes	Metro_0.5	No	R-40_Metro_0.5_NOTPA	29,272	89,906	33%	43,909	49%	61,472	68%
Sligo Creek	R-40	Yes	Metro_1.0	Yes	R-40_Metro_1.0_PA	1,773	15,238	12%	1,773	12%	1,773	12%
Sligo Creek	R-40	Yes	Metro_1.0	No	R-40_Metro_1.0_NOTPA	104,046	292,396	36%	156,069	53%	191,450	65%
Sligo Creek	R-40	Yes	Purple_0.5	No	R-40_Purple_0.5_NOTPA	210,582	590,941	36%	315,872	53%	386,926	65%
Sligo Creek	R-40	No	NA	Yes	R-40_NA_PA	1,797	8,755	21%	1,797	21%	1,797	21%
Sligo Creek	R-40	No	NA	No	R-40_NA_NOTPA	801,015	1,952,386	41%	839,794	43%	878,574	45%
Sligo Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	52,639	386,524	14%	52,639	14%	52,639	14%
Sligo Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	1,053,678	2,870,664	37%	1,580,517	55%	2,212,724	77%
Sligo Creek	R-60	Yes	Metro_0.5	Yes	R-60_Metro_0.5_PA	127,262	699,283	18%	127,262	18%	127,262	18%
Sligo Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	5,562,138	16,892,076	33%	8,343,207	49%	11,680,490	69%
Sligo Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	1,512,491	13,068,505	12%	1,512,491	12%	1,512,491	12%
Sligo Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	13,865,464	44,519,402	31%	20,798,196	47%	29,117,475	65%
Sligo Creek	R-60	Yes	MRAC_0.5	No	R-60_MRAC_0.5_NOTPA	232,740	825,394	28%	349,110	42%	488,754	59%
Sligo Creek	R-60	Yes	Purple_0.5	Yes	R-60_Purple_0.5_PA	1,083,770	9,689,562	11%	1,083,770	11%	1,083,770	11%
Sligo Creek	R-60	Yes	Purple_0.5	No	R-60_Purple_0.5_NOTPA	10,929,927	35,310,454	31%	16,394,891	46%	22,952,847	65%
Sligo Creek	R-60	No	NA	Yes	R-60_NA_PA	828,366	7,670,205	11%	828,366	11%	828,366	11%
Sligo Creek	R-60	No	NA	No	R-60_NA_NOTPA	11,818,320	37,213,893	32%	17,259,397	46%	22,700,475	61%
Sligo Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	208,181	1,124,321	19%	312,271	28%	437,179	39%
Sligo Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	91,891	3,631,586	3%	91,891	3%	91,891	3%
Sligo Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	2,272,190	7,971,271	29%	3,408,284	43%	4,771,598	60%
Sligo Creek	R-90	No	NA	Yes	R-90_NA_PA	23,462	909,272	3%	23,462	3%	23,462	3%
Sligo Creek	R-90	No	NA	No	R-90_NA_NOTPA	250,712	711,440	35%	280,806	39%	310,899	44%
Sligo Creek	RE-2	Yes	Metro_1.0	Yes	RE-2_Metro_1.0_PA	409	51,113	1%	409	1%	409	1%
Sligo Creek	RE-2	Yes	Purple_0.5	Yes	RE-2_Purple_0.5_PA	5,039	206,303	2%	5,039	2%	5,039	2%
Sligo Creek	RE-2	No	NA	Yes	RE-2_NA_PA	41,008	1,143,271	4%	41,008	4%	41,008	4%
Sligo Creek	RE-2	No	NA	No	RE-2_NA_NOTPA		0	0%	0	19%	0	37%
Sligo Creek	R-H	No	NA	Yes	R-H_NA_PA		5	0%	0	0%	0	0%
Sligo Creek	R-H	No	NA	No	R-H_NA_NOTPA	554,049	1,045,479	53%	557,796	53%	561,544	54%
Sligo Creek	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	79,993	126,400	63%	79,993	63%	79,993	63%
Sligo Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	1,151,908	2,221,510	52%	1,727,862	78%	1,999,359	90%
Sligo Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	71,527	135,145	53%	71,527	53%	71,527	53%
Sligo Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	7,874,128	11,335,567	69%	9,598,958	85%	9,598,958	85%
Sligo Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	578,777	1,392,900	42%	578,777	42%	578,777	42%
Sligo Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	10,001,828	16,094,771	62%	10,538,250	65%	10,538,250	65%
Sligo Creek	ROW	Yes	MRAC_0.5	Yes	ROW_MRAC_0.5_PA	774	5,650	14%	774	14%	774	14%
Sligo Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	250,016	345,391	72%	250,016	72%	250,016	72%
Sligo Creek	ROW	Yes	Purple_0.5	Yes	ROW_Purple_0.5_PA	326,300	930,410	35%	326,300	35%	326,300	35%
Sligo Creek	ROW	Yes	Purple_0.5	No	ROW_Purple_0.5_NOTPA	10,874,553	16,638,773	65%	10,894,443	65%	10,894,443	65%
Sligo Creek	ROW	No	NA	Yes	ROW_NA_PA	359,063	725,835	49%	359,063	49%	359,063	49%
Sligo Creek	ROW	No	NA	No	ROW_NA_NOTPA	9,260,051	15,605,238	59%	9,389,623	60%	9,519,195	61%
Sligo Creek	RT-10.0	Yes	Metro_0.5	No	RT-10.0_Metro_0.5_NOTPA	46,065	107,773	43%	69,098	64%	91,263	85%
Sligo Creek	RT-10.0	Yes	Metro_1.0	Yes	RT-10.0_Metro_1.0_PA		18	0%	0	0%	0	0%

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Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Sligo Creek	RT-10.0	Yes	Metro_1.0	No	RT-10.0_Metro_1.0_NOTPA	79,017	179,505	44%	117,533	65%	117,533	65%
Sligo Creek	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	9,010	34,439	26%	15,009	44%	21,008	61%
Sligo Creek	RT-12.5	Yes	Metro_0.5	Yes	RT-12.5_Metro_0.5_PA	13,038	41,233	32%	13,038	32%	13,038	32%
Sligo Creek	RT-12.5	Yes	Metro_0.5	No	RT-12.5_Metro_0.5_NOTPA	336,124	636,698	53%	504,186	79%	539,156	85%
Sligo Creek	RT-12.5	Yes	Metro_1.0	Yes	RT-12.5_Metro_1.0_PA		164	0%	0	0%	0	0%
Sligo Creek	RT-12.5	Yes	Metro_1.0	No	RT-12.5_Metro_1.0_NOTPA	415,105	758,629	55%	496,722	65%	496,722	65%
Sligo Creek	RT-12.5	Yes	Purple_0.5	Yes	RT-12.5_Purple_0.5_PA	19,704	265,373	7%	19,704	7%	19,704	7%
Sligo Creek	RT-12.5	Yes	Purple_0.5	No	RT-12.5_Purple_0.5_NOTPA	786,489	1,469,979	54%	962,487	65%	962,487	65%
Sligo Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA		10,161	0%	0	0%	0	0%
Sligo Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	290,577	600,233	48%	340,365	57%	390,152	65%
Sligo Creek	RT-15.0	Yes	Metro_0.5	No	RT-15.0_Metro_0.5_NOTPA	220,338	318,744	69%	269,913	85%	269,913	85%
Sligo Creek	RT-15.0	Yes	Metro_1.0	No	RT-15.0_Metro_1.0_NOTPA	222,645	394,070	56%	258,022	65%	258,022	65%
Sligo Creek	RT-8.0	Yes	Metro_0.5	No	RT-8.0_Metro_0.5_NOTPA	57,553	145,147	40%	86,330	59%	120,862	83%
Sligo Creek	RT-8.0	Yes	Metro_1.0	Yes	RT-8.0_Metro_1.0_PA	2,659	168,131	2%	2,659	2%	2,659	2%
Sligo Creek	RT-8.0	Yes	Metro_1.0	No	RT-8.0_Metro_1.0_NOTPA	13,569	24,083	56%	15,769	65%	15,769	65%
Sligo Creek	RT-8.0	Yes	MRAC_0.5	No	RT-8.0_MRAC_0.5_NOTPA	5,918	12,095	49%	7,920	65%	7,920	65%
Sligo Creek	RT-8.0	Yes	Purple_0.5	No	RT-8.0_Purple_0.5_NOTPA	73,709	234,569	31%	110,564	47%	153,587	65%
Sligo Creek	RT-8.0	No	NA	Yes	RT-8.0_NA_PA	1,811	117,353	2%	1,811	2%	1,811	2%
Sligo Creek	TMD	Yes	Metro_0.5	No	TMD_Metro_0.5_NOTPA	92,818	190,872	49%	139,227	73%	161,630	85%
Sligo Creek	TMD	Yes	Purple_0.5	No	TMD_Purple_0.5_NOTPA	116,182	203,785	57%	133,431	65%	133,431	65%
Watts Branch	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	42,241	56,454	75%	47,805	85%	47,805	85%
Watts Branch	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	2,716	23,648	11%	2,716	11%	2,716	11%
Watts Branch	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2,769	40,701	7%	4,154	10%	5,815	14%
Watts Branch	CR	No	NA	Yes	CR_NA_PA	13,913	2,207,098	1%	13,913	1%	13,913	1%
Watts Branch	CR	No	NA	No	CR_NA_NOTPA	2,112,095	6,041,797	35%	3,895,692	64%	5,679,289	94%
Watts Branch	EOF	No	NA	No	EOF_NA_NOTPA	2,763,435	5,391,844	51%	3,889,441	72%	5,015,446	93%
Watts Branch	IH	No	NA	Yes	IH_NA_PA		12,676	0%	0	0%	0	0%
Watts Branch	IH	No	NA	No	IH_NA_NOTPA	168,843	11,905,466	1%	2,698,344	23%	5,227,845	44%
Watts Branch	IM	Yes	Corridor	No	IM_Corridor_NOTPA	448	1,559	29%	672	43%	941	60%
Watts Branch	IM	Yes	Metro_0.5	No	IM_Metro_0.5_NOTPA	14,702	18,763	78%	15,888	85%	15,888	85%
Watts Branch	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	33,160	40,443	82%	33,160	82%	33,160	82%
Watts Branch	IM	No	NA	No	IM_NA_NOTPA	10,193	66,570	15%	36,331	55%	62,469	94%
Watts Branch	PD-Low	No	NA	Yes	PD-Low_NA_PA	98	2,588	4%	98	4%	98	4%
Watts Branch	PD-Low	No	NA	No	PD-Low_NA_NOTPA	421,868	1,649,987	26%	425,432	26%	428,997	26%
Watts Branch	R-200	No	NA	Yes	R-200_NA_PA	451,146	17,362,905	3%	451,146	3%	451,146	3%
Watts Branch	R-200	No	NA	No	R-200_NA_NOTPA	18,934,456	72,488,965	26%	27,988,159	39%	37,041,861	51%
Watts Branch	R-90	No	NA	No	R-90_NA_NOTPA	94,644	328,445	29%	119,087	36%	143,530	44%
Watts Branch	RE-1	No	NA	Yes	RE-1_NA_PA	132,116	12,910,133	1%	132,116	1%	132,116	1%
Watts Branch	RE-1	No	NA	No	RE-1_NA_NOTPA	6,081,837	43,550,958	14%	13,710,903	31%	21,339,969	49%
Watts Branch	RE-2	No	NA	Yes	RE-2_NA_PA	1,059,146	57,252,253	2%	1,059,146	2%	1,059,146	2%
Watts Branch	RE-2	No	NA	No	RE-2_NA_NOTPA	21,278,506	174,906,581	12%	42,996,970	25%	64,715,435	37%
Watts Branch	RE-2C	No	NA	Yes	RE-2C_NA_PA	192	888,162	0%	192	0%	192	0%

ATTACHMENT 5 - WATERSHED-ZONE LEVEL RESULTS FOR CURRENT (2019) AND FUTURE PROJECTED % IMPERVIOUS AREA

Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Watts Branch	RE-2C	No	NA	No	RE-2C_NA_NOTPA	284,304	1,321,271	22%	287,492	22%	290,680	22%
Watts Branch	RNC	No	NA	Yes	RNC_NA_PA	24,792	3,778,435	1%	24,792	1%	24,792	1%
Watts Branch	RNC	No	NA	No	RNC_NA_NOTPA	564,366	2,225,943	25%	564,366	25%	564,366	25%
Watts Branch	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	247,428	349,926	71%	296,317	85%	296,317	85%
Watts Branch	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	156,004	246,787	63%	156,004	63%	156,004	63%
Watts Branch	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	3,593,633	5,357,141	67%	3,593,633	67%	3,593,633	67%
Watts Branch	ROW	No	NA	Yes	ROW_NA_PA	1,274,960	2,543,884	50%	1,274,960	50%	1,274,960	50%
Watts Branch	ROW	No	NA	No	ROW_NA_NOTPA	32,567,348	62,127,074	52%	35,232,432	57%	37,897,515	61%
Watts Branch	RT-10.0	No	NA	No	RT-10.0_NA_NOTPA	393	6,869	6%	2,291	33%	4,190	61%
Middle Rock Creek	CR	Yes	Corridor	No	CR_Corridor_NOTPA	537901.2429	678319.0089	79%	610,487	90%	610,487	90%
Middle Rock Creek	CR	Yes	Metro_0.5	Yes	CR_Metro_0.5_PA	323231.4593	574164.3349	56%	323,231	56%	323,231	56%
Middle Rock Creek	CR	Yes	Metro_0.5	No	CR_Metro_0.5_NOTPA	7262269.757	11289627.34	64%	9,560,056	85%	9,560,056	85%
Middle Rock Creek	CR	Yes	Metro_1.0	Yes	CR_Metro_1.0_PA	113266.99	544311.2689	21%	113,267	21%	113,267	21%
Middle Rock Creek	CR	Yes	Metro_1.0	No	CR_Metro_1.0_NOTPA	2433631.217	4742353.669	51%	3,105,115	65%	3,105,115	65%
Middle Rock Creek	CR	No	NA	No	CR_NA_NOTPA	1969013.719	2559882.563	77%	2,187,652	85%	2,406,290	94%
Middle Rock Creek	EOF	Yes	Corridor	No	EOF_Corridor_NOTPA	363155.418	490812.5376	74%	441,731	90%	441,731	90%
Middle Rock Creek	EOF	No	NA	No	EOF_NA_NOTPA	1309214.347	1535768.47	85%	1,368,886	89%	1,428,558	93%
Middle Rock Creek	IH	Yes	Metro_1.0	Yes	IH_Metro_1.0_PA	61572.88543	81908.65432	75%	61,573	75%	61,573	75%
Middle Rock Creek	IH	Yes	Metro_1.0	No	IH_Metro_1.0_NOTPA	169235.7766	390704.8477	43%	253,854	65%	255,819	65%
Middle Rock Creek	IH	No	NA	Yes	IH_NA_PA	172731.1193	1081019.18	16%	172,731	16%	172,731	16%
Middle Rock Creek	IH	No	NA	No	IH_NA_NOTPA	1993846.571	3735441.245	53%	1,993,847	53%	1,993,847	53%
Middle Rock Creek	IL	Yes	Metro_0.5	No	IL_Metro_0.5_NOTPA	728106.2011	807724.6363	90%	728,106	90%	728,106	90%
Middle Rock Creek	IL	Yes	Metro_1.0	No	IL_Metro_1.0_NOTPA	1387535.426	1625393.423	85%	1,387,535	85%	1,387,535	85%
Middle Rock Creek	IL	No	NA	Yes	IL_NA_PA		36705.35464	0%	0	0%	0	0%
Middle Rock Creek	IL	No	NA	No	IL_NA_NOTPA	103971.6736	162935.4828	64%	128,271	79%	152,570	94%
Middle Rock Creek	IM	Yes	Corridor	No	IM_Corridor_NOTPA	458322.6845	1177510.924	39%	687,484	58%	962,478	82%
Middle Rock Creek	IM	Yes	Metro_0.5	No	IM_Metro_0.5_NOTPA	2236904.021	4404888.237	51%	3,355,356	76%	3,730,059	85%
Middle Rock Creek	IM	Yes	Metro_1.0	Yes	IM_Metro_1.0_PA	83.54051088	289011.5938	0%	84	0%	84	0%
Middle Rock Creek	IM	Yes	Metro_1.0	No	IM_Metro_1.0_NOTPA	3860079.792	7026335.269	55%	4,600,580	65%	4,600,580	65%
Middle Rock Creek	IM	No	NA	Yes	IM_NA_PA	45947.75557	1006437.813	5%	45,948	5%	45,948	5%
Middle Rock Creek	IM	No	NA	No	IM_NA_NOTPA	5009910.55	9676481.686	52%	7,045,099	73%	9,080,287	94%
Middle Rock Creek	PD-Low	Yes	Metro_0.5	Yes	PD-Low_Metro_0.5_PA	1938.272657	320929.1332	1%	1,938	1%	1,938	1%
Middle Rock Creek	PD-Low	Yes	Metro_0.5	No	PD-Low_Metro_0.5_NOTPA		0.782327254	0%	0	0%	0	0%
Middle Rock Creek	PD-Low	Yes	Metro_1.0	Yes	PD-Low_Metro_1.0_PA	49.00236581	2064754.905	0%	49	0%	49	0%
Middle Rock Creek	PD-Low	No	NA	Yes	PD-Low_NA_PA	1128.627654	1546639.272	0%	1,129	0%	1,129	0%
Middle Rock Creek	PRC	Yes	Corridor	No	PRC_Corridor_NOTPA	194198.2922	481608.1758	40%	291,297	60%	407,816	85%
Middle Rock Creek	PRC	No	NA	Yes	PRC_NA_PA		476766.7329	0%	0	0%	0	0%
Middle Rock Creek	PRC	No	NA	No	PRC_NA_NOTPA	2092243.135	4313420.144	49%	2,124,477	49%	2,156,710	50%
Middle Rock Creek	R-10	No	NA	Yes	R-10_NA_PA	134140.6545	322223.232	42%	134,141	42%	134,141	42%
Middle Rock Creek	R-10	No	NA	No	R-10_NA_NOTPA	314330.5657	451163.311	70%	314,656	70%	314,981	70%
Middle Rock Creek	R-20	Yes	Corridor	Yes	R-20_Corridor_PA	40114.65988	109978.513	36%	40,115	36%	40,115	36%
Middle Rock Creek	R-20	Yes	Corridor	No	R-20_Corridor_NOTPA	655345.9729	1217431.565	54%	983,019	81%	1,095,688	90%

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Note: The summary table provided herein does not include several incorporated areas with different zoning categories from Montgomery County zoning, such as Rockville and Gaithersburg.

									FGA Scenario **Inside FGA: Existing % IA * Growth Rates (capped at Maximum FGA + % Uplift)**			
Watershed (MD12DIG_N)	**Generalized ZONE**	**Within Focus Growth Area (FGA)?**	**FGA SubArea**	**Within Preserved Area?**	**FGA Subarea name**	**Impervious Area (Sqft)**	**Total Area (Sqft)**	**2019 %IA**	FGA - Midterm Total IA (SF)	Midterm % IA	FGA - Longterm Total IA (SF)	Longterm % IA
Middle Rock Creek	R-20	Yes	Metro_1.0	Yes	R-20_Metro_1.0_PA	23373.40735	85716.02336	27%	23,373	27%	23,373	27%
Middle Rock Creek	R-20	Yes	Metro_1.0	No	R-20_Metro_1.0_NOTPA	1018634.84	2139380.909	48%	1,400,786	65%	1,400,786	65%
Middle Rock Creek	R-20	No	NA	Yes	R-20_NA_PA	74293.42245	352571.544	21%	74,293	21%	74,293	21%
Middle Rock Creek	R-20	No	NA	No	R-20_NA_NOTPA	4405531.334	8681758.536	51%	5,235,229	60%	6,064,926	70%
Middle Rock Creek	R-200	Yes	Corridor	No	R-200_Corridor_NOTPA	159721.0334	978948.6931	16%	239,582	24%	335,414	34%
Middle Rock Creek	R-200	Yes	Metro_0.5	Yes	R-200_Metro_0.5_PA	116.5244644	188852.7524	0%	117	0%	117	0%
Middle Rock Creek	R-200	Yes	Metro_0.5	No	R-200_Metro_0.5_NOTPA	48963.68109	287277.7701	17%	73,446	26%	102,824	36%
Middle Rock Creek	R-200	Yes	Metro_1.0	Yes	R-200_Metro_1.0_PA	129007.2038	5722425.116	2%	129,007	2%	129,007	2%
Middle Rock Creek	R-200	Yes	Metro_1.0	No	R-200_Metro_1.0_NOTPA	644342.4085	4979082.019	13%	966,514	19%	1,353,119	27%
Middle Rock Creek	R-200	No	NA	Yes	R-200_NA_PA	398764.5432	21087208.91	2%	398,765	2%	398,765	2%
Middle Rock Creek	R-200	No	NA	No	R-200_NA_NOTPA	4298336.647	25368240.44	17%	8,630,754	34%	12,963,171	51%
Middle Rock Creek	R-30	No	NA	No	R-30_NA_NOTPA	190633.0985	479532.6143	40%	229,586	48%	268,538	56%
Middle Rock Creek	R-60	Yes	Corridor	Yes	R-60_Corridor_PA	42021.30113	606343.6261	7%	42,021	7%	42,021	7%
Middle Rock Creek	R-60	Yes	Corridor	No	R-60_Corridor_NOTPA	267621.0562	907503.4673	29%	401,432	44%	562,004	62%
Middle Rock Creek	R-60	Yes	Metro_0.5	No	R-60_Metro_0.5_NOTPA	24422.61414	81373.8016	30%	36,634	45%	51,287	63%
Middle Rock Creek	R-60	Yes	Metro_1.0	Yes	R-60_Metro_1.0_PA	1255.528889	4099.619908	31%	1,256	31%	1,256	31%
Middle Rock Creek	R-60	Yes	Metro_1.0	No	R-60_Metro_1.0_NOTPA	1179214.641	3646481.04	32%	1,768,822	49%	2,387,579	65%
Middle Rock Creek	R-60	No	NA	Yes	R-60_NA_PA	255243.7993	6209127.232	4%	255,244	4%	255,244	4%
Middle Rock Creek	R-60	No	NA	No	R-60_NA_NOTPA	11152807.19	34509032.08	32%	16,101,658	47%	21,050,510	61%
Middle Rock Creek	R-90	Yes	Corridor	Yes	R-90_Corridor_PA	87854.66838	407993.4687	22%	87,855	22%	87,855	22%
Middle Rock Creek	R-90	Yes	Corridor	No	R-90_Corridor_NOTPA	528029.7069	1650913.697	32%	792,045	48%	1,108,862	67%
Middle Rock Creek	R-90	Yes	Metro_0.5	Yes	R-90_Metro_0.5_PA	6184.026045	962801.7093	1%	6,184	1%	6,184	1%
Middle Rock Creek	R-90	Yes	Metro_0.5	No	R-90_Metro_0.5_NOTPA	207092.8969	1103095.427	19%	310,639	28%	434,895	39%
Middle Rock Creek	R-90	Yes	Metro_1.0	Yes	R-90_Metro_1.0_PA	6916.630518	877150.7882	1%	6,917	1%	6,917	1%
Middle Rock Creek	R-90	Yes	Metro_1.0	No	R-90_Metro_1.0_NOTPA	821090.8478	3865526.848	21%	1,231,636	32%	1,724,291	45%
Middle Rock Creek	R-90	No	NA	Yes	R-90_NA_PA	366697.2086	11577579.67	3%	366,697	3%	366,697	3%
Middle Rock Creek	R-90	No	NA	No	R-90_NA_NOTPA	12145581.46	43240376.2	28%	15,520,813	36%	18,896,044	44%
Middle Rock Creek	RE-1	Yes	Metro_0.5	Yes	RE-1_Metro_0.5_PA	3043.858694	8961.7793	34%	3,044	34%	3,044	34%
Middle Rock Creek	RE-1	Yes	Metro_0.5	No	RE-1_Metro_0.5_NOTPA	33963.39006	149578.7198	23%	50,945	34%	71,323	48%
Middle Rock Creek	RE-1	Yes	Metro_1.0	Yes	RE-1_Metro_1.0_PA	2616.064014	1071749.912	0%	2,616	0%	2,616	0%
Middle Rock Creek	RE-1	Yes	Metro_1.0	No	RE-1_Metro_1.0_NOTPA	534984.442	2671039.154	20%	802,477	30%	1,123,467	42%
Middle Rock Creek	RE-1	No	NA	Yes	RE-1_NA_PA		89703.02043	0%	0	0%	0	0%
Middle Rock Creek	RE-1	No	NA	No	RE-1_NA_NOTPA	228400.6044	713866.4662	32%	289,098	40%	349,795	49%
Middle Rock Creek	RE-2	Yes	Corridor	No	RE-2_Corridor_NOTPA	184613.0959	929614.246	20%	276,920	30%	387,688	42%
Middle Rock Creek	RE-2	No	NA	Yes	RE-2_NA_PA	1094126.144	37274926.39	3%	1,094,126	3%	1,094,126	3%
Middle Rock Creek	RE-2	No	NA	No	RE-2_NA_NOTPA	1300339.002	13626581.19	10%	3,171,087	23%	5,041,835	37%
Middle Rock Creek	RNC	No	NA	Yes	RNC_NA_PA	490.270997	414422.8317	0%	490	0%	490	0%
Middle Rock Creek	RNC	No	NA	No	RNC_NA_NOTPA	106265.5729	1047407.254	10%	110,740	11%	115,215	11%
Middle Rock Creek	ROW	Yes	Corridor	Yes	ROW_Corridor_PA	48556.21154	106671.273	46%	48,556	46%	48,556	46%
Middle Rock Creek	ROW	Yes	Corridor	No	ROW_Corridor_NOTPA	2355901.353	4054504.807	58%	3,533,852	87%	3,649,054	90%
Middle Rock Creek	ROW	Yes	Metro_0.5	Yes	ROW_Metro_0.5_PA	119811.7862	189875.2124	63%	119,812	63%	119,812	63%
Middle Rock Creek	ROW	Yes	Metro_0.5	No	ROW_Metro_0.5_NOTPA	5770061.044	8138260.15	71%	6,891,479	85%	6,891,479	85%

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Middle Rock Creek	ROW	Yes	Metro_1.0	Yes	ROW_Metro_1.0_PA	234648.1648	596466.2753	39%	234,648	39%	234,648	39%
Middle Rock Creek	ROW	Yes	Metro_1.0	No	ROW_Metro_1.0_NOTPA	9063877.228	14593294.04	62%	9,555,140	65%	9,555,140	65%
Middle Rock Creek	ROW	Yes	MRAC_0.5	No	ROW_MRAC_0.5_NOTPA	80703.51956	122551.8516	66%	80,704	66%	80,704	66%
Middle Rock Creek	ROW	No	NA	Yes	ROW_NA_PA	570606.6122	1506777.375	38%	570,607	38%	570,607	38%
Middle Rock Creek	ROW	No	NA	No	ROW_NA_NOTPA	23496469.24	40799390.8	58%	24,192,049	59%	24,887,628	61%
Middle Rock Creek	RT-12.5	No	NA	Yes	RT-12.5_NA_PA	2492.138686	274144.7892	1%	2,492	1%	2,492	1%
Middle Rock Creek	RT-12.5	No	NA	No	RT-12.5_NA_NOTPA	263189.6894	627659.3648	42%	335,584	53%	407,979	65%
Middle Rock Creek	RT-8.0	No	NA	Yes	RT-8.0_NA_PA		4569.782409	0%	0	0%	0	0%
Middle Rock Creek	RT-8.0	No	NA	No	RT-8.0_NA_NOTPA	76566.00503	227605.2245	34%	89,494	39%	102,422	45%
Middle Rock Creek	TLD	Yes	Metro_0.5	Yes	TLD_Metro_0.5_PA	2916.891508	53525.9378	5%	2,917	5%	2,917	5%
Middle Rock Creek	TLD	Yes	Metro_0.5	No	TLD_Metro_0.5_NOTPA	134483.3327	411793.2003	33%	201,725	49%	282,415	69%
Middle Rock Creek	TLD	Yes	Metro_1.0	Yes	TLD_Metro_1.0_PA	0.043849674	38750.66247	0%	0	0%	0	0%
Middle Rock Creek	TLD	Yes	Metro_1.0	No	TLD_Metro_1.0_NOTPA	192857.1189	538563.9313	36%	289,286	54%	352,631	65%
Middle Rock Creek	TMD	Yes	Metro_0.5	No	TMD_Metro_0.5_NOTPA	27955.0844	70087.43881	40%	41,933	60%	58,706	84%
Middle Rock Creek	TMD	Yes	Metro_1.0	No	TMD_Metro_1.0_NOTPA	512966.2115	1290305.11	40%	769,449	60%	844,843	65%

Attachment 6. CFMP Phase 2: Sligo Creek Pilot Watershed Study-Flood Modeling Scenario Development Workshop #2 Documentation

Climate and Impervious Area Scenario development (Task W-2) Workshop #2

Date:	September 26, 2023
Project name:	Montgomery County Comprehensive Flood Management Plan Phase 2-Sligo Creek
Project no:	E4X56706
Prepared by:	Yilin Giltinan/Jacobs
Location:	2425 Reedie Dr, Wheaton, MD 20902
Participants:	*Virtual:* *Mark, Etheridge /MC DPS* *Musico, William /MC DPS* *Afzal, Khalid /Planning* *Mcardle, Erin /Parks* *Symborski, Mark /Planning* *Iseli, Claire / MC OCE* *Reifer, Krystal /MC DEP* *Dreyer, Zachary /Planning* *Jantzen, Tyler /Jacobs* *Rakestraw, Emma /Jacobs* *Harper, Matthew /Parks* *Miziorko, Matthias /MC DPS* *Copiz, Darian /MC DEP*
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Purpose

This is the second of three planned workshops to develop county-wide climate and impervious area scenarios for hydrologic and hydraulic (H&H) modeling (Task W2 of Task Order #4). Following this meeting, Jacobs will continue work on Task W-2 and preparations for the third and final scenario selection workshop.

Discussion

Part 1 Climate/Rainfall Projections

Recommended rainfall gauge location for IDF update

- Jacobs presented the gauges analyzed for update of rainfall intensity-duration-frequency (IDF) curves and recommended use of the Dalecarlia Reservoir gauge for projections. The recommendation is due to the gauge being within the County and a relatively high value, and so conservative. DEP pointed out one of the Atlas 14 change values was shown as negative – the correction was made (slides in Attachment B include this change).
- OEMHS questioned how the nine gauges for IDF curve data were selected and whether period of record and location were considered. Jacob explained that this was a subject of discussion in the first workshop. Out of 14 available gauges, nine were selected based on having an extended data

record and having data within the last 10-years, in order to gather some of the more recent intensities. 2022 or had more extended data periods.

Recommended projections for flood modeling

- Planning asked why the Shared Socioeconomic Pathway 8.5 90th percentile scenario (highest projection developed) was not recommended as a climate scenario for the H&H modeling. Jacobs explained that this projection represents the highest projection and was not recommended as the results will be more extreme. Jacobs noted there is some overlap between rainfall depths projected for the various SSPs and non-exceedance intervals, but that those for the SSP 8.5 90th percentile were deemed very high. It is useful to have the rainfall projections, for comparison purposes, but likely too extreme for developing monetary risk, for example. .
- OEMHS pointed out that there are other components for the H&H modeling, such as the land use scenario, that will introduce other elements of conservatism, and noted that combining this with the highest rainfall projection may lead to unrealistic flood modeling results.
- Jacobs recommended use of 5 baseline return period scenarios (10-, 25-, 50-, 100-, and 500-year return periods) and selection of 2 climate scenarios for development of future projections. Recommended climate scenarios are: 2050 SSP 8.5 50th percentile and 2100 SSP 8.5 50th percentile. Projections for these two climate scenarios will be used to project the 5 return periods. The climate scenarios were selected due to having a good amount of overlap within the data.

Historical observed events

- Jacobs presented observations from several historical events. It was recommended to use two events for modeling purposes – the September 2020 event observed in Silver Spring and the July 2019 event, observed in Clarksburg. It was noted that the impacts of these events were in other locations as well, but observations presented are from available gauges.
- DOT questioned why the team selected the gauge data from the Silver Spring for analyzing the 2020 September storm event since the storm is likely to be more intense in the northwest part of the Cunty. DOT asked if it was due to the lack of data from the north Bethesda gauge. Jacobs confirmed DOT's assumption and explained the following storm event is based on data from the north Bethesda gauge.
- DEP pointed out that the name gauge name, Clarksville, maybe a mistype from Clarksburg and suggested the team check. Jacobs agreed to check. (Jacobs team further confirmed, according to the metadata, that the gauge is named as Clarksville, an Maryland city outside Montgomery County to the northeast. But the latitude and longitude are near Clarksburg [inside Montgomery County], therefore Jacobs team changed this to "Ten Mile Creek near Clarksburg" for the TM map and will add a footnote about the name discrepancy).
- DOT suggested cross-checking the historic events with resident complaints (possibly 311 calls) within a month of the extreme rainfall event. Since Clarksburg typically doesn't experience intense rainfall, the gage may not accurately reflect the intensity in the Silver Spring area. Therefore, analyzing the spike in 311 calls can provide a fuller picture of the 2019 storm event, as rainfall intensity can vary widely across different areas. For example, DOT noted that flash flooding occurred at George Washington University and Canal Road during the July 2019 storm event, potentially indicating this event was more severe to the southwest of the County.

- Additionally, a 300-year rainfall intensity event occurred during the September 2021 storm event associated with a Rockville area fatality. DOT has a detailed flood study report on the event that includes the rainfall event statistics. The gauge was a temporary gauge from City of Rockville so would not be visible on national gauge networks. The gauge is no longer in place but data could potentially be obtained from the City if needed.
    - *Action item: Jacobs to incorporate rainfall assessment/data for September 1, 2021 event from Twinbrook Drainage Study into analysis of historic events.*
- Jacobs clarified that the historical event is characterized based on available gauge data. But the model simulation will apply this rainfall across the entire model area.
- DEP highlighted the importance of communicating rainfall intensity in high flood-risk areas. These areas are already susceptible to even a low-intensity rainfall event. It will be necessary to communicate to residents how high- and low- intensity rainfall events interact with stormwater and drainage infrastructure.

Temporal distributions

- Jacobs explained the potential temporal distributions used for developing flood model input. The Alternating Block method is recommended for use because it will be most consistently associated with the selected statistical event return period for all durations (e.g. 10-year).

Closing

- Jacobs noted that the subject of the next and final workshop will be discussing combining of the recommended rainfall scenarios with the recommended impervious scenarios.

Part 2 Impervious Area Scenario Development

Objectives and Purpose of IA Scenarios Development

- Jacobs noted that the objective of Part 2 of the workshop is to obtain agreement on the approach for development of impervious area scenarios informing flood modeling.
- Jacobs presented a few slides on why impervious area scenarios are being developed and how they will be incorporated in the flood model.

Input Data for Impervious Area Scenario Development

- Jacobs presented the various impervious area datasets that were considered for the analysis. Some data sets are more robust than others, and classification of impervious gets better over time. It is important to understand the quality differences so as not to inflate change over time (which may just be due to better data). Likewise, it is important to note the aerial imagery source data year so that users can understand the imagery year which the data represents.
- DEP asked if "building" IA excluded pavement areas other than the building. Jacobs confirmed this and noted that building IA is most complete since it has been generated over a long period of time and been through more quality checks. Pavement areas have been added over time, but earlier data sets only included pavement areas that met certain area threshold for example. Thus it is not possible to accurately compare pavement IA from one period to the next since it may show increases that are just due to improvements in data.

Impervious Area Analysis Summaries

- Jacobs presented a few slides showing the current breakdown of IA by zone in Tier 1-3 (suburban) watersheds and in Sligo Creek. Residential zones R-60, R-200, R-90, right-of-war (ROW) areas, and a generalized Commercial Residential (CR) zone represent the vast majority of current IA. These zones are therefore the focus of the scenario development approach.

- Jacobs presented building impervious area data from 2008 and 2019 to illustrate that while building IA has grown over time, the growth has not been consisted between watersheds. Some watersheds saw higher growth than others. Growth generally ranged from 0-3%/year, depending on watershed and zone.

Scenario Development Approach

- Jacobs presented an overall approach for development of IA scenarios, including development of a "reasonable worst case" (RWC) % IA for given zone categories. A "high" and "low" scenario will be developed based on the observed RWC results. The "high" scenario will also include consideration of a future "focus growth area" (FGA) that may see up-zoning (or changes to development standards allowing for more density) for residential area. The approach also suggests excluding certain preserved areas for future scenarios (i.e. not increasing % IA in these areas for future scenarios).

- OCE asked if Jacobs calculated the maximum PIA based on development standards. Jacobs noted that the team initially considered developing an estimate of the maximum allowed % IA using development standards. However, there is limited treatment in the development standards for pavement IA. Pavement IA is a significant contributor to total IA, thus it was not deemed reasonable to proceed with a RWC based only on building coverage. Because of this limitation, observed % IA has been used as a source for more reasonable estimates.

- OCE asked how Jacobs factored in potential zoning changes. Jacobs also noted that potential up-zoning (higher density zoning) will be addressed through development of a mapped boundary (the "Focus Growth Area" (FGA)) that shows areas that Planning anticipates being potential areas of up-zoning or changes to development standards. Different "high" scenario assumptions will be used in these areas.

- DEP pointed out that the 1% difference between R-60's high and low scenario for the reasonable worst-case scenario (RWC) seems low. Jacobs agreed with the comment noted that this is due to the observed examples not showing much variation. Jacobs explained that the low scenario is based on the average PIA of five observed RWC examples.

- Planning asked if the % IA calculation covered all IA. Jacobs confirmed that yes, the estimate includes both building and pavement areas within a parcel. That is, public ROW areas are not included.

- DEP asked if the low scenario is based on the average of all examples or just R-60 land use. Jacobs clarified that the low scenario, for each zone category, is based on the average of 5 observed examples from that zone category. And the "high" scenario is based on the maximum of 5 observed examples. Jacobs further clarified that the approach was carried out for the most significant zone categories only.

- DEP recommended calculating the % IA solely based on the observed maximum observed IA without considering time. Jacobs agreed and explained that the future "trend" has been back-calculated from the observed RWC. The reality of when a specific area reaches the RWC, if at all, will likely not follow this trend. The intent is to show a reasonable density increase based on

observations and providing a do-nothing bookend for flood modeling and flood exposure risk assessment. Jacobs agreed to generally refer to the near-term and long-term scenarios rather than labeling as "2050" and "2100".

- Planning noted that using a long-term year so far in the future may be unrealistic for capital planning purposes. Available funds will likely limit expenditures on this and the focus should be on obtaining information that will provide the ability to prioritize projects based on assessed benefits. Jacobs agreed and indicated that having a mid-term and long-term scenario provides an interim condition (in addition to current conditions) that can be used for this purpose.

