Stormwater Coalition of Albany County

Storm System Mapping Project

Final Report

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Prepared By:

Nancy Heinzen
Stormwater Coalition of Albany County
112 State Street, Room 720
Albany, NY 12207
(518) 447-5645

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Acknowledgments

The following individuals participated in the storm system mapping project.

Coalition Staff	Nancy Heinzen	Coalition Program Coordinator
	Christina Chiappetta	GIS Technician
	Patricia Shultis	Student Intern
Coalition Members		
City of Albany	Maryella Davenport	Coalition Working Group; SW Prog Coor
	Justin Schievelbein	Water Dept-GIS Water Infrastructure
	Mary Millus	City-GIS Planning
	Mihaela Bruhma	Water Department; GPS Training
Town of Bethlehem	Jason Baum	Town GIS Coordinator
City of Cohoes	Garry Nathan	Coalition Working Group; SW Prog Coor
	Barbara Decker	Coalition Working Group
Town of Colonie	Rob Mateja	Town GIS Coordinator
	John Dzialo	Coalition Working Group; SW Prog Coor
	Ray Merolle	GIS Support
Village of Colonie	Carl Fleshman	Supt of Public Works
	Les Decker	Public Works
	Chris BiSagnano	Public Works
	Chris Ciota	Public Works
	Lisa Merwin (Labarge)	Consultant; Working Group
Village of Green Island	Sean Ward	Exec Ass't Mayor; Working Group; SW Prog Coor
	Tony Cesar	DPW
	John Heffern	DPW
Town of Guilderland	Ken d'Arpino	Coalition Working Group; SW Prog Coor
	Pete Donato	Highway Dept
	Tom Spawn	Highway Dept
	Brian Cook	Highway Dept
Village of Menands	Paul Reuss	Exec Ass't Mayor; Working Group
	Tim Boyd	Highway Foreman
Town of New Scotland	Paul Cantlin	Coalition Working Group; SW Prog Coor
	Jeremy Cramer	Coalition Working Group; SW Prog Coor
	Ken Guyer	Supt of Highways
Village of Voorheesville	Jerry Gordinier	Coalition Working Group; SW Prog Coor
	Glenn Hebert	Coalition Working Group; SW Prog Coor
	Will Smith	DPW Sup't and Wastewater
City of Watervliet	David Dressel	Coalition Working Group; Water Treatment
Albany County	Margaret Della Rocco	Coalition Working Group; DPW
	Laura DeGaetano	Coalition Working Group; Planning
	Bob Counihan	County DPW
	Tony Fernandez	County DPW
University at Albany-SUNY	Frank Fazio	Coalition Working Group; SW Coor
	Mike Hiller	Campus Planning/GPS Training
	Andrew Weiss	Campus Planning/GPS Training
	Batuka Gombosuran	Campus Planning/GPS Training

Consultants		
Fountains Spatial, Inc	Austin Fisher Anya Rozanova Jenny Smith Christine Smith	GIS Consultants
Waypoint Technologies	Jonathan Cobb	GPS Training & Support
Others		
New York State Department of Transportation	Peter Howard	Environmental Coordinator-Region 1
New York State Department of Transportation	Craig Bock	Mapping Documents

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I. Introduction

A. Background

In November 2009, the Stormwater Coalition of Albany County applied for a NYSDEC Environmental Protection Fund Water Quality Improvement Project grant. The purpose of the grant was to fund storm system mapping as described in the NYSDEC SPDES General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems "MS4s"; educate land use decision makers about green infrastructure; and develop Model Green Infrastructure Local Law(s) for use by interested municipalities.

In December 2010, the Coalition was awarded the grant and by mid-April 2011, the grant work plan was submitted to NYSDEC for their approval. This report will focus on the storm system mapping project, providing for agency staff a description of activities completed as part of the grant, and for Coalition members a document to use as a reference when evaluating or further pursuing their own mapping initiatives.

The purpose of this storm system mapping project in general was two-fold, both equally important. From a Permit perspective, for compliance purposes, the goal was to implement mapping requirements named in the permit (see Figure 1) and thus avoid regulatory penalties. From a water quality perspective, if the storm infrastructure is well mapped, movement of polluted stormwater can tracked from the source of pollution to the point of discharge. If the map is derived from an electronic geographic information system (GIS) and is sufficiently endowed with data, the maps can also be used for multiple analytical purposes.

For example, by identifying who owns which portion of the entire storm system, jurisdictional authority for enforcement and elimination can be established. If structural data has been collected, such as the elevation and diameter of pipes, sewershed hydrology can be modeled and engineering solutions developed to address drainage and water quality issues.

