



# **Regulated Municipal Separate Storm Sewer System (MS4) Outfall Determination**

Standard Operating Procedure

**Department of Environmental Services**

**Office of Sustainability and Environmental Management**

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## Introduction

In order to identify the stormwater infrastructure regulated under the County's Phase I Municipal Separate Storm Sewer System (MS4) permit, Arlington County has initiated an effort to identify its regulated MS4 outfalls. The County's initial effort will lead to the development of a regulated MS4 outfall inventory and will also inform the delineation of Arlington County's MS4 service area. As the County's MS4 outfall identification evolves, the County has recognized the need to ensure that the regulated MS4 outfall identification and delineation process should include a standard procedure for the necessary updates that this spatial dataset will require over time. As such, Arlington County has developed the following standard operating procedure (SOP) in order to facilitate the ongoing identification of regulated stormwater outfalls under the Arlington County MS4 permit. This SOP describes the process by which Arlington County can identify its regulated MS4 stormwater outfalls and review and verify, to the extent feasible, those findings.

The procedure described in this document establishes a methodology to distinguish non-MS4 outfalls from MS4 outfalls in cases where the evaluator can make a determination with relative certainty based on office or field observations. This SOP may not be sufficient, however, to allow the evaluator to reach a definitive conclusion in specific instances where a high degree of uncertainty exists with respect to an outfall's ownership or regulatory status as well as that of the receiving channel into which it discharges. These "questionable" structures may require a more detailed adjudication on a case-by-case basis to determine whether the outfall is (1) a regulated MS4 outfall; and (2) the jurisdictional responsibility of Arlington County pursuant to the County's Phase I MS4 permit.

## Key Components of a Regulated MS4 Outfall

The key components of a regulated MS4 outfall are as follows:

- The outfall structure is properly identified in the County GIS as an outfall or point of confluence of a man-made channel or conveyance feature to a natural watercourse.
- The outfall is owned and/or maintained by Arlington County through an easement or other instrument of jurisdictional ownership (i.e. deed to the County Board etc.).
- The outfall meets the regulatory definition of *outfall* in accordance with 40 CFR 122.26(b)(9), that is, the outfall is located "at a point where the MS4 discharges to waters of the United States" or "surface waters" (4VAC50-60-10) but not "open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other water of the United States and are used to convey water of the United States." This definition is inclusive of points where such man-made conveyance channels discharge into "waters of the United States" as defined by 40 CFR 230.3(s) or "surface waters" as defined by 4VAC50-60-10. In order for an outfall to be considered a *regulated MS4 outfall* for the purposes of this analysis, it must meet all three of the above criteria. An outfall designated as a regulated MS4 outfall falls under the jurisdiction of Arlington County and is subject to the

requirements of the County's MS4 permit. Each step in the above-outlined analysis is explained in further detail in the paragraphs below.

### **Necessary GIS Data Package**

The data package needed to perform the analysis will include the most up-to-date versions of the following GIS layers:

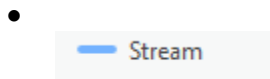
- Stormwater\_node
- Stormwater\_arc
- Property\_Poly
- Street Network
- Watersheds
- Hydrology
- Contours
- Orthophotography
- Stream Analysis Report (SAR)
- Pave - Impervious Surfaces
- Resource Protection Areas (RPA)
- Lands with NPDES Permits

## Step One: Initial Regulated MS4 Outfall Identification

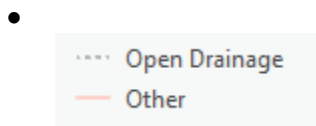
The first step in identifying the County’s regulated MS4 outfalls utilizes ArcGIS to perform a desktop analysis of the County’s storm water network GIS database in order to determine outfalls or other potential outfall structure as a regulated MS4 outfall. In general, Storm Water nodes with a “Struct\_Type\_Code” of “STEW” or End Wall should be considered a potential outfall.


















Another key component in identifying regulated MS4 outfalls involves the characteristics of the channel from the potential outfall structure. The following channels and features should be considered surface waters, and structures which discharge to them should be considered regulated MS4 outfalls:



Other types of channels or features may also be considered surface waters depending on a number of factors discussed below in Step 2 and Step 3. Ultimately, potential outfalls that discharge to receiving channels which cannot be classified or verified as to type during the desktop analysis should be further investigated in the field:



The desktop analysis is designed to identify potential outfalls and assign responsible party. This method uses a copy of the stormwater\_node feature class named stormwater\_junction\_export in which several fields have been added to track outfall information. Table 1-1 documents the fields, acceptable values, description and symbols used to track information related to outfall identification.

