

# Derry Township

## Stormwater Management Study — 2nd Phase

December 9, 2008



[ BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS. ]

# HRG CONTACT INFORMATION

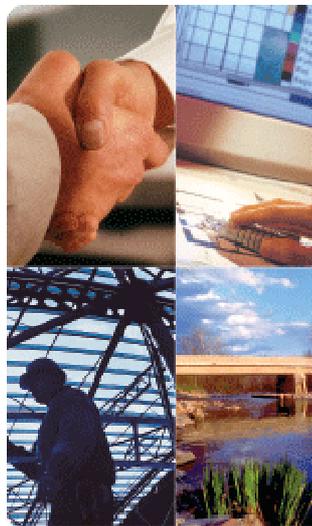
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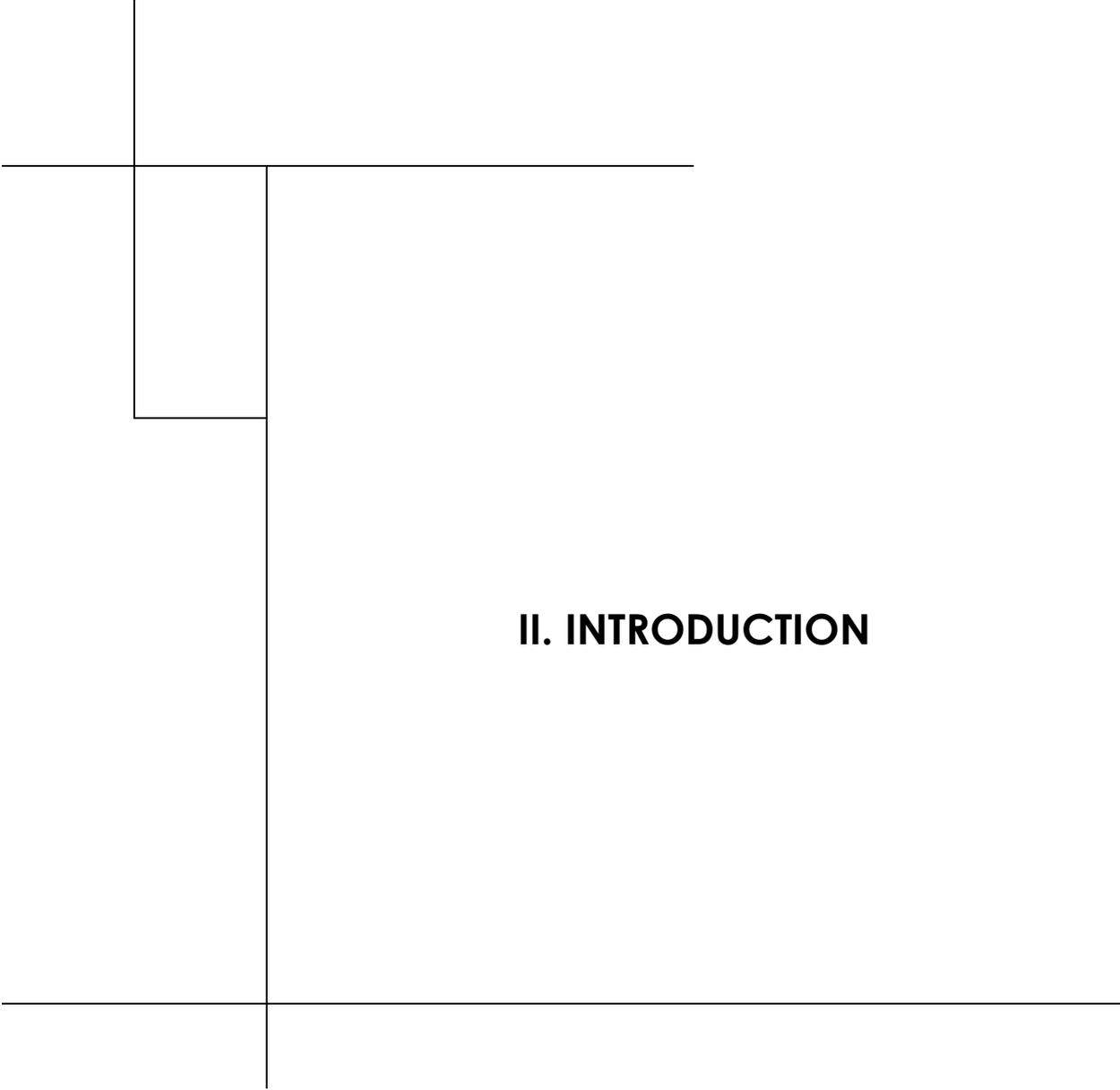
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**BUILDING RELATIONSHIPS.  
DESIGNING SOLUTIONS.**



