BASIN EXHIBIT B

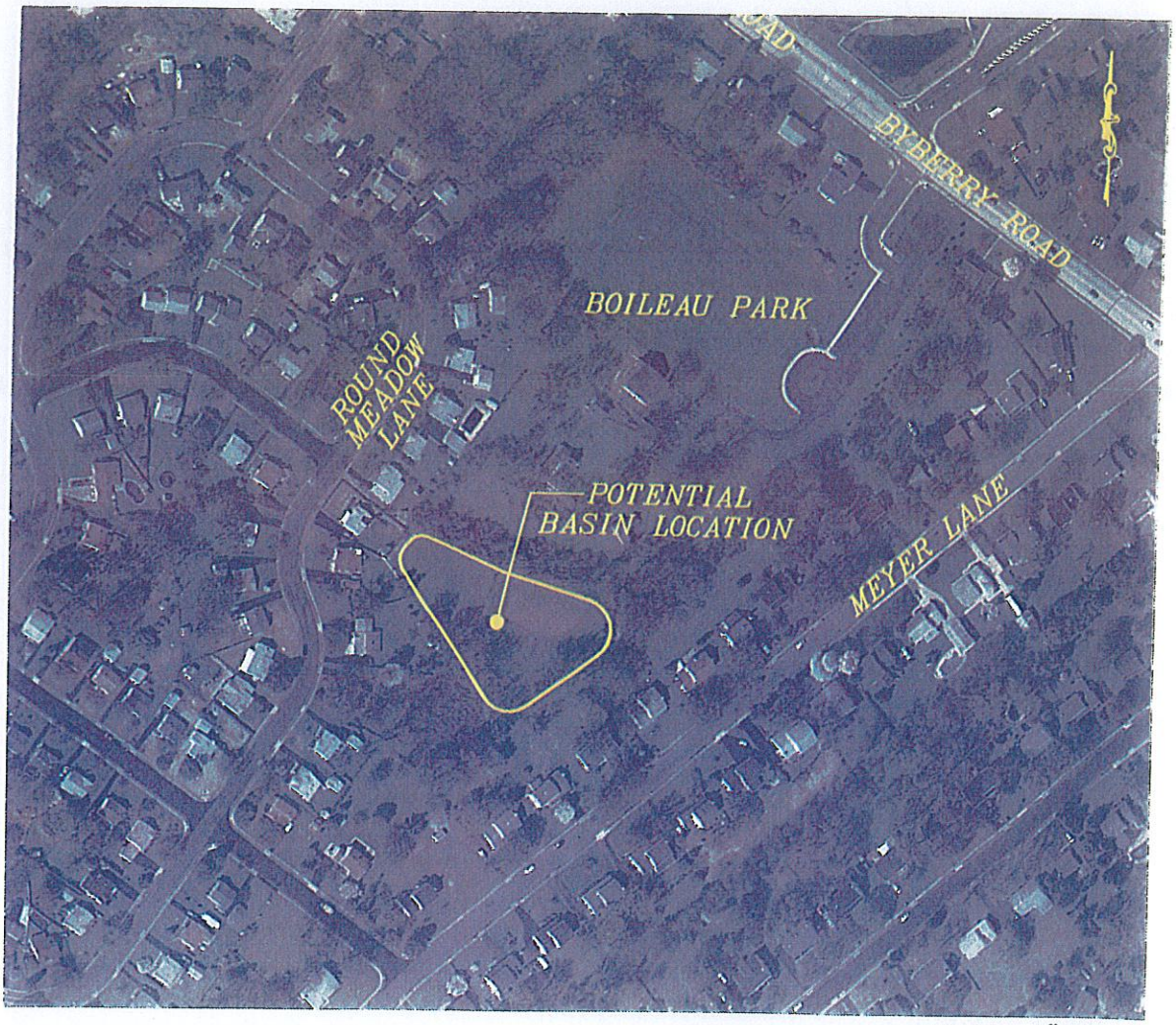
Basin Location: Boileau Park

Area: Approximately 1.2 acres

Depth: Approximately 3 feet

Storage: Approximately 3.6 acre-feet

Notes: Basin location is identified in 2009 PennVEST grant application. The area is within a Township owned park and could potentially help solve the problem identified in Exhibit 5.6.



SCALE: 1"=300'

BASIN EXHIBIT C

Basin Location: Butternut Drive

Area: Approximately 1.4 acres

Depth: Approximately 3 feet

Storage: Approximately 4.2 acre-feet

Notes: Basin location is identified in 2009 PennVEST grant application. There is an existing basin at the end of Butternut Drive that could be made larger to hold back more water.

SCALE: 1"=300'

BASIN EXHIBIT F

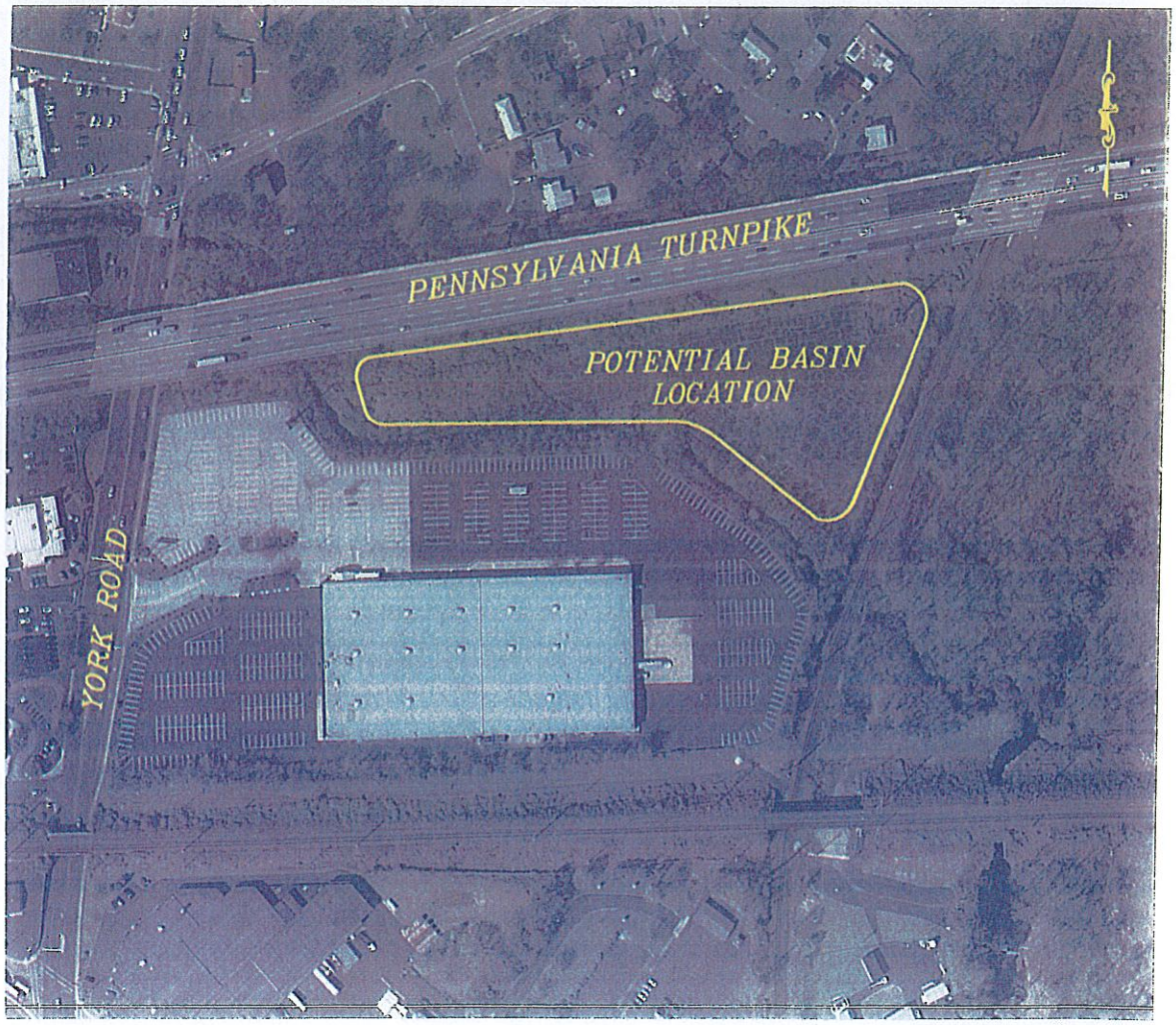
Basin Location: Former Sam's Club Parking Lot

Area: Approximately 3.9 acres

Depth: Approximately 3 feet

Storage: Approximately 11.7 acre-feet

Note: This location is identified in the 2009 PennVEST grant application. The parcel is not currently owned by the Township and it is unknown how easily the land could be obtained.