Figure 1. Excerpt from NYSDEC SPDES GP-0-10-002.
Minimum Control Measure 3 Illicit Discharge Detection and Elimination
For Traditional MS4s with Land Use Control Authority (pg. 34);
Traditional MS4s Without Land Use Control Authority and Non-Traditional MS4s (pg. 55)

Develop (for newly authorized MS4s) and maintain a map, at a minimum within the *covered entity's* jurisdiction in the *urbanized area* and *additionally designated* area, showing:
i. the location of all *outfalls* and the names and location of all *surface waters of the State* that receive *discharges* from those *outfalls*;
ii. by March 9, 2010, the preliminary boundaries of the *covered entity=s storm sewersheds* have been determined using GIS or other tools, even if they extend outside of the *urbanized area* (to facilitate track down), and *additionally designated* area within the *covered entity=s* jurisdiction; and
iii. when grant funds are made available or for sewer lines surveyed during an illicit discharge track down, the *covered entity=s* storm sewer system in accordance with available *State* and EPA guidance;
c. Field verify *outfall* locations;

B. Stormwater Coalition of Albany County

Throughout this Report, references will be made to the Stormwater Coalition of Albany County. As this is a distinct entity which played a critical role in implementing this project, a short description of the Coalition organizational structure, members, funding, and staffing is necessary. Essentially the Coalition enabled this inter-municipal project to move from concept to completion relatively quickly and the value added as a consequence of existing Coalition operations is important to mention and appreciate.

The Coalition was formed in 2008 via an inter-municipal agreement as a way to share services and potentially reduce stormwater program implementation costs named in the NYSDEC SPDES "MS4" Permit. The Coalition Board of Directors which consists of one representative from each MS4/municipality of which there are 13 paying members meets quarterly and oversees the Coalition budget, staffing, and other policy matters. Working Group representatives meet monthly, with additional ad-hoc meetings as needed. These meetings include representatives from all the municipalities, each with considerable experience in municipal and facility operations, across many sectors and disciplines.

Coalition dues, which currently range from $3500 to $21,000 per year support 1 full-time Stormwater Program Coordinator and 1 part time student intern, along with various administrative expenses. In general, the purpose of the Coalition is to implement select MS4 Permit requirements of benefit to all Coalition members and to facilitate the coordination of Permit implementation where it is prudent. See Table 1. for the list Coalition members, their NYSDEC MS4 Permit number, MS4 type, and for comparison purposes, their population size, square miles, estimated urbanized area, and whether or not the MS4 is also responsible for a CSO Permit.

Throughout this project, four of the Coalition members, the City of Albany, City of Watervliet, City of Cohoes, and the Village of Green Island, were simultaneously addressing requirements evolving out of the Albany Pool Combined Sewer Overflow Long Term Control Plan (CSO LTCP). That effort frequently informed this mapping project in very specific ways. Consequently, if possible, any mapping requirements shared by both the CSO LTCP and MS4 Permit requirements were incorporated into this project. Similarly, because the storm infrastructure residing within these municipalities was at times hard to detangle, special attention focused on a deliberate and intentional effort to both understand and adequately explain both the separated and combined stormwater infrastructure.

Table 1. List of Coalition Members					
Coalition Member	**MS4 Permit No.**	**CSO outfalls? CSO LTCP?**	**Population (MS4 Permit "public")**	**Total sq. mi in urbanized MS4 Area (2000 Census)**	**Total sq. mi**
Traditional Land Use Control MS4:					
City of Albany	NYR20A464	Yes	97,856	19.28	22
Town of Bethlehem	NYR20A208	No	33,656	27.74	50
City of Cohoes	NYR20A243	Yes	16,168	3.74	4
Town of Colonie	NYR20A190	No	69,808 (Town only)	45.43	51
Village of Colonie	NYR20A076	No	7,793	3.36	3
Village of Green Island	NYR20A377	Yes	2,620	.7	1
Town of Guilderland	NYR20A211	No	33,583 (Town only)	17.58	58
Village of Menands	NYR20A144	No	3,990	3.09	3
Town of New Scotland	NYR20A463	No	5,859 (Town only)	.67	56
Village of Voorheesville	NYR20A210	No	2,789	2.07	2
City of Watervliet	NYR20A087	Yes	10,254	1.34	1
Source of Data:			CDRPC Community Fact Sheets (2013)	SW Coalition IMA (2009)	Municipal GIS Data Layer: Polygon attributes
Traditional Non Land Use Control MS4:					
Albany County	NYR20A359	No	MS4 Permit County "public" (staff, contractors, and visitors). County staff: 2490 active employees (FT, PT, per diem)	NA. The County land area and political jurisdiction duplicates the land area and political jurisdiction of other regulated MS4/municipalities (towns, villages, cities). Therefore implementation of the County MS4 Permit focuses on separated storm system infrastructure owned by County (roads and facilities).	
Source of Data:			County Dept of Human Resources (2013)		
Non Traditional MS4:					
University at Albany-SUNY Uptown	NYR20A234	No	MS4 Permit UAlbany "public" (faculty, other staff, students, visitors): 20,000	NA. The UAlbany land area duplicates the political jurisdiction of the Town of Guilderland and City of Albany. Therefore implementation of the UAlbany MS4 permit focuses on separated storm infrastructure owned and operated by UAlbany which is located on the uptown campus.	
Source of Data:			UAlbany SW Program Coordinator (2013)		