<b>Field: MS4_Outfall</b>		
Value	Description	Symbol
1	Possible outfall further investigation required	
2	MS4 Outfall -1 – Outfall to stream	
13	MS4 Outfall – 1 -Connection to Pipe Stream	
14	MS4 Outfall – 1 – Outfall of Pipe Stream	
15	MS4 Outfall – 1 – Outfall of Split Pipe System DA	
16	MS4 Outfall – 1 – Outfall of Split Pipe System DA not Mapped	
3	Outfall Federal Responsibility	
4	Outfall VDOT Responsibility	
5	Outfall Fairfax County Responsibility	
7	Outfall Falls Church Responsibility	
8	Outfall Private Responsibility	
9	MS4 Outfall to stream on Property not owned by Arlington County	
10	Arlington Public Schools (APS) Outfall	
11	MS4 Outfall – 2 – connection point from ACG MS4 system to another MS4 system that does not reconnect to AC MS4 system	
12	MS4Outfall – 3 – connection point from ACG MS4 service area (pipe system not maintained by ACG <sup>1</sup> ) to another MS4 system that does not reconnect to AC MS4 system	
<b>Field: Location</b>		
ROW	Outfall located in right-of-way	
Private	Outfall located on private property	
Public	Outfall located on public property	
<b>Field: Verif_Needed</b>		
Yes	Verification of ownership required.	
No	No Verification of ownership is required	
Refer	Referred to Data/Mapping	
<b>Field: Owner_Verf</b>		
	If outfall is located on private property and documents have been reviewed and verified ownership responsibility. If a question of maintenance responsibility exists for outfalls located on VDOT or Federal property, but are maintained by County. Notation of document reviewed.	
<b>Field: UPST_Out_ID</b>		
Yes	Upstream outfall(s) identified upstream of outfall identified as being the responsibility of someone other than the MS4	
No	Upstream outfall(s) still need to be identified	
NoMS4	No MS4 area draining to outfall.	

<sup>1</sup> Note: This outfall category exists due to Arlington’s conservative methodology for delineating its MS4 service area. Please refer to MS4 service area documentation for more information.

*Table 1-1 – Fields added to stormwater\_node Layer to Track Outfalls*

Next the user scans the area adjacent to stream and County boundary identifying potential outfalls. To assist in the determination of what is to be considered an MS4 outfall, examples have been included in Appendix A. The user should also consults the Tax Exempt, Federal road, VDOT road and permitted facilities layers to assist with determination of ownership. Once ownership has been determined the MS4\_Outfall field should be updated, along with the location field. If responsibility is not Arlington County update the UPST\_Out\_ID to “No”, indicating that in the next step someone will need to check upstream to identify MS4 outfalls. If the outfall is within Arlington County ROW and Owner\_Code is “PW” no ownership verification is required and the Verif\_Needed field should be updated to “No”. Ownership verification is needed in the following circumstances:

- If the Owner\_Code in the stormwater\_node layer is identified as “PW” or “PK” and is not within Arlington maintained right-of-way the structure should be referred to Data/Mapping for verification.
- If the outfall is within Arlington County maintained right-of-way and Owner\_Code is not identified as “PW” or “PK” the the Owner\_Verf field should be updated to “Refer” and the structure should be referred to Data/Mapping correction.
- Any node located within the VDOT right-of-way should be considered a VDOT maintained structure. If the Owner\_Code is not identified as “VA” the Owner\_Verf field should be updated to “Refer” and the structure should be referred to Data/Mapping correction.
- Any node located within federally owned property will be considered a federally maintained structure. If the Owner is not identified as “US” the the Owner\_Verf field should be updated to “Refer” and the structure should be referred to Data/Mapping correction.

If in the process mapping error are discovered unrelated to ownership the information should also be relayed to Data/Mapping for correction. For information to be included in Data/Mapping correction request see Appendix B. If ownership verification is needed the Verif\_Needed field will need to be updated to reflect the status of the verification process. When a Data/Mapping request is forwarded the Verif\_Needed field should be updated to “Refer” and when the ownership has been verified the Verif\_Needed field should be updated to “No” and in the Owner\_Verf field note the documentation used to verify ownership.

A flow chart of this process can be found in Appendix C

Areas reviewed are tracked using the Watershed layer. Table 1-2 documents the field, acceptable values, description used to track status of watershed related to outfall identification.

<b>Field: Status</b>	
1	Identified outfall near streams
2	Upstream MS4 outfall(s) identified for non-MS4 outfalls
3	Checked for last structure upstream of the County Line

*Table 1-2 – Fields added to Watershed Layer to Status of Outfall identification*



## **Step Two: Identification of MS4 Outfalls Upstream of Outfalls Owned or Operated by Another MS4.**

The second step is to identify MS4 outfalls upstream of the outfalls identified in step one that were assigned an MS4 Outfall value greater than 2, as defined in Table 1-1. These outfalls have a maintenance responsibility of some other organization or individual. User will need to trace the system upstream to locate the first structure that is maintained by Arlington County. This structure will be identified as the MS4 outfall - 2. However, for drainage delineation purposes for this outfall, the first upstream drainage input (e.g., catch basin, grate inlet, etc.) will be the outlet of the drainage area. If the structure is within the MS4 service area, but not a part of the MS4 system the outfall will be identified as MS4 outfall – 3. See footnote to Table 1-1. For examples see Appendix A.