## II. INTRODUCTION

## INTRODUCTION

Residential, commercial, and industrial growth in Derry Township has been a mixed blessing. The Township is viewed as a desirable, high quality living area and has many attractive and popular amenities for the residents of the community. However, the growth has generated some undesirable impacts that most developing areas exhibit, such as traffic and stormwater management problems. The Township has strict zoning, subdivision and land development, and stormwater management ordinances, but even these cannot completely control the negative impacts of development.

This study documents a number of stormwater-related problems that have been identified over the past few years. Problem identification was accomplished through discussions with Township staff, field views, documentation from an earlier study, and personal knowledge. Most of these problems occur only during severe storm events where high-intensity rainfall exceeds the ability of soil to infiltrate and the resulting runoff causes flooding, channel erosion, and sediment deposition. The frequency of storm events that cause problems appears to be increasing. Causes of this increase in frequency of problems can be attributed to increased levels of development, changing storm patterns, and a reduction in the use of groundwater for water supply.

The Derry Township Board of Supervisors directed Herbert, Rowland & Grubic, Inc. (HRG) to identify, research, and document a number of significant stormwater-related problems in the Township and to develop planning stage recommendations for resolving those problems. In reviewing the problem areas, it became obvious that there were three (3) independent systems or drainage areas within which the individual problems could be grouped. The largest system represents the drainage area of Spring Creek. This watershed, illustrated on Figure 1, covers slightly more than 24 square miles and includes nearly all of downtown Hershey. The second system is the drainage area of the unnamed tributary that parallels Bullfrog Valley Road and Hershey Park Drive and then discharges directly to Swatara Creek. This 2.84 square mile watershed is shown on Figure 2 and includes the Hershey Medical Center, Park Village Plaza and Hershey Square Plaza shopping centers, as well as some large residential developments. The third system is a very small watershed (0.61 square miles) drained by an unnamed tributary that flows through the Highmeadow Camp parking lot before discharging to Swatara Creek. This watershed is illustrated on Figure 3.

HRG has compiled data from various sources and identified seventeen (17) significant stormwater areas. There are other problem areas in the Township, but these 17 areas were considered the most significant. The location of these priority problem areas are identified on Map No. A and listed in Table 4.

Each of these priority areas were examined during field views, the conditions that were causing the problems were identified, and engineering calculations were developed regarding the peak flow and capacity characteristics of the associated stream channels, culverts, and storm sewer systems.

