

Green Stormwater Infrastructure Master Plan: Town of Somerset, Maryland

January 2022

Rainplan



Low Impact
Development
Center

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1. Executive Summary

The following master plan is a blueprint on how property owners in the Town of Somerset, Maryland can address localized flooding and water quality issues on private properties. Over the past 80 years, increased storm intensity along with urban growth and local property improvements have increased the impact of rain events on individual private property owners in Somerset. While Montgomery County can make improvements to the infrastructure in the public right of way, the focus of this plan is to demonstrate how individual residential property owners can be educated and empowered to construct Low Impact Development (LID) and Green Stormwater Infrastructure (GSI) Infrastructure to reduce impacts of stormwater on their property.

Low Impact Development (LID) installations are small-scale stormwater practices that replicate watershed processes such as infiltration and evapotranspiration to reduce the volume of stormwater runoff. Green Stormwater Infrastructure (GSI) is the implementation of LID at the watershed scale. This plan is unlike many traditional watershed studies that are based on larger scale drainage areas and focused on centralized drainage systems and infrastructure. This master plan focuses on impacts of individual lots and “clusters” of small-scale, but high impact, drainage issues. A typical watershed study may look at dividing Somerset into one or just a few drainage areas. This study, however, divides the Town into thirty-nine (39) distinct drainage areas. Four (4) of the drainage areas were studied in detail to demonstrate the effectiveness of incorporating LID practices. The results show a reduction in stormwater volume that can also be expected in the other drainage areas.

A foundation of the plan is the well-documented survey by the residents describing which areas of the Town have the most stormwater issues. The survey was used to develop micro-watershed drainage area maps to reveal the runoff problems. These block scale watershed plans target locations where residents responded to the survey. Each property is viewed as generating stormwater runoff that drains offsite and/or receiving runoff from upstream flows. These localized watersheds are used to determine the best locations for the construction of Low Impact Development installations to reduce stormwater impacts on specific properties, as well as neighboring properties.

To further the education and empowerment of Somerset property owners, an online dashboard was created by Rainplan™. Rainplan is a technology company whose mission is to serve as an online stormwater marketplace to make it easier for property owners to understand their property’s drainage challenges, plan their property improvements, and access environmental incentive programs, qualified contractors, and more affordable financing plans.

The Rainplan dashboard acts as a gateway for information on available funding and rebates through Montgomery County, State, and Federal governments. It creates a foundation for construction of small-scale LID practices such as tree planting, conservation landscaping, green roofs, rain gardens, rain barrels, and permeable pavements. The dashboard includes key stormwater information on each property such as lot size, green area, roof area, and imperviousness. By using the Rainplan dashboard of incentive opportunities, residents have a gateway to implement solutions to property challenges related to stormwater.

The Somerset stormwater master plan also includes recommendations for typical street improvements to be located in the public street right-of-way and public space such as permeable gutters, rain garden curb bump outs, and parking lot retrofits. The final part of the plan is recommended codes and ordinances that

can be used to mitigate the impacts of stormwater from new construction projects such as building additions, patios, and driveways.

2. Background

The Town of Somerset is primarily a single-family residential community of approximately 413 houses, a town hall, a community building and pool, and some local parks. The community was mostly undeveloped in the 1940s until being mostly built out in the 1960s. Figure 1 is a US Geological Survey Map from 1945 showing the beginning of the development of the Town along Dorsett Avenue (USGS, 1945). Figure 2 is a historical overlay showing that there were several streams on the tract of land. These were either re-routed or buried during development. The spring head or source of the water is most likely forming local high water tables. Figure 3 is an aerial photograph showing the development of the Town in 1970. The photograph shows the Town completely built out. Note the mature tree canopy north of Essex Avenue from the original development in the 1940s and 1950s until the 1970s. Now the tree canopy is well-established and mature. Figure 4 is a GIS map of Somerset showing the current tree canopy which covers almost the entire Town.



Figure 1: US Geological Survey Map from 1945



Somerset Historic Streams

Figure 2: Historical Overlay of Streams

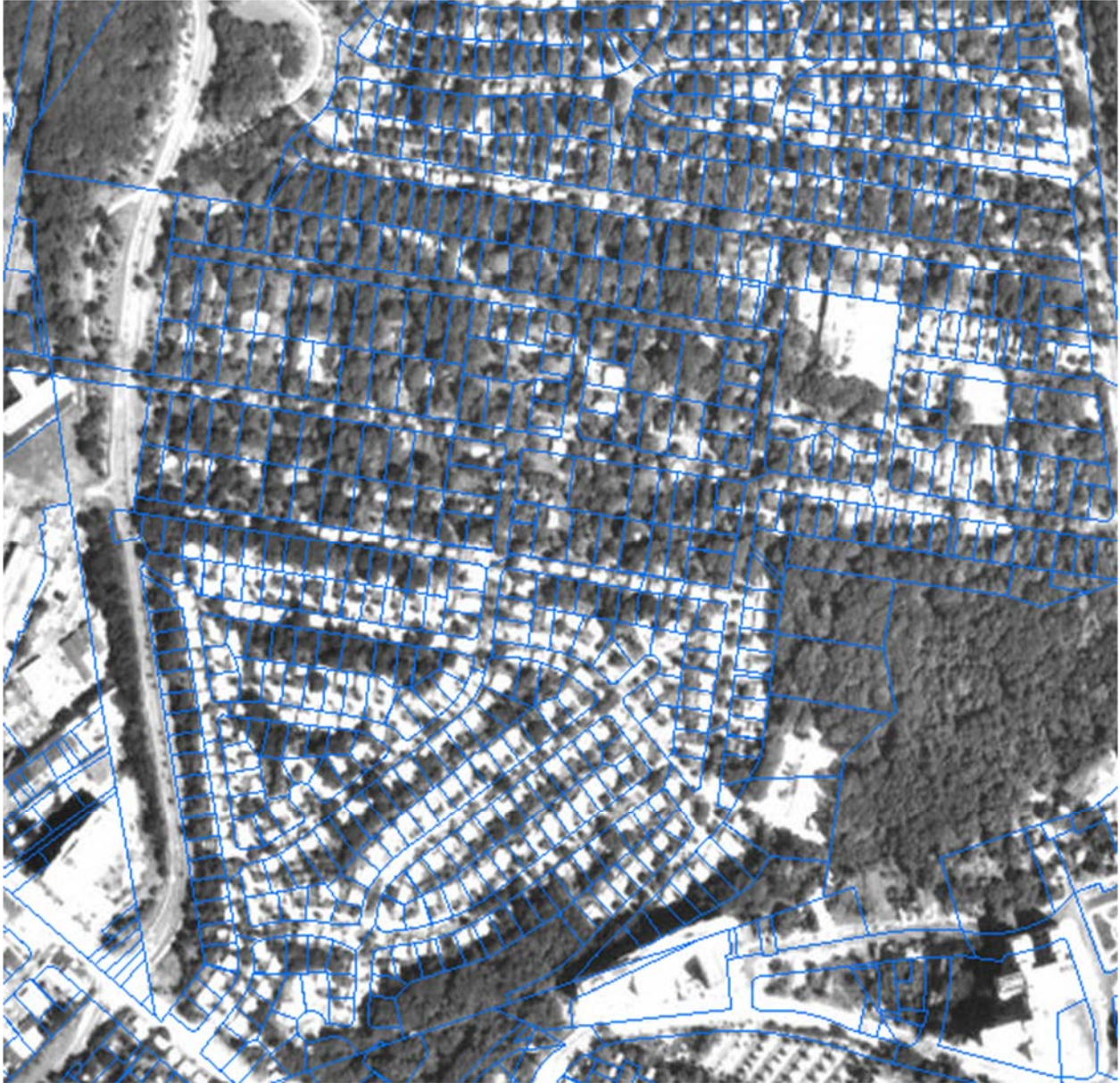


Figure 3: Aerial Photograph of Town in 1970

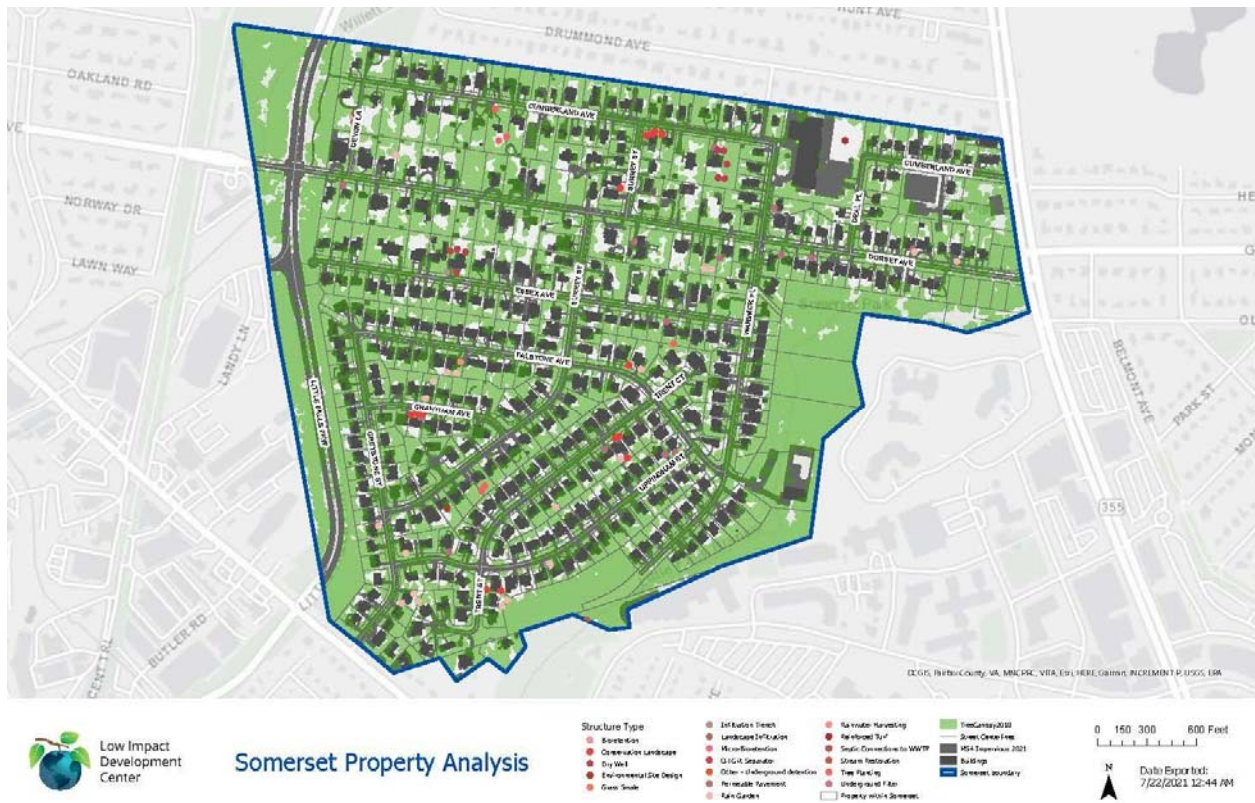


Figure 4: GIS Map of Somerset – Current Tree Canopy

Even though the Town is built out there is still a significant amount of development and changes to the tree canopy in the form of building and site additions on individual properties. This includes demolition of existing houses and construction of a new house or a significant expansion. Figure 5 shows the results of an analysis conducted by the committee, which looked at the building permits issued by the County for property in Somerset for the years 2000-2021. The analysis shows that almost 60% of households did some type of addition or construction on their property.

The continual expansion of the houses, patios, walkways, and driveways and loss of established vegetation has helped contribute to the increased runoff and localized stormwater issues.

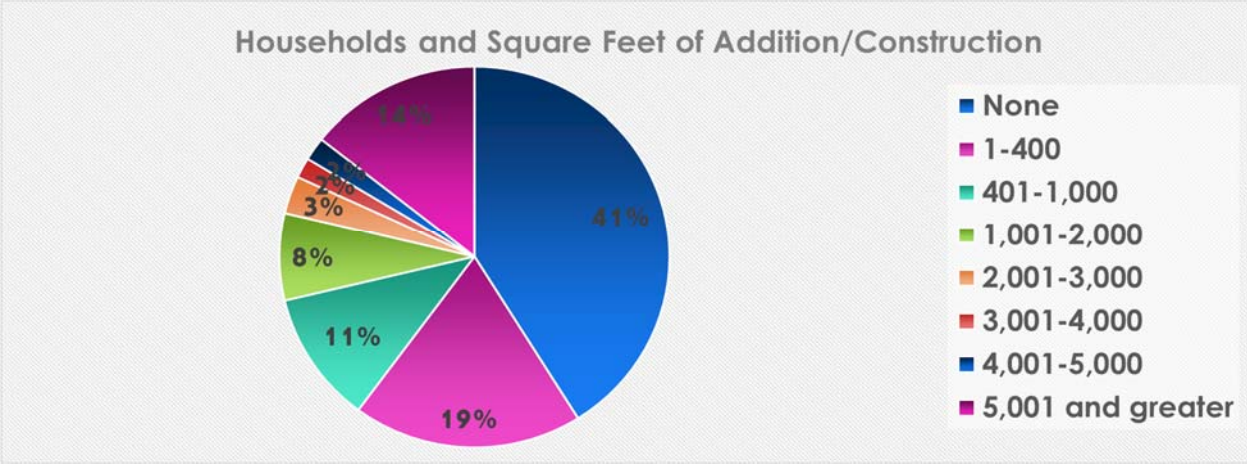


Figure 5: Resident Survey

Somerset has an extensive and well-established tree canopy. This helps intercept rainfall and uptake stormwater runoff. It is estimated there are approximately 1,000 trees in public space and almost 8,000 trees on private property. There has been substantial decline in the number of trees due to various natural and man-made circumstances. Natural causes of death and disease and clearing for critical infrastructure in the public space are for the most part unavoidable. New construction contributes greatly to tree decline in the city. There were approximately 33 new construction projects over the last 10 years. This accounted for approximately 21% of the tree loss in the community. Figure 6 shows how many trees out of the 1,130 total were removed each year over the past decade, and whether it was due to construction or other reasons.