For this particular grant, Coalition staff applied for and managed the grant, with Albany County as host of the Coalition functioning as Lead Municipality and the entity under contract with NYSDEC to complete grant deliverables as described in the Work Plan. The grant itself funded the full-time GIS Technician hired to implement technical aspects of the storm system mapping project, while Coalition dues as an ongoing operational expense funded the Stormwater Program Coordinator position. The Coordinator was generally responsible for inter-municipal coordination of all aspects of the project and coordinating the technical and training support provided by consulting firms, in particular Fountains Spatial, for GIS related support and Waypoint Technologies, for Global Position System (GPS) services. For this particular project, the Stormwater Coalition received $121,000 in State Funds, which covered staffing expenses (GIS Technician), training and consultant services, and GPS equipment.

It is important to note that like most relatively large geographic areas, Albany County contains many urbanized watersheds, generally of a size considered to be a sub-watershed. While "urbanized" is based on census data and defined in the MS4 Permit, there is no set standard for what defines a sub-watershed. Generally speaking, a sub-watershed boundary includes land features familiar to the lay person, at a scale where individuals throughout the watershed can work collaboratively. Given Home Rule and the relatively small size of municipal jurisdictions here in New York State, the sub-watershed boundary will typically include multiple municipalities. For this project, the purpose was to map storm system infrastructure contained within six sub-watersheds with each watershed, at the outset, known to include multiple MS4/municipalities. The land area of each watershed ranged from 4.10 to 14.07 square miles, generally thought to be at a scale suitable for collaborative work. All were sub-watersheds within the larger Hudson River watershed. For the sake of simplicity, these sub-watersheds are referred to as watersheds.

While there is often an informal understanding of who owns which catch basins, manholes, and storm system pipes, and an awareness of how and where storm water is conveyed from one municipality to another, when attempting to map an inter-municipal storm water system residing within a particular watershed, communication and coordination with adjacent MS4/municipalities is key. The history of Coalition members working together for many years, and various routine monthly meetings built into Coalition operations provided a place for this coordination to occur easily and efficiently. This proved to be a helpful element of the entire project.

II. Grant Work Plan

A. Project Overview

At the outset, the project was relatively straight forward. A common terminology for describing the storm system infrastructure needed to be developed and Coalition members needed to figure out what structures to map. To the extent possible, existing maps were to be used; however if these maps were inadequate, areas would be re-mapped using GPS and GIS technology. Once all municipal storm system structures within a particular watershed were mapped, these would be grouped together based on flow direction, with those structures conveying stormwater to a common point or waterbody forming the storm sewershed boundary. Using various GIS tools and LiDAR elevation data, the area draining to all collection points (catch basins) would be delineated as well, thus establishing the outer edges of the storm sewershed boundary.

As a final step, all mapped information would be made available in multiple formats, such that high level users of GIS technology would receive electronic mapping files to be incorporated into their own GIS; users without their own GIS would receive hard copy maps; and all users would have access to map layers using the password protected GIS web-mapper (AIMS) owned and managed by Coalition members.

The mapping effort would first focus on watersheds with few regulated MS4s, thus limiting the complexity of the task and providing a place to learn how best to complete various mapping tasks. Then later in the timeline, mapping work would move to more complex watersheds which included multiple regulated MS4s. In anticipation of likely watershed based TMDL plans, watersheds which contained 303d impaired waterbody segments were a mapping priority. Looking ahead, in addition to MS4 permit related requirements, well mapped storm infrastructure could be used for analytical purposes when developing TMDLs and support implementation steps associated with multiple Clean Water Act SPDES permits potentially named in the TMDL document.

The Work Plan submitted to New York State Department of Environmental Conservation (NYSDEC) includes an itemized list of objectives, activities, tasks, deliverables, and parties responsible for implementing these tasks. Included as well is a time line which provides a rough idea of the likely sequence of events. What follows is a description of what actually happened, with the content presented here matched to activities listed in the Work Plan. Where appropriate named grant deliverables are included in this document.