- Planning suggested applying the increased PIA (public infrastructure assessment) proportionally instead of equally. For example, a high-low scenario could be applied to 10% of the R-60 land use over time, assuming that 10% of the R-60 will be redeveloped while the rest is transformed at a later time. Jacobs noted that this approach is not ideal given that calculations will be done at catchment resolution. Applying this approach would require identifying specific catchments that will be increased, which may be tedious and less transparent than using a zone-wide assumption.

- Planning suggested increasing the gap between low and high scenarios by using short-term RWC for long-term RWC IA projections.

- DEP suggested modifying the RWC chart shown on Slide #20 by changing the X-axis scale to represent the time horizon. This will allow for a comparison between near-term and long-term.

    - *Action Item: Jacobs to revise graphic on Slide #20. [Complete, reflected in Attachment B]*

- Planning questioned the credibility of the proposed % IA ROC based on the observed % IA in terms of representing future growth. Planning noted that development pattern and conditions before 2021 are anticipated to differ from those in 2050. For example, more redevelopment is anticipated to occur in the future, particularly in the suburban watersheds. Jacobs acknowledge this but indicated that the approach is endeavoring to develop a "do nothing" estimate for future conditions based on best available data. The intent of the study is not to accurately represent future development, but rather bracket risk based on potential high and low scenarios.

- DEP noted that it would be useful to have a scenario that shows future conditions rainfall but no change in IA. This would allow a comparison of relative impact of IA on the results.

    - *Action Item: Jacobs to propose scenario with future rainfall and current conditions IA.*

- OEMHS asked if the FGA boundary has been developed with consideration of past % IA change. Jacobs explained that the FGA boundary is solely based on the county's comp plan "corridor growth areas". That is - there has been no FGA-specific study of current and past % IA. Jacobs noted that the "upzoning"/development standard changes that the FGA intends to capture is focused on residential zones and has not been carried out . Therefore the proposed changes are not observable elsewhere in the County. The intent is to move single family residential into higher density residential. Some of this is observable in "optional method" development of larger single-family lots. But Change of smaller single-family lots to "optional" is not observable. Jacobs acknowledged that looking at current % IA in transportation hub areas may still be helpful to understand % IA for residential areas near a transportation hub.

- Planning questioned whether applying 100% IA for CR for single-family residential ZC within 0.5 miles of the metro station is reasonable. Planning suggested using a lower % IA based on observed % IA in transportation hub areas. Transportation hub areas could be generalized as high-

density (e.g. Wheaton, Bethesda, Rockville), medium-density (e.g. Takoma Park, Shady Grove), and lower-density (e.g. Medical Center, Forest Glen) in order to define more appropriate % IA uplift in those areas. It may also be more appropriate to define a transitional area around the metro station hub and use this same uplift for lower density FGA areas like the planned Purple Line station locations.

  - *Action item: Jacobs to generate summaries to understand potential modifications to FGA % IA increase for single-family residential areas.*
  - *Action item: Jacobs to work with planning to define uplift/upzone criteria for various FGA areas.*

- Parks noted that Parks owns most of the excluded areas and the % IA will still increase over time because Park is consistently adding new facilities to those areas. Parks acknowledged that the % IA Rate of Change (ROC) for their property will not increase as much as in other zones. DEP suggested leaving Parks property out of the land use scenario or having Parks define the % IA ROC for their properties. Parks suggested they can provide % IA-ROC based on park facility type but also opened to leave their property out of land use scenario (no growth). Jacobs agreed to use the current % IA for all Parks properties and exclude them from land use calculation.
- OEMHS asked if the increase in permeable pavement through green infrastructure or best management practices projects would be captured in the flood model. Jacobs confirmed that it LID and BMPs will be incorporated in the flood model using other means of input (infiltration methods, direct entry of storage features, etc.).

Preliminary % IA Scenario Results for Sligo Creek Watershed

- DEP questioned why there is no change in the % IA for Right of Way (ROW) and noted that sidewalk and bike projects typically require road widening that will contribute to IA. Jacobs explained no change in ROW's % IA was an initial assumption set in this study but can be revised. Jacobs asked for input on the appropriate methodology for capturing the % IA ROC for ROW.
- DOT agreed that it is preferable to show %IA increases in ROW areas. DOT pointed out that not all bike lane and pedestrian (BP) infrastructure requires road widening. But DOT gave examples of green space being converted into BP, such as the Capital Crescent Trail in Sligo Creek, the Green train along Wayne Avenue, the Metropolitan Branch Trail, and the new BP that will be constructed within a 0.25- and 0.5-mile radius of the purple line metro. DOT did note that there are some BP projects that did not require road widening, such as the White Flint TOD and Spring Cedar St., which were generated using existing roadway pavement areas.
  - *Action item: Jacobs to use determine reasonable value to use for ROW IA growth.*
- Planning noted the % IA ROC for the ROW would vary along the FGA and suggested developing typologies accordingly. Planning suggested one can be a half mile and within one mile beyond metro station areas. Jacobs indicated that it would be most straightforward to present a single % IA ROC for ROW to apply County-wide.
- Planning asked if 2009 and 2012 planimetry have data for bikes and pedestrian pathways and noted that the % IA ROC for county property could be a good alternative for understanding the % IA ROC for ROW. Jacobs replied that neither the 2009 and 2012 data (both sourced from 2008 imagery) do not include all pavement areas. Jacobs suggested using the most recent (2019) DEP

data, with pavement classifications, and looking at some defined BP project areas should be sufficient for understanding % IA ROC for ROW.

Next Steps

- Jacobs reviewed next steps in the IA scenario development process, including pulling some new summaries discussed in the meeting. Future scenario preliminary results (pending catchment delineations) will be produced for review in the third and final Task W-2 workshop, planned for November 14th.

Action Items

1. ~~Jacobs to check the gauge's location near Clarksburg, confirm the location's name is Clarksville.~~ [Complete, reflected in Attachment A]
2. Jacobs to incorporate rainfall assessment/data for September 1, 2021 event from Twinbrook Drainage Study into analysis of historic events.
3. Jacobs will develop IA summaries for transportation hub areas to identify appropriate % IA for upzoning in FGAs.
4. Jacobs to work with Planning to generate final FGA boundaries for Workshop #3.
5. Jacobs to develop estimated % IA increase for ROW areas.
6. Jacobs to propose scenario with future rainfall and *current* conditions IA.
7. ~~Jacobs to revise graphic on Slide #20.~~ [Complete, reflected in Attachment B]

Attachments

A. Task W2.1 Climate/Rainfall Projections & Scenarios Presentation

B. Task W2.2 Impervious Area Scenarios Presentation

Jacobs Challenging today. Reinventing tomorrow.

Scenario Planning Workshop 2:
Part I: Climate Science & Scenario Planning

September 26, 2023

Purpose

- **Project**:
  - Determine current and future risk of flooding for a range of events – use hydrologic and hydraulic (H&H) modeling
  - Assess alternatives to mitigate flooding: projects in CIP, design criteria, policy
- **Task**: Develop inputs for H&H modeling
  - Storm events
    - Synthetic events (design storm) – based on precipitation statistics (IDF curves)
      - Historical and future projected climate
    - Actual (historical observed) events
  - Impervious Area

Workshop #2 Objectives

- Climate Scenarios
  - Present final projections for rainfall IDF
  - Recommended events for modeling (observed, current and future)
  - Discussion of rainfall distributions for modeling: SCS Type II, NRCS Region C, Alternating Block (intensity vs time)
- Impervious Area Scenarios
  - Review approach and results for “reasonable worst case” conditions and observed rates of change
  - Agreement on proposed methods of impervious area projection

Recommendations - Preview

- Updated Baseline IDF Curves
  - based on Dalecarlia Reservoir
  - small decrease in 100-year event since Atlas 14; increase in 10-year event
- Projected Future Conditions IDF Curves
  - 41% increase for 24-hr 100-year event, 2100, High Climate, 50%
- Events for Modeling (17)
  - 2 observed
    - Sept. 2020, Silver Spring
    - July 2019, Ten Mile Creek
  - 5 Baseline (5 return periods)
  - 10 Future Climate (5 return periods * 2 climate scenarios)
- Synthetic Distribution for Modeling
  - Alternating Block (not SCS Type II)

Review of Key Decisions from Workshop #1

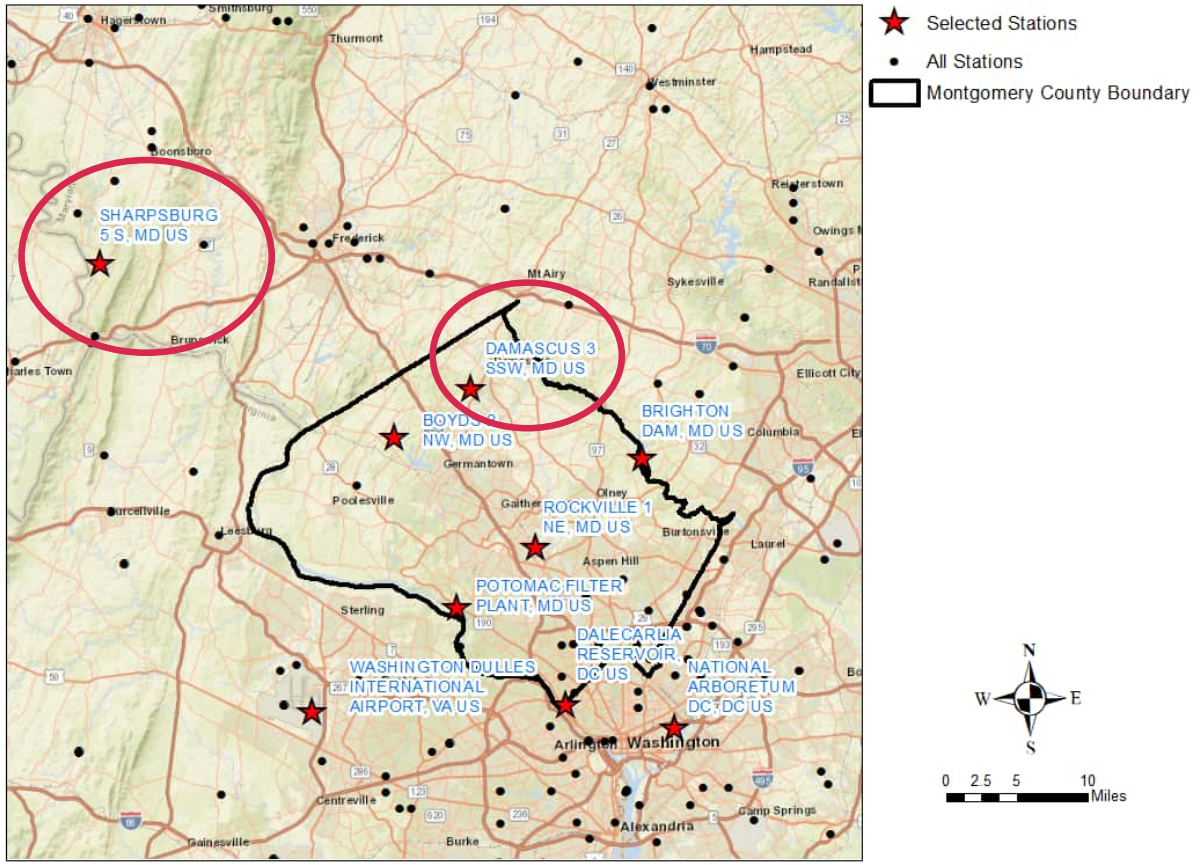
- Finalize climate change parameters
  - Climate Change Projection Source
    - **SimCLIM**
  - Planning time horizons
    - **2050**
    - **2100**
  - Greenhouse Gas (GHG) scenarios
    - **SSP2-4.5**
    - **SSP5-8.5**
  - Global Climate Model (GCM) Summaries
    - **50% non-exceedance**
    - **90% non-exceedance**
- Select historical storm events (up to 5)
  - **July 8, 2019**
  - **August 7, 2019**
  - **September 10, 2020**
  - Considered Hurricane Isabel in 2003 – but only has daily data
- Select gages (both daily/long term and sub-daily/short term)
  - Daily / Long Term – increased from 7 to **9**
  - Sub-daily / Short Term - **4**

Precipitation IDF Curves

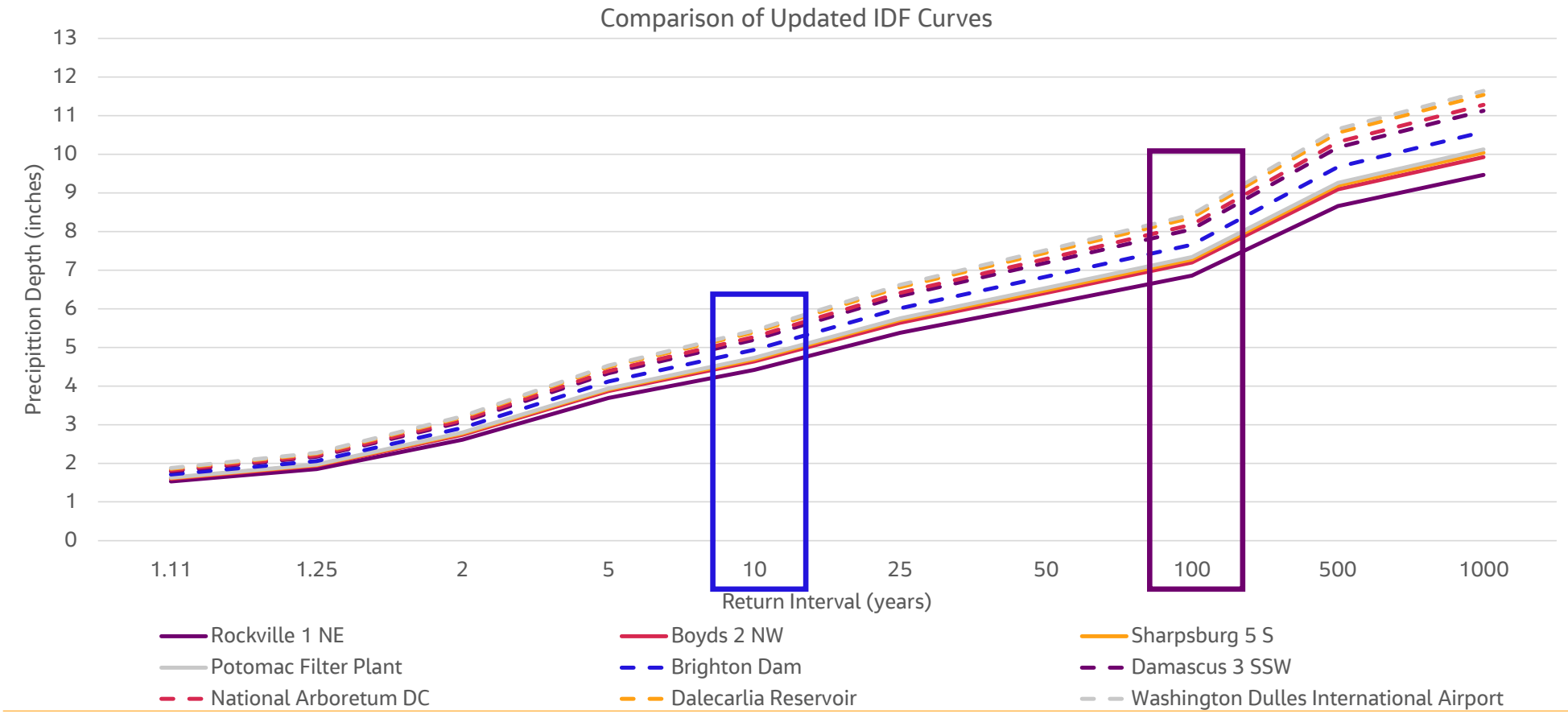
Updated Historical Baseline and
Future Projections

From Workshop #1, plus updates

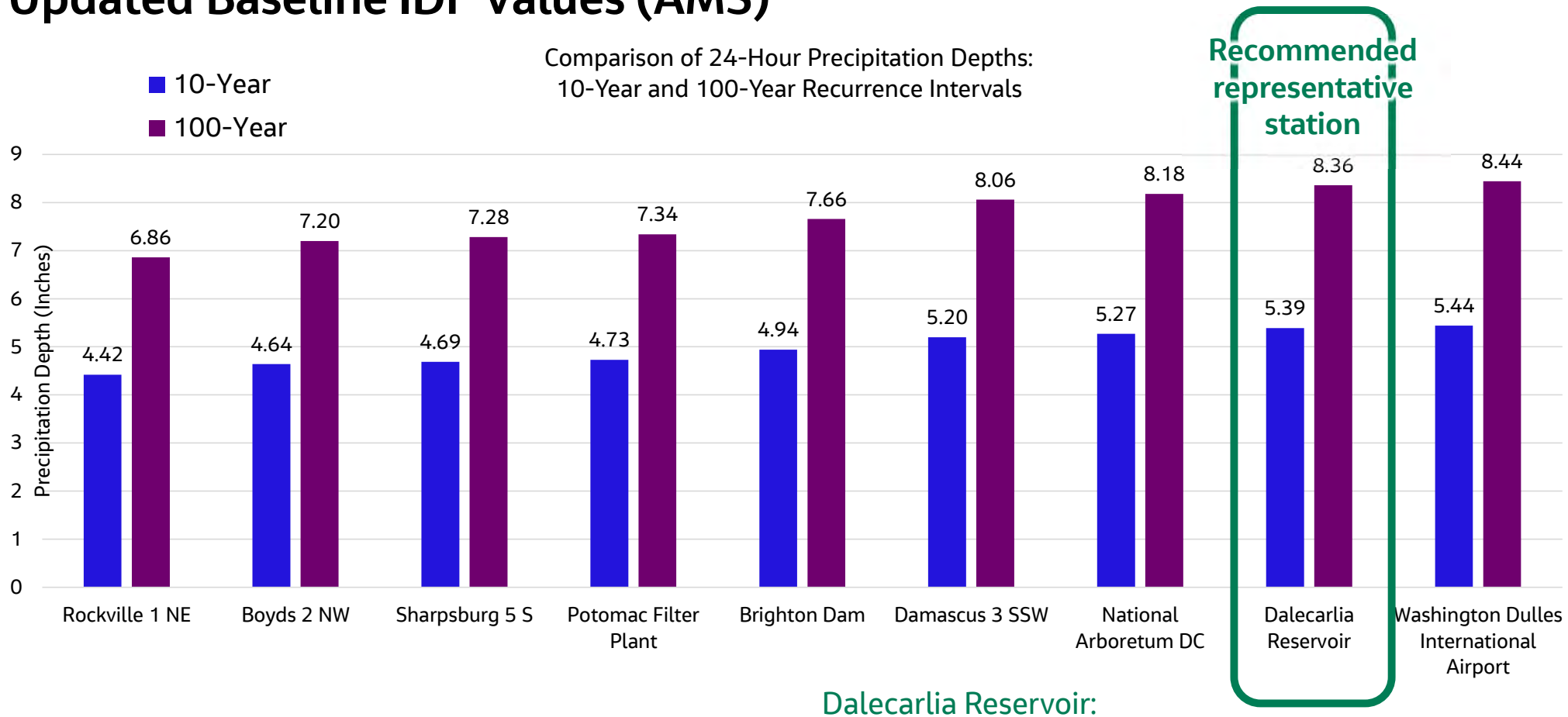
- Stations have been analyzed and selected based on
  - proximity to the County
  - length of record
  - data availability
  - data completeness
  - whether it was used by Atlas 14
- **Two additional stations added to the north/northwest after Workshop #1**



Updated 24-hour Baseline IDF Values: 9 stations



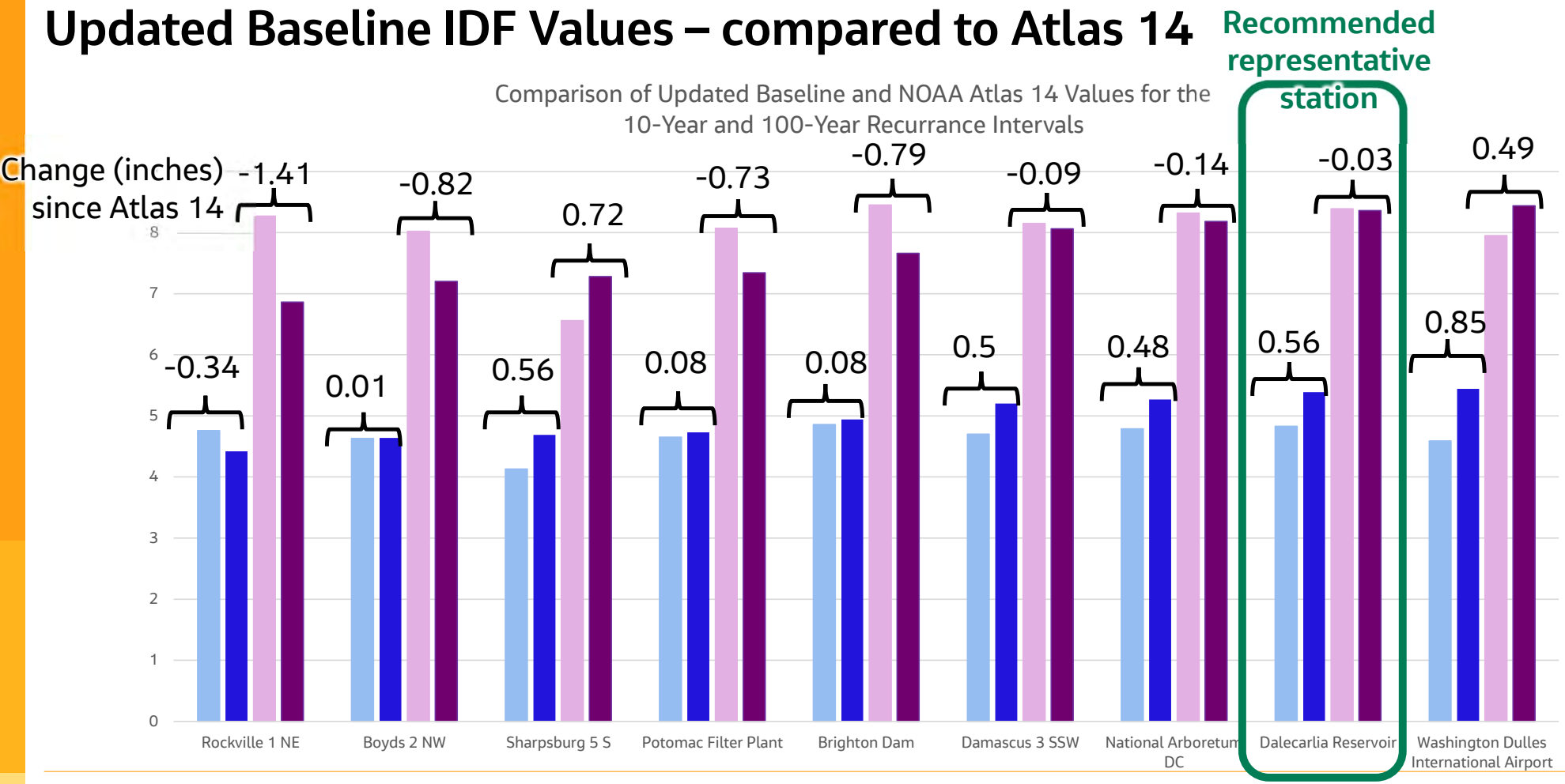
Updated Baseline IDF Values (AMS)



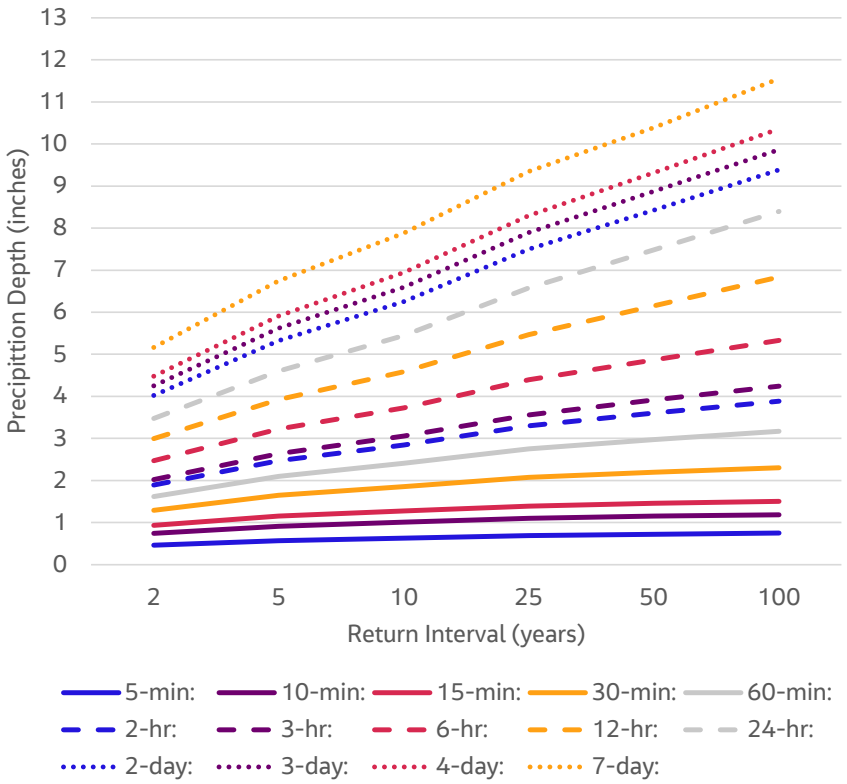
Dalecarlia Reservoir:

- Inside County (at border)
- High value (conservative)

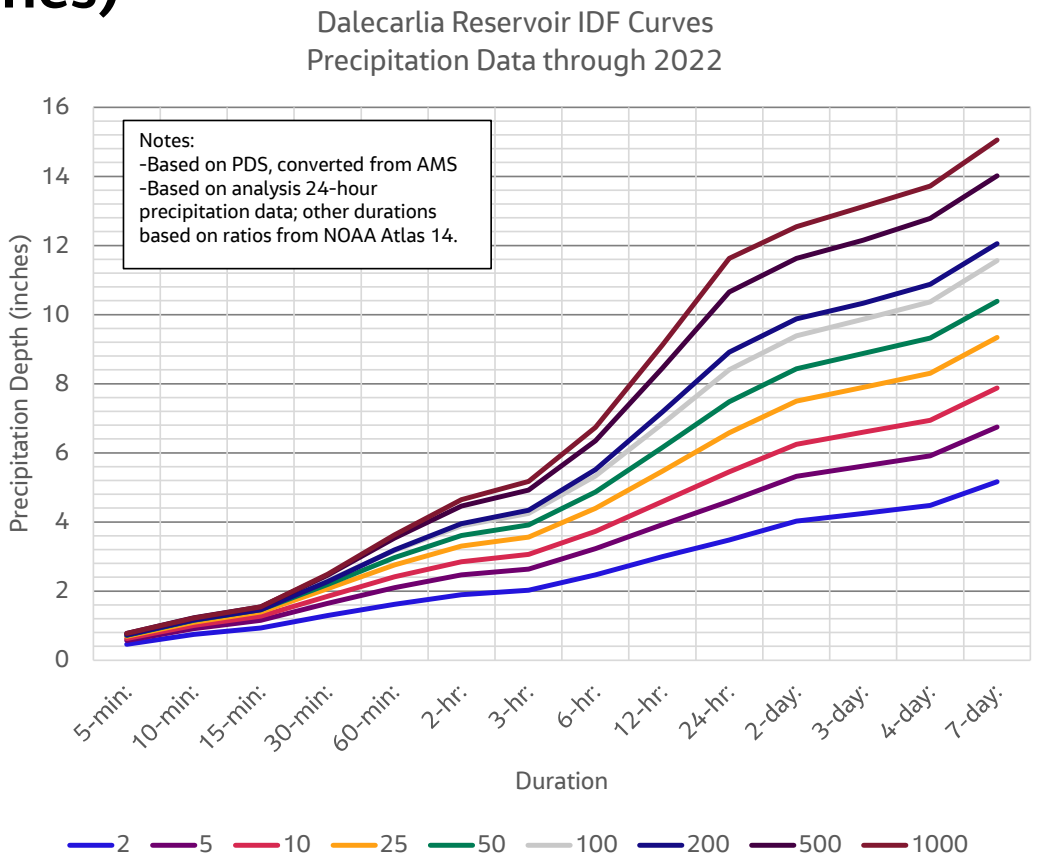
Updated Baseline IDF Values – compared to Atlas 14



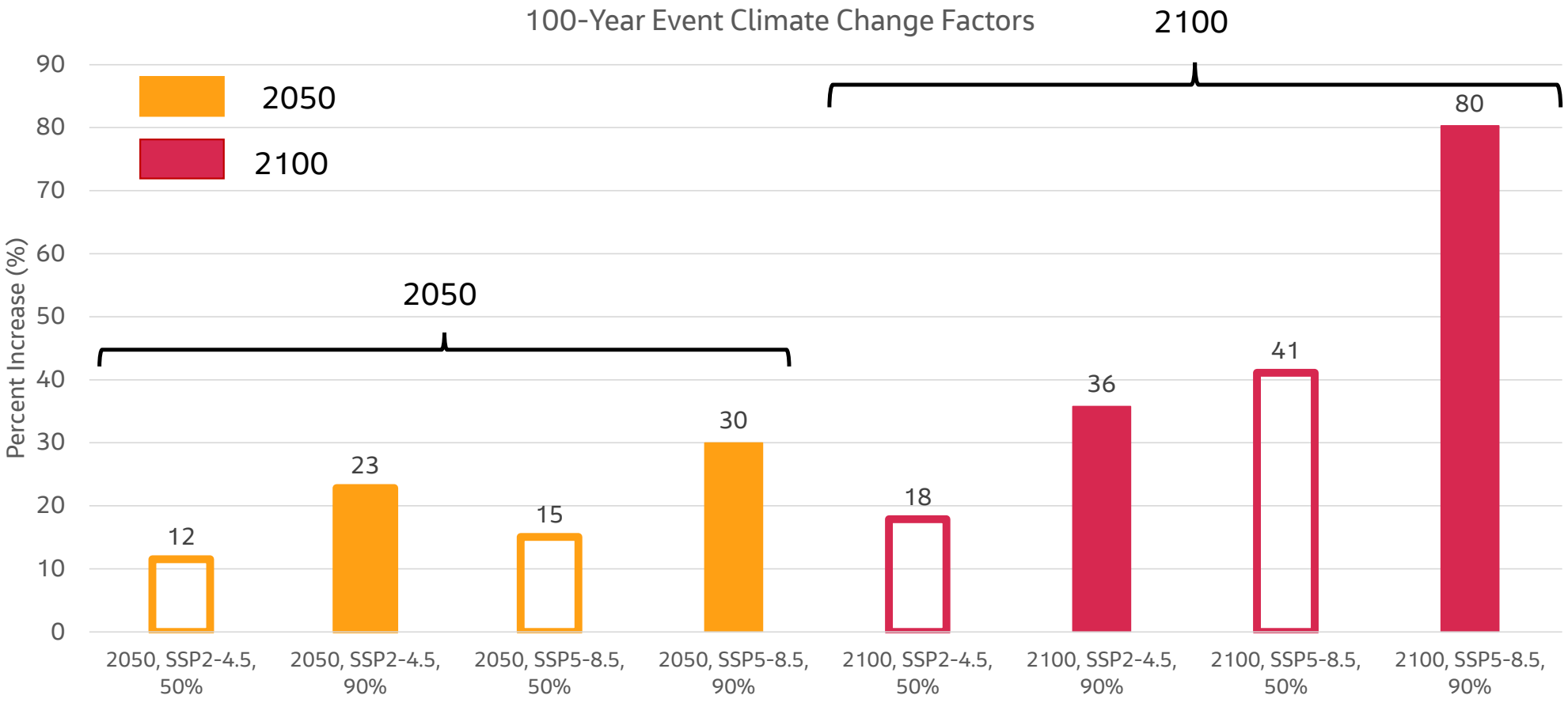
Updated Baseline IDF Values (inches)



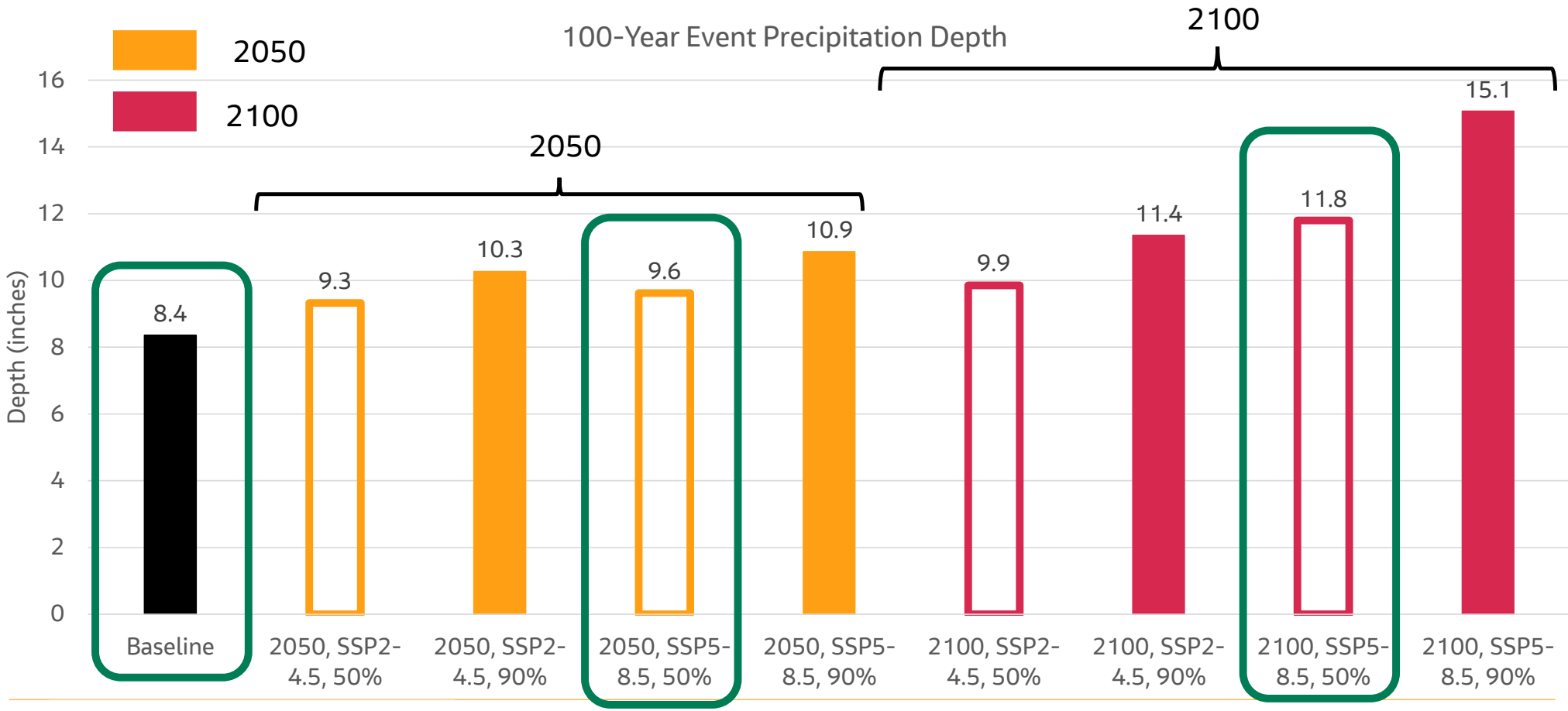
Notes:
-PDS, converted from AMS
-Based on analysis of 24-hour precipitation data; other durations converted using ratios from NOAA Atlas 14.



