

PRELIMINARY
STORMWATER IMPROVEMENT PLAN FOR DOGWOOD DRIVE
CHARLES COUNTY, MARYLAND

I. BACKGROUND

The stormwater infrastructure in the Pinefield Neighborhood near Waldorf, Charles County, Maryland is aging. The capacity of the stormwater pipes near Dogwood Drive cannot handle the peak flows that are generated during heavy rain events from the highly residential watershed in upland areas. Because of this stormwater conveyance issue, Charles County has repaired sinkholes due to deterioration of the drainage system along Dogwood Drive. In addition, stormwater-related flooding is a serious issue in this neighborhood.

The Charles County Department of Planning and Growth Management (CC-PGM) has requested the assistance of the Planning Division of the U.S. Army Corps of Engineers, Baltimore District (USACE) to identify the stormwater-related flood risk in this community and develop a stormwater improvement plan to address the flooding issues.

II. STUDY AREA AND STUDY PURPOSE

The study area for this effort is an unnamed tributary to Mattawoman Creek near Waldorf, Charles County, Maryland. This unnamed tributary is an open channel upstream of Country Lane, and enters a closed-pipe stormwater system from Country Lane to its outfall north of Holly Avenue. The drainage area of this unnamed tributary at its confluence with Mattawoman Creek is approximately 188 acres (0.29 square miles). The watershed is highly urbanized with the majority of the land being single-family residential lots (Figure 1).

The objectives of this investigation are to identify the risk of stormwater-related flooding for the residential structures in the vicinity of Dogwood Drive and develop an improvement plan to alleviate the flooding issues. The study will entail data collection, stormwater system mapping, hydrologic and hydraulic analysis, flood mapping, development of alternatives, and report preparation.

This study is planning-level and do not lead to detailed design/construction. The results of this investigation can be used by CC-PGM to identify the logical stormwater improvements required to alleviate flooding issues and progress to design and construction of stormwater infrastructure improvements.

III. STUDY AUTHORITY

To be determined.

Figure 1: Study Area



IV. TASKS

TASK 1: DATA COLLECTION

The Corps will contact the appropriate entities to collect data pertinent to this investigation. It is assumed that the following data, at a minimum will be provided by CC-PGM (if available): Geographic Information System (GIS) base layers such as roads, parcels, buildings, etc...; most recent topographic data for the area (Digital Elevation Model (DEM) or contour GIS layer); most recent soils data for the area; aerial photography (most recent and historical); development plans; utility data (stormwater, water, sewer line locations); and previous stormwater studies.

The Corps will contact other Federal, State, or watershed associations in order to request data to assist in this investigation, if appropriate.

TASK 2: STORMWATER SYSTEM MAPPING AND ASSESSMENT

The purpose of this task is to gain a clear understanding of the flow of stormwater within the watershed. The team will locate and assess the stormwater conveyance system (i.e. inlets, culverts, and pipes) within the watershed to determine flow paths and stormwater pipe sizes. All stormwater features will be located using Global Positioning System (GPS) technology. The x and y coordinates of each feature will be determined using a hand-held GPS unit with sub-meter accuracy. The elevation of the features, if not available from development plans, will be determined using Real-Time Kinematic (RTK) GPS units which will measure vertical elevation (z) within centimeters accuracy. If RTK cannot be used due to factors such as tree cover, topographic data provided by the county (DEM or contours) will be used. Corps personnel will not enter manholes or inlets. All measurements will be taken from the surface and pipe invert elevations will be determined from subtracting the top elevation from the measured distance at the feature.

The condition of the underground stormwater pipes will not be assessed other than at the inlets. Assessing the underground pipes requires Closed Circuit Television (CCTV) technology which is outside the scope of this investigation.

The end product of this task will be a stormwater system conveyance map, showing inlet locations, pipe locations, outfalls, and stormwater ponds, which will assist in determining flow paths for hydrologic and hydraulic analyses in future tasks. A secondary product will be a complete assessment of the condition of the conveyance system within the watershed.