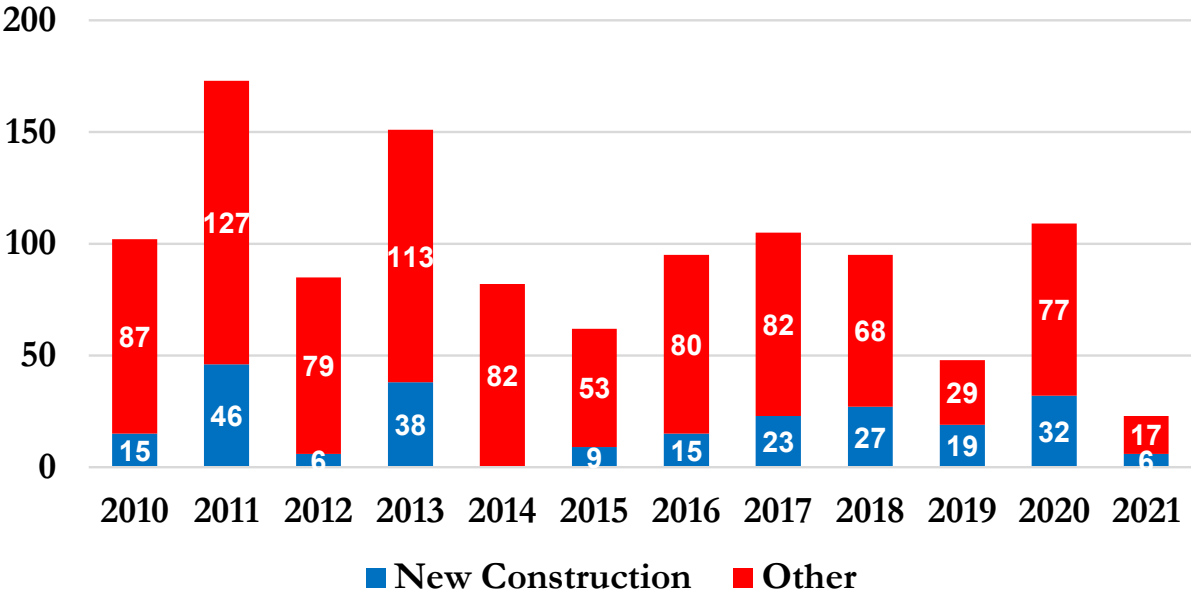


Figure 6: Trees Removed per Year for Construction and Other Reasons

This combination of reconstruction and expansion and the impacts on the existing tree canopy is contributing significantly to the stormwater runoff issues in the community.

2.1. Previous Study/Implementation Effort

Two (2) previous stormwater management studies were conducted for the Town. One was by the Center for Watershed Protection (CWP) and the second by The Montgomery County Department of the Environment (DEP). The CWP watershed study was conducted based on the Better Site Design (BSD) Model Principles (CWP, 2009). This approach is typically used for new development, but much of it is applicable for redevelopment. The study did not focus on recommendations for specific properties but offered general retrofit strategies. The recommendations also included criteria for management of the urban tree canopy and revising the building codes to address the impacts of impervious surfaces.

The DEP also conducted a watershed assessment of the front of the homes in the Town (DEP, 2014). The assessment was to see where and what type of practices might be possible for retrofitting the front yards. The assessment was conducted for 384 houses. Of those there were 138 properties where retrofits using LID practices was appropriate. The summary of potential practices is shown in Table 1.

Table 1: Summary of Front Yard Practices

Yard Practice	Percent (%) of properties with good opportunities
Rain Gardens	20%
Conservation Landscaping	31%
Rain Barrel/Cistern	25%
Tree Canopy	9%
On-lot Driveway Retrofit	2%

The study also included the potential reduction in pollutant loads and made recommendations on some of the public spaces to be used as demonstration projects.

2.1.1. Household Survey

A survey of stormwater issues as well as the impacts of trees on stormwater was conducted by the Town Stormwater Management Committee (Town of Somerset, 2021). The study had several significant findings that were used to develop the Master Plan. There are 440 homes in Somerset. There were 220 households or roughly 50% that replied to the survey. Figure 7 is a portion of the map of where flooding and drainage occurred according to the survey. Appendix A is a map of the entire surveyed area.



Figure 7: Occurrence of Flooding and Drainage According to Survey

The following is a list of the key results:

- 70% of the respondents said that stormwater runoff was ranked as a 4 out of 5 (5 being most important) as a key issue and that they had experienced some type of flooding or water issue. Figure 8 shows the importance of runoff for the respondents.
- Out of 152 respondents the majority have had stormwater issues for over 5 years. These issues also occurred frequently with over 30% occurring over five (5) times a year as shown in Figure 9.
- Over 100 of the households had spent approximately \$3 million collectively on water issues but only 20 of them had success in reducing impacts. Figure 10 shows approximately the range of what 116 respondents spent on addressing stormwater. Figure 11 shows the types of improvements that have been made by the households. Figure 12 shows the perceptions in the community about the cause of these stormwater issues. Figure 13 is a map of stormwater management improvements that have been documented through public contributions such as the Rainscapes program in the County or by private funds.

How important is the issue of stormwater runoff to you?
(n = 220)

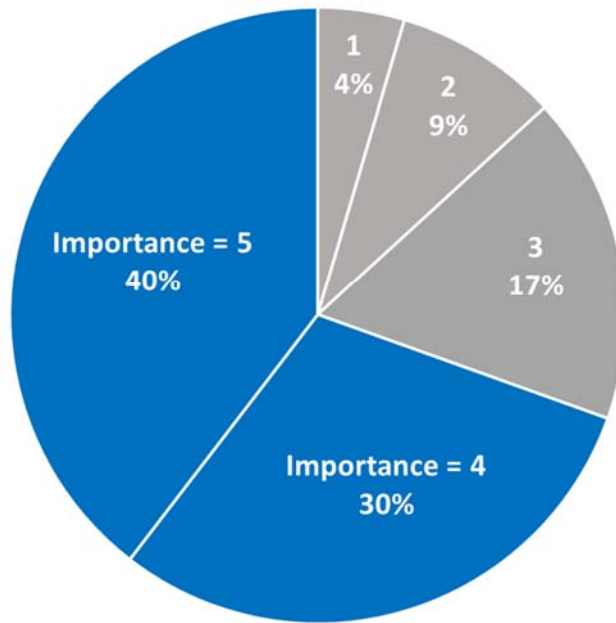


Figure 8: Survey Results – Importance of Stormwater Runoff

When did stormwater runoff become an issue for you?
of those whose said their property has been affected (n = 154)