Projected Change (%) in 100-Year, 24-Hour Event Depth



24-hour, 100-Year Event Depth (inches)



Recommended scenarios for modeling

24-hour Future IDF Values

- 56 future climate scenarios + 7 baseline (24-hour)
- Selection of 15 scenarios for future modeling
- Many values overlap between future scenarios

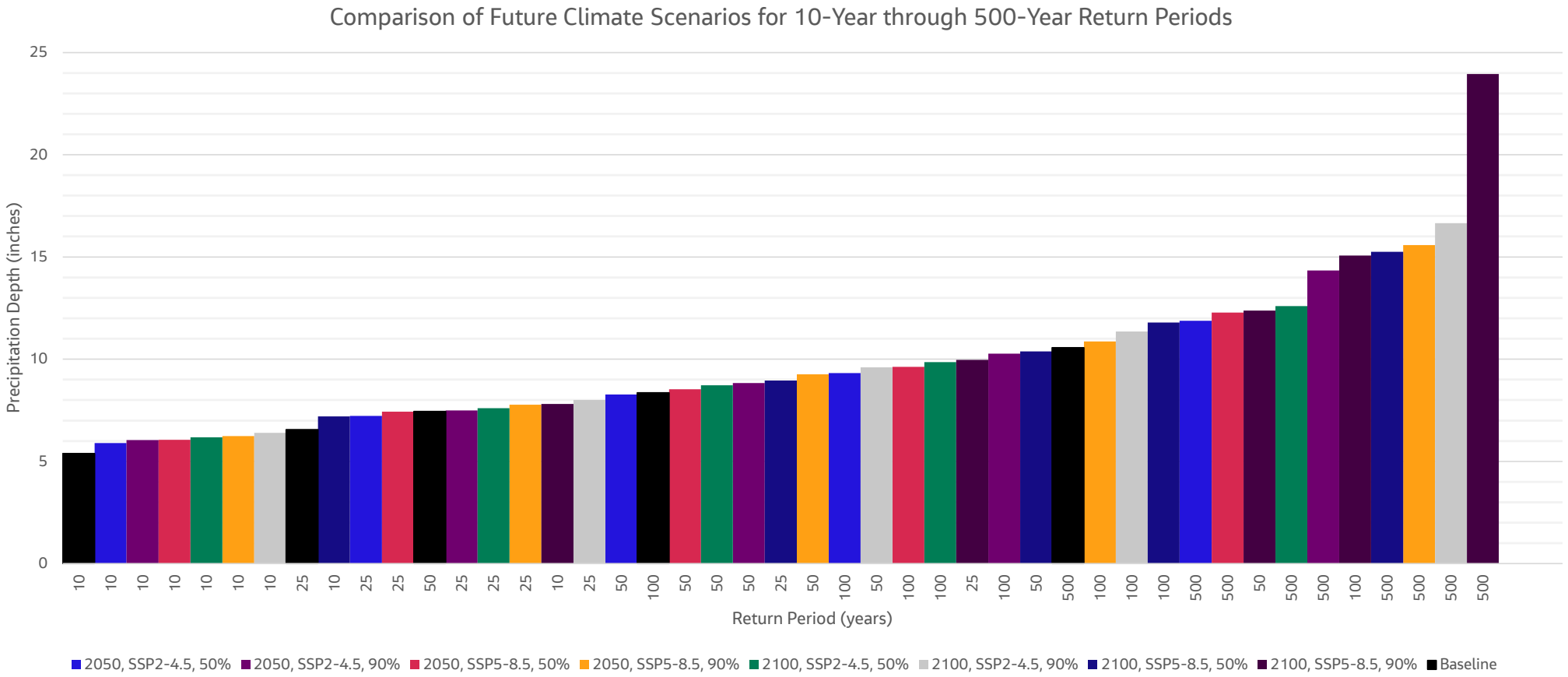
	Depth (inches)								
Return Period (years)	Updated Baseline (AMS)	2050, SSP2-4.5, 50th Percentile	2050, SSP2-4.5, 90th Percentile	2050, SSP5-8.5, 50th Percentile	2050, SSP5-8.5, 90th Percentile	2100, SSP2-4.5, 50th Percentile	2100, SSP2-4.5, 90th Percentile	2100, SSP5-8.5, 50th Percentile	2100, SSP5-8.5, 90th Percentile
2	3.2	3.4	3.6	3.4	3.8	3.5	3.9	3.9	4.6
5	4.5	4.9	5.0	5.0	5.2	5.1	5.3	5.9	6.4
10	5.4	5.9	6.0	6.1	6.2	6.2	6.4	7.2	7.8
25	6.6	7.2	7.5	7.4	7.8	7.6	8.0	9.0	10.0
50	7.5	8.3	8.8	8.5	9.3	8.7	9.6	10.4	12.4
100	**8.4**	**9.3**	**10.3**	**9.6**	**10.9**	**9.9**	**11.4**	**11.8**	**15.1**
500	10.6	11.9	14.3	12.3	15.6	12.6	16.6	15.2	23.9

Recommended scenarios for modeling

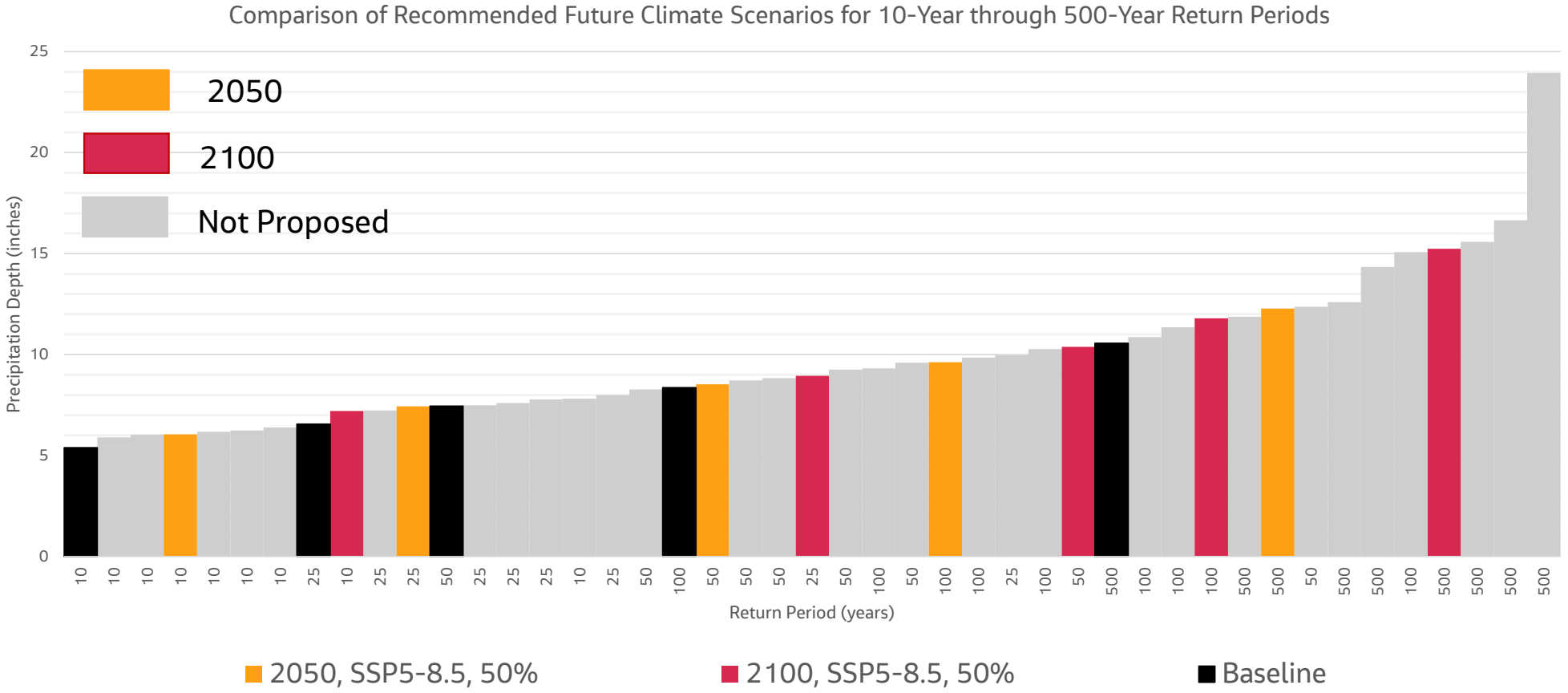
Recommended scenarios for <u>future</u> modeling

Recommended scenarios for <u>future</u> modeling

Future IDF Values – 10 through 500-Year Return Periods

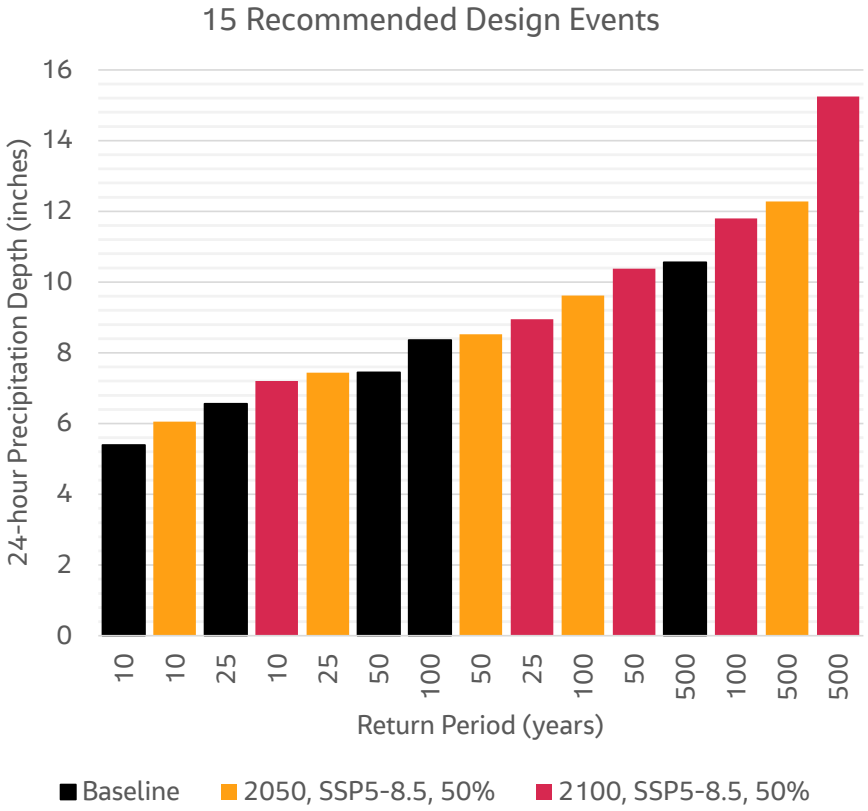


Future IDF Values – Recommended for Modeling



Recommendation: 17 Recommended Scenarios for Modeling

- 2 Observed Events (covered in next slides)
  - Sept. 2020, Silver Spring
  - July, 2019, Ten Mile Creek
- 15 Design Events (synthetic temporal distribution)
  - Baseline climate, 5 return periods:
    - 10, 25, 50, 100, 500
  - 2 Future Climate scenarios, 5 return periods (each):
    - 2050, High 50th
      - 10, 25, 50, 100, 500
    - 2100, High 50th
      - 10, 25, 50, 100, 500

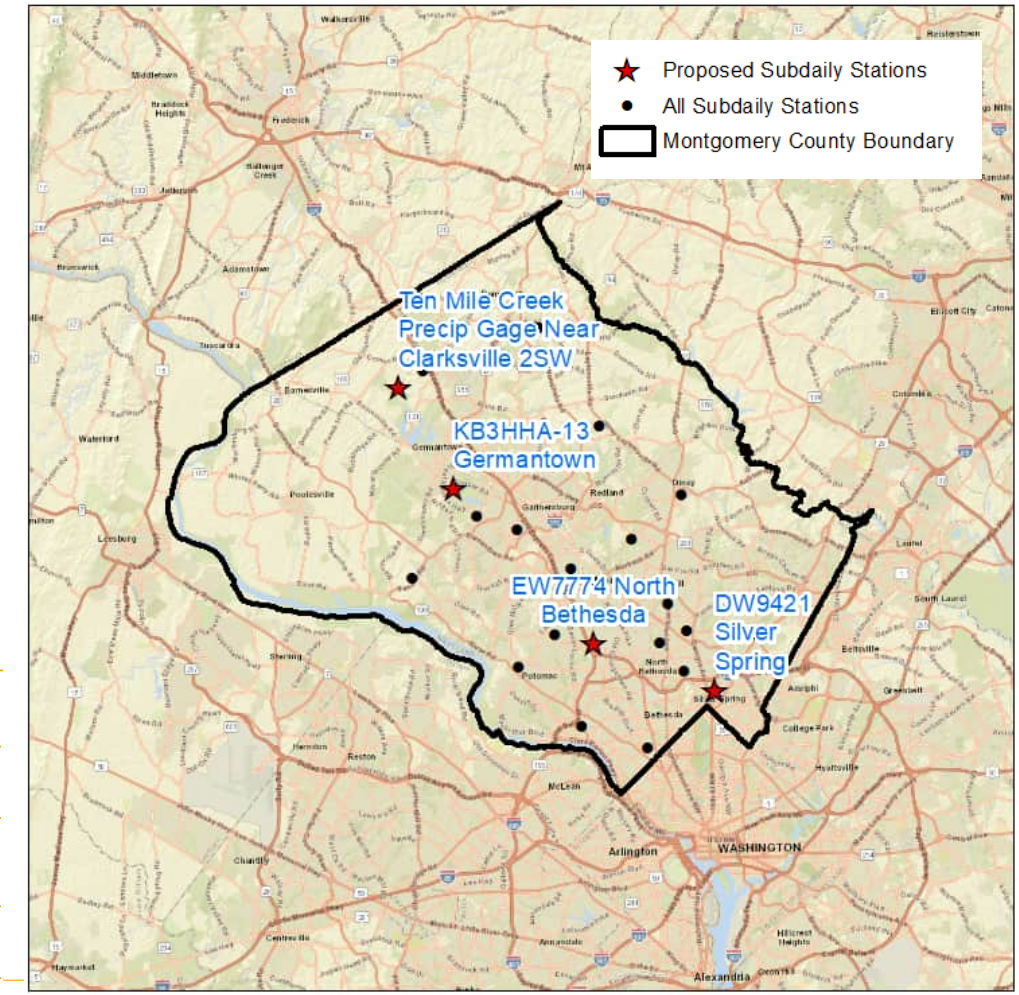


Historical Observed Events

From Workshop 1:
High Resolution Precipitation Stations

- Stations within the County with subdaily data
  - Gaithersburg - Montgomery County Airport replaced with Ten Mile Creek Precip Gage Near Clarksville 2SW*
- Different than daily stations used to update the baseline IDF curves
- Event Characterization: 3 events, 2 stations each

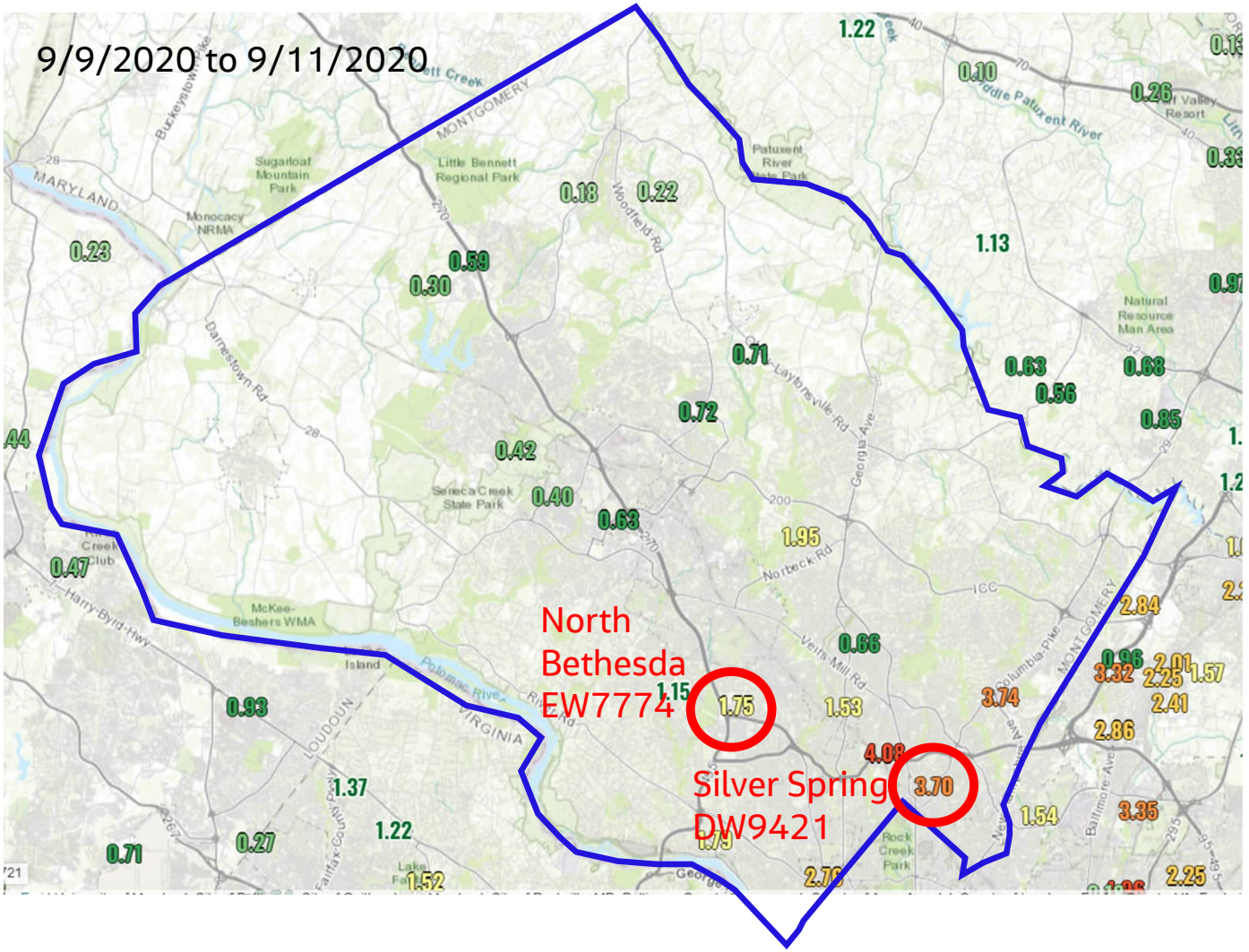
Station ID	Station Name	Mesonet	Status
AS787	KB3HHA-13 Germantown	APRSWXNET/ CWOP	ACTIVE
TMPM2	TEN MILE CREEK	HADS	ACTIVE
D9421	DW9421 Silver Spring	APRSWXNET/ CWOP	ACTIVE
E7774	EW7774 North Bethesda	APRSWXNET/ CWOP	ACTIVE



*Note: Ten Mile Creek Precip Gage Near **Clarksville** 2SW appears to be erroneously named and will be referred to as Ten Mile Creek Precip Gage Near **Clarksburg** 2SW in the Technical Memo (to follow)

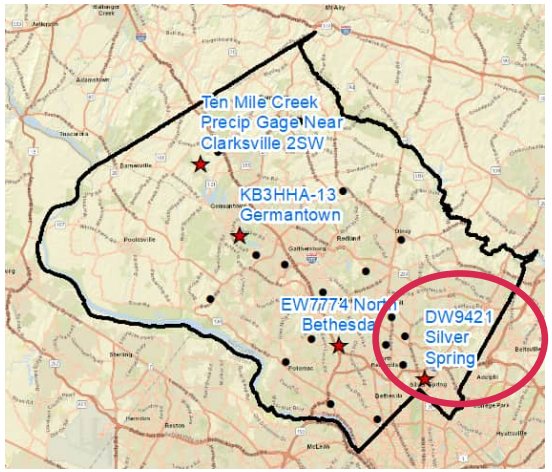
September 10, 2020

- Two stations selected for event characterization
  - Silver Spring
    - 5-year at 15-min, 1-hr, 2-hr, and 3-hr durations
  - North Bethesda
    - <2-yr at all durations

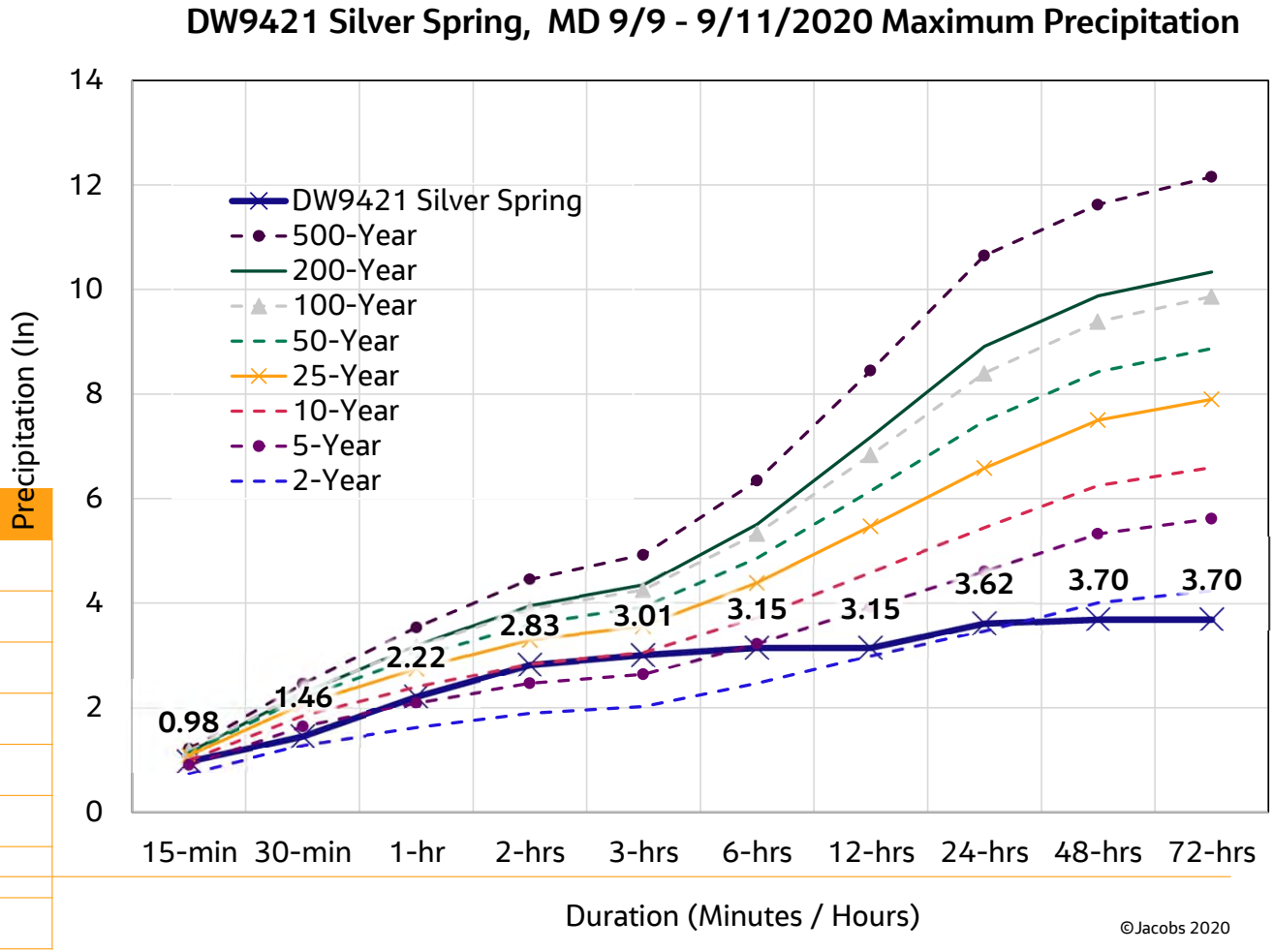


Recommendation: Use this for Model Event

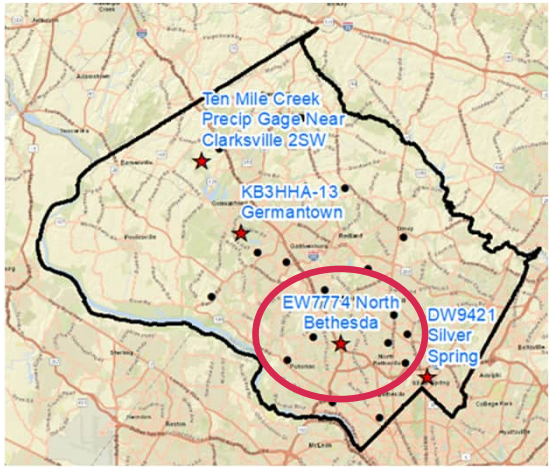
Historical Event Analysis – September 10th 2020 (max 5-year, various)



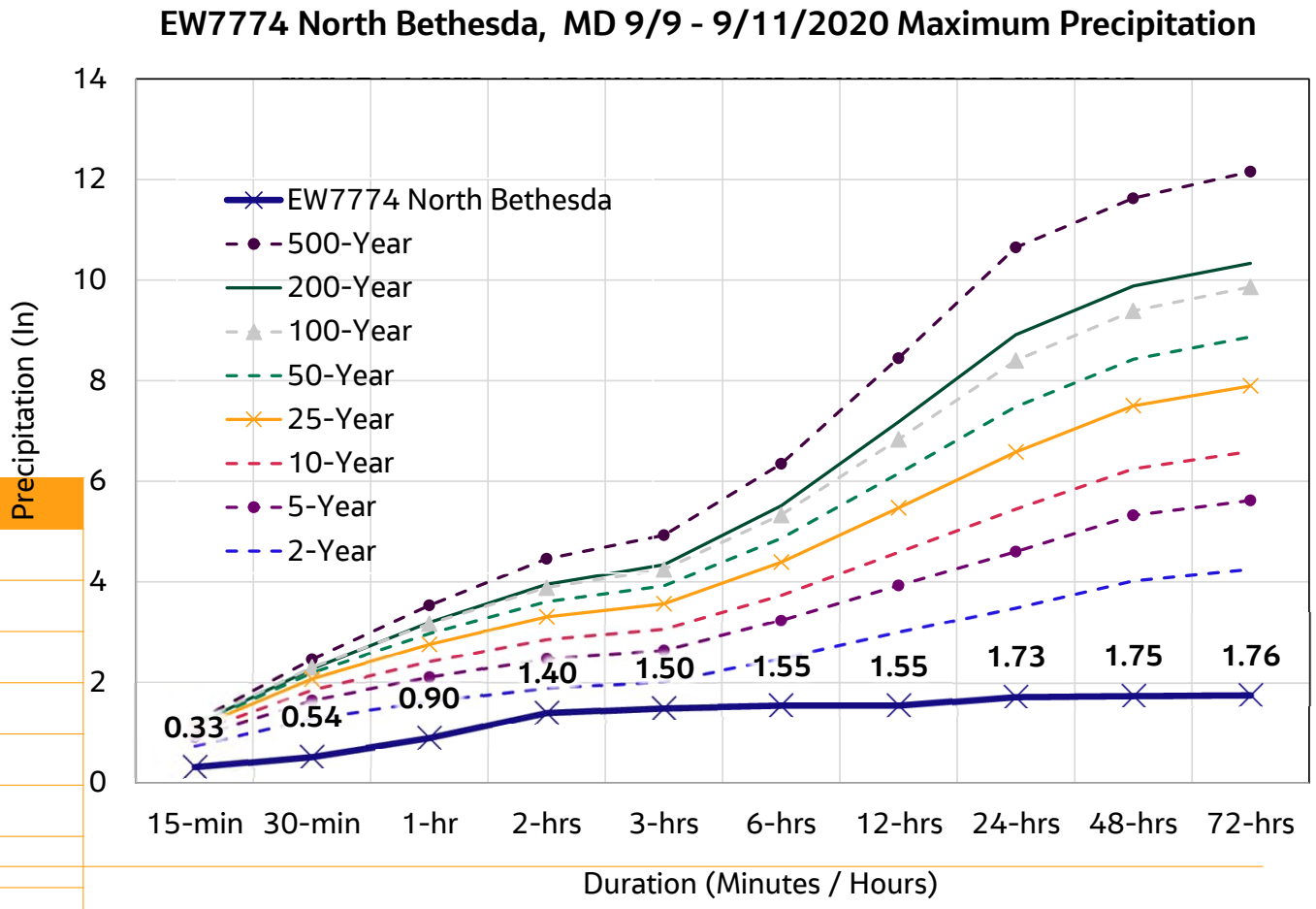
Duration	Depth (inches)	Return Interval
15-min	0.98	5-Year
30-min	1.46	2-Year
1-hr	2.22	5-Year
2-hrs	2.83	5-Year
3-hrs	3.01	5-Year
6-hrs	3.15	2-Year
12-hrs	3.15	2-Year
24-hrs	3.62	2-Year



Historical Event Analysis – September 10th 2020 (max <2-Year)

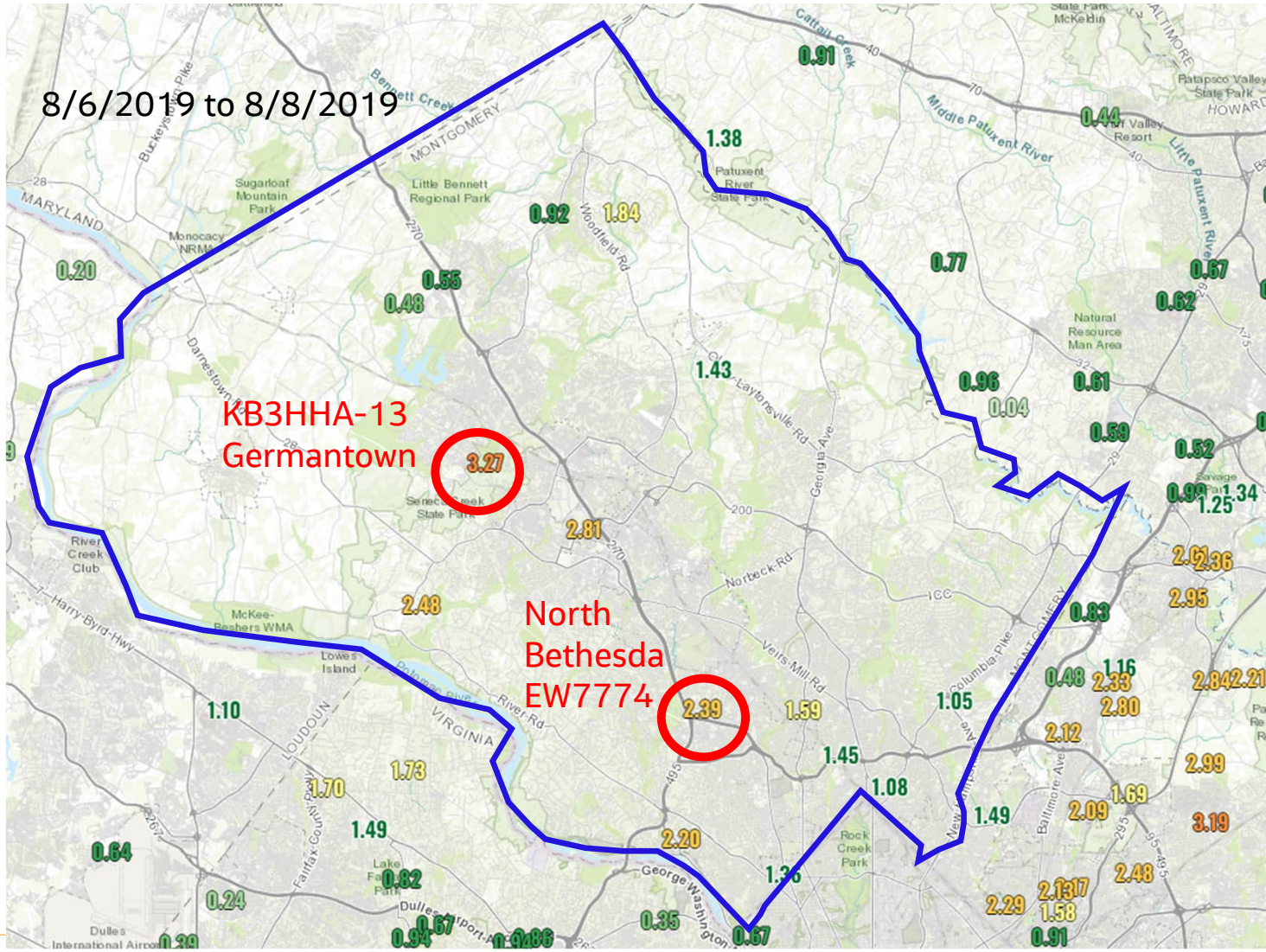


Duration	Depth (inches)	Return Interval
15-min	0.33	<=2
30-min	0.54	<=2
1-hr	0.9	<=2
2-hrs	1.4	<=2
3-hrs	1.5	<=2
6-hrs	1.55	<=2
12-hrs	1.55	<=2
24-hrs	1.73	<=2

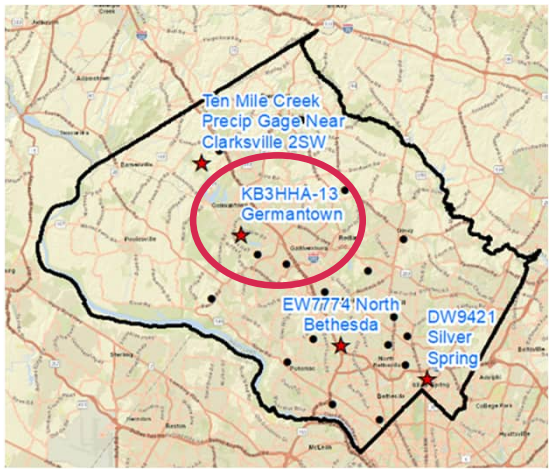


August 7, 2019

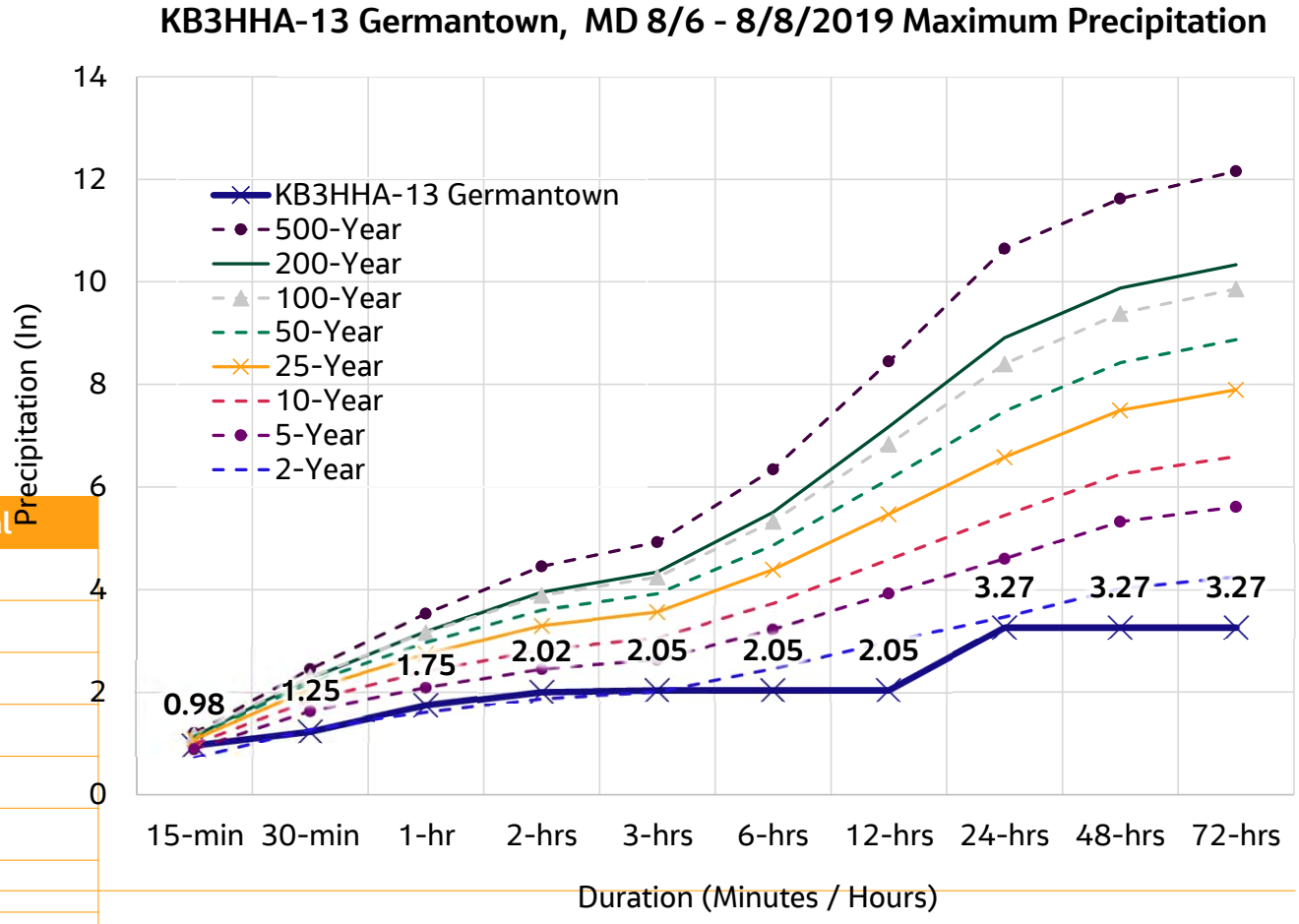
- Two stations selected for event characterization
  - North Bethesda
    - <2-yr at all durations
  - Germantown
    - 5-yr at 15-min duration



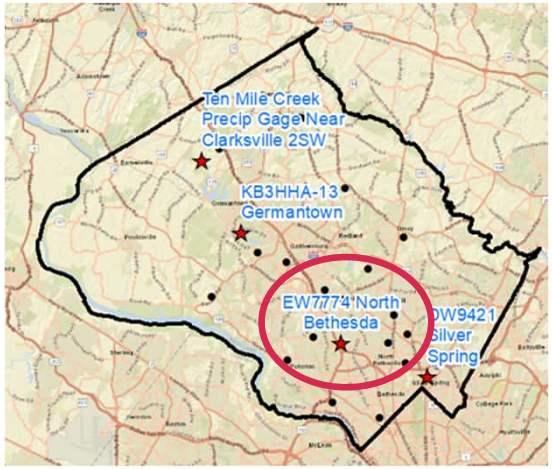
Historical Event Analysis – August 7th 2019 (max 5-year, 15-minute)



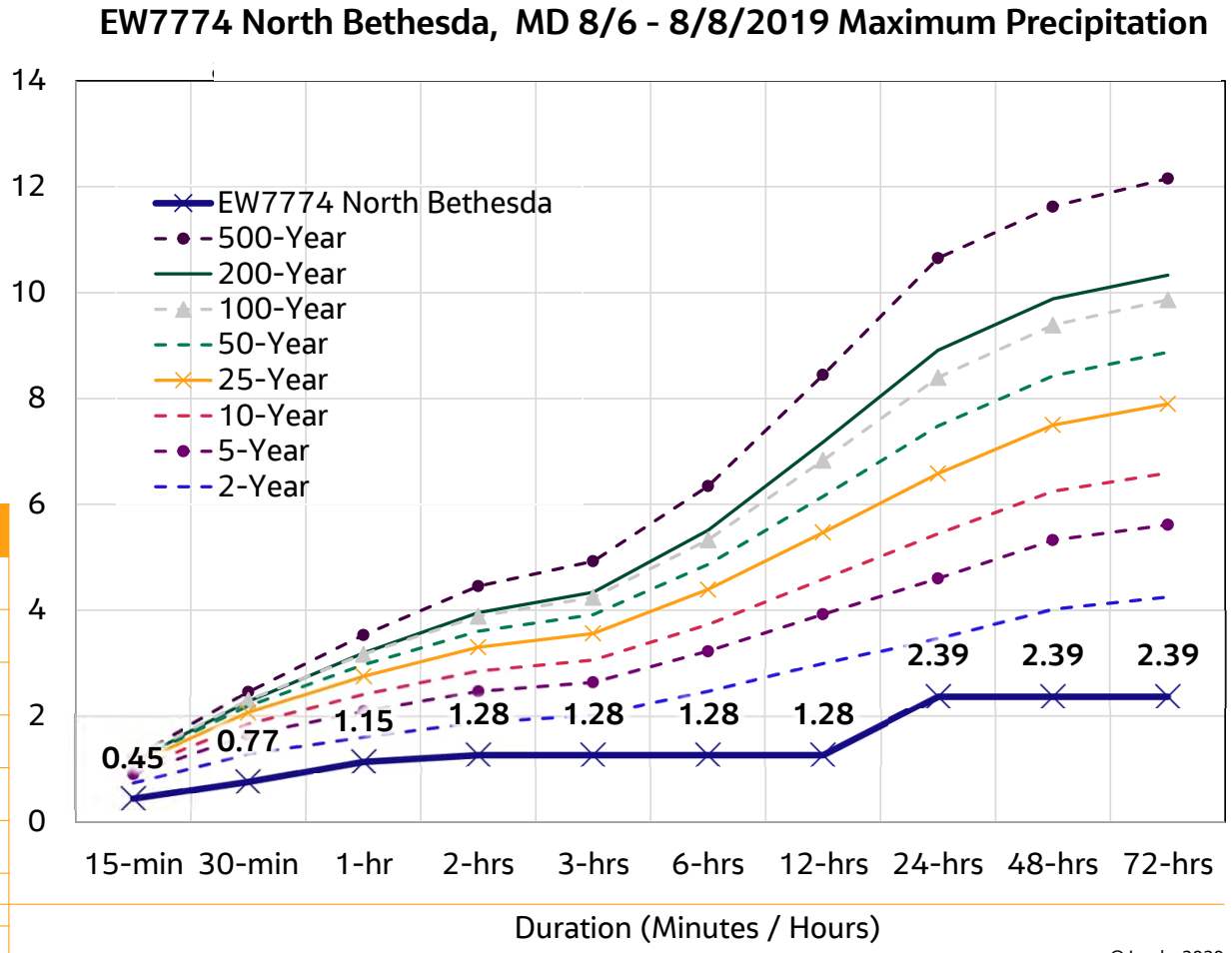
Duration	Depth (inches)	Return Interval
15-min	0.98	5-Year
30-min	1.25	<=2
1-hr	1.75	2-Year
2-hrs	2.02	2-Year
3-hrs	2.05	2-Year
6-hrs	2.05	<=2
12-hrs	2.05	<=2
24-hrs	3.27	<=2