B. What Happened

1. Getting Started

Time Frame: January, 2011 to July, 2011

Administrative Activities Itemized In Work Plan:

- Establish a Storm System MS4 GIS Advisory Team and Meet as Needed
- Hire a GIS Technician (2 years, if possible)
- Set Up Computer Work Station
- Provide GIS/GPS Training Support
- Manage Grant and Coordinate Grant Activities

Mapping Activities Itemized In Work Plan:

- Research Existing Stormwater Conveyance System maps

Description of Activities:

Prior to submitting the Grant Work Plan to NYSDEC, the Stormwater Program Coordinator established and met with the MS4 GIS Advisory Team to discuss the content of the grant work plan (January 13, 2011). Meeting participants included staff from those municipalities with an active, in-house GIS presence, such that the staff person was either a full-time GIS coordinator or an experienced user of ESRI ArcView products. Many of these individuals had also been involved with developing the Albany Internet Mapping System (AIMS), operational as of April, 2009 and were easily identified as potential members of the MS4 GIS Advisory Team. AIMS was another stormwater related mapping initiative previously funded by NYSDEC, thus many involved with the storm system project were already familiar with the stormwater regulations, a distinct advantage.

Their insights, as presented in the January 13 meeting and in private discussions included recommendations regarding how best to conduct field work; likely issues regarding merging individual municipal data into a comprehensive, inter-municipal data set; data management issues in general; what to look for when hiring the GIS Technician; and the status of outfall and storm system mapping within their own municipality. The value of the project and the need for a consistent, shared approach to collecting storm system data was fully understood by participants.

The general consensus was to use as a guide for creating the data model the most robust, existing storm system data set available to members. This was from the Town of Colonie, a municipality with a long history and much experience using GIS to manage municipal operations. They had already mapped their storm infrastructure, were in the process of updating and expanding key map layers and had extensive experience collecting GPS points associated with their infrastructure. They also had little interest in changing their existing GIS and others were very willing to build off of their mapping experience. The GIS Advisory Team also recognized the value of researching and potentially incorporating some or all elements of the Stormwater Systems Uniform Mapping Protocol (SSUMP) developed by Herkimer-Oneida County, NY, a document referenced by NYS DEC when explaining storm system mapping requirements.

Following this January meeting, after the Work Plan had been submitted to NYSDEC and there were sufficient reassurances from DEC that the contracting process was well underway, the Coalition Program Coordinator initiated a set of activities related to hiring a staff person. The plan was to hire someone with adequate GIS skills and supplement their anticipated lack of experience with the services of a GIS consulting firm, either for specific GIS tasks or to provide training as needed.

Stormwater Coalition employees, although funded independently either through Coalition member dues or with grants, are public sector employees of the County. Therefore, all hiring must conform to County Personnel Rules and Regulations; the County Affirmative Action laws; State Civil Service law and NY State Minority and Women Owned Business requirements embedded in the grant contracting process.

With assistance from County Civil Service staff, a job specification which matched MS4 permit requirements and included storm system mapping skills was created and submitted to New York State Civil Service for their approval. This job specification was used to hire the GIS Technician, who for the past two years had been a student intern working for the Coalition and while a student had completed Master's level course work related to conservation biology and a GIS Certificate. At some point, the GIS Technician would need to sit for the related Civil Service exam, but that was not an immediate requirement (See Appendix A. Civil Service Job Specification -Technical/Administrative GIS/GPS Technician).

Having worked with municipalities conducting their ORI inventory, the GIS Technician was familiar with outfall locations, some components of the storm system infrastructure, and MS4 Permit requirements more generally. Although a biologist by training, what she lacked in civil engineering skills could be addressed with assistance from engineers already involved with the Coalition. On the strength of her past work, the Coalition Board of Directors strongly supported the hiring decision.

Matched to any hiring initiative is the positioning of money within the Coalition/County budget, such that the appropriate personnel line is funded adequately. An added administrative step is the alignment of decisions made by the Coalition Board of Directors, which approves the Coalition budget and work plan, with any necessary changes in the County budget. This is necessary because the Coalition budget is a subset of the County budget and all approvals to the Coalition budget must conform to County procedures related to budgeting, as administered by the County Department of Management of Budget and County Comptroller.

These various hurdles were addressed in a serious of meetings by all the necessary players, including the Coalition Board of Directors; County Department of Civil Service; County Department of Human Resources; County Department of Management and Budget; County Department of Public Works; County Legislature Public Works Committee; County Legislature; County Executive; the County Committee To Fill; and the County Purchasing Department such that by July 1, 2011, the GIS Technician was officially a full-time County employee, hired for two years, with an end date of June 30, 2013; the services of a GIS consulting firm, Fountains Spatial, Inc. secured; and a computer work station provided to the Coalition from the County Information Services, in place for the GIS Technician to begin work.