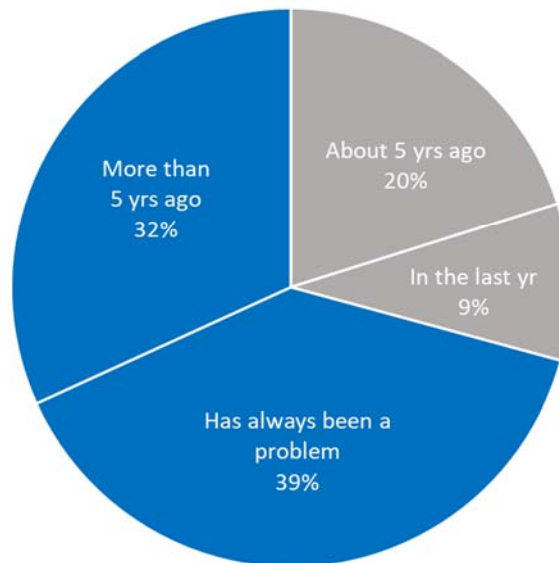


Figure 9: Length of Time of Stormwater Runoff Issue

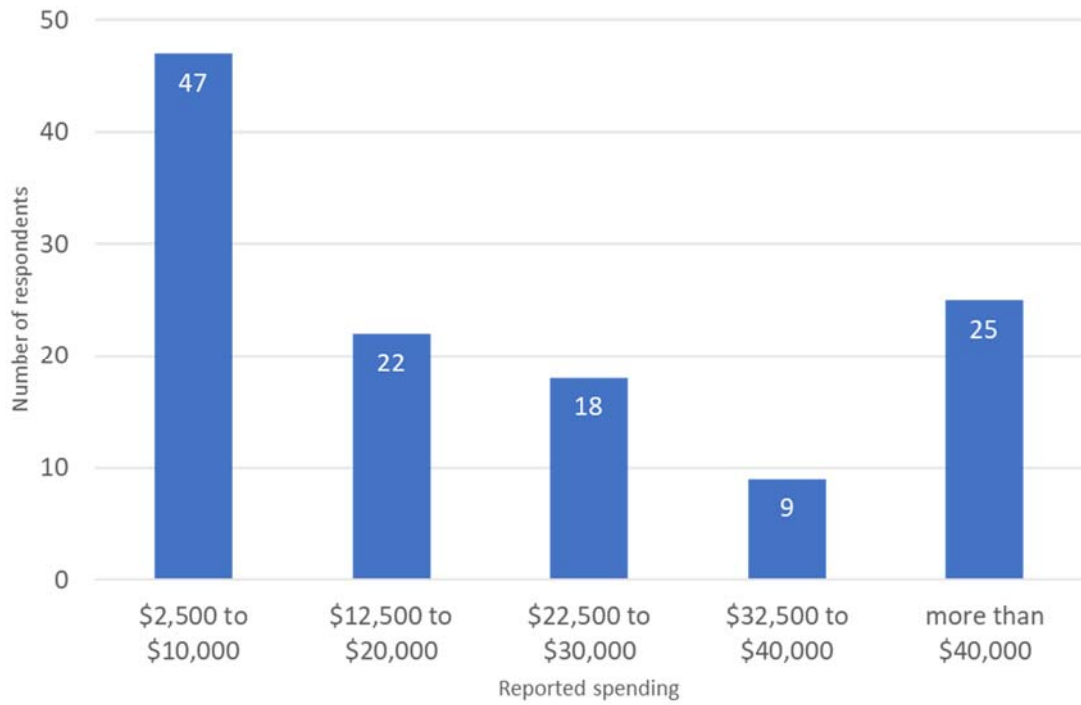


Figure 10: Reported Spending on Stormwater Issues

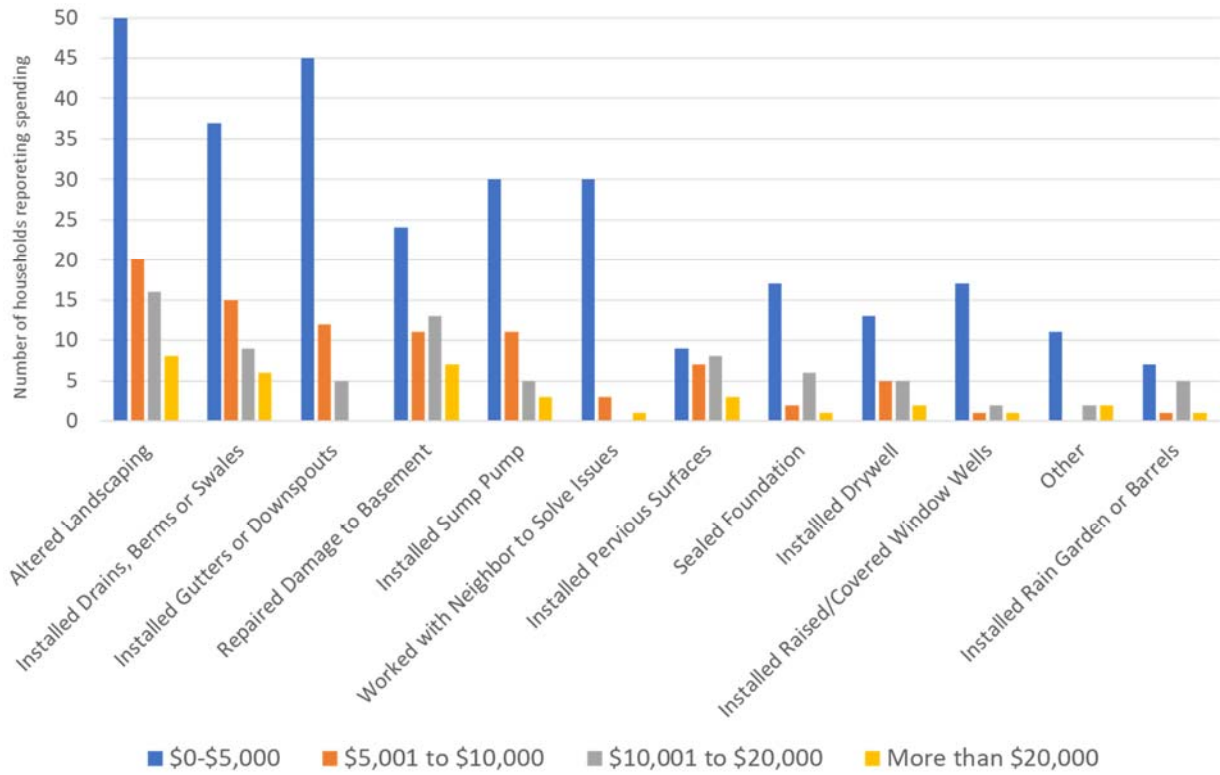


Figure 11: Types of Improvements Made by Households

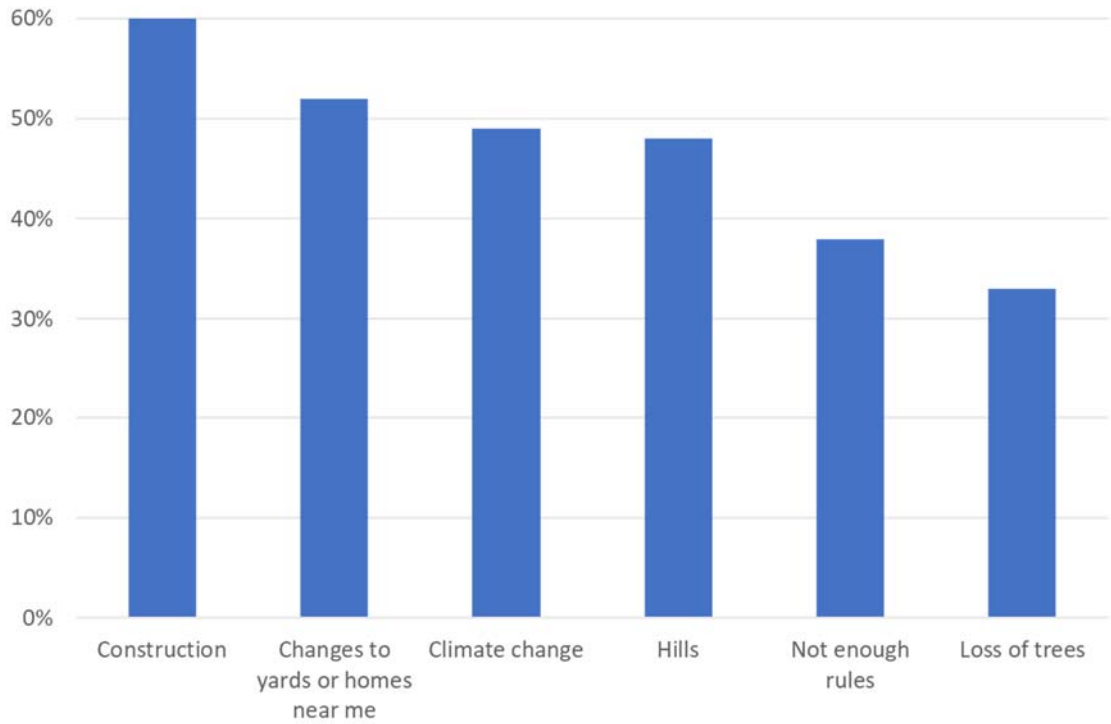


Figure 12: Resident Opinion of Cause on the Localized Flooding



Figure 13: Map of Rainscapes Stormwater Management Improvements

The most common impacts reported about stormwater were:

- 102 households reported water in their basements once or more in the past
- 68 households reported their yards are perpetually wet
- 61 households reported losing multiple plants or shrubs due to excess water
- 20 households reported losing trees due to excess water

Some property owners have participated in the County Rainscapes Program where private residential property owners can receive rebates of up to \$7,500 to construct raingardens, green roofs, permeable driveways, conservation landscaping, and other LID Best Management Practices (BMPs). Figure 13 is a map of some of the techniques installed. There are approximately 29 households using 59 practices within the Town as of 2019. A map of area showing the details of practices is found at: https://mcgov-gis.maps.arcgis.com/apps/Embed/index.html?webmap=78cfbcb920d144739e036e05d2e9dc5d&exten=-77.5128,39.002,-76.8777,39.2845&home=true&zoom=true&scale=true&legend=true&disable_scroll=true&theme=light.

3. Codes and Ordinances

There are several opportunities to address stormwater management codes and regulations for proposed new site development and building construction of houses and for modifications to existing properties. The Montgomery County Department of Permitting Services reviews site plans for new construction of buildings or additions to determine if the project requires stormwater management. Residential lots in the Town of Somerset are a range of sizes. They are often located on soils with poor infiltration rates. Because of this claim the stormwater management requirements are often waived by the County, or the stormwater measures are significantly reduced in size and function. Since 2013 the County has almost universally waived the stormwater requirements for new construction in the Town. The Town can add additional stormwater requirements and is currently considering a new stormwater management ordinance. A draft is included in Appendix B.

This planning effort included a review of current County and Town stormwater requirements. The purpose was to identify potential modifications to the Town building codes to better facilitate the implementation of Green and Grey Stormwater Infrastructure to reduce localized or urban flooding and improve water quality. This effort included evaluating the Towns proposed ordinance language and providing suggestions to strengthen its ability to require green infrastructure for new construction, renovations, or additions. A workshop was held with the stormwater committee to present these options and gain feedback on the specific recommendation. A list of the recommendations and a description of the potential outcomes follow.

1. The proposed Town resolution on stormwater focuses on amending the currently proposed ordinance to require a stormwater drainage plan for “new building construction.” New building construction is defined as “[t]he construction or erection of a new building including any appurtenant surfaces, such as a patio, walkway, parking pad, or driveway.” This does not appear to pertain to construction site improvements or the regrading of sites where there are existing buildings that are to remain. The Town should consider categorizing construction into New Building Construction and Impervious Surface Construction:
 - a. New Building Construction: The construction of a new structure (house, shed, freestanding garage, gazebo) or the expansion of that structure where there was no previous roofed area.

- b. Impervious Surface Construction: The construction of new site features. This includes decks, patios, sidewalks, parking areas, pools, pool decks, and other impervious surfaces that generate stormwater runoff. Gravel surfaces, according to County code, do not qualify as pervious surfaces.
2. Include a sentence in the code that there be no net increase in impervious surface. A BMP must be used to capture any additional runoff volume. The increase may be mitigated by removal of impervious surfaces and landscaping those areas that are within the same drainage area.
3. The proposed control of the one-year 24-hour storm event of 2.6 inches control and management seems reasonable. It should be noted that the 2.6-inch volume of runoff may change with the ongoing efforts to revise the rainfall frequency maps. It is recommended to leave off the exact volume depth and say current. It should also be noted that many of the small-scale green infrastructure controls (rain gardens, green roofs, cisterns) are not designed to manage or capture more intensive storm events, such as the 10-year 24-hour storm event and may overflow. They are mostly used for water quality management which is approximately 1 inch in depth but are being modified here for greater volume control at the source of the runoff.
4. Infiltration of volume must occur over 72 hours. Soil infiltration rates are to be determined by infiltrometer or soil borings and geotechnical testing. An underdrain to an acceptable outfall must be provided to dewater the volume of water not infiltrated over the 72-hour period. The detention volume must be released over 72 hours. Calculations must be sealed by an engineer or qualified professional. Requirements for impervious surface treatment for structures (buildings, garages, sheds) is addressed in the County stormwater regulations. It should be noted that during times of prolonged periods of rain when the soil is saturated the runoff may not completely be absorbed by the soil. The soil should have an existing infiltration rate of 0.5 inches per hour. Soil amendments or other devices may be used to increase the infiltration rate.
5. Drainage direction, drainage area, and outfall locations such as downspouts may not be changed without review by the Town appointed engineer for new or renovation projects. Adjacent property owners must be notified if there are proposed changes to drainage patterns.
6. Downspouts that are discharged to the surface must have energy dissipation (typically river rock or conservation landscaping) devices to create sheet flow at point of discharge. Energy dissipation device must be located at least five (5) feet from property line.
7. Curb cuts for drainage pipes and sump pump discharge lines should not be allowed. This creates areas in the gutter pan that can ice up and become slippery.
8. Drainage from drainage pipes and sump pumps shall not discharge to sidewalks. This creates areas that are slippery in winter conditions.
9. All existing private drainage pipes and infiltration devices should be cleaned and inspected annually. Resources such as fact sheets or demonstrations should be included in the effort.
10. New driveways or additions to driveways should use permeable pavers.

11. New swales that collect water from adjacent lots should be bioretention swales. This could help retain and dissipate the volume of runoff and the cumulative impacts.
12. A limit or ceiling on the amount or percentage of the property for new site impervious areas could be enforced. This was not recommended because it would create inequities between larger and smaller lots.

Many of the above listed activities would be easy to implement, and in many cases relatively inexpensive. The technical requirements and the administrative burden of reviewing plans, inspection, and then enforcement would require significant resources. It may also require cooperation between property owners, for rights of entry or easements, where drainage pathways or privately constructed drainage systems cross over property lines. Further discussions with Council are required to determine which of the above are appropriate and manageable.

4. Master Plan

The objective of the stormwater management master plan was to identify where there were significant areas of surface runoff across property lines and make general recommendations about LID techniques that can be used to mitigate the effects of runoff on each property that can reduce overall impacts. The plan was developed using a combination of the results of an in-depth survey of property owners, desktop analysis of surface runoff characteristics, field verification of the elements used in the desktop analysis, and field assessments of potential locations for BMPs. Due to constraints of time and budget, the Low Impact Development Center was not able to visit all areas of concern, but encourages the Town to continue this process of evaluation and recommendation

4.1. Analysis and Approach

The first step in the analysis was to develop base maps of the land uses and associated runoff characteristics such as soil type, imperviousness, and vegetation classification (lawn or woods). For this study the woods were considered areas under the tree canopy. This was done using the DEP GIS data from 2019. Each individual land use has a distinct runoff characteristic or volume based on a specific storm event. The percent of each land use within the study area is used to develop a composite land cover or Curve Number (CN). The GIS analysis was used to break the land cover down to the lot level so that each property is assigned its own CN.

The next step was to determine the runoff volume that is generated by distinct rainfall events. The 85th Percentile storm event data (Zing, 2021) was used as the rainfall event. The percentile storm event is based on the number and depth of rainfall of storm events with a 24-hour period for the period of record (approximately 50 years). The result is that 85% of the time the rainfall is 0.9 inches or less. By comparison the 95th percentile storm event is almost double at 1.5 inches. The National Conservation Resource Service (NRCS) runoff volume formula was used to determine the depth and runoff volume for each property. This is a function of the CN and the rainfall depth. The calculations are included in Appendix C. It should be noted the NRCS method is typically used for larger watersheds and like other ungauged and uncalibrated watersheds there is some variability in the model and computations. This method was chosen because it is universally acceptable and used by regulatory and resource agencies in reviewing stormwater impacts at the site design and watershed levels.

The project team then developed the drainage area maps. There are 39 distinct drainage areas that are based on a combination of survey responses and the physical boundaries of the micro-watersheds. Each individual property was evaluated as being a generator or receiver of stormwater. For example, lots that are lower in elevation in the watershed are generally receivers of stormwater as the upstream lots or lots on high points of elevation are generators. The BMP placement goal is to locate facilities in areas where the accumulation of flow can be minimized. Each drainage area that was developed during the desktop analysis was adjusted due to field conditions. The objective was to show demarc the areas into small clusters where there were concentrations of stormwater and responses from property owners where there were stormwater issues. This approach allows the planner to identify where BMPs make the most sense to reduce the volume of runoff. Figure 14 is a map of the 39 drainage areas. Figure 15 is a detailed map of one of the field verified drainage areas.