Historical Event Analysis – August 7th 2019 (max <2-Year)

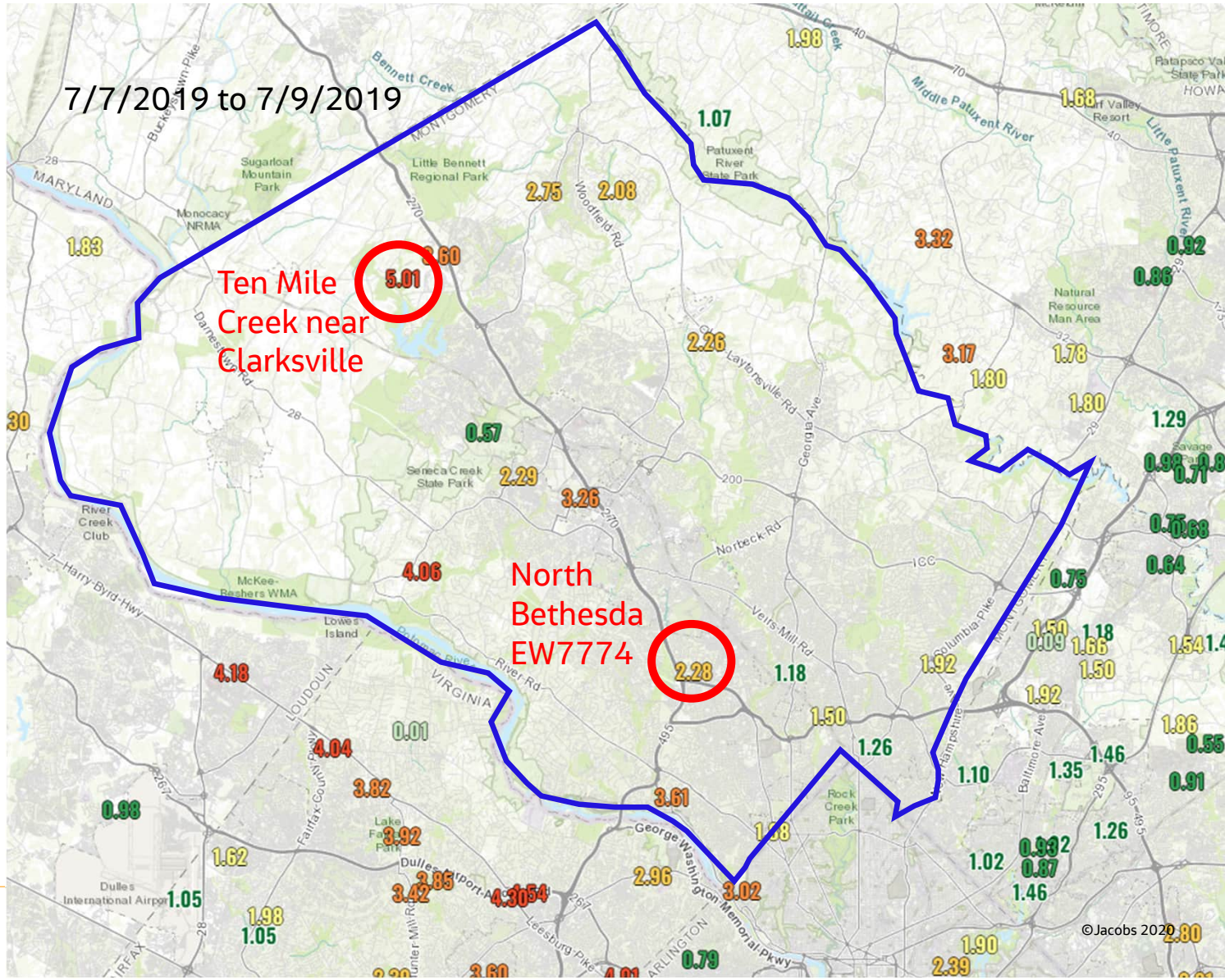


Duration	Depth (inches)	Return Interval
15-min	0.45	<=2
30-min	0.77	<=2
1-hr	1.15	<=2
2-hrs	1.28	<=2
3-hrs	1.28	<=2
6-hrs	1.28	<=2
12-hrs	1.28	<=2
24-hrs	2.39	<=2

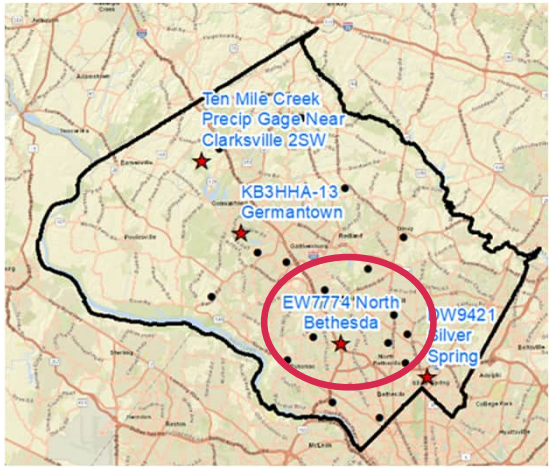


July 8, 2019

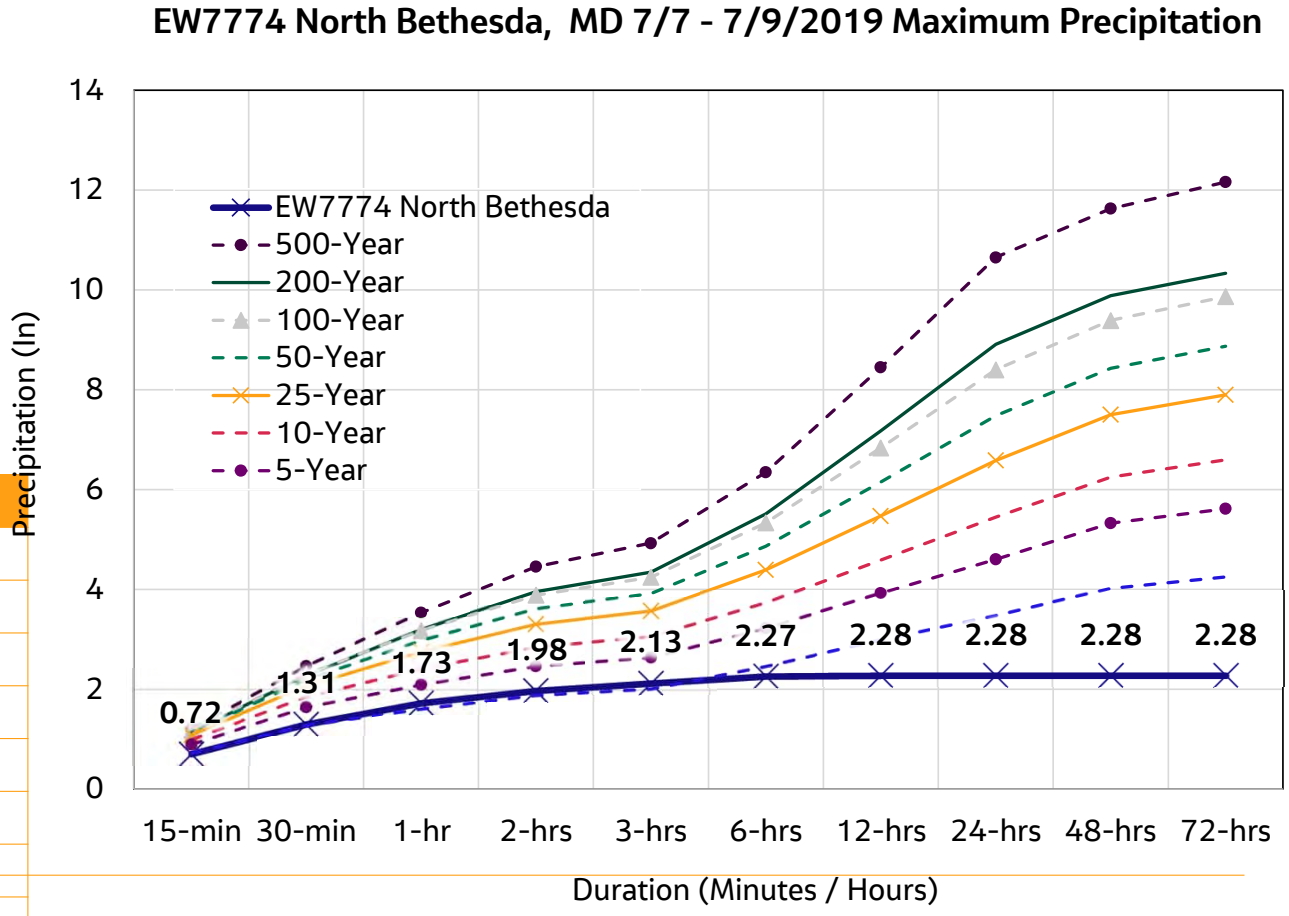
- Two stations selected for event characterization
  - Ten Mile Creek
    - 500 yr at 15-min to 1-hr durations
  - North Bethesda
    - 2 yr at 30-min to 6-hr durations



Historical Event Analysis – July 8th 2019 (max 2-Year, various)

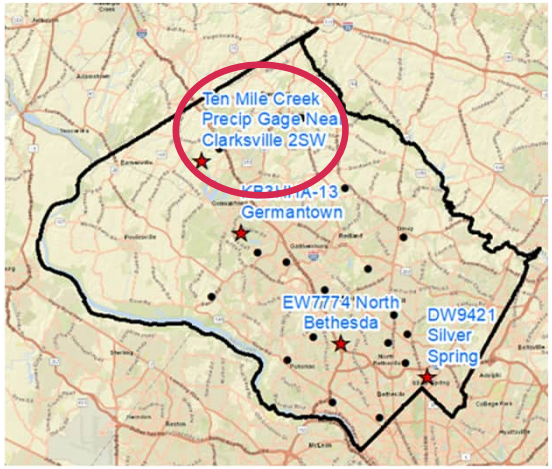


Duration	Depth (inches)	Return Interval
15-min	0.72	<=2
30-min	1.31	2-Year
1-hr	1.73	2-Year
2-hrs	1.98	2-Year
3-hrs	2.13	2-Year
6-hrs	2.27	2-Year
12-hrs	2.28	<=2
24-hrs	2.28	<=2

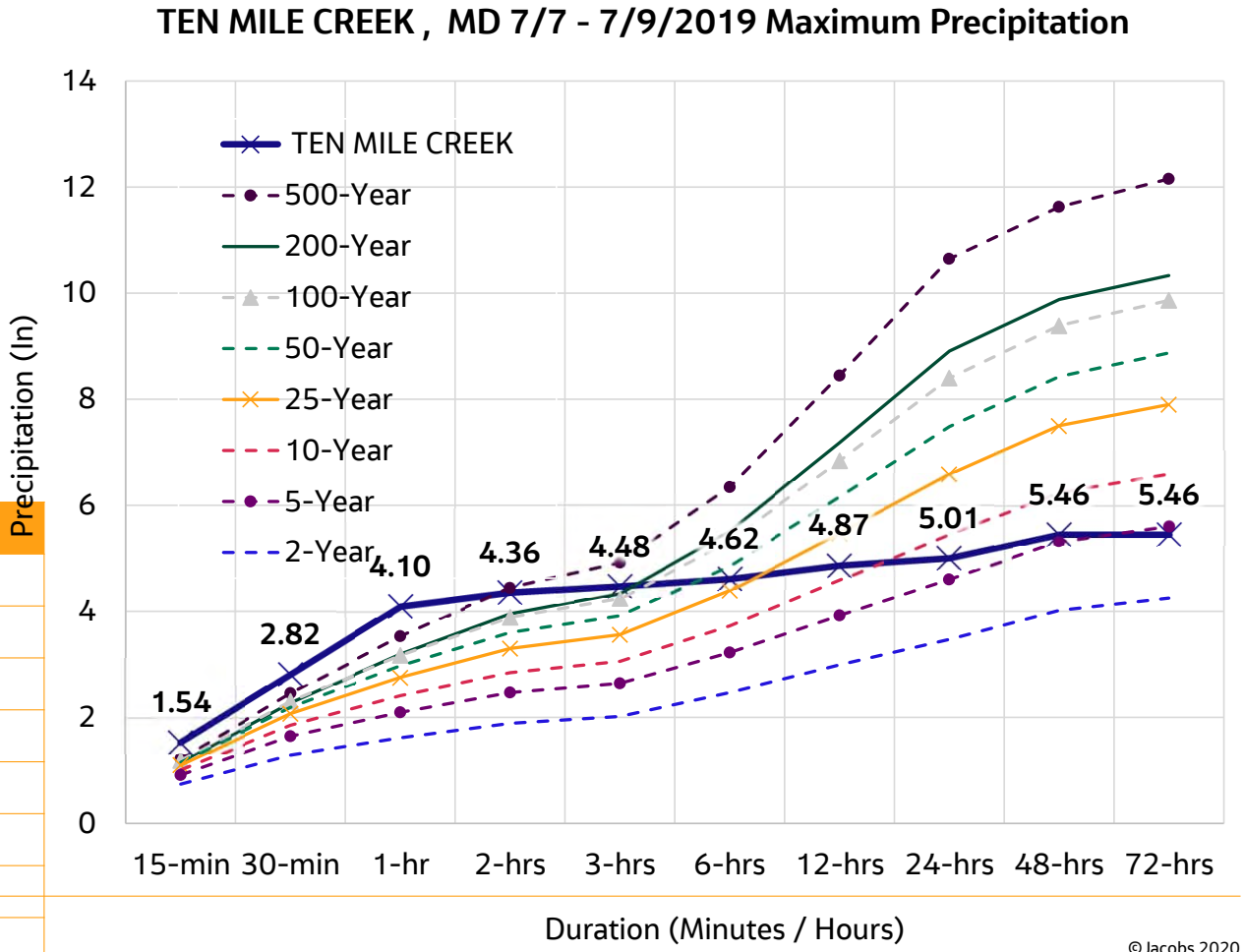


Recommendation: Use this for Model Event

Historical Event Analysis – July 8th 2019 (500-Year, various)



Duration	Depth (inches)	Return Interval
15-min	1.54	500-Year
30-min	2.82	500-Year
1-hr	4.1	500-Year
2-hrs	4.36	200-Year
3-hrs	4.48	200-Year
6-hrs	4.62	25-Year
12-hrs	4.87	10-Year
24-hrs	5.01	5-Year



Note: Ten Mile Creek Precip Gage Near **Clarksville** 2SW appears to be erroneously named and will be referred to as Ten Mile Creek Precip Gage Near **Clarksburg** 2SW in the Technical Memo (to follow)

Temporal Distributions

Design Storm – Synthetic Temporal Distribution

- Distributions Considered:
  - SCS Type II (currently being used by County)
  - NRCS Region C
  - Alternating Block - Recommended
- Synthetic temporal rainfall distributions:
  - Commonly used as “design storms” for H&H models
  - Are different from actual (observed) storm events
  - Generally 24 hours in duration; actual storms have any duration from minutes up to days
  - Desired characteristics (intensity) at multiple durations
  - Very useful where sub-daily precipitation data are not available
  - Unitless: $depth_n/depth_{24hr}$
    - $depth_{1\text{-}hr}/depth_{24hr}$ is a common metric

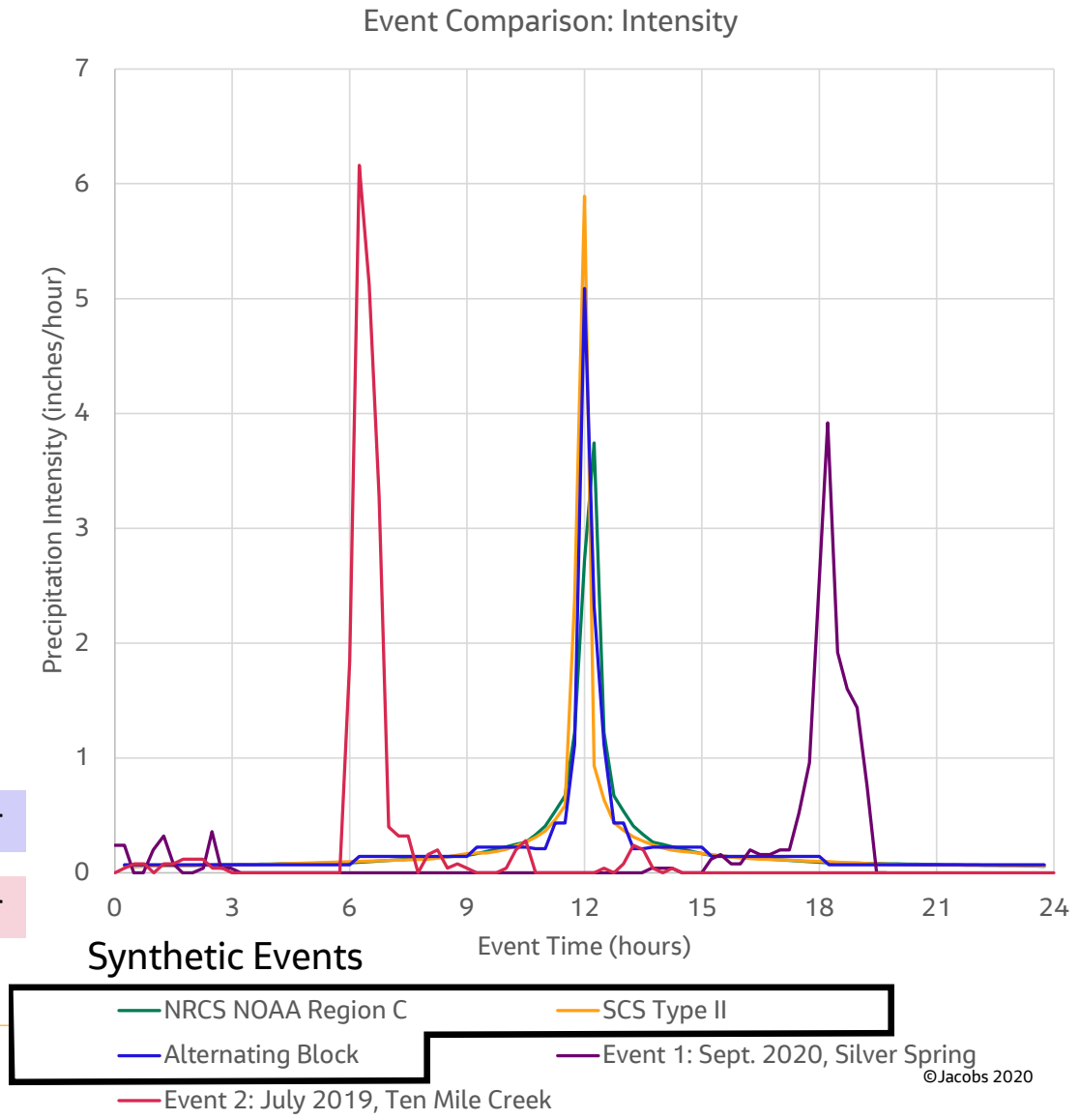
10-year, 24-hour Design Storm Comparison

Max Depth (inches) vs. Duration	10-yr SCS Type II	10-yr NRCS Region C	10-yr Alt Block	Event 1 Sept. 2020 Silver Spring	Event 2 July 2019 Ten Mile Creek
5-min:	0.67	0.57	0.63		
10-min:	1.15	0.92	1.01		
15-min:	1.4	1.1	1.3	1.0	1.5
30-min:	2.1	1.6	1.9	1.5	2.8
60-min:	2.4	2.1	2.4	2.2	4.1
2-hr:	2.9	2.8	2.8	2.8	4.4
3-hr:	3.2	3.2	3.1	3.0	4.5
6-hr:	3.8	3.9	3.7	3.2	4.6
12-hr:	4.6	4.6	4.6	3.2	4.9
24-hr:	5.4	5.4	5.4	3.6	5.0

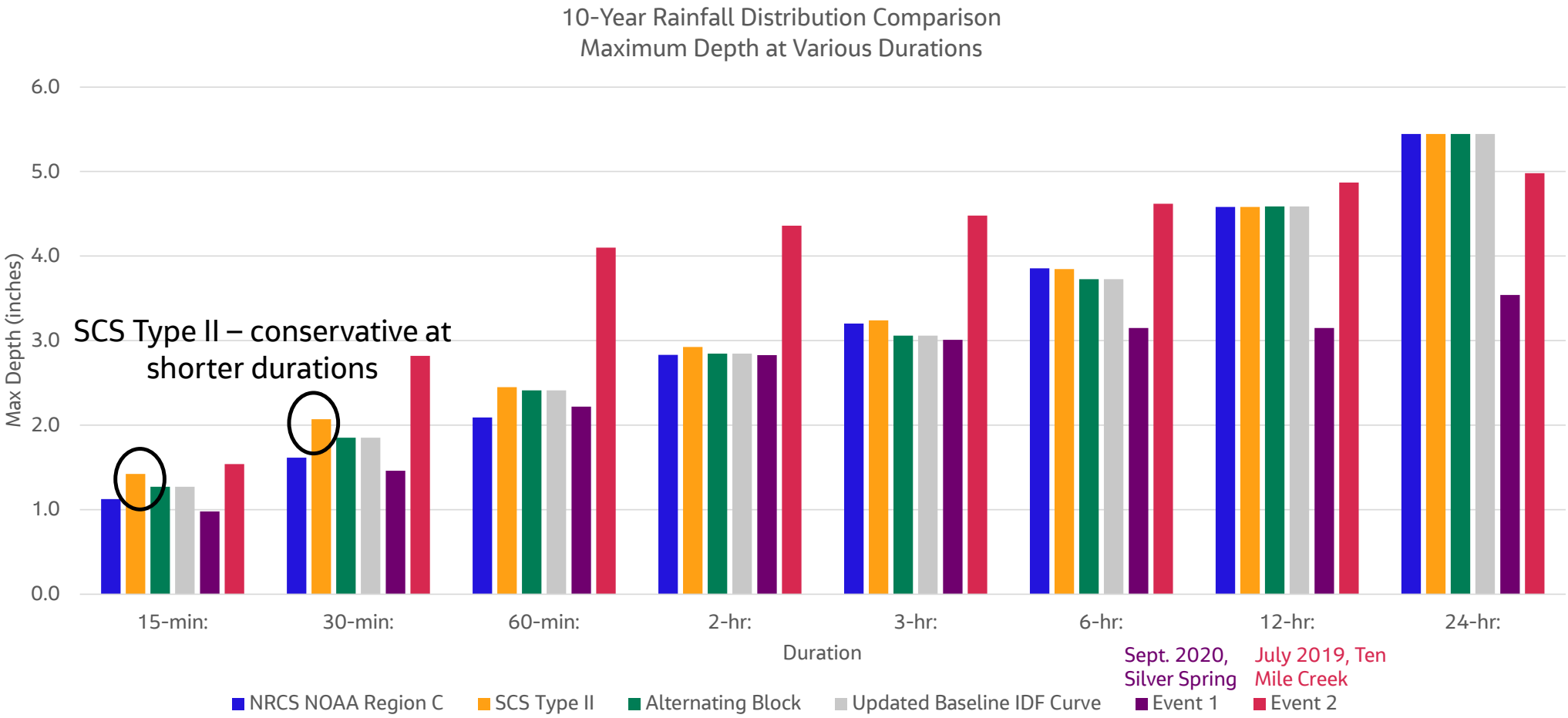
Equivalent Return Period (years)	10-yr SCS Type II	10-yr NRCS Region C	10-yr Alt Block	Event 1 Sept. 2020 Silver Spring	Event 2 July 2019 Ten Mile Creek
5-min:	19	5	10	-	-
10-min:	47	5	10	-	-
15-min:	37	5	10	3	>500
30-min:	25	5	10	3	>500
60-min:	11	5	10	7	>500
2-hr:	13	10	10	10	443
3-hr:	15	14	10	9	271
6-hr:	13	13	10	5	37
12-hr:	10	10	10	3	15
24-hr:	10	10	10	2	7

<10-yr

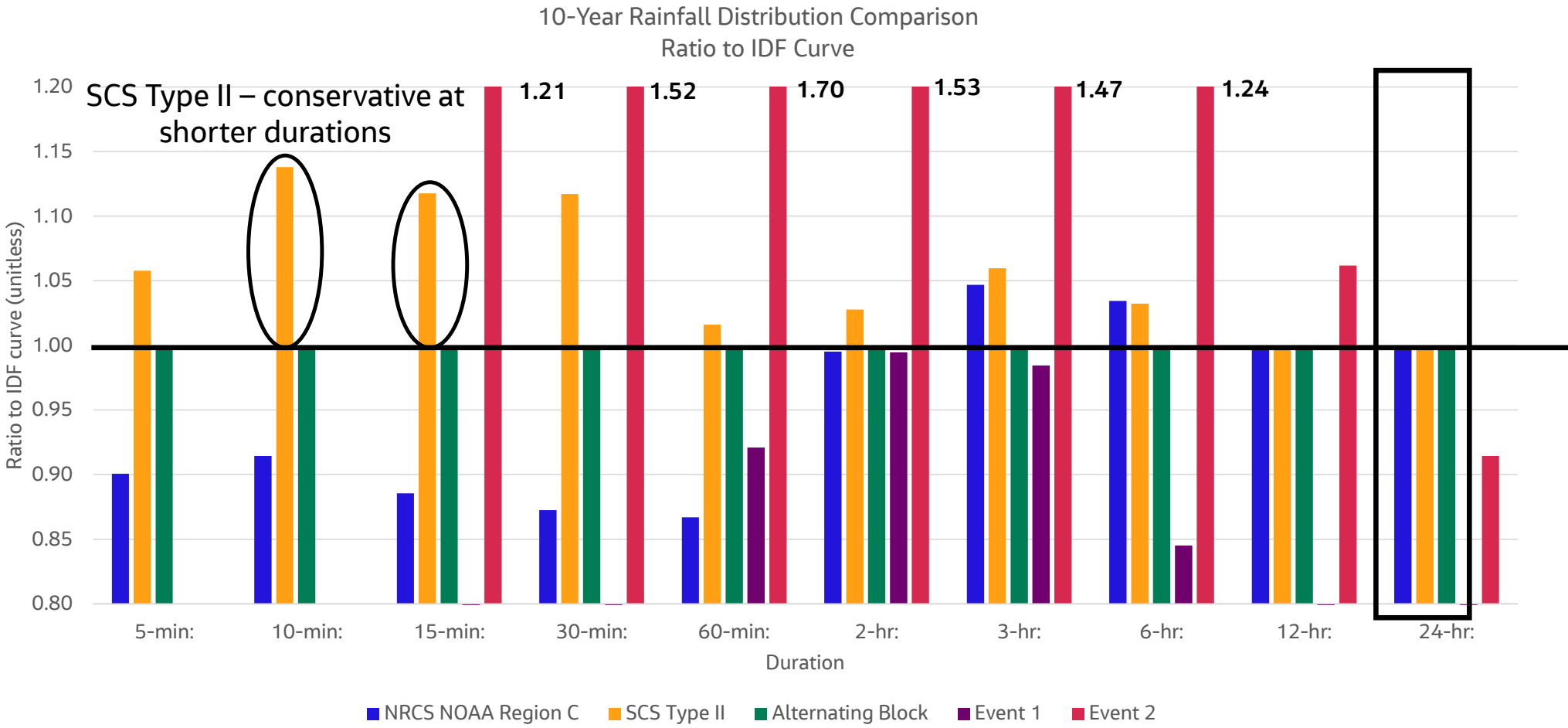
>10-yr



Precipitation Depth at Various Durations (10-year, 24-hour storm)

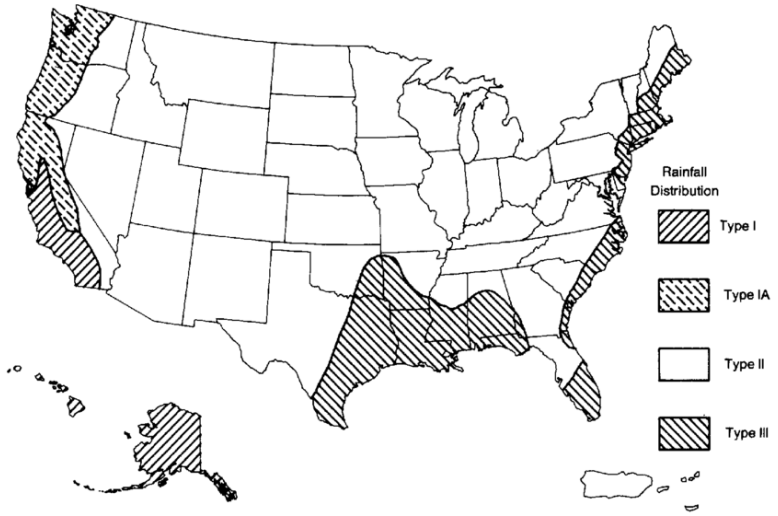


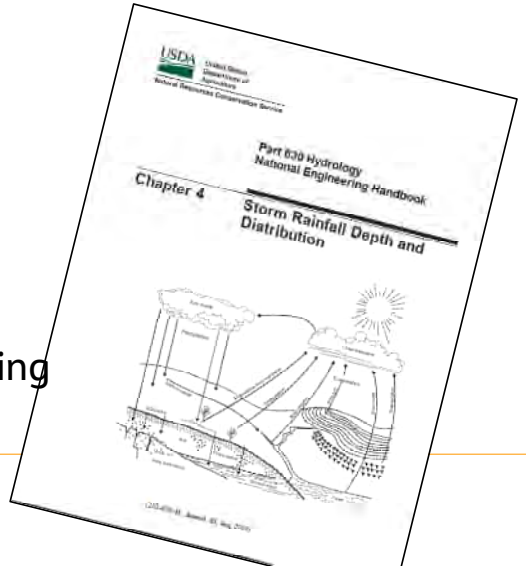
Ratio to IDF at Various Durations (10-year, 24-hour storm)

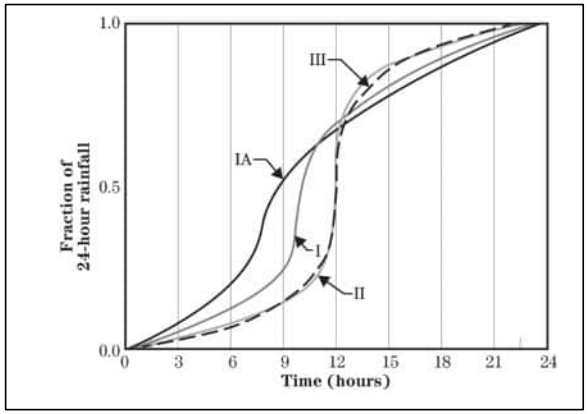


SCS Type II

- Based on Technical Paper 40 (TP 40, Weather Bureau 1961) rainfall frequency maps
- Requires only limited information: 24-hour depth
- Tends to be overly conservative at short durations, for many locations
- **Still commonly used today**



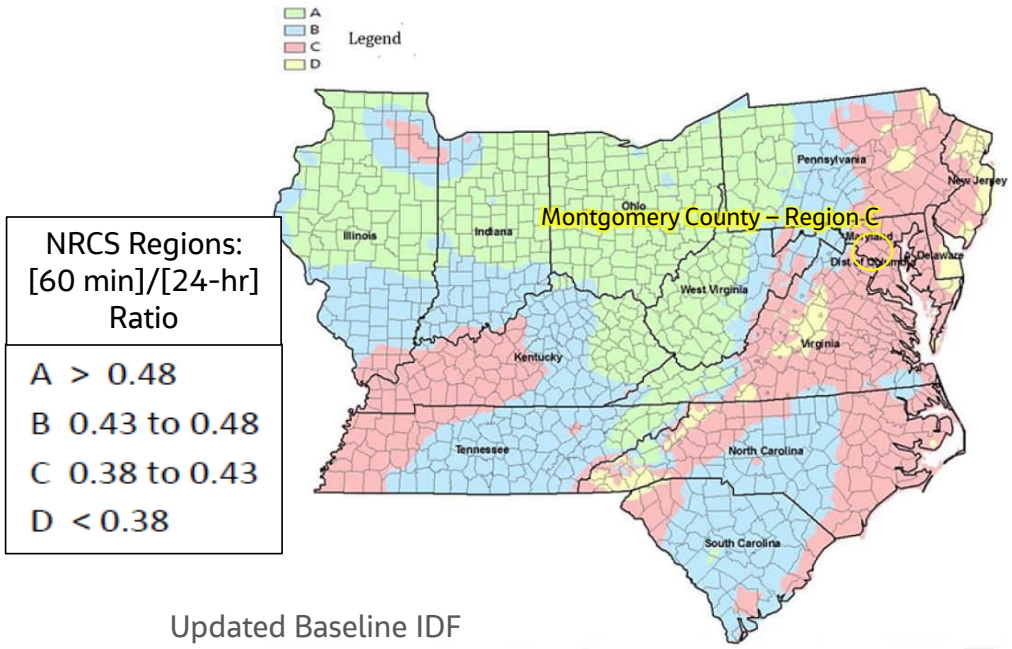




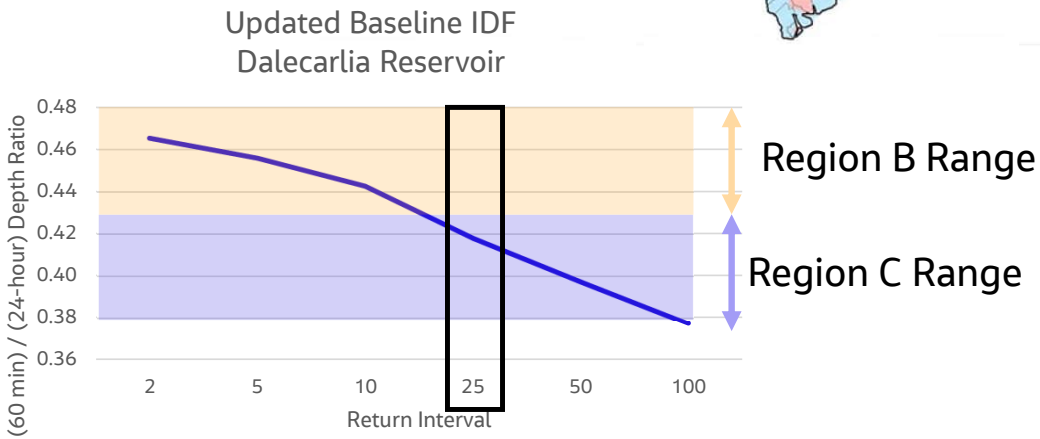
"Little documentation is available that describes the development of the Type II and other legacy rainfall distributions. Study of what is available leads to the conclusion that ***their use be discontinued in areas covered by NOAA Atlas 14 data****"* National Engineering Handbook Chapter 4 (2019)

NOAA NRCS Regional Distribution Curves
Region C

- Based on Atlas 14
- More location-specific than SCS Type curves
- One curve for all return intervals
- Generalized based on ratio of [60-minute]/[24-hour]
  - Varies by return interval: NRCS based on 25-year
- Simplified
  - not precise nested distribution for all durations and all return intervals
  - only need 24-hour depth

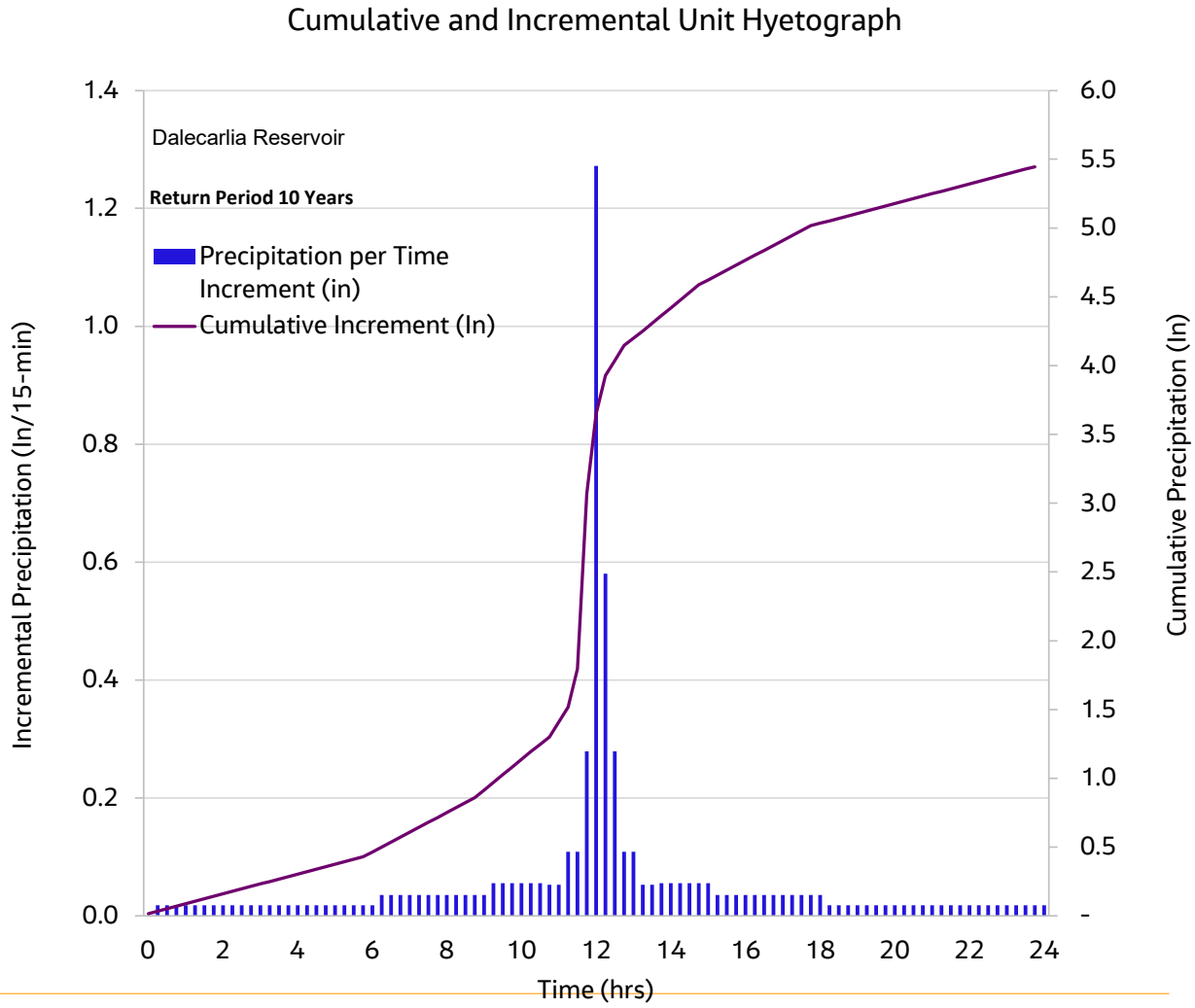


NRCS Regions: [60 min]/[24-hr] Ratio
A > 0.48
B 0.43 to 0.48
C 0.38 to 0.43
D < 0.38



Alternating Block
Recommended for Modeling

- Nested method: 15-minute event nested within 1-hour event, within 3 hour event, etc…
- Identical to IDF curve **at all durations**, by definition
- Location specific
- Distribution varies by return interval (frequency)
- Center weighted (this can be adjusted)
- Requires Atlas 14 IDF resolution
  - Return intervals
  - Durations



Closing

Recommendations

- Updated Baseline IDF Curves
  - **based on Dalecarlia Reservoir**
  - small decrease in 100-year event since Atlas 14; increase in 10-year event
- Projected Future Conditions IDF Curves
  - 41% increase for 24-hr 100-year event, 2100, High Climate, 50%
- Events for Modeling
  - **2 observed**
    - **Sept. 2020, Silver Spring**
    - **July 2019, Ten Mile Creek**
  - **5 Baseline (5 return periods): 10-, 25-, 50-, 100- , and 500-year return periods**
  - **10 Future Climate (5 return periods * 2 climate scenarios): 10-, 25-, 50-, 100- , and 500-year return periods for 2050, SSP5-8.5, 50th Percentile and 2100, SSP5-8.5, 50th Percentile**
- Synthetic Distribution for Modeling
  - **Alternating Block** (not SCS Type II)

Next Steps for Climate Scenario Development

- Workshop 3 – 10/24
  - Review results of impervious are scenarios
  - Recommend climate and impervious area scenarios to use in flood impact models, and vulnerability and risk assessment

Jacobs Challenging today. Reinventing tomorrow.