### **QA/QC Checklist Form**

To ensure accuracy in the process of identifying regulated MS4 outfalls, Arlington County should utilize the following quality assurance/quality control (QA/QC) checklist to verify and validate the findings of steps one and two (the initial MS4 identification and upstream identification). The checklist on the next page was designed to provide a consistent QA/QC procedure for making desktop-based determinations.

## Arlington County MS4 Outfall Criteria

What is an outfall?	
YES	NO
1. When an outfall discharges into a natural stream	1. When a potential outfall discharges into pipes, hardened channels or other man-made conveyances that do not convey surface waters
2. When a potential outfall discharges into an "in-line" lake, stormwater management pond or other impoundment.	2. When potential outfall discharges into a dry pond that is not "in-line" with a stream.
3. When a potential outfall discharges into a natural ditch that empties into a natural stream or wetland area. (i.e. surface waters are located at the downstream end of the ditch)	3. When a potential outfall discharges to a ditch that empties back into a pipe, hardened channel or other man-made conveyance.
4. When a potential outfall discharges into a stream segment that is connected to an adjacent stream segment by a culvert, pipe, paved channel or other man-made conveyance	4. When a potential outfall is the upstream end of a culvert or pipe.
5. When a potential outfall is the downstream end of a box culvert or culver pipe which (1) discharges to a stream or other surface waters and (2) receives discharge from adjacent pipes, hardened channels or other man-made conveyances that do not convey surface waters.	5. When a potential outfall is the downstream end of a box culvert which connects segments of the same stream (i.e., conveys surface waters).
6. When a potential outfall discharges into a wetland area adjacent to natural stream.	
7. When a potential outfall discharges into a 100-year floodplain or Resource Protection Area (RPA) but the system does not show a ditch, stream or conveyance channel conveying flow to the stream channel.	
8. When a potential outfall is the last structure in the system prior to leaving the MS4 system. (i.e. last MS4 structure before leaving the County or last MS4 structure above an outfall belonging to other NPDES permittee assuming that no other MS4 outfalls existing downstream on the same segment)	
9. When a potential outfall is located on the property of another NPDES permittee, but an easement or agreement exists for County maintenance.	
10. When a potential outfall is connected to pipes, tunnels or other conveyances which connect segments of the same stream.	
Definitions	
<p>"Outfall" means: CFR40.122.26 A point source at the point where a municipal separate storm sewer discharges into surface water and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other surface waters and are used to convey surface water.</p>	
<p>"Surface Waters" means CFR40.110.1</p> <ol style="list-style-type: none"> <li>1. All water that are currently used, were used in the past, or may be susceptible to use interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide.</li> <li>2. All interstate waters, including interstate wetlands.</li> <li>3. All other water such as intrastate lakes, river, streams (including intermittent streams). Mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation or destruction of which would affect or could affect interstate or foreign commerce including any such waters: a. that are or could be used by interstate or foreign travelers for recreational or other purposes; b. from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or c. That are used or could be used for industrial purposes by industries in interstate commerce.</li> <li>4. All impoundments of waters otherwise defined as surface water under this definition</li> <li>5. Tributaries of waters identified in subdivision 1 through 4 of this definition.</li> <li>6. The territorial sea; and</li> <li>7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in subdivisions 1 through 6 of this definition.</li> </ol> <p>Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA and the law, are not surface waters. Surface waters do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other agency, for the purposes of the Clean Water Act the final authority regarding the Clean Water Action jurisdiction remains with the EPA.</p>	

### Step Three: Field Investigation

Select stormwater junctions that have been identified in step one or two as requiring field investigation. Create maps of each site to assist in the field investigation.

Once in the field determine if the outfall is mapped correctly, if not sketch up corrections to be made to the GIS. If additional systems/culverts are located note length, pipe size, pipe material. Create a sketch to be used to update the GIS. Update the owner verify field to read "GIS Map update requested". When the system is mapped correctly go back into the GIS and change the status of the field verify field to "No" and map a note in the owner verify field that "Mapping is correct".

For pipes identified in the stream assessment and not mapped on the GIS, print maps and investigate in the field. If pipe is located note length, pipe size, pipe material and create a sketch to be used to update the GIS. On the GIS add a point as a place holder and set MS4\_outfall field to "1" and owner verify field to "GIS Map update requested". If necessary, request WSS to TV the line to determine connectivity if upstream system cannot be identified. If the pipe is not located do nothing. If the pipe is located and determined to be a roof drain or small private yard drain do not map.