**TABLE 4  
PRIORITY AREA LOCATIONS**

PRIORITY NO.	SYSTEM	LOCATION
1	Spring Creek	Mill Street / Cherry Drive
2	Spring Creek	Cocoa Avenue / Governor Road
3	Spring Creek	Cocoa Avenue between Elm and Areba
4	Spring Creek	Forest Avenue, Clark and Sand Hill Roads
5	Bullfrog Valley Rd. / Hershey Park Dr.	Hershey Park Drive – Shopping Center
6	Bullfrog Valley Rd. / Hershey Park Dr.	Wood Road at Bullfrog Valley Road
7	Spring Creek	East Chocolate Avenue
8	Spring Creek	Sunset Drive
9	Bullfrog Valley Rd. / Hershey Park Dr.	Lucy Avenue
10	Spring Creek	Mill Road Underpass
11	Spring Creek	Palmdale Park and Route 422
12	Spring Creek	West Chocolate at Swatara Avenue
13	Bullfrog Valley Rd. / Hershey Park Dr.	Route 422 / 322 Interchange
14	Highmeadow Campground Trib.	Norfolk Southern RR near Sipe Avenue
15	Swatara Creek	Bindnagle Road*
16	Highmeadow Campground Trib.	Highmeadow Camp Parking Lot
17	Spring Creek	West Mansion Road

\*Note: The inclusion of Bindnagle Road does not imply any attempt to control flooding of Swatara Creek. Control of a drainage area the size of Swatara Creek's at Hershey is beyond the scope of this study and economically unfeasible.

Based on the preliminary engineering analyses performed, HRG developed conceptual solutions that would mitigate the problems for selected design storm events. The majority of the solutions that have been developed involve increasing the capacity of existing channels, culverts and storm sewers. In most of the priority areas, there are no other reasonable alternatives due to the level and intensity of development that has already occurred. The development level precludes the opportunity for meaningful implementation of many Best Management approaches, such as infiltration systems, and on-lot, rooftop or parking lot storage to solve a number of the existing problem areas.

For some of the priority areas (Nos. 2, 6, 8, 11 and 17), it may be possible to construct upstream flood control detention facilities that would store runoff during heavy rain events and release it at a controlled rate to minimize flooding and erosion downstream. However, these flood control detention facilities would most likely be classified as high hazard dams by the Pennsylvania Department of Environmental Protection due to the level of development downstream of their locations. This classification would impose very strict requirements concerning their design, construction, and maintenance. It is expected that the cost of these impoundments would be much greater than the

solutions that have been recommended in this report for these problem areas, with the exception of Priority Area No. 17 (West Mansion Road).

