SOUTH WILMINGTON DRAINAGE STUDY

Prepared by

Rummel, Klepper & Kahl, LLP

For the City of Wilmington, Department of Public Works

September 2006

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Reference: South Wilmington Drainage Study

Subject: Final Engineering Report

Dear David Beattie:

Rummel, Klepper & Kahl, LLP (RK&K) is please to submit five copies of the final report of the *South Wilmington Drainage Study*. The report includes a description of areas subject to "nuisance" drainage problems, the identification of probable causes of these drainage problems and recommendations for each site. The report has been revised in accordance with review comments received during our July 18, 2006 meeting and an executive summary has been included. Copies of this report are also being sent to DNREC, New Castle County and the New Castle Conservation District.

Please contact Doug Sweeney or me if you have any questions or require additional copies of the report. We thank you for the opportunity to provide our services for this important project as well as the Steering Committee's assistance throughout project.

Very truly yours,

RUMMEL, KLEPPER & KAHL, LLP

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CITY OF WILMINGTON

DEPARTMENT OF PUBLIC WORKS

SOUTH WILMINGTON DRAINAGE STUDY

September 2006

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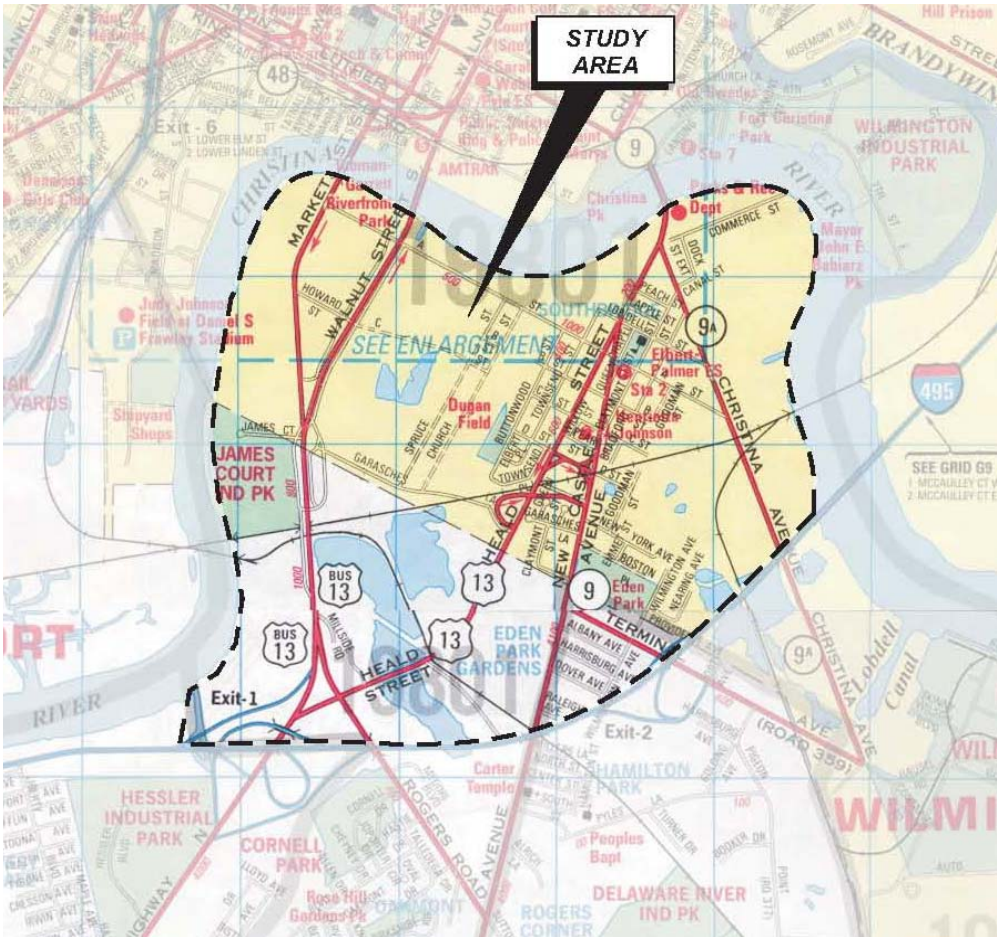
1.0 Introduction

The South Wilmington area is geographically defined as the area bounded by the Christina River to the north, east and west and I-495 to the south and is shown in the map below. The drainage study maps the existing drainage systems in this area, identifies locations with chronic flooding problems and provides some solutions to address these problems.



2.0 Drainage Problem Areas

The problem areas where flooding frequently occurs are depicted in the map on the next page and in Table 1.

Christina River

Market St.

Walnut St.

Howard St.

A St.

Garasches Ln.

CSO # 10

Site # 1

CSO # 9C

Site # 3

B St.

Site # 2

C St.

Site # 4

Site # 5

D St.

Site # 6

Site # 7

New Castle Ave.

New York Ave.

Christina Ave.

495

Heald St.

Terminal Ave.

Site # 8

N

South Wilmington Drainage Study

RK&K

Problem Drainage Areas

Scale	Date
1" = 600'	September 2006

Legend

Manholes	Sewers
Combined	Combined
Sanitary	Sanitary
Storm	Storm

- Problem Drainage Site
- CSO
- Corporate Boundary
- Flow Direction

Table 1 Identified Drainage Problem Areas in South Wilmington	
Site No.	Location
1	A Street at Buttonwood Street
2	A Street at Bradford Street
3	B Street near Townsend Street
4	D Street from South Heald Street to Buttonwood Street
5	New Castle Avenue near C Street
6	New Castle Avenue near D Street
7	Traffic Loop near Garasches Lane and South Heald Street
8	South Heald Street near Magnus Tire

Site 1 - A Street at Buttonwood Street

Flooding at Site 1 is caused by high tides in the Christina River and a lack of capacity in the combined sewer that drains this area.

Site 2 - A Street and Bradford Street

The primary cause of the flooding at Site 2 is the lack of capacity in the combined sewer paralleling Christina Avenue. A contributing cause is that one of the tide gates at the tide structure adjacent to the Christina River is not watertight.

Site 3 - B Street near Townsend Street

The most likely cause of flooding at Site 3 is that the combined sewer is undersized and cannot handle the amount of flow even during more frequent and less intense rain events. There is a lack of capacity in the combined sewer system both in the immediate area of Site 3 and downstream of this site.

Site 4 - D Street from South Heald Street to Buttonwood Street

Similar to Site 3, the probable cause of flooding at this site is a lack of capacity in the combined sewer system both in the immediate area and downstream of Site 4.

Site 5 - New Castle Avenue near the Henrietta Johnson Medical Center

The storm drain system is undersized and cannot handle the amount of flow draining to it. In addition, there are collapsed, deteriorated or clogged pipes and/or inlets in the drainage system.

Site 6 - New Castle Avenue near D Street

Possible causes for the flooding at Site 6 are that the storm drainage system is undersized and cannot handle the amount of flow draining to it, and the pipes and/or inlets are clogged, deteriorated or collapsed.

Site 7 - Traffic Loop – Garasches Lane and South Heald Street

The primary cause of flooding within the traffic loop is blockages in the storm drainage system downstream of the traffic loop.

Site 8 - South Heald Street near Magnus Tire

The flooding at Site 8 is influenced by the tides in the Christina River. Another possible contributory cause is the poor condition of the ditches along the railroad. Lastly, pipes under the railroad may be collapsed or otherwise non-functional. It is apparent that the railroad hinders the flow of water to the Christina River.

3.0 Recommendations

Sites 1, 3, and 4

Sites 1, 3 and 4 are considered together since they are all located within the same drainage area and all lead to the same combined sewer. To reduce the flooding problems at these sites, the most effective solution would be to separate the combined system within this drainage area. The storm runoff could then be diverted into the proposed “central park” which will be used, at least in part, as a stormwater retention area.

Site 2 - A Street and Bradford Street

Install a 42-inch storm drain along Christina Avenue parallel to the existing combined sewer to at least double the current capacity. Repair the flap valve at the tide structure. Clean the existing pipes, manholes and ditches.

Site 5 - New Castle Avenue near the Henrietta Johnson Medical Center

Inspect and clean all of the inlets and storm drains.

Site 6 - New Castle Avenue near D Street

Clean all of the clogged storm drain inlets.

Site 7 - Traffic Loop – Garasches Lane and South Heald Street

Remove trash from the manholes. Repair or replace the manhole on the north side of the railroad. Once the planned internal television inspections of the storm drains are completed, additional recommendations may be made depending on the condition of the system.

Site 8 - South Heald Street near Magnus Tire

Replace or repair the culverts under the railroad, clean the ditches along the railroad and re-establish the ditch downstream of the railroad through the junkyard on the north side of the railroad.

Planning level construction costs for each of these recommendations is provided in Table 2.

Table 2
Summary of Cost Estimates

Site(s)	Cost Estimate
1, 3 & 4	$3,000,000
2	$300,000
5	$50,000
6	$50,000
7	$85,000
8	$400,000

1.0 INTRODUCTION

The South Wilmington Area has been subject to repeated flooding and drainage problems. This area is geographically defined as the area bounded by the Christina River to the north, east and west and I-495 to the south, with emphasis on those areas within or directly adjacent to the jurisdictional boundary of the City of Wilmington, Delaware. This area is depicted on the Location Map, Figure 1 contained on the following page. This project is intended primarily to address common "nuisance" drainage problems.

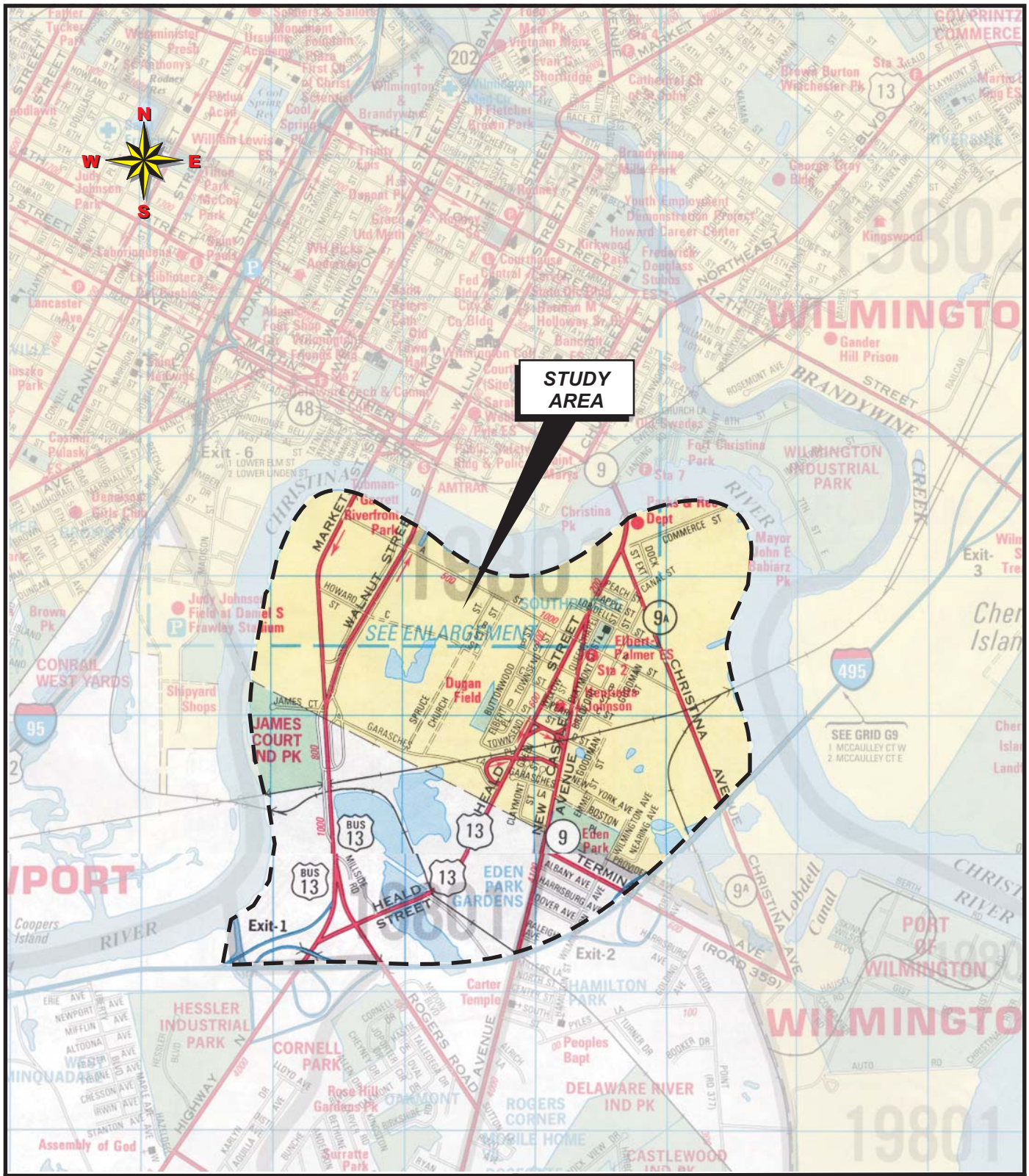
The purpose of this study is:

- to identify the drainage and flooding problems;
- to develop a comprehensive list of drainage problems and their locations;
- to prioritize the drainage problem areas;
- to develop recommendations for improvements;
- to develop conceptual designs for the high priority drainage problems;
- to prepare a preliminary engineering report.

The South Wilmington Area includes the residential community of Southbridge and numerous commercial and industrial sites. The area also includes undeveloped land and wetlands. According to the South Wilmington Socioeconomic Profile, industrial uses account for approximately 57 percent of the land; urban and residential property represents approximately 22 percent of the area; and wetlands and other natural areas account for approximately 9 percent of the land.

The South Wilmington Drainage Study is a component of the South Wilmington Special Area Management Plan (SAMP). The goal of the SAMP is to revitalize South Wilmington while improving the environment and providing opportunities for economic development. Other components of the SAMP consist of a Neighborhood Plan; a comprehensive review of legal authorities; development of an Environmental and Enhancement Plan; a Non-residential Sustainable Economic Development Plan; and public outreach and public participation.

One of the elements of the Neighborhood Plan is a central park that would be located between Southbridge and Walnut Street. This area contains a large amount of wetlands. The Neighborhood Plan recommends that the wetlands be improved for flood retention and to include trails to link recreational facilities. The park would primarily emphasize natural features and would preserve the existing wetlands and waterways.



KEY MAP OF DELAWARE

SOUTH WILMINGTON DRAINAGE STUDY

LOCATION MAP

RUMMEL KLEPPER & KAHL, LLP	DATE: June 2006	FIGURE 1

2.0 DRAINAGE PROBLEM AREAS

2.1 General

Areas within South Wilmington that are subject to flooding and drainage problems have been identified through: the use of a questionnaire distributed to the community; a community workshop held in Southbridge on October 20, 2005; review of previous reports; discussions with local officials; hydraulic modeling of the combined sewer and storm drainage systems; and through multiple field inspections. Information regarding the community involvement process is contained in Appendix B. Table 1 lists the areas which have been identified as experiencing frequent and considerable drainage problems.

Table 1
Identified Drainage Problem Areas in South Wilmington

Site No.	Location
1	A Street at Buttonwood Street
2	A Street at Bradford Street
3	B Street near Townsend Street
4	D Street from South Heald Street to Buttonwood Street
5	New Castle Avenue near C Street
6	New Castle Avenue near D Street
7	Traffic Loop near Garasches Lane and South Heald Street
8	South Heald Street near Magnus Tire

The locations of the drainage problem areas are depicted on Figure 2 on the following page. A larger scale version of Figure 2 is Appendix A.

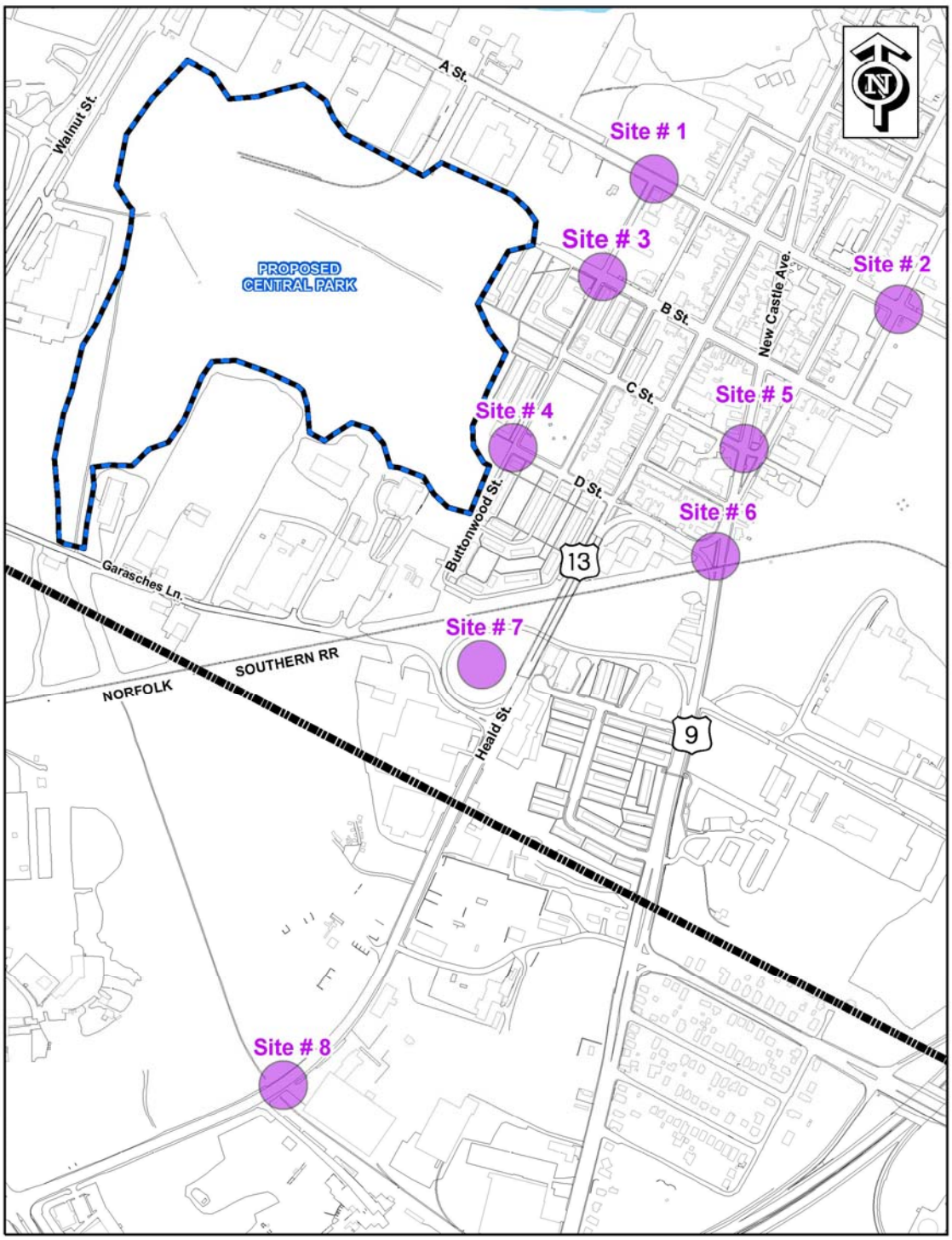
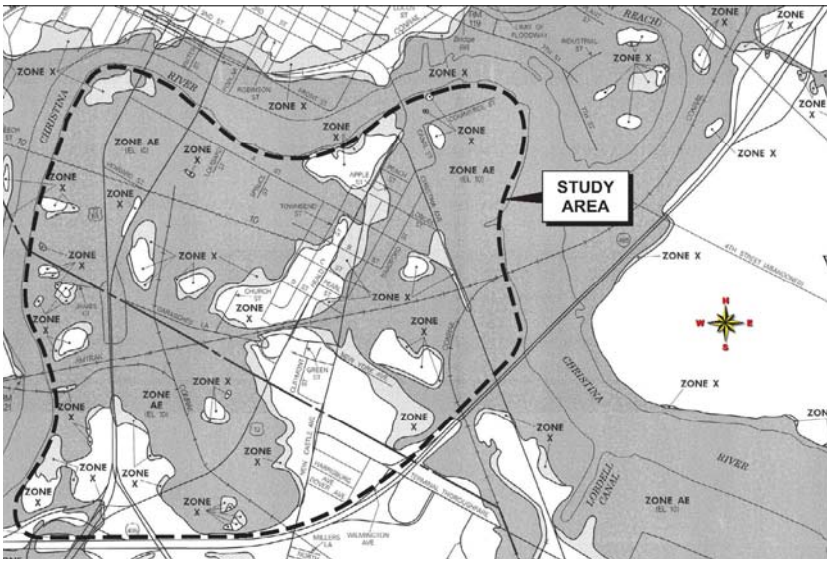

Site # 1
Site # 2
Site # 3
Site # 4
Site # 5
Site # 6
Site # 7
Site # 8
PROPOSED
CENTRAL PARK
A St.
Walnut St.
B St.
C St.
D St.
New Castle Ave.
Buttonwood St.
Garasches Ln.
SOUTHERN RR
NORFOLK
Heald St.
13
9

FIGURE 2

2.2 Tidal Influences

A significant portion of the South Wilmington Area lies within the 100-year floodplain of the Christina River. The Federal Emergency Management Agency (FEMA) floodplain map is depicted below and as Figure 3 in Appendix A. The 100-year flood elevation estimated by FEMA is 8.8 feet based on the North American Vertical Datum of 1988 (NAVD88).