#### **Step Four: New Outfalls or Modification to Existing Outfalls**

New outfalls will be identified during the mapping process. Stormwater systems that connect directly to the stream or to another MS4 system will be reviewed to determine if they meet the outfall criteria. If it is determined that the system meets the outfall criteria it will be noted in the database and OSEM will be notified that a new outfall has been identified to ensure that list of outfalls is updated and included in the next annual report. Modification to existing outfalls will also be identified during the mapping process. Existing outfalls that are modified by extending the system will remain as an outfall but the latitude and longitude will need to be updated and OSEM will need to be notified of the change. If an existing outfall is rerouted to connect with an existing system the outfall will be abandoned in the database and OSEM will be notified that the outfall has been abandoned and rerouted to another system

## Appendix A

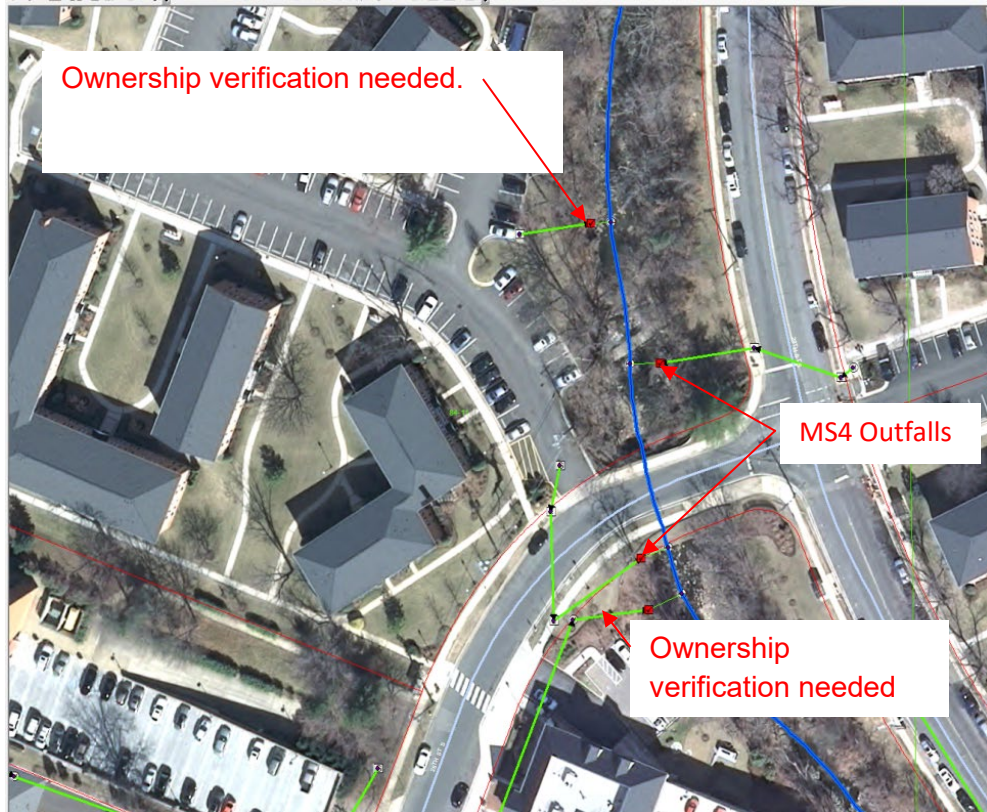
### Outfall Identification Examples

1. Example of no MS4 area draining to a non-Arlington County outfall.



Outfall is located on VDOT property and has no MS4 area draining into the system.

2. Example of MS4 outfalls that should have ownership verified.



Outfall drains directly to stream but does not carry road water. Ownership responsibility needs to be verified to determine if this is an Arlington County outfall or a private outfall. The MS4 outfalls in this example carry road water.

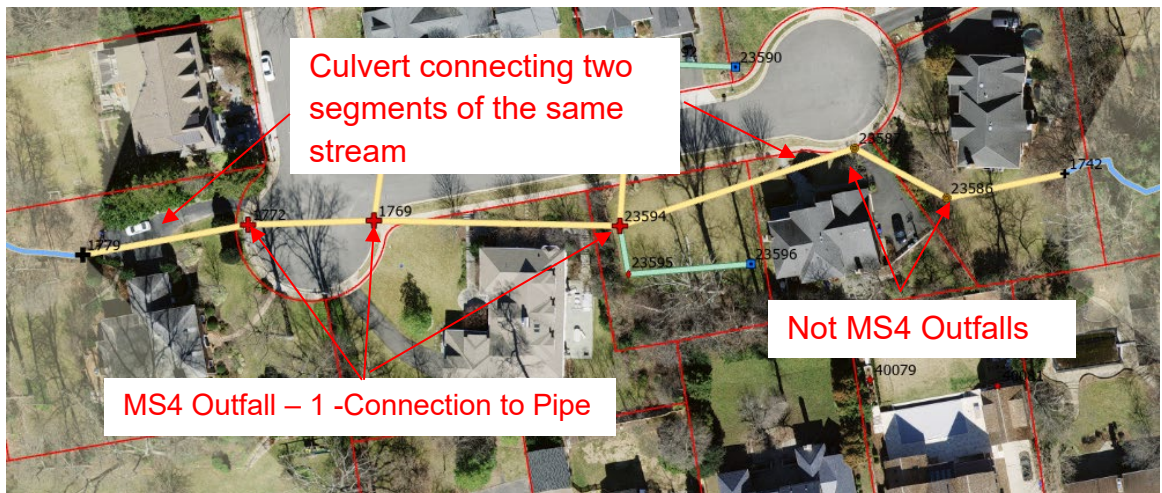
3. Example of stream with no MS4 system draining into it.