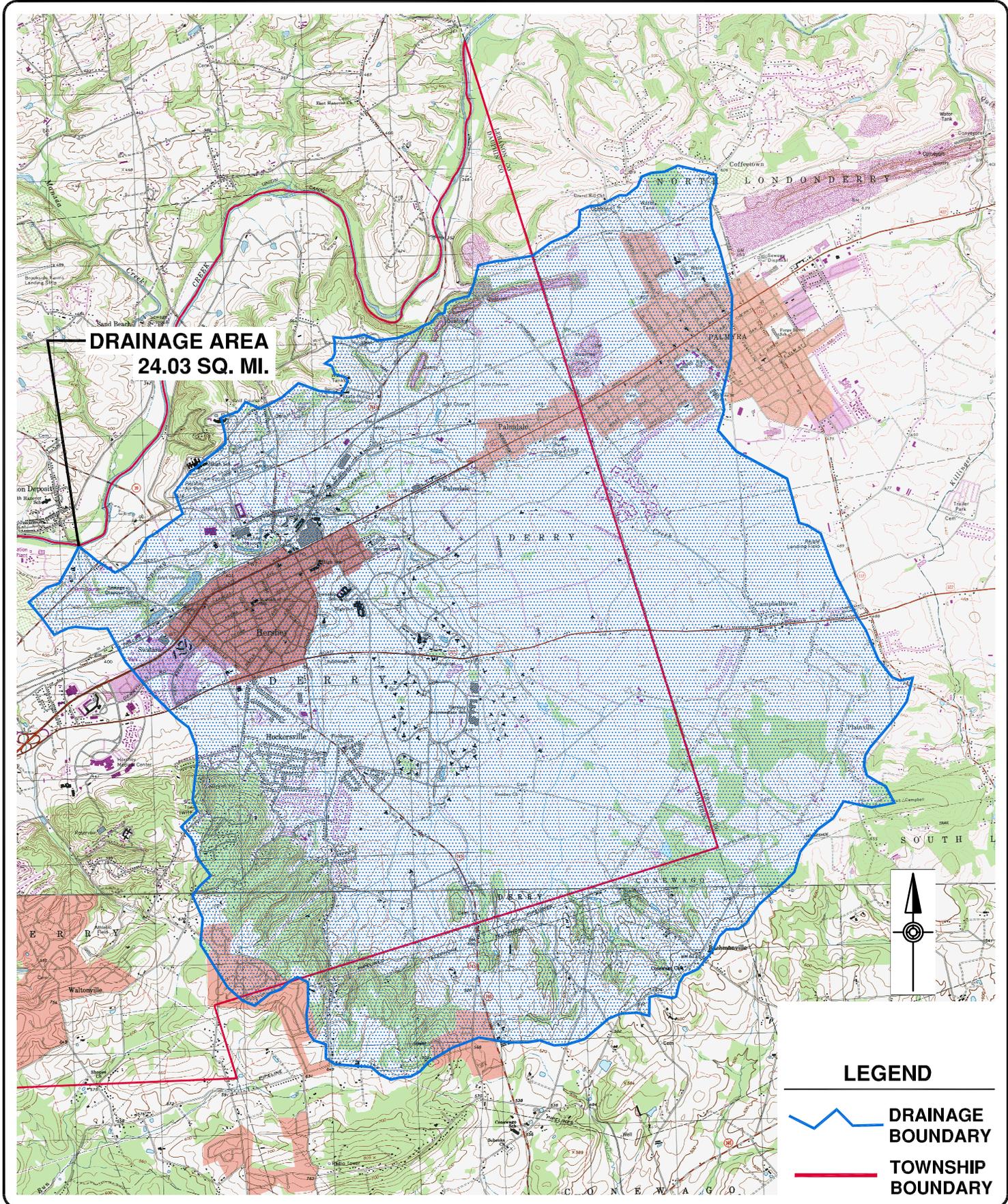
It is important to keep in mind that solving a flooding problem by increasing the capacity of the conveyance system (open channels, culverts, and storm sewers) can often result in passing the problem to an area further downstream. We have considered this condition with respect to the drainage paths in the vicinity and downstream of the problem areas and feel that the recommended solutions will not cause problems within the identified system drainage areas. There could be an increase in the rate of discharge from these systems into the downstream receiving waters. However, it is felt that the level of increase in peak discharge from these systems would be minor in comparison to the total flow downstream and there would not be any measurable increase in flooding. In some instances, though, it will be necessary to implement the downstream recommendations prior to constructing the upstream facilities (e.g., Priority Area No. 5 should be built before Priority Area No. 13 is implemented).

In addition to the “hard-scape” solutions recommended in the next section of this report, the Township should consider incorporating additional requirements in their ordinances for implementing Best Management Practices (BMPs) for new development. Greater emphasis should be placed on controlling runoff at the source through the use of such techniques as infiltration, rain gardens, runoff capture and reuse, minimization of impervious surfaces, and requiring the disconnection of impervious surfaces from direct discharge to storm sewers and streams. The Township should also encourage property owners to retrofit their sites to incorporate BMPs wherever practical. Even small changes, implemented on numerous sites, can have a beneficial impact. A few BMPs that should be considered include:

- Infiltration Basins, Beds, and Trenches
- Rain Gardens
- Bioretention Areas
- Dry Wells
- Seepage Pits
- Vegetated Swales
- Constructed Wetlands
- Retention Basins
- Rain Barrels

Special consideration will need to be given when implementing these BMPs in areas of Karst terrain where sinkholes have been noted. Any increases in infiltration amounts have the potential to increase sinkhole activity.

The next section of this report contains descriptions of the priority areas and recommended conceptual solutions. The appendices to this report contain details of the estimated construction costs, site photographs, and background information on the hydrologic analysis performed as part of the preliminary engineering work.