FEMA Floodplain Map

The flood elevations for the Christina River in this area are controlled by the tides. The South Wilmington Area tide elevations previously determined are listed in Table 2 below.

Table 2
Tidal Elevations for South Wilmington

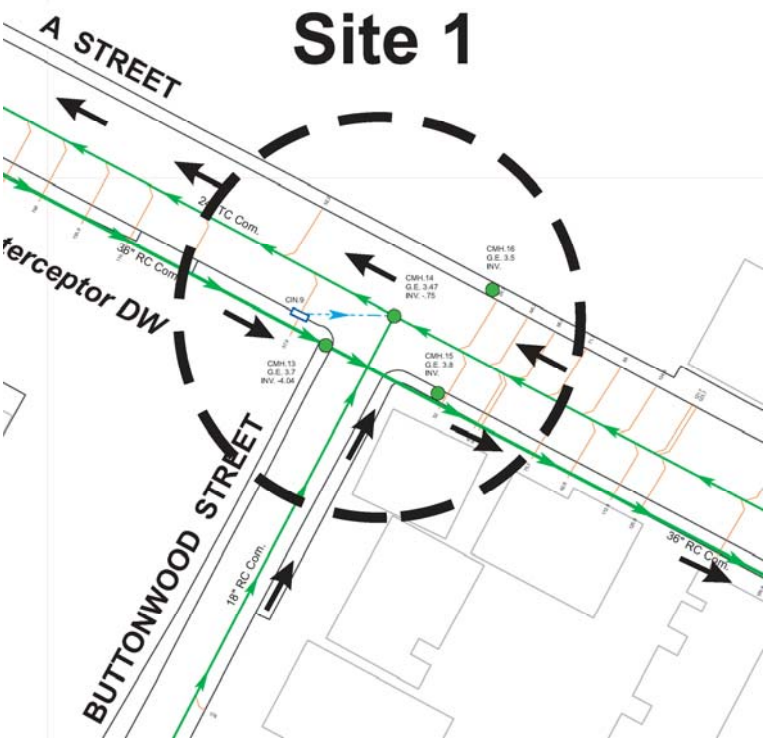
Description	Elevation (NAVD88)
Mean Higher High Water	2.94
Mean High Water	2.55
Spring High Water	3.59
Mean Tide Level	-0.10
Mean Low Water	-2.75
Mean Lower Low Water	-2.94

There is a tidal gaging station located at the Wilmington Marine Terminal which is operated by the United States Geological Survey (USGS). This station has been

in operation from 1983 through 1991 and from April 1994 to the present. The highest tide elevation measured during this period was 7.0 in October 1983.

2.3 Site 1 - A Street at Buttonwood Street

This site was discussed at the Community Workshop held in October 2005 as being an area of frequent flooding. A City fireman indicated that a boat has been required to cross this intersection following several rain events. The topography shows that this intersection is at a low point in the roadway with a ground elevation of approximately 3.4 feet (NAVD88 datum). This site is depicted below and as Figure 4 in Appendix A.

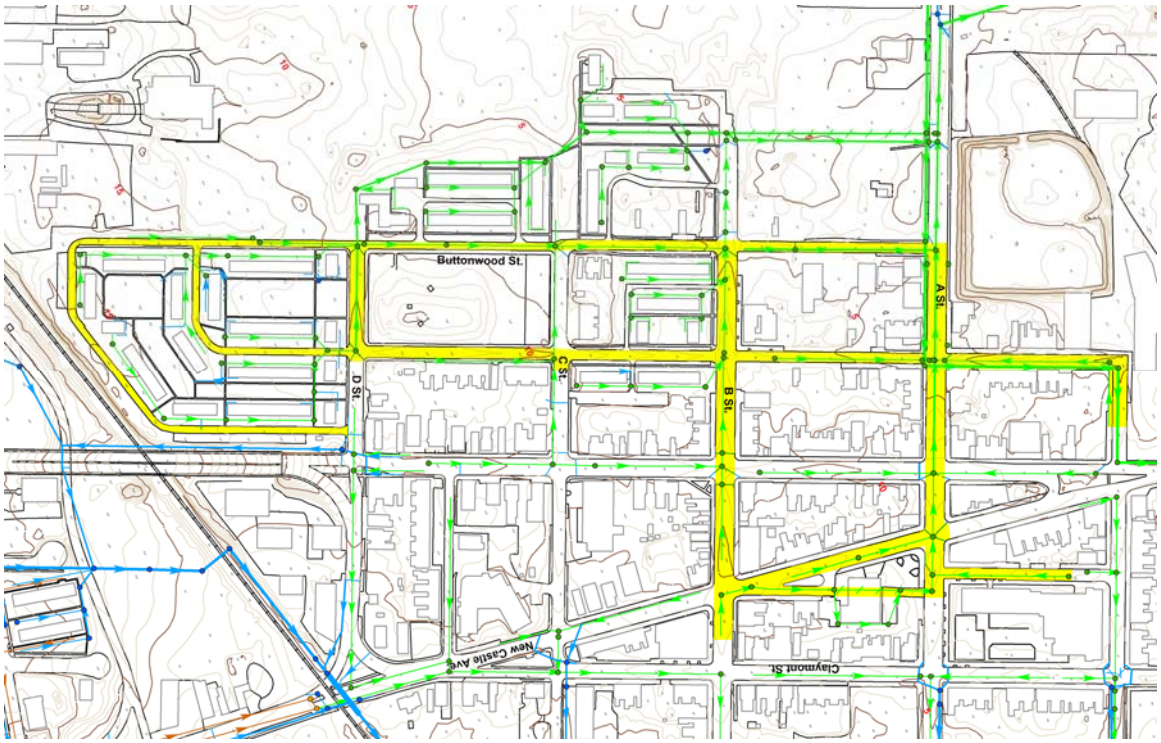


The inlets at Buttonwood and Locust Streets connect to a 24-inch combined sewer in the middle of A Street which connects to combined sewer overflow (CSO) 10 at Locust Street. Under normal conditions, the flows in this 24-inch combined sewer travels west until it reaches CSO 10 and then enters Interceptor DW, a 36-inch combined sewer traveling east along the south side of A Street. If Interceptor DW is surcharged, however, the flow would then overtop the weir in CSO10 and flow into a 24-inch drain which joins a 48-inch pipe approximately 250 feet to the west which ultimately discharges into the Christina River. There is a tide gate at the end of this 48-inch pipe at the Christina River.

The 24-inch combined sewer that connects to CSO 10 in A Street collects storm drainage flows from the following streets:

- A Street from Queen Street to CSO 10
- Queen Street from B Street to A Street
- B Street from 100 feet east of Queen Street to 260 feet west of Buttonwood Street
- Chapel Street from 100 feet south of Lobdell Street to A Street
- New Castle Avenue from approximately 150 feet north of B Street to A Street
- South Heald Street from Pearl Street to Lobdell Street
- Lobdell Street from approximately 150 feet east of Townsend Street to Townsend Street
- Townsend Street from D Street to Lobdell Street
- Buttonwood Street from Townsend Place to A Street
- Townsend Place from Buttonwood Street to D Street
- Elbert Place from Buttonwood Street to D Street
- D Street from Townsend Street to Buttonwood Street

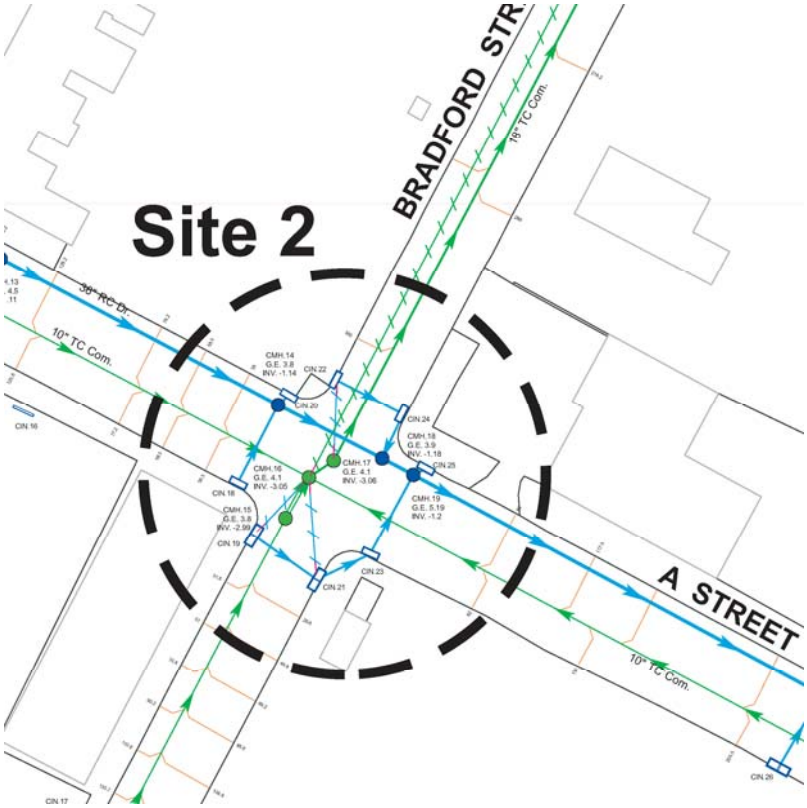
This drainage area is depicted below. The streets highlighted in yellow indicate the areas of combined sewers that drain to CSO 10. The total drainage area of the 24-inch combined sewer is approximately 42 acres.



A Street at Buttonwood Street

2.4 Site 2 - A Street and Bradford Street

This location was identified via the questionnaire as being subject to flooding. A Street at its intersection with Bradford Street is located at a low point in both A Street and Bradford Street. This site is depicted on the following page and as Figure 5 in Appendix A. Water drains along A Street from a high point at the intersection with South Heald Street to the low point at Bradford Street. Water also drains from another high point along A Street located approximately 500 feet east of Bradford Street to the low point at the intersection. Along Bradford Street water drains from one high point located approximately 250 feet north of A Street to the intersection and from another high point located at the intersection of Bradford Street and B Street to the low point at the intersection of Bradford Street with A Street.



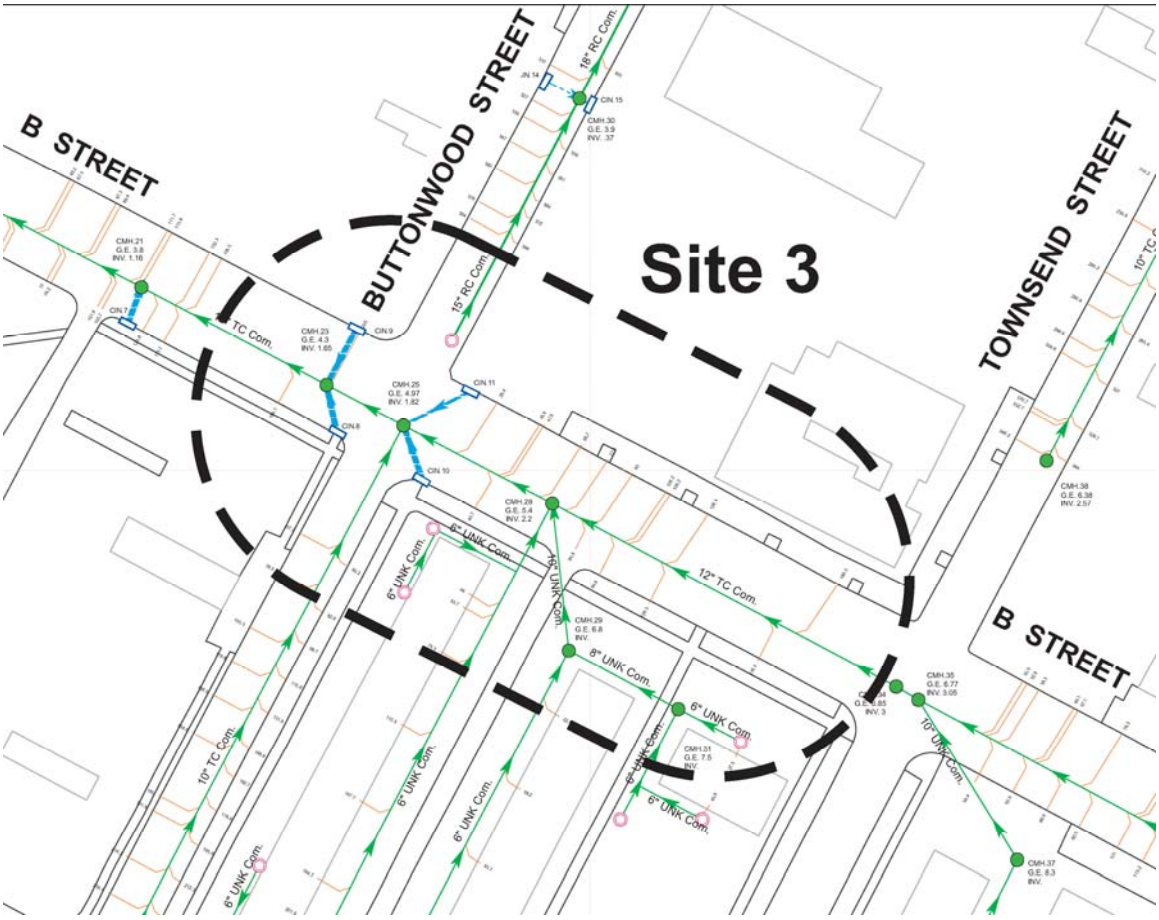
The storm drain system in A Street was constructed as part of improvements completed in 1992 to improve the drainage system. This portion of the work included the addition of inlets at the intersections of A Street with Claymont and Bradford Streets and separating the storm drain system from the combined system by adding a storm drain along A Street from Claymont Street to Christina Avenue. The storm drain system draining this area connects to a 42-inch pipe on the southwest side of Christina Avenue that also serves as the overflow pipe for CSO 9C. The 42-inch pipe follows Christina Avenue for approximately 300 feet until it connects with a twin 43-inch by 27-inch culvert crossing Christina Avenue, north of the railroad. This culvert outlets into a ditch draining to the east away from Christina Avenue and paralleling the railroad. There is a dike on the north side of this ditch and a railroad paralleling the ditch on the south side. This ditch continues to the Christina River where it connects to a junction chamber before emptying into the Christina River. There are two cast iron tide gates located at the outlet end of this structure. During a field investigation on January 3, 2006, it was determined that a hinge supporting one of the tide gates has separated from the concrete headwall.

Tide Gate East of Christina Avenue with Broken Hinge

This tide gate is probably no longer water tight and it is likely that Christina River flow could back up into the ditch during certain hydraulic conditions.

2.5 Site 3 - B Street near Townsend Street

Flooding has been reported along B Street from east of Townsend Street to its western terminus, located approximately 350 feet west of Buttonwood Street. This site was identified as a problem site via the questionnaire and during a site visit with local officials. The Mount Joy Church located near the intersection of B and Townsend Streets has reported that their basement has flooded for decades. This site is depicted on the following page and as Figure 6 in Appendix A.

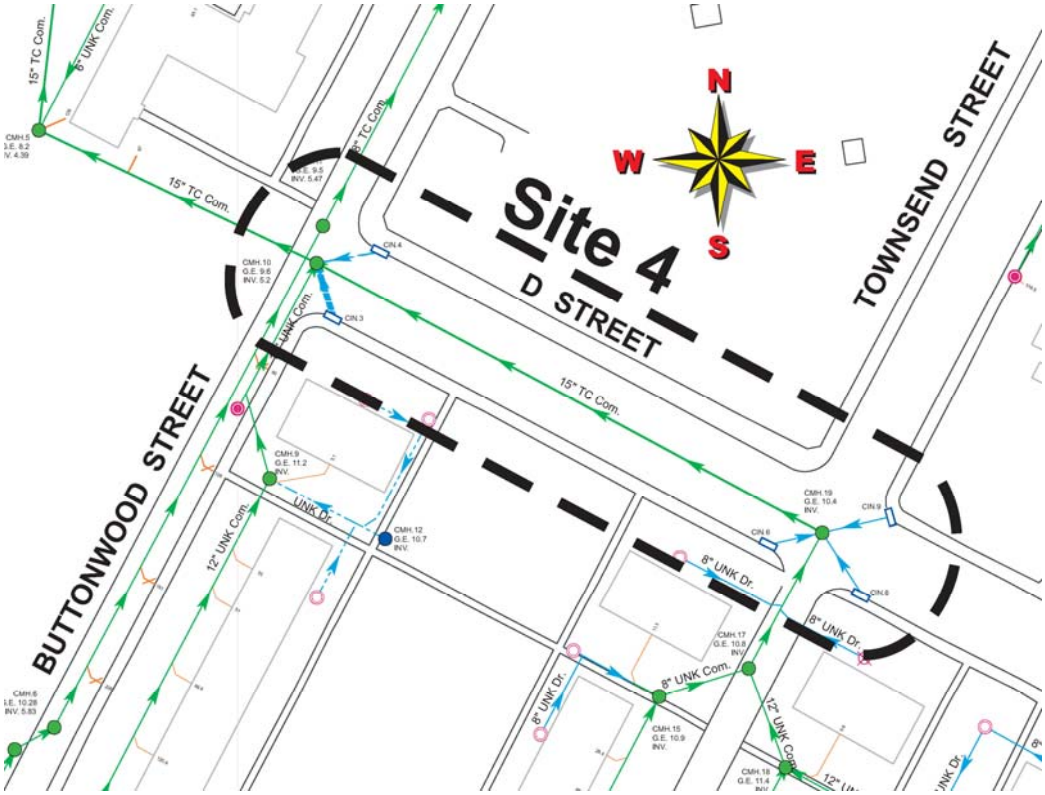


Roadway drainage flows along B Street to the west from a high point near New Castle Avenue. There appears to be a low point just east of the western terminus of B Street. The inlets along this portion of B Street connect into the 12-inch combined sewer in B Street. This combined sewer eventually connects to the system connecting to CSO 10. Roadway drainage flows towards B Street along South Heald Street, Townsend Street and Buttonwood Street from the south.

Rear of Mount Joy Church – Area Subject to Frequent Flooding

2.6 Site 4 - D Street from South Heald Street to Buttonwood Street

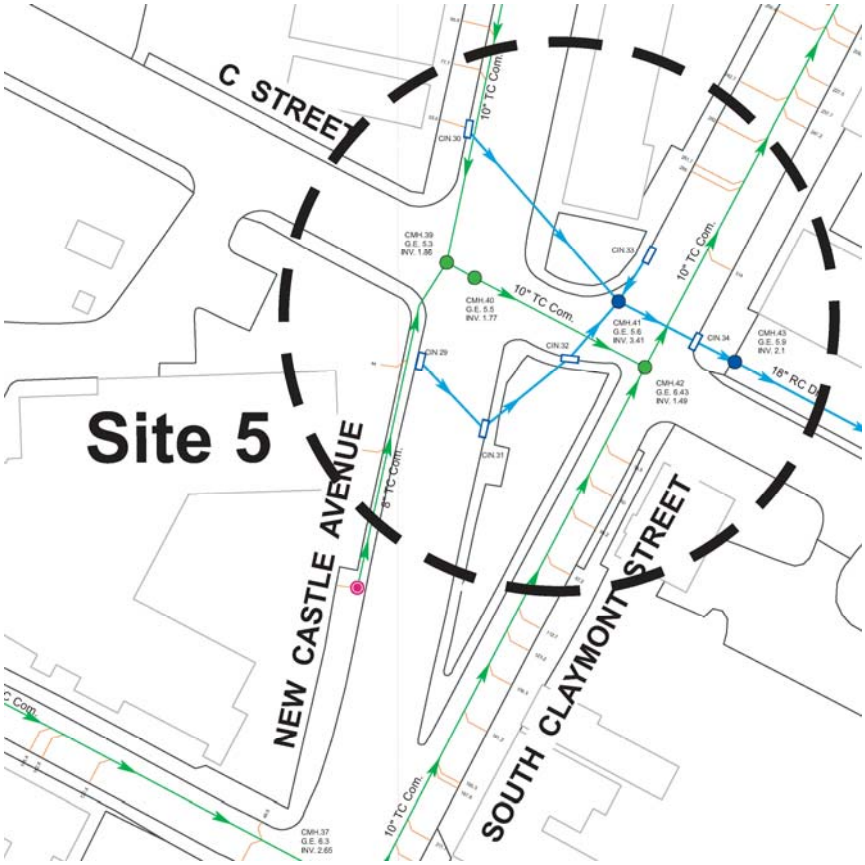
D Street near Buttonwood Street has also been identified as an area that experiences frequent flooding by local officials. It has been reported that water along D Street has reached the top of the curbs. This location is depicted on the next page and as Figure 7 in Appendix A. Roadway drainage along D Street flows from a high point at South Heald Street towards the west to its terminus at Buttonwood Street. Drainage from the South Heald Street bridge over the railroad drains onto D Street. Drainage along Elbert Place and Buttonwood Street flows to the north towards D Street. Inlets along D Street near South Heald Street drain into a separate storm drain system that flows south parallel to South Heald Street. Inlets from the intersection with Townsend Street to Buttonwood Street connect into a 15-inch combined sewer that eventually joins the 24-inch combined sewer that connects to CSO 10. Based on available information, there does not appear to be any inlets located along Buttonwood Street or Elbert Place south of D Street along the portions that would drain towards D Street.



