

# STORMWATER MASTER PLAN

## WILLISTOWN TOWNSHIP

April 2024



This flyer provides a summary and some of the highlights from the Willistown Township Stormwater Master Plan.

Although this flyer serves as a summary, the full plan will be available for viewing at the Township offices and on the website.

### WHAT IS THE PURPOSE OF THIS PLAN?

The Plan is the product of a comprehensive effort to identify stormwater and flooding issues within the Township. The intent of the Plan is to present the findings of the study effort and provide a framework to identify potential stormwater related programmatic efforts and flood mitigation projects to be implemented by the Township.



### PLAN HIGHLIGHTS

The following are the key components of the Plan and planning process:

1. Stormwater infrastructure asset **GPS field-data collection**
2. Stormwater GIS Database developed in ArcGIS Pro
3. **Conditions Assessment** of existing stormwater infrastructure
4. Township-wide **Hydrologic & Hydraulic (H&H) Model** of storm sewer drainage developed
5. **Problem Area Identification**
6. **Problem Area Prioritization** determined the **Highest Priority Areas**
7. Developed **Mitigation Solutions for Highest Priority Areas**
8. **Recommendations**



## CONDITIONS ASSESSMENT OF EXISTING STORMWATER INFRASTRUCTURE

The Township did not have a complete Stormwater GIS Database prior to the study. As part of the study, the project team collected existing GIS data, available mapping, and field-collected data to develop a Township-wide Stormwater GIS Database to serve as a central repository for stormwater system information.

As part of this task the field investigation team performed visual condition assessment of 708 inlets, 42 manholes, and 202 outfalls owned by both the Township and the State, as shown in the following table (Table 1).

TABLE 1 - CONDITIONS ASSESSMENT SUMMARY					
Asset Type	No Visible Defects	Minor Cosmetic Defects	Minor Structural Defects	Near Failure/ Major Structural Defects	Failure
Inlets	5	101	361	41	20
Outfalls	1	28	85	31	27

## PROBLEM AREA IDENTIFICATION

Identification and review of existing information concerning the Township's flooding and wet weather issues within the limits was conducted. The project team requested Township input on known problem areas and obtained additional insight during field inspection of stormwater infrastructure through site assessment and property owner communications. The responses were reviewed and incorporated into the assessment of Problem Area mitigation options. Field reconnaissance was subsequently conducted to confirm Problem Area locations, assess existing conditions, identify Problem Area causes, and gather data to complete a planning level concept solution analysis. Each reported Problem Area is listed in Table 2.

TABLE 2 – WILLISTOWN STORMWATER PROBLEM AREAS	
ID	Problem Description
PA-1	Failing culvert along Forest Lane at the crossing with Crum Creek. Road floods during larger storms.
PA-2	Localized flooding along Farmhouse Lane. Runoff comes from north of the Township.
PA-3	Failing culvert along Spring Road, severe flooding with roadway overtopping causing road closures.
PA-4	Flooding of properties at the low point of Chetwynd Road.
PA-5	History of flooding in properties along the eastern side of Clover Lane.
PA-6	History of flooding along North Cedar Hollow Road.
PA-7	Flooding of low point of Bryan Avenue.
PA-8	Known issues along Paoli Pike between Warren Avenue and Devon Road.
PA-9	Natural/old swale outlets directly onto Paoli Pike between Sandy Lane and Grubb Road.
PA-10	Flooding reported in yards between Lloyd Avenue and Frazer Avenue.
PA-11	Flooding at intersection of Paoli Pike and Line Road.
PA-12	Flooding reported at culvert on Dutton Mill Road at the crossing of Hunters Run.
PA-13	Flooding reported at Harvey Lane leading to a swale between Harvey Lane and Callery Way.
PA-14	Reports of erosion at the end of Timber Lane.
PA-15	Localized flooding on Hillview Road with roadway overtopping causing road closures.
PA-16	Significant flooding along Jacqueline Drive. Steep slopes, undersized infrastructure may be the cause. - <b>TOWNSHIP IS CURRENTLY ADDRESSING</b>
PA-17	Flooding at end the of Four Winds Lane. A Storage facility seems to have failed. - <b>TOWNSHIP HAS ADDRESSED</b>
PA-18	Bridge near 776 White Horse Road damaged from Hurricanes Fred and Ida. - <b>TOWNSHIP HAS ADDRESSED</b>
PA-19	Stormwater pipe upgrade/replacement needed near 30 Harvey Lane. - <b>TOWNSHIP HAS ADDRESSED</b>