**DRAINAGE AREA**  
**24.03 SQ. MI.**



**LEGEND**

	<b>DRAINAGE BOUNDARY</b>
	<b>TOWNSHIP BOUNDARY</b>

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**HRG**  
Herbert, Rowland & Grubic, Inc.  
Engineering & Related Services

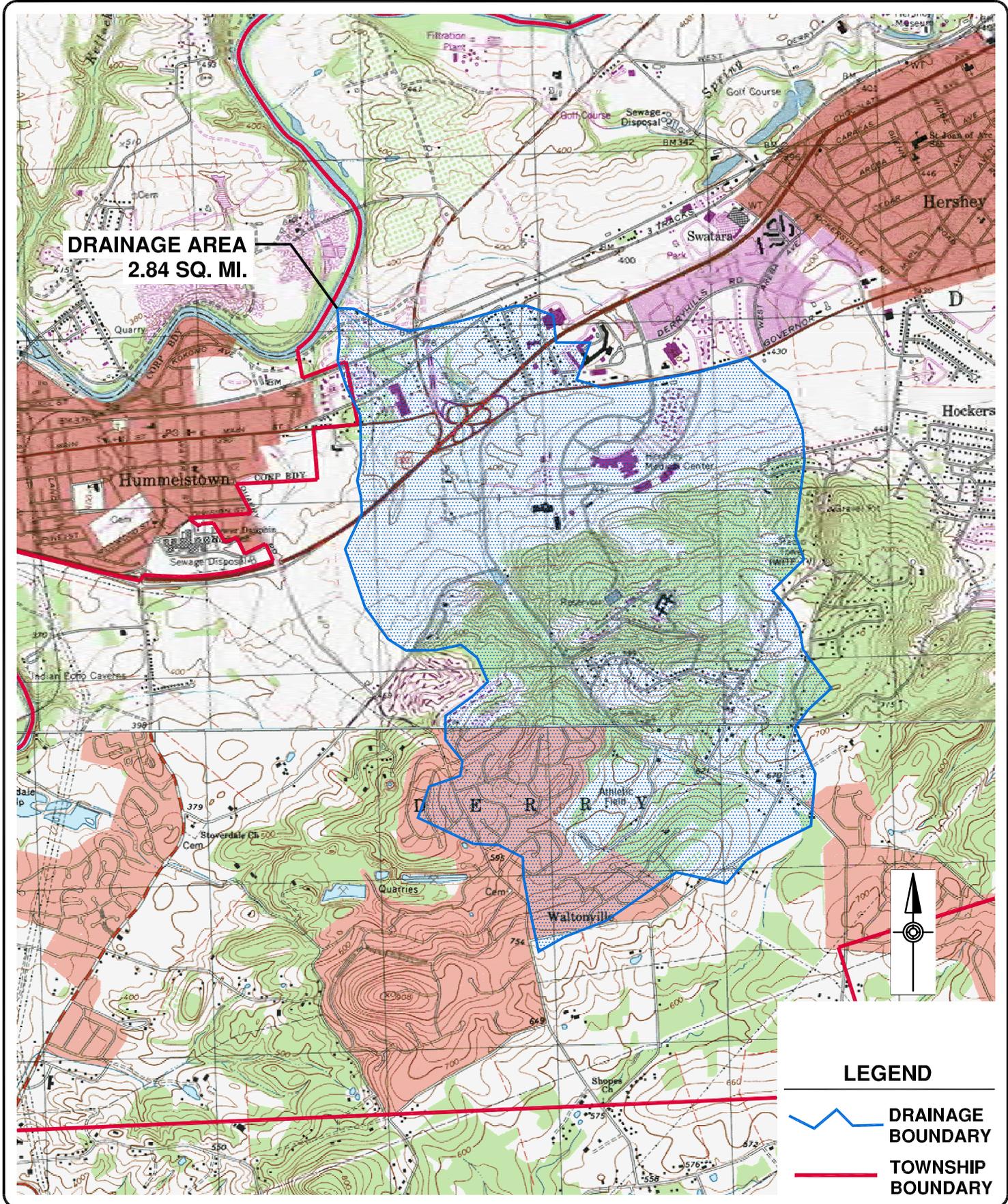
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**DERRY TOWNSHIP**  
**STORMWATER MANAGEMENT STUDY**  
**SPRING CREEK WATERSHED**  
**DRAINAGE AREA BOUNDARY**