The final cost of all of these storm system mapping items, excluding the cost of related support services (County and legislative staff time) and Stormwater Program Coordinator staff time, is roughly as described in the original grant budget ($121,000), see Appendix B. Grant Budget Worksheet. Overlooked however is the cost of municipal staff time associated with extended field work at various points throughout the project. While the grant lists a Local Match amount of $21,750 (Coalition members salary and fringe), that match was quickly absorbed by the Green Infrastructure Model Local Law project. A more accurate accounting of the true cost of storm system mapping would be beneficial. This grant budget however is a useful starting point.

A description of computer and mapping related items either purchased with grant money or provided by the County Department of Information Services can be found in Appendix C. GIS Technician Work Station and Mapping Equipment.

To prepare for the anticipated hiring of the GIS Technician and imminent participation of staff from GIS Consulting firm, on June 7, 2011 the MS4 GIS Advisory Team met to discuss the status of the project; in particular the work plan objectives, tasks, and deliverables named in the plan submitted to NYSDEC and the time line describing which tasks needed to be completed by when. This helped to establish the anticipated work load of participating municipalities, with the initial inventory of existing storm system maps conducted by the Coalition Program Coordinator providing for everyone a preliminary, if cursory snapshot of how much mapping had already been completed by some of the municipalities. The Team also discussed the line-up of watersheds and municipalities to be mapped as described in the Work Plan.

The overall intention was to provide some storm system mapping support for all the Coalition members and to focus on those watersheds with 303d impaired stream segments. The general plan was to start with the less complex Krommakill watershed, thought to include two MS4/municipalities (Town of Colonie and Village of Menands), then move onto the Dry River watershed, also with two MS4/municipalities (Town of Colonie and City of Watervliet), both of which contain 303d impaired waterbody segments. The more complex watersheds, such as the Patroon Creek and Krumkill, also with 303d impaired segments, were scheduled for mapping work later in the time line. Multiple MS4s were included within the Patroon Creek and Krumkill boundaries, which at the outset set them apart as particularly complicated watersheds.

The Vly Creek and Salt Kill watersheds, both lacking impaired 303d waterbody segments, would be mapped sometime after the Krommakill and Dry River and most likely before the Patroon Creek and Krumkill. In deference to the City of Watervliet and the Village of Green Island, two municipalities thought to reside outside of any of these watersheds, mapping would take place throughout the municipality. To appreciate the geography of each of these named watersheds, in particular which MS4/municipalities reside within which watersheds, as understood at the outset of the project, see Appendix D. Maps of Priority Watersheds.

The named goal of all the mapping work was to create, based on the storm system infrastructure maps, preliminary storm sewershed boundaries of the following prioritized watersheds: Dry River; Krommakill, Patroon Creek; and Krumkill and to post on the Albany Internet Mapping System, storm system maps and possibly sewershed delineations of 3 watersheds. Throughout, given uncertainties regarding the quality of existing maps and what might be necessary to correct and/or create new maps, some leeway was built into the grant work plan. While completing all system maps and delineating storm sewersheds in all of the named watersheds was the preferred outcome, likely issues and related delays were anticipated. In general, the underlying management philosophy of the entire project was to line up resources, consultant services, and Coalition member support sufficiently so that mapping goals in general had a reasonable chance of success. The time frame for completing this work was two years, roughly matched to the dedicated staff time (GIS Technician) available to complete this project.

Over time, various issues emerged. Road infrastructure owned by MS4s, such as the New York State Department of Transportation weaved in and out of storm system structure owned by municipalities, creating holes in the storm system data set (I-90; I-787; Central Ave; Western Ave, parts of Broadway). Also, ownership of NYSDOT roads changed depending on where it was located. The Village of Menands, as a village, did not own Rte 32 Broadway infrastructure, but the same road, if located in a city, was owned by the city, as was the case for the City of Watervliet and City of Cohoes. County roads, like NYSDOT, also weaved in out and out of existing town, village, or city infrastructure, appearing in unexpected locations. With each additional discovery of yet another MS4 to include in the storm system mapping effort, the work load was adjusted upwards. As of project completion, the most up-to-date understanding of watershed and MS4/municipal geography is described in Table 2. This same Table, used throughout the project helped prioritize next steps and the work load in general.

The Dry River watershed presented other problems. For the City of Watervliet, a portion of the Dry River is a closed drainage system which discharges to a CSO outfall at the Hudson River. Stormwater drains directly to this closed pipe via catch basins near the closed pipe and as such the catch basins are part of the combined sanitary storm infrastructure. This same closed pipe, however, is also a classified stream. If considered a stream, then the same catch basins are part of the separated storm system. Efforts to clarify the status of the Dry River catch basins proved futile. To keep the project moving along, the catch basins were mapped as separated storm infrastructure.