Scenario Planning Workshop 2: Part II - Impervious Area Scenario Development

September 26, 2023

Agenda

- Objectives
- Purpose of Impervious Area Scenario Development
- Input Data for Impervious Area Scenario Development
- Impervious Area Analysis Summaries:
  - Current impervious area by watershed (IA by watershed/zone)
  - Change in building impervious area
- Scenario Development Approach
- Preliminary % IA Scenario Results for Sligo Creek Watershed
- Next Steps

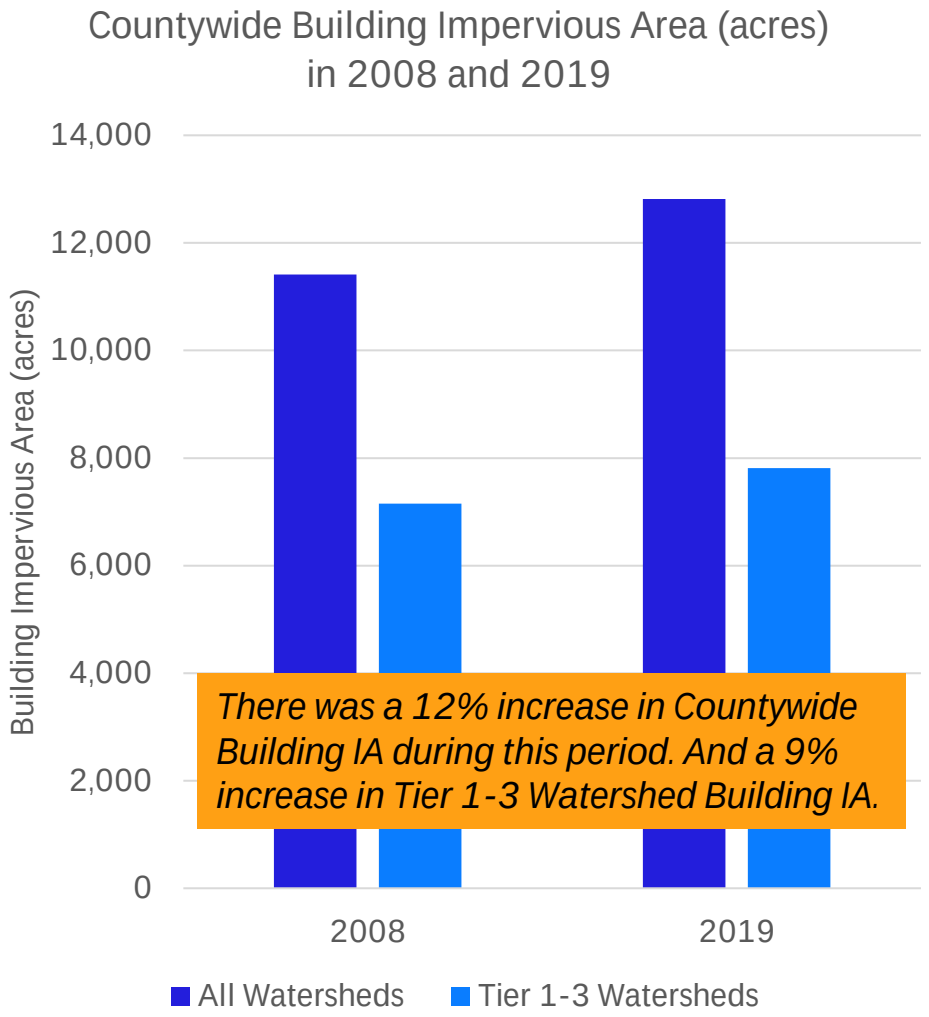
Objectives

- Obtain agreement on approach for development of scenarios informing flood modeling

Purpose of Impervious Area (IA) Scenario Development

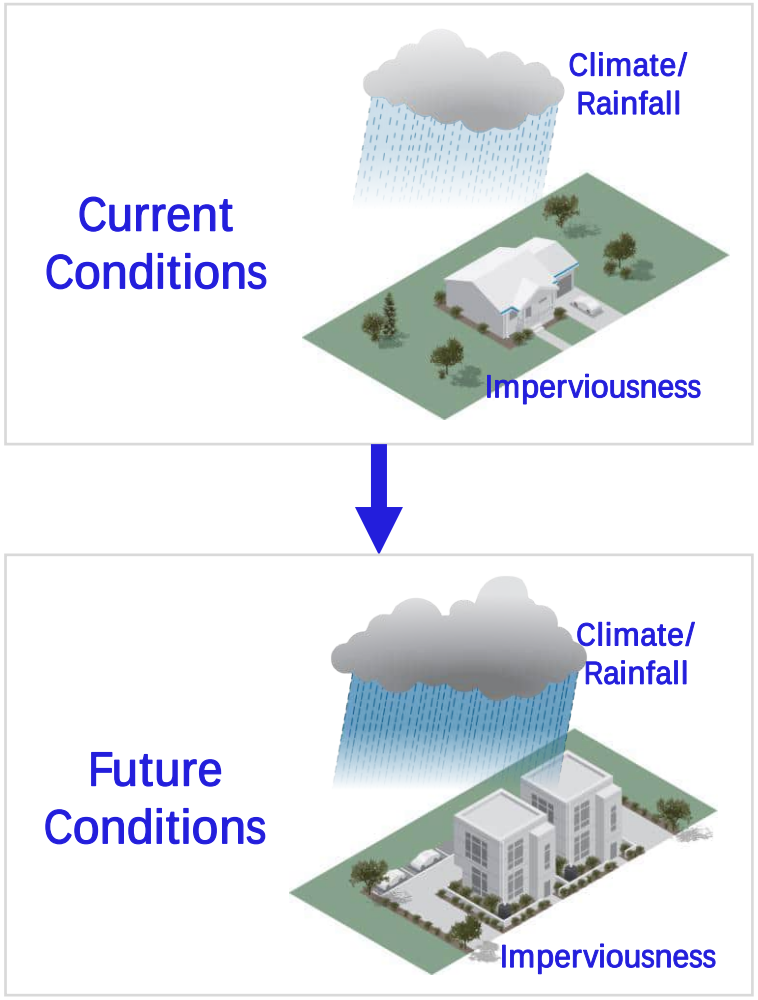
Purpose of Developing Impervious Area (IA) Scenarios

- IA is changing across the County…
  - Change is highly variable/difficult to predict
  - There is a recognition that this change is having a cumulative impact on runoff volumes and peak flow rates, particularly for high-intensity storm events
- Typical approach of averaging IA across a large drainage area may be insufficient to estimate local flood risk
- Range of future IA conditions may be helpful for decision making:
  - Identifying highly localized impacts due to IA increase
  - Characterizing and prioritizing based on risk
  - Developing flood risk management strategies, including possible adjustments to future land use plans, and identification and prioritization of capital projects
- GIS and H&H modeling tools allow us to look at this differently than in the past…



Purpose of Developing Impervious Area (IA) Scenarios

- Input to the hydrologic model, along with rainfall scenarios
  - IA will be calculated at flood model catchment scale
- Defining a future “do nothing” condition for flood risk that reflects risk due to:
  - changing climate and
  - Increases in impervious area with no change in land use policy
- Risk assessment results will be used to quantify risk avoided by a selected mitigation strategy (“do nothing” vs. “mitigation concept”)



Model and Impervious Area Input Resolution

- Current and future conditions IA will be calculated at the catchment level
- Catchment size is TBD
  - Currently assumed to be approximately 2-blocks in size
  - Sizing of catchments is reliant upon minimum pipe size (15” or 18”)
- A discussion of flood model resolution, and it’s impact on flood extent and depth information is planned for Tuesday, October 10, 2023.

Input Data for Impervious Area (IA) Scenario Development

Comparison of available impervious area (IA) planimetric data sets

- Various IA datasets from DEP and Planning…
- Building areas are included in all, but pavement areas have been progressively added (2008 through 2020)
  - Comparison of “building” type IA provides more accurate means of understanding change over time
- The IA summaries that follow are developed using DEP 2012 (2008 era) and 2020 (2019 era) data

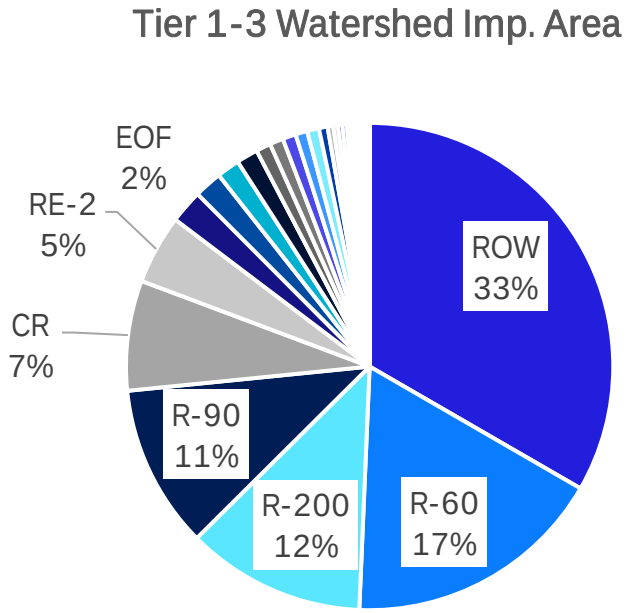
	Owner	Year of Source Imagery	Planimetric Source	Includes Buildings	Includes all Pavement Types
2009	DEP	2008	NA	X	No
2012	DEP	2008	NA	X	Some, Classified
2014	Planning	2014	2014	X	No, Classified
2017	Planning	2017	2014	X	Some, Not classified
2020	Planning	2020	2017	X	Yes, Not classified
2020	DEP	2019	Limited use of MNCPPC 2018	X	Yes, Classified

Current Impervious Area (IA) by Watershed and Zone

Estimated using IA data from 2019 imagery

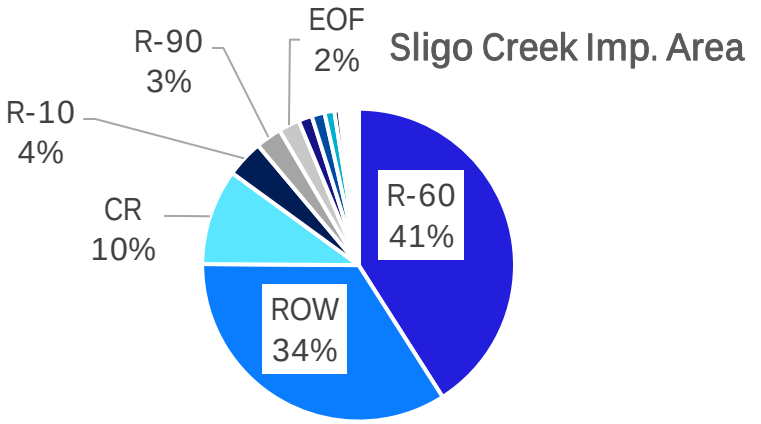
Zones that include the majority of IA within Tier 1-3 watersheds

- Identify zones that account for the majority of IA acreage within the Tier 1-3 watersheds
- Develop uncertainty bounds for these zones based on data
- Use the results of this analysis to inform uncertainty bounds for other zones



In terms of impervious area, most significant zones across all Tier 1-3 watersheds: CR, R-200, R-60, R-90, ROW

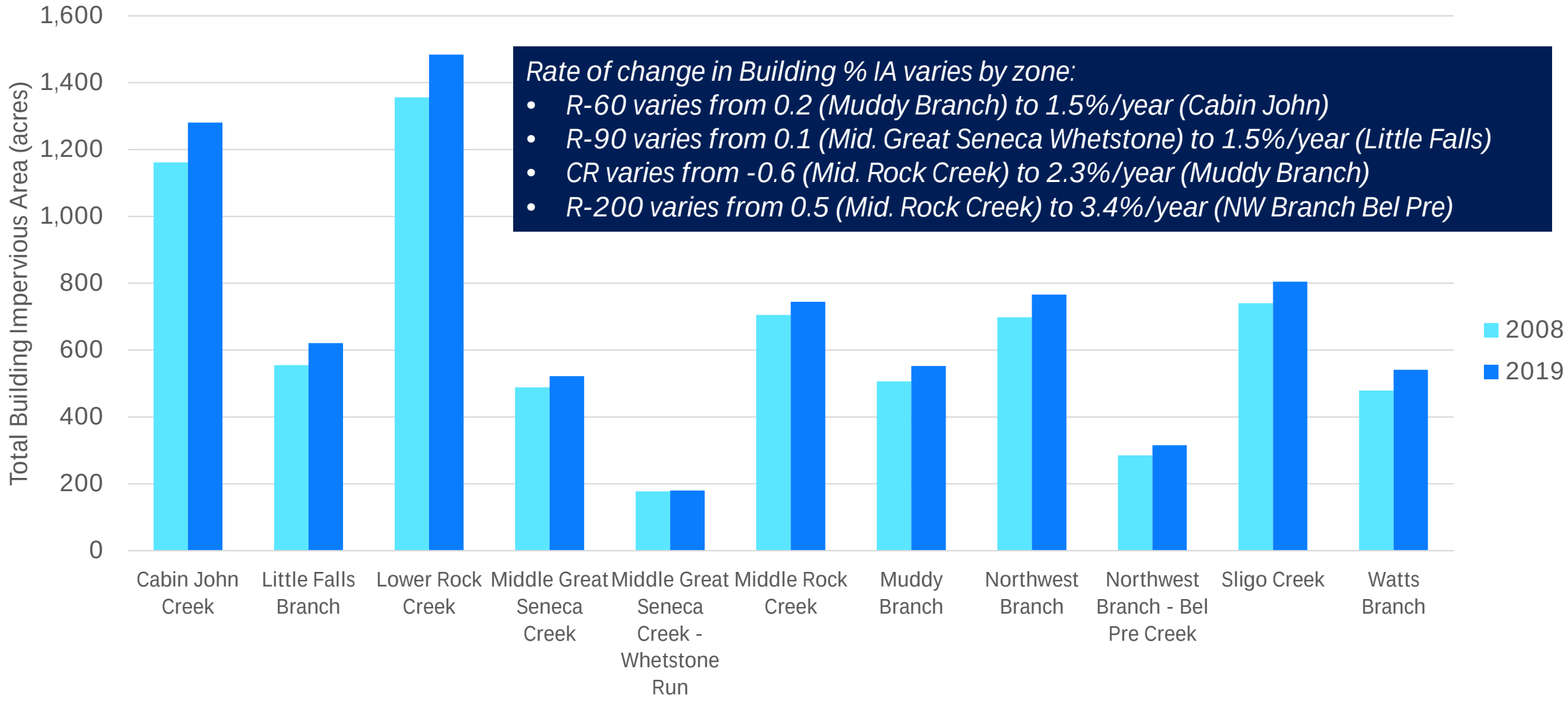
Most significant zones vary by watershed... Sligo: R-60, ROW, CR



Change in Building Impervious Area (IA)

Estimated using IA data from 2008 and 2019 imagery

Building Impervious Area in 2008 and 2019 for Tier 1-3 Watersheds



Rate of change in Building % IA varies by zone:

- *R-60 varies from 0.2 (Muddy Branch) to 1.5%/year (Cabin John)*
- *R-90 varies from 0.1 (Mid. Great Seneca Whetstone) to 1.5%/year (Little Falls)*
- *CR varies from -0.6 (Mid. Rock Creek) to 2.3%/year (Muddy Branch)*
- *R-200 varies from 0.5 (Mid. Rock Creek) to 3.4%/year (NW Branch Bel Pre)*

Scenario Development Approach

Impervious Area Scenario Development Approach

- Characterize current impervious area (2020)
  - by watershed and zone (e.g. R-60 within Sligo Creek Watershed) and
  - by subdivision and zone (e.g. R-60 within Woodmoor)
- Characterize future impervious area high and low scenarios by defining a “reasonable worst case impervious area” (RWC) by zone
- Develop “low” and “high” future scenarios using current impervious area, RWC, and “focus growth area” boundary – with consideration of preservation areas

Approach to developing “reasonable worst case” (RWC) % IA by zone

- For zones with significant impervious area in Tier 1-3 watersheds:
  1. Use current conditions IA data (subdivision scale IA by zone) to locate areas with relatively high % IA
  2. Identify and quantify % IA for 5 such areas (20-100 parcels) by zone
     - RWC-Low = Average % IA across the examples
     - RWC-High = Highest observed % IA
- For other zones, RWC = Maximum observed subdivision-scale % IA for the zone
- Public ROW (roads, sidewalks) is currently 62% impervious. This is not projected to change in future conditions scenarios.

Zone	RWC-Low	RWC-High	Methods
CR	94%	100%	Based on RWC Examples
EOF	93%		Based on Observed Subdivision %IA
IL	94%		Based on Observed Subdivision %IA
IM	94%		Based on Observed Subdivision %IA
PD-Med	49%		Based on Observed Subdivision %IA
PD-MedLow	60%		Based on Observed Subdivision %IA
R-10	100%		Based on Observed Subdivision %IA
R-20	88%		Based on Observed Subdivision %IA
R-200	54%	56%	Based on RWC Examples
R-30	66%		Based on Observed Subdivision %IA
R-40	45%		Based on Observed Subdivision %IA
R-60	61%	62%	Based on RWC Examples
R-90	54%	73%	Based on RWC Examples
RE-2	41%		Based on Observed Subdivision %IA
R-H	99%		Based on Observed Subdivision %IA
ROW	62%		Based on Observed %IA – Not projected to change
RT-10.0	61%		Based on Observed Subdivision %IA
RT-12.5	86%		Based on Observed Subdivision %IA
RT-15.0	76%		Based on Observed Subdivision %IA
RT-8.0	59%		Based on Observed Subdivision %IA
TMD	68%		Based on Observed Subdivision %IA

Example: R-60 Observed RWC % IA

RWC-High = Highest Observed Value, RWC-Low = Average of Observed Values

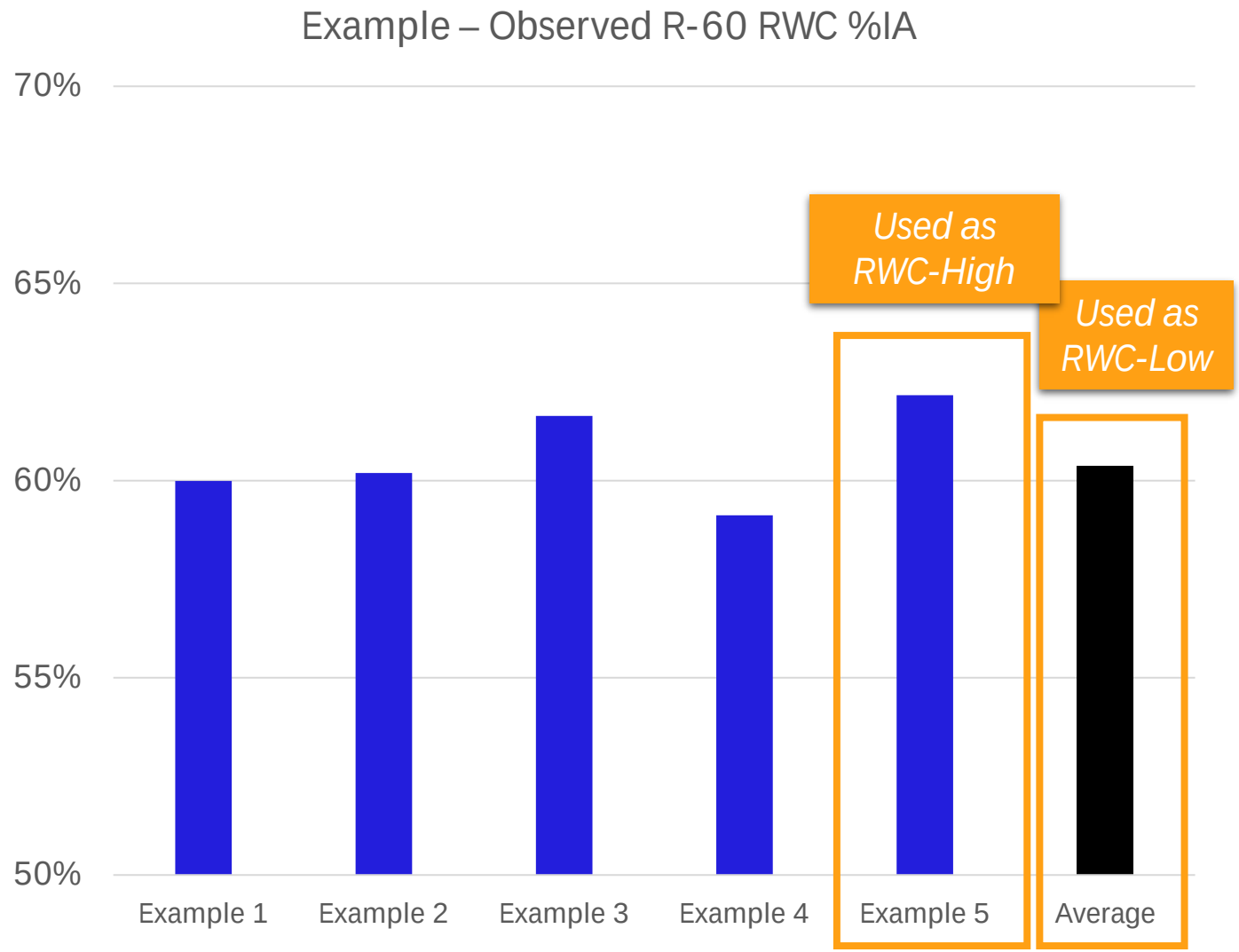
Battery Park (Lower Rock Creek) 60%

Edgemoor (Little Falls) 60%

Mary J Boland (Middle Great Seneca Creek) 62%

Decoverly Adventure (Muddy Branch) 59%

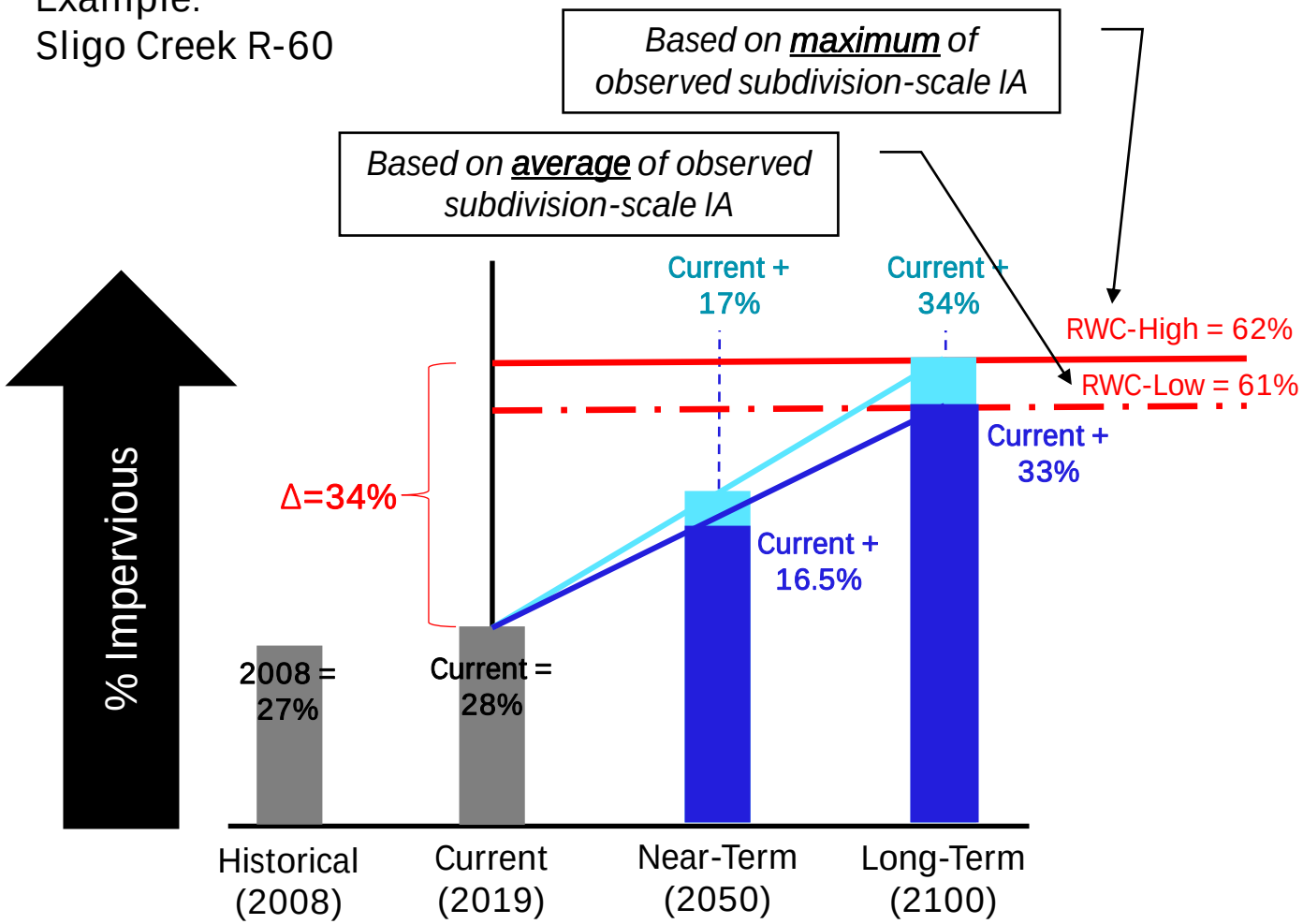
Chevy Chase Terrace (Little Falls) 62%



Proposed Approach for Impervious Area Study

- Current: Observed current (2019) %IA based on DEP WQPC IA data
- Future-High
  - Long-term: RWC-High %IA for the zone
  - Near-term: Current %IA + half of the variation between current and RWC-High
  - Incorporation of "Focus Growth Area" residential zone uplift
- Future-Low
  - Same approach, but using "RWC-Low"

Example:
Sligo Creek R-60

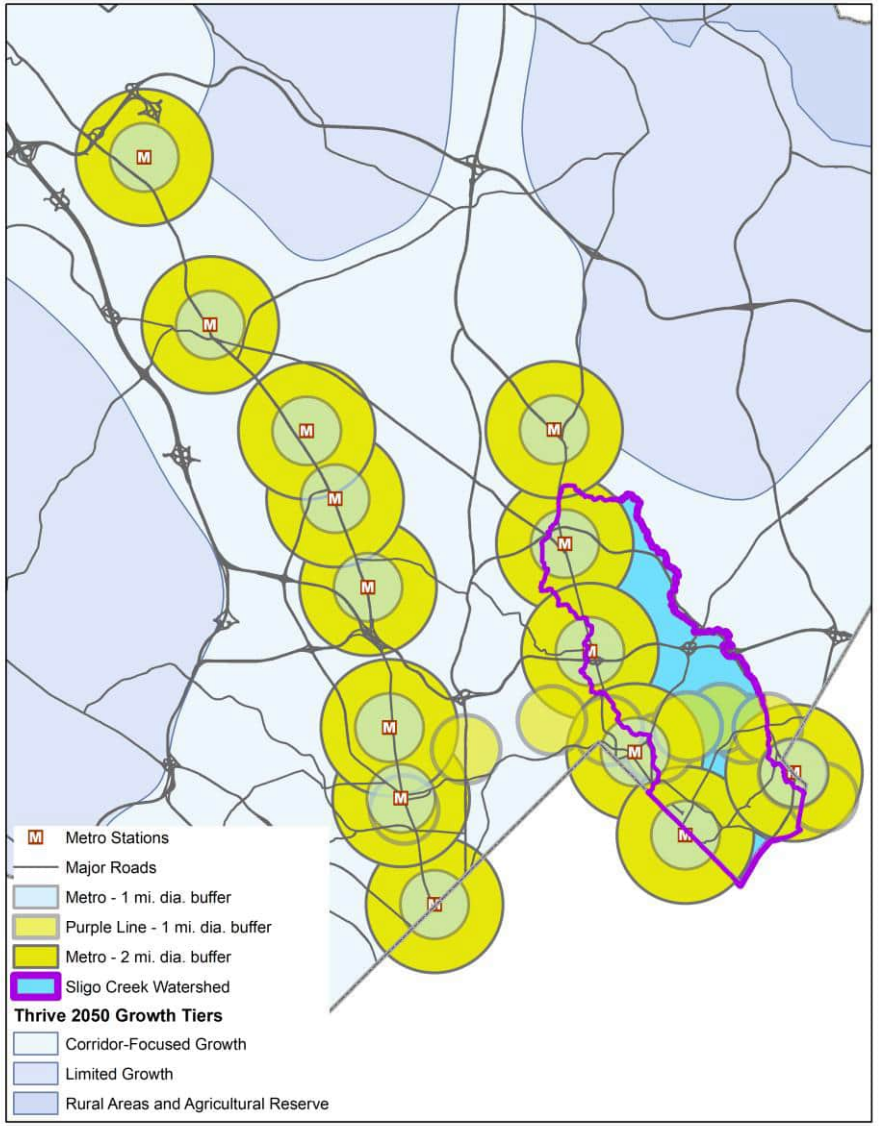


Focus Growth Areas for Future High Scenario

- Define buffer area along growth corridors (e.g. Georgia Avenue, Route 29) and/or in vicinity of transportation hubs
- Residential zones within the defined areas are converted to CR type zones for future “high” scenarios.
  - 500-feet off Georgia Avenue (from southern terminus northward to Glenmont) → RWC-High = 100% IA (CR)
  - 1-mile from metro stations
    - 0.0 to 0.5-mile of station → RWC-High = 100% IA (CR)
    - 0.5-mile to 1-mile of → RWC-High = 88% IA (R-20)
  - 0.5-mile from future Purple Line → RWC-High = 88% IA (R-20)
- No change from existing zoning for “low” scenarios.
- No change to non-residential zones.

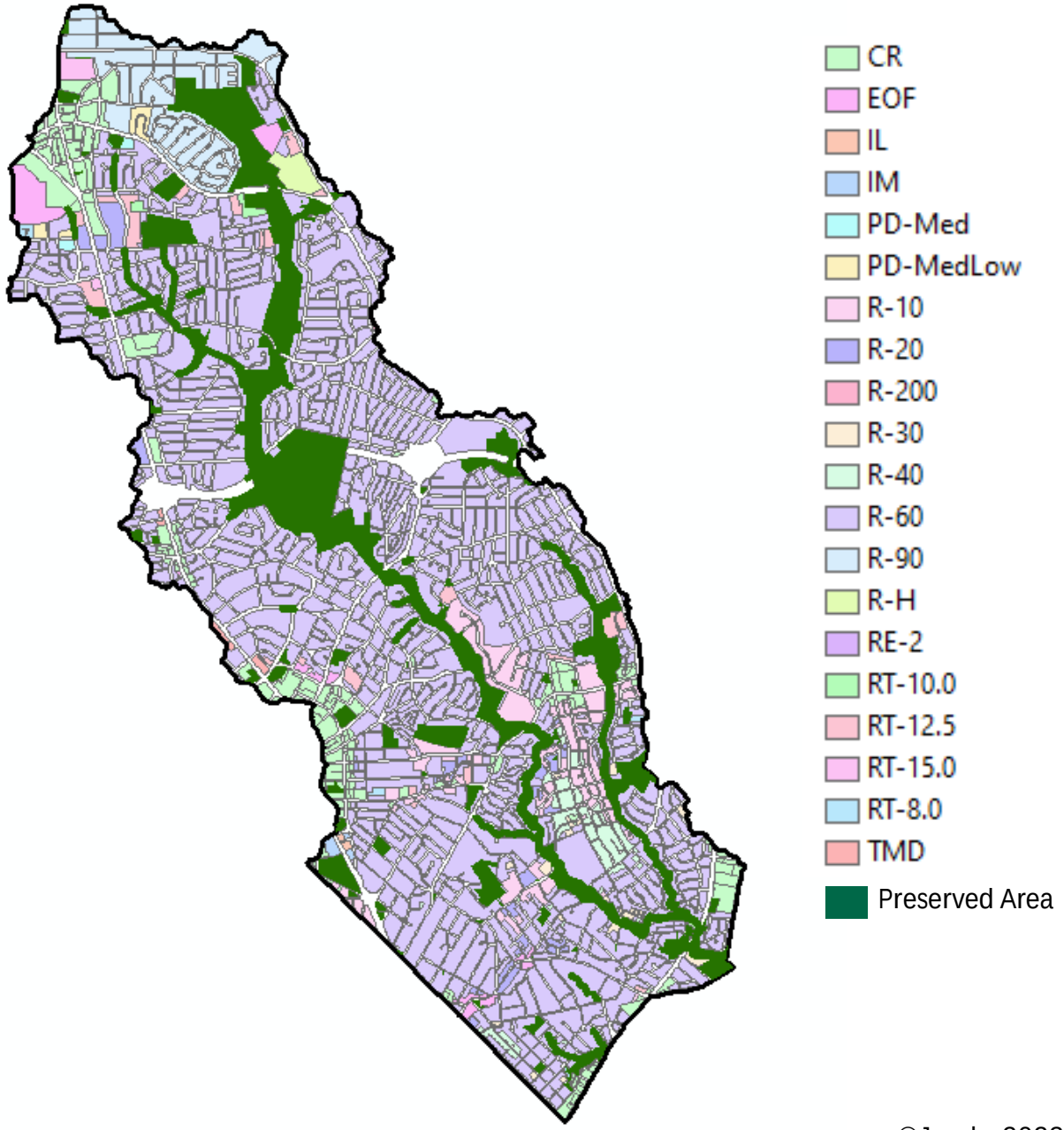
Draft Focus Growth Area Map

Final boundaries are still in development with Planning.