SCALE: 1"=300'

BASIN EXHIBIT N

Basin Location: Woodlawn Park

Area: Approximately 0.5 acres*

Depth: Approximately 3 feet

Storage: Approximately 1.5 acre-feet*

*Area and Storage represent the sum of both locations.

Note: A basin could be implemented within this Township owned park without the need to remove the existing baseball field.

SCALE: 1"=200'

BASIN EXHIBIT P

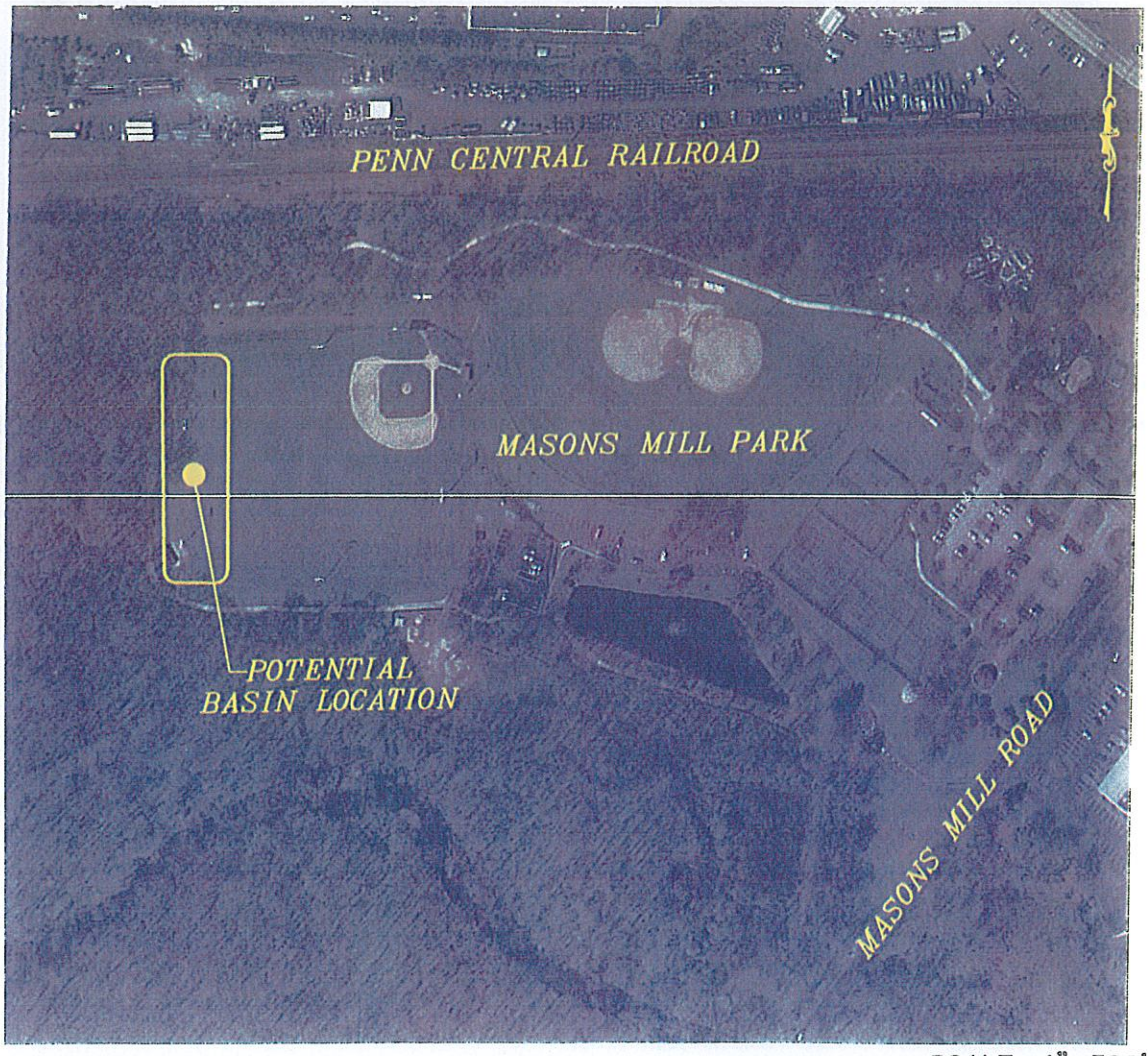
Basin Location: Masons Mill Park

Area: Approximately 0.8 acres

Depth: Approximately 3 feet

Storage: Approximately 2.4 acre-feet

Notes: A basin project could be implemented at this location without the need to remove any of the existing athletic fields.



SCALE: 1"=300'

BASIN EXHIBIT R

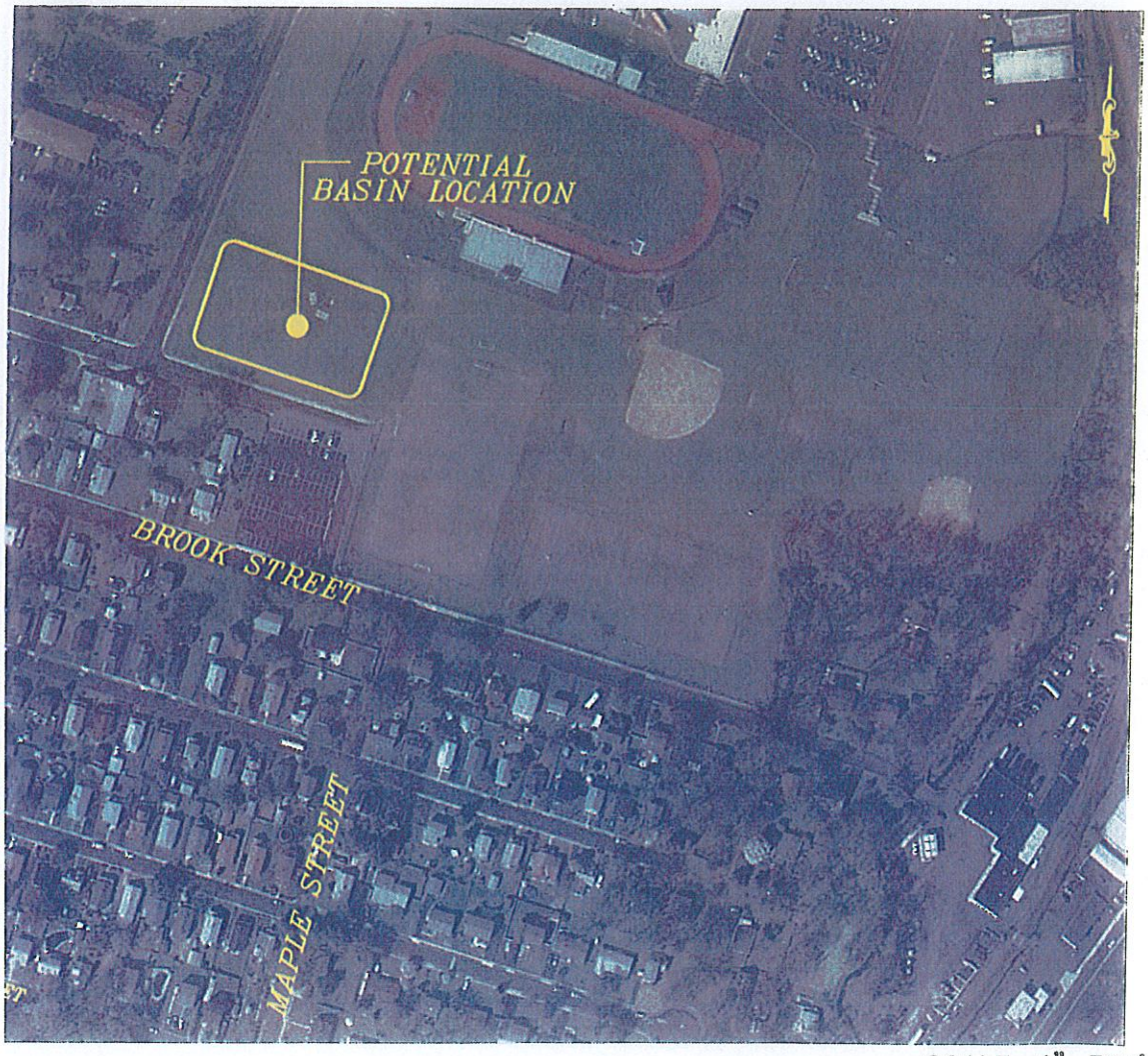
Basin Location: Former Cold Springs Elementary