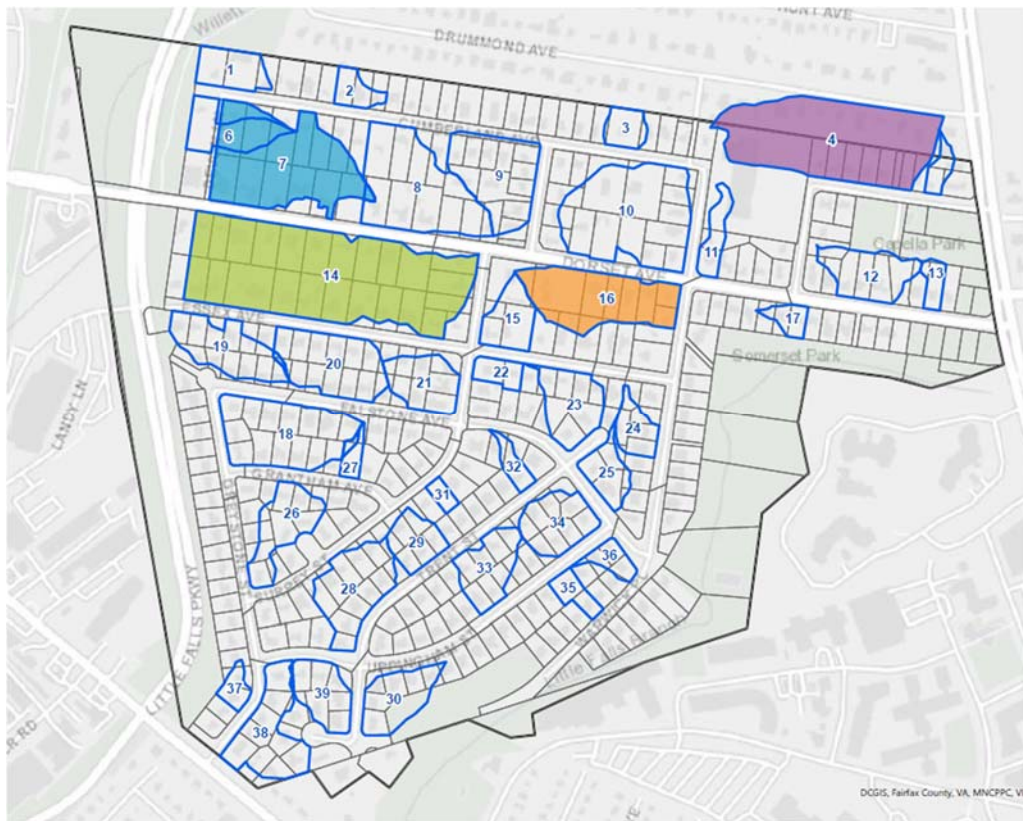


Figure 14: Map of 39 Drainage Areas

Drainage Area 10 Exhibit

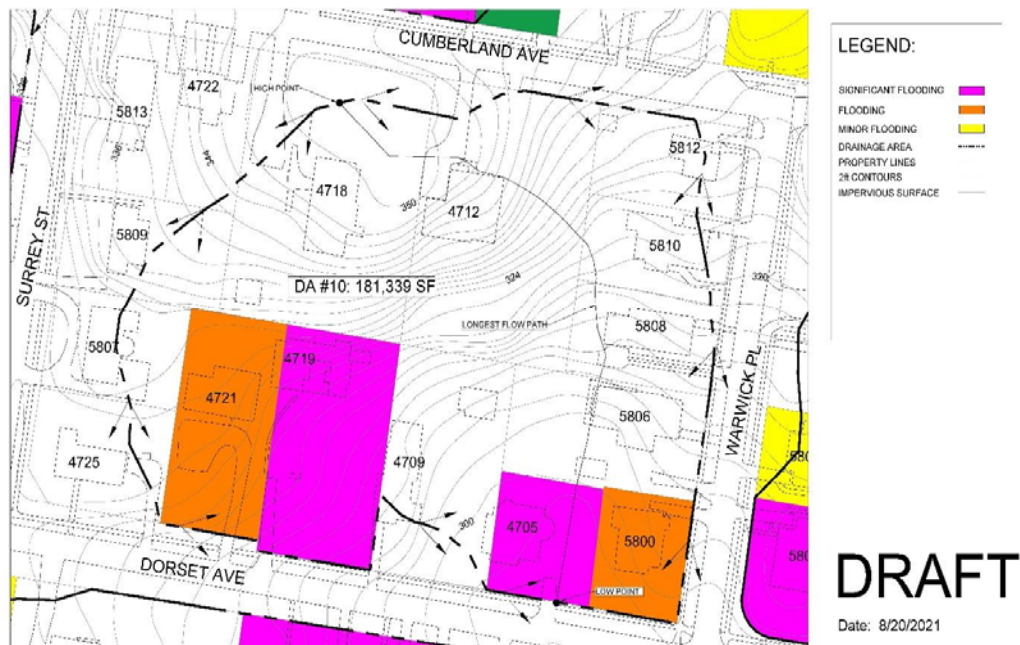


Figure 15: Field Verified Drainage Areas

4.1.1. Field Visits and Recommendations

Once the desktop drainage areas were determined the team prepared base maps with topographic information, soils mapping, tree canopy, drainage structures, and property lines and structures. Described below is a summary of the existing conditions and recommendations for each watershed area. The watershed drainage area maps are found in Appendix D.

Watershed A: South 4700 Block of Dorset Avenue

This watershed represents stormwater flows that run across properties and parallel to the street then from the end of the backyards and to the front yard and then to the street. The flows are accumulating across the yards and then often accumulate in one or two concentrated areas. Exhibit A shows how the runoff is flowing from 4722 Dorset Avenue down to 5710 Warwick Place in a west to east direction. Water flows across 4718 Dorset Avenue and keeps accumulating until it reaches the low point at Warwick Place. There are several private BMPs that were identified as being constructed through the Rainscapes program. In order to reduce flows towards the lower elevation properties the recommendation is to refocus some of the roof leaders and intercept the flows about ½ way down the slope to a new yard inlet between or near 4716 and 4708 Dorset Avenue and connect a new storm drain to the existing inlet on the other side of Dorset Avenue. Although this is primarily a grey infrastructure solution it is warranted because of the limited opportunities to construct BMPs on the lower lots.

Watershed B: 4500 Block of Cumberland Avenue

This watershed is bounded primarily by Drummond Avenue and Cumberland Avenue. The drainage flows from the front of the houses to the back yards and then to a sump inlet in between 4515 and 4517 Cumberland Avenue. The sump inlet is part of the County's system but there appears to be several private

connections along the system. These areas are reported as severe to moderate flooding. There are a few sinkholes along the system that are outside the drainage area and parallel to Deal Place to the east. The sinkholes are typically an indicator of pipe separation or collapse. These connections are from roof leaders or privately constructed inlets and pipes. This area acts as a “bowl” and a good solution would be to intercept the water from the houses on Drummond Avenue with bioretention cells before they discharge by sheet flow to the lots on Cumberland Avenue. The underdrains and overflow can then be collected in the County Storm drain system. The connections to the County system should be coordinated with DEP.

Watershed C: 4900 Block of Dorset Avenue

This area is bounded by Devon Lane, Dorset Avenue, and Cumberland Avenue. The stormwater generally flows perpendicular to Devon Lane across the block towards the corner of Devon Lane and Dorset Avenue. Runoff is accumulating on 4919 and 4915 Dorset Avenue. A rain garden and dry well are located along the eastern side of the rear yard of 4915 Dorset Avenue, but it needs to be maintained and there is a significant amount of runoff that looks like it collects there. The proposed solutions include replacing the existing drainage pipes along the lot lines to have more capacity and have them drain towards a larger bioretention cell between 4915 and 4911 Dorset Avenue and then connect that with the public drainage system. Improvements to existing swales so that they can adequately convey stormwater more efficiently should be considered.

Watershed D: Dorset Avenue South 4900 and 4800 Block

This area is bounded by Surrey Street to the east and Essex Avenue and Dorset Avenue. There are several instances of downspouts that direct stormwater towards other properties. The topography essentially is a large depression that collects flows from the rear of the lots along Essex and Dorset Avenues and creates a large swale with a drainage area of several acres. This essentially creates a large swale or temporary creek during the rain. The volume of water saturates the soil so that it is muddy in several spots. If this block were designed under current county regulations, there would be several inlets collecting the runoff and conveying it to the public storm drain system. The solutions to this area include realigning the roof leaders and directing them away from the adjacent properties. A series of raingardens or a bioswale could be constructed across property lines and then connected to the public system near the northeast corner around 4914 Dorset Avenue.

5. Rainplan for Community LID Implementation

Myrainplan.com is an online marketplace tool curated for communities that have agreed to engage in civic responsibility and collectively fix local drainage and pollutant problems by constructing individual property LID installations. Rainplan assists communities by offering a financial incentive filing service, connection to qualified contractors, as well as easy payment financing. Through using Rainplan services, and connecting with a Rainplanner, other benefits are realized like improving wildlife habitats and neighborhood beautification.

For the community of Somerset, Rainplan has created a unique account dashboard for property owners that shows elements of the master plan as well as individual property features. The goal is to educate and empower property owners to implement the master plan’s LID recommendations.

5.1. Private Property Owner and Rainplan's Role

The first step a property owner can take towards implementing LID is to set up a property dashboard account on myrainplan.com. From there, property owners can use the incentive search engine to discover and select local incentive programs that they qualify for using their property address. Rainplanners are available for a consultation call to discuss property opportunities, recommend potential contractors, and provide further guidance for funding the property owner's project. A consultation call will either start the application filing process or help inform and educate property owners on their potential options.

5.2. Property Owner's Rainplan Dashboard

When a community member sets up a Rainplan account, they gain an organizing tool in the form of a property dashboard. Each Somerset property dashboard includes a parcel map that shows impervious surface calculations, a drainage area map, and a list of incentives available to that property for installing LID features.

The parcel map estimates how much stormwater falls onto a lot during a typical rain event. By estimating stormwater flows on both impervious and pervious lot surfaces, the amount of runoff is then tabulated. This educational feature is intended to guide households toward storing water on their lot and reducing impervious surfaces where possible to reach community goals.

The property dashboard also includes a map that shows the 39 micro-drainage areas analyzed during the master plan process. This map supports recommendations made in the master plan to reduce flows and impacts to properties at drainage area low points. Property owners within these micro-drainage areas can follow arrows shown on the map to understand how stormwater flows around them. In this way, properties can be categorized as stormwater generators, receivers, or a combination of the two.

Generators are properties located on or near the higher elevations in a neighborhood. Receivers are typically located at lower elevations in the community and therefore have stormwater flowing downslope toward them. Combination properties are locations where stormwater flows from the higher generator areas toward the lower receiver areas. LID installations in higher elevations and mid-elevations within a micro-watershed reduce stormwater flows for properties at lower elevations during storm events up to a certain size.

5.2.1. Take Advantage of Programs

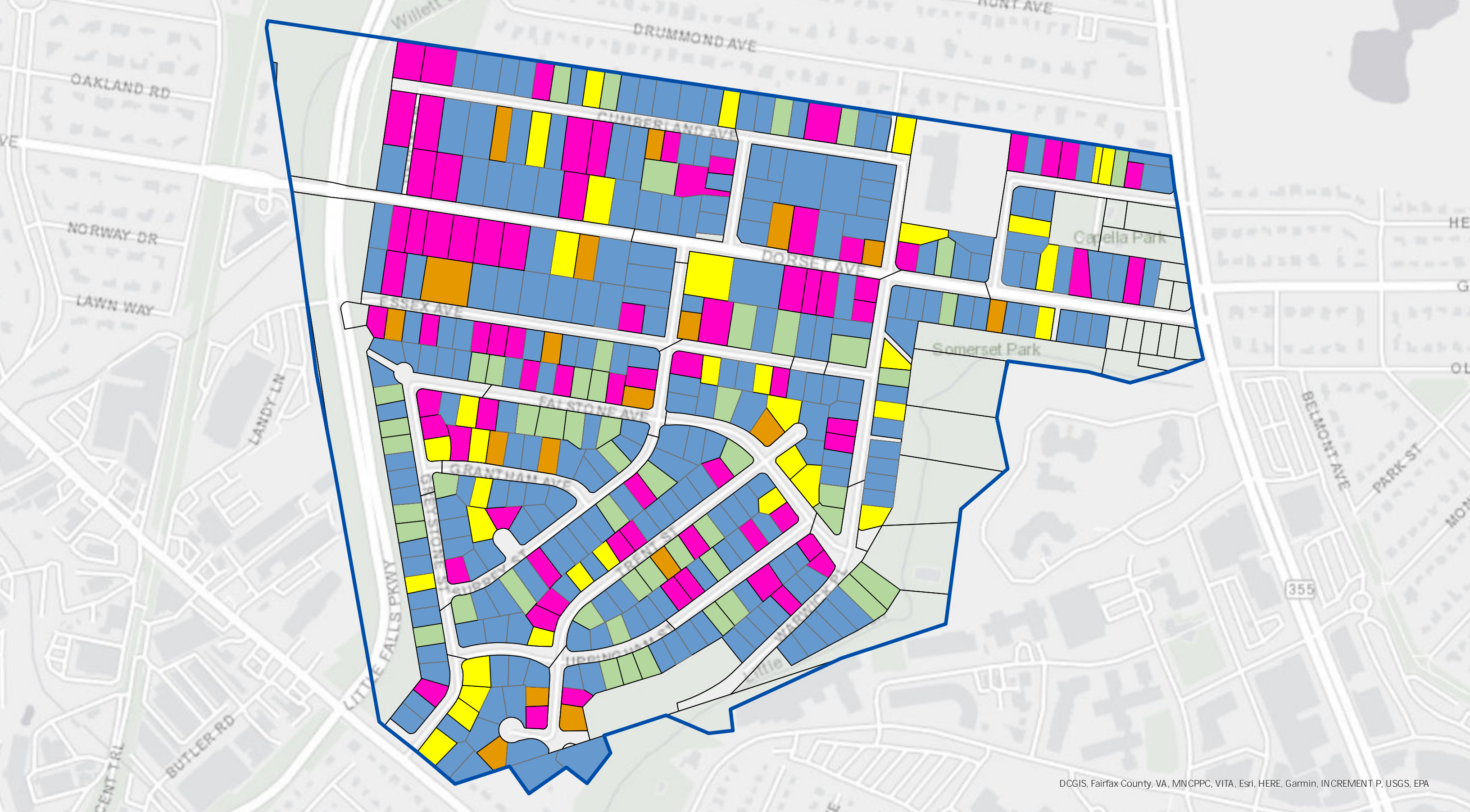
Rainplan's mission is to connect property owners with incentive programs that financially assist with installing LID features on their land. Montgomery County qualifies these types of LID projects for residential properties: rain gardens, permeable paving, conservation plantings, green roofs, cisterns, and rain barrels as well as pavement removal.