Table 2. MS4s in Watersheds; 303d Segments; and Individual MS4 System Maps								
	Storm System Mapping Project Sub-Watersheds						Individual Storm System Maps	
	Location: Albany County, NY Area: > 4.0 sq mi and <14.5 sq mi							
	Kromma Kill	Dry River	Salt Kill	Vly Creek	Krum Kill	Patroon Creek	City of W'vliet	V. of Green Island
Watershed Area (sq mi) *Source: USGS StreamStats*	7.26	4.54	4.10	13.00	5.74	14.07	NA	NA
303d Impaired Segments?	Yes	Yes	No	No	Yes	Yes	Yes	No
MS4/Municipality *(In Coalition, as of 12/31/2013)*								
Albany County	X *(Rtes 152-Old Niskayuna 154-Osborne)*			X *(Rtes 208-School Rd; 201-No. Main; 306-Voorheesville Ave)*	X *(Rtes 156-Fuller, 204-Russell)*	X *(Rte 156-Fuller, 155-Everett; and 154-Osborne)*		X
City of Albany					X	X		
UAlbany-SUNY					X	X		
Town of Bethlehem					X			
City of Cohoes			X					
Town of Colonie	X	X	X			X		
Village of Colonie						X		
Village of Green Is.			X					X
Town of Guilderland				X	X	X		
Village of Menands	X							
Town of New Scotland				X				
Village of Voorheesville				X				
City of Watervliet		X	X				X	
MS4/Non-Traditional *(Not In Coalition)*								
NYSDOT	X *(Rte 32-Broadway)*	X *(Rte 7; Rte 2; Rte 378; I-787*	X *(I-787)*	X (Rtes 85A, 156, 396)		X (*Central Ave)*		
NYSOGS					X (State Campus)			
Federal Highway, Interstate	X *(I-787)*				X *(Rte 20-Western Ave)*	X *(I-787; I-90; Rte 9)*		
Number of Known MS4s	5 known MS4s, 3 in SW Coal.	3 known MS4s 2 in SW Coal.	5 known MS4s, 4 in SW Coal.	4 known MS4s, 3 in SW Coal.	7 known MS4s, 5 in SW Coal.	8 known MS4s, 6 in SW Coal.		

2. Coalition Storm System Data Model

Time Frame: July, 2011 to December, 2012

Administrative Activities Itemized In Work Plan:

- Manage Grant and Coordinate Grant Activities

Mapping Activities Itemized in Work Plan:

- Develop a Coalition Storm System Data Model
- GIS Training Support and Consultant Services

Description of Activities:

Before describing how the data model was developed, an explanation of the term "data model" is necessary. Familiar to most users of maps would be the following example of a storm system map (See Figure 2. Stormwater Conveyance Diagram which describes structures typically used to convey stormwater from one location to another. For individuals unfamiliar with the terms and physical appearance of these system components, see Figure 3. Stormwater Conveyance Diagram – With Pictures.