D Street at Buttonwood Street

2.7 Site 5 - New Castle Avenue near the Henrietta Johnson Medical Center

A low point exists along New Castle Avenue near the Henrietta Johnson Medical Center near C Street. This site has been reported by local officials and responses to the questionnaire to experience frequent flooding. This location is shown below and as Figure 8 in Appendix A.



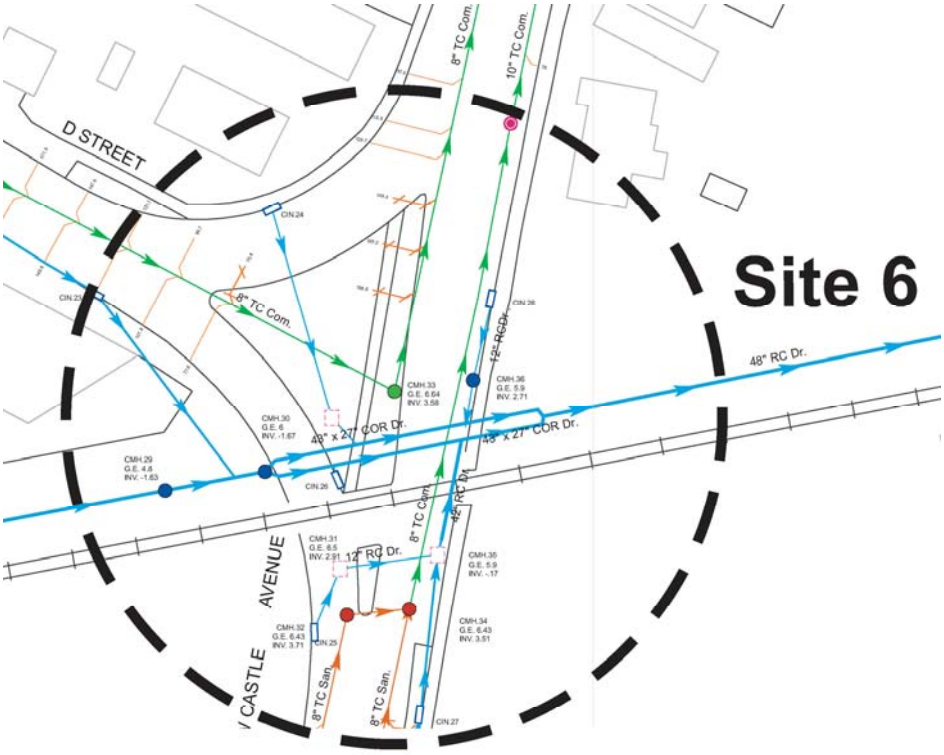
The roadway elevation at this low point is approximately 5.3 feet based on the available topography. There are two inlets, one on each side of the street, at or near this low point. Roadway drainage flows to this low point from a high point located just north of B Street to a high point to the south located approximately 350 feet south of Terminal Avenue. In the area of the intersection with D Street, the grade along New Castle Avenue appears to be flat and there may be an intermediate low point in this area. A portion of the roadway drainage from New York Avenue flows onto New Castle Avenue and towards the flooding area. D Street from Heald Street to New Castle Avenue drains to New Castle Avenue. Approximately 200 feet of Pearl Street to the west of New Castle Avenue drains towards New Castle Avenue. C Street drains towards New Castle Avenue starting at Townsend Street. The inlets at the low point near C Street connect to a storm drain system that parallels C Street and empties into a ditch that leads to a culvert that crosses Christina Avenue just north of the railroad. This is the

same twin 43-inch by 27-inch pipe that drains the flow from A Street as described for Site 2. This pipe outlets into a ditch draining to the east away from Christina Avenue and paralleling the railroad. This ditch continues to the Christina River where it connects to a junction chamber before emptying into the Christina River.

New Castle Avenue at C Street

2.8 Site 6 - New Castle Avenue near D Street

The roadway grades at the intersection of New Castle Avenue and D Street are located in a low area. This is another area that has been reported by local officials to experience frequent flooding. This site is depicted on the next page and as Figure 8 in Appendix A. There is a twin 43-inch by 27-inch pipe crossing New Castle Avenue at this location just north of the railroad. This culvert drains the area from the south including the traffic loop near Garasches Lane, part of D Street, New Castle Avenue to the south from near Terminal Avenue, and the Southbridge Extension.



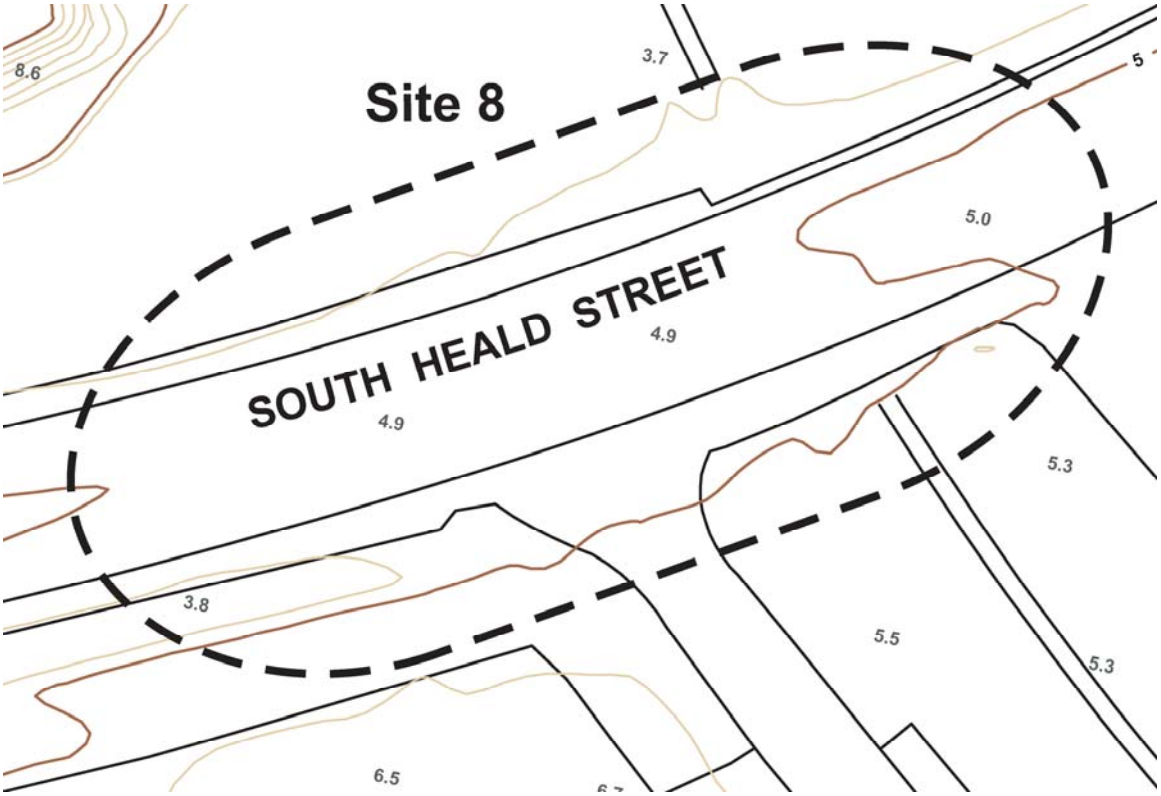
New Castle Avenue at D Street

2.9 Site 7 - Traffic Loop: Garasches Lane and South Heald Street

Available topography shows that the drainage area to this traffic loop includes roadway drainage from South Heald Street from a high point on the bridge crossing the railroad to the ramp to the loop. Local officials and residents have indicated that this site has experienced flooding to the point where the entire loop has been flooded. This site is depicted below and as Figure 9 in Appendix A. The area within the loop drains to a low point located along the loop. There are five inlets that drain this traffic loop. The storm drain system that drains the traffic loop connects to a storm drain system that drains the Southbridge Extension, passes behind Morheat Hardware, connects into a 48-inch pipe that parallels the railroad and then crosses New Castle Avenue. This pipe then empties into a ditch located east of New Castle Avenue. This ditch is the same ditch that drains New Castle Avenue from C Street (see Site 5).

2.10 Site 8 - South Heald Street near Magnus Tire

South Heald Street near Magnus Tire is located approximately 1,200 feet east of Market Street and 1,000 feet north of I-495. This area floods frequently and there is a roadway sign warning motorists of the flooding hazard. This site is below and as Figure 10 in Appendix A. South Heald Street at this location consists of a bridge over the waterway. The drainage area extends to the south to the other side of I-495. This area is located at a low point in the roadway at an elevation of approximately 4.9. Downstream of South Heald Street there is a wide waterway that extends from South Heald Street to the railroad. The flow drains into a ditch paralleling the railroad. During a field investigation along the railroad, it was noticed that portions of the flow from this area were seeping through the railroad ballast to the ditch on the north side of the railroad. The ditch along the railroad drains to the west to the Christina River through a tide gate. There may be a pipe or pipes installed under the railroad that drains through the area to the north outleting at Garasches Lane, but this has not been confirmed to date. The pipe, if it exists, may be collapsed or clogged.



South Heald Street near Magnus Tire

3.0. PROBABLE CAUSES OF FLOODING

3.1 General

Flooding in the sites previously discussed may be caused by a number of potential reasons. The South Wilmington Area is relatively low in comparison to the tidal levels in the Christina River. High tide levels could prevent flow from draining in an efficient manner. In some cases, the tide levels can reach levels which are higher than inland ground elevations. For example, based on a USGS tide gage located at the Wilmington Marine Terminal, tide levels have exceeded Elevation 5.0 (NAVD88 datum) 19 times in the period from April 1994 through September 2005. This elevation is higher than the ground elevation at a number of the sites identified as being subject to frequent flooding.

Other possible causes include clogged or collapsed pipes or manholes or undersized drainage systems. A number of inlets have been found to be clogged with debris, trash and silt. For example, during a January 2006 field investigation, a sinkhole was found along a storm drain pipe. It was later determined that this was caused by a collapsed manhole which was filled with

bricks, tires and other heavy debris. This manhole has since been repaired but the storm drain still contains heavy debris. There are other instances where inlets and manholes are filled with trash and silt causing restrictions in the flow. This appears to be a common problem in the drainage systems in South Wilmington. Some drainage problems could be alleviated or possibly eliminated if trash and other debris were removed from the drainage systems.

3.2 Site 1 - A Street at Buttonwood Street

RK&K's *November 2003 Flow Monitoring and Hydraulic Modeling Report* indicates that CSO 10 is quite active, overflowing an average of 32 times a year. The drainage area of Interceptor DW at CSO 10 is approximately 316 acres. The crest of the weir in CSO 10 is at Elev. -0.85. This elevation, however, is low compared to the normal water levels in the Christina River. The mean tide level in the Christina River is -0.1 feet, which is 0.75 feet higher than the weir crest. Water cannot pass through the tide gate unless the hydraulic gradient is higher than the tide elevation. If the tide gate is closed, water will fill the pipe behind the tide gate until the hydraulic gradient exceeds the tide elevation. If the tides are high, then the water could back up to the point where A Street would be flooded. The flow in the 24-inch combined sewer subsequently could back up through the storm drain inlets or force its way through the manhole covers. For the one-year period from September 2004 through October 2005, the high tide elevation exceeded the low point at A Street and Buttonwood Street on approximately 237 days, or 65 percent.

The 24-inch combined sewer that is located along the north side of A Street drains approximately 42 acres. Hydraulic modeling conducted for this study indicates that this is insufficient to drain this area without surcharging for a storm as frequent as a one-year storm event.

Therefore, it appears that there are two main contributing factors which cause the flooding at Site 1. Tide elevations in the Christina River are often near or above the low point in A Street and the combined sewer that drains the area in this vicinity is undersized.

3.3 Site 2 - A Street and Bradford Street

The low point at the intersection of A Street and Bradford Street is at approximate elevation 4.0 feet. The lowest rim elevation of the inlets at this intersection is 3.35 feet. This situation is similar to Site 1, A Street and Buttonwood Street, in that the tide elevations can be higher than the inlet rim elevations. In this case the tide gate could be shut and flows cannot exit the system. It appears to be a fairly common situation where the daily high tide is higher the lowest inlet rim elevation at the intersection of A and Bradford Streets. For the one-year period from September 2004 through August 2005, the high tide

elevation exceeded the low point at the intersection of A Street and Bradford Street on approximately 252 days, or 69 percent.

It is also possible that overflows from CSO 9C overtaxes the drainage system. CSO 9C overflows approximately four times a year and has an approximate capture efficiency of 79 percent. The drainage area from Interceptor D to CSO 9C is approximately 165 acres.

Record data indicates that the 42-inch pipe along Christina Avenue has a flat slope of 0.04 percent. The full-flow capacity of this 42-inch pipe is approximately 20 cfs, which is less than the capacity of either of the storm drain systems in A Street and Lobdell Street that drain into it. Calculations indicate that the capacity of the 42-inch pipe is less than the 1-year storm for the total storm water runoff from A Street and Lobdell Street.

A field investigation indicates that the ditches are in reasonable condition and probably do not contribute to the flooding problem. This field investigation, however, also showed that the tide gate is no longer watertight and flow may be backing up from the river. The primary cause of the flooding at Site 2 appears, however, to be caused by the lack of capacity in the 42-inch pipe paralleling A Street.

3.4 Site 3 - B Street near Townsend Street

The drainage system that drains the storm runoff in this area is a combined sewer system. If the combined system is surcharging, then water flowing to the roadway inlets may not be able enter the combined system. Based on the frequency that CSO 10 overflows, this would appear to be a frequent occurrence. During such an overflow, water would then bypass the inlets and flow down the gutters. Under this scenario, eventually enough water would accumulate that the street could be flooded. Another possible cause could be if the combined sewer is surcharging and flow is backing up through the inlets or manholes. Lastly, if there is not an adequate number of inlets to capture the flow this will contribute to the problem.

The most probable cause is that the combined system is undersized and cannot handle the amount of flow even during smaller storm events. The combined sewer in B Street at the intersection with Townsend Street is a 12-inch pipe. The drainage area at the point is approximately 3.9 acres. Calculations indicate that this 12-inch pipe cannot handle a 1-year storm without exceeding the capacity of the combined sewer. Another contributing factor is that the combined system in this area drains towards CSO 10. Since this CSO overflows frequently, the lack of downstream capacity is limiting the ability of flow to pass through the sewer in B Street, resulting in flooding. There is a lack of capacity both in the immediate area of Site 3 and downstream of this site.

3.5 Site 4 - D Street from South Heald Street to Buttonwood Street

The drainage system in the area of Site 4 is a combined sewer system. Similar to Site 3, if the combined system is surcharging, then water flowing to the roadway inlets may not be able enter the combined system. Since CSO 10 overflows relatively frequently, the combined system could surcharge due to a capacity problems in the system downstream of Site 4. Water would then bypass the inlets and flow down the gutters. Under this scenario, eventually enough water would accumulate that the street could be flooded. Another possible cause could be if the combined sewer is surcharging and flow is backing up through the inlets or manholes. An inadequate number of inlets to capture the flow may also contribute to the problem. This could be particularly true for the flow draining towards D Street along Buttonwood Street, Elbert Place and Townsend Place where few or no inlets exist. Also there is overland drainage flowing towards D Street from areas north and south of D Street.

The drainage area contributing to the 15-inch combined sewer in D Street at Buttonwood Street is approximately 3.4 acres. Calculations indicate that the runoff that drains to this pipe exceeds the capacity of this pipe for storms including a 1-year event. The most probable cause of flooding is a lack of capacity in the combined sewer system in the area of Site 4 and downstream on this site.

3.6 Site 5 - New Castle Avenue near the Henrietta Johnson Medical Center

The most likely causes of flooding along New Castle Avenue near C Street are the drainage system is undersized and cannot handle the amount of flow draining to it and/or there are collapsed, deteriorated or clogged pipes and/or inlets in the drainage system. The 18-inch pipe along C Street empties into a ditch along the railroad. A field investigation indicates that the ditches along the railroad are in reasonable condition and probably do not contribute to the flooding problem. Since the low point at C Street and New Castle Avenue is somewhat above the tide elevations, it appears unlikely that high tides are the cause of the flooding problem. In the one-year period from September 2004 through August 2005, the tide elevations were higher than the low point elevation at the intersection of C Street and New Castle Avenue on only two days.

During field investigations, it was determined that several of the inlets in this intersection were clogged with debris and probably pass little or no flow. Also at an inlet adjacent to C Street located approximately 160 feet east of Claymont Street had debris and standing water. This suggests that the 18-inch pipe that drains into the railroad ditch may be clogged. There are currently plans to internally inspect this pipe. At the time of this report, this inspection has not been conducted.

Calculations indicate that the 18-inch pipe does not have the capacity to pass a 2-year storm without surcharging. Based on available information, this pipe has a calculated slope of approximately 0.4 percent, although the actual slope is not indicated on the available record drawings. There are seven inlets in the Site 3 area, which appear to be adequate but some of them require cleaning.

3.7 Site 6 - New Castle Avenue near D Street

There are two possible causes for the flooding at Site 6. One is that the drainage system is undersized and cannot handle the amount of flow draining to it. An examination of the topography indicates that the roadway in this area is relatively flat which may contribute to the drainage problem. A field investigation indicates that the drainage ditch is in reasonable condition and probably does not contribute to the flooding problem. Storm drainage calculations indicate that the storm drainage system along New Castle Avenue can pass approximately 90 percent of the 2-year storm flow.

The second possible cause is that the pipes and/or inlets are clogged, deteriorated or collapsed. Field investigations determined that three of the 11 inlets in the storm drain system that drain to Site 6 are completely clogged and would not pass any flow. A manhole just upstream of the culvert under New Castle Avenue near the railroad had trash accumulation above the top of the culvert. It is possible that the culvert is also clogged with debris and trash.

3.8 Site 7 - Traffic Loop: Garasches Lane and South Heald Street

Since the low point in the loop is at approximate elevation 9, it would appear to be too high to be affected by the tide elevations. The drainage area to the inlets around and within the traffic loop is not large enough to cause the amount of reported flooding. During a field investigation on January 3, 2006, a sinkhole along the alignment of the storm drain system downstream of the traffic loop was found behind Morheat Hardware. It was later determined that this sinkhole was caused by a collapsed manhole. This manhole (AD51CMH27) also had large debris blocking passage of flow, including tires and concrete rubble. This manhole has since been repaired and the debris has been removed. Investigations also have found one inlet in the traffic loop where water was ponding and was not passing flow efficiently. There are several manholes downstream of the manhole behind Morheat Hardware which reduce the flow capacity. Two of these manholes have significant trash and debris (AC51CIN18 and AC51CMH30). There is another manhole (AC51CMH26) that is covered with silt and is deteriorated.

3.9 Site 8 - South Heald Street near Magnus Tire

South Heald Street at the location of the flooding is quite low and the flooding is influenced by the tide levels in the Christina River. During Water Year 2005 (October 2004 through September 2005), the tide elevations were higher than this low point on 7 days. Although this is not frequent, the appreciable length that the water travels must also be considered. Another possible contributory cause is the condition of the ditches along the railroad, which have not been maintained properly. Also, as mentioned previously, there may be a pipe or pipes installed under the railroad but they have since collapsed or are otherwise non-functional. Based on several field investigations and input from DNREC, ponding along the railroad is a nearly constant condition. It is apparent that the railroad obstructs the flow of water to the Christina River.