## PROBLEM AREA PRIORITIZATION

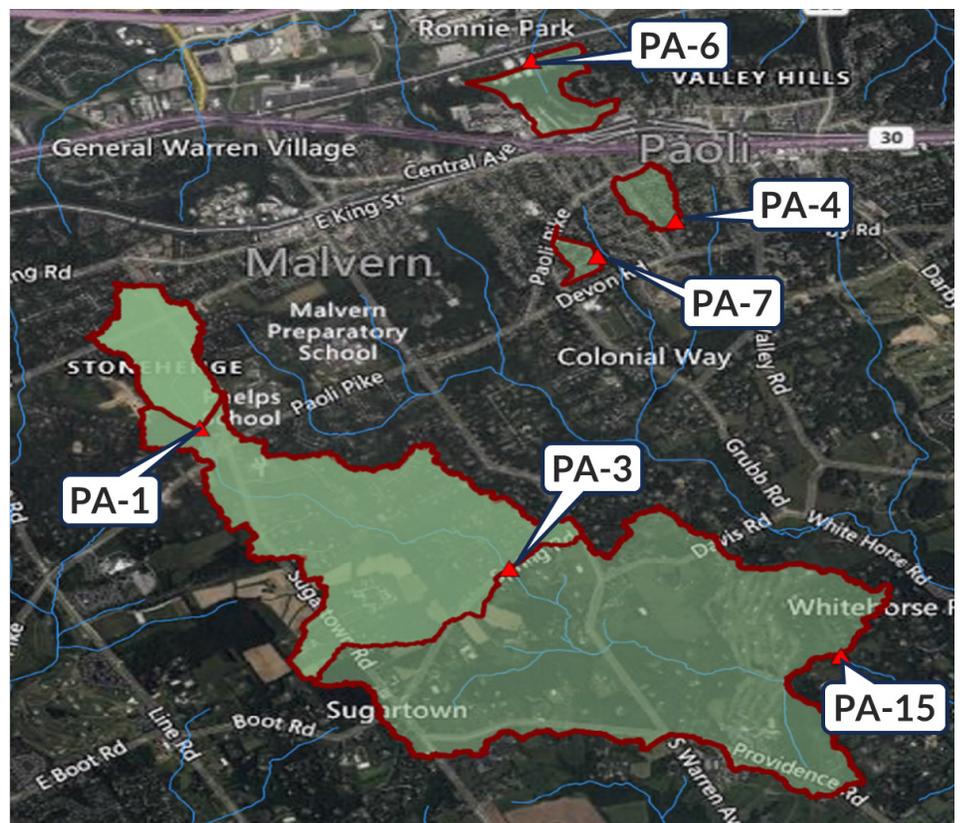
Based on the Problem Areas listed in Table 2, and feedback received from Township staff, the prioritization criteria presented in Table 3 was developed. This table summary describes the criteria along with associated scoring levels. The objective of prioritizing Problem Areas was to identify the Township's top six (6) Highest Priority Areas, for evaluation and development of planning-level mitigation concepts in the study.

Priority Score (5= high, 1 = low)	Flood Mitigation Benefit	Property / Public Impact	Residents Affected	Feasibility	Estimated Project Time	O&M Requirements	Demand on Municipal Resources
5	Significant flooding reduction possible	Major roads inundated/ significant property damage	>50	On Township property/ no permitting issues	<6 months	Low maintenance, long design life	Significant demand
3	Moderate flooding reduction possible	Local roads inundated/ moderate property damage	10-50	On private property/ moderate permitting requirements	6-12 months	Moderate maintenance, moderate design life	Moderate demand
1	Minor flooding reduction possible	Minimal property damage	<10	On State/private property/significant permit requirements	>12 months	High maintenance, short design life	Minimal demand