Figure 2. Stormwater Conveyance Diagram

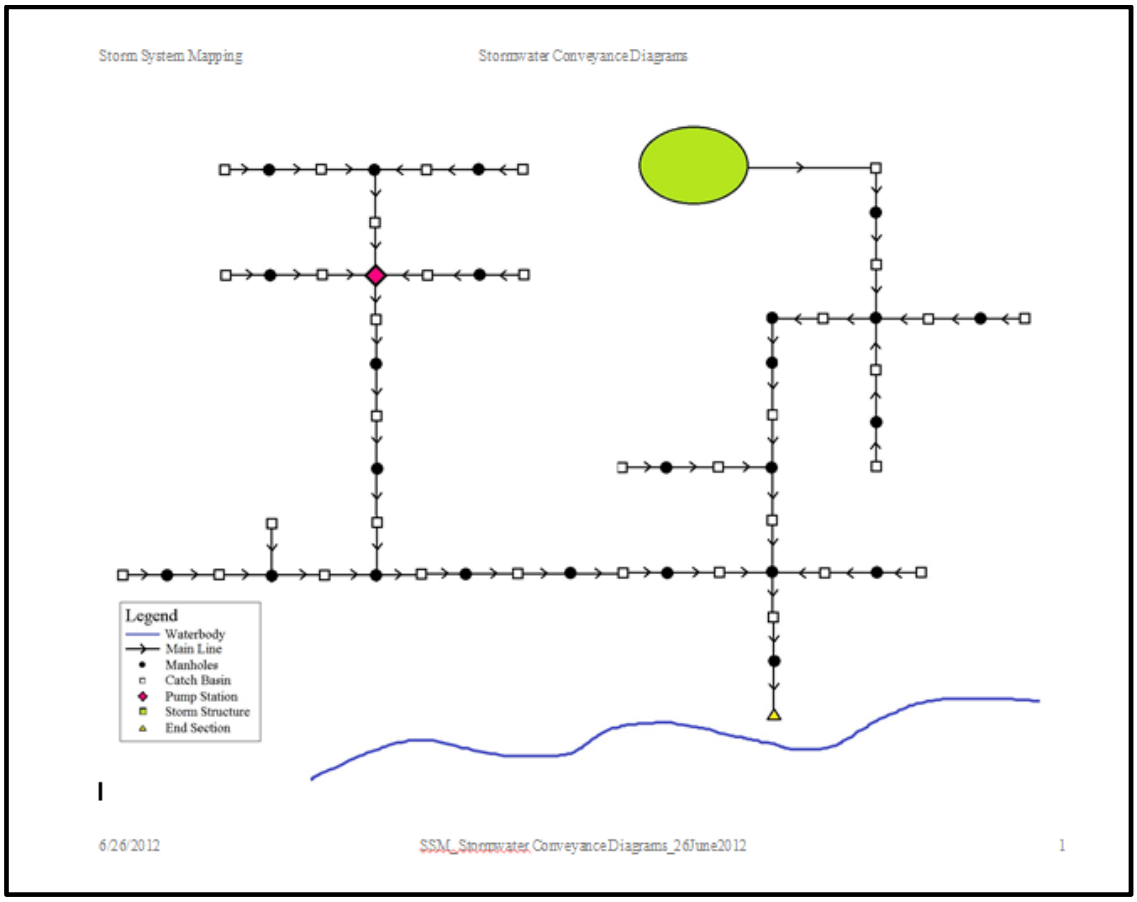
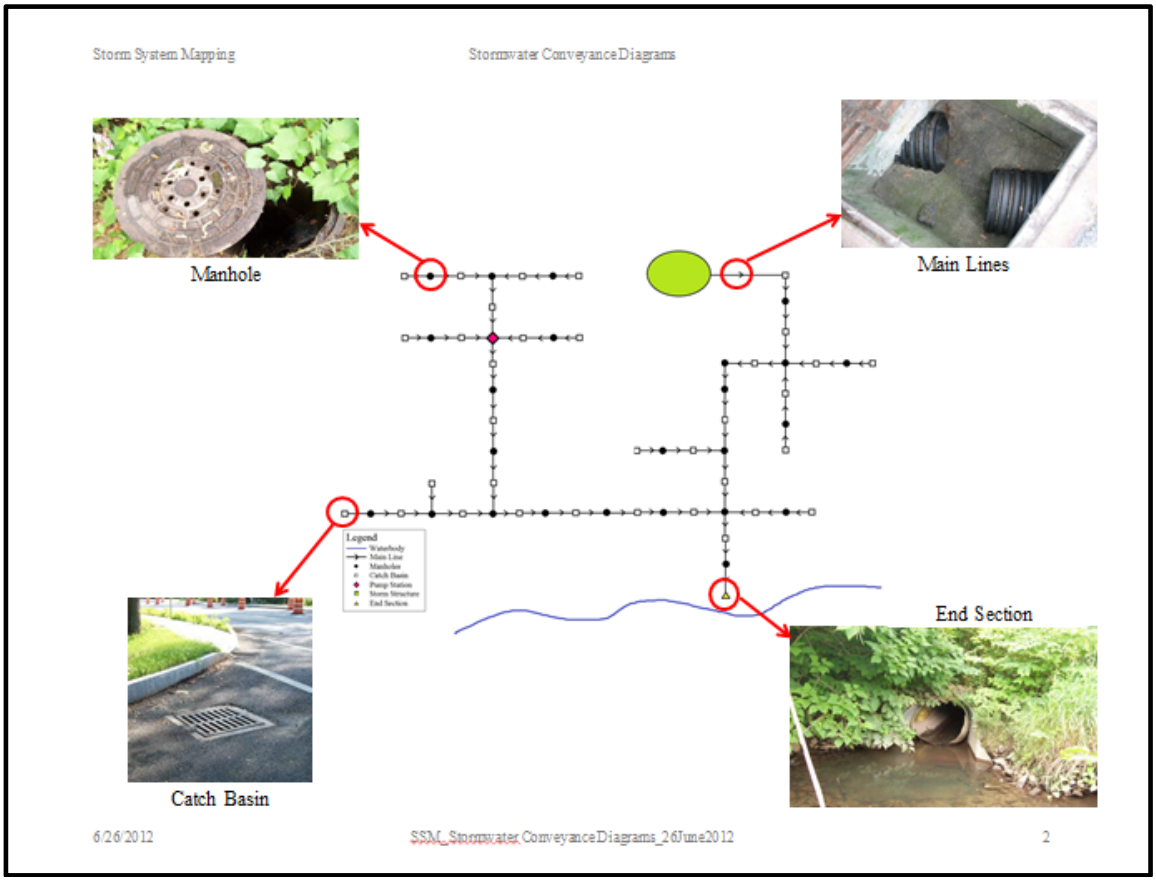