4.0 RECOMMENDATIONS

4.1 General

Recommendations have been developed for each of the eight drainage problem areas. The recommendations range from intensive capital improvements such as separating a portion of the combined system to relatively inexpensive solutions including removing debris from storm drain inlets. Planning level construction cost estimates are provided.

During the field investigations, it was frequently found that one of the contributing factors to the drainage problems was that the storm drain inlets and pipes are clogged with silt, garbage and other debris. Much of the flooding problems could be reduced if the collection system was inspected and clogged pipes and inlets cleaned on a periodic basis.

4.2 Sites 1, 3, and 4

Recommendations for Sites 1, 3 and 4 are provided together since these three sites are located within the same drainage area and all drain to CSO 10. A lack of hydraulic capacity in the combined system is the most apparent cause of the drainage problems at these three sites. To solve these problems, the most effective solution would be to separate the combined system within this drainage area. The majority of this drainage area is located within Southbridge. The *March 2006 South Wilmington Neighborhood Plan* indicates that this area is planned for neighborhood revitalization. It is also possible to separate a portion of the total drainage area, although the benefits would obviously be less than total separation. The storm runoff could be diverted into the proposed central park which will be used, at least in part, as a stormwater retention area. The proposed improvements are depicted on Figure 11 in Appendix A.

The preliminary project cost for a complete separation within the entire drainage area would be approximately $3.0 million. In order to finance such improvements, funding could be provided from current and future development within South Wilmington. Funding could also come from the City's stormwater utility fund.

4.3 Site 2

As previously discussed, the drainage problems at Site 2 are caused by a lack of capacity in the 42-inch pipe paralleling New Castle Avenue and the flap valve at the tidal structure near the Christina River.

The recommendations for this site, therefore, include the installation of a 42-inch drain parallel to the existing to double the current hydraulic capacity. Also, it is recommended to repair the flap valve. Cleaning of the existing pipes, manholes and ditches is also recommended. The preliminary project cost for these recommendations is $300,000. The proposed improvements are depicted on Figure 12 in Appendix A.

4.4 Site 5

The analysis of this site indicates that the primary cause of drainage problems is clogged inlets and/or pipes. Once a planned CCTV inspection of the outlet pipe is completed, there will be additional information to document the conditions of this 18-inch pipe along C Street.

Based on available information, the preliminary recommendation is to inspect and clean all of the inlets and pipes. The preliminary project cost for this recommendation is $50,000. The proposed improvements are depicted on Figure 13.

4.5 Site 6

Similar to Site 5, it appears that the primary cause of flooding at this site is clogged inlets and/or pipes. The storm drainage system drains into a twin corrugated metal culvert under New Castle Avenue. The planned CCTV inspection will determine the conditions of this culvert. If it is clogged and/or deteriorated, this would contribute to the drainage problem. As noted before, three of the inlets along this drainage system are completely clogged.

Based on the available information, the preliminary recommendations are that all of the clogged inlets be cleaned. Once the CCTV inspections are completed, final recommendations regarding the culvert under New Castle Avenue will be provided. The preliminary project cost for this recommendation is $50,000. The proposed improvements are depicted on Figure 14.

4.6 Site 7

As previously discussed, the primary cause of flooding within the traffic loop appears to be caused by blockage within the storm drain system downstream of this site. Based on the information available at this time, it is recommended that the trash be removed from at least two manholes (AC51CMH30 and AC51CIN18). It is likely that one manhole will have to be repaired or replaced (AC51CMH26). Once the CCTV inspections are completed, additional recommendations may be provided depending on the condition of the system. The preliminary project cost for this recommendation is $85,000. The proposed improvements are depicted on Figure 15.

4.7 Site 8

As previously described, the primary cause of flooding at this location is the blockage to the flow caused by the railroad. The planned dyed water testing for this site will provide additional information regarding the flow patterns from South Heald Street to the railroad and downstream of the railroad.

Based on the information known at this time, the preliminary recommendations include replacing or repairing the culverts under the railroad, cleaning the ditches along the railroad and reestablishing the ditch downstream of the railroad through the junkyard on the north side of the railroad. The preliminary project cost for this recommendation is $400,000. The proposed improvements are depicted on Figure 16.

5.0 EASEMENTS

5.1 General

To provide some of the recommended improvements to reduce the frequency and extent of drainage problems in South Wilmington, it will be necessary to obtain new easements along the drainage pipelines and ditches.

5.2 Sites 1, 3 and 4

The recommended improvements to reduce the drainage problems within Sites 1, 3 and 4 include separating the combined system within the drainage areas of these sites. Most of this work would occur within existing streets, therefore, no additional easements would be expected for this work. New easements may, however, be needed for the outfalls for the storm drain outfalls. The most logical locations for the storm drain systems to drain to would be the proposed central park that would be located west of Buttonwood Street and south of A Street. Easements may be needed along paths paralleling B, C and D Streets west of their termini near Buttonwood Street.

5.3 Site 2

The proposed recommendation for Site 2 includes a new 42-inch pipe along Christina Avenue. It may be necessary to expand the current easement along this street for this recommendation. The other recommendations should not require any new easements.

5.4 Site 5

Since the recommendations for this site involves cleaning existing inlets and or pipes, no new easements are anticipated.

5.5 Site 6

Since the recommendations for this site involves cleaning existing inlets and or pipes, no new easements are anticipated.

5.6 Site 7

The recommendations for this site include cleaning and/or repairing several manholes. It is our understanding that an easement along the storm drain behind Morheat Hardware has recently been obtained. If existing easements along the storm drain system that parallels the railroad do not exist, they should be obtained.

5.7 Site 8

Easements may be required along the railroad for the drainage ditches and for the ditch through the junkyard on the north side of the railroad between the railroad and Garasches Lane.

APPENDIX A

Figures

Christina River

Market St.

Walnut St.

Howard St.

A St.

CSO # 10

Site # 1

CSO # 9C

Site # 3

B St.

Site # 2

C St.

Site # 4

Site # 5

D St.

Site # 6

Garasches Ln.

Site # 7

New Castle Ave.

New York Ave.

Christina Ave.

495

Heald St.

Terminal Ave.

Site # 8

N

South Wilmington Drainage Study

Problem Drainage Areas

Scale	Date	Fig. No.
1" = 600'	August 2006	2

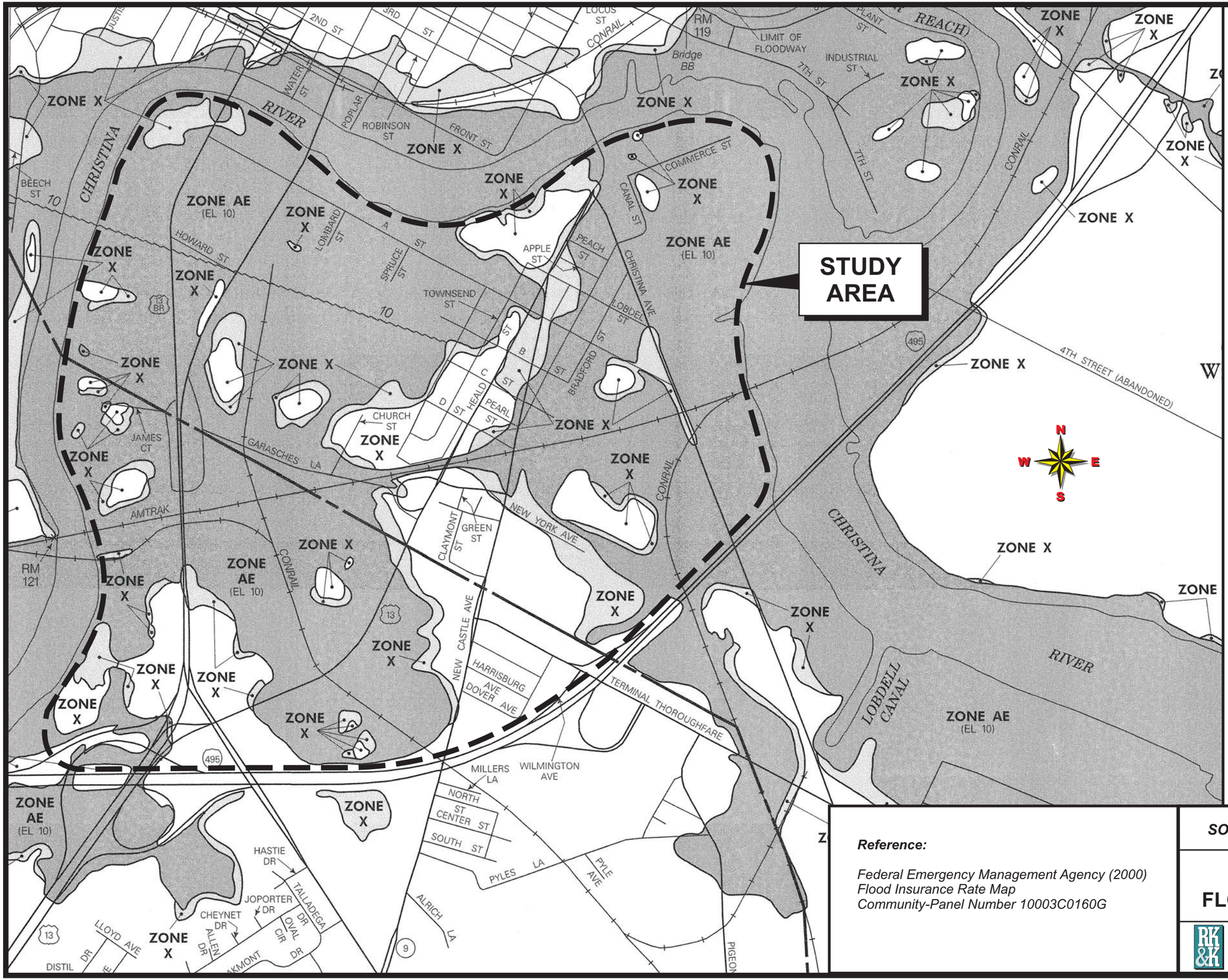
Legend

Manholes	Sewers
Combined	Combined
Sanitary	Sanitary
Storm	Storm

Problem Drainage Site

CSO

Corporate Boundary



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE AE Base flood elevations determined

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100- year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year flood plain.

Floodplain Boundary

EL (987) Base Flood Elevation in Feet Where Uniform Within Zone**

$RM7_X$ Elevation Reference Mark

• M1.5 River Mile

** Referenced to the National Geodetic Vertical Datum of 1929

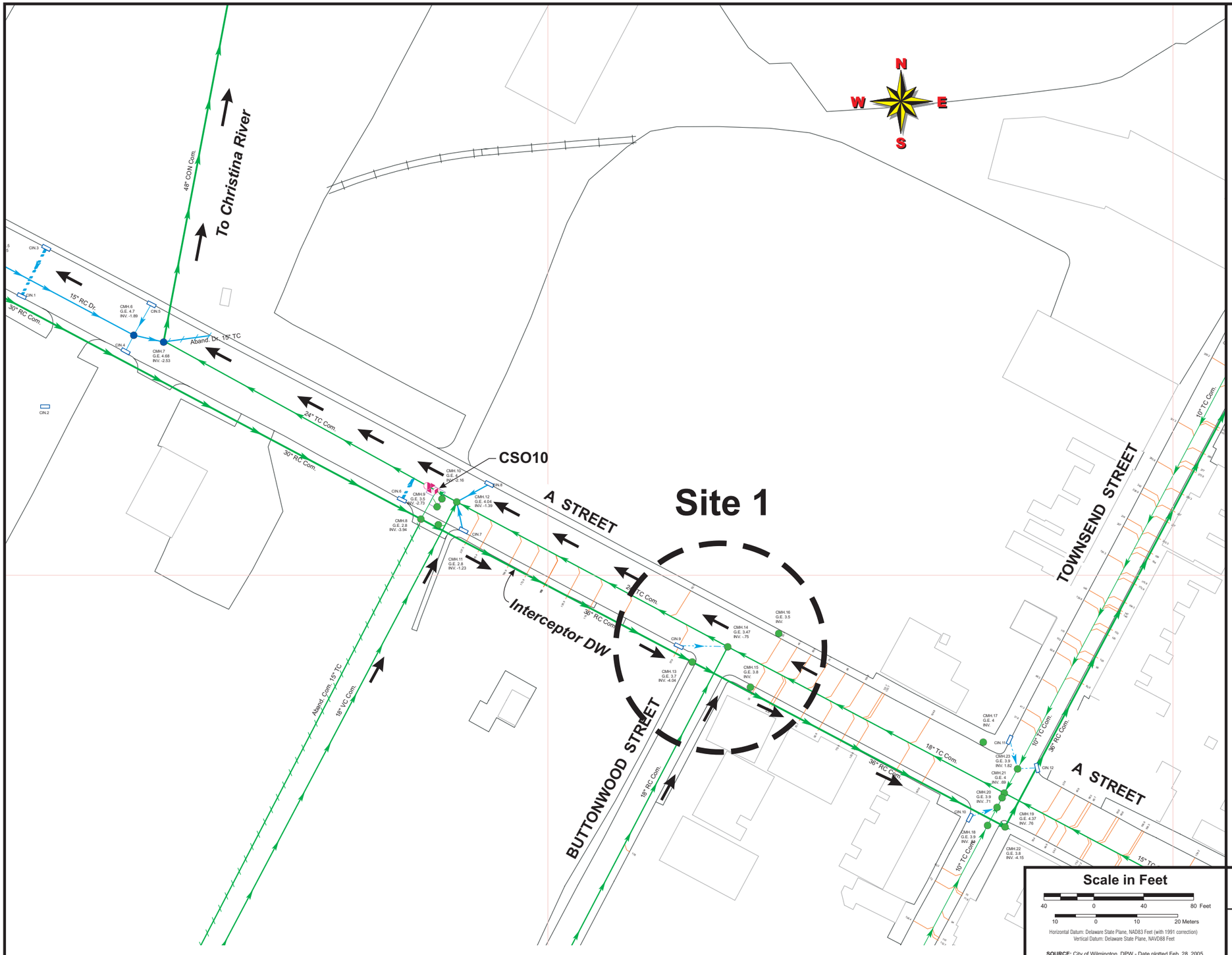
Reference:

Federal Emergency Management Agency (2000)
Flood Insurance Rate Map
Community-Panel Number 10003C0160G

SOUTH WILMINGTON DRAINAGE STUDY

FEMA
FLOOD INSURANCE RATE MAP

RUMMEL KLEPPER & KAHL, LLP	DATE: June 2006	FIGURE 3



LEGEND

- Combined Sewer
- Combined Sewer Manhole
- Abandoned Sewer
- Storm Drain
- Storm Drain Manhole
- Roadway Storm Drain Inlet
- CSO — Combined Sewer Overflow

Scale in Feet

40 0 40 80 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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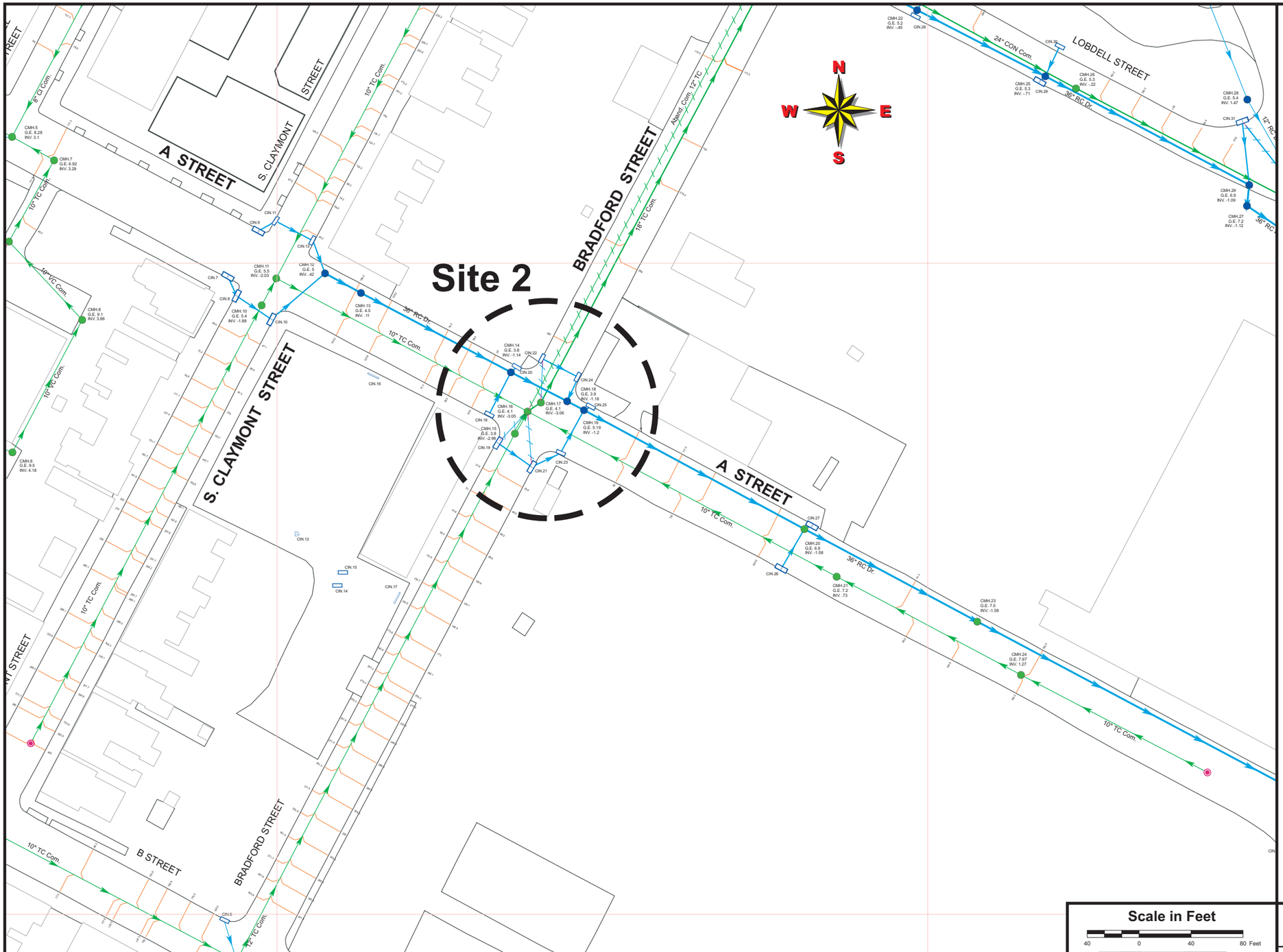
South Wilmington Drainage Study

Site Map
Drainage Problem Area 1

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	4



LEGEND

- Combined Sewer
- Combined Sewer Manhole
- Abandoned Sewer
- Storm Drain
- Storm Drain Manhole
- Roadway Storm Drain Inlet
- CSO — Combined Sewer Overflow

Scale in Feet

40 0 40 80 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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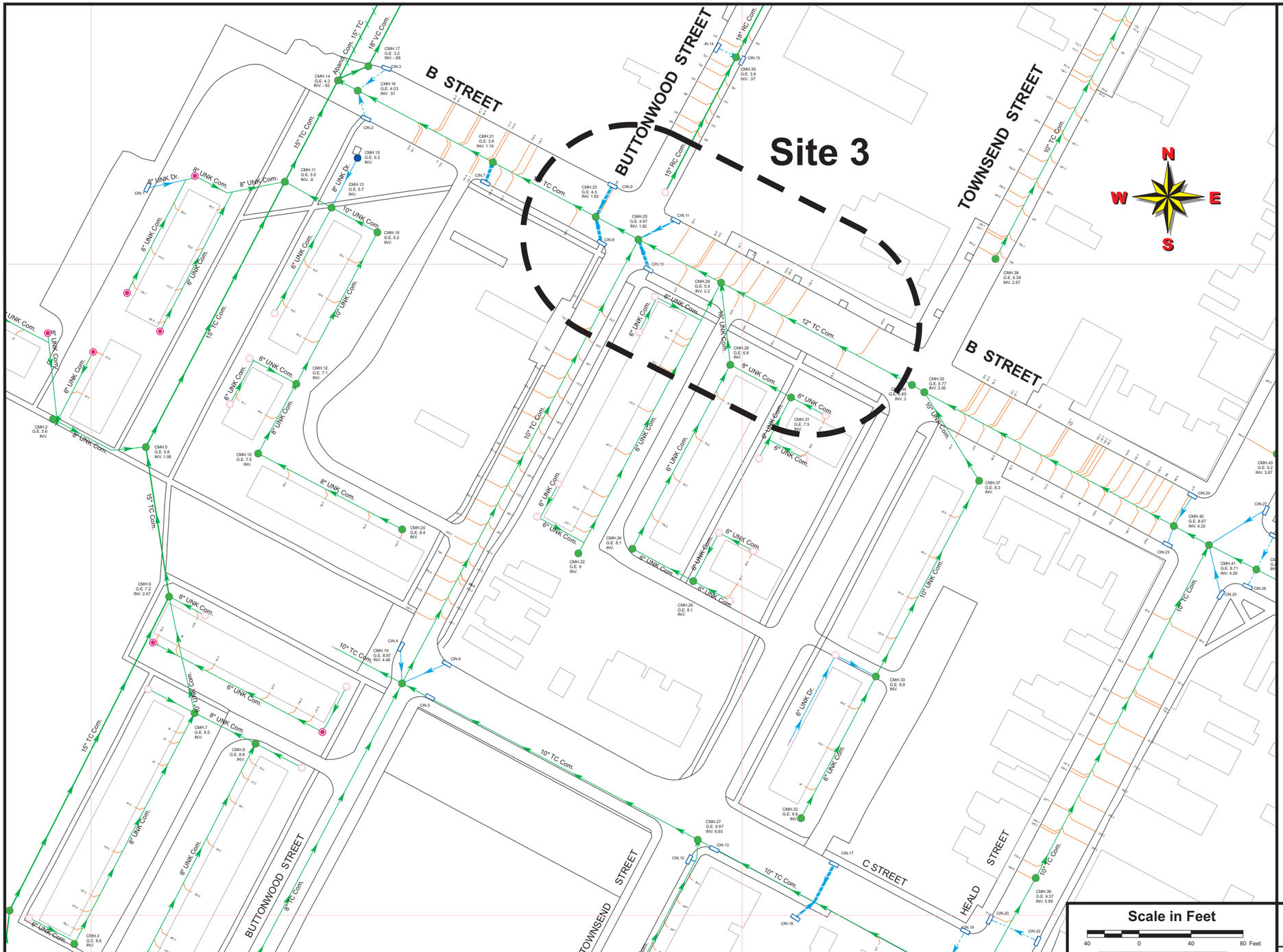
South Wilmington Drainage Study