## MITIGATION SOLUTIONS FOR THE HIGHEST PRIORITY AREAS

Once the Problem Areas were ranked, the top six (6) Highest Priority Areas were then confirmed for the purpose of the study. Highest Priority Mitigation Solution Models were developed for:

- » PA-1: Forest Lane  
Priority Score = 4.1
- » PA-3: Spring Road  
Priority Score = 3.8
- » PA-4: Chetwynd Road  
Priority Score = 4.1
- » PA-6: North Cedar Hollow Road  
Priority Score = 3.8
- » PA-7: Bryan Avenue  
Priority Score = 4.1
- » PA-15: Hillview Road  
Priority Score = 4.1



Drainage area map of 6 Highest Priority Areas

## RECOMMENDATIONS

The Willistown Stormwater Master Plan is a comprehensive effort to assist the Township to implement a set of prioritized projects and strategies. The project team was assigned to perform the study and identify actionable steps and recommendations. The following tables identify strategic recommendations and prioritized projects, and are intended to provide Township officials with the information to prioritize next steps for increasing Willistown's stormwater and flood mitigation efforts.

**TABLE 4 – SHORT-TERM RECOMMENDATIONS (1-3 YEARS)**

Item	Description
A1	Implement Priority Area PA-1 Forest Lane Mitigation Solution project.
A2	Implement Priority Area PA-3 Spring Road Mitigation Solution project.
A3	Investigate the condition of the eroded outlet structure identified within the North Cedar Hollow Road watershed, which was identified during field inspections as eroding on a steep slope.
A4	Use the results of the stormwater infrastructure conditions assessment to address those assets that are in most severe, failing condition.
A5	Build upon the Stormwater GIS Database for asset management, capital improvement project planning and tracking, NPDES MS4 mapping and project tracking, logging residential stormwater concerns, operation & maintenance tracking, hazardous spill response, etc.
A6	Capital improvements planning to identify stormwater capital projects, planning schedule, and finance options to realize the plan. This type of planning will put the Township in the position to identify grant opportunities well in advance.
A7	Review the MS4 Permit Pollutant Reduction Plan (PRP), and update if necessary. Recommend reviewing loading rates areas and additional opportunities for water quality projects. The current project list should be reviewed for feasibility and reviewed against other potential projects not currently included in the PRP.
A8	Utilize the Stormwater GIS Database developed through this study for MS4 compliance tracking (e.g., BMP inspections, operations & maintenance, etc.)

**TABLE 5 – MEDIUM-TERM RECOMMENDATIONS (3-6 YEARS)**

Item	Description
B1	Implement Priority Area PA-4 Chetwynd Road Mitigation Solution project. Feasibility study recommended.
B2	Implement Priority Area PA-6 North Cedar Hollow Road Mitigation Solution project. Feasibility study recommended.
B3	Implement Priority Area PA-7 Bryan Avenue Mitigation Solution project. Feasibility study recommended.
B4	Implement Priority Area PA-15 Hillview Road Mitigation Solution project. Feasibility study recommended.

**TABLE 6 – ADDITIONAL ITEMS TO CONSIDER**

Item	Description
X1	It is recommended that a study be performed on all creek crossings within Township boundaries to understand and address any future impacts to adjacent roadways.
X2	While elevation (Z) data was collected during field data collection with one (1) centimeter accuracy, they are typically less accurate than horizontal (X,Y) data. The data collected for this study is sufficient for planning purposes, however it is recommended that a field survey be conducted for higher level of accuracy in more detailed studies and designs.
X3	Closed Circuit Television (CCTV) is recommended of the storm sewer system for a more accurate understanding of the asset condition and for prioritization of rehabilitation and replacement projects. Corrugated metal pipe (CMP) has a shorter useful life than concrete pipe, and as such, it is recommended that the Township consider rehabilitation or replacement of CMP within the drainage system.
X4	It is recommended that planning and design of mitigation projects include H&H analysis of simulated high-intensity rainfall events to assess the feasibility of mitigating for larger rainfall events.
X5	It is recommended that the Township consider the additional suggestions for MS4 Permit Compliance and Programmatic Improvements included in Section 7.1 of the Plan.
X6	It is recommended that the Township consider the suggestions for ordinance and policy improvements included in Section 7.2 of the Plan.