DERRY TOWNSHIP      DAUPHIN COUNTY      PENNSYLVANIA

PROJ. MGR. - MSB
DESIGN- ATB
CADD-
CHECKED-
SCALE- 1" = 500'
DATE- 6-30-08

FIGURE NO.
<b>1</b>
SHEET NO.
<b>1 OF 37</b>
PROJECT 2484.0022



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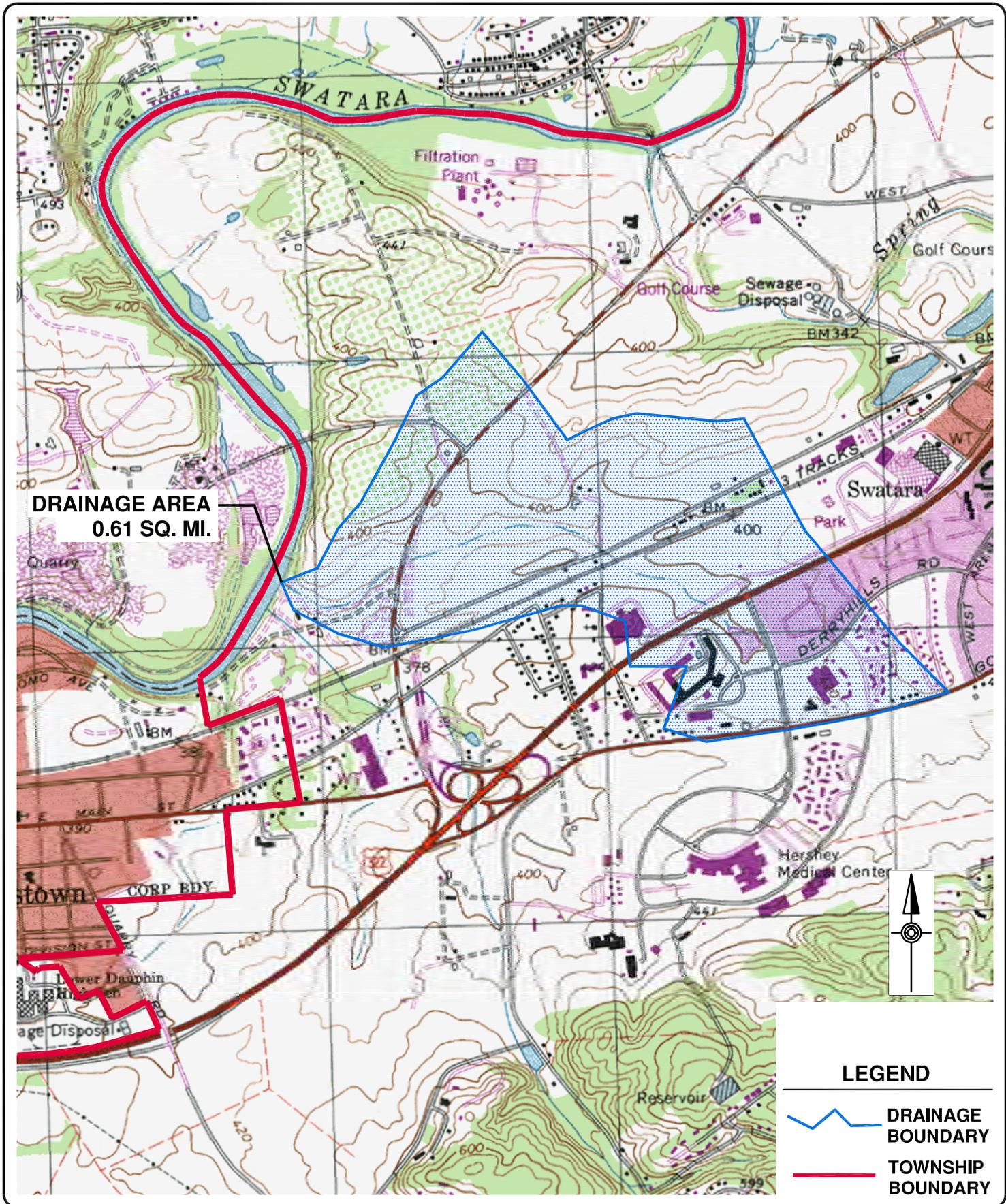
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**DERRY TOWNSHIP**  
**STORMWATER MANAGEMENT STUDY**  
**BULLFROG VALLEY RD / HERSHEY PARK DR**  
**DRAINAGE AREA BOUNDARY**