Site Map
Drainage Problem Area 2

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	5



LEGEND

- Combined Sewer
- Combined Sewer Manhole
- Abandoned Sewer
- Storm Drain
- Storm Drain Manhole
- Roadway Storm Drain Inlet
- CSO — Combined Sewer Overflow

Scale in Feet

40 0 40 80 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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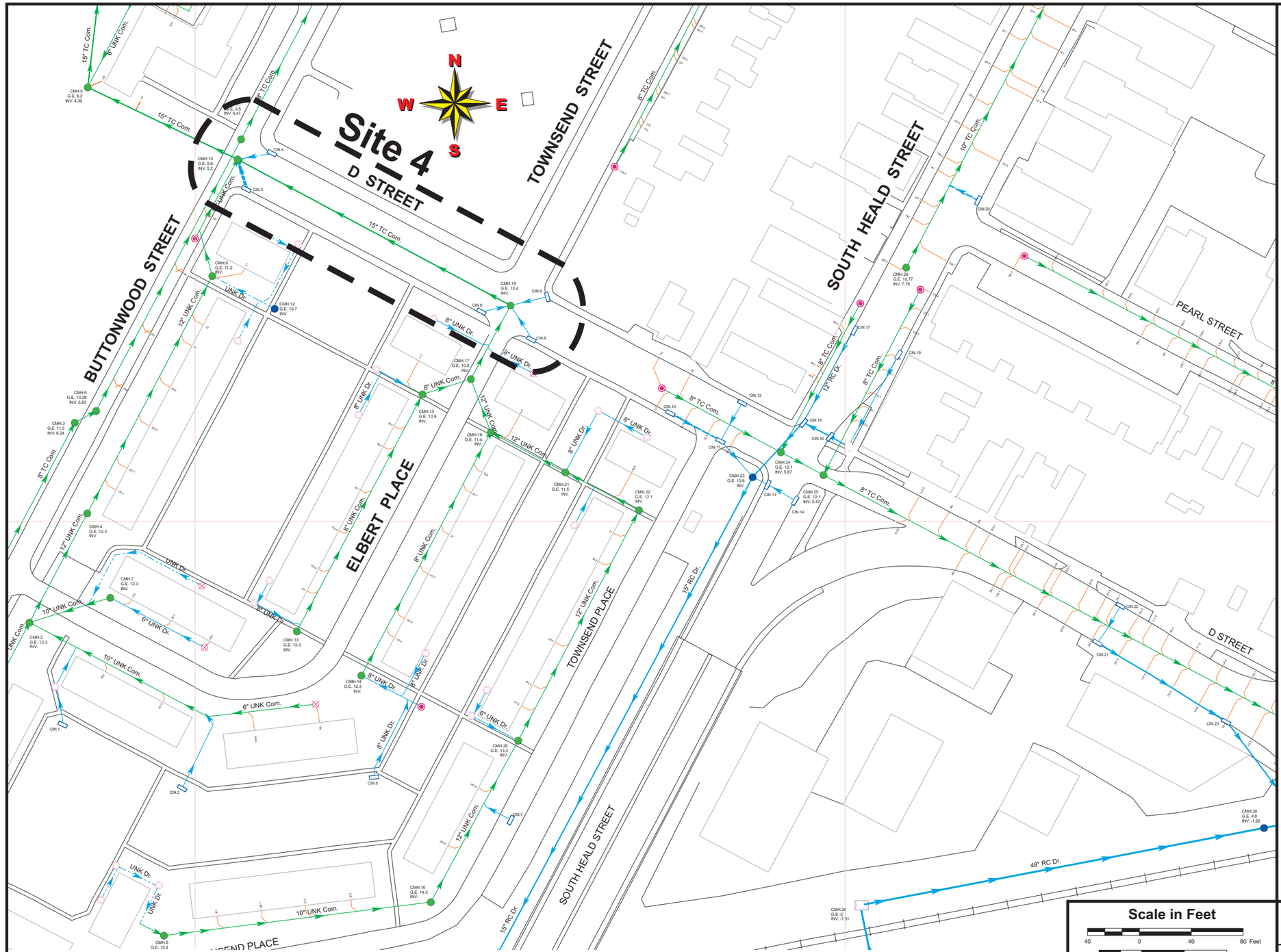
South Wilmington Drainage Study

Site Map
Drainage Problem Area 3

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	6



LEGEND

- Combined Sewer
- Combined Sewer Manhole
- Abandoned Sewer
- Storm Drain
- Storm Drain Manhole
- Roadway Storm Drain Inlet
- CSO — Combined Sewer Overflow

Scale in Feet

40 0 40 80 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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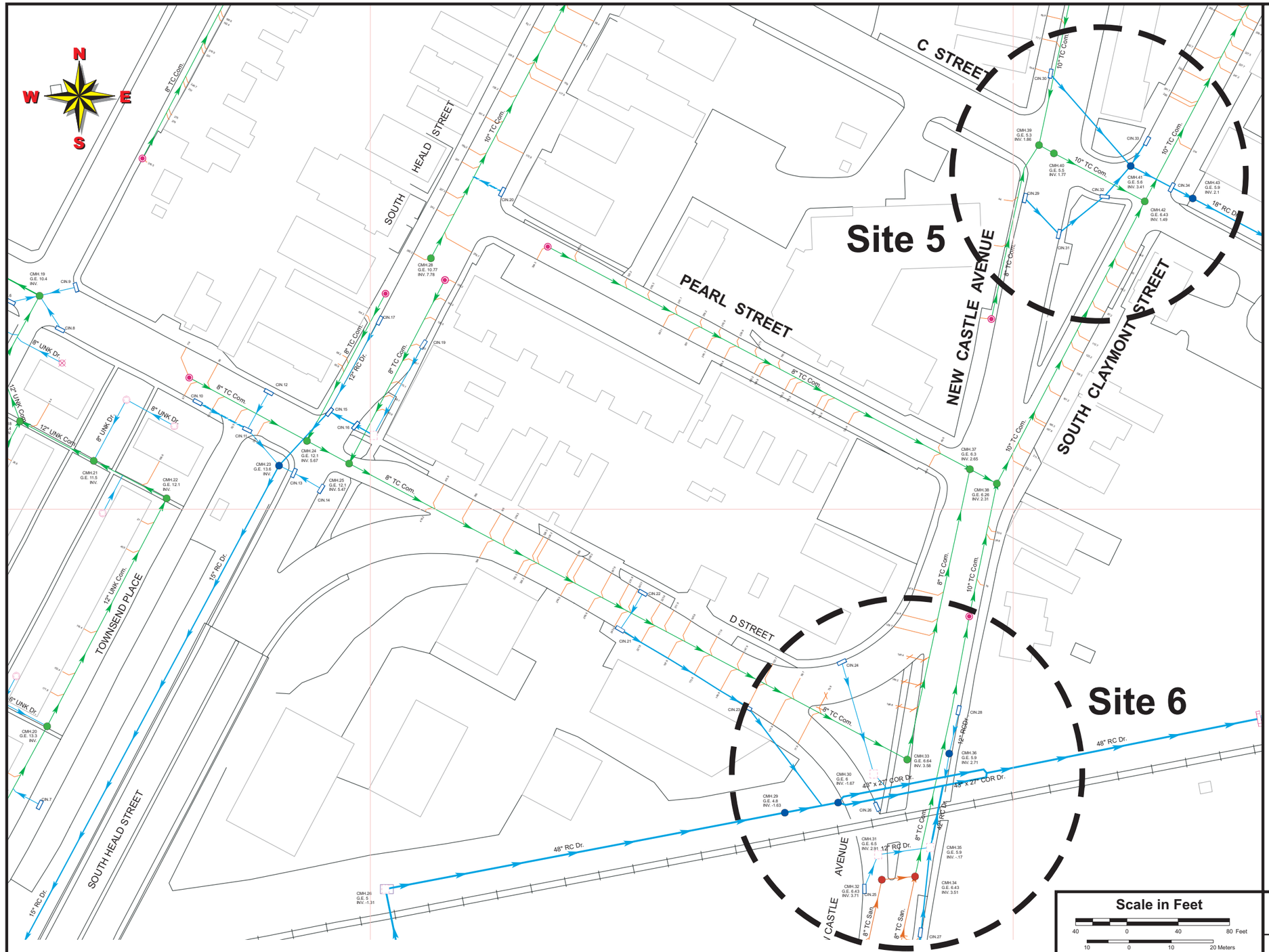
South Wilmington Drainage Study

Site Map
Drainage Problem Area 4

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	7



LEGEND

- Combined Sewer
- Combined Sewer Manhole
- Abandoned Sewer
- Storm Drain
- Storm Drain Manhole
- Roadway Storm Drain Inlet
- CSO — Combined Sewer Overflow

Scale in Feet

40 0 40 80 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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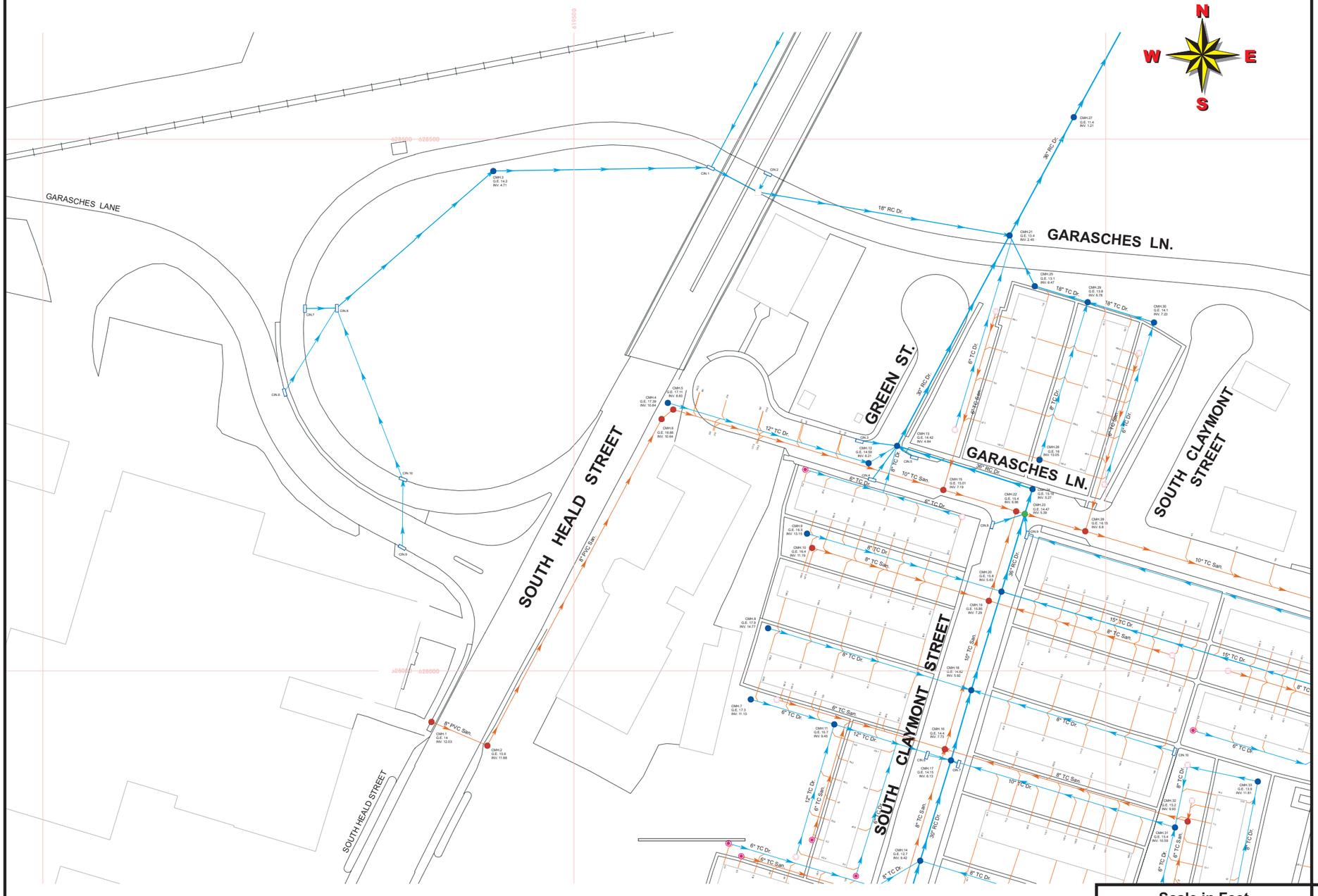
South Wilmington Drainage Study

Site Map
Drainage Problem Areas 5 and 6

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	8



LEGEND

- Combined Sewer
- Combined Sewer Manhole
- Abandoned Sewer
- Storm Drain
- Storm Drain Manhole
- Roadway Storm Drain Inlet
- CSO — Combined Sewer Overflow

Scale in Feet

40 0 40 80 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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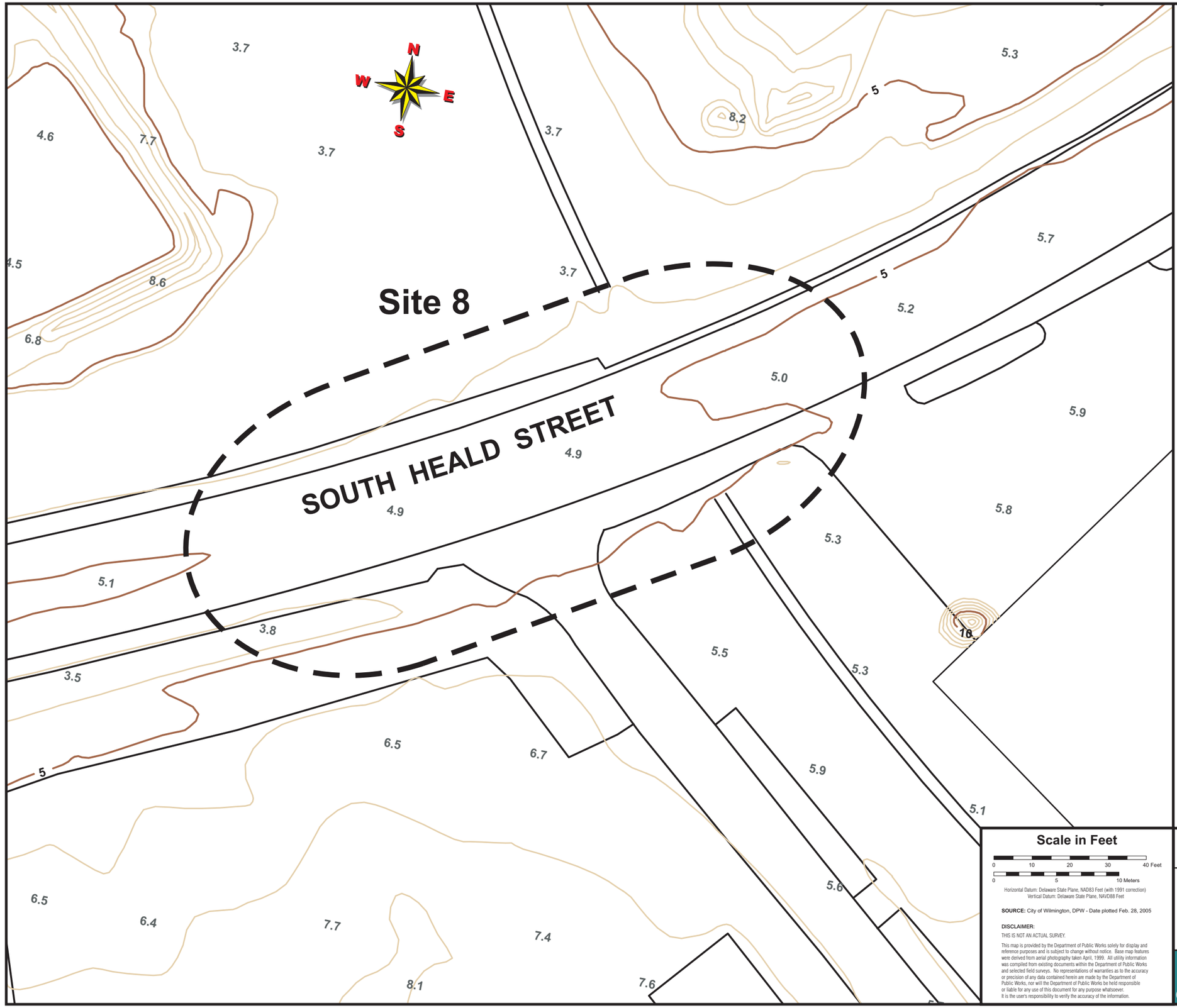
South Wilmington Drainage Study

Site Map
Drainage Problem Area 7

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	9



LEGEND

- Combined Sewer
- Combined Sewer Manhole
- Abandoned Sewer
- Storm Drain
- Storm Drain Manhole
- Roadway Storm Drain Inlet
- CSO — Combined Sewer Overflow

Scale in Feet

0 10 20 30 40 Feet

0 5 10 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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South Wilmington Drainage Study

Site Map
Drainage Problem Area 8

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	10

Recommendation:
Separate Combined System Along Streets Highlighted in Yellow

Buttonwood St.

C St.

D St.

B St.

A St.

New Castle Ave.

LEGEND

- Storm Drain
- Combined Sewer
- Sanitary Sewer

Scale in Feet

80 0 80 160 Feet

20 0 20 40 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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South Wilmington Drainage Study

Recommended Improvements Drainage Problem Area 1, 3 & 4

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	11

Recommendation:
Construct 42-Inch Storm Drain Parallel to Existing 42-Inch Drain

Recommendation:
Inspect and Clean Existing Pipes as Necessary

Recommendation:
Clean Existing Ditch

Recommendation:
Repair Flap Valve on Tidal Structure

Recommendation:
Clean Existing Ditch

A St.

42" RC Com.

42" RC Com.

42" RC Com.

36" RC Com.

36" RC Com.

Christina Ave.

42" RC Com.

42" x 96" UNK Dr.

36" RC Com.

42" RC Com

42" RC Dr.

36"x 72" Ditch

36"x 72" Ditch

36" CON Com.

36" CON Com.