Area: Approximately 1.7acres

Depth: Approximately 3 feet

Storage: Approximately 5.1 acre-feet

Notes: The existing soccer fields located on the south side of the property in the location of the former Cold Springs Elementary school have irrigation systems that were recently installed. The potential basin location depicted below is in the vicinity of the shot putt / discus track and field equipment. If the school district agreed to move the equipment to another area on site, this may be a viable basin location; however, a detailed analysis of the contributing drainage area and topography of the site would need to be conducted to determine if this location is suitable for the construction of a stormwater basin.



SCALE: 1"=300'

BASIN EXHIBIT S

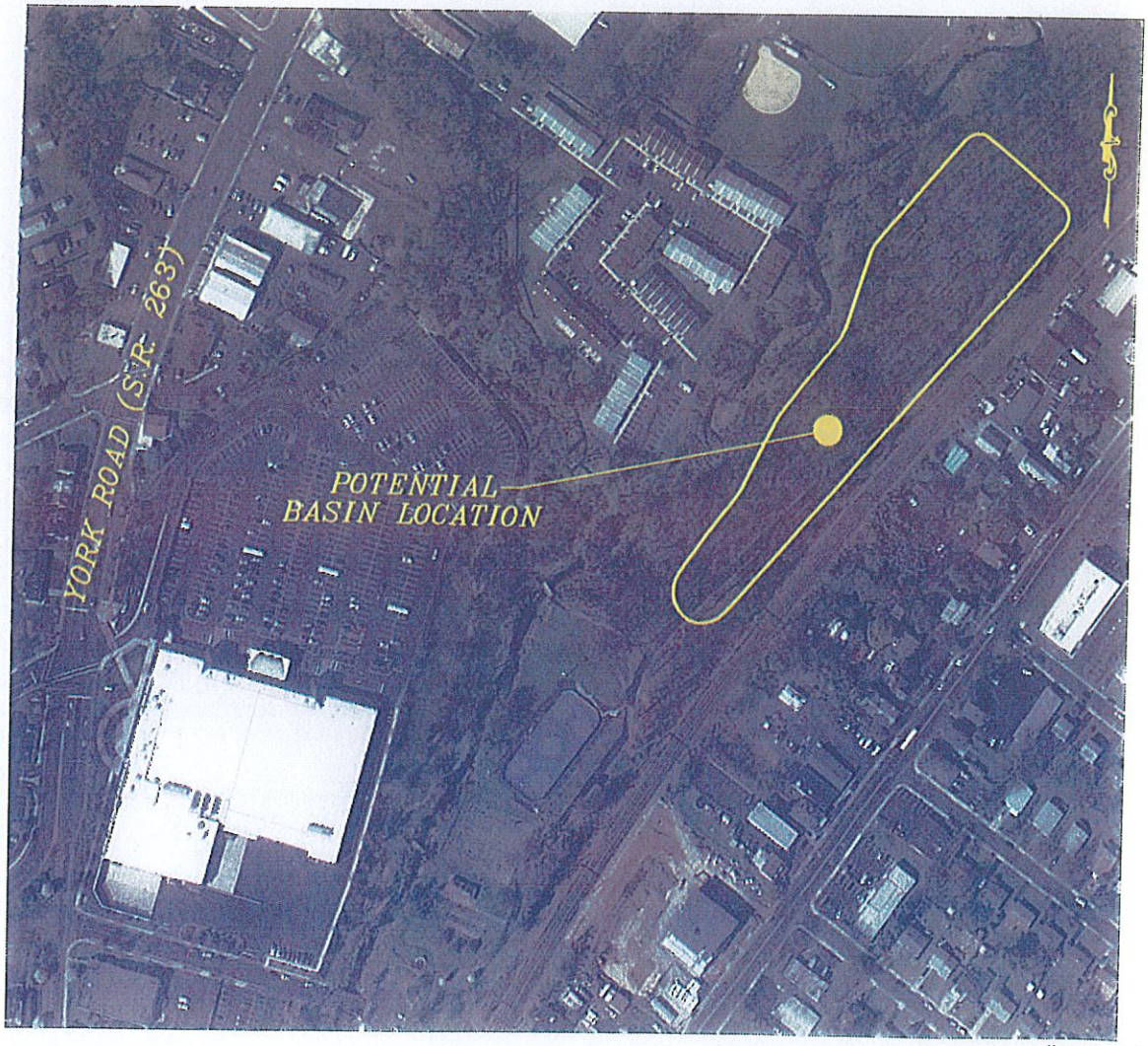
Basin Location: Township Open Space adjacent to Veteran's Memorial Park

Area: Approximately 3.3 acres

Depth: Approximately 3 feet

Storage: Approximately 9.9 acre-feet

Notes: Giant Super Market was identified by the sub-committee as a potential basin location; however, the super market has an existing underground basin on site that would be very costly to increase in size. Additionally, there is a steep grade change in the area between the development and the creek, which would not be a viable place to put a basin. The location highlighted below is on Township owned property that is adjacent to Veteran's Memorial Park, although the area is 100% wooded, it may be a viable spot for a small basin or several small basins around existing trees within the highlighted area.



SCALE: 1"=300'