6. Summary of Findings and Recommendations

The following is a summary of the Master Plan Recommendations and the overall effort.

- Climate change will cause more frequent and higher intensity storm events. This will make the flooding situation worse as the soils on the individual lots become less capable of absorbing the increased runoff.
- Public sector construction of storm drain infrastructure is extremely expensive and may not totally address some of the localized flooding on individual lots. Privately funded and constructed GSI and LID on individual lots will be required to help alleviate the flooding.
- The Town codes should have strict limits on the direction of stormwater discharges and the mitigation of new impervious surfaces.
- Many of the recommendations on codes would be difficult to inspect and enforce because of lack of staff and resources. Educating households through fliers, listservs, and workshops would be an important tool for implementation.
- The engagement of private partners, such as Rainplan, for tracking grants and arranging funding will facilitate applications and help make grant and reimbursement programs available to the community.
- Neighbors and the community need to work together on implementing the recommendations and further engineering studies to resolve “downstream” flooding issues through coordination of projects and to understand the impacts of runoff at the property level.
- There are substantial amounts of runoff that drains across and in the backs of lots that account for the formation of channels and flooded areas downstream and in between lots. The accumulated runoff cannot be totally reduced and managed by GSI. Some combination of GSI and LID to reduce flows at the tops of the drainage areas with grey infrastructure to safely convey the runoff to an acceptable outfall will be required in some cases.

Appendix A: Map of Surveyed Area

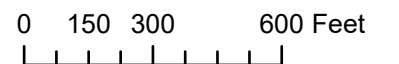
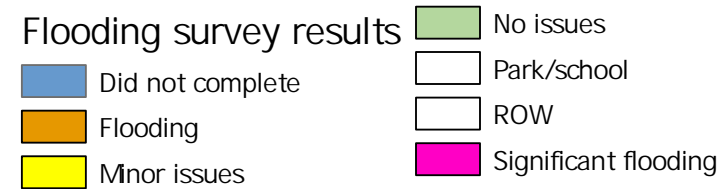


DCGIS, Fairfax County, VA, MNCPPC, VITA, Esri, HERE, Garmin, INCREMENT P, USGS, EPA



Low Impact
Development
Center

Somerset Property Flooding Survey Results



— Date Exported:
7/27/2021 2:38 PM

Appendix B: Draft Stormwater Management Ordinance

Town of Somerset
Ordinance to Amend Building Regulations
(Stormwater Drainage)

Resolution No.: 6-21-1
Introduced: August __, 2021
Adopted:
Effective Date:

AN ORDINANCE TO AMEND THE CODE OF ORDINANCES TO REQUIRE A STORMWATER DRAINAGE PLAN FOR NEW CONSTRUCTION PROJECTS; TO ADD STORMWATER DRAINAGE PLAN REQUIREMENTS; TO ADD TO THE STATEMENT OF INTENTS AND PURPOSES; TO ADD DEFINITIONS; TO REQUIRE A PRE-PERMIT INFORMATIONAL MEETING; AND TO APPLY THE EXISTING VARIANCE PROCEDURES TO THE NEW STORM WATER DRAINAGE PLAN REQUIREMENTS

WHEREAS, Maryland Code, Local Government Article, Section 5-202, as amended, grants to the legislative body of every incorporated municipality in Maryland general power to pass such ordinances not contrary to the Constitution of Maryland, or the public general law, as deemed necessary in order to assure the good government of the municipality, to protect and preserve the municipality's rights, property, and privileges, to preserve peace and good order, to secure persons and property from danger and destruction, and to protect the health, comfort and convenience of the citizens of the municipality;

WHEREAS, Maryland Code, Local Government Article, Section 5-211, as amended, authorizes the legislative body of each municipal corporation in the State of Maryland to make reasonable regulations concerning buildings to be erected within the limits of the municipality, including a building code and the requirement for building permits;

WHEREAS, Maryland Code, Land Use Article, Section 20-509 grants to the legislative body of incorporated municipalities in the Maryland-Washington Regional District general power to adopt building regulations for the protection of the public health, safety, and welfare; the preservation, improvement, and protection of lands, water, and improvements in the municipal corporation; and to regulate the construction, repair, or remodeling of buildings on land zoned for single-family residential uses at it relates to fences, walls, hedges, and similar barriers; signs; residential parking; residential storage; the location of structures, including setback requirements; the dimensions of structures, including height, bulk, massing, and design; and lot coverage, including impervious surfaces;

WHEREAS, Section 83-17 of the Town Charter authorizes the Town Council to pass ordinances not contrary to the Constitution and laws of the State of Maryland or the Town Charter, as it may deem necessary for the good government of the Town; for the protection and preservation the Town's property, rights, and privileges; for the preservation of peace and good order; for securing persons and property from violence, danger, or destruction; and for the protection and promotion

of the health, safety, comfort, convenience, welfare, and happiness of the residents of the Town and visitors thereto and sojourners therein;

WHEREAS, after proper notice to the public, the Town Council introduced the following Ordinance in an open meeting conducted on the ___th day of August, 2021;

WHEREAS, to comply with Maryland Code, Land Use Article, Section 20-509, on the ___th day of August, 2021, a copy of following Ordinance was submitted to the Montgomery County Council for its comments;

WHEREAS, the Montgomery County Council indicated receipt of the draft on ___th day of _____, 2021 and provided no comments;

WHEREAS, after proper notice to the public, and after at least thirty days from the date a copy of the following Ordinance was transmitted to the Montgomery County Council, the Town Council considered the following Ordinance in public session assembled on the ___th day of _____, 2021;

WHEREAS, after receiving a recommendation from staff, and upon consideration of the testimony and evidence presented at the public hearing, the Town Council finds that the ordinance as hereinafter set forth is necessary for the good government of the Town; for the protection and preservation the Town's property, rights, and privileges; for the preservation of peace and good order; for securing persons and property from violence, danger, or destruction; and for the protection and promotion of the health, safety, comfort, convenience, welfare, and happiness of the residents of the Town and visitors thereto and sojourners therein.

NOW, THEREFORE, the Town Council does hereby adopt the foregoing Ordinance.

BE IT ORDAINED AND ORDERED, this ___ day of _____, 2021, by the Town Council, acting under and by virtue of the authority given it by the Maryland Code and the Town Charter that the Code of Ordinances is hereby amended as follows:

* * *

**Chapter 112
BUILDING CONSTRUCTION**

**Part 1
Building Code**

**ARTICLE I
Purpose and Definitions**

§ 112-1. Purpose.

It is the purpose of this Part 1 to ensure public safety, health and welfare insofar as they are affected by building construction; to ensure the safety to life and property from all hazards incident to the design, erection, repair, removal, and demolition of buildings; **to protect, maintain and enhance the public safety, health, and welfare by establishing minimum requirements to control the adverse impacts associated with stormwater runoff from developed and developing land; to reduce stream channel erosion, pollution, siltation and sedimentation, and local flooding;** and to ensure compliance with all applicable Town, county, state and federal laws.

* * *

§ 112-2. Definitions.

As used in this Part 1, the words set forth below shall be defined as follows:

* * *

1-YEAR STORM EVENT - A storm resulting in at least 2.6 inches of rainfall within 24 hours.

* * *

NEW BUILDING CONSTRUCTION - The construction or erection of a new building including any appurtenant surfaces, such as a patio, walkway, parking pad, or driveway.

* * *

§ 112-3. Circumstances requiring building permits; exceptions.

A. Except as set forth herein, no building, air conditioner, heat pump or generator located within the Town of Somerset shall be commenced, installed, constructed, extended, repaired, removed or altered, nor shall excavation for a building be commenced, without first obtaining a building permit from the Town of Somerset. Before a Town permit will be issued, a Montgomery County permit, if required, must be delivered to the Clerk-Treasurer.

* * *

§ 112-4. Inapplicability of Montgomery County Code Section 8-24B(e).

Section 8-24B(e) of the Montgomery County Code shall not apply within the Town of Somerset. That section would otherwise require applicants for building permits from Montgomery County to obtain a building permit from the Town of Somerset prior to applying for a building permit from Montgomery County, Maryland, when the property for which the building permit is sought is located within the Town of Somerset.

§ 112-5. Application form.

* * *

C. County permit required. No building permit shall be issued in the absence of a valid building permit issued by Montgomery County for the identical work which is the subject of the Town permit. **With respect to new construction, a permit must be sought from the Town before a permit is sought from the County, at the same time, or within 7 days after an application is filed with the County. The Town Council may approve a new construction permit application in the absence of a County permit but the Town permit shall not be issued by the Town until a copy of the County permit for the identical work is provided to the Town.**

* * *

E. Required information. The building permit application shall be submitted to the Clerk-Treasurer and shall contain the following minimum information, in addition to other information requested:

* * *

(e) The location and size of all facilities which conduct or discharge stormwater, including downspouts and pipes, to be located, constructed or altered pursuant to the project for which the building permit is sought, and a description, in written or diagram form, indicating the direction and approximate course on the applicant's lot of the stormwater from such facility ~~and for a new building on a recorded lot smaller than 15,000 square feet, or for any addition to a residential building that would increase the building lot coverage by more than 400 square feet, a plan providing for the safe conveyance or control of increased water runoff as required by Section 8-29B of the Montgomery County Code (2009).~~ **Also, for new construction, or for the construction or replacement of a driveway, a stormwater drainage plan shall be submitted with the application;**

* * *

G. For new construction, a code compliance informational meeting shall be required before a Town Building permit application will be processed. The Town Manager, or the Town Manager's designee, shall conduct the meeting with the prospective applicant. The meeting will be conducted for the purposes of exchanging information, receiving feedback, and informing the prospective applicant about Town building, stormwater, tree removal, and other requirements.

* * *

112-6. Documents to accompany application.

An applicant for a Town of Somerset building permit shall submit the following materials with the permit application; the application and all accompanying documents shall be available for public inspection at the Town Hall:

A. A copy of the Montgomery County building permit granted by Montgomery County for the identical work for which the applicant seeks a permit from the Town of Somerset.

B. A copy of the application for a building permit as submitted to Montgomery County for the identical work for which the applicant seeks a permit from the Town of Somerset, along with all site plans and architectural drawings submitted in connection with that application. For proposed work costing \$25,000 or more, the following are required: two full-size sets; eight additional full-size site plans; and eight sets, either 8 1/2 inches by 14 inches or 8 1/2 inches x 11 inches. **In addition, an electronic version of all documents, printable in either 8 1/2 inches by 14 inches or 8 1/2 inches x 11 inches, shall be submitted to the Town Manager.** The site plan must include:

- (1) Locations and dimensions of existing and proposed buildings, air conditioners, heat pumps and generators;
- (2) Removal of trees with a diameter of four inches or more, as measured four and one-half feet (4 1/2') feet above the ground (see requirements in § 182-6);
- (3) New curb cuts (see requirements in § 170-2B);
- (4) New fences and walls (see requirements in § 112-33);
- (5) Estimated location of exterior side, front and rear perimeters of existing buildings on directly adjoining properties; and
- (6) If the location of any proposed work will be within four feet (4') of a building restriction line, the site plan must be supported by a recent boundary survey with a margin of error of one inch (1") or less. The site plan must show the lot boundaries, driveways, and the locations and dimensions of existing and proposed buildings, air conditioners, heat pumps and generators, and the distances of the same to the lot lines.

* * *

K. For new construction, a copy of the pest control letter required by Montgomery County.

L. For new construction, or for the construction or replacement of a driveway, a stormwater drainage plan.

* * *

§ 112-14. Building requirements; stormwater drainage.

* * *

D. Other requirements.

* * *

(3) Stormwater drainage.

(a) **All new building construction must include a stormwater drainage plan. The plan must provide storage for all runoff from all rooftop surfaces. Storage must be provided for a 1-year storm event in devices such as drywells, raintanks, cisterns, green roofs, or other devices approved by the Town Council.**

(b) **All new or replacement driveways must be constructed of permeable materials. This requirement shall not apply to an apron in front of a garage entrance, measuring no more than 5 feet in length and 15 feet in width. This requirement shall also not apply to an apron within a public right-of-way.**

E. Variance. The Town Council may grant a variance from the requirements of this section, subject to the following limitations:

(1) The Town Council finds after a duly noticed public hearing, based on the evidence before it, that good cause has been shown on either of the following grounds:

(a) **With respect to a variance not concerning stormwater drainage requirements,** ~~the~~ proposed ~~new building~~ construction would not ~~unduly~~ **significantly** interfere with light and air between residences or other structures, would not be ~~unduly~~ incompatible with the scale, massing, and character of the Town or of nearby residences or other structures, and would otherwise not ~~unduly~~ **unreasonably** adversely affect the use, enjoyment or value of nearby properties. In making such finding, the Council may consider such factors as:

[1] Size and location of proposed ~~new building~~ construction;

[2] Size and location of existing and potential buildings and other structures on nearby lots; and

[3] Topography and existing or planned vegetation of the lot on which the proposed ~~new building~~ construction will be located and of nearby lots. Should the Council be requested to consider planned vegetation, the applicant for the variance shall submit a landscape plan with the variance application; or

(b) The strict and literal application of this section would result in peculiar or unusual practical difficulties to the owner of the lot on which the proposed ~~new building~~ construction is to be located due to exceptional narrowness, shallowness, shape, topographical conditions or other extraordinary situations or conditions peculiar to a specific parcel of property. The following do not constitute practical difficulty for the purposes of this section:

[1] The existence of nearby structures or buildings which do not comply with this section;

[2] The granting of a variance on other lots; or

[3] Any condition resulting from the conduct of the applicant or applicant's predecessor(s) in title.