- An example of a MS4 outfall where the pipe ownership and/or access easement has not been determined. Due to the number and difficulty finding records because of the age of the system, ACG is assuming these are MS4 outfalls and research on ownership and access will continue as staffing allows.



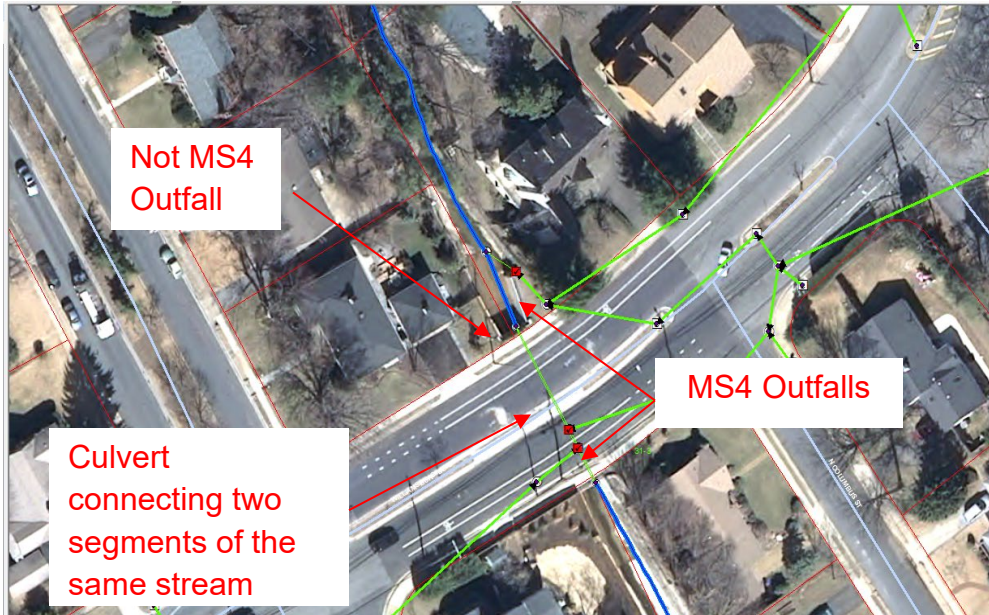
- Example of MS4 outfall being the connection point from ACG MS4 system to another MS4 system (in this case, outside the County boundary).
- Examples of outfalls connected to pipes, tunnels or other conveyances which connect segments of the same stream.



When a culvert conveys two segments of the same stream, the culvert is treated as the stream. Every junction that adds more water from the MS4 system to the culvert is an outfall. The three

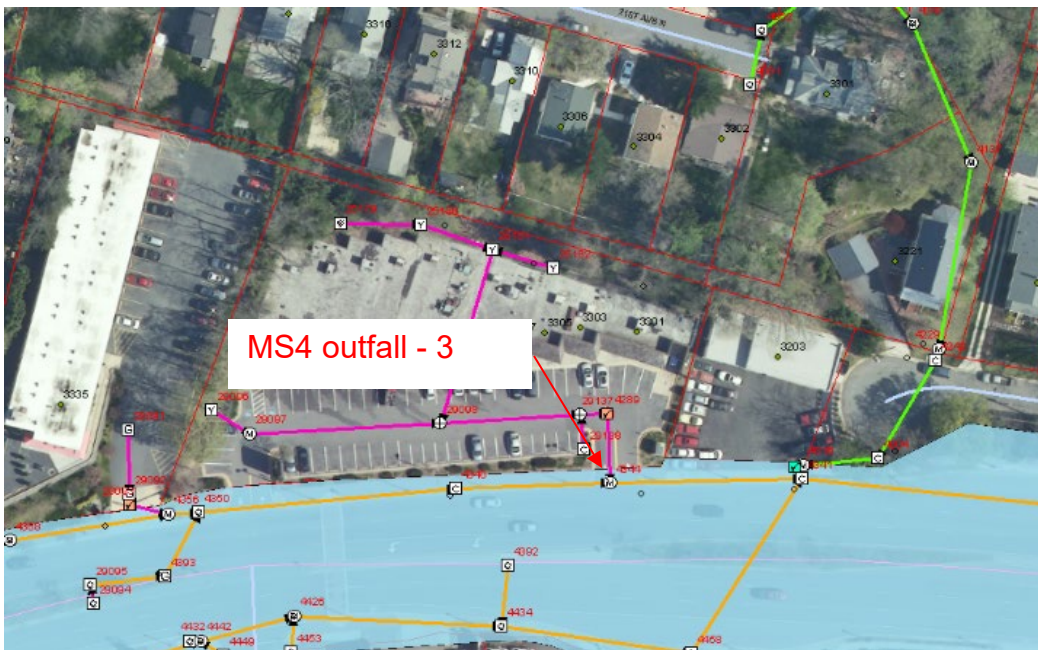
structures that are classified as MS4 outfalls contribute additional MS4 water to the system conveying the stream. The two structures classified as not MS4 outfalls do not contribute additional water.