Exclusion Areas for Future Scenarios

- Preserved areas (e.g. Parklands) will remain constant in terms of % IA for future scenarios
  - These areas will <u>not</u> have %IA growth applied
- Based on MNCPPC Planning "Preserved Areas" which compiles various known parks, wetlands, and other conservation areas - *Still being reviewed*



Preliminary % IA Scenario Results for Sligo Creek Watershed

Example Results: Sligo Creek Watershed Reasonable Worst Case Imperviousness Scenarios

Zone	Total Impervious Area (acres)	Current	Future-Low 2050	Future-Low 2100	Future-High 2050	Future-High 2100	Methods
R-60	995	28%	44%	61%	45%	62%	Based on 5 examples
ROW	829	62%	62%	62%	62%	62%	Subdivision data
CR	241	78%	86%	94%	89%	100%	Based on 5 examples
R-10	94	50%	75%	100%	75%	100%	Subdivision data
R-90	65	20%	32%	44%	34%	49%	Based on 5 examples

Indicated zones reflect 93% of total watershed area and 92% of total impervious area

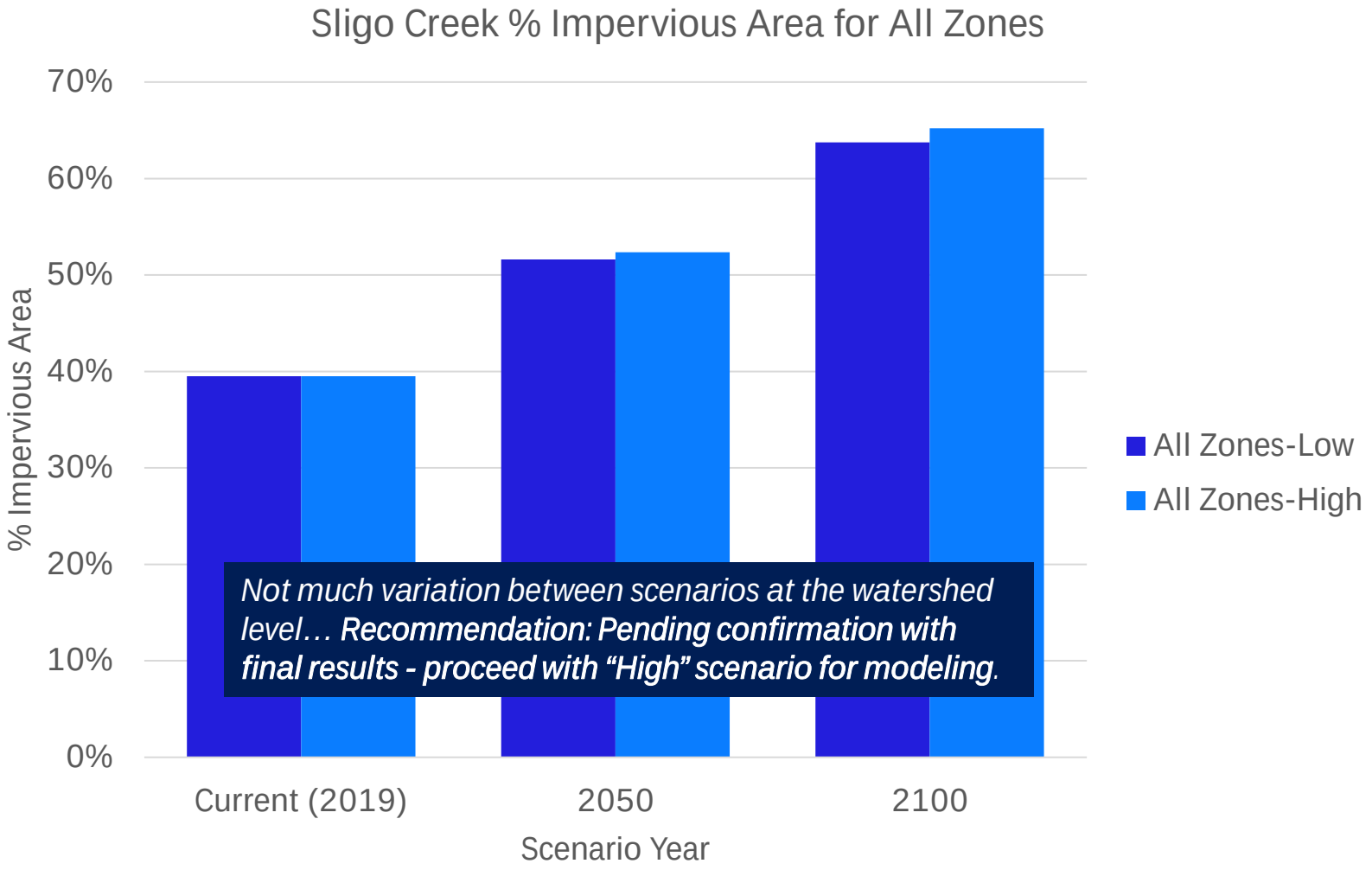
Not yet included in the draft projections:

- *Areas removed from future scenarios (e.g. parkland)*
- *Impact of Focus Growth Areas for "High" scenario*

Example results for Sligo Creek Watershed

- Final results will be computed once catchment delineation is complete
  - Each line shown at right will be a catchment-level calculation
  - Currently based on watershed-level average (all zones)

Not yet incorporated in this plot:
- *Areas removed from future scenarios (e.g. parkland)*
- *Impact of Focus Growth Areas for "High" scenario*



Example results for Sligo Creek Watershed

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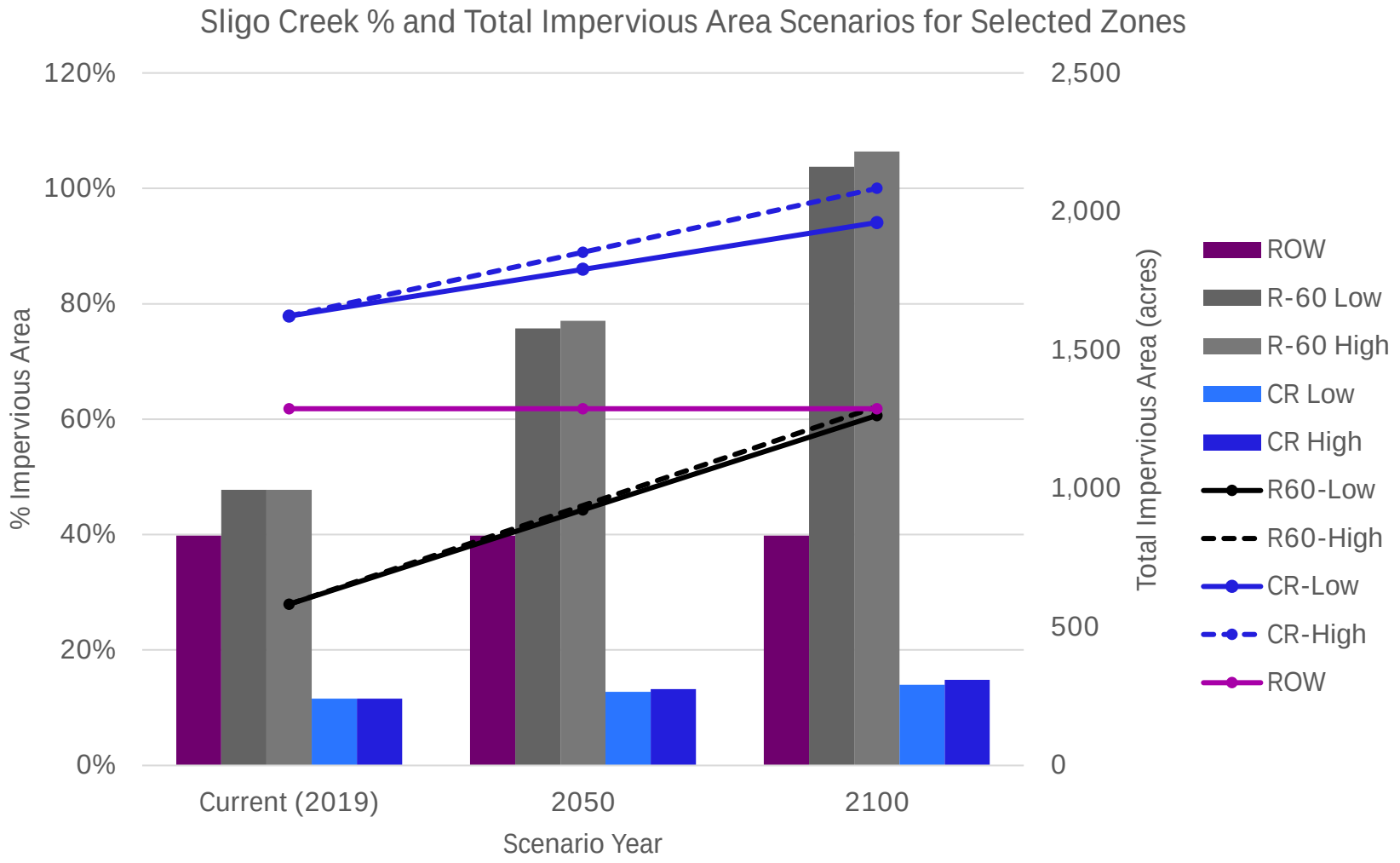
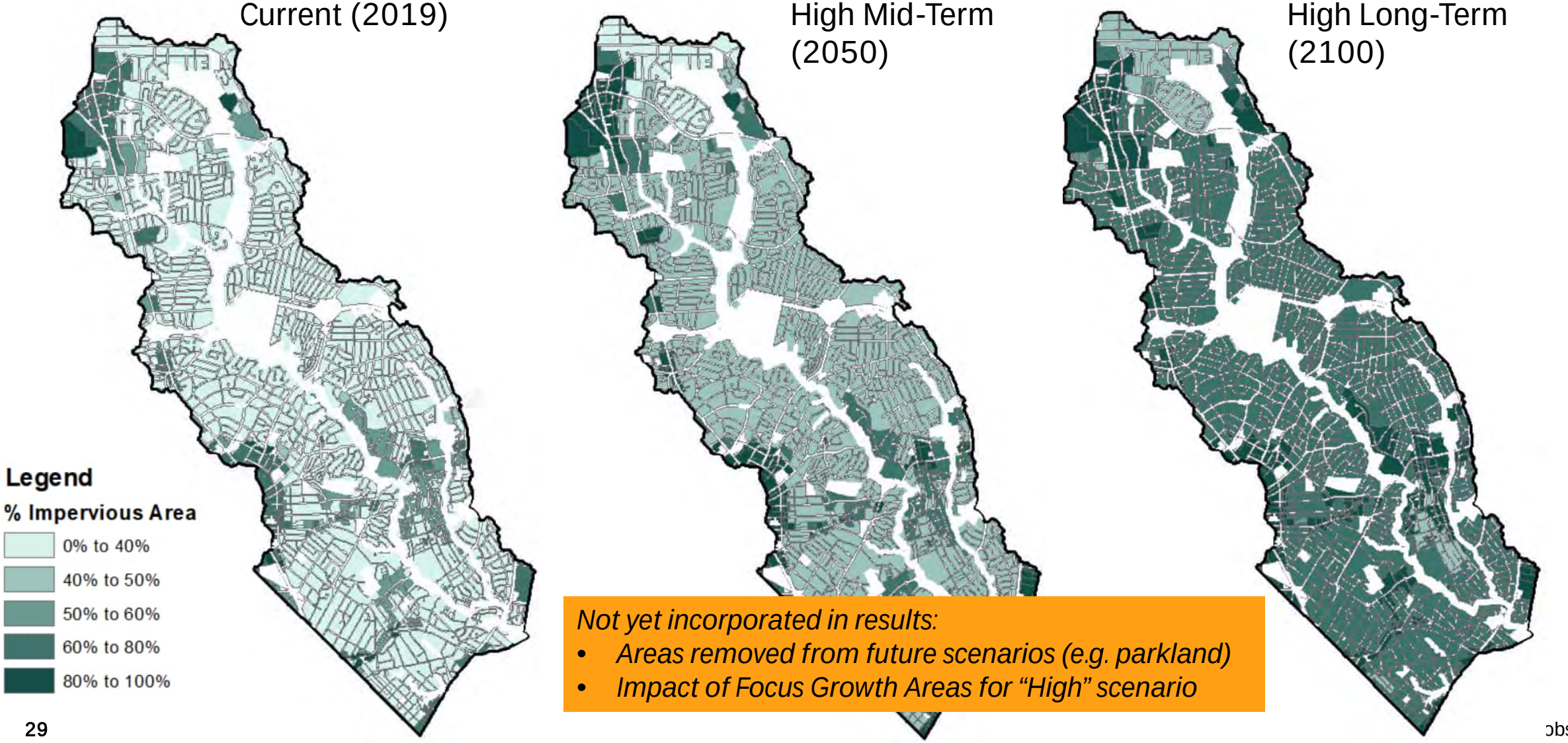


Sligo Creek Watershed "High" Scenario Results – All Zones

Current (2019)

High Mid-Term (2050)

High Long-Term (2100)



Not yet incorporated in results:

- *Areas removed from future scenarios (e.g. parkland)*
- *Impact of Focus Growth Areas for "High" scenario*

Next Steps

Next Steps for Impervious Area Scenario Development

- Complete development of future scenarios inclusive of Focus Growth Areas and preserved areas
- Workshop #3 – October 24th from 1:30-3:30pm (hybrid)
  - Review results of impervious area scenarios
  - Discuss recommended scenarios for flood modeling and finalize selection
- Following Workshop #3
  - Incorporate catchment delineations to develop final model input
  - Document methods and results in technical memorandum

Jacobs

Challenging today.
Reinventing tomorrow.

Attachment 7. CFMP Phase 2: Sligo Creek Pilot Watershed Study-Flood Modeling Scenario Development Workshop #3 Documentation

Climate and Impervious Area Scenario Development (Task W-2) Workshop #3

Date: November 28, 2023

Project name: Montgomery County Comprehensive Flood Management Plan Phase 2-Sligo Creek

Project no: E4X56706

Prepared by: Yilin Giltinan/Jacobs

Location: 2425 Reedie Dr, Wheaton, MD 20902

Participants:

Virtual:
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Bahador, Ehsan / MC OEMHS
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Copiz, Darian /MC DEP
Dreyer, Zachary /Planning
Etheridge, Mark /MC DPS
Harper, Matthew /Parks
Iseli, Claire / MC OCE
Kapusnick, Jean / MC DEP
McArdle, Erin / Park
Musico, William /MC DPS
Miziorko, Matthias / MC OEMHS
Reifer, Krystal /MC DEP
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Dawson, Frank /MC DEP
Laboy, Kristina /MC OEMHS

Purpose

This meeting is the third of three workshops planned for Task W-2.3 of Task Order 6 Comprehensive Flood Management Plan (CFMP) Phase 2 Sligo Creek Pilot Watershed Study. Task W-2 includes determining climate and impervious area scenarios (county-wide) for detailed modeling purposes.

Summary of Discussion

Executive Summary: Proposed Rainfall and IA Scenarios for Flood Modeling

- Jacobs initially presented the recommended scenarios for flood modeling. The scenarios were comprised of rainfall + impervious area selections. Jacobs noted that rainfall totals have been developed for all design storms (2-, 10-, 25-, 50-, 100-, and 500-year return intervals) but that it is recommended to complete modeling runs for just those events typically used for drainage and flood design (10-year and larger).

Purpose of Impervious Area (IA) Scenario Development

- DEP suggested rephrasing the wording for 'do-nothing' and suggested using the term "status quo" or "no physical and policy flood mitigation action" scenario to better describe the intent of the IA scenarios for modeling.
  - *Action item: Jacobs team to modify the wording in the presentation and the technical memo.*

IA Scenario Development Approach Overview

- Jacobs presented the approach to development of IA scenarios. A map of Sligo Creek was presented indicating the breakdown of generalized zones. OEMHS questioned what R-60 is since it represents a large portion of Sligo Creek Watershed. Jacobs explained that R-60 is the primary zoning category in the Sligo Creek Watershed and is a, generally, 6,000 square foot residential single-family lot. Jacobs further noted that the dominant zone category varies from one part of the County to another.
- OEMHS asked if there's any consideration of implementing a mandate for "bio-buffers" and expressed concern about the negative impact of concrete and cement pavement on streams, which causes a thermal shock and affects the riverine ecosystem. Parks asked if the Jacobs team is considering "bio-buffers" as a potential solution to slow down and absorb the warm runoff from floods into the stream. Jacobs noted that, presently, requirements for managing water quality impacts of development are focused on, generally, a 2-year storm event. These structures are therefore not sufficient for attenuating flows from larger events.
- DEP noted that this study focuses on identifying flood risks and proposing mitigation solutions. While the results may be used for other environmental issues, the primary focus remains on flood mitigation.
- OCE acknowledged Parks' concern about thermal shock and noted the attainable housing initiative as a driver for increasing impervious surface that could affect stream biota. OCE expressed interest in learning more about "bio-buffers" and thermal impacts. OCE suggested that the timing of this study aligns with various on-going attainable housing initiatives and understanding the different points of view (ecosystem preservation, flood mitigation, and development) can assist in decision making.

Scenario Development Detail

- Jacobs reviewed that a "reasonable worst case" (RWC) %IA was identified for each relevant zone. The intent of the RWC is to provide a high but achievable %IA condition based on existing conditions. A RWC %IA was identified for each zone by looking at existing %IA at a subdivision-zone scale (e.g., R-60 within the Woodmoor Subdivision). For zones that represent a particularly high percentage of County property (CR, R-60, R-90, and R-200), several examples were identified and averaged to generate the RWC.
- Future condition IA projections with Focus Growth Areas (FGAs) around transit stations were developed in conjunction with Planning staff.
- DOT sought clarification on whether the selected example had been rezoned or if the high %IA was based on what the current R-60 zone use regulation allowed. Jacobs clarified that the examples are current R-60 zoning. There can be a mixture of housing types using the different development methods allowable for R-60. Jacobs noted that the RWC selection used a mix of standard and optional development methods allowed by the County zone code to factor in the possibility of a higher %IA permitted by the optional development.
- Planning inquired whether open space requirements were considered in development of the RWC values. Jacobs noted that the open space requirements were not considered because the requirements can vary within the development standards and sometimes only apply to larger lot sizes. Therefore, it

was not a reliable means of capping %IA for a given zone. Planning further pointed out that RWC values over 90% may not be valid. Jacobs noted that the RWC values shown were calculated based on subdivision-zone level data. Jacobs will check that there are not unreasonably high values due to GIS-related error.

- Action item: Jacobs to review RWC values again to screen for small-area calculations (slivers).

Results for Sligo Creek Watershed

- Jacobs presented mapped results for the Sligo Creek Watershed existing and long-term scenarios. DEP sought clarification on the percentage of impervious area (%IA) differences between the RWC and FGA maps for the exact location. Jacobs explained that the %IA difference was attributed to the cap assigned for calculation purposes. Specifically, the RWC's future %IA scenario calculation allowed for greater zone expansion, resulting in a higher %IA. Conversely, the FGA's calculation capped RWC growth, leading to a lower %IA in areas outside the FGA along the Purple Line.
- Planning noted that certain zones in the Sligo Creek Watershed require 10% greenery and questioned if Jacobs had considered this factor. Jacobs clarified that greenery requirements are lot size-dependent, while the RWC is calculated based on subdivisions. Jacobs acknowledged the need to factor in development standards to justify some of the highest %IA results and will revisit the calculation of the County %IA data.
- DEP sought clarification on the definition of a "green area" in the context of a built environment feature. Planning explained that greenery was a land coverage requirement that varied by zone, excluding green roofs. Planning suggested adding a 90% cap to areas shown as 100% IA on the map, considering recent master plan updates have been increasing the greenery requirement addition to the County zoning code. DEP highlighted the reality that most green space in the urban environment, including the tree canopy, is not permeable due to soil conditions. Planning agreed but expressed concern about the potential for the message to mislead non-technical individuals. Jacobs confirmed that the model factored in soil conditions independently from the %IA study, considering urban soils as generally impervious.
- Parks inquired about the exclusion of the urban park from the calculation, specifically noting the Beach Drive along the ROW. Jacobs confirmed that the ROW and the park polygon were not included in the presented IA scenario map. Jacobs further noted that the IA scenario acknowledges the IA from the park and ROW and the %IA growth. In this study, the park is defined as having no growth, while the ROW has minimal growth, depending on whether it is inside the FGA or not.
- Planning questioned whether the cap uplifts differ between WMATA metro stations, and Jacobs clarified that although the cap is uniform across all stations, each has a different IA baseline, leading to potential variations in reaching the cap.
    - *Planning agreed with how the IA was developed in the areas surrounding the WMATA metro stations.*

Climate/Rainfall Scenarios

Recommended Rainfall Scenarios for Flood Modeling

- Jacobs reviewed the rainfall scenarios recommended for flood modeling. These include Shared SocioEconomic Pathway (SSP) 5 50th percentile non-exceedance interval projections for the 10-, 25-, 50-, 100-, and 500-year events for 2010 and 10-, 100-, and 500-year events for 2050. Baseline/existing conditions scenarios for the 10-, 25-, 50-, 100-, and 500-year events are also recommended for inclusion.

Historical Observed Events

- Jacobs reviewed the historical events that are recommended for modeling. The July 8, 2019 event is recommended for modeling because it is the most intense event available. The Rockville Twinbrook event (September 1, 2021) was not quite as intense. Jacobs noted that the modeling event will take the observed rainfall and apply is across the watersheds – simulating impacts if that event had centered on the watershed (vs. actual observed location of rainfall).
- Jacobs further recommended use of the September 10, 2020 event for modeling. This is because gauge data are anticipated to be available along Sligo Creek and will be helpful for validation.
- DEP noted that the Clarksville gauge name must be incorrect and should be Clarksburg. Jacobs confirmed the gauge name, while likely inaccurate, is Clarksville (and retained since it is needed should someone want to identify the USGS gauge) but the data is from Clarksburg, MD (Montgomery County). A footnote was included in the slide and the discrepancy noted in the technical memo.

Recommended Flood Modeling Scenarios

Considerations for the Development of Flood Modeling Scenarios

- Jacobs summarized the key considerations for development of the flood modeling scenarios. These include the identification of a baseline or "do-nothing" condition, the computation of a range of scenarios to support risk assessment using Hazus, and the understanding of the impacts of changes in infrastructure and rainfall patterns. Jacob also emphasized that social vulnerability will be considered to inform the benefit-cost analysis.
- DEP noted that the importance of using appropriate terminology when presenting the study's results and suggested using the name 'what could be reasonable worst case' conditions.
- Planning highlighted the study's benefit as a technical guide for the County Council to approve zoning changes to preserve permeable areas. They noted that the study could help inform the necessary zoning changes for preserving permeable areas.
- OCE concurred and pointed out the potential conflict between stormwater management and affordable housing strategies. OCE also highlighted that the study's results should help inform the council's decision on County land use, given the potential impact on affordable housing strategies and the need to balance these with stormwater management goals.

Recommended Scenarios

- Jacobs clarified that the selection of scenarios is based on the number of scenarios defined in the scope of work (see **Attachment A**, slide #4). To accommodate an earlier DEP request to view future conditions with and without impervious area growth (allowing assessment of relative impact/sensitivity to the IA conditions), Jacobs included a current IA conditions scenario with future rainfall (10- and 100-year 2100).
- DEP asked whether the future mid-term/2050 25- and 50-year events (omitted from the modeling scenario recommendation) are included in the future long-term/2100 set, in terms of total rainfall. Jacobs noted that in terms of rainfall, the future mid-term/2050 25-year is very close to the baseline/current 50-year event and the future mid-term/2050 50-year is very close to the baseline/current 100-year event.
- Jacobs noted that the FEMA Hazus tool will be used to compare risk assessments for single events (e.g. 2050 10-year event). It will also be used to generate annualized risk assessment between current and 2100 conditions. That calculation will utilize all selected design events.

- OEMHS asked about the version of the FEMA risk modeling and benefit cost analysis (BCA) tool that the Jacobs team will use for the calculations. Jacobs clarified that they will be using the latest version of Hazus for the calculation, and the BCA will be based on the FEMA BCA toolkit. Additionally, Jacobs noted that additional tools will be applied to provide climate impact assessment, which is often considered by FEMA but not included in the toolkit.

Next Steps

- Jacobs noted that, following the meeting, they will finalize and share a technical memo documenting impervious area scenarios and final flood modeling recommendations.
- Jacobs also reminded the County working group to submit comments on the Climate/Rainfall Scenarios TM by 12/1.

Action Items

1. Jacobs will finalize the technical memo documenting impervious area scenarios and final flood modeling recommendations.
2. The County working group will review the memo on climate scenarios and provide comments.
3. Jacobs will review the high percentage of %IA in the Sligo Creek scenario example.
4. Jacobs will modify the wording in the presentation and the technical memo.

Attachments

A Presentation

Jacobs Challenging today. Reinventing tomorrow.

Flood Modeling Scenario Development Workshop #3

CFMP Phase 2: Sligo Creek Pilot Watershed Study

November 28, 2023

Agenda

- *Executive Summary: Proposed Rainfall and IA Scenarios for Flood Modeling*
- IA Scenarios
  - Review of approach
  - Results for Sligo Creek Watershed
- Climate/Rainfall Scenarios
  - Review of recommended rainfall scenarios
  - Historic events
- Recommended Flood Modeling Scenarios
  - Considerations
  - Recommended Scenarios

Executive Summary: Proposed Rainfall and IA Scenarios for Flood Modeling

Proposed Scenarios for Flood Modeling

- 24-hour values for all storms will be included in projections TM
- Damages will be calculated for all events
- Benefits calculation will be current to 2100 (annualized damages…)
- Future rainfall scenarios with future conditions impervious area projections
- Future rainfall scenarios with current IA conditions

	Historic Events	Updated Atlas14	RCP4.5 / SSP3					RCP8.5 / SSP5			
Non-exceedance interval	*NA*	*NA*	*50%*		*90%*			*50%*			*90%*
IA Condition	*Current*	*Current*	*RWC*	*FGA*	*RWC*	*FGA*	*RWC*	*FGA*	*Current*	*RWC*	
Historic #1 (July 8, 2019)											
	x										
Historic #2 (September 10, 2020)											
	x										
Current											
2-year											
10-year		x									
25-year		x									
50-year		x									
100-year		x									
500-year		x									
Future Mid-term (~2050)											
2-year											
10-year								x			
25-year											
50-year											
100-year								x			
500-year								x			
Future Long-term (~2100)											
2-year											
10-year								x	x		
25-year								x			
50-year								x			
100-year								x	x		
500-year								x			

Rainfall component

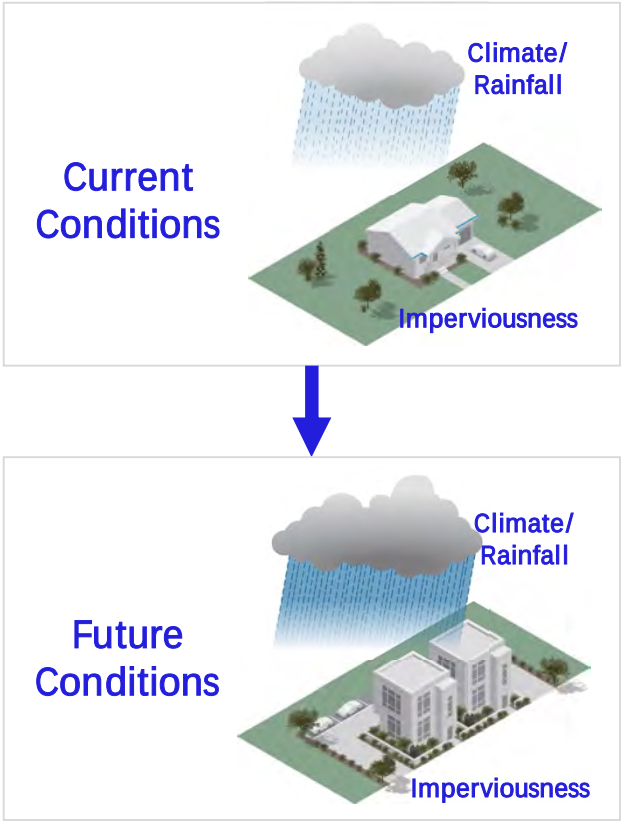
Impervious component

RCP = Representative Concentration Pathway, SSP = Shared Socioeconomic Pathway,
RWC = Reasonable Worst Case IA Scenario , FGA = Reasonable Worse Case + Focus Growth Area IA Scenario

Purpose of Impervious Area (IA) Scenario Development

Purpose of Developing Impervious Area (IA) Scenarios

- Input to the hydrologic model, along with rainfall scenarios
  - IA will be calculated at flood model catchment scale
- Defining a future "**status quo**" condition for flood risk that reflects risk due to:
  - changing climate and
  - Increases in impervious area with no change in land use policy
- Risk assessment results will be used to quantify risk avoided by a selected mitigation strategy ("status quo" vs. "mitigation concept")



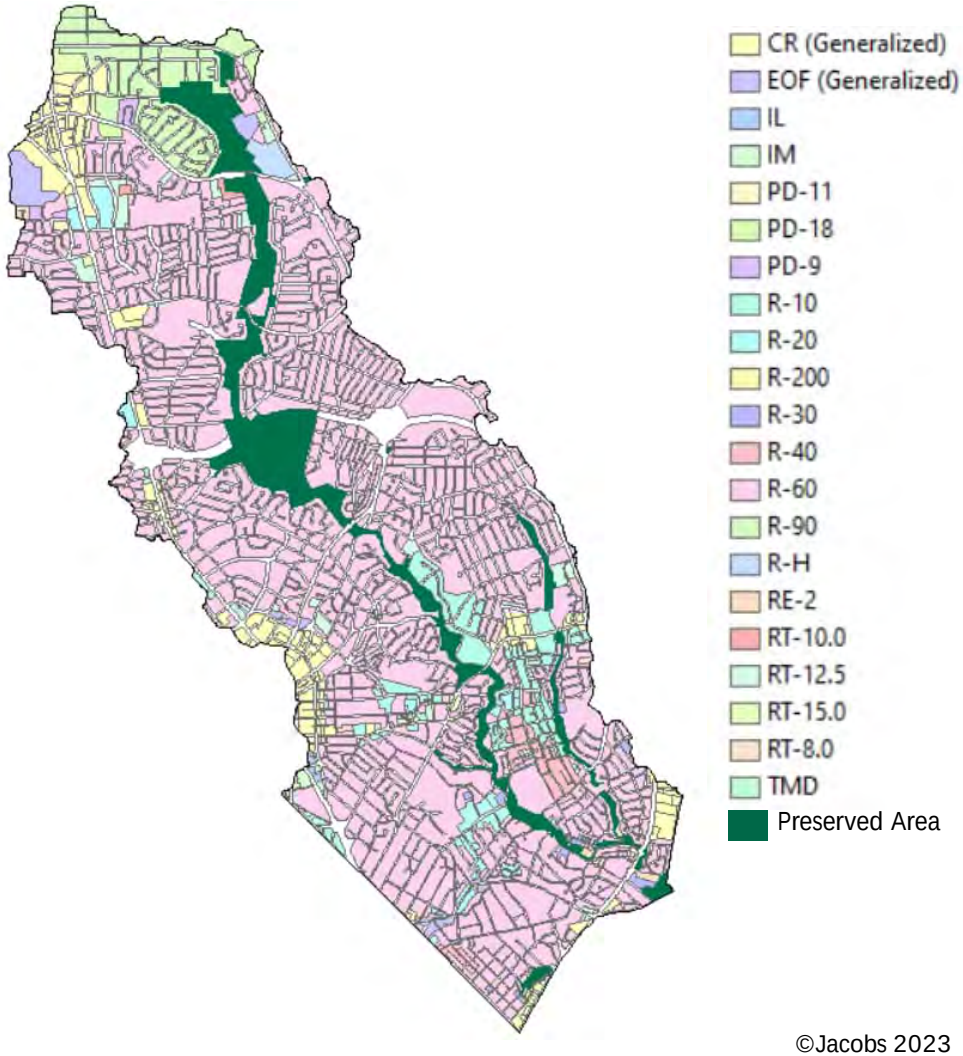
Model and Impervious Area Input Resolution

- IA will be calculated at the catchment level
- Catchments boundaries are still in development
  - Currently assumed to be approximately 2-blocks in size
  - Sizing of catchments is reliant upon minimum pipe size (15” or 18”)
- *IA summaries presented today have been calculated at the watershed-zone level. The same methods will be used to calculate watershed-catchment level totals when boundaries are available.*

Scenario Development Approach Overview

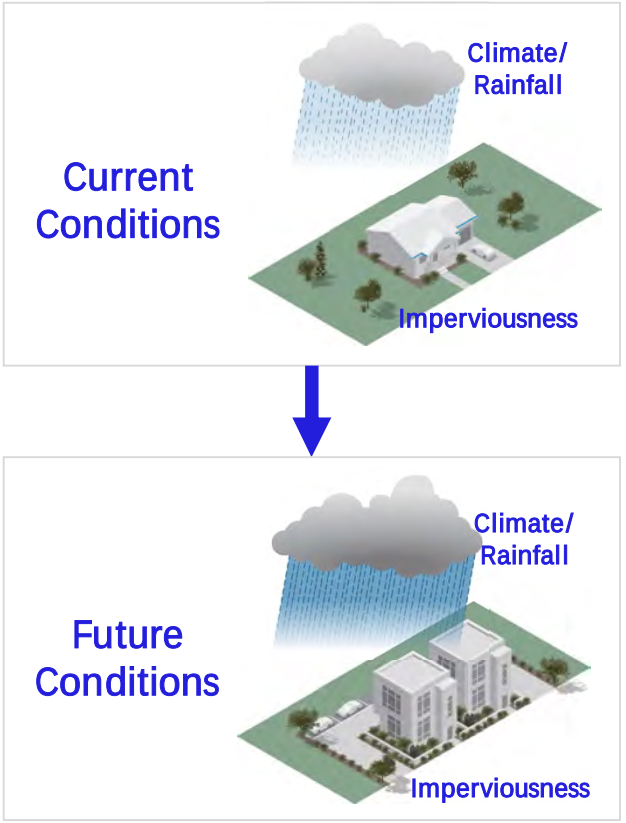
Impervious Area Scenario Development Approach

- Characterize current impervious area (2019)
  - by watershed and zone (e.g. R-60 within Sligo Creek Watershed) and
  - by subdivision and zone (e.g. R-60 within Woodmoor)
- Characterize future impervious area scenarios by defining a “reasonable worst case % impervious area” (RWC) by zone with consideration of preserved areas
- Develop another future scenarios using a “focus growth area” (FGA) boundary to accommodate higher growth near transit
- Define “preserved areas” to reflect areas unlikely to increase in impervious area
- Developed in coordination with Planning staff



Overview of Impervious Area Scenarios

- Scenario #1: Current Conditions Scenario: Scenario developed by summarizing existing (2019) impervious area by catchment and zone.
- Two Future Conditions Scenarios
  - Scenario #2: Reasonable Worst Case (RWC) Scenario: Mid- and Long-term IA projections developed by growing existing (2019) impervious area to observed average "reasonable worst case" (RWC) values by zone.
  - Scenario #3: Focus Growth Area (FGA) Scenario: Mid- and Long-term IA projections developed by growing existing (2019) impervious area to observed average RWC values by zone and incorporating increased IA growth around transit areas.

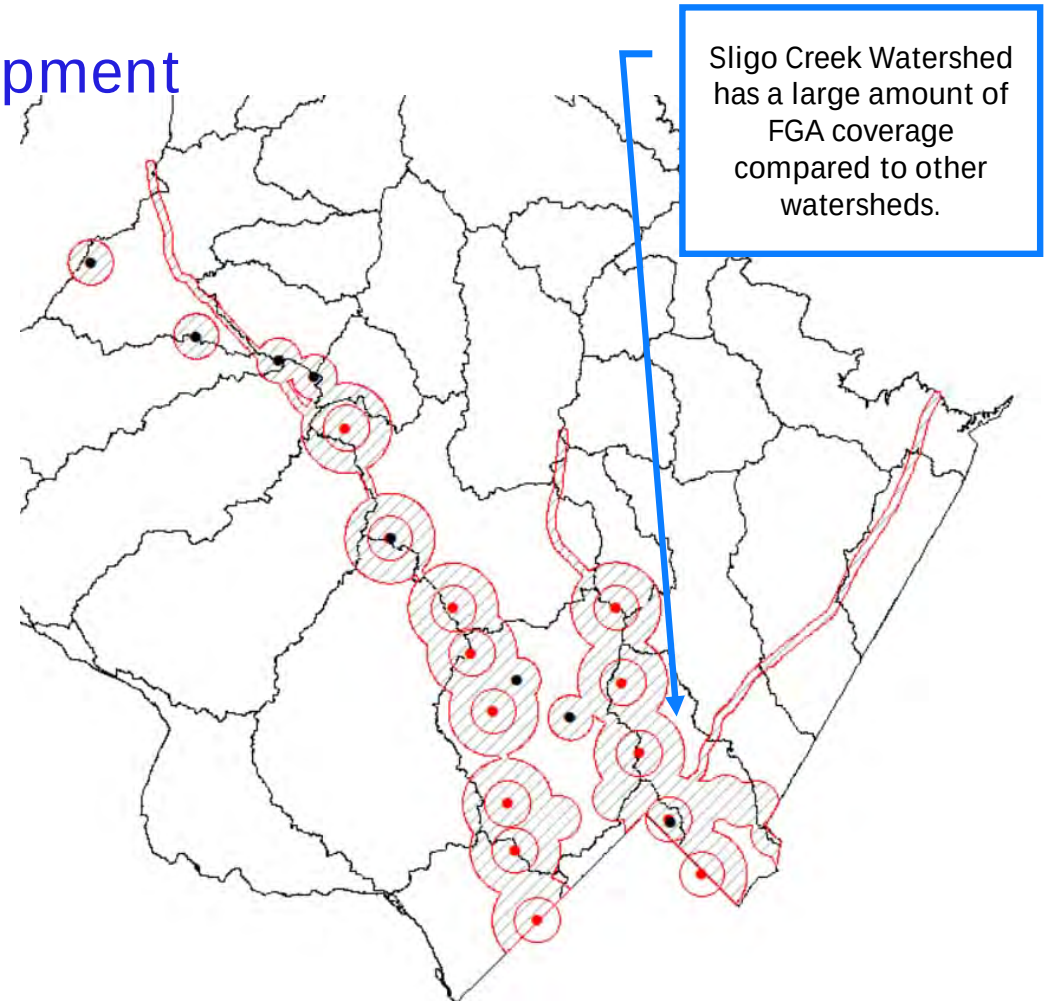


Objectives of Future IA Conditions Scenarios

- Scenario #2: Reasonable Worst Case (RWC) Scenario
  - *Objective: Generate a projection of IA based on observed "reasonable worst case" % IA by zone.*
- Scenario #3: Focus Growth Area (FGA) Scenario
  - *Objective: Provide a future projection that demonstrates increase in IA growth around transit areas, using % growth rates and capped based on observed maximum % IA conditions with an uplift.*
  - Results in nominally higher watershed-level IA as well as higher transit-area IA compared with Scenario #2.