(2) The variance must be for the minimum reasonably necessary to avoid the above conditions or situations.

(3) The Town Council may impose, in granting a variance, such conditions as it deems in the public interest and necessary to effectuate the purposes of this section.

* * *

AND BE IT FURTHER ORDAINED AND ORDERED, by the Town Council, acting under and by virtue of the authority granted to it by the Maryland Code and the Town Charter, that:

1. If any part or provision of this Ordinance is declared by a court of competent jurisdiction to be invalid, the part or provision held to be invalid shall not affect the validity of the Ordinance as a whole or any remaining part thereof; and

2. This Ordinance shall take effect on the _____ day of _____, 2021 (36 calendar days after approval by the Mayor).

ATTEST:

TOWN OF SOMERSET

Matt Trollinger, Manager/Clerk-Treasurer
Town of Somerset

Stephen Surko, President
Town Council

Approved:

Jeffrey Slavin, Mayor
Town of Somerset

Date: _____

Bold and Underline indicates new material

~~Strikethrough~~ indicates material deleted

* * * indicates material unchanged

Appendix C: Property Depth and Runoff Volume Calculations

Excel Calculator Tool for Somerset Drainage Areas

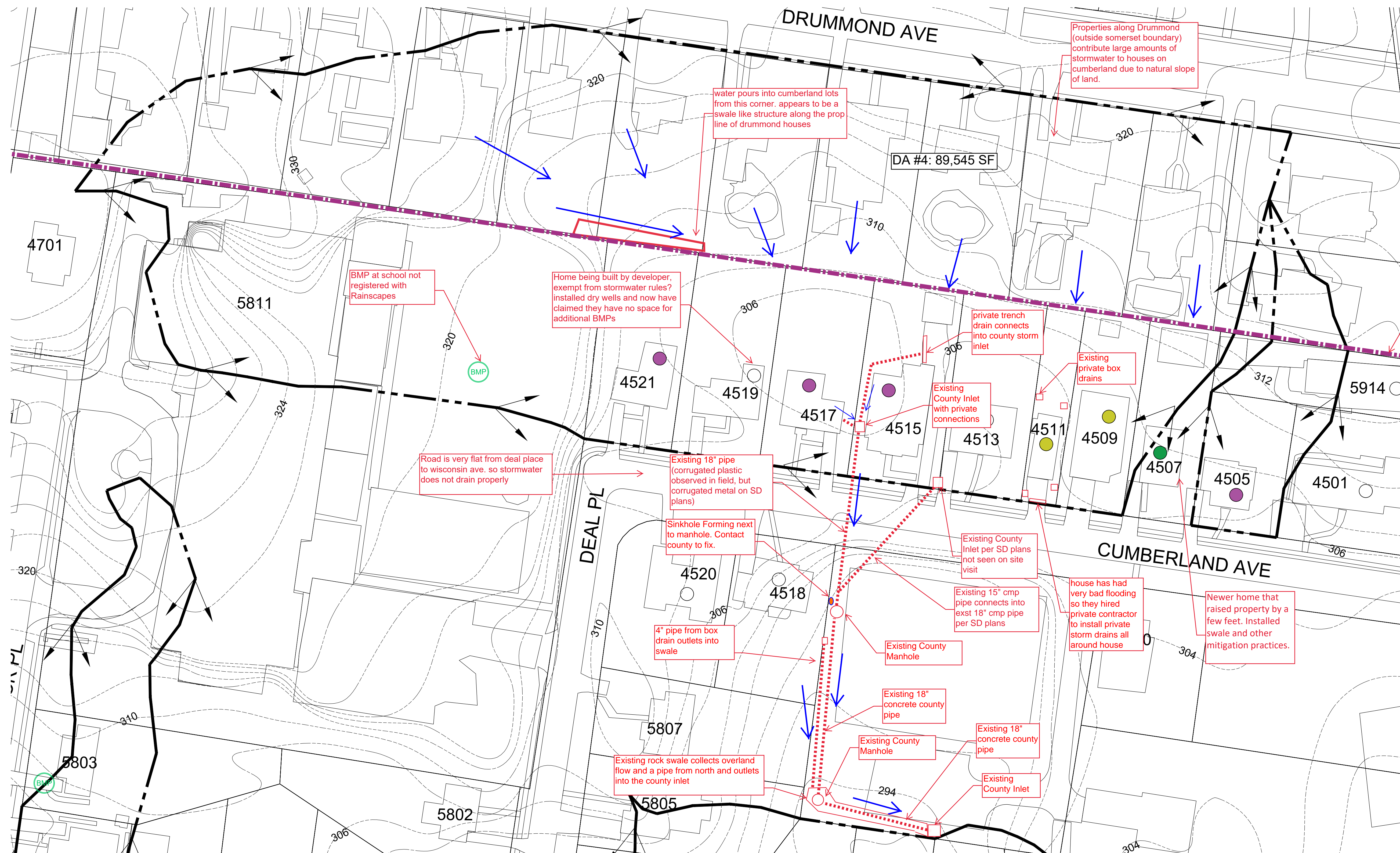
Process Overview

- This tool calculates the runoff to groups of houses that are experiencing flooding issues
- Focus areas were formed based on groups of houses in proximity that reported flooding in their survey responses
- Any properties reporting flooding/significant flooding were fully included in the drainage area
- The drainage area also includes land that generates runoff to these groups of houses as determined from topographical contours

Calculator Overview

- Each drainage area has an existing conditions and post-BMP conditions section
- The existing conditions section lists each property within the drainage area with its portion of property within the larger drainage area (this may or not be equal to the entire property area). From this it calculates its existing runoff volume for a given storm depth which will be chosen by the LID Center.
- The post-BMP conditions section list each property and has a column for four possible BMPs that can be implemented on each property to store rainwater and thus reduce runoff volume
 - The BMPs and its respective inputs into the calculator are as follows:
 - Rain Barrell – To collect Rooftop runoff from downspouts
 - Input a volume
 - Yard Bioretention/Rain Garden – To collect overland or rooftop runoff
 - Input an area (standard section of ½’ ponding, 2’ media, 1’ gravel)
 - Permeable Pavement Driveway – To collect water that falls directly onto it
 - Input an area (standard section of 1’ gravel)
 - Impervious Disconnection – Directing runoff from impervious surfaces to pervious areas (i.e. roof downspouts onto lawns)
 - Input a percentage of the property’s impervious area that is to be directed to pervious areas
 - Not all BMPs can automatically be used for all properties within the drainage area. BMPs can only be implemented on properties that sufficient space within the drainage area for that BMP. (i.e. Some houses only have a small sliver of area that contributes to the larger drainage area). Because of this, BMPs have to be implemented on a case-by-case basis for specific conditions in each drainage area.
- The outputs of the calculator will show the following for the entire drainage area and for each property within it:
 - runoff volume before and after BMP implementation
 - percent runoff volume reduction achieved by BMP implementation
 - BMP storage volumes

Appendix D: Watershed Drainage Area Maps



LEGEND:

- SIGNIFICANT FLOODING ●
- FLOODING ●
- MINOR FLOODING ●
- NO FLOODING ●
- DID NOT RESPOND ○
- EXISTING PIPE —
- STORMWATER FLOW —
- DRAINAGE AREA —
- PROPERTY LINES —
- EXISTING 2 ft CONTOURS —
- IMPERVIOUS SURFACE —
- EXISTING PRIVATE BMP ○
- DRAINAGE DIVIDE ARROW >

General Recommendations For All Properties:

- Avoid saturating the yard before a rain event. Reduce sprinkler system use, ensure sprinkler sensors work properly, and limit watering of gardens. When the ground becomes saturated it functions similarly to hardscape surfaces.
- Any roof leaders or yard drains that can be directed to the front of the house should be. If possible, outletting at the right of way is ideal. This can be done either above or underground.
- Roof leaders that cannot flow to the front yard should empty straight back and not to the side of the house directly into the downhill neighbor's yard.
- Small scale regrading in between lots can be used to prevent runoff into downhill neighbor's yard.



LOW IMPACT DEVELOPMENT CENTER

5000 Sunnyside Avenue, Suite 100
 Beltsville, MD 20705
 Tel. (301) 982-5559
 Fax. (301) 982-9305
 www.lowimpactdevelopment.org



SCALE: 1" = 40'

REV. NO.	DATE	REVISIONS PRIOR TO APPROVAL

**EXISTING FIELD CONDITIONS AND DRAINAGE PLAN
 DRAINAGE AREA #4**

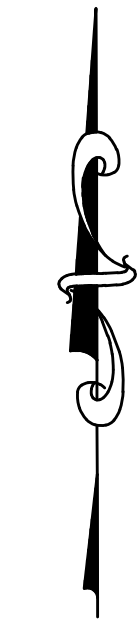
SOMERSET DRAINAGE MAPS

SOMERSET, MD 20815
 MONTGOMERY COUNTY, MARYLAND

ISSUE:	DATE: 10/26/21
SCALE: 1"=40'	SHEET: 1 OF 1
FILE NO:	C-1.01
DRAFTED: GK	
CHECKED: DM	

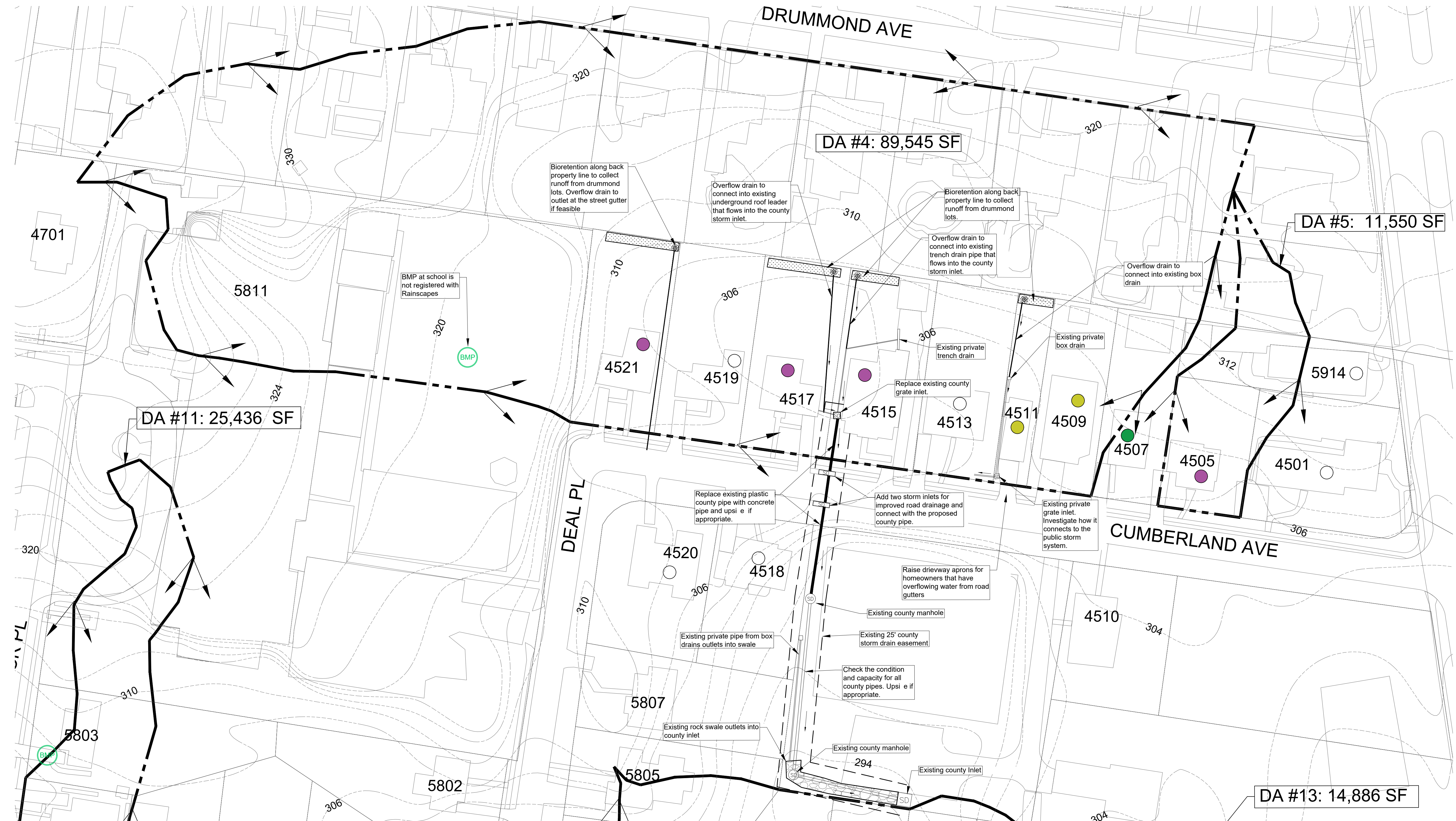
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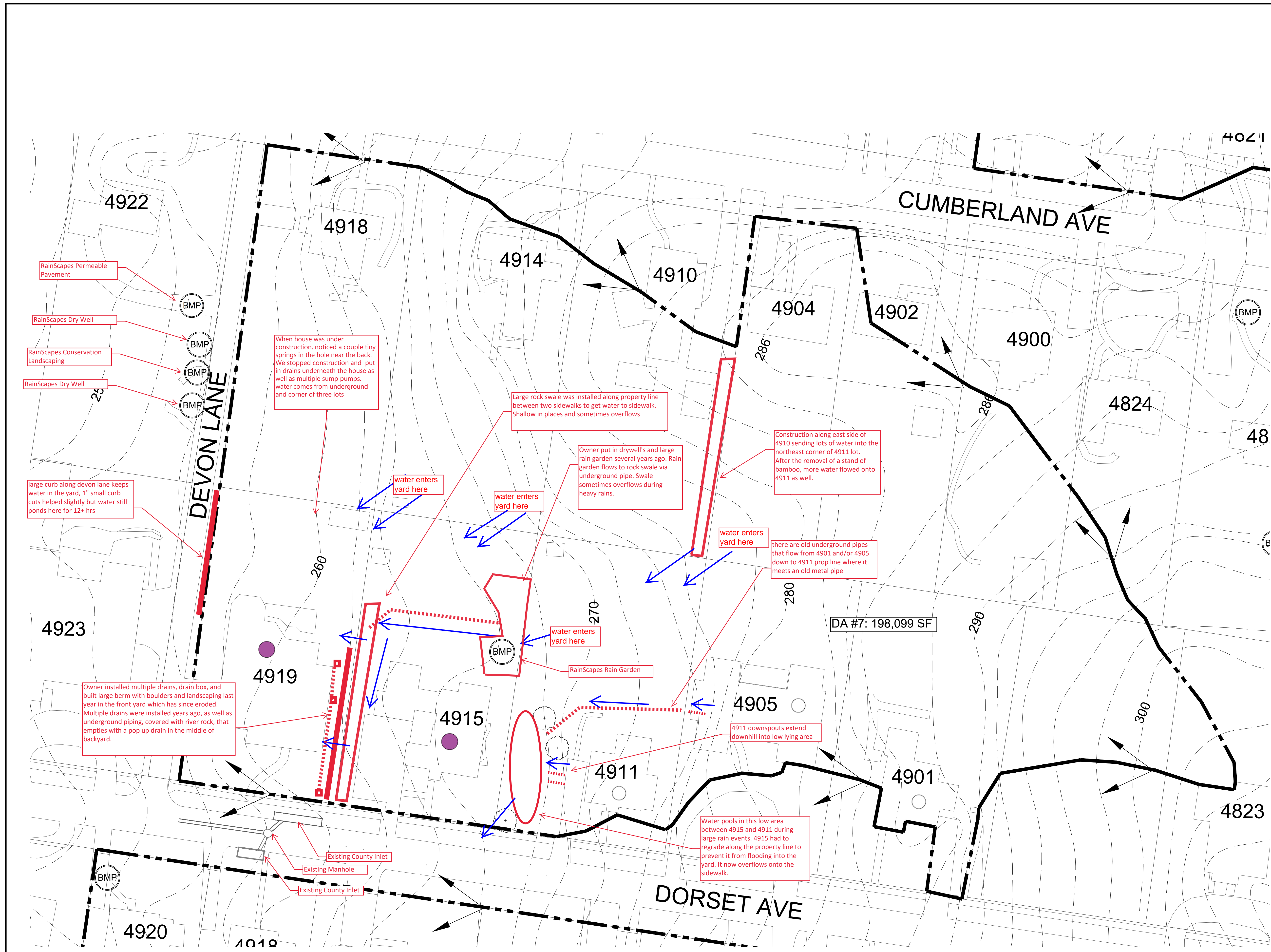