BASIN EXHIBIT J

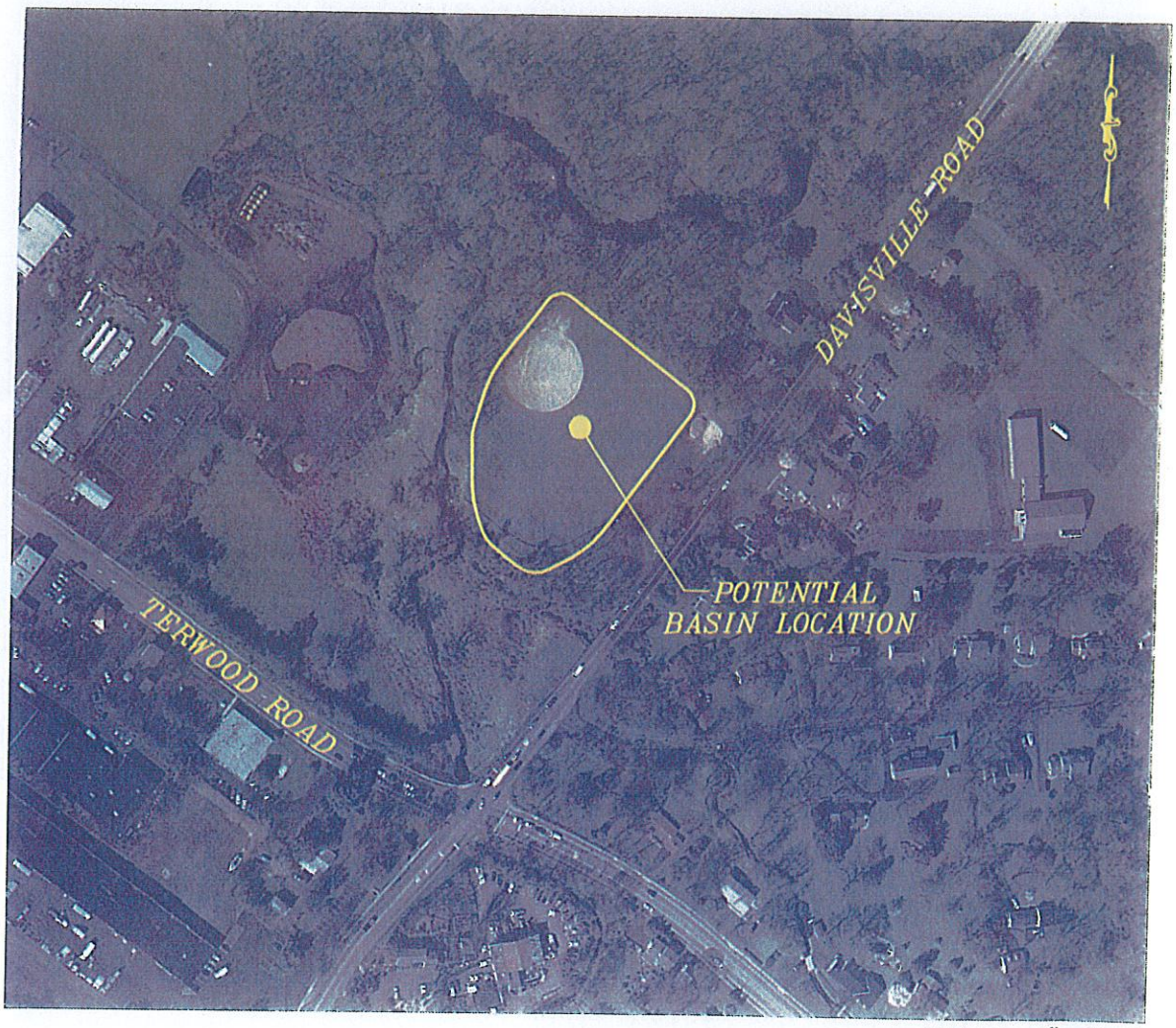
Basin Location: Terwood Park

Area: Approximately 2.3 acres

Depth: Approximately 3 feet

Storage: Approximately 6.9 acre-feet

Notes: This location is identified in the 2009 PennVEST grant application. Implementation of the basin project to the extent highlighted below and in the grant application would require either the removal of the existing baseball field or a groundwater study to determine if the baseball field could function at a lower elevation. Additionally, the property is owned by the Upper Moreland Hatboro Joint Sewer Authority and leased to the Township, so any proposed development on the parcel would require UMHJSA approval.



SCALE: 1"=300'

BASIN EXHIBIT CC

Basin Location: Upper Moreland – Hatboro Joint Sewer Authority

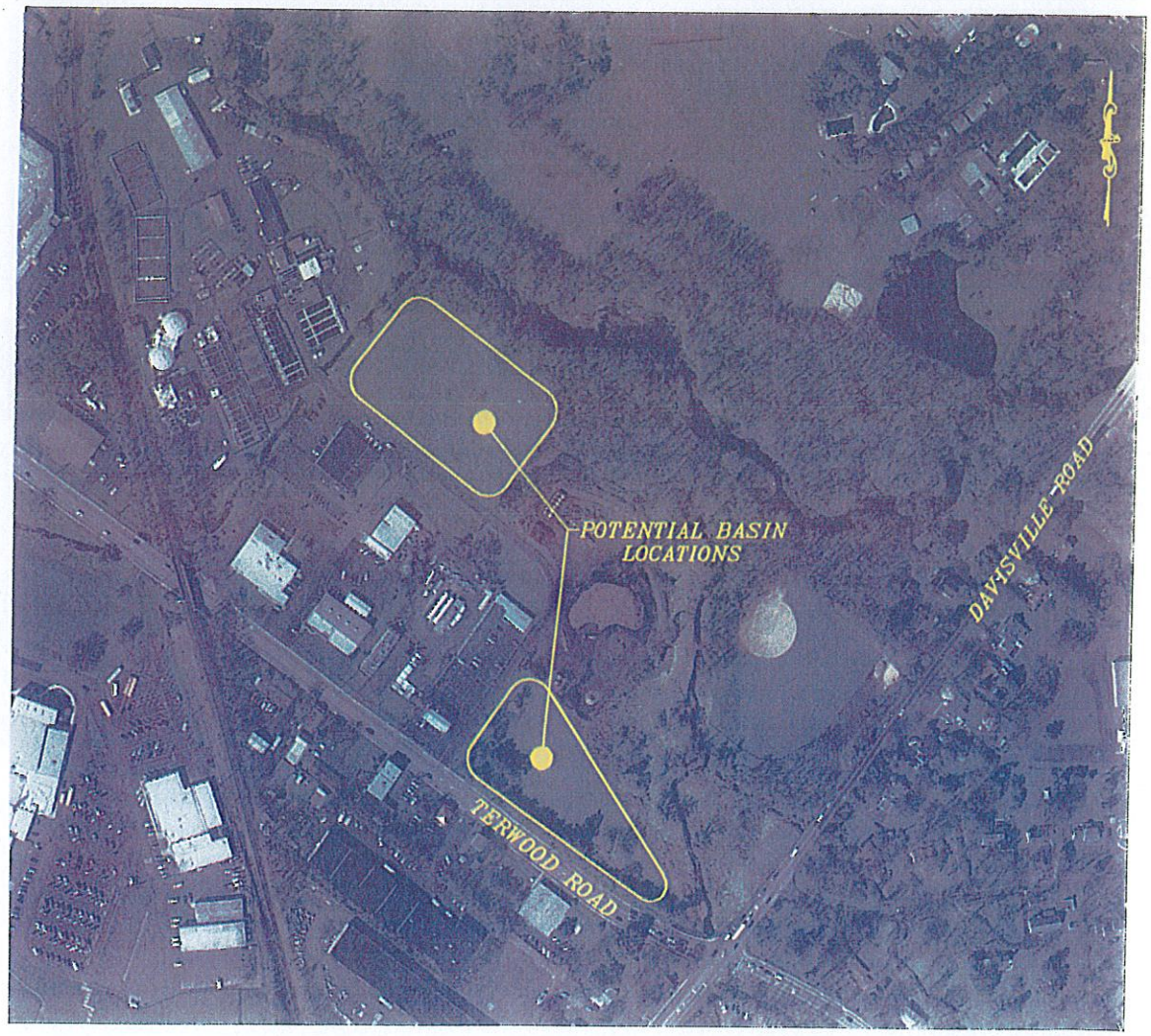
Area: Approximately 4.3 Acres*

Depth: Approximately 3 feet

Storage: Approximately 12.9 acre-feet*

* Area and Storage represent sum of both potential locations.

Notes: The property is owned by the UMHJSA and any basin project would require coordination and an agreement with the authority. The northern location highlighted below is adjacent to the creek and could provide additional storage during flood events and reduce the severity of flooding downstream. A detailed analysis of the topography of the site, contributing drainage area, and existing stormwater infrastructure in the area would be necessary to determine if a basin project could be implemented on this site.



SCALE: 1"=400'

BASIN EXHIBIT BB

Basin Location: Little League Park

Area: Approximately 3.5 Acres

Depth: Approximately 3 feet

Storage: Approximately 10.5 acre-feet

Notes: Implementing a stormwater project on the property would require coordination and an agreement with the little league association. In order to construct a basin on this property either one or more baseball fields would need to be removed or a groundwater study done to determine if the baseball fields could function at a lower elevation.