LEGEND

- Storm Drain
- Combined Sewer
- Sanitary Sewer

Scale in Feet

30 0 30 60 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

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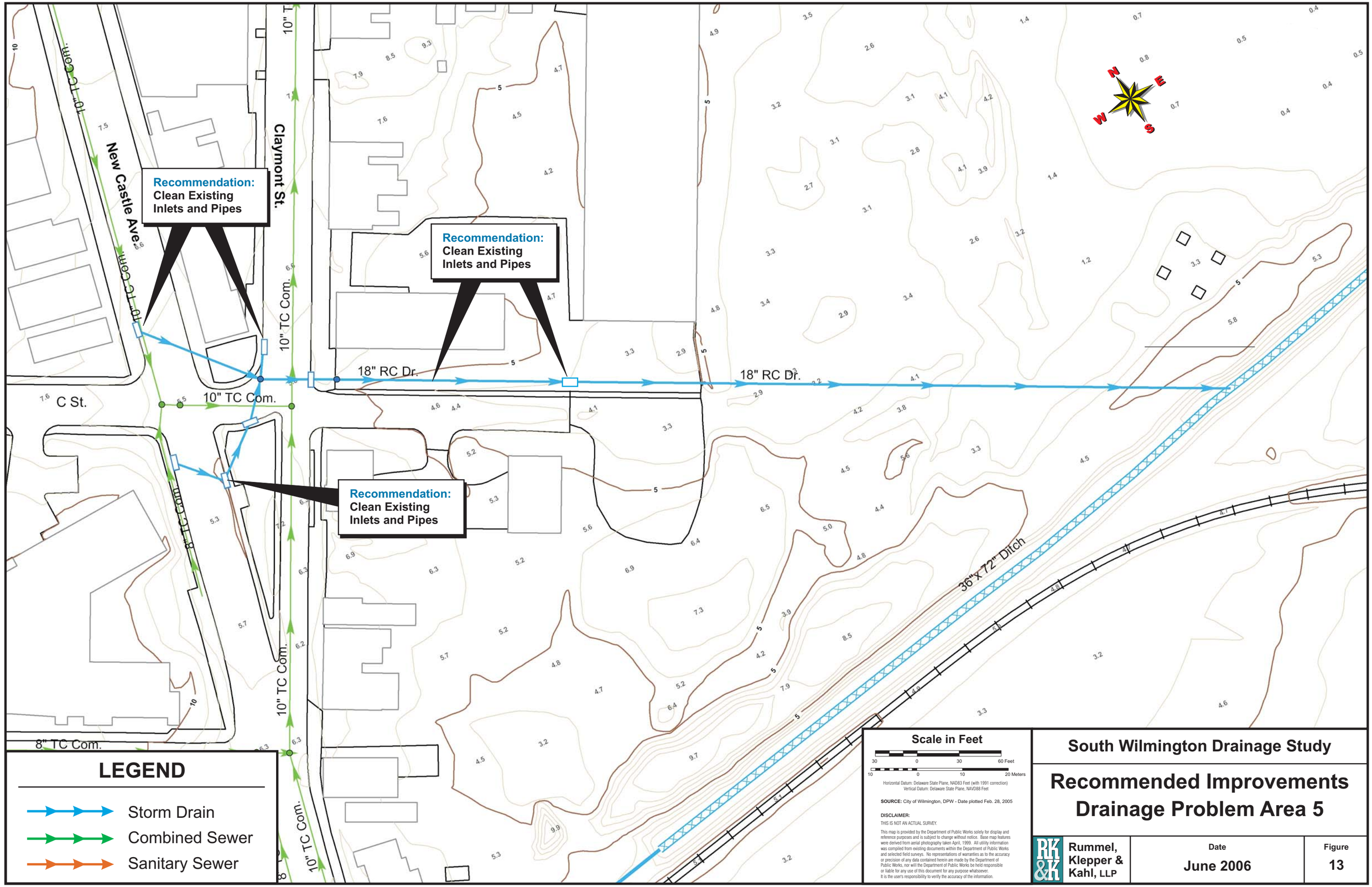
South Wilmington Drainage Study

Recommended Improvements Drainage Problem Area 2

Rummel, Klepper & Kahl, LLP

Date: June 2006

Figure: 12



LEGEND

- Storm Drain
- Combined Sewer
- Sanitary Sewer

Scale in Feet

30 0 30 60 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

DISCLAIMER:

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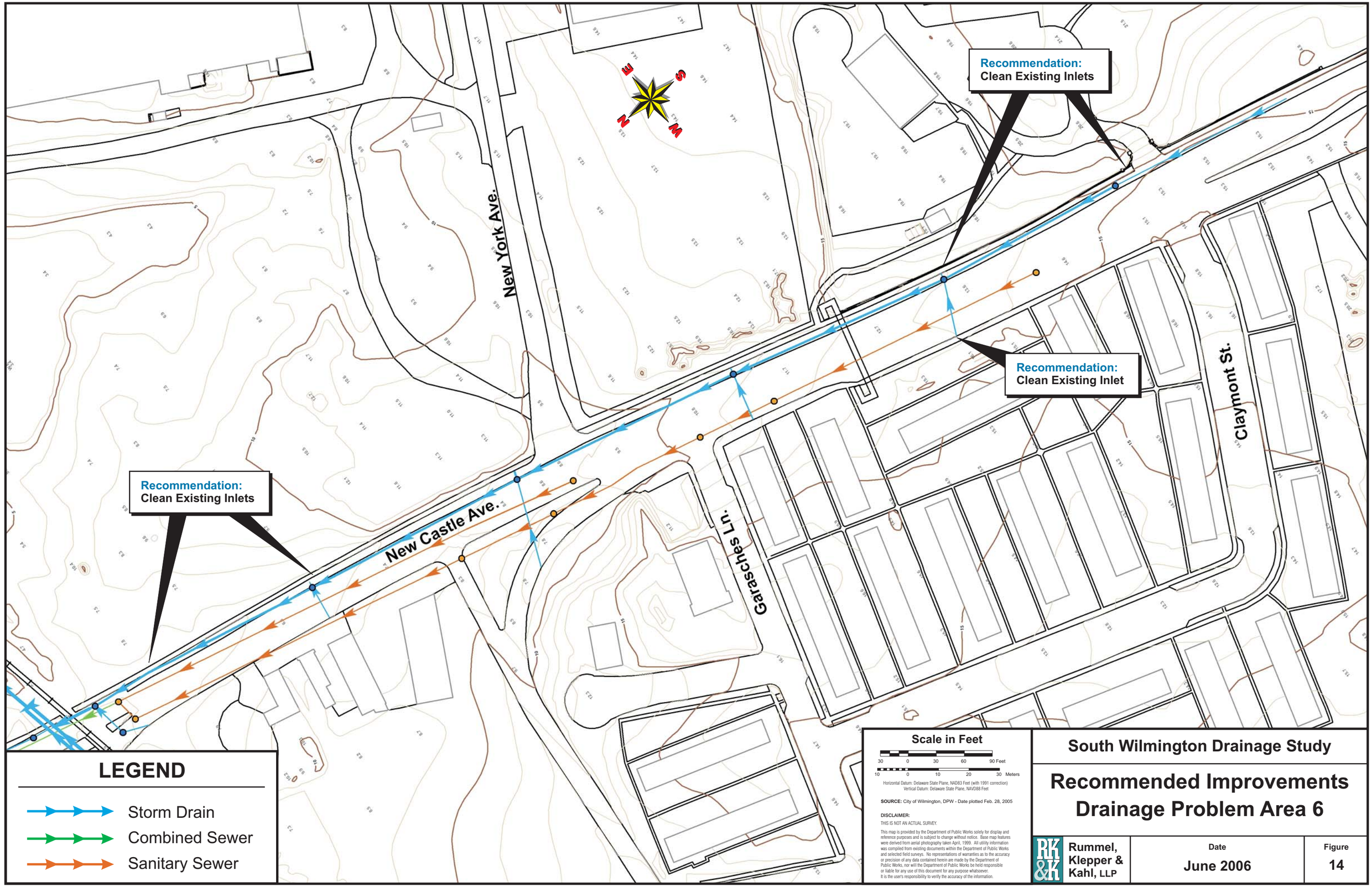
South Wilmington Drainage Study

Recommended Improvements Drainage Problem Area 5

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	13



LEGEND

- Storm Drain
- Combined Sewer
- Sanitary Sewer

Scale in Feet

30 0 30 60 90 Feet

10 0 10 20 30 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

DISCLAIMER:

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South Wilmington Drainage Study

Recommended Improvements Drainage Problem Area 6

Rummel, Klepper & Kahl, LLP

Date	Figure
June 2006	14

Recommendation:
Replace Manhole

Recommendation:
Remove Trash from Manhole

Recommendation:
Remove Debris from Storm Drain

42" RC Dr.

36" RC Dr.

36" RC Dr.

18" RC Dr.

Garasches Ln.

Heald St.

30" RC Dr.

6" TC Dr.

6" TC San.

18" TC Dr.

18" TC Dr.

8" TC Dr.

6" TC Dr.

10" TC San.

6" TC Dr.

12" TC Dr.

8" TC Dr.

8" TC San.

8" PVC San.

8" TC Dr.

6" TC San.

6" TC Dr.

N

W

E

S

LEGEND

- Storm Drain
- Combined Sewer
- Sanitary Sewer

Scale in Feet

30 0 30 60 Feet

10 0 10 20 Meters

Horizontal Datum: Delaware State Plane, NAD83 Feet (with 1991 correction)
Vertical Datum: Delaware State Plane, NAVD88 Feet

SOURCE: City of Wilmington, DPW - Date plotted Feb. 28, 2005

DISCLAIMER:

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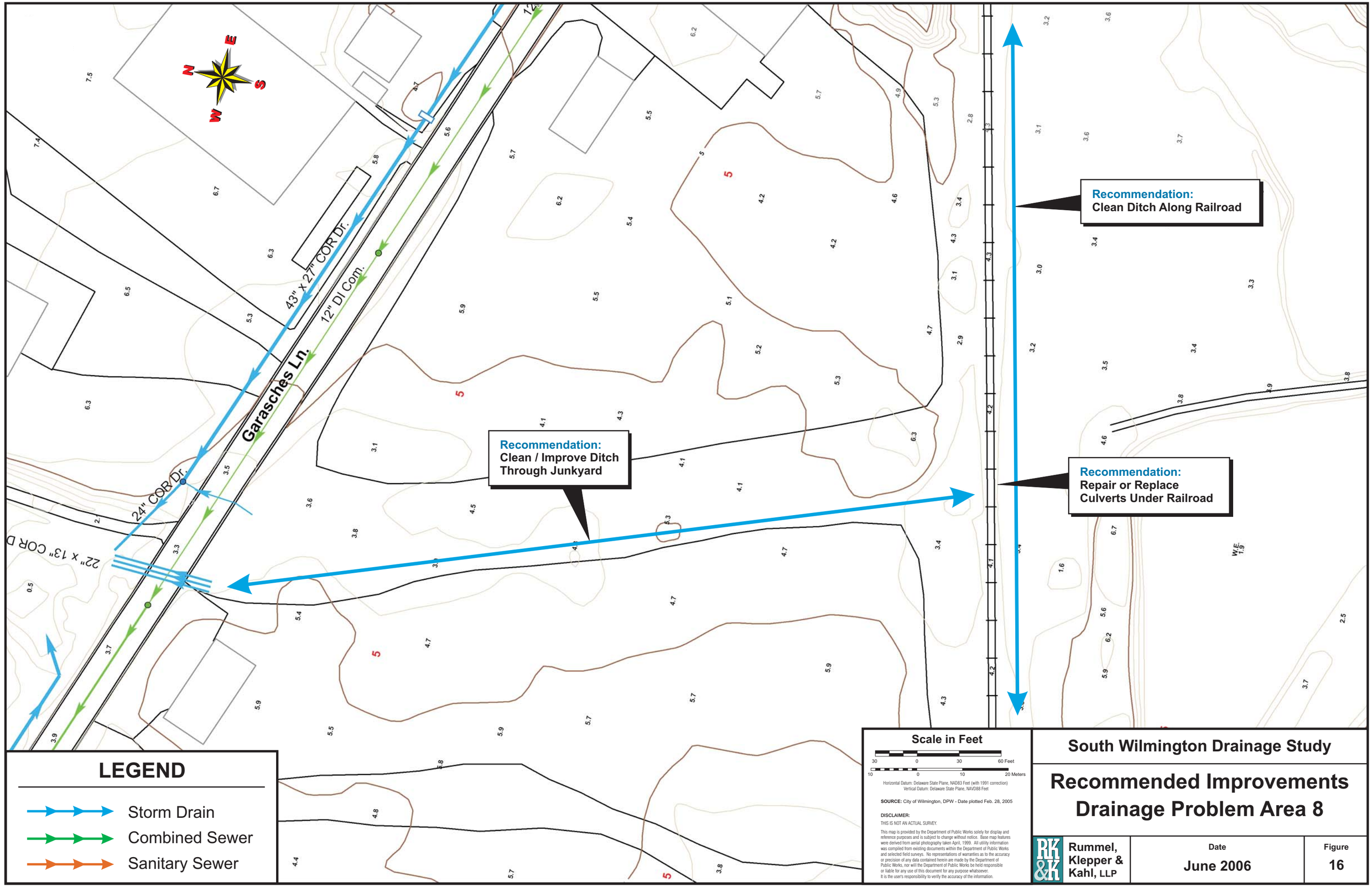
South Wilmington Drainage Study

Recommended Improvements Drainage Problem Area 7

Rummel, Klepper & Kahl, LLP

Date: June 2006

Figure: 15



South Wilmington Drainage Study

Recommended Improvements Drainage Problem Area 8

Rummel, Klepper & Kahl, LLP	Date	Figure
	June 2006	16

APPENDIX B

Community Involvement

ATTENTION SOUTH WILMINGTON COMMUNITY MEMBERS, LANDOWNERS AND BUSINESSES

Your help and input is needed in an effort to reduce flooding and improve drainage in South Wilmington.

Community Workshop
South Wilmington Drainage Study

To Be Held at the Neighborhood House
Southbridge, Wilmington
1218 B Street
October 20, 2005 at 6 P.M.

Learn about the proposed effort to improve drainage and reduce flooding in South Wilmington. Take advantage of this opportunity to provide your input regarding drainage and flooding problems in the area of Wilmington located between I-495 and the Christina River.

South Wilmington Drainage Study

Community Workshop

October 20, 2005

6 P.M.

South Wilmington Drainage Study

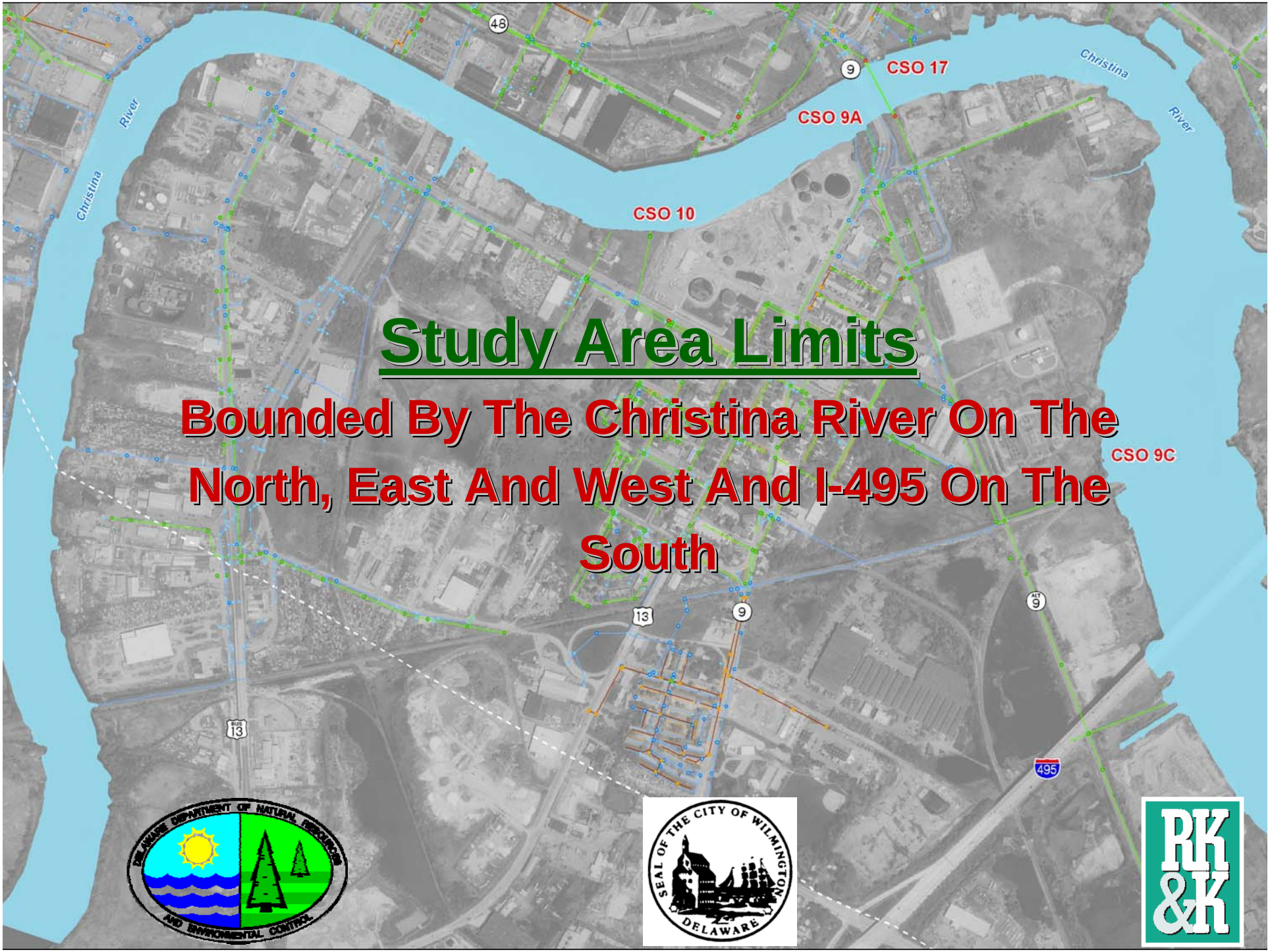
AGENDA

1. Welcome & Introductions
2. Project Purpose
3. Project Study Area
4. Project Tasks & Schedule
5. Questionnaires
6. Open Discussion

South Wilmington Drainage Study

PURPOSE OF PROJECT

- Identify Flooding/Drainage Problems in South Wilmington
- Rank/Prioritize Drainage Problems
- Develop Recommendations for Improvements
- Develop Conceptual Designs for Proposed Improvements



Study Area Limits

Bounded By The Christina River On The North, East And West And I-495 On The South