TASK 3: HYDROLOGIC ANALYSIS TO COUNTRY LANE

The purpose of this task is to calculate peak flows entering the piped system under Dogwood Drive at Country Lane. An appropriate rainfall/runoff model (i.e., TR20, HEC-HMS, or similar) will be used to generate rainfall for the existing-conditions 1-, 2-, 10-, 25-, 50- and 100-yr storm events. Proprietary models such as StormCAD by Haested or XPSWMM may be utilized to further improve the rainfall-runoff model. Peak flow hydrographs will be generated from the rainfall-runoff model and used in future tasks. Only the existing-conditions land use will be modeled in this task.

TASK 4: HYDROLOGIC AND HYDRAULIC ANALYSIS-DOGWOOD DRIVE SYSTEM

The purpose of this task is to determine the existing-conditions capacity of the underground pipes at Dogwood Drive to the outfall at Mattawoman Creek. Proprietary models such as StormCAD by Haested or XPSWMM will be used to determine pipe capacities and hydraulic conditions of the system for the 1-, 2-, 10-, 25-, 50-, and 100-year storm events. Peak flows from Task 3 will be used in this model as well as additional input values for the stormwater inlets contributing to the system under Dogwood Drive.

TASK 5: OVERLAND FLOOD ANALYSIS FOR DOGWOOD DRIVE

The purpose of this task is to identify the existing stormwater-related flood risk for above-ground areas near Dogwood Drive. Peak flow data from Task 3 and 4, as well as terrain data from the provided DEM, will be entered into a two-dimensional software package (anticipated to be FLO-2D) to determine above-ground flow depths and velocities. The results of this two-dimensional analysis will be used to generate flood mapping showing the risk of flooding and to what depth/velocity for the residences in the area.

TASK 6: DEVELOPMENT OF STORMWATER IMPROVEMENT PLAN

The purpose of this task is to develop reasonable alternatives for alleviating flooding issues within the study area. Alternatives such as pipe enlargements, diversions, or upstream stormwater detention will be considered (among others). Baseline existing-conditions modeling in Tasks 3-5 will be modified to determine the impact an alternative will have to the system.

The alternatives developed may be considered individually or in combination with one another. The Corps will develop planning-level conceptual plans and generalized construction cost estimates for the alternatives. Constraints to implementing the alternatives may exist and will be identified.

TASK 7: REPORT PREPARATION

The Corps will prepare a technical report describing alternatives for stormwater improvement. The report will include the stormwater mapping (hardcopy and electronic copy), hydrologic and hydraulic model results, and descriptions of developed alternatives. All data will be submitted electronically on a project disc. Three copies of a draft report will be provided to CC-PGM for review. Substantial comments will be incorporated into a final report. Five copies of the final report, along with project discs, will be provided to CC-PGM.

V. COORDINATION:

The Corps will conduct general project management activities necessary to produce the deliverables for this investigation, and will coordinate with Charles County Department of Planning and Growth Management to resolve any issues that may arise during the execution of this work. The Corps will provide information related to project status and budget as requested by Charles County Department of Planning and Growth Management.

It is anticipated that a formal kick-off meeting will be held to between Charles County and the Corps to discuss the objectives of the study and other matters related to the investigation. The Corps will provide the agenda for the meeting. In-progress meetings may be held and close coordination efforts will assure that the county staff will have a full understanding of the methodology for the investigation.

VI. COST

The cost to complete this effort is estimated to be \$ 45,000.

VII. SCHEDULE

It is estimated that this project will take no more than six months to complete. A detailed schedule will be agreed upon and provided prior to the initiation of the study.

VIII. ASSUMPTIONS

- CC-PGM will assist in data collection (Task 1).
- CC-PGM will assist in obtaining proper permissions from residential property owners for mapping and accessing stormwater features.
- This study is considered planning level. The documents, drawings, and cost-estimates are considered preliminary and further refinements/design will be required prior to implementing any alternatives developed as part of this investigation.