SCALE: 1"=300'

BASIN EXHIBIT Y

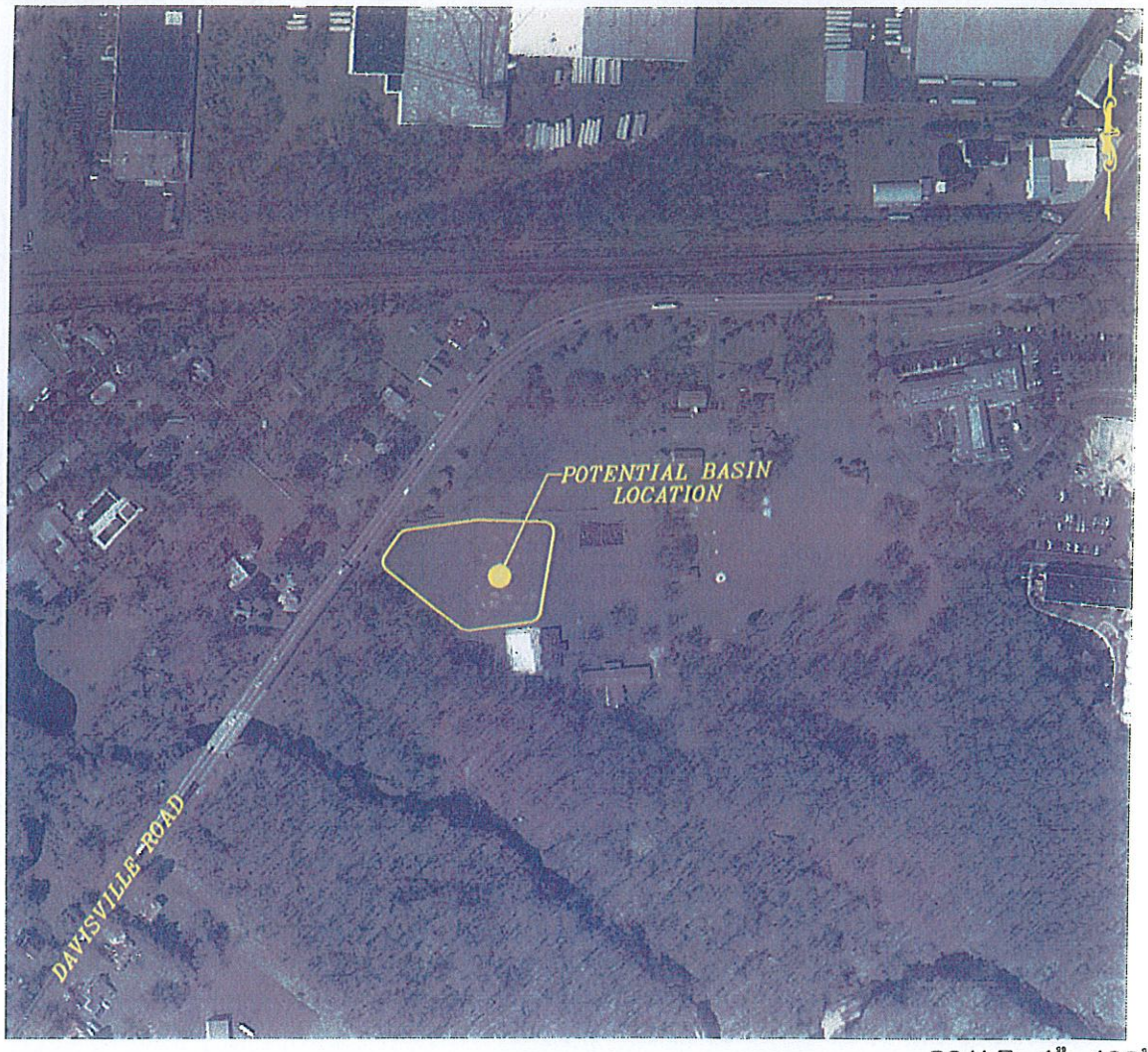
Basin Location: Carson-Simpson Farm Christian Center

Area: Approximately 1.5 Acres

Depth: Approximately 3 feet

Storage: Approximately 4.5 acre-feet

Notes: A basin could be implemented on the Carson-Simpson Farm property. This location is on private property and it is unknown whether the owner would be interested in letting the Township install a basin on the property.



SCALE: 1"=400'

BASIN EXHIBIT Z

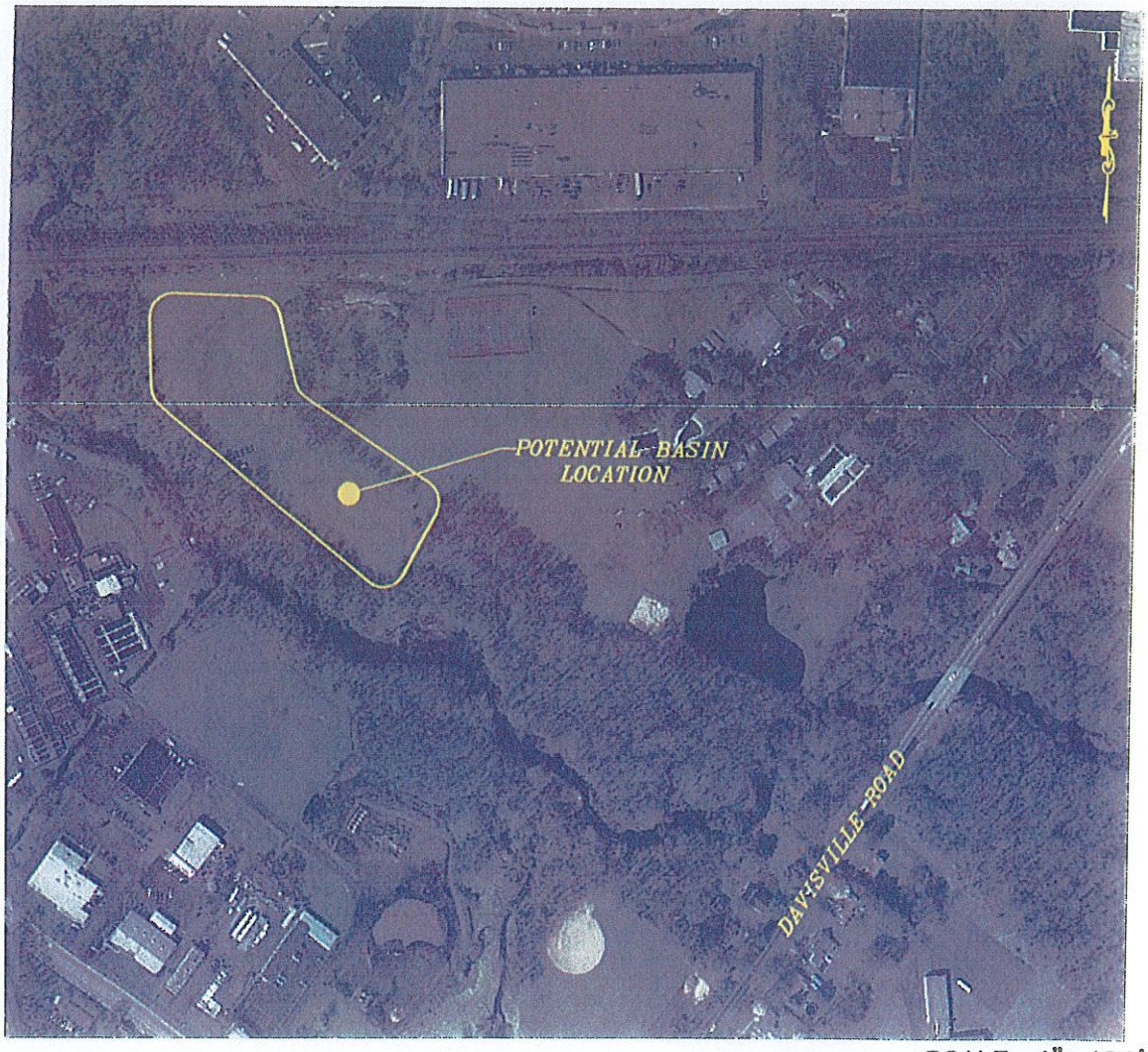
Basin Location: Willow Grove Day Camp

Area: Approximately 4.1 Acres

Depth: Approximately 3 feet

Storage: Approximately 12.3 acre-feet

Notes: A basin could be implemented on the Willow Grove Day Camp property. This location is on private property and it is unknown whether the owner would be interested in letting the Township install a basin on the property.