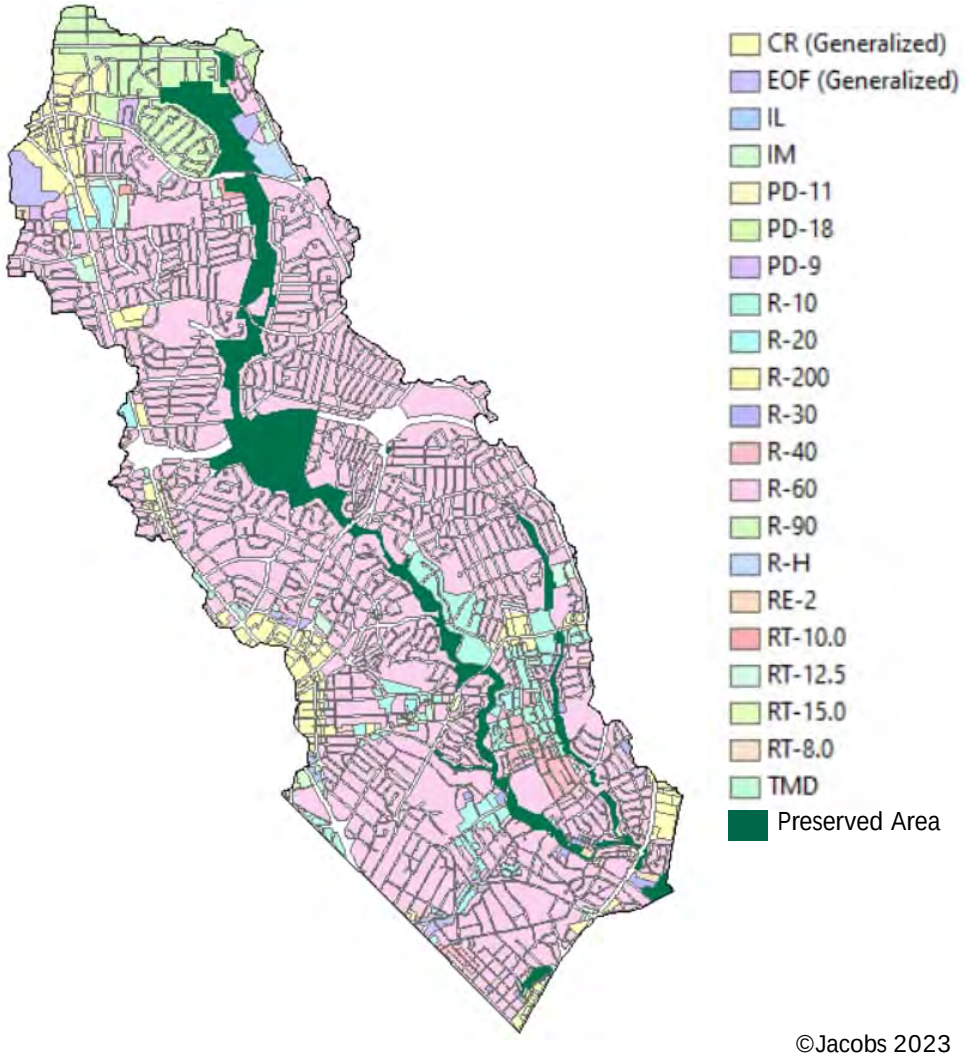
Focus Growth Area Scenario Development

- Intended to define areas around transit that are anticipated to have higher IA growth in accordance with Comp. Plan transit-focused growth initiatives
- Components:
  - Half-mile radius around WMATA stations
  - Mile radius around WMATA stations
  - Half-mile radius around MARC stations
  - Half-mile radius around future Purple Line stations
  - 500-foot buffer around Rockville Pike, Georgia Avenue, and Colesville Road corridors



Exclusion Areas for Future Scenarios

- Preserved areas (e.g. Parklands) will remain constant in terms of % IA for future scenarios
  - These areas will be kept at Existing %IA and will <u>not</u> show IA growth
- Based on MNCPPC Planning "Preserved Areas" for parks only
  - *Best natural areas*
  - *Biodiversity areas*
  - *Stream valley*
  - *Neighborhood conservation*
  - *Managed open natural areas*

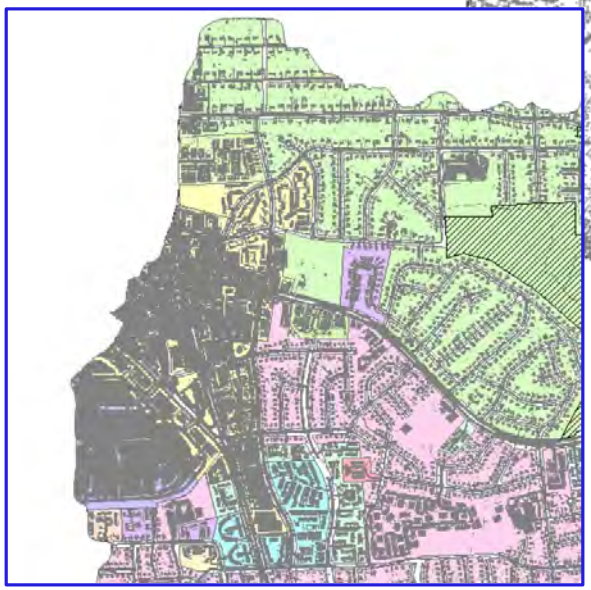


Scenario Development Detail

Scenario #1: Current Impervious Area Conditions

- Based on observed current (2019) %IA calculated from County IA data
- *Results summarized today are based on watershed-zone totals. Once catchment delineations are finalized, results will be developed at that scale.*

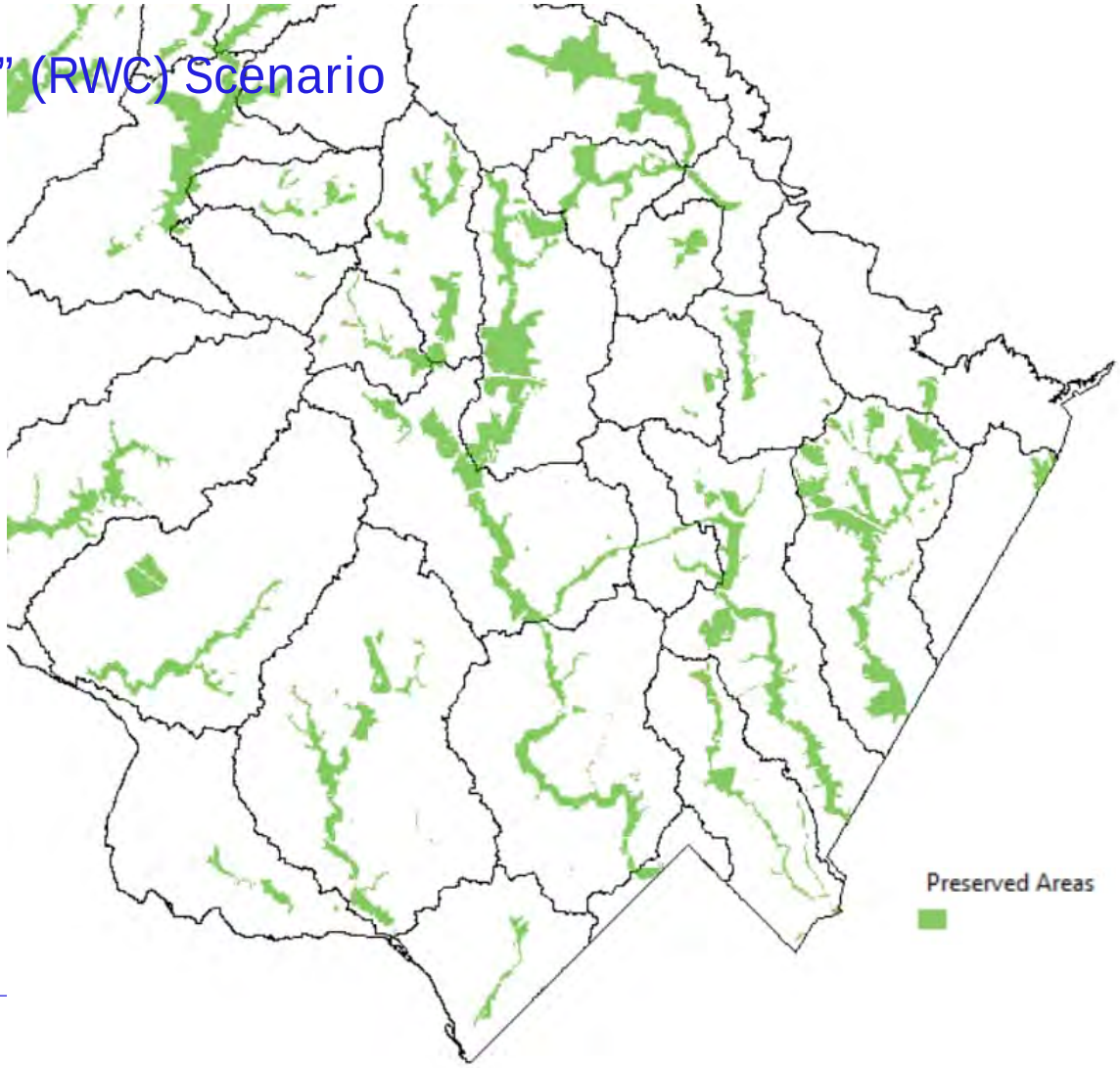
2019 Impervious Area (DEP, 2020)



2019 Impervious Area & MNCPPC Zoning

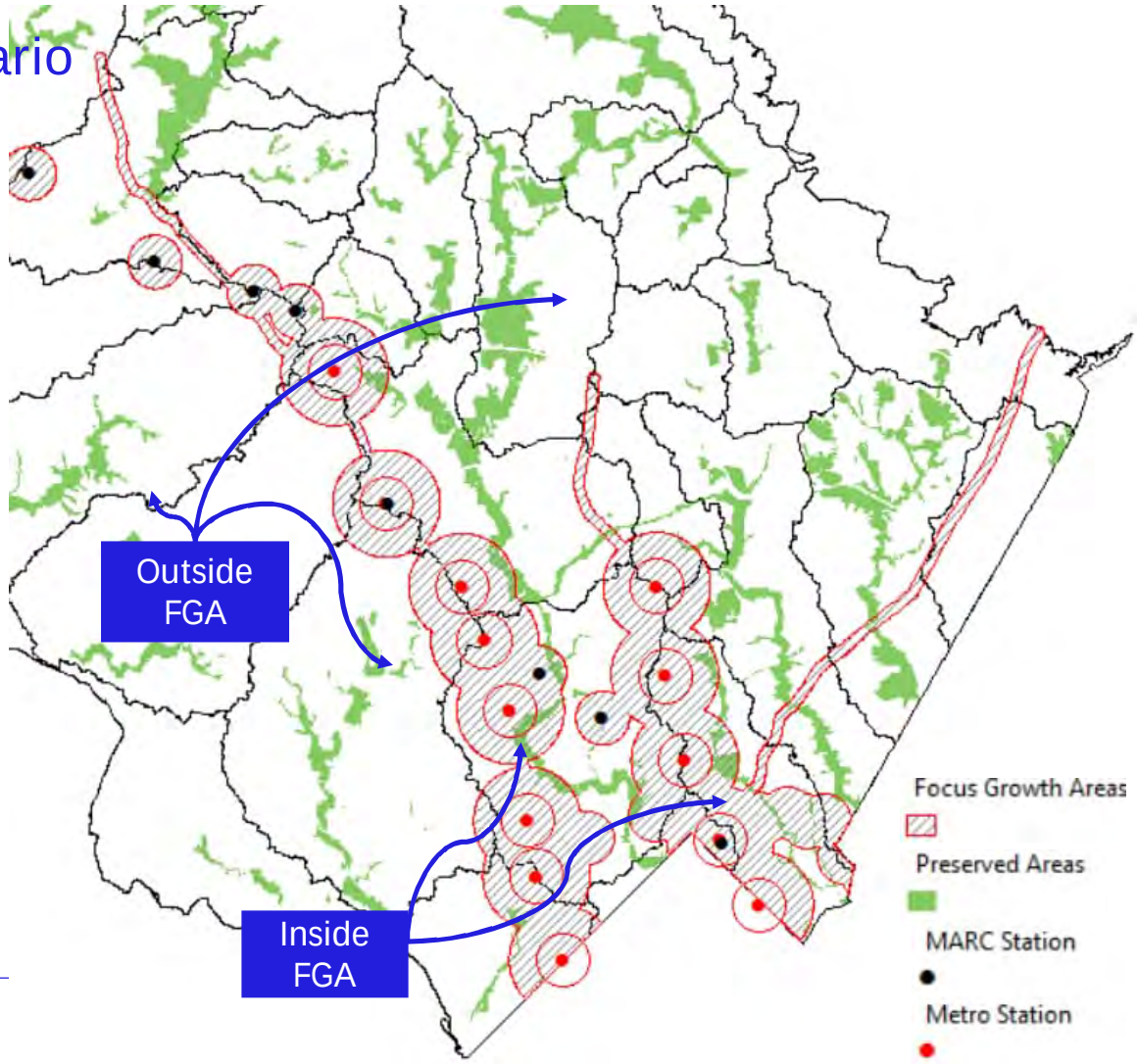
Scenario #2: “Reasonable Worst Case” (RWC) Scenario

- Each watershed-zone is grown from Existing %IA to the zone-based Reasonable Worst Case %IA
- Preserved areas stay as “Existing %IA” (no growth)



Scenario #3: Focus Growth Area Scenario

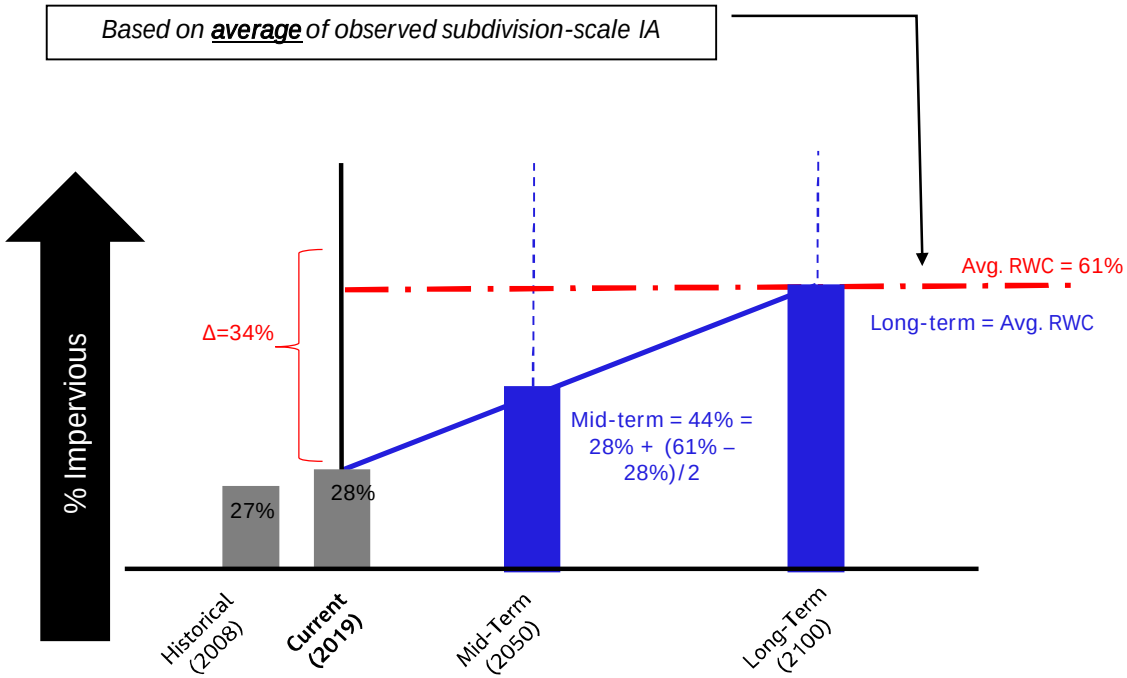
- Focus Growth Area comprised of transit and corridor areas to reflect transit-oriented density goals
- Preserved areas stay as “Existing %IA” (no growth)
- Outside of the Focus Growth Area:
  - Same as Scenario #2 - Each watershed-zone is grown from Existing %IA to the zone-based Reasonable Worst Case %IA
- Inside the Focus Growth Area:
  - Existing %IA is grown using “% Growth Rates”
  - Values are capped with the maximum observed % IA for the FGA



Scenario #2: Reasonable Worst Case (RWC) Scenario

- Mid-term = Existing %IA + half of the variation between Existing %IA and Average RWC
- Long-term = Average RWC %IA for the zone
- *Initial results: These calculations are applied, by zone, to all areas within a given watershed*
- *Final results: Pending development of final catchments, the calculations will be applied, by zone, to all areas within a given catchment*

Example:
Sligo Creek R-60



Approach to developing "reasonable worst case" (RWC) % IA by zone
(Applies everywhere in the "RWC Scenario", and outside FGA in "FGA Scenario")

- For zones with significant impervious area in Tier 1-3 watersheds (R-60, R-90, R-200, and generalized CR):
  1. Use current conditions IA data (subdivision scale IA by zone) to locate areas with relatively high % IA
  2. Identify and quantify % IA for 5 such areas (20-100 parcels) by zone
     - Average RWC = Average % IA across the examples
- For other zones
  - RWC = Maximum observed subdivision-scale % IA for the zone
- Public ROW (roads, sidewalks) is currently 62% impervious.

Zone	Average RWC	Methods
CR	85%	Based on RWC Examples
EOF	93%	Based on Observed Subdivision %IA
IL	94%	Based on Observed Subdivision %IA
IM	94%	Based on Observed Subdivision %IA
PD-Med	49%	Based on Observed Subdivision %IA
PD-MedLow	60%	Based on Observed Subdivision %IA
R-10	100%	Based on Observed Subdivision %IA
R-20	88%	Based on Observed Subdivision %IA
R-200	54%	Based on RWC Examples
R-30	66%	Based on Observed Subdivision %IA
R-40	45%	Based on Observed Subdivision %IA
R-60	61%	Based on RWC Examples
R-90	54%	Based on RWC Examples
RE-2	41%	Based on Observed Subdivision %IA
R-H	99%	Based on Observed Subdivision %IA
ROW	62%	Based on Observed %IA
RT-10.0	61%	Based on Observed Subdivision %IA
RT-12.5	86%	Based on Observed Subdivision %IA
RT-15.0	76%	Based on Observed Subdivision %IA
RT-8.0	59%	Based on Observed Subdivision %IA
TMD	68%	Based on Observed Subdivision %IA

Example: R-60 Observed RWC % IA

Average RWC = Average of Observed Values

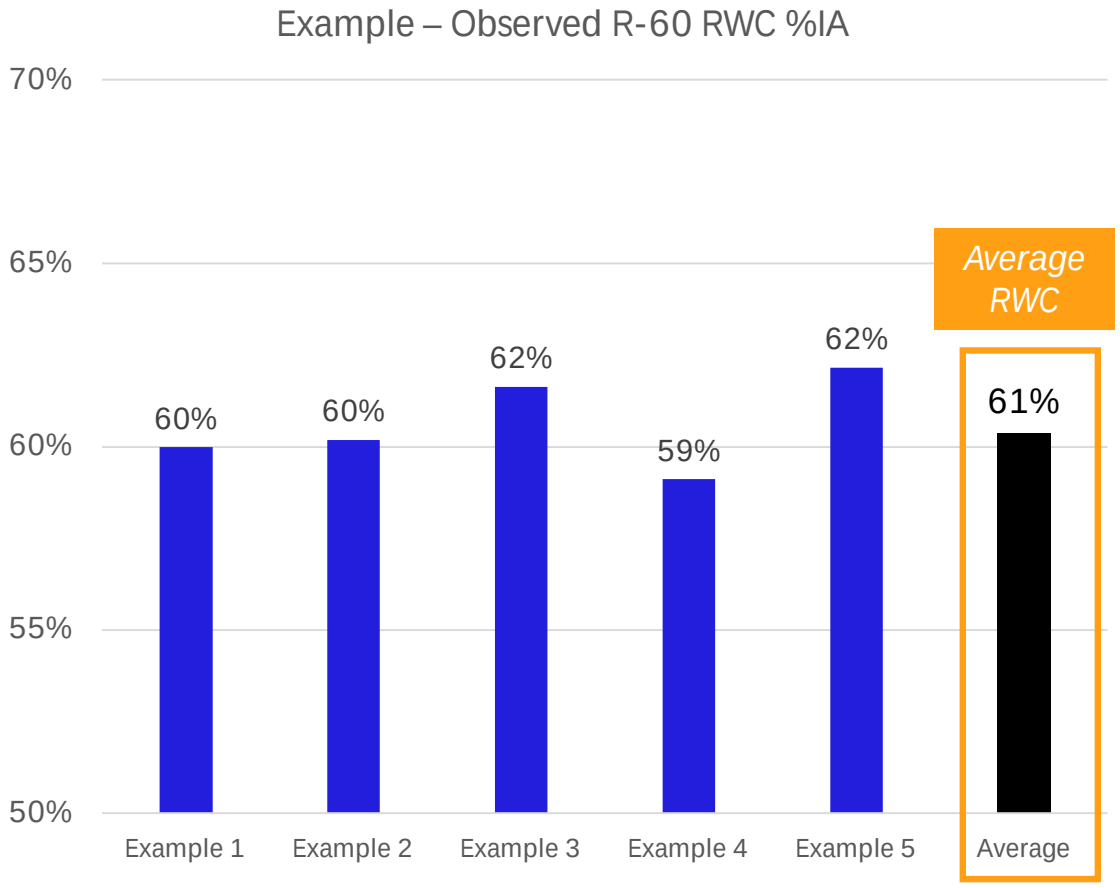
Battery Park (Lower Rock Creek) 60%

Edgemoor (Little Falls) 60%

Mary J Boland (Middle Great Seneca Creek) 62%

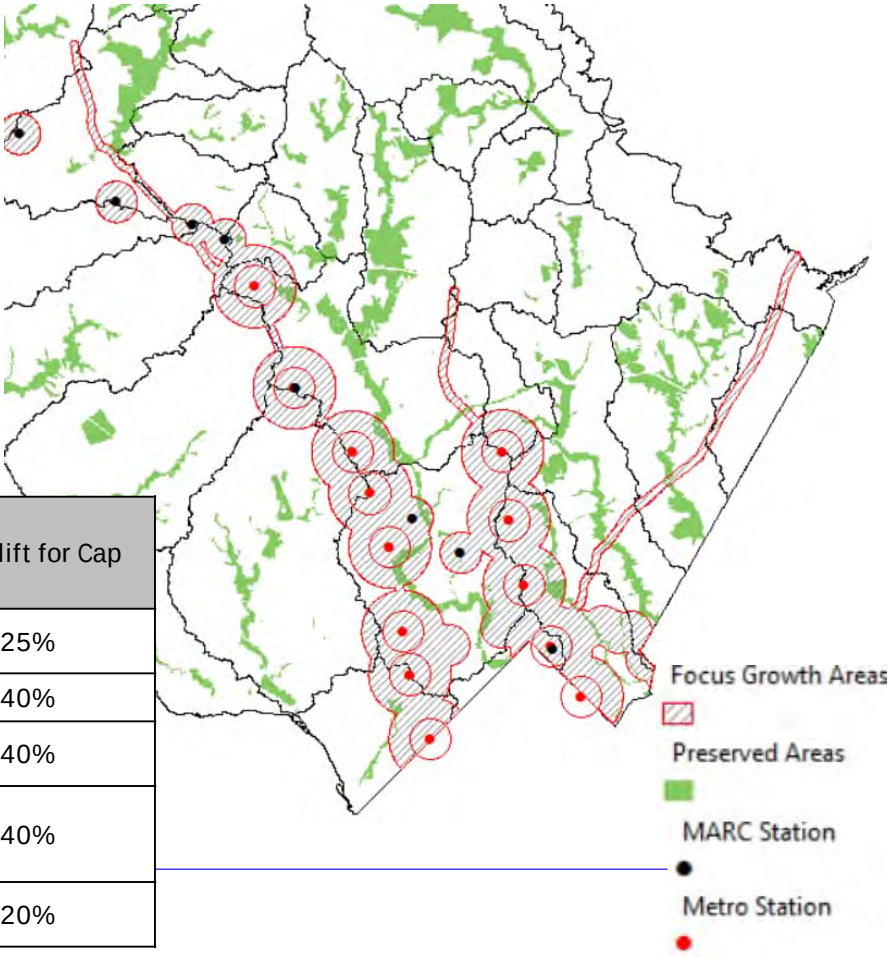
Decoverly Adventure (Muddy Branch) 59%

Chevy Chase Terrace (Little Falls) 62%



Scenario #3: Focus Growth Area (FGA) Scenario

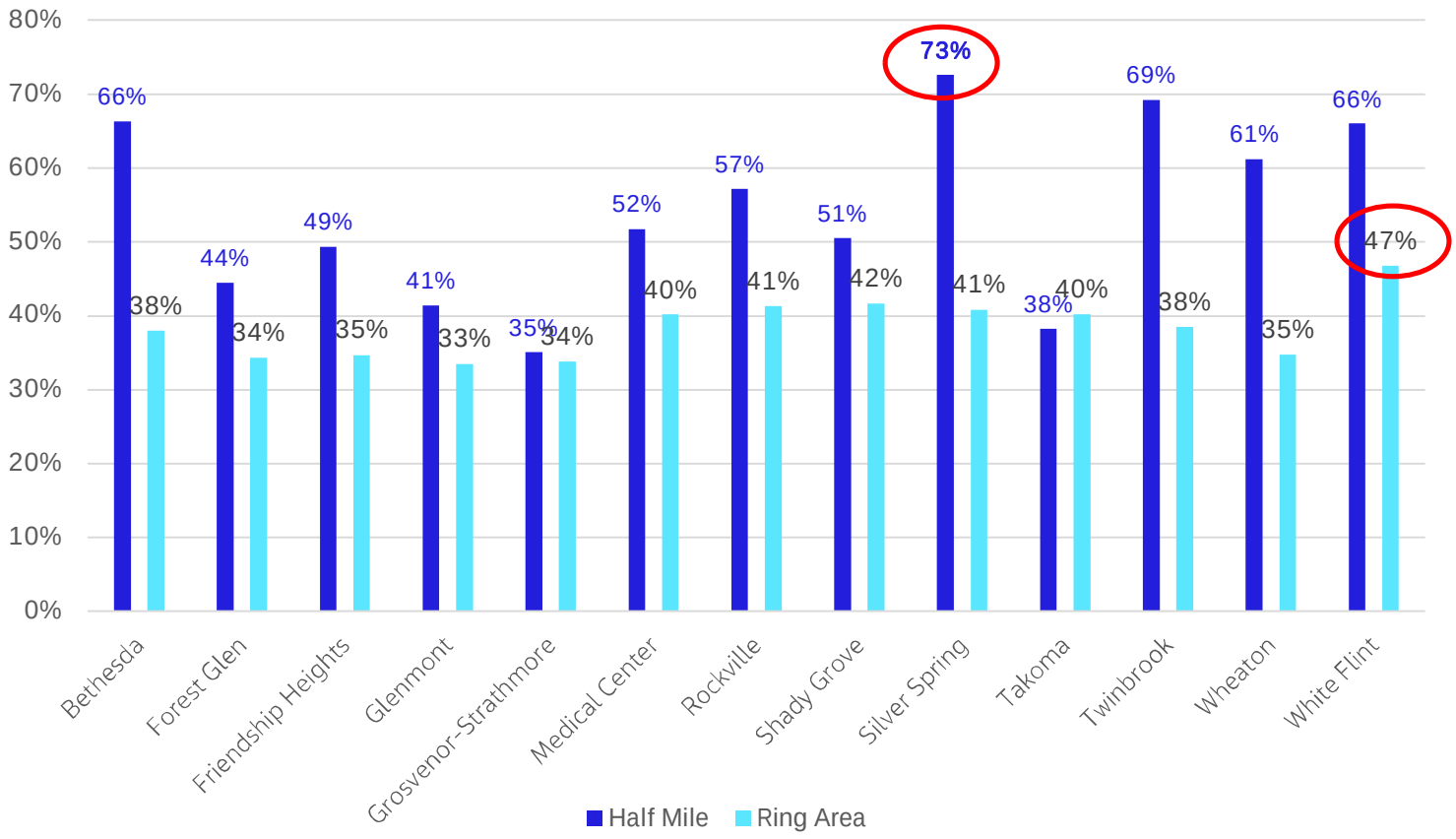
- Outside FGA: Same as Scenario #2
- Inside FGA
  - Mid-term = Existing %IA * Mid-term % Growth Rate
  - Long-term = Mid-term %IA * Long-term % Growth Rate
  - Capping based on maximum observed IA around transit (Metro) stations + Uplift %



FGA Subarea Name	% Growth Rate		Maximum Observed %IA	% Uplift for Cap
	Future Mid-term	Future Long-term (% above mid-term)		
FGA_Metro_0.5	50%	70%	73% (Silver Spring)	25%
FGA_Metro_1.0	50%	70%	52% (White Flint)	40%
FGA_Purple_0.5	50%	70%	Metro 1.0 Mile (52%, White Flint)	40%
FGA_MARC_0.5	60%	60%	Metro 1.0 Mile used (52%, White Flint)	40%
FGA_Corridor_500	60%	60%	75% (Rockville Pike)	20%

Cap for FGA Growth Based on Maximum Current Total % IA for Areas Within 0.5-Mile and 1-Mile Radius of WMATA Stations, Plus % Uplift

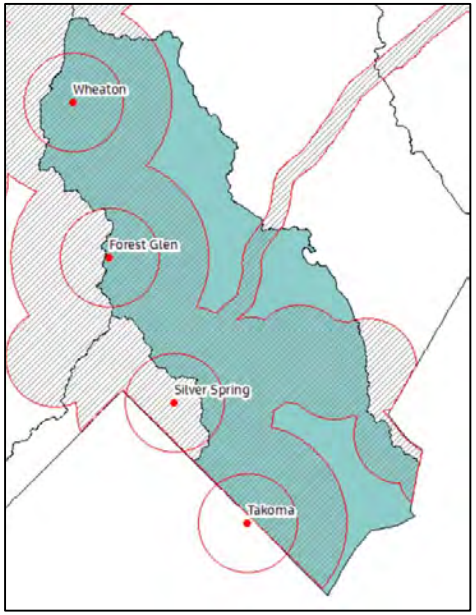
- Maximum Total %IA for
  - 0.5-mile station radius is for Silver Spring (73%)
  - 1-mile station radius is for White Flint (52%)
- Radius of 1-mile generally contains a significant amount of residential area

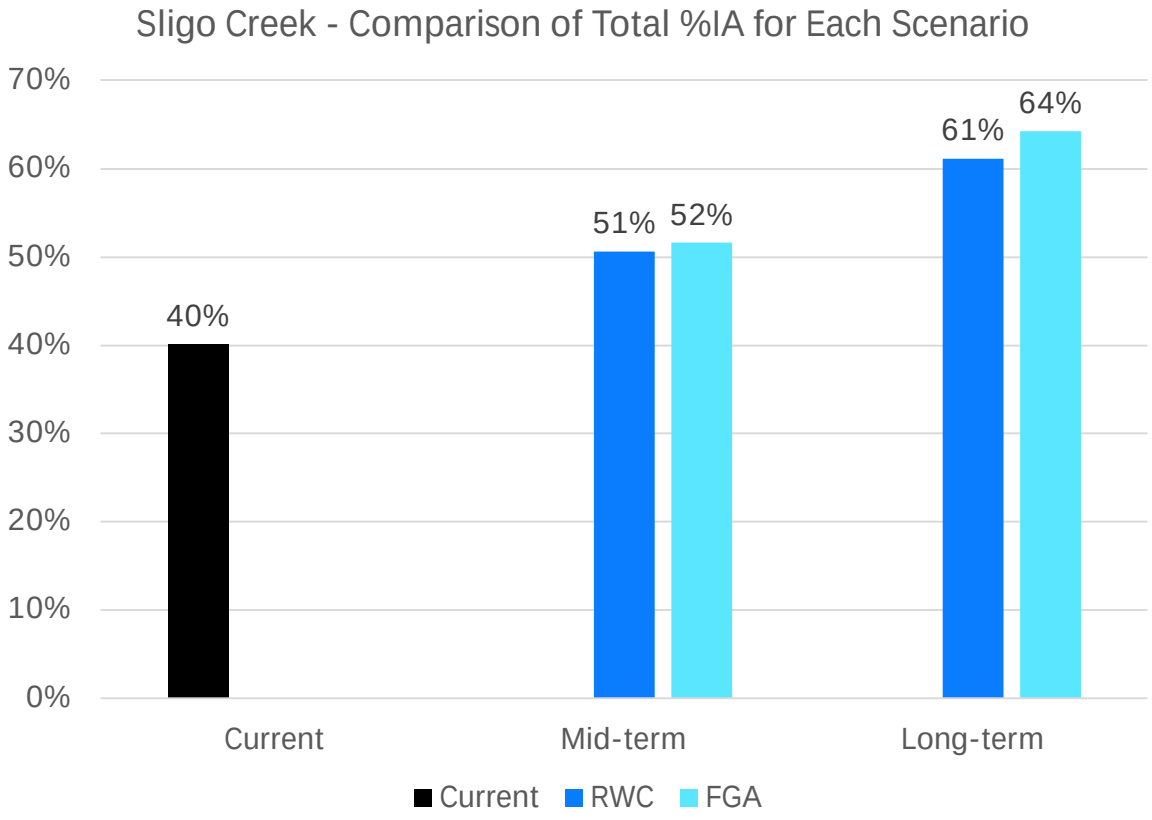


Results for Sligo Creek Watershed

Comparison of Impervious Area Scenarios

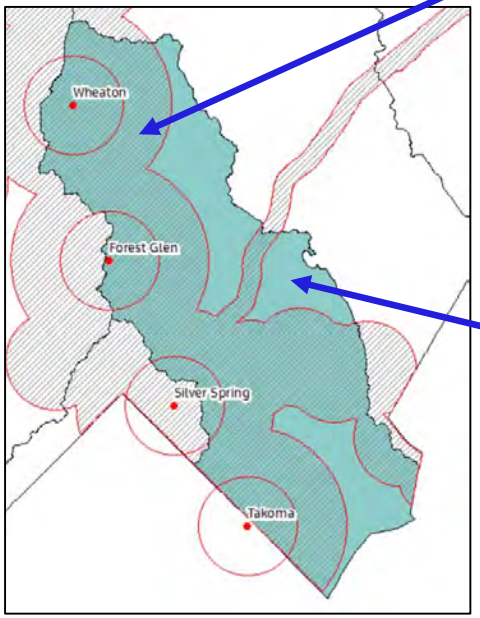
- Small differences between the "RWC" and "FGA" scenarios
  - The difference is within the FGA area, %IA for areas outside the FGA are the same

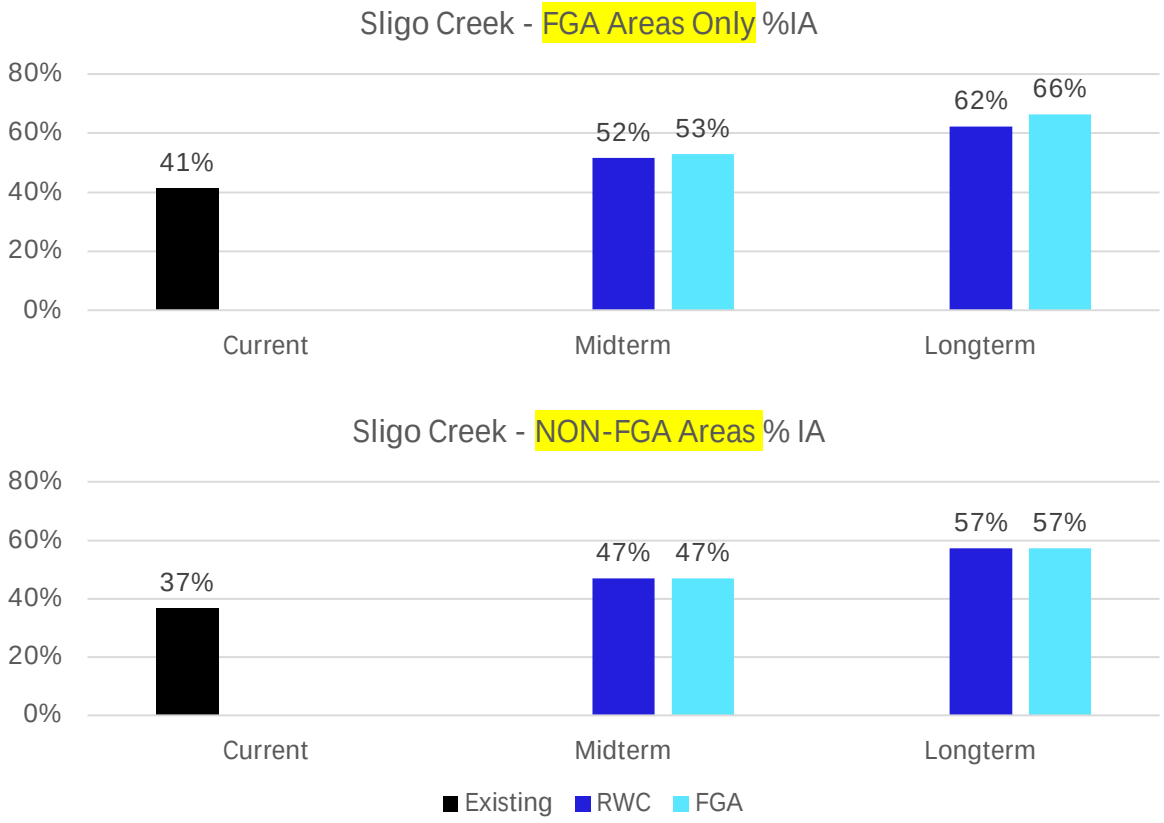




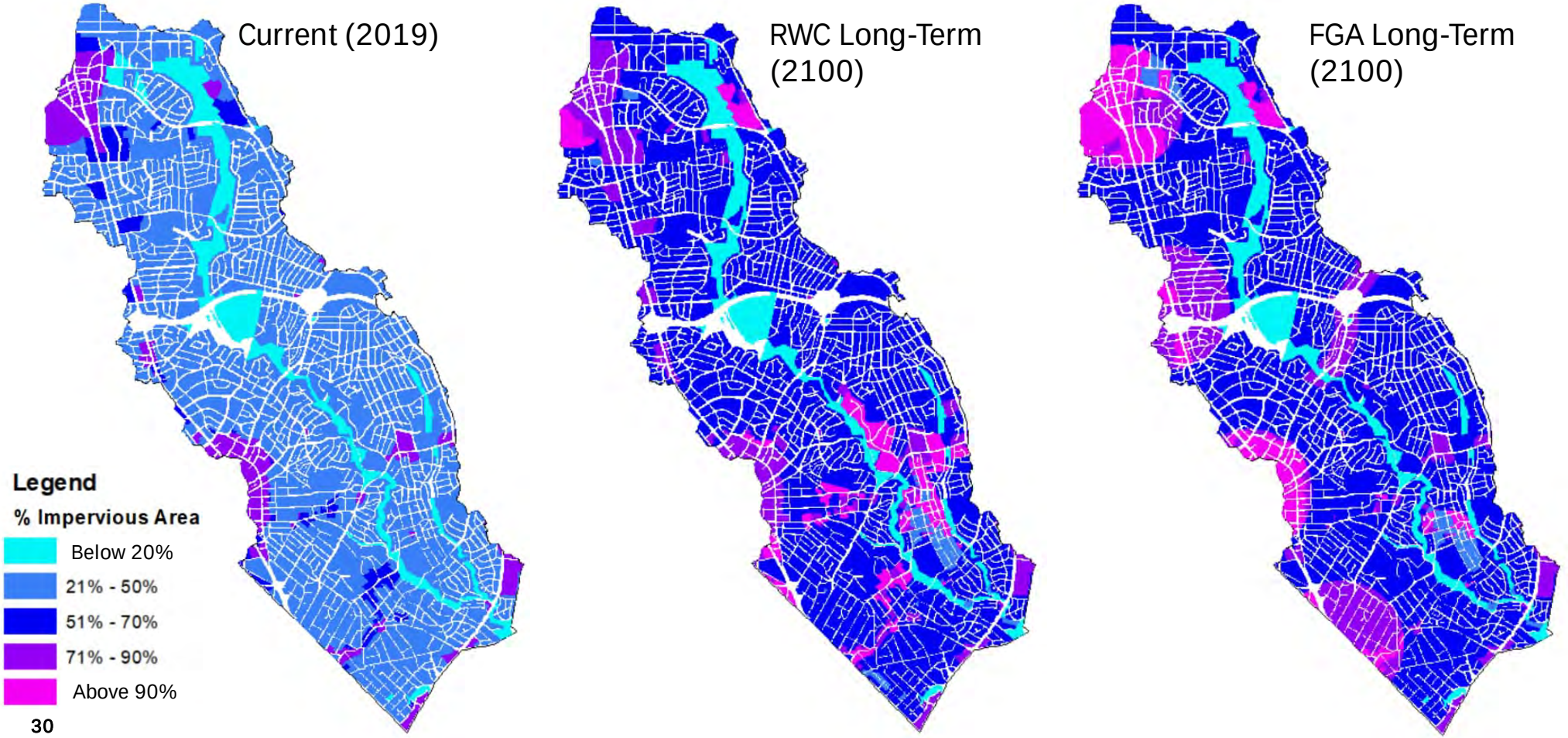
Comparison of Impervious Area Scenarios (FGA vs. Non-FGA)

- Small differences between the "RWC" and "FGA" scenarios
  - The difference is within the FGA area, %IA for areas outside the FGA are the same