South Wilmington Drainage Study

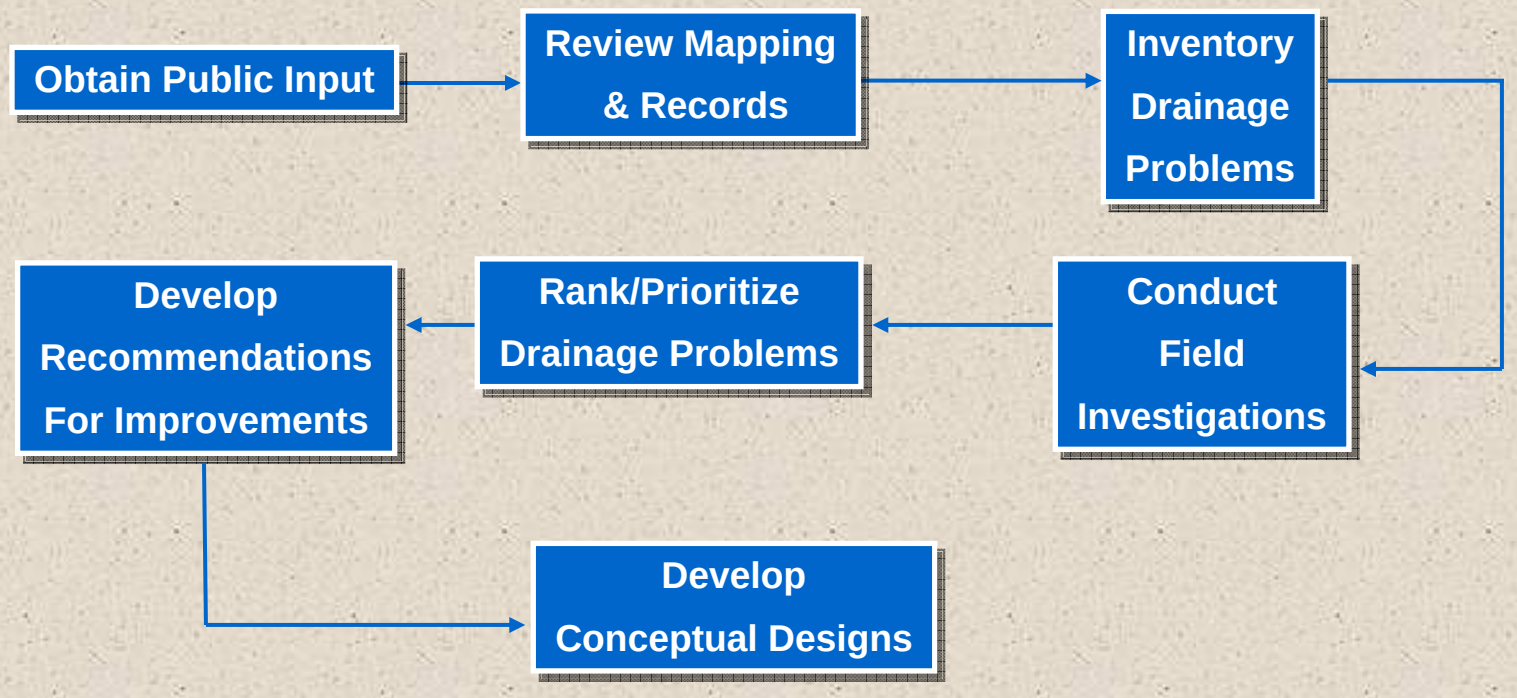
Photos of Previous Flooding

South Wilmington Drainage Study

Photos of Previous Flooding

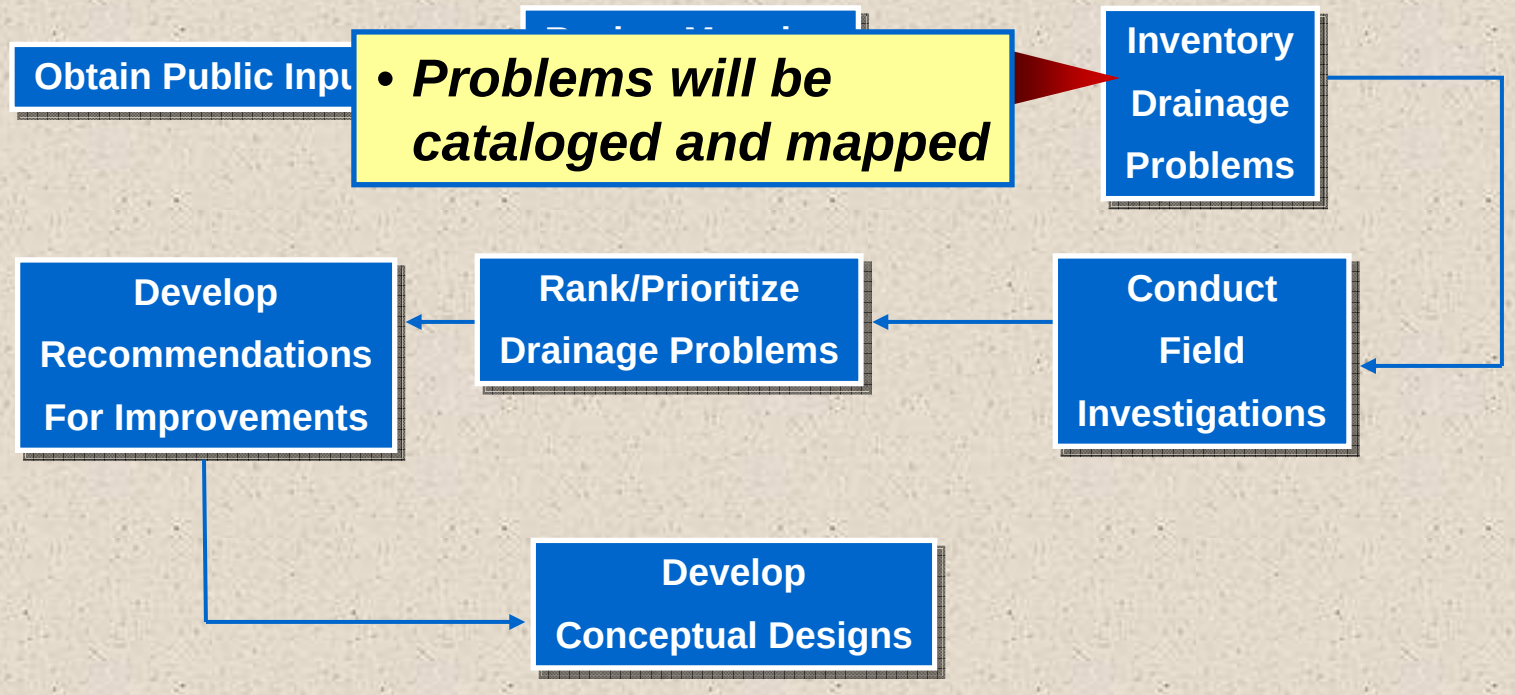
South Wilmington Drainage Study

PROJECT TASKS



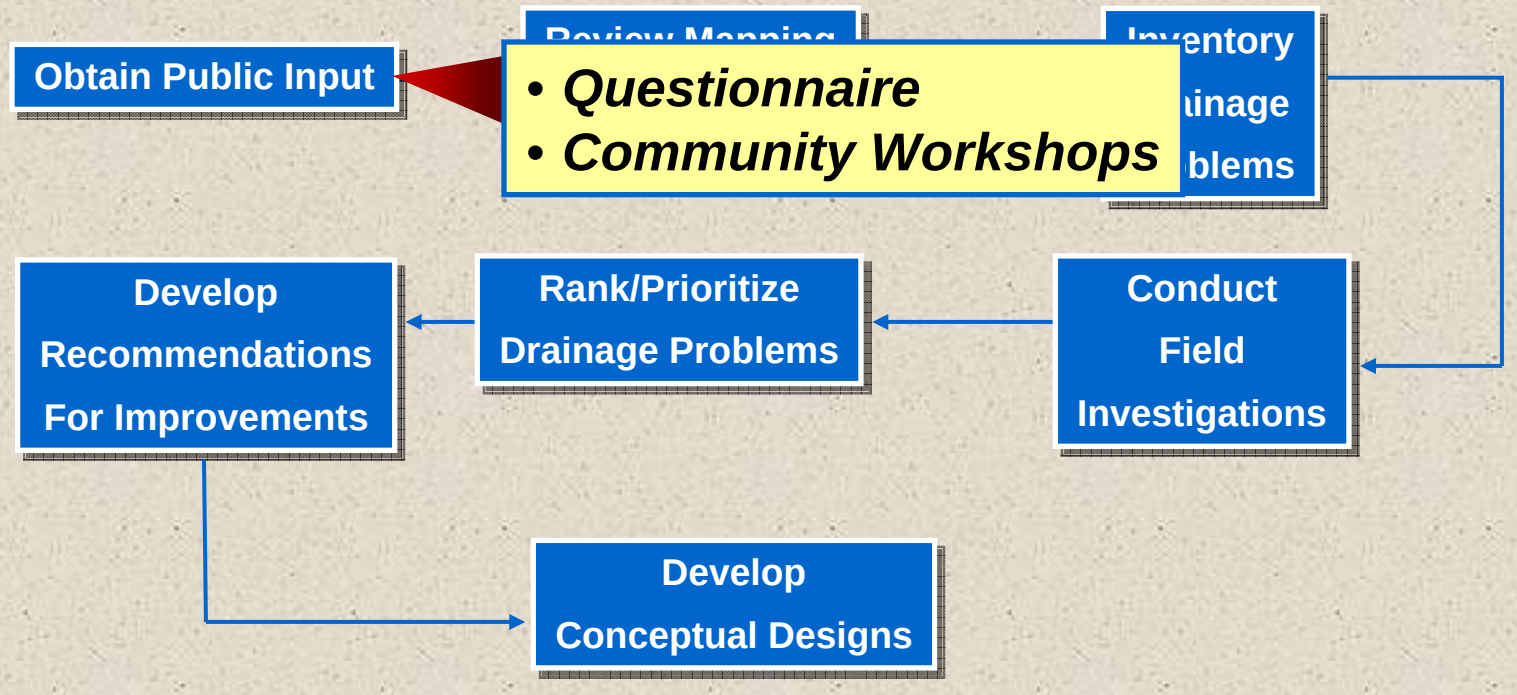
South Wilmington Drainage Study

PROJECT TASKS



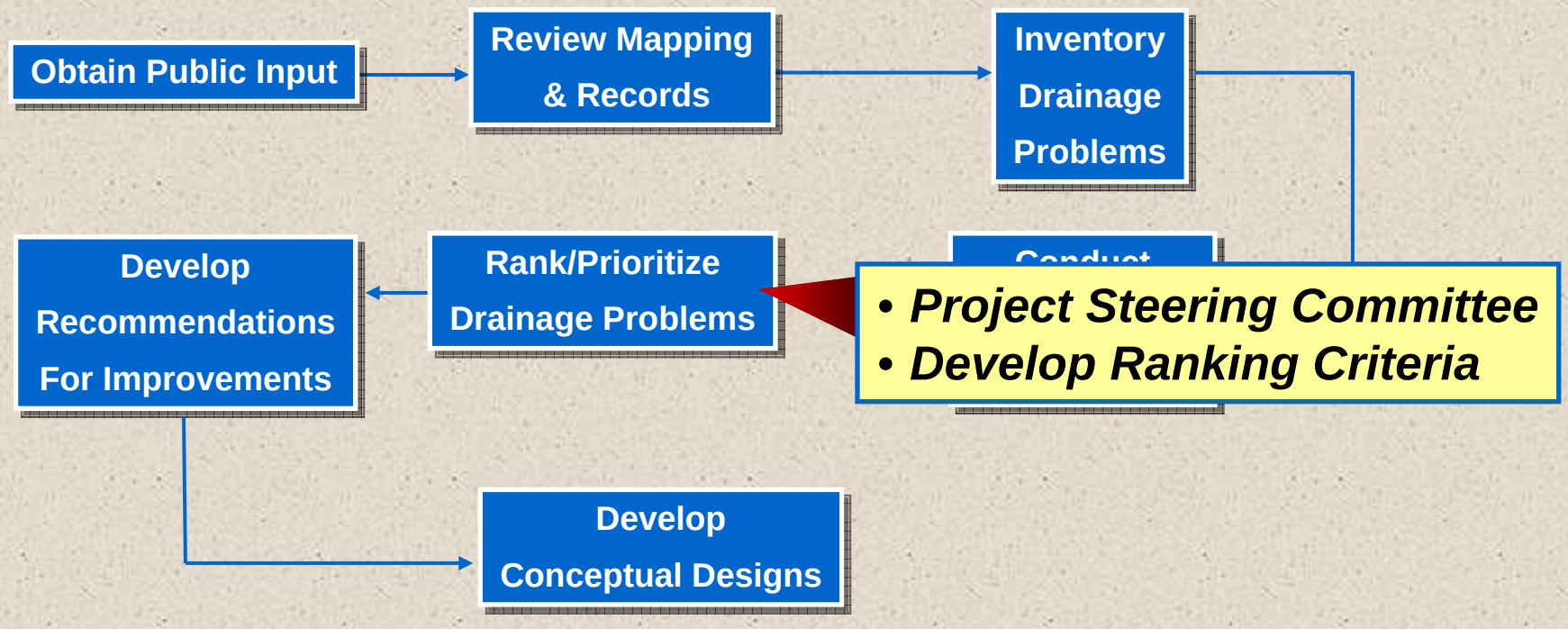
South Wilmington Drainage Study

PROJECT TASKS



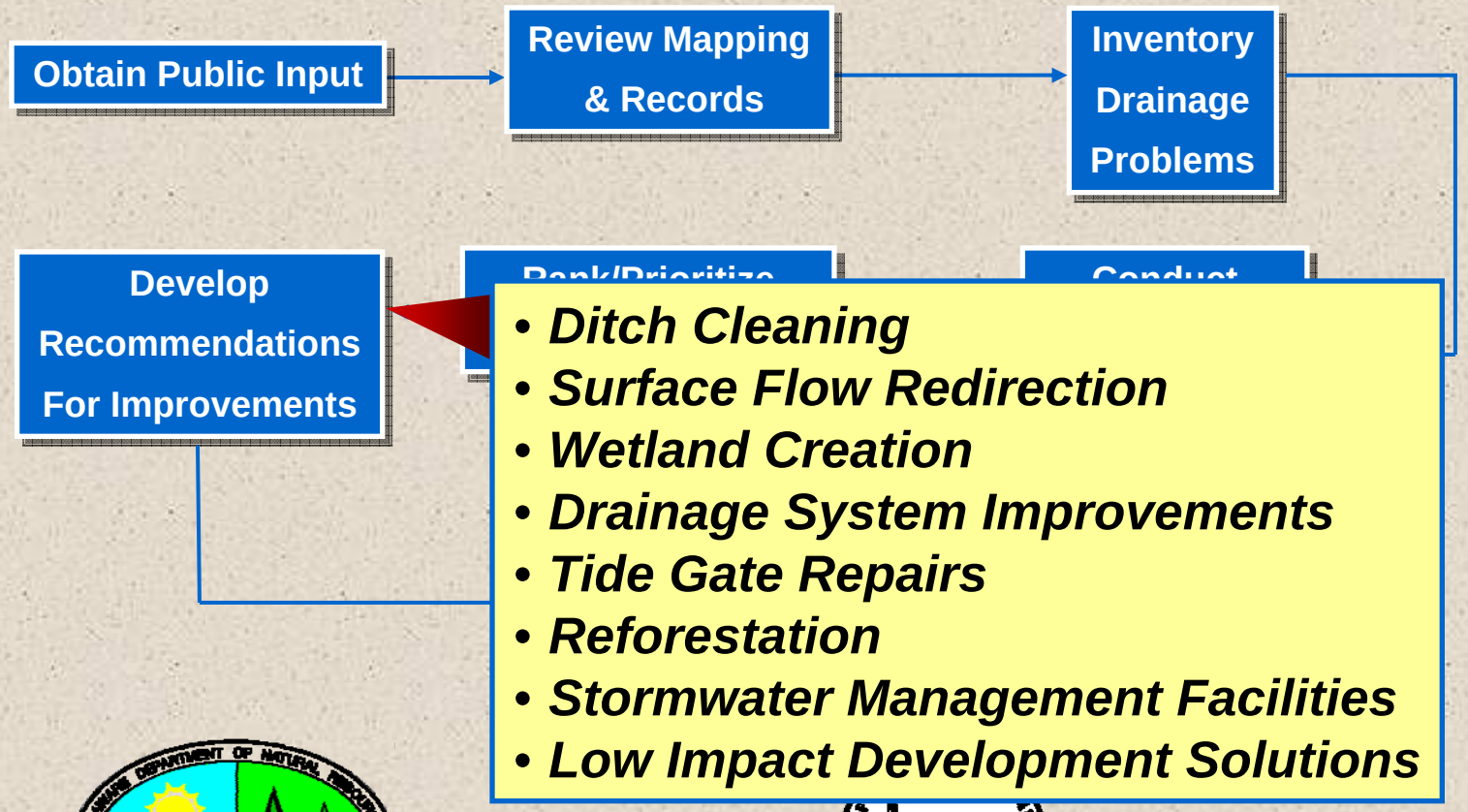
South Wilmington Drainage Study

PROJECT TASKS



South Wilmington Drainage Study

PROJECT TASKS



South Wilmington Drainage Study

SCHEDULE

❖ Community Workshop	October 20, 2005
❖ Conduct Field Reconnaissance	Late October
❖ Develop Comprehensive List of Drainage Problems	Early November
❖ Rank/Prioritize Drainage Problems	Late November
❖ Develop Recommendations for Improvements	December
❖ Develop Conceptual Designs	March 2006
❖ Submit Study Report	April 2006

South Wilmington Drainage Study

Please Complete Questionnaire By October 28th

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name			
Street Address			
Home Phone			
Other Phone			
E-mail Address			
Do you wish to remain anonymous?		Yes ☐	No ☐
Would you like to be notified before an investigation?		Yes ☐	No ☐
How would you like to be notified?	Home Phone ☐ E-mail ☐ Door Hanger ☐		
Drainage and/or Flooding Problem			
Location (if different than home address)			
Street Flooding?	Yes ☐	No ☐	
Is House or Building Flooded?	Yes ☐	No ☐	
Date and Time Observed			
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐		
How Long has the Problem Existed?			
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐ Don't Know ☐		
Extent and/or Depth of Flooding			
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☐		

South Wilmington Drainage Study

OPEN DISCUSSION

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

HOME ADDRESS

Personal Information				
Name	KOZUR, ROBERT & CHARLES V			
Street Address	625 S. HEALD (309 MARSH RD FOR MAIL)			
Home Phone	302 762 5764			
Other Phone	229 3643			
E-mail Address				
Would you like to be notified before a site inspection?	Yes ☑	No ☐		
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☐	

Drainage and/or Flooding Problem		
Location (if different than home address)	625 S. HEALD	
Street Flooding?	Yes ☑	No ☐
Is House or Building Flooded?	Yes ☐	No ☑
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed		
Frequency of Flooding	2 Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	FOREVER	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding	BASEMENT	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☑ Don't Know ☑	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	LEROY BAILEY		
Street Address	405 NEW CASTLE Ave. Wilmington, DE 19801		
Home Phone	302-426-1113		
Other Phone	302-275-6787		
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☑	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☑

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☑	No ☐
Is House or Building Flooded?	Yes ☑	No ☐
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed	Severe MAIN	
Frequency of Flooding	___ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?		
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding	3 to 4"	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☑	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	DONALD BLUESTEIN		
Street Address	315 SOUTH MEALD		
Home Phone	753 9712		
Other Phone			
E-mail Address	DONALD6714@YAHOO.COM		
Would you like to be notified before a site inspection?	Yes ☒	No ☐	
How would you like to be notified?	Home Phone ☐	E-mail ☒	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)	BASEMENT	
Street Flooding?	Yes ☐	No ☒
Is House or Building Flooded?	Yes ☒	No ☐
Is Flooding Confined To The Basement?	Yes ☒	No ☐
Date and Time Observed		
Frequency of Flooding	2/3 Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?		
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☒ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding	1/2 - 2 INCH	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☒	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	LANA TURNER		
Street Address	500 South Heald St		
Home Phone	425-0539		
Other Phone	743-0009		
E-mail Address	lana91261@verizon.net		
Would you like to be notified before a site inspection?	Yes ☒	No ☐	
How would you like to be notified?	Home Phone ☒ E-mail ☐	Door Hanger ☒	

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☐
Is House or Building ~~Flooded~~? DAMP	Yes ☒	No ☐
Is ~~Flooding~~ DAMPness Confined To The Basement?	Yes ☒	No ☐
Date and Time Observed		
Frequency of Flooding	? Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	4ish	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐ Don't Know ☒	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☒ Don't Know ☒	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	Mary E. Smith
Street Address	507 W. 32nd St. Wilm. DE. 19801
Home Phone	302-654-4071
Other Phone	
E-mail Address	
Would you like to be notified before a site inspection?	Yes ☑ No ☐
How would you like to be notified?	Home Phone ☑ E-mail ☐ Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)	1200 Poplar St. /100 Blk. Harold St.	
Street Flooding?	Yes ☐	No ☐
Is House or Building Flooded?	Yes ☐	No ☐
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed	Each Time It RAINS	
Frequency of Flooding	depends on Water Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	always (10 yrs. for me)	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☑ Don't Know ☐	
Extent and/or Depth of Flooding	up to Lt. of water if rain continues	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Larry Woody		
Street Address	519 So. Heald St		
Home Phone	302-426-9003		
Other Phone			
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☑	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☑

Drainage and/or Flooding Problem			
Location (if different than home address)	work on the roof needs done		
Street Flooding?	Yes ☑	No ☐	
Is House or Building Flooded?	Yes ☑ Wet walls	No ☐	
Is Flooding Confined To The Basement?	Yes ☑	No ☑	
Date and Time Observed	Every times it rains hard		
Frequency of Flooding	when it rai Times Per Year ☐ /Decade ☐		
How Long has the Problem Existed?	~~extent time~~,		
Does Problem Occur During Intense Rain Storms or High Tides? Yes	Storms ☐	Tides ☐	Both ☐ Don't Know ☐
Extent and/or Depth of Flooding wet when Rains	it for a period of time		
Apparent Cause of Flooding weather	Tidal ☐	Blocked Pipe/Inlet ☐	Don't Know ☐
Do You Have Photos Of The Flooding?	Yes ☐	No ☐	

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

Please use this space to provide any other information you wish to share:

when it rains for an extended period of time rain will come in from the walls, and the trees in the back of the house and the roof need work as well.

Photos: Citizens are encouraged to attach photos that depict the problem that they are reporting.