SCALE: 1"=400'

BASIN EXHIBIT O

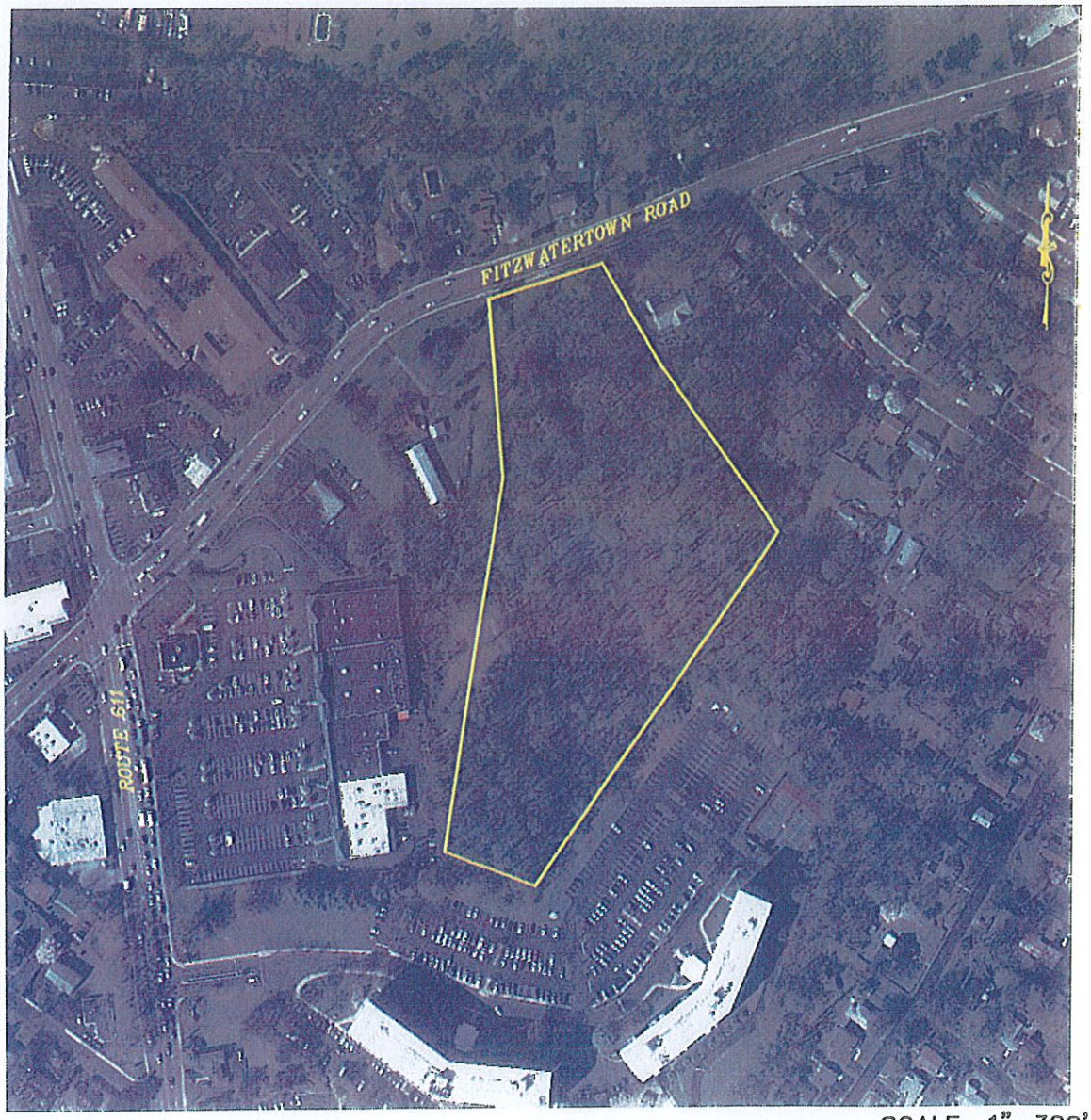
Basin Location: Beuhler Park

Area: NA

Depth: NA

Storage: NA

Notes: The existing park is 90-95% wooded and therefore does not represent a viable option for basin placement.



SCALE: 1"=300'

XI. Recommendations

Based on the information contained in the report, the stormwater sub-committee recommends the Township take the following actions to implement improvements to meet the goals outlined earlier in the report:

A. Once all input is received from the public, commissioners, township staff and other stakeholders, the Township should adopt, via resolution, this report as the official stormwater management improvement implementation plan to guide the Township in making improvements, applying for grants, fixing problem areas, etc.

B. This report recommends that all Category 1 problems be explored and fixed (where possible) before moving onto Category 2 problems. Since solutions to Mill & York Road and Warminster Road near Surrey Lane have been previously explored and the remaining residents declined to be "bought out" of their properties, these two issues should be considered "closed" by the Township. Further, since the Robert Bruce Apartments have been previously analyzed and determined that no localized solution exists, this issue should also be considered "closed" by the Township. As such, the remaining two issues: 2603 Broadway and the single-family home on Davisville Road are the highest priority issues to address. The Township should authorize further investigation of these two issues prior to moving onto Category 2 problems.

C. A large majority of the existing stormwater problems identified in the Township are due to creek flooding and backwater conditions. The problems are not localized drainage issues. As such, besides the two issues identified in Item B above, the Township should concentrate all available resources and funding to implement the BMPs identified in Section X of this report.

D. Unless a specific grant requirement or partnering source affects the BMP project chosen to be implemented, the Township should follow the priority listing of potential basins identified in Section X as the analysis is based on the basin that provides the maximum benefit for the entire Township.

E. There are numerous locations on Township owned land where small BMPs, like rain gardens, could be implemented. Since these smaller BMPs will not have the same regional benefit as large basins the Township should not expend resources to implement these types of BMPs until significant progress has been made with regards to the BMPs outlined in Section X of this report. *This approach was supported by the majority of the commissioners during the interview process.*

F. This report identifies numerous grant programs available to help implement stormwater improvements. The Township should assign a staff member in charge of tracking grant opportunities in conjunction with the Township Engineer and Redevelopment Coordinator.

G. The Township should contact all of the potential partners identified in this report. We suggest the primary contact be via the Township Manager's office

in the form of a letter which could even attach a copy of this report along with a follow-up phone call. The secondary contact should be at the elected official level based on personal and/or political relationships.

H. Place one of the following or both proposals on an upcoming election ballot as referendum questions:

   i. Support of a tax increase dedicated to stormwater management improvements to address flooding and drainage concerns in Upper Moreland Township. *Based on the commissioner interviews, 5 of the 7 commissioners believed their residents could support a 2% increase.*

   ii. Support of the Township borrowing a large sum of money (ex: 10 million dollars) towards the implementation of stormwater management improvements in accordance with the findings of this report. *This large sum would likely be used to make several projects "shovel ready" and as the required matching funds for a grant program.*

I. A stormwater permit fee for building permits is worth adopting in the event a tax increase dedicated to stormwater management improvements is not implemented.

J. Money from the Township's existing Tree Replacement Fund should be utilized in stormwater management projects specifically where plantings are needed in BMPs such as rain gardens, basin retrofits, riparian buffer restoration, stream bank stabilization, etc.

K. Authorize the professional staff to negotiate with developers regarding tree replacement fund money being applied to the stormwater management fund. The contributed amount could be a portion of the total that would be required to be contributed to the tree replacement fund (85%). The "discount" would provide incentive for the developer to contribute the money to the stormwater fund.

L. The Township should authorize the professional staff to work with in-house staff to develop an ordinance amendment that provides an incentive for developers to exceed the requirements of the Township Stormwater Management Ordinance in exchange for an increase in density or impervious coverage or building coverage, but not height. The incentive would allow for a 25% incentive when the stormwater requirements are exceeded by more than 25% for all design storms as determined by the Township Engineer.

M. The Parks & Recreation Director should identify areas within the Township park system that could be converted from lawn to low-mow/no-mow areas for approval by the Board of Commissioners.

N. There are three major routes to get from one side of the Township to the other; Easton Road (SR 0611), York Road (SR 0263) and Davisville Road (SR 2042). At current time, Easton Road represents the best route for emergency service purposes during storm events since it's higher in the

watershed and recent improvements to the UPS facility and Horsham Gate in Horsham Township and Willow Pointe in Upper Moreland Township have significantly reduced flooding at the intersection with Maryland Road. Davisville Road represents the next best route as the area that experiences flooding has fewer constraints to implement future road and drainage improvements when compared to York Road. York Road closes at Mill Road, but due to the Turnpike overpass and SEPTA regional rail line it is very constrained with regard to potential improvements.

O. At present time its unclear if the creation of a stormwater authority is allowed by law. However, the sub-committee does not recommend the creation of a new Stormwater Authority unless it's multi-municipal. If the Township wishes to explore the possibility of a multi-municipal authority, we recommend the Township Manager reach out to gauge interest with the neighboring municipalities who contribute flow to the Pennypack Creek as identified in this report.