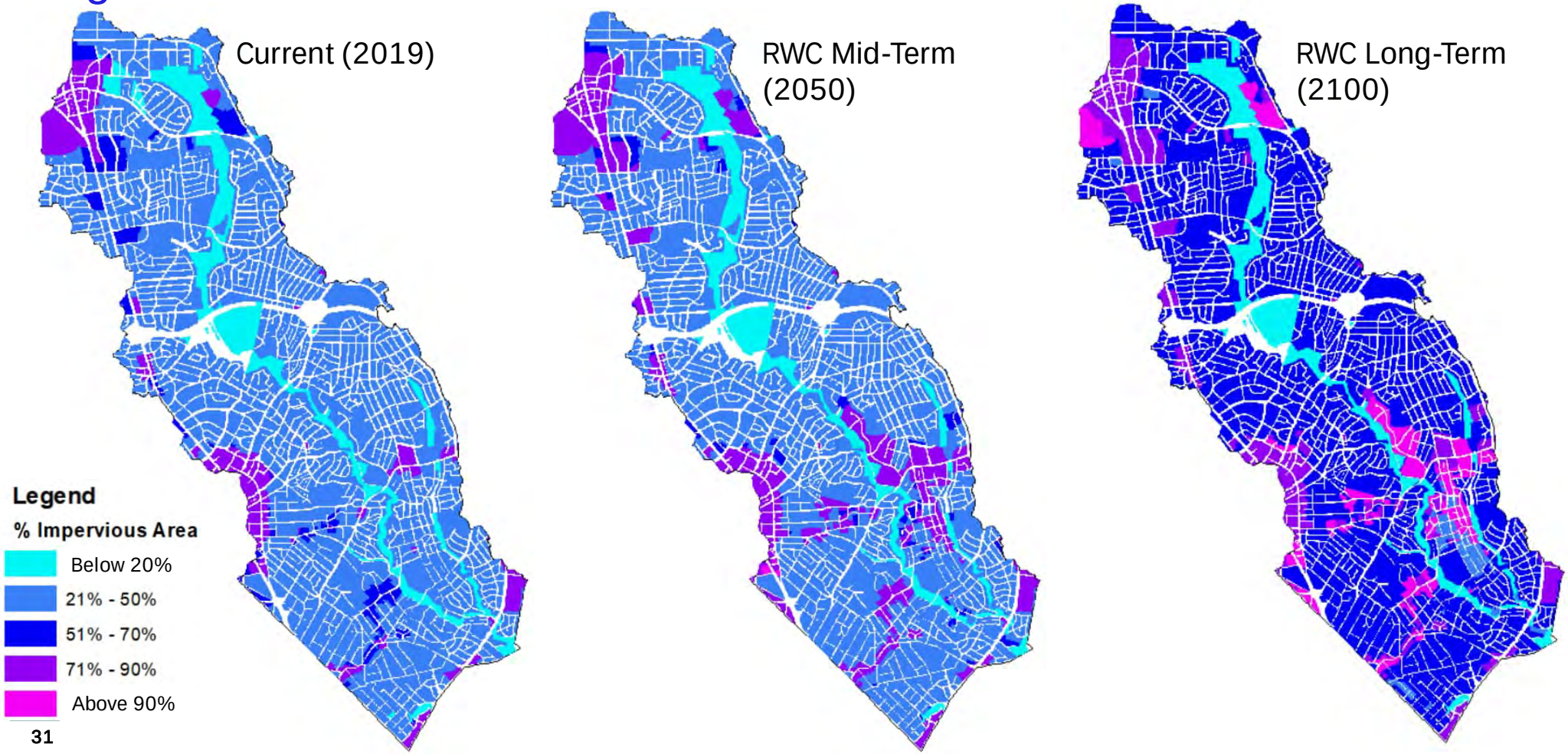




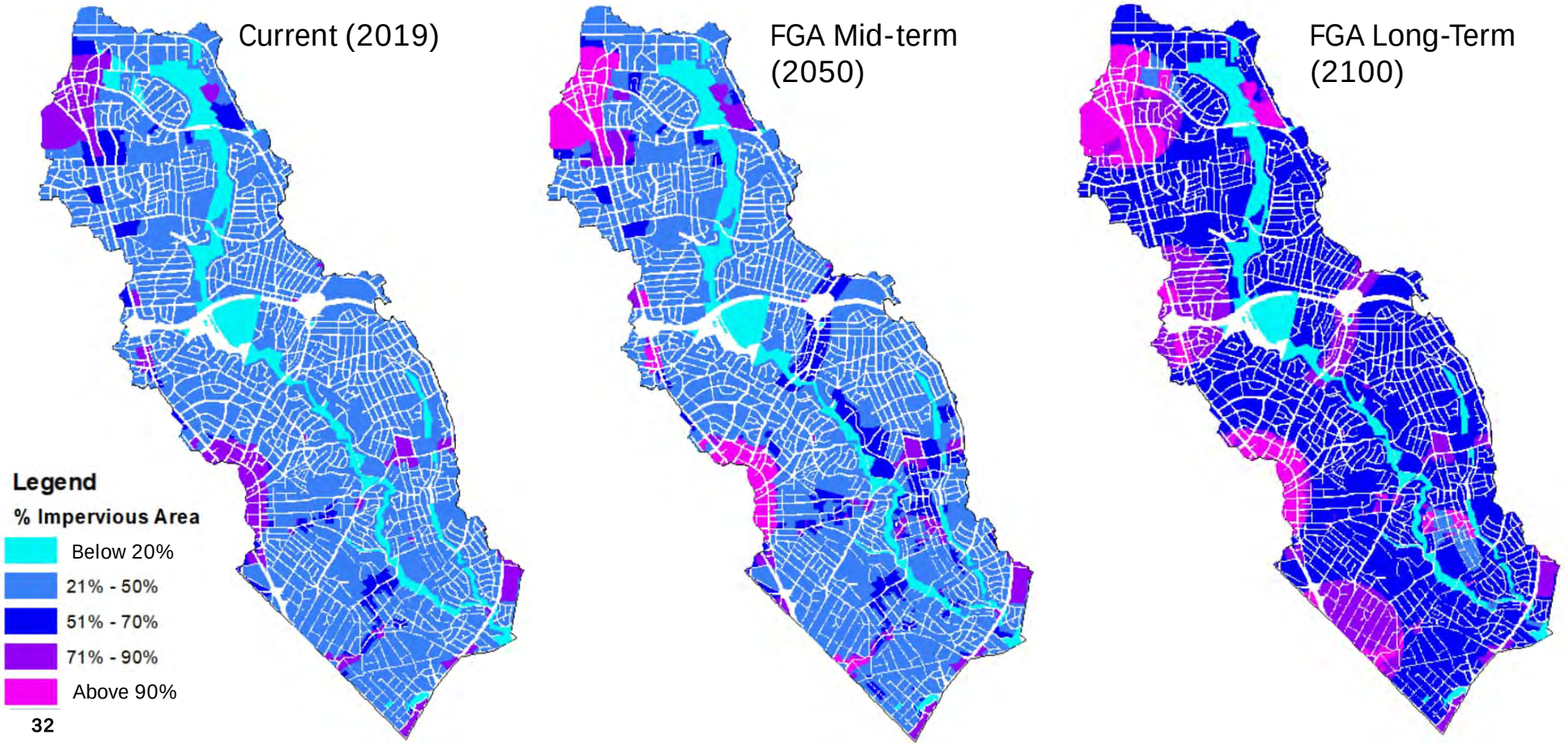
Sligo Creek Watershed Existing and Long-term Results



Sligo Creek Watershed “RWC” Scenario Results

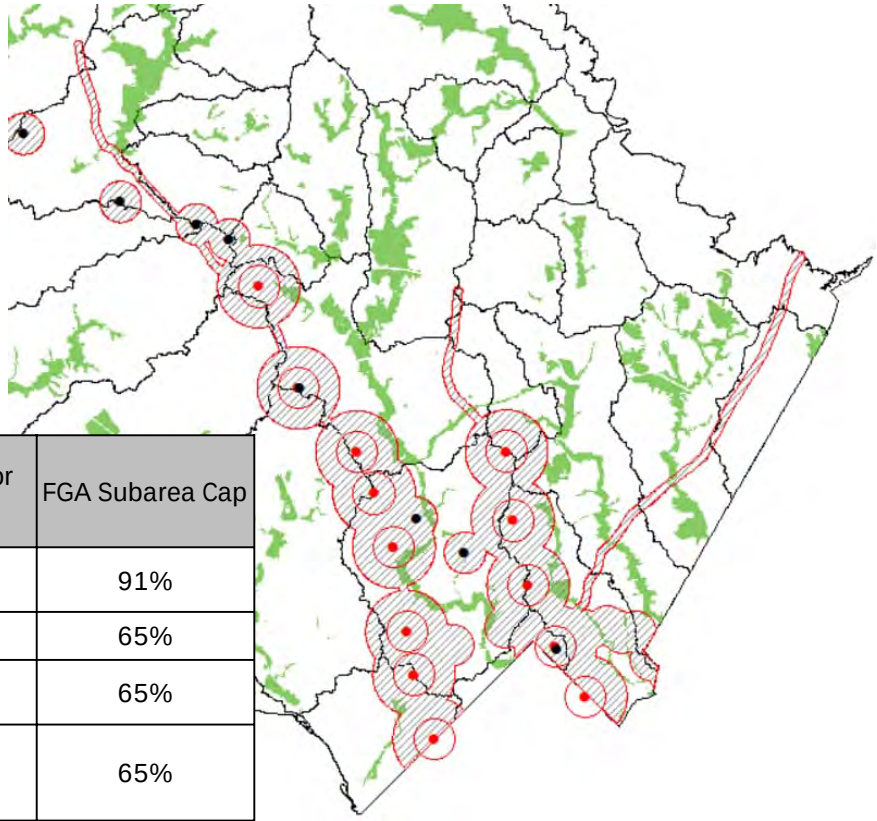


Sligo Creek Watershed “FGA” Scenario Results



Impervious Area Scenario Recommendation

- Recommended Impervious Area Scenario for Flood Modeling = FGA Scenario
  - Using % growth rates and caps by FGA Subarea to reflect higher IA growth than the RWC near transit/corridors
  - Localized higher IA totals near transit areas – consistent with input from Planning



FGA Subarea Name	% Growth Rate		Maximum Observed %IA	% Uplift for Cap	FGA Subarea Cap
	Future Mid-term	Future Long-term (% above mid-term)			
FGA_Metro_0.5	50%	70%	73% (Silver Spring)	25%	91%
FGA_Metro_1.0	50%	70%	52% (White Flint)	40%	65%
FGA_Purple_0.5	50%	70%	Metro 1.0 Mile (52%, White Flint)	40%	65%
FGA_MARC_0.5	60%	60%	Metro 1.0 Mile used (52%, White Flint)	40%	65%
FGA_Corridor_500	60%	60%	75% (Rockville Pike)	20%	90%

Part II: Climate/Rainfall Scenarios

24-hour Future IDF Values

- 56 future climate scenarios + 7 baseline (24-hour)
- Selection of 15 scenarios for future modeling
- Many values overlap between future scenarios

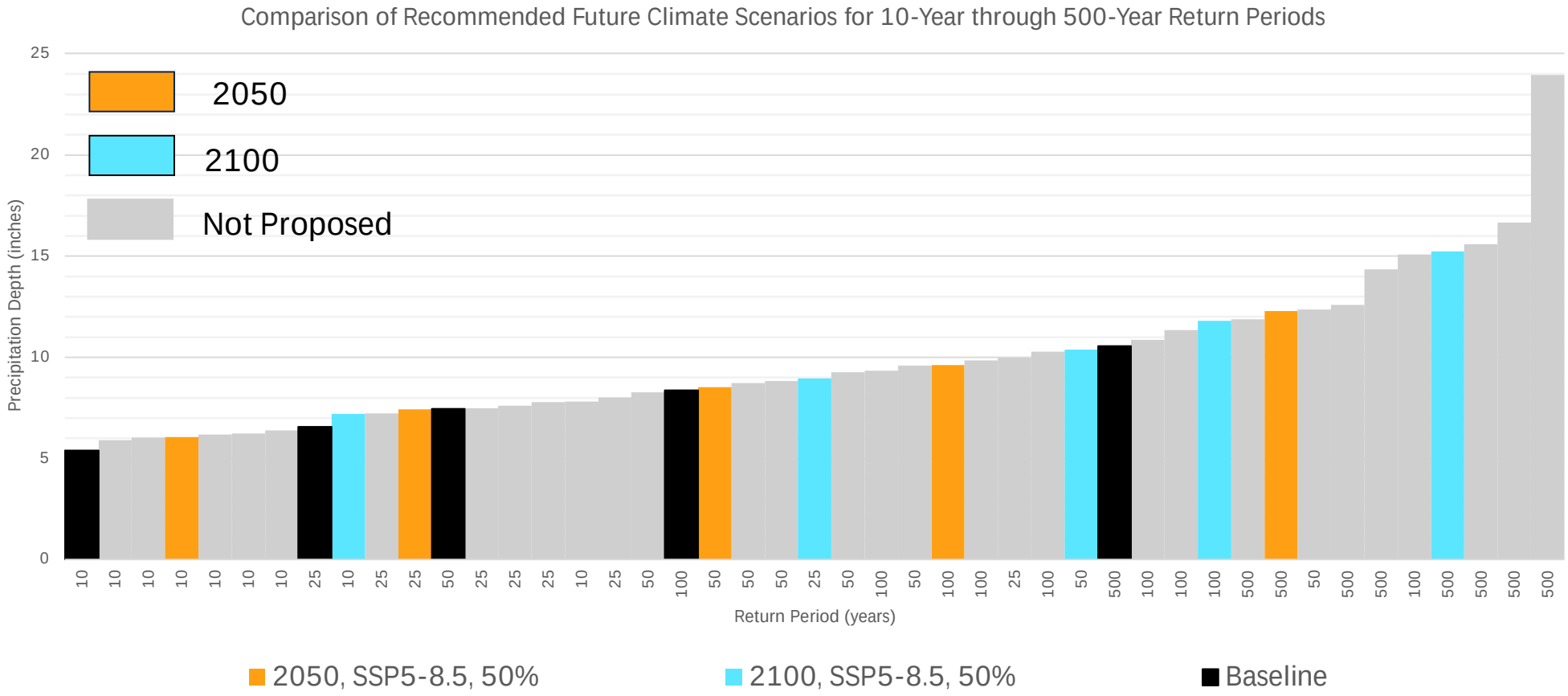
	Depth (inches)								
Return Period (years)	Updated Baseline (AMS)	2050, SSP2-4.5, 50th Percentile	2050, SSP2-4.5, 90th Percentile	2050, SSP5-8.5, 50th Percentile	2050, SSP5-8.5, 90th Percentile	2100, SSP2-4.5, 50th Percentile	2100, SSP2-4.5, 90th Percentile	2100, SSP5-8.5, 50th Percentile	2100, SSP5-8.5, 90th Percentile
2	3.2	3.4	3.6	3.4	3.8	3.5	3.9	3.9	4.6
5	4.5	4.9	5.0	5.0	5.2	5.1	5.3	5.9	6.4
10	5.4	5.9	6.0	6.1	6.2	6.2	6.4	7.2	7.8
25	6.6	7.2	7.5	7.4	7.8	7.6	8.0	9.0	10.0
50	7.5	8.3	8.8	8.5	9.3	8.7	9.6	10.4	12.4
100	8.4	9.3	10.3	9.6	10.9	9.9	11.4	11.8	15.1
500	10.6	11.9	14.3	12.3	15.6	12.6	16.6	15.2	23.9

Recommended scenarios for modeling

Recommended scenarios for future modeling

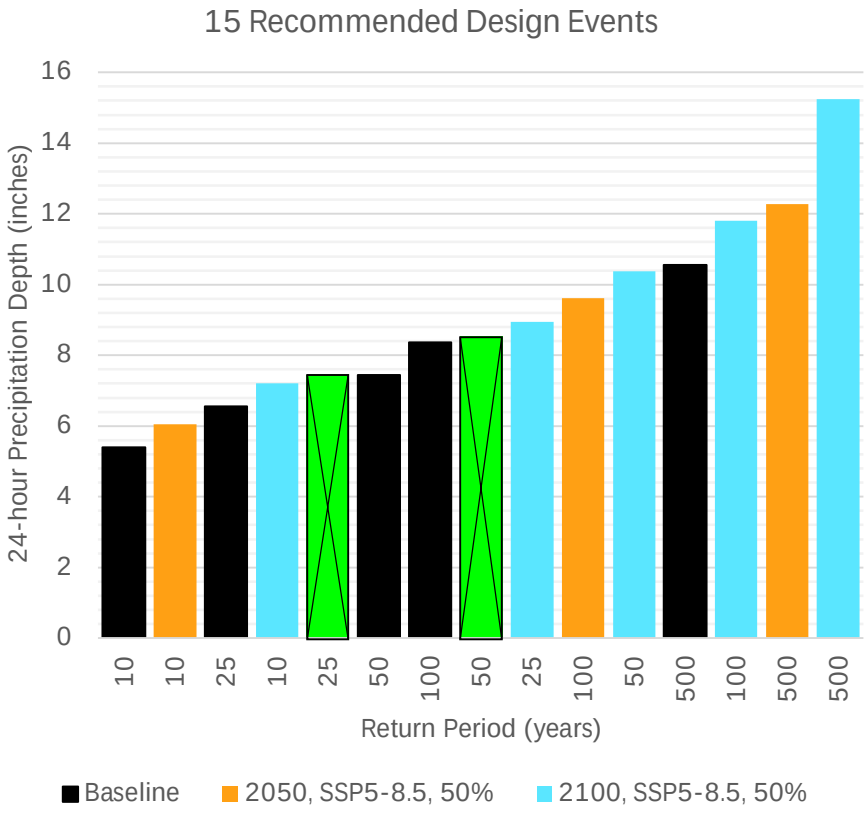
Recommended scenarios for future modeling

Future IDF Values – Recommended for Modeling



Recommendation: 17 Recommended Scenarios for Modeling

- 2 Observed Events (covered in next slides)
  - Sept. 2020, Silver Spring
  - July, 2019, Ten Mile Creek
- 15 Design Events (synthetic temporal distribution)
  - Baseline climate, 5 return periods:
    - 10, 25, 50, 100, 500
  - 2 Future Climate scenarios, 5 return periods (each):
    - 2050, High 50th
      - 10, ~~25, 50~~, 100, 500
    - 2100, High 50th
      - 10, 25, 50, 100, 500



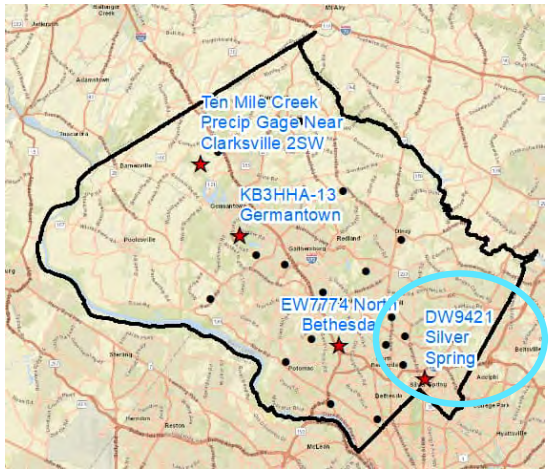
Historical Observed Events

Historic Events - Summary

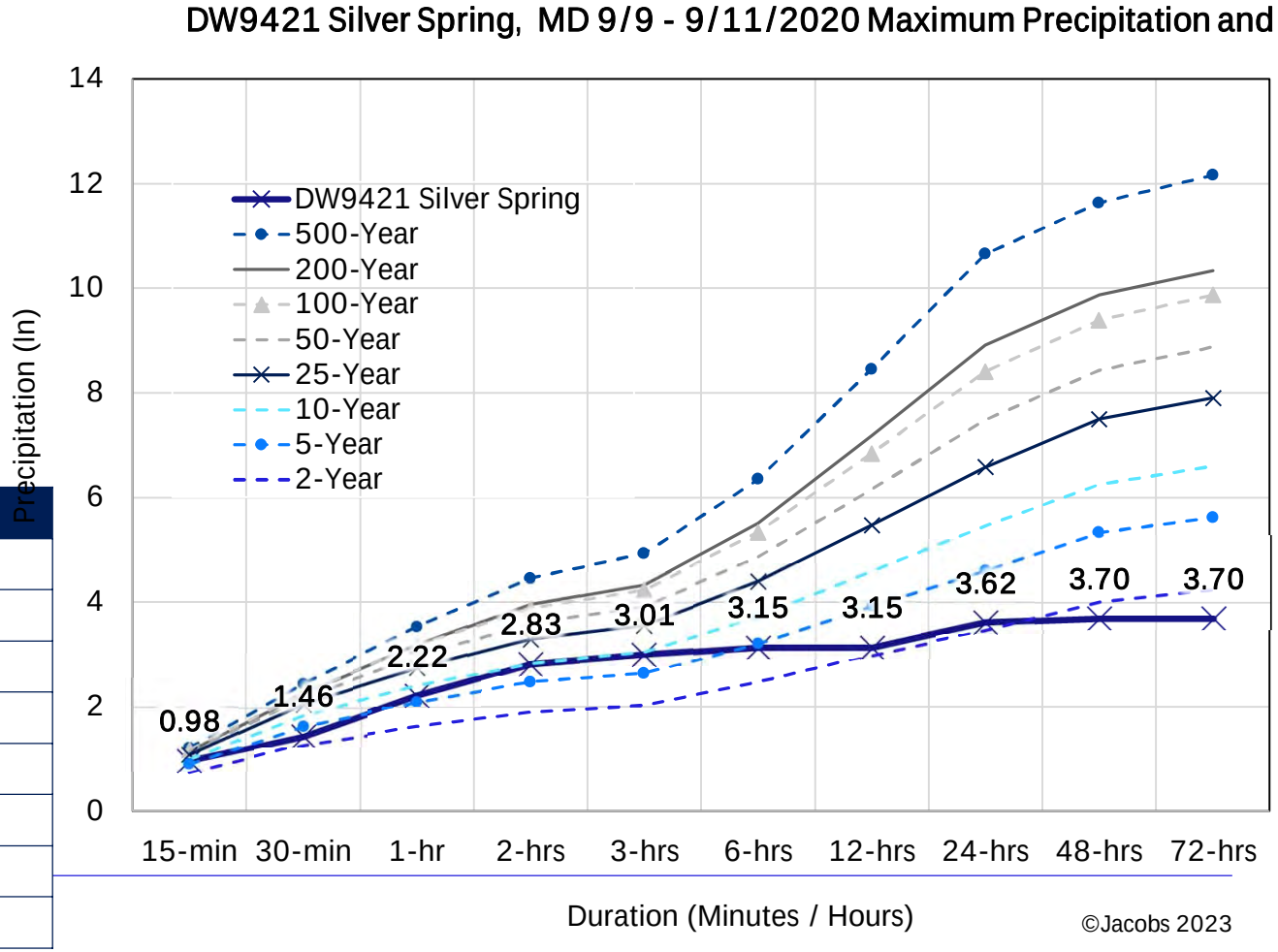
- Several historic storms analyzed:
  - July 8, 2019 / Clarksville
  - August 7, 2019 / Germantown
  - September 10, 2020 / Bethesda
  - September 1, 2021 / Rockville – Twinbrook
- Recommendation for modeling:
  - July 8, 2019 – Use this because it is the most extreme event available
  - September 10, 2020 – Use this because it is local to Sligo, helpful for validation

Recommendation: Use this for Model Event

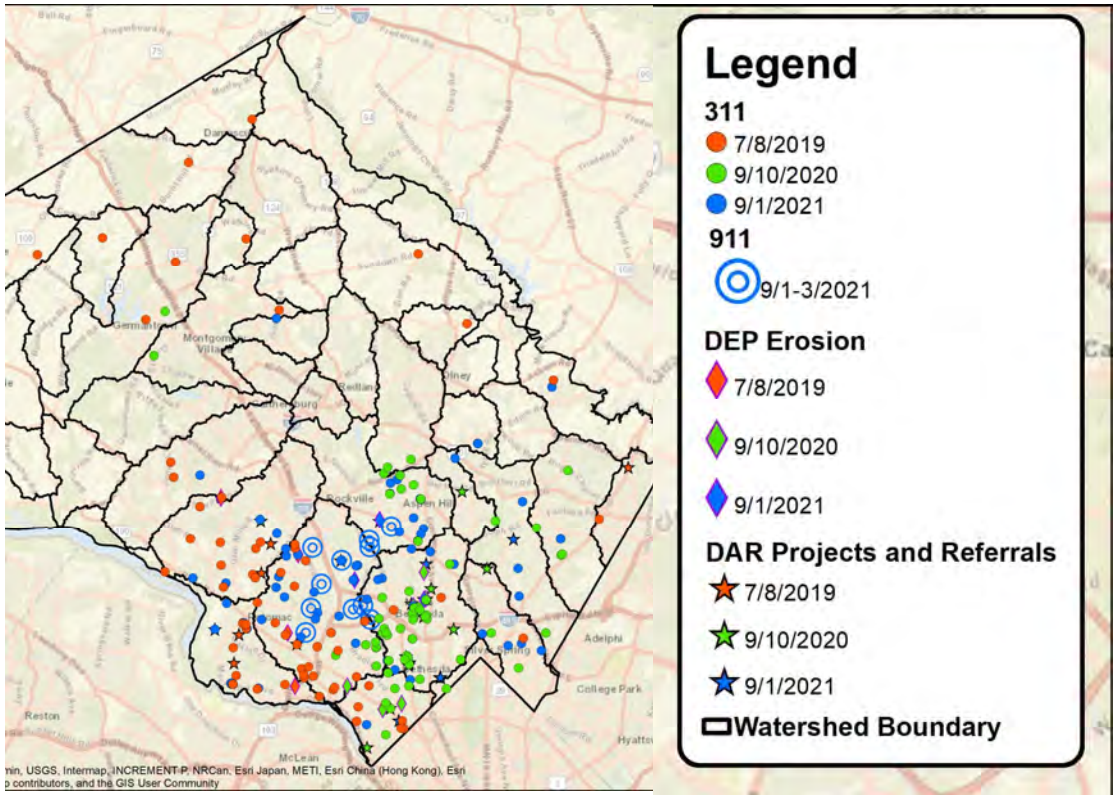
Historical Event Analysis – September 10th 2020 (max 5-year, various)

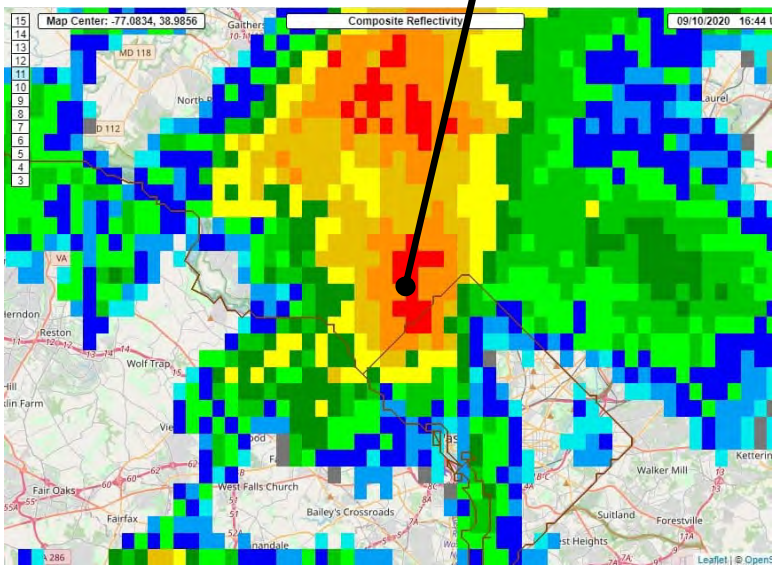


Duration	Depth (inches)	Return Interval
15-min	0.98	5-Year
30-min	1.46	2-Year
1-hr	2.22	5-Year
2-hrs	2.83	5-Year
3-hrs	3.01	5-Year
6-hrs	3.15	2-Year
12-hrs	3.15	2-Year
24-hrs	3.62	2-Year



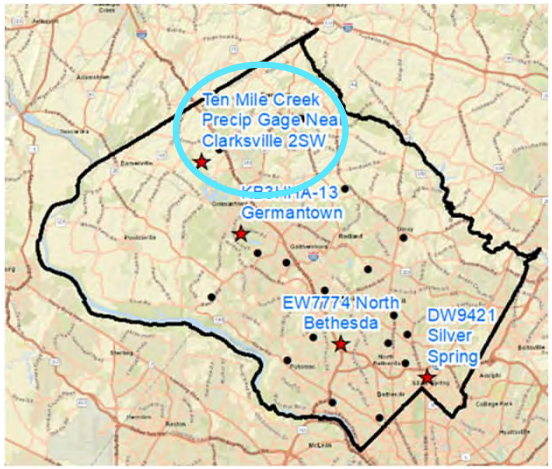
September 10, 2020 Event



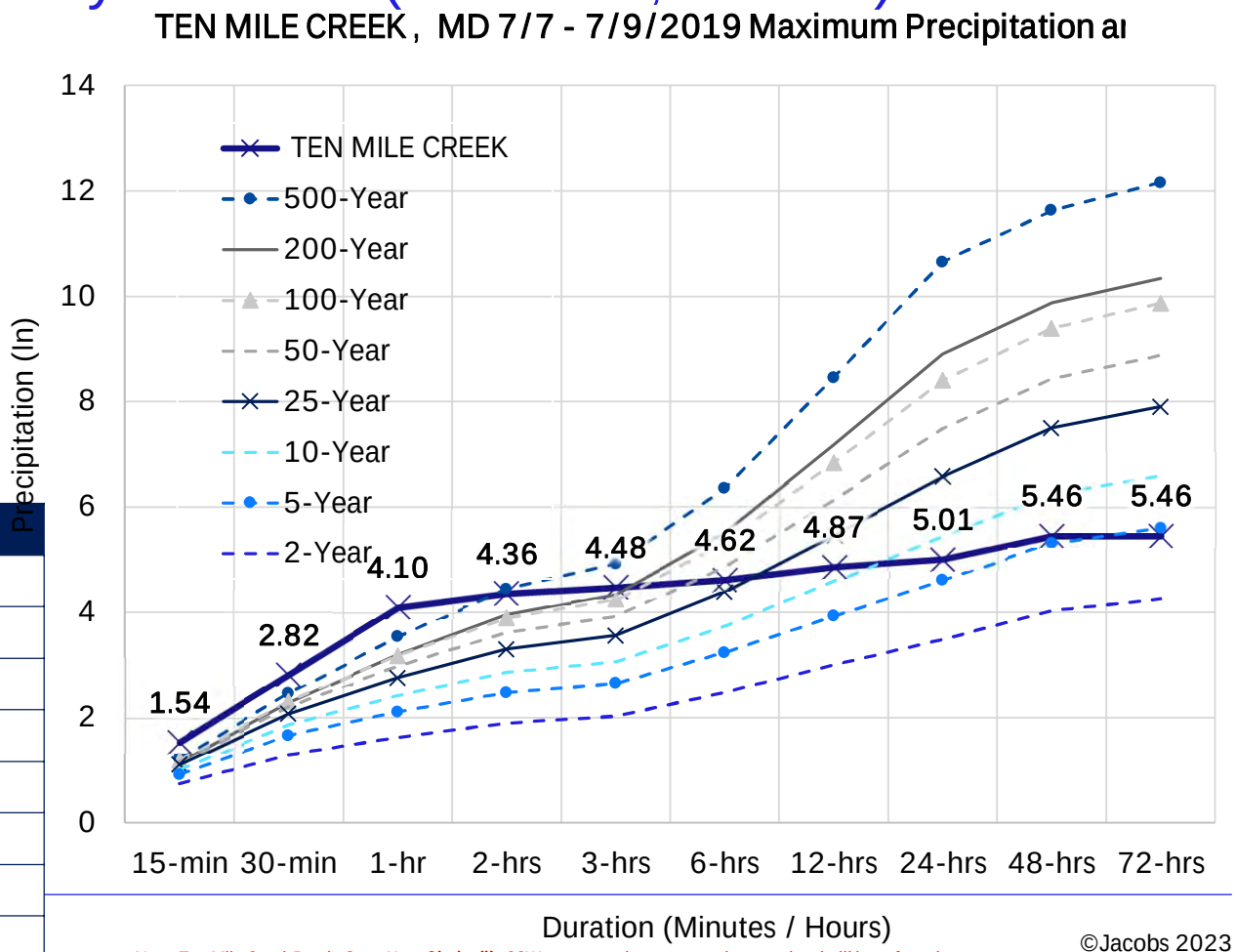


Recommendation: Use this for Model Event

Historical Event Analysis – July 8th 2019 (500-Year, various)

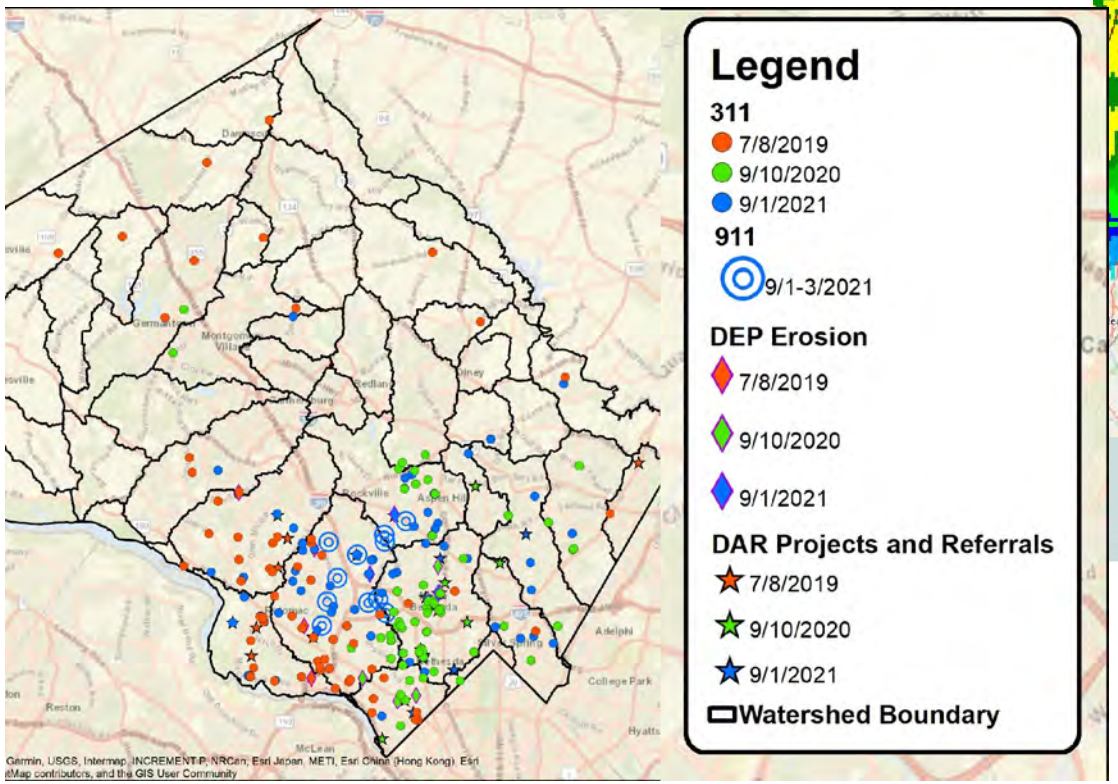


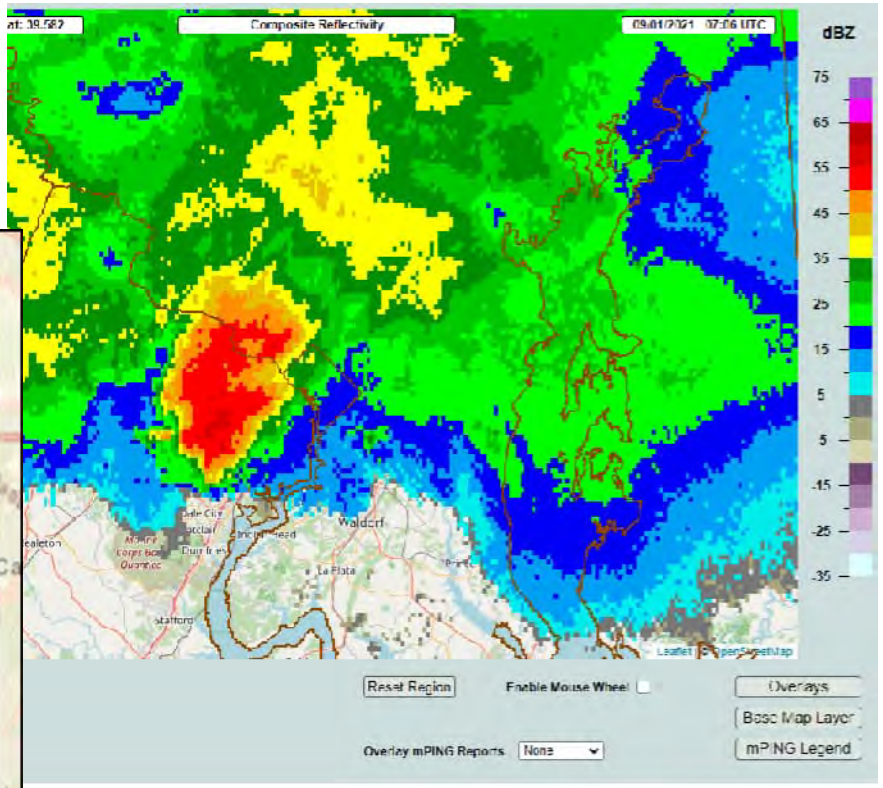
Duration	Depth (inches)	Return Interval
15-min	1.54	500-Year
30-min	2.82	500-Year
1-hr	4.1	500-Year
2-hrs	4.36	200-Year
3-hrs	4.48	200-Year
6-hrs	4.62	25-Year
12-hrs	4.87	10-Year
24-hrs	5.01	5-Year



Note: Ten Mile Creek Precip Gage Near **Clarksville** 2SW appears to be erroneously named and will be referred to as Ten Mile Creek Precip Gage Near **Clarksburg** 2SW in the Technical Memo (to follow)

July 8, 2019 Event





Recommended Scenarios for Flood Modeling

Considerations for Development of Flood Modeling Scenarios

- Defining a “status quo” condition for planning purposes
- Computing a range of scenarios to support risk assessment using Hazus
- Understanding impacts of IA changes vs. rainfall changes

Proposed Scenarios for Flood Modeling

- 24-hour values for all storms will be included in projections TM
- Damages will be calculated for all events
- Benefits calculation will be current to 2100 (annualized damages…)
- Future rainfall scenarios with future conditions impervious area projections
- Future rainfall scenarios with current IA conditions

	Historic Events	Updated Atlas14	RCP4.5 / SSP3				RCP8.5 / SSP5				
Non-exceedance interval	*NA*	*NA*	*50%*		*90%*			*50%*		*90%*	
IA Condition	*Current*	*Current*	*RWC*	*+FGA*	*RWC*	*+FGA*	*RWC*	*+FGA*	*Current*	*RWC*	*+FGA*
Historic #1 (July 8, 2019)											
	x										
Historic #2 (September 10, 2020)											
	x										
Current											
2-year											
10-year		x									
25-year		x									
50-year		x									
100-year		x									
500-year		x									
Future Mid-term (~2050)											
2-year											
10-year								x			
25-year											
50-year											
100-year								x			
500-year								x			
Future Long-term (~2100)											
2-year											
10-year								x	x		
25-year								x			
50-year								x			
100-year								x	x		
500-year								x			

Rainfall component

Impervious component

RCP = Representative Concentration Pathway, SSP = Shared Socioeconomic Pathway,
RWC = Reasonable Worst Case IA Scenario , FGA = Reasonable Worse Case + Focus Growth Area IA Scenario

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