DERRY TOWNSHIP      DAUPHIN COUNTY      PENNSYLVANIA

PROJ. MGR. - MSB
DESIGN - ATB
CADD -
CHECKED -
SCALE - 1" = 2500'
DATE - 6-30-08

FIGURE NO.
<b>2</b>
SHEET NO.
<b>2 OF 37</b>
PROJECT 2484.0022



**DRAINAGE AREA**  
0.61 SQ. MI.

**LEGEND**

 **DRAINAGE BOUNDARY**

 **TOWNSHIP BOUNDARY**

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**DERRY TOWNSHIP**  
**STORMWATER MANAGEMENT STUDY**  
**HIGHMEADOW CAMPGROUND - TRIB. 2**  
**DRAINAGE AREA BOUNDARY**

DERRY TOWNSHIP      DAUPHIN COUNTY      PENNSYLVANIA

PROJ. MGR. - MSB  
DESIGN - ATB  
CADD -  
CHECKED -  
SCALE - 1" = 1500'  
DATE - 6-30-08

FIGURE NO.  
**3**

SHEET NO.  
**3 OF 37**

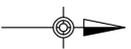
PROJECT 2484.0022

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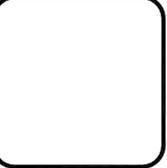
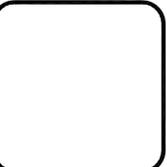


## PRIORITY AREA IDENTIFICATION

1	MILL STREET / CHERRY DRIVE
2	COCOA AVENUE / GOVERNOR ROAD
3	COCOA AVENUE BETWEEN ELM AND AREBA
4	FOREST AVENUE, CLARK AND SAND HILL ROADS
5	HERSHEY PARK DRIVE - SHOPPING CENTER
6	WOOD ROAD AT BULLFROG VALLEY ROAD
7	EAST CHOCOLATE AVENUE
8	SUNSET DRIVE
9	LUCY AVENUE
10	MILL ROAD UNDERPASS
11	PALMDALE PARK AND ROUTE 422
12	WEST CHOCOLATE AT SWATARA AVENUE
13	ROUTE 422 / 322 INTERCHANGE
14	NORFOLK SOUTHERN RR NEAR SIPE AVENUE
15	BINDNAGLE ROAD
16	HIGHMEADOW CAMP PARKING LOT
17	WEST MANSION ROAD



NO.	REVISION	DATE	BY



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**DERRY TOWNSHIP**  
**STORMWATER MANAGEMENT**  
**IMPLEMENTATION STUDY**

**STORMWATER PRIORITY AREAS**  
**INDEX MAP**

DAUPHIN COUNTY  
PENNSYLVANIA

PROJ. MGR. - MSB
DESIGN - ATB
CADD -
CHECKED -
SCALE - NTS
DATE - 11-4-08

DRAWING NO.	<b>A</b>
SHEET NO.	<b>A</b>
OF	<b>A</b>
PROJECT	2484-0429