P. Amending the Township By-Laws for the creation of a Stormwater Committee is not recommended since stormwater management is a standing agenda item on the existing Community Development Committee meeting agenda. Also, the stormwater sub-committee that helped prepare this report can meet as necessary when stormwater management issues arise.

Q. This report and its recommendations should be considered a constantly evolving document that is always being updated as new information becomes available. As such, a semi-annual review of its contents should be performed to determine if the policy set forth herein is still applicable and the most-effective approach to guarantee the health, safety and welfare of the residents, business community and the general public that commutes through the Township each day.

Appendix A

Existing Stormwater Problem Master List

Upper Moreland Township - Stormwater Project Priority Rating System									
Project Location	Report Exhibit #	Category	Frequency of Flooding	Depth of Flooding	Duration of Flooding	Emergency Response Delay	ADT Affected	Estimated Project Cost*	Average Score
Edge Hill & Moreland Road	1.1	3	1	3	1	3	3	$10,000	2.20
Quigley Road	1.2	2	3	3	3	3	3	$100K - $500K	3.00
Evans Circle & Quigley Road	1.3	3	2	3	2	3	3	$10,000	2.60
Frazier & Evans Circle	1.4	2	1	1	2	2	3	$100K - $500K	1.80
Inman Road near Frazier	1.5	3	2	3	2	3	3	$10,000	2.60
239 Cowbell Road	1.6	2	2	2	3	2	3	$100K - $500K	2.40
Division & Krewson Street	1.7	2	3	3	3	3	3	$25,000	3.00
Church & Cherry Streets	1.8	2	1	2	2	2	3	$500K - $1M	2.00
Norwyn & Shirley Road	2.1	2	1	1	2	1	3	$500K - $1M	1.60
Robert Bruce Apartments	2.2	1	1	1	1	1	3	NA	1.40
Monument Avenue	2.3	2	2	2	3	2	2	$1M - $1.5M	2.20
2603 Broadway	2.4	1	1	1	1	1	3	$10,000	1.40
Parkside at Sycamore	2.6	3	1	3	3	3	3	$10,000	2.60
Costello Avenue near Lynn	2.7	3	1	3	3	3	3	$10,000	2.60
Blair Mill near County Line	2.8	2	1	1	2	2	1	$1M - $1.5M	1.40
Blair Mill between Broadway & Parkside	2.9	3	2	2	3	3	3	$10,000	2.60
Commerce Avenue Apartments	3.1	3	2	3	2	3	3	$25,000	2.60
523 Grant Street	3.2	2	1	3	3	2	3	< $100K	2.40
Duffield Street (natural spring)	3.3	2	1	3	3	3	3	< $10,000	2.60
Lincoln Avenue & York Road	3.4	2	1	2	2	1	3	NA	1.80
Green Willow Run Apartments	3.5	3	1	1	2	3	3	NA	2.00
Fitzwatertown Road	3.7	3	2	1	2	3	3	NA	2.20
401 & 403 Crown Street	3.8	3	2	3	2	3	3	$10,000	2.60
Route 611 & Maryland Road	4.1	2	1	1	2	1	1	NA	1.20
Whitehall Drive near Hideaway	4.2	2	1	1	3	2	2	NA	1.80
Dogwood Lane Cul-de-sac	4.3	3	2	3	3	3	3	$25,000	2.80
Cameron & Sheldon Road	4.4	2	1	2	2	3	3	$100K - $500K	2.20
Sheldon Road between Ellis & Fitzwatertown	4.5	2	1	3	3	3	3	< $100K	2.60
Maryland Road (stream erosion)	4.6	3	3	3	3	3	3	$100K - $500K	3.00
Mill & York Road	5.1a	1	1	1	1	1	1	NA	1.00
Mill & York Road	5.1b	2	1	1	1	1	1	NA	1.00
Warminster Road near Lori & Surrey Lane	5.2a	1	1	2	1	2	3	NA	1.80
Warminster Road near Lori & Surrey Lane	5.2b	2	1	2	1	2	3	NA	1.80
Bonnett Lane at St. Dunstans Road	5.3	2	1	1	1	3	3	NA	1.80
4115 Hoffman Road	5.4	3	2	2	2	3	3	$10,000	2.40
Exton & Orangeman's Intersection	5.5	2	1	1	3	1	2	$100K - $500K	1.60
3800 Meyer Lane	5.6	3	2	2	2	3	3	$10,000	2.40
Davisville Between Terwood & Carson-Simpson	6.1a	1	1	1	1	1	1	$5,000	1.00
Davisville Between Terwood & Carson-Simpson	6.1b	2	1	1	1	1	1	NA	1.00
Terwood Road Tributary	6.2	2	1	2	2	1	2	NA	1.60
1400 Terwood Road (PennDOT to fix)	6.3	2	3	3	3	3	2	< $10K	2.80
Byberry Road Bridge near Pioneer	6.4	2	1	1	1	1	1	$2M	1.00
Mason's Mill Road Bridge	6.5	2	1	1	1	1	2	$2M	1.20
Huntingdon Road at Mason's Mill	6.6	3	2	2	3	3	3	$25,000	2.60
2105 Huntingdon Road	6.7	3	2	2	2	3	3	NA	2.40
Fern Village Park at Exton Road	7.1	2	3	3	3	3	3	< $100K	3.00
							Total Cost:**	**$12,525,000**	

Average score is the average score obtained for each project when taking into account the 5 criteria's numeric amount assigned. The lower the average, the higher the priority.

*** Estimated Project Costs with "NA" represents project that do not have a localized solution. Only regional basins will help alleviate flooding in these areas.***

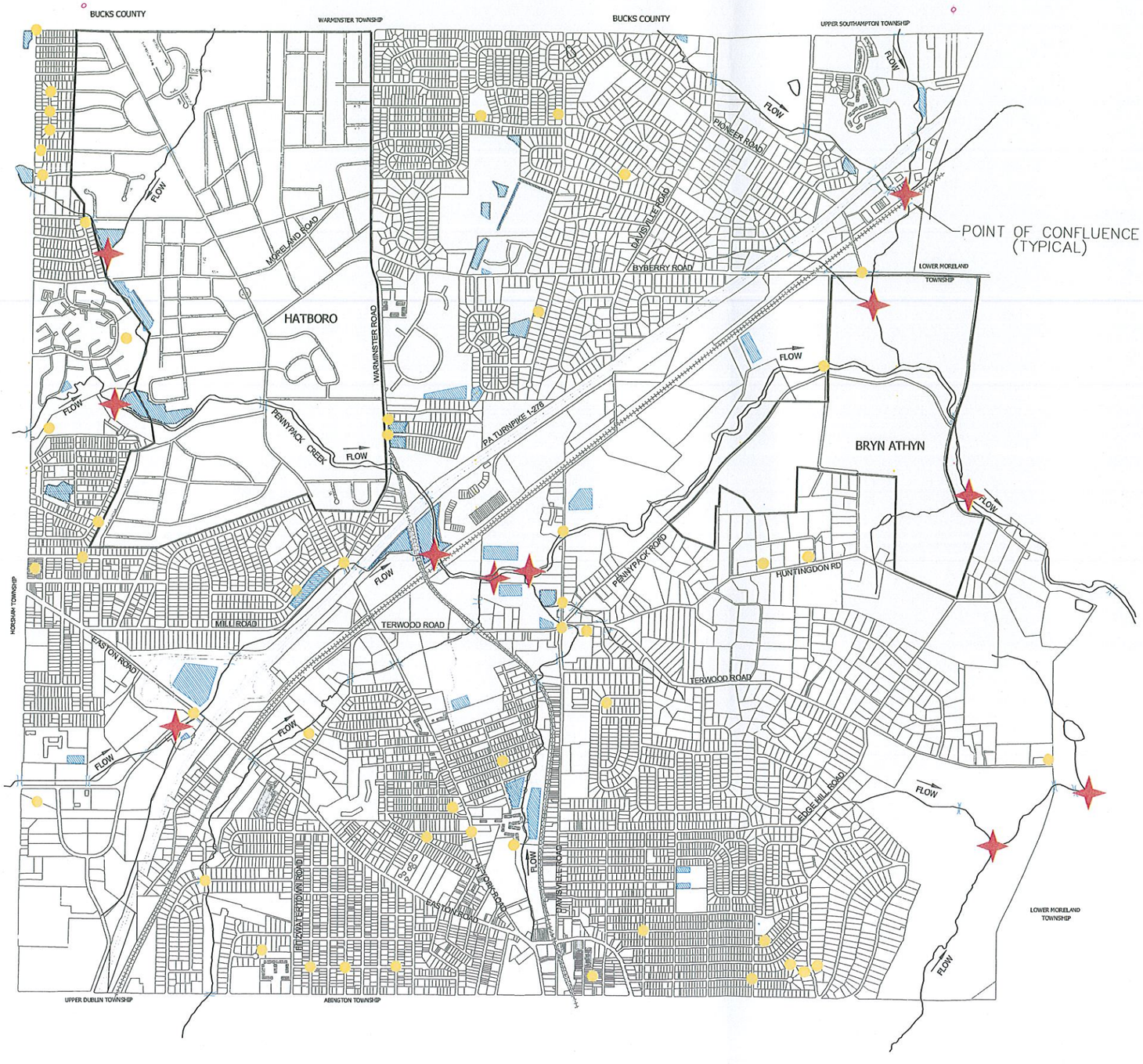
**** Total Cost is based on higher value for projects where estimated cost is given as a range.***