LEGEND:

- SIGNIFICANT FLOODING ●
- FLOODING ●
- MINOR FLOODING ●
- NO FLOODING ●
- DID NOT RESPOND ○
- EXISTING PIPE
- PROPOSED PIPE
- DRAINAGE AREA
- PROPERTY LINES
- EXISTING 2 ft CONTOURS
- IMPERVIOUS SURFACE
- EXISTING PRIVATE BMP
- DRAINAGE DIVIDE ARROW >
- STORM DRAIN EASEMENT



REV. NO.	DATE	REVISIONS PRIOR TO APPROVAL



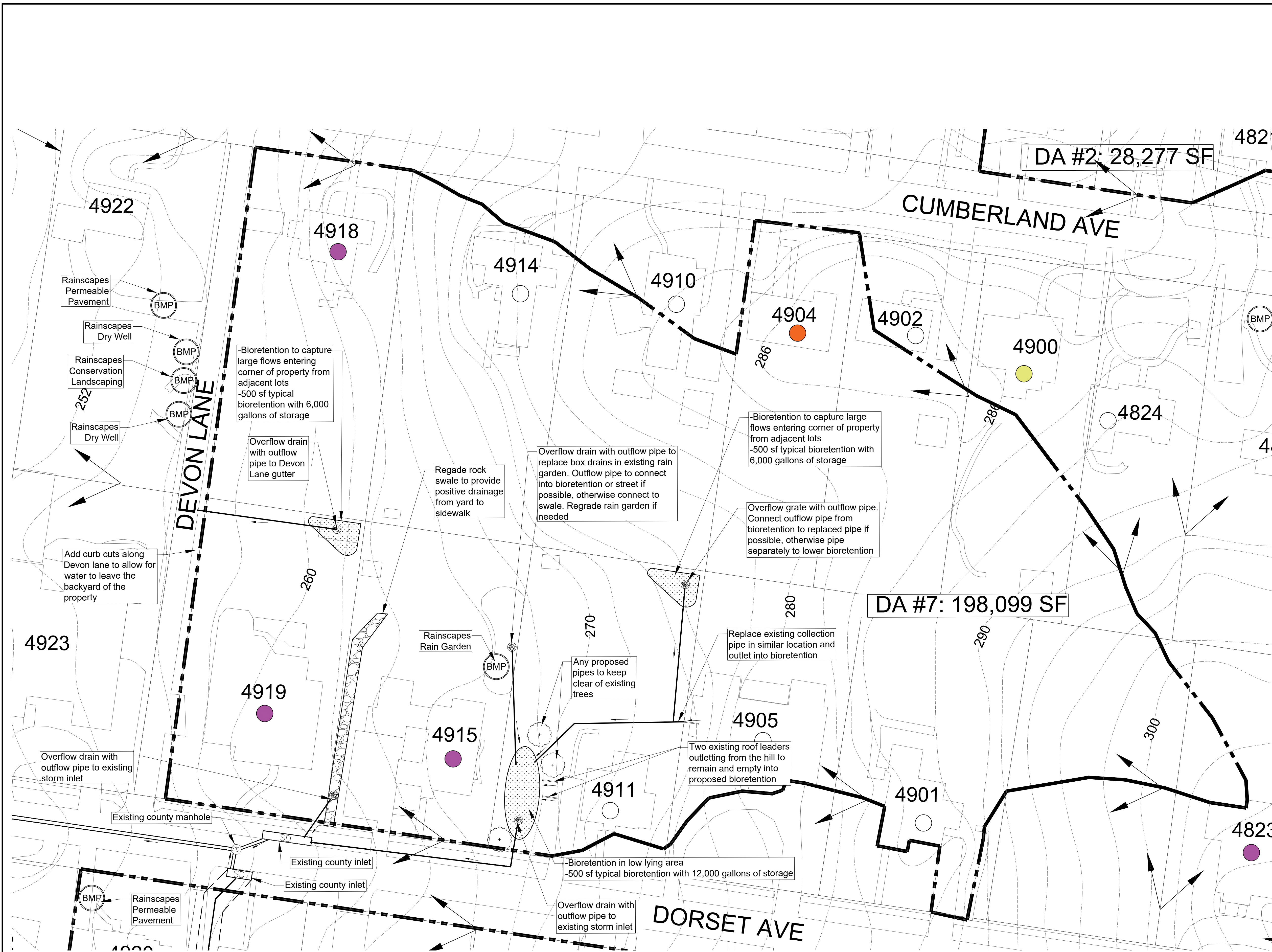
LEGEND:

- SIGNIFICANT FLOODING ●
- FLOODING ●
- MINOR FLOODING ●
- NO FLOODING ●
- DID NOT RESPOND ○
- EXISTING PIPE
- STORMWATER FLOW →
- DRAINAGE AREA
- PROPERTY LINES
- EXISTING 2 ft CONTOURS
- IMPERVIOUS SURFACE
- EXISTING BMP
- DRAINAGE DIVIDE ARROW >

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REV. NO.	DATE	REVISIONS PRIOR TO APPROVAL

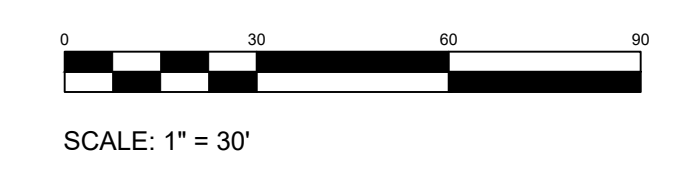


LEGEND:

- SIGNIFICANT FLOODING ●
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- MINOR FLOODING ●
- NO FLOODING ●
- DID NOT RESPOND ○
- EXISTING PIPE
- PROPOSED PIPE
- DRAINAGE AREA
- PROPERTY LINES
- EXISTING 2 ft CONTOURS
- IMPERVIOUS SURFACE
- EXISTING PRIVATE BMP
- DRAINAGE DIVIDE ARROW >

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REV. NO.	DATE	REVISIONS PRIOR TO APPROVAL

**PROPOSED STORMWATER
 MANAGEMENT PLAN
 DRAINAGE AREA #7**

SOMERSET DRAINAGE MAPS
 SOMERSET, MD 20815
 MONTGOMERY COUNTY, MARYLAND

ISSUE:	DATE: 12/15/21
SCALE: 1"=30'	SHEET 1 OF 1
FILE NO:	C-1.01
DRAFTED: GK	
CHECKED: DM	

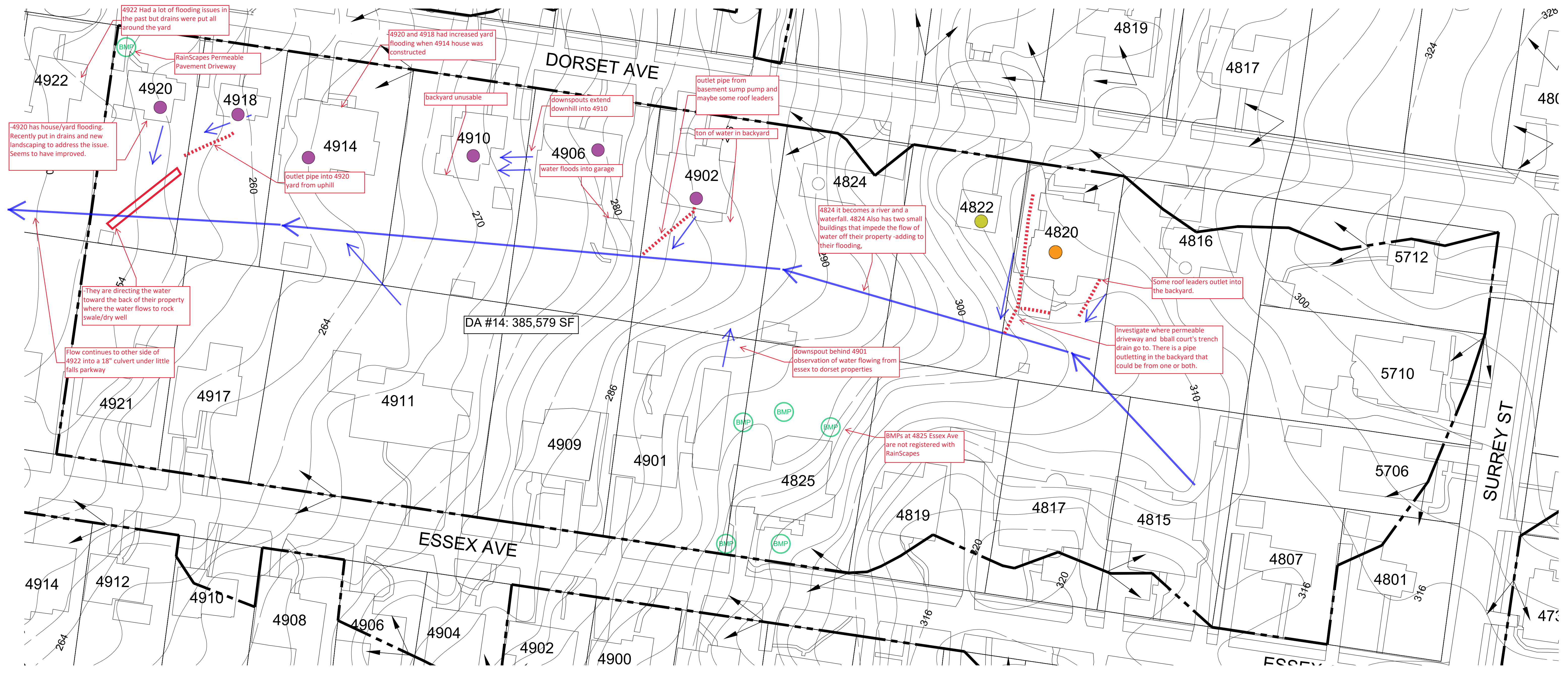


LEGEND:

- SIGNIFICANT FLOODING ●
- FLOODING ●
- MINOR FLOODING ●
- NO FLOODING ●
- DID NOT RESPOND
- EXISTING PIPE -----
- STOMRWATER FLOW →
- DRAINAGE AREA ———
- PROPERTY LINES ———
- EXISTING 2 ft CONTOURS - - - - -
- IMPERVIOUS SURFACE ———
- EXISTING PRIVATE BMP
- DRAINAGE DIVIDE ARROW >

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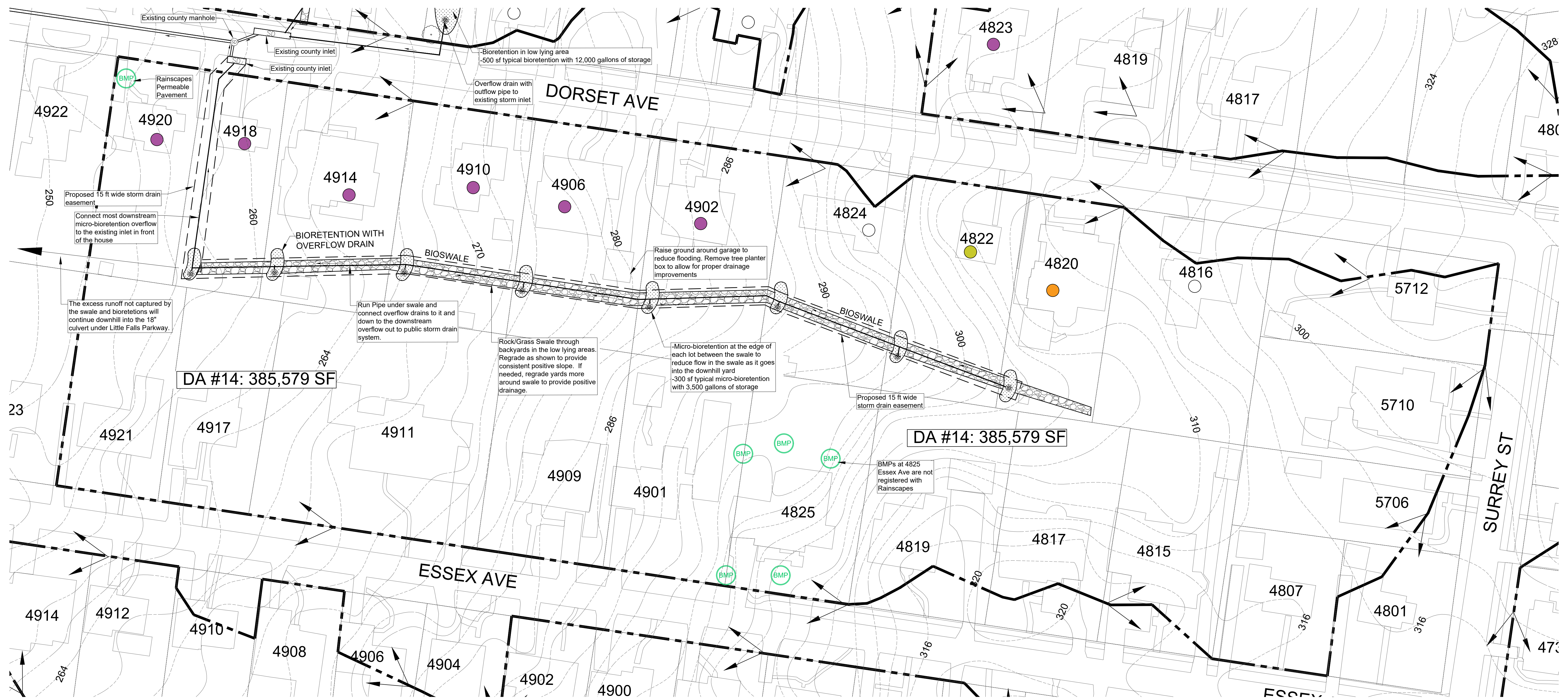
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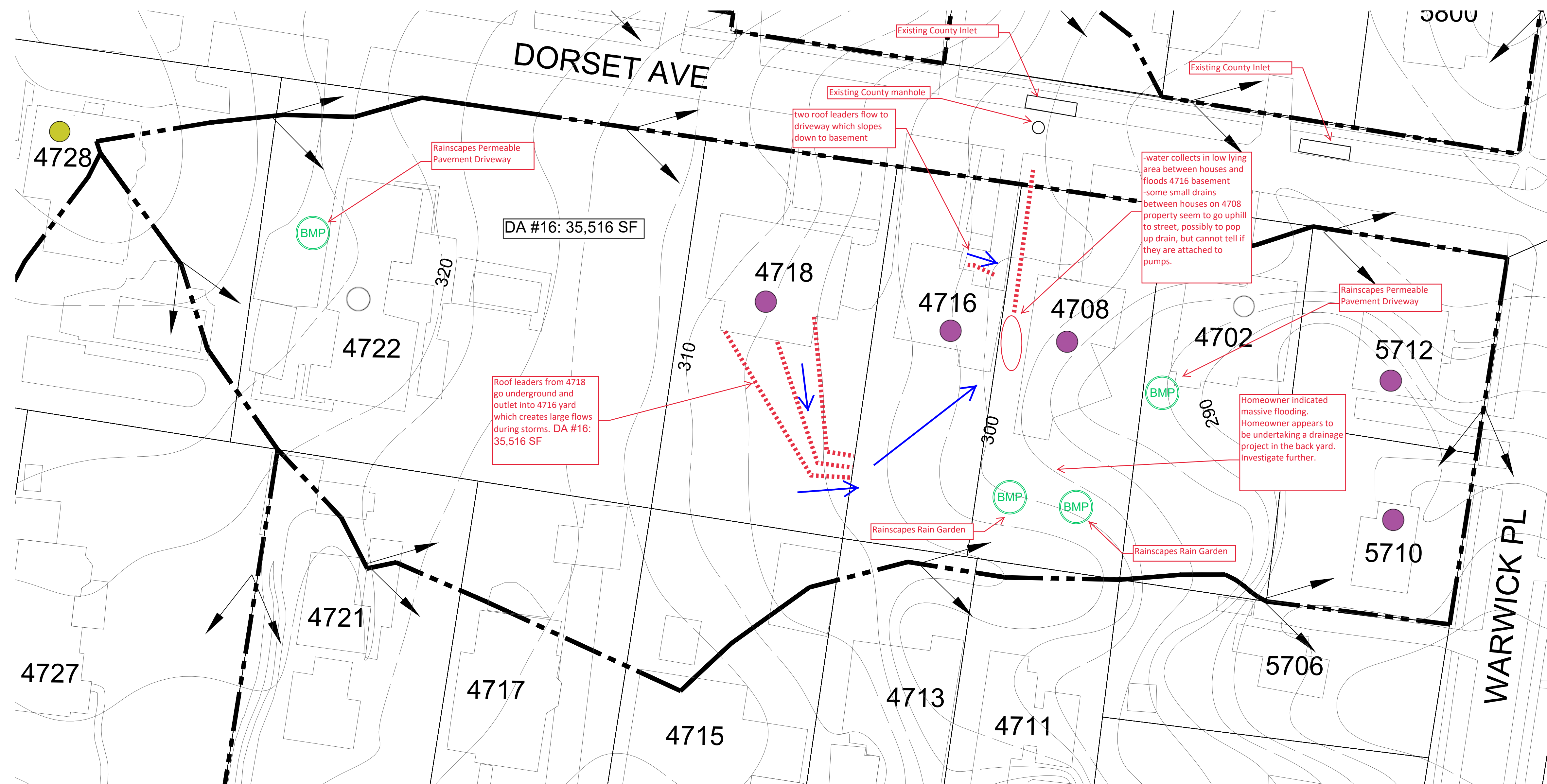
- SIGNIFICANT FLOODING ●
- FLOODING ●
- MINOR FLOODING ●
- NO FLOODING ●
- DID NOT RESPOND
- EXISTING PIPE
- PROPOSED PIPE
- DRAINAGE AREA
- PROPERTY LINES
- EXISTING 2 ft CONTOURS
- IMPERVIOUS SURFACE
- EXISTING PRIVATE BMP
- DRAINAGE DIVIDE ARROW >
- STORM DRAIN EASEMENT
- PROPOSED 2 ft CONTOURS

General Recommendations For All Properties:

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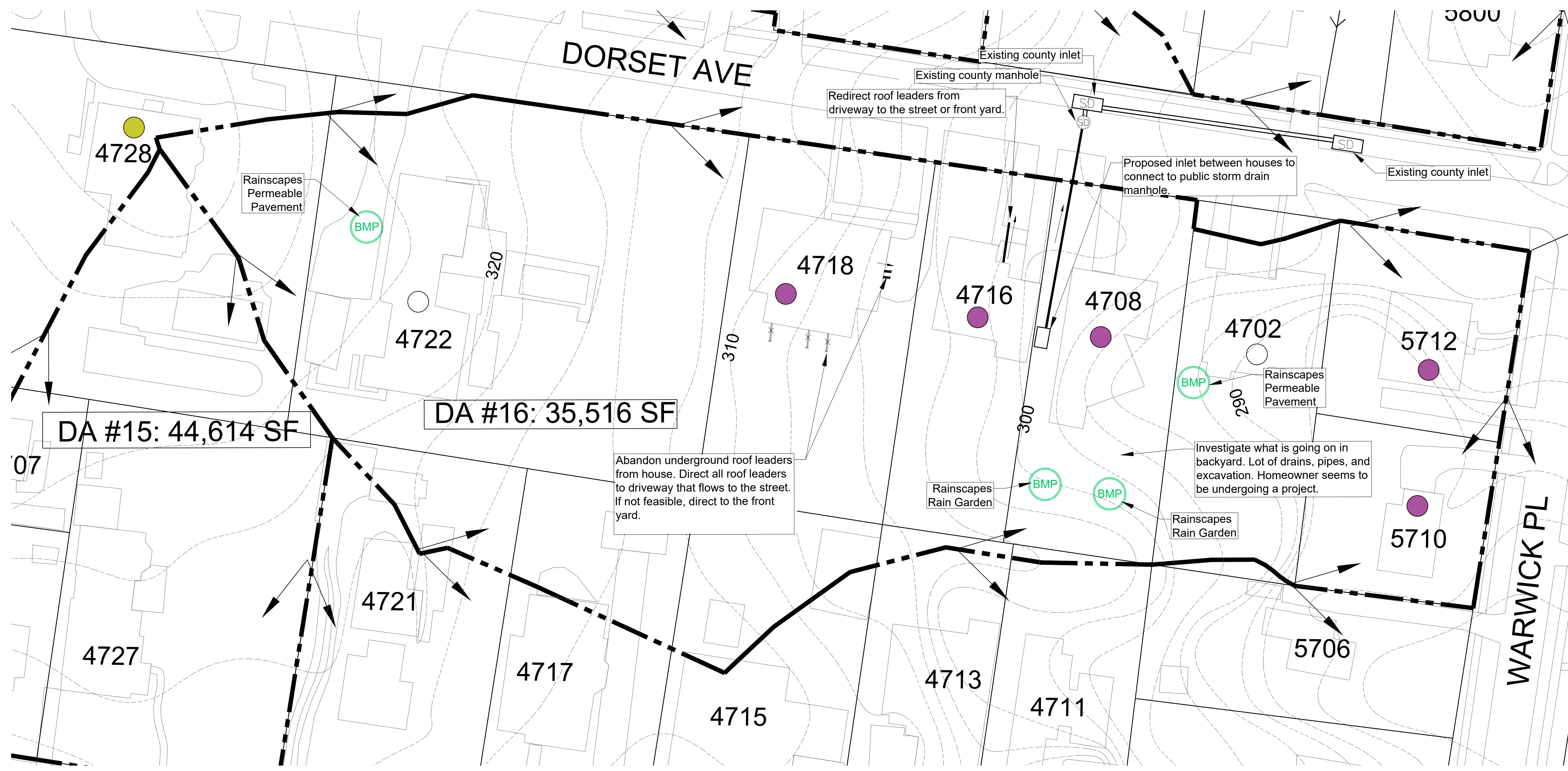
LEGEND:

- SIGNIFICANT FLOODING ●
- FLOODING ●
- MINOR FLOODING ●
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- EXISTING PIPE ---
- STORMWATER FLOW →
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- PROPERTY LINES ---
- EXISTING 2 ft CONTOURS ---
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- EXISTING PRIVATE BMP ○
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REV. NO.	DATE	REVISIONS PRIOR TO APPROVAL



LEGEND:

SIGNIFICANT FLOODING	●
FLOODING	●
MINOR FLOODING	●
NO FLOODING	●
DID NOT RESPOND	○
EXISTING PIPE	—
PROPOSED PIPE	—
DRAINAGE AREA	—
PROPERTY LINES	—
EXISTING 2 ft CONTOURS	—
IMPERVIOUS SURFACE	—
EXISTING PRIVATE BMP	○
DRAINAGE DIVIDE ARROW	>

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