7. Examples of outfalls when connected to pipes, tunnels or other conveyances which connect segments of the same stream.



When a culvert is connecting two segments of the same stream the downstream end wall is not an outfall because the culvert is part of the stream.

8. Example of an MS4 outfall – 3 – when a private outfall that is within ACG MS4 service area connects with another MS4 system. The outfall is not considered an MS4 outfall.

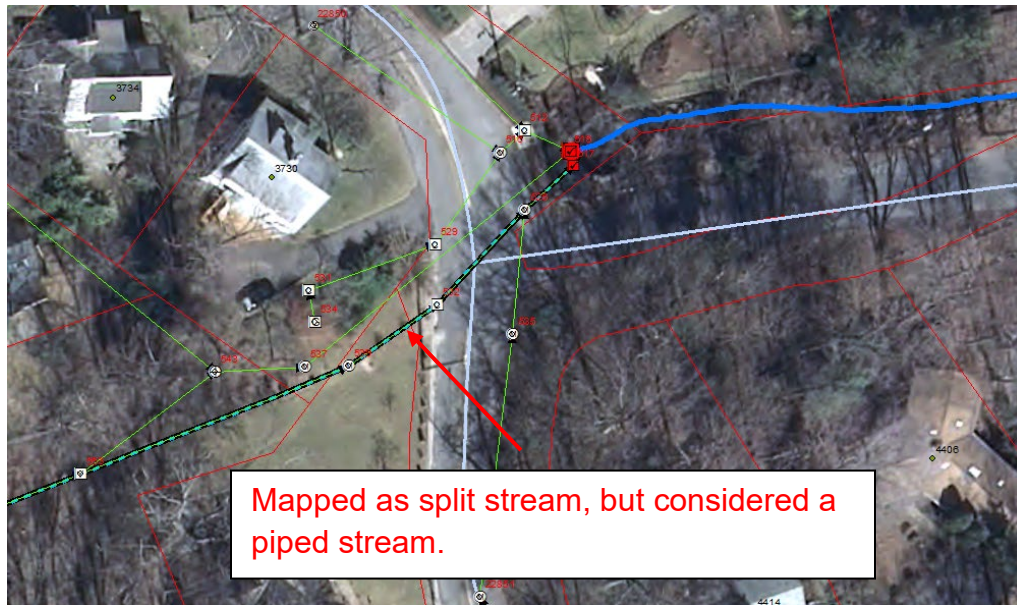




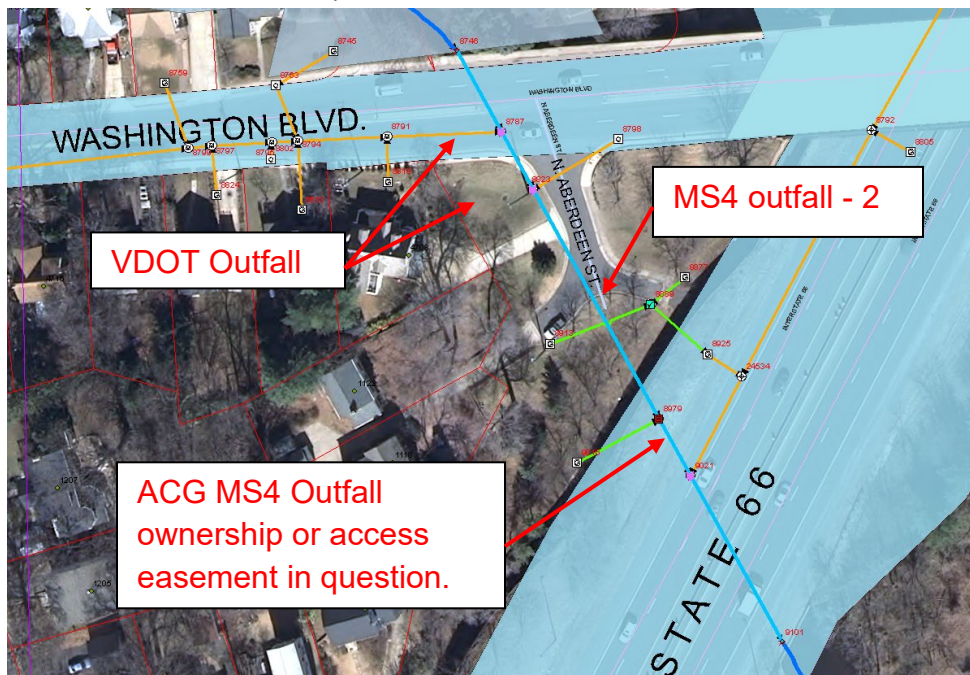
Example of an MS4 outfall – 2 where ACG MS4 system connects with another MS4 system. ACG MS4 outfall is the first upstream structure that is maintained by Arlington County