Appendix B

Potential Basin Location Map

POTENTIAL BASIN LOCATION MAP

UPPER MORELAND TOWNSHIP, MONTGOMERY COUNTY



LEGEND

- EXISTING STORMWATER PROBLEM
- POINT OF CONFLUENCE
- POTENTIAL BASIN LOCATION

REV.	DESCRIPTION	DATE	BY

POTENTIAL BASIN LOCATION MAP

UPPER MORELAND TOWNSHIP

UPPER MORELAND TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

SCALE: NOT TO SCALE

DATE: 2-4-13

GILMORE & ASSOCIATES, INC.

ENGINEERING & CONSULTING SERVICES

JOB NO.: 12-01004

SHEET NO.: 1 OF 1

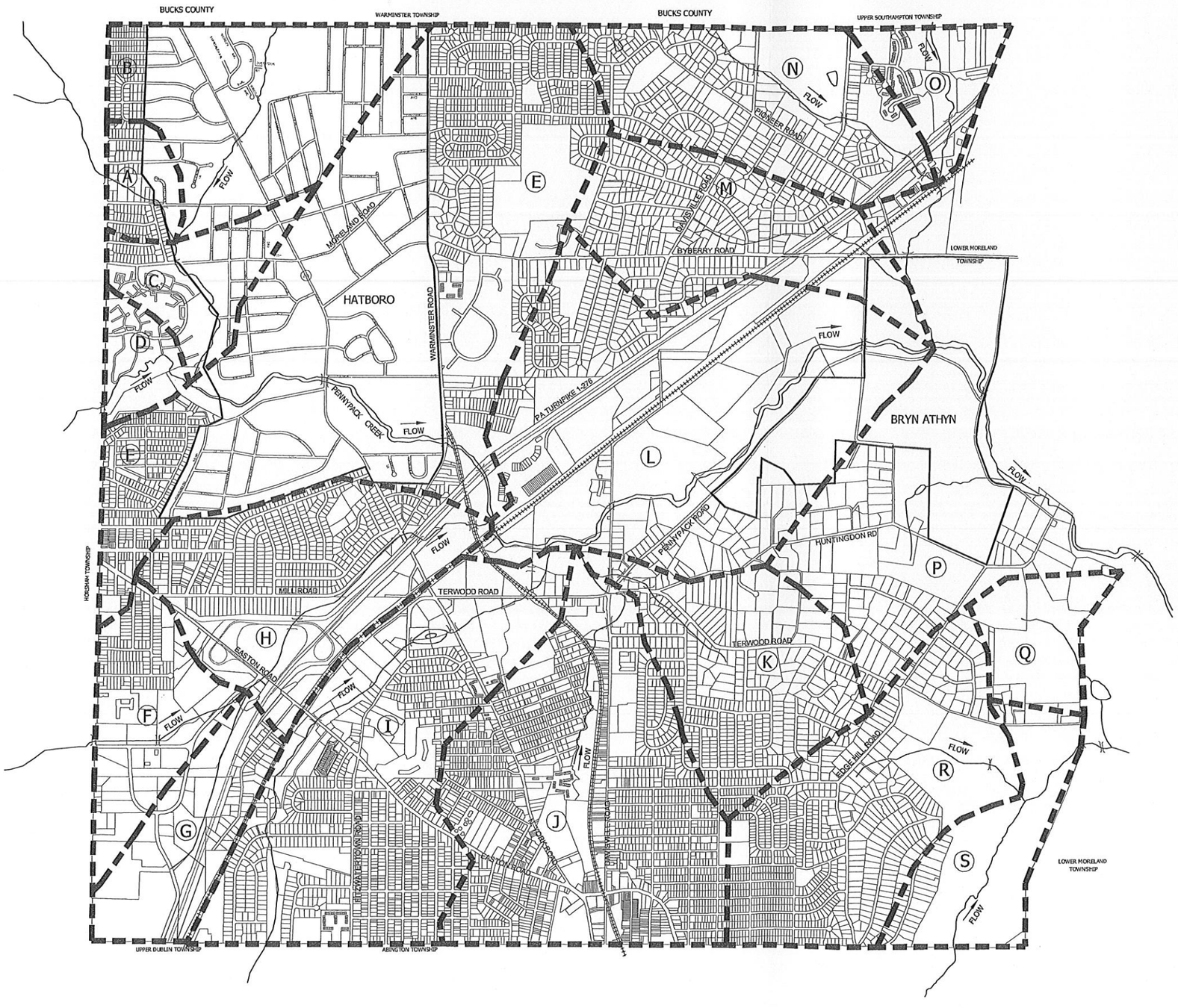
DESIGNED BY: JCG | DRAWN BY: JSH | CHECKED BY: JCG

Appendix C

Pennypack Creek Sub-Watershed Map

PENNYPACK CREEK SUB WATERSHED MAP

UPPER MORELAND TOWNSHIP, MONTGOMERY COUNTY



PENNYPACK CREEK SUB WATERSHED AREA	
SUB-WATERSHED	DRAINAGE AREA WITHIN UMT
A	40.5 AC.
B	28.6 AC.
C	58.8 AC.
D	58.6 AC.
E	531.0 AC.
F	175.1 AC.
G	168.2 AC.
H	352.4 AC.
I	549.2 AC.
J	575.0 AC.
K	284.8 AC.
L	631.1 AC.
M	262.3 AC.
N	320.7 AC.
O	94.7 AC.
P	266.6 AC.
Q	102.2 AC.
R	395.7 AC.
S	170.4 AC.
TOTAL	5,065.9 AC.

AREA FROM ADJACENT MUNICIPALITIES CONTRIBUTING FLOW TO THE PENNYPACK IN UMT	
ABINGTON TOWNSHIP	940 ACRES
BRYN ATHYN BOROUGH	302 ACRES
BOROUGH OF HATBORO	895 ACRES
HORSHAM TOWNSHIP	3,700 ACRES
UPPER DUBLIN TOWNSHIP	265 ACRES
UPPER SOUTHAMPTON TWP.	1,090 ACRES
WARMINSTER TOWNSHIP	3,100 ACRES
TOTAL	10,292 ACRES

NOTE: CONTRIBUTING AREAS TAKEN FROM THE PENNYPACK CREEK ACT 167 PLAN PREPARED BY THE TEMPLE UNIVERSITY CENTER FOR SUSTAINABLE COMMUNITIES.

REV.	DESCRIPTION	DATE	BY

SCALE: NOT TO SCALE
DATE: 2-4-13

PENNYPACK CREEK
SUB WATERSHED MAP
UPPER MORELAND TOWNSHIP
UPPER MORELAND TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

JOB NO.: 12-01004
SHEET NO.: 1 OF 1

DESIGNED BY: JEC | DRAWN BY: JJH | CHECKED BY: JEC