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Christopher N Jackson		
Street Address	414 S. Harold St Wilm. DE		
Home Phone	302-652-0767		
Other Phone			
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☐	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☑
Is House or Building Flooded?	Yes ☐	No ☐
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed		
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	About 4 years	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding	Floods part of Basement	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☑	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Norkia Baker		
Street Address	436 South Heald Street		
Home Phone	302-494-2066		
Other Phone			
E-mail Address	Kia.Baker@GMAIL.com		
Would you like to be notified before a site inspection?	Yes ☑	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☑	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☑
Is House or Building Flooded?	Yes ☑	No ☐
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed	Oct. 8 - Oct. 9	
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	Not Sure	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☑	
Extent and/or Depth of Flooding	Approx. 1.5 inches	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☑ Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 28th to the Neighborhood House or:

Fax: 302-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Marvin Thomas		
Street Address	216 South Heald St. Wilm.		
Home Phone	656-4823		
Other Phone	N/A		
E-mail Address	Marthomas@comcast.net		
Would you like to be notified before a site inspection?	Yes ☐	No ☑	
How would you like to be notified?	Home Phone ☐	E-mail ☐	Door Hanger ☐
Drainage and/or Flooding Problem			
Location (if different than home address)	Butterwood & A St. New Castle Ave & C St. Broadford St. & A St.		
Street Flooding?	Yes ☑	No ☐	
Is House or Building Flooded?	Yes ☐	No ☑	
Is Flooding Confined To The Basement?	Yes N/A ☐	No N/A ☐	
Date and Time Observed	Every time it rains		
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐		
How Long has the Problem Existed?	4 yrs		
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐	Tides ☐	Both ☑ Don't Know ☐
Extent and/or Depth of Flooding			
Apparent Cause of Flooding	Tidal ☐	Blocked Pipe/Inlet ☐	Don't Know ☐
Do You Have Photos Of The Flooding?	Yes ☐	No ☐	

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Tina Hopkins		
Street Address	500 South Claymont Street Wilm DE 19801		
Home Phone	(302) 6556583		
Other Phone			
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☒	No ☐	
How would you like to be notified?	Home Phone ☒	E-mail ☐	Door Hanger ☒

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☒
Is House or Building Flooded?	Yes ☒	No ☐
Is Flooding Confined To The Basement?	Yes ☒	No ☐
Date and Time Observed	Heavy Rains & Storms	
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	Floor 20 yrs Wall and Floor 15 yrs.	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☒ Tides ☒ Both ☒ Don't Know ☐	
Extent and/or Depth of Flooding	Right Side of Basement Wall and Floor	
Apparent Cause of Flooding	Tidal ☒ Blocked Pipe/Inlet ☐ Don't Know ☒	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

Contact - Wayne Brown

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Mount Joy U.M.C.		
Street Address	451 Townsend Street		
Home Phone			
Other Phone	(302) 655-7751		
E-mail Address	WAYNEFBROWN@JUNO.COM		
Would you like to be notified before a site inspection?	Yes ☒	No ☐	
How would you like to be notified?	Home Phone ☒	E-mail ☒	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)	Mount Joy UMC 451 Townsend St	
Street Flooding?	Yes ☒	No ☐
Is House or Building Flooded?	Yes ☒	No ☐
Is Flooding Confined To The Basement?	Yes ☒	No ☐
Date and Time Observed		
Frequency of Flooding	Varies Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	Decades	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐ Don't Know ☒	
Extent and/or Depth of Flooding	Can be extensive	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☒	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

Please use this space to provide any other information you wish to share:

The church basement floods. It can flood during intense or light rain and can last for long periods of time. We have to pump it out with a sump pump. If left alone it could rise a foot or more in the basement.

Photos: Citizens are encouraged to attach photos that depict the problem that they are reporting.

576-3103
Problem

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	Earline Lemon
Street Address	429 S. Claymont Street
Home Phone	654-5334
Other Phone	
E-mail Address	
Would you like to be notified before a site inspection?	Yes ☑ No ☐
How would you like to be notified?	Home Phone ☐ E-mail ☐ Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☐
Is House or Building Flooded?	Yes ☐	No ☐
Is Flooding Confined To The Basement?	Yes ☐	No ☐
Date and Time Observed		
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?		
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☐

Please return the form by October 28th to the Neighborhood House or:

Fax: 302-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

Mess up gutter
3,000 work on gutter
Came down in upstairs
bathroom and kitchen

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	Mary P. Mahon
Street Address	510 S. Harold St
Home Phone	(302) 658-2291
Other Phone	—
E-mail Address	—

Would you like to be notified before a site inspection?	Yes	☒	No	☐	
How would you like to be notified?	Home Phone	☒	E-mail ☐	Door Hanger	☐

Drainage and/or Flooding Problem				
Location (if different than home address)				
Street Flooding?	Yes	☐	No	☒
Is House or Building Flooded?	Yes	☐	No	☒
Is Flooding Confined To The Basement?	Yes	☒	No	☐
Date and Time Observed	with any heavy rain			
Frequency of Flooding	___ Times Per Year ☐	/Decade ☐		
How Long has the Problem Existed?				
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☒	Tides ☐	Both ☒	Don't Know ☐
Extent and/or Depth of Flooding				
Apparent Cause of Flooding	Tidal ☐	Blocked Pipe/Inlet ☐	Don't Know ☒	
Do You Have Photos Of The Flooding?	Yes	☐	No	☒

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
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Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Cora Thomas		
Street Address	613 S. Heald St		
Home Phone	1302 652 5170		
Other Phone	—		
E-mail Address	—		
Would you like to be notified before a site inspection?	Yes ☑	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☑

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☐
Is House or Building Flooded?	Yes ☐	No ☐
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed	When it rains	
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	For many years	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☑ Don't Know ☐	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☑ Don't Know ☑	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	Timothy W Stanley
Street Address	326 Bradford St.
Home Phone	6558796
Other Phone	
E-mail Address	
Would you like to be notified before a site inspection?	Yes ☒ No ☐
How would you like to be notified?	Home Phone ☐ E-mail ☐ Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☒	No ☐
Is House or Building Flooded?	Yes ☒	No ☐
Is Flooding Confined To The Basement?	Yes ☐	No ☐
Date and Time Observed		
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?		
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☒ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒

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Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	IRENE Butts		
Street Address	638 TOWNSEND St		
Home Phone	658-8124		
Other Phone	654-7921		
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☒	No ☐	
How would you like to be notified?	Home Phone ☒	E-mail ☐	Door Hanger ☒

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☐
Is House or Building Flooded?	Yes ☒	No ☐
Is Flooding Confined To The Basement?	Yes ☒	No ☐
Date and Time Observed		
Frequency of Flooding	___ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	EVERY SINCE WE have lived in Home	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☒ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☒	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒

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Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information				
Name	Patty Y. King			
Street Address	621 South Heald Street			
Home Phone	(302) 594-9798			
Other Phone				
E-mail Address	CarolinaPKing@aol.com			
Would you like to be notified before a site inspection?	Yes ☑	No ☐		
How would you like to be notified?	Home Phone ☑	E-mail ☑	Door Hanger ☑	
Drainage and/or Flooding Problem				
Location (if different than home address)				
Street Flooding?	Yes ☑	No ☐		
Is House or Building Flooded?	Yes ☐	No ☐		
Is Flooding Confined To The Basement?	Yes ☐	No ☑		
Date and Time Observed				
Frequency of Flooding	Heavy rain Times Per Year ☐	/Decade ☐	Varies	
How Long has the Problem Existed?	Since I've lived there.			
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐	Tides ☐	Both ☑	Don't Know ☐
Extent and/or Depth of Flooding	Water sits on the side of the house			
Apparent Cause of Flooding	Tidal ☑	Blocked Pipe/Inlet ☐	Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑		

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Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	LEATHIA C TATE		
Street Address	1120 B St Wilm DE 19801		
Home Phone	302 888 1068		
Other Phone	302 897 4089		
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☑	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☑	No ☐
Is House or Building Flooded?	Yes ☐	No ☑
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed	9-5	
Frequency of Flooding	___ Times Per Year ☐ /Decade ☑	
How Long has the Problem Existed?	1990	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☑	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

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Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	MARY JACKSON		
Street Address	521 SOUTH HEALD		
Home Phone	302 661-1018		
Other Phone	—		
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☑	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☑	No ☐
Is House or Building Flooded?	Yes ☑	No ☐
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed		
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	Everytime	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☑ Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

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Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	EDWARD L SR + BRENDA J. DRYDEN		
Street Address	442 SOUTH CLAYMONT ST		
Home Phone	302-654-3268		
Other Phone			
E-mail Address			
Would you like to be notified before a site inspection?	Yes ☑	No ☐	
How would you like to be notified?	Home Phone ☑	E-mail ☐	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☑
Is House or Building Flooded?	Yes ☐	No ☑
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed	Don't Know	
Frequency of Flooding	____ Times Per Year ☐	/Decade ☐
How Long has the Problem Existed?	?	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐	Don't Know ☑
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐	Don't Know ☑
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information			
Name	Christine Munson		
Street Address	520 S. Claymont Street		
Home Phone	652-2688		
Other Phone	n/a		
E-mail Address	n/a		
Would you like to be notified before a site inspection?	Yes ☒	No ☐	
How would you like to be notified?	Home Phone ☒	E-mail ☐	Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☒	No ☐
Is House or Building Flooded?	Yes ☐	No ☒
Is Flooding Confined To The Basement?	Yes ☒	No ☒
Date and Time Observed	March 2005	
Frequency of Flooding	____ Times Per Year ☐ /Decade ☒	
How Long has the Problem Existed?	once	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐ Don't Know ☒	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☒	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒

Please return the form by October 21st to the Neighborhood House or: Tina Pipkins 6556583

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information				
Name	Yvonne A Blue			
Street Address	324 BRADford St			
Home Phone	655 40619			
Other Phone				
E-mail Address				
Would you like to be notified before a site inspection?	Yes ☐	No ☒		
How would you like to be notified?	Home Phone ☐	E-mail ☐	Door Hanger ☐	
[illegible]				
Location (if different than home address)				
Street Flooding?	Yes ☐	No ☒		
Is House or Building Flooded?	Yes ☐	No ☒		
Is Flooding Confined To The Basement?	Yes ☒	No ☐		
Date and Time Observed				
Frequency of Flooding	____ Times Per Year ☐	/Decade ☒		
How Long has the Problem Existed?				
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☒	Tides ☐	Both ☐	Don't Know ☐
Extent and/or Depth of Flooding	1/2 inch			
Apparent Cause of Flooding	Tidal ☐	Blocked Pipe/Inlet ☐	Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☒		

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Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	Linda L Lemon
Street Address	506 St Clayment Street
Home Phone	(302-654-3364)
Other Phone	(302-654-9334) Mother address phone number
E-mail Address	N/A
Would you like to be notified before a site Inspection?	Yes ☐ No ☐
How would you like to be notified?	Home Phone ☐ E-mail ☐ Door Hanger ☐

Questions about Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☐	No ☐
Is House or Building Flooded?	Yes ☐	No ☐
Is Flooding Confined To The Basement?	Yes ☐	No ☐
Date and Time Observed		
Frequency of Flooding	____ Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?		
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding		
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☐

Please return the form by October 28th to the Neighborhood House or:

Fax: 302-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

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SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	Bobbie J. Foote-Alston
Street Address	523 New Castle Ave
Home Phone	655-6087
Other Phone	
E-mail Address	
Would you like to be notified before a site inspection?	Yes ☑ No ☐
How would you like to be notified?	Home Phone ☑ E-mail ☐ Door Hanger ☐

Flooding Problem Information	
Location (if different than home address)	
Street Flooding?	Yes ☑ No ☐
Is House or Building Flooded?	Yes ☐ No ☐
Is Flooding Confined To The Basement?	Yes ☑ No ☐
Date and Time Observed	
Frequency of Flooding	___ Times Per Year ☐ /Decade ☐
How Long has the Problem Existed?	For many years 25yrs or more
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☐
Extent and/or Depth of Flooding	3 to 4ft during storm or torin down pours
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☑ Don't Know ☐
Do You Have Photos Of The Flooding?	Yes ☑ No ☐

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	Willie & Edna Anderson
Street Address	432 S. Claymont St
Home Phone	302-898-1282
Other Phone	302-352-2995
E-mail Address	Wanderers@Comcast.net
Would you like to be notified before a site inspection?	Yes ☑ No ☐
How would you like to be notified?	Home Phone ☑ E-mail ☐ Door Hanger ☑
Drainage and/or Flooding Problem	
Location (if different than home address)	
Street Flooding?	Yes ☑ No ☐
Is House or Building Flooded?	Yes ☑ No ☐
Is Flooding Confined To The Basement?	Yes ☑ No ☐
Date and Time Observed	Hard Rain
Frequency of Flooding	3 Times Per Year ☑ /Decade ☐
How Long has the Problem Existed?	For a while
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☐
Extent and/or Depth of Flooding	2 in sometime
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☑
Do You Have Photos Of The Flooding?	Yes ☐ No ☑

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E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

My Basement Door, Kicken And Back Bedroom All Leak

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Personal Information	
Name	FIBRE PROCESSING CORP
Street Address	701 GARASCHES LANE
Home Phone	302 654 3659
Other Phone	
E-mail Address	
Would you like to be notified before a site inspection?	Yes ☑ No ☐
How would you like to be notified?	Home Phone ☑ E-mail ☐ Door Hanger ☐

Drainage and/or Flooding Problem		
Location (if different than home address)		
Street Flooding?	Yes ☑	No ☐
Is House or Building Flooded?	Yes ☐	No ☑
Is Flooding Confined To The Basement?	Yes ☐	No ☐
Date and Time Observed		
Frequency of Flooding	2 Times Per Year ☐ /Decade ☐	
How Long has the Problem Existed?	4 YRS	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☐ Tides ☐ Both ☑ Don't Know ☐	
Extent and/or Depth of Flooding	8 TO 10 INCHES	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☑ Don't Know ☐	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 28th to the Neighborhood House or:

Fax: 302-571-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

SOUTH WILMINGTON DRAINAGE STUDY

FLOODING & DRAINAGE PROBLEM QUESTIONNAIRE

Name	LOUISE Harvey
Street Address	430 QUEEN STREET
Home Phone	(302) 832-9787 (H)
Other Phone	(302) 892-7501 (W)
E-mail Address	
Would you like to be notified before a site inspection?	Yes ☑ No ☐
How would you like to be notified?	Home Phone ☑ E-mail ☐ Door Hanger ☐

Location (if different than home address)		
Street Flooding?	Yes ☐	No ☐
Is House or Building Flooded?	Yes ☑	No ☐
Is Flooding Confined To The Basement?	Yes ☑	No ☐
Date and Time Observed		
Frequency of Flooding	~2-3 X Times Per Year ☑ /Decade ☐	
How Long has the Problem Existed?	1-2 YRS	
Does Problem Occur During Intense Rain Storms or High Tides?	Storms ☑ Tides ☐ Both ☐ Don't Know ☐	
Extent and/or Depth of Flooding	3+ INCHES	
Apparent Cause of Flooding	Tidal ☐ Blocked Pipe/Inlet ☐ Don't Know ☑	
Do You Have Photos Of The Flooding?	Yes ☐	No ☑

Please return the form by October 21st to the Neighborhood House or:

Fax: 301-671-4579 Attention: Mr. David Beattie

E-mail: dbeattie@ci.wilmington.de.us

Mail: Mr. David Beattie
Louis L. Redding
City/County Building
800 French Street
Wilmington, DE 19801-3537

Please use the other side to provide additional information that you may have

APPENDIX C

Preliminary Cost Estimates

PRELIMINARY COST ESTIMATE

Item No.	Approximate Quantities	ITEM DESCRIPTION	Unit Price		
			Dollars	Cents	Dollars
1		Mobilization and Demobilization	Lump Sum		99,500
2	20 EA.	Test Pits	600	00	12,000
3	3,540 L.F.	18-Inch Storm Drain	100	00	354,000
4	1,770 L.F.	24-Inch Storm Drain	140	00	247,800
5	1,770 L.F.	30-Inch Storm Drain	175	00	309,750
6	1,770 L.F.	36-Inch Storm Drain	200	00	354,000
7	500 EA.	House Disconnections	500	00	250,000
8	8,276 C.Y.	Trench Excavation	15	00	124,140
9	8,500 S.Y.	Graded Aggregate Base	9	00	76,500
10	1,756 Tons	Hot Mix Aspalt	85	00	149,260
11	25	Manholes – Minimum Depth	3,500	00	87,500
12	50	Manholes – Vertical Depth	200	00	10,000
11	Lump Sum	Maintenance of Traffic	Lump Sum		10,000
12	Lump Sum	Sediment and Erosion Control	Lump Sum		5,000
		SUB-TOTAL			2,089,450
	Lump Sum	Contingencies	Lump Sum		835,780
		TOTAL FOR SITES 1, 3 AND 4			2,925,230

SAY $3,000,000

PRELIMINARY COST ESTIMATE

SITE 2
(A STREET AT BRADFORD STREET)

Item No.	Approximate Quantities	ITEM DESCRIPTION	Unit Price		
			Dollars	Cents	Dollars
1	Lump Sum	Mobilization and Demobilization (10% of Sub-Total)	Lump Sum		20,983
2	5 EA.	Test Pits	600	00	3,000
3	310 L.F.	42-Inch Storm Drain	540	00	167,400
4	448 S.Y.	Graded Aggregate Base	9	00	4,032
5	87 Tons	Hot Mix Aspalt	85	00	7,395
6	4 EA.	Manholes	4,500	00	18,000
7	Lump Sum	Repair of Existing Flap Valve	1,000	00	1,000
8	Lump Sum	Cleaning of Pipes, Manholes and Ditches	2,000	00	2,000
9	Lump Sum	Maintenance of Traffic	Lump Sum		5,000
10	Lump Sum	Sediment and Erosion Control	Lump Sum		2,000
		SUB-TOTAL			230,810
	Lump Sum	Contingencies @ 30%	Lump Sum		69,243
		TOTAL FOR SITE 2			300,053

SAY $300,000

PRELIMINARY COST ESTIMATE

SITE 5
(NEW CASTLE AVENUE NEAR C STREET)

Item No.	Approximate Quantities	ITEM DESCRIPTION	Unit Price		
			Dollars	Cents	Dollars
1	Lump Sum	Mobilization and Demobilization (10% of Sub-Total	Lump Sum		3,500
2	Lump Sum	Cleaning of Pipes, Inlets, Manholes and Ditches	Lump Sum		20,000
3	2 EA.	Catch Basins	6,000	00	12,000
4	Lump Sum	Maintenance of Traffic	Lump Sum		2,000
5	Lump Sum	Sediment and Erosion Control	Lump Sum		1,000
		SUB-TOTAL			38,500
	Lump Sum	Contingencies @ 30%	Lump Sum		11,550
		TOTAL FOR SITE 5			50,050

SAY $50,000

PRELIMINARY COST ESTIMATE

SITE 6
(NEW CASTLE AVENUE AT D STREET)

Item No.	Approximate Quantities	ITEM DESCRIPTION	Unit Price		Dollars
			Dollars	Cents	
1	Lump Sum	Mobilization and Demobilization (10% of Sub-Total	Lump Sum		3,500
2	Lump Sum	Cleaning of Pipes, Inlets, Manholes and Ditches	Lump Sum		20,000
3	2 EA.	Catch Basins	6,000	00	12,000
4	Lump Sum	Maintenance of Traffic	Lump Sum		2,000
5	Lump Sum	Sediment and Erosion Control	Lump Sum		1,000
		SUB-TOTAL			38,500
	Lump Sum	Contingencies @ 30%	Lump Sum		11,550
		TOTAL FOR SITE 6			50,050

SAY $50,000

PRELIMINARY COST ESTIMATE

SITE 7
(TRAFFIC LOOP NEAR GARASCHES LANE AND SOUTH HEALD STREET)

Item No.	Approximate Quantities	ITEM DESCRIPTION	Unit Price		
			Dollars	Cents	Dollars
1	Lump Sum	Mobilization and Demobilization (10% of Sub-Total)	Lump Sum		5,850
2	Lump Sum	Cleaning of Pipes, Inlets, Manholes and Ditches	Lump Sum		25,000
3	1 EA	Replace Manhole	4,500	00	4,500
4	1 EA	Replace Junction Chamber	20,000	00	20,000
5	Lump Sum	Excavation/Removal of Existing Structures	5,000	00	5,000
6	Lump Sum	Maintenance of Traffic	Lump Sum		2,000
7	Lump Sum	Sediment and Erosion Control	Lump Sum		2,000
		SUB-TOTAL			64,350
	Lump Sum	Contingencies @ 30%	Lump Sum		19,305
		TOTAL FOR SITE 7			83,655

SAY $85,000

PRELIMINARY COST ESTIMATE

SITE 8
(SOUTH HEALD STREET NEAR MAGNUS TIRE)

Item No.	Approximate Quantities	ITEM DESCRIPTION	Unit Price		
			Dollars	Cents	Dollars
1	Lump Sum	Mobilization and Demobilization (10% of Sub-Total)	Lump Sum		28,100
2	Lump Sum	Cleaning of Railroad Ditches	Lump Sum		25,000
3	Lump Sum	Replacement of Pipes under RR	Lump Sum		250,000
4	Lump Sum	Maintenance of Traffic	Lump Sum		2,000
5	Lump Sum	Sediment and Erosion Control	Lump Sum		4,000
		SUB-TOTAL			309,100
	Lump Sum	Contingencies @ 30%	Lump Sum		92,730
		TOTAL FOR SITE 8			401,830

SAY $400,000