10. Example of area mapped as split stream<sup>2</sup>, but it is piped from the headwaters so considered piped with an open channel over the top. End wall carrying stream is considered the outfall.



11. Example of a culvert that crosses VDOT right-of-way but conveys two segments of the same stream. This culvert acts as a stream. Outfalls that connect to the culvert are identified as an outfall of MS4 service area that drains to that point.



<sup>2</sup> A split stream carries mostly baseflow diverted from parallel underground pipe to the surface as an amenity for adjacent residents.

12. Example of a pipe system that has been split to provide relief for under sized system. Larger pipe will be used as the outfall to determine drainage area.



13. Stream has been piped and pipe system split to provide relief. Only outfall to stream for large pipe system will be used to determine drainage area.



14. Example of a pipe stream that splits, transitions to a single pipe and them back to a split pipe.



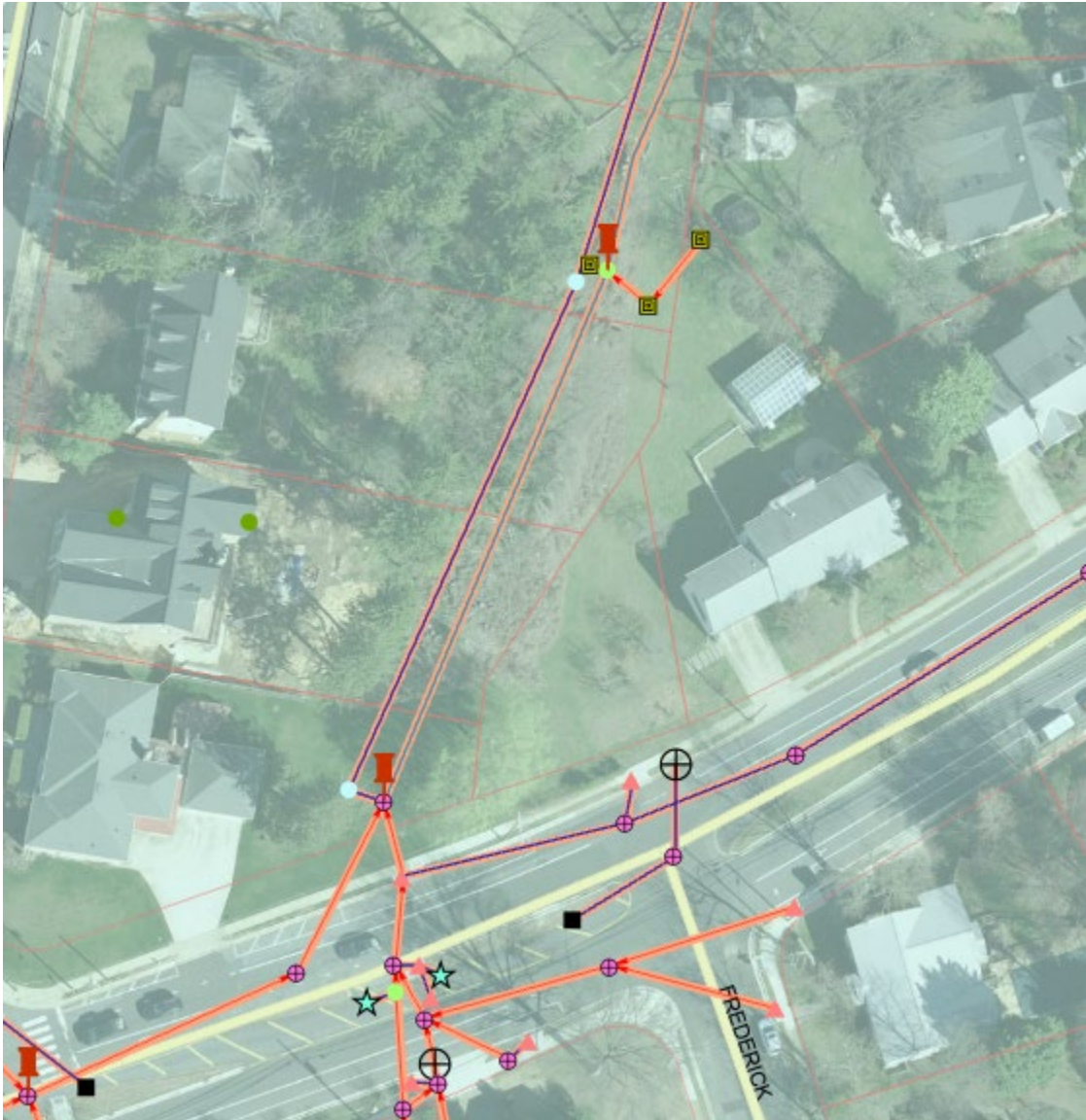
First split of the pipe system:



Split system become one pipe system again:



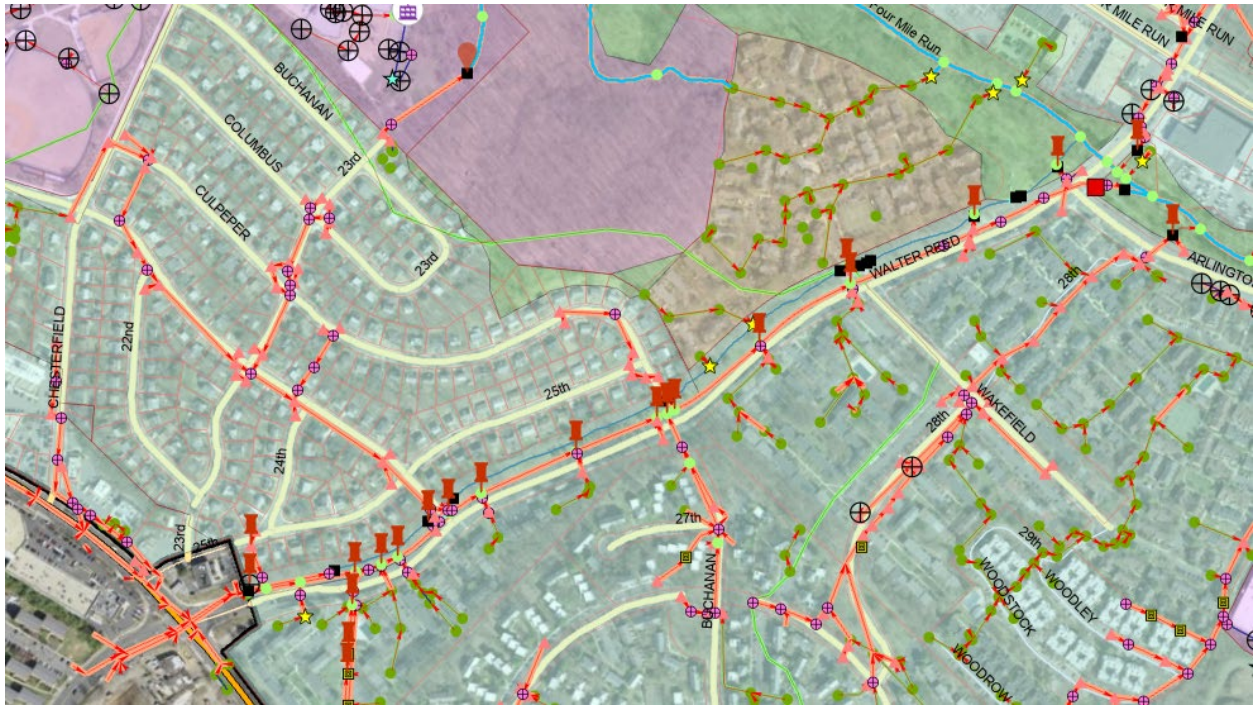
Second split of the pipe system creates a split stream.



Split stream and pipe join at exit headwall. Drainage area will be taken at the headwall.



16. Stream had been piped the outfall for drainage mapping with the outfall to the stream.





## Appendix B

### Data/Mapping Correction

Data/Mapping correction/verification requests should be made through the email system. Emails should be sent to Alexander Middleton at [amiddleton@arlingtonva.us](mailto:amiddleton@arlingtonva.us). Information to be included:

- All GIS\_ID's for both arcs and nodes effected.
- Reason for change/verification:
  - Structure(s) located within Arlington maintained right-of-way and Owner\_code is not "PW".
  - Structure(s) located on right-of-way maintained by another party but Owner\_code is "PW" or "PK".
  - Structure(s) on park property but Owner\_Code is not "PK".
  - Structures outside the right-of-way and located on private property with Owner\_Code of "PW" – ownership verification is needed.
- Include any supporting documentation available, site plan or engineering drawing references and screen captures of the area.

For mapping corrections create a printout of the existing storm sewer network including appropriate base map information. Enough information should be provided to allow the Records Specialist/GIS analysis to identify what existing structures are effected, Sketch in changes and/or additions including notes to assist in populating

## Appendix C MS4 Outfall Identification Flowchart

### Arlington County MS4 Outfall Identification Flowchart