Figure 3. Stormwater Conveyance Diagrams-With Pictures



Each part of this map describes a particular feature of the entire system. For example stormwater enters the system at a catch basin or collects in a storm structure, such as a pond then it moves to a pipe, described as a main line in the legend. From there, it is redirected to other pipes, eventually leaving the system at the end section, where it is discharged into a water body, which for regulatory purposes is often called an outfall. Sometimes it is re-routed and accessible by opening up a manhole or it may be pumped up and out into an adjacent section of the system at a pump station. These individual features (catch basin, pond, pipes, manholes, pump station, end section) when combined describe the entire storm sewer system.

Current mapping technology, also referred to as "GIS" or a Geographic Information System, involves describing these individual features using points, lines, and polygons, such that a line is a set of individual points, and a polygon is a set of lines which are enclosed, forming an area. Each point has a latitude and longitude position on earth and because points combine to form lines, and lines combine to form polygons, all points, lines, and polygons have a geographic, latitude and longitude position. In this Stormwater Conveyance Diagram (Figure 1), catch basins are point locations and represent one layer of the map. That point layer of catch basins is called a feature class. Manholes, also a point location, are another map layer, or feature class. Pipes are lines, another map layer, also another feature class consisting not of points, but of lines, and called main lines. When displaying a map for print purposes or as hand drawn as in this example, these individual layers appear to be one layer, but in fact, they are separate layers, created independently, yet displayed to look like one continuous map.

For every feature, using GIS technology, it's possible to attach to it, descriptions of the feature of interest to the user. For example, one might be interested in the age of the catch basin, when it was installed, whether or not or it's owned by one municipality or another. These are called attributes (age, installation date, and owner) and for each map layer or feature class it's possible to identify many attributes of interest. To facilitate data entry, it's possible to assign to these attributes more detailed information which can be applied to all attributes throughout all feature classes. For example a drop down list describing owner might have three options: public, private, or don't know and these descriptions could be applied to the catch basin, manhole, and pump station layers where there is an attribute, "owner". To save computer processing time and space, these shared descriptors can be grouped together as domains and dispersed throughout the database.

Once the data is entered into the mapping software, it's possible to select out attribute characteristics of interest and create maps which group these characteristics. For example, if ownership information as described above has been recorded for all catch basins, it's possible to search for all publicly owned catch basins and display a map of just those catch basins. In general, the more ways a feature is described, the more information there is about the system and from that a greater variety of maps can be created capable of analyzing a greater variety of characteristics.

A data model then is a description of which features of the system will be mapped and what information will be collected about each feature. It doesn't include the actual location of mapped catch basins or descriptions of that catch basin; it's just a big picture description of what you intend to map and the data you intend to collect. As the data is gathered and entered into the electronic mapping system, it's possible to manipulate the data to create actual maps, of the actual system. An important goal of this project was to create a data model suitable to all Coalition members, such that future storm system mapping initiatives would be standardized across all municipalities and the analytical information of interest to members would be built into the model at the outset. For GIS practitioners, the bones of the data model needed to conform to and work with more advanced GIS systems already in place at the municipal level.

For our purposes, because the Town of Colonie had already mapped most of their storm system infrastructure, we chose to use their data model as a starting point. We needed, as well, to make sure that the features mapped met MS4 Permit requirements and conformed to emerging regulatory standards regarding storm system mapping in general. How best to create the data model, was the first task after the GIS Technician was hired in July, 2011 and immediately the GIS consulting firm, Fountains Spatial was brought into guide the process.

There were five meetings related to the data model development process. The first meeting on July 20, 2011 which included the consultant, Coalition Program Coordinator, and GIS Technician focused on defining project objectives clearly; developing a systematic approach to analyzing the Town of Colonie storm system data model; establishing what kind of information needed to be collected about existing mapping data sets; establishing a methodology for managing data from multiple municipalities; identifying training needs of the GIS Technician, and developing a timetable for involving Coalition members in the data model development process.

Immediately the GIS Technician set to work analyzing all of the map layers and attributes contained in the Town of Colonie data model and met with Town of Colonie staff, asking them to match description of system infrastructure with actual infrastructure. To better explain system attributes, diagrams were prepared and definitions written. GIS personnel from Herkimer-Oneida Regional Commission and Monroe County were contacted to find out how they set up their data model; collected data; and otherwise completed their system mapping. With the help of the consultant an Access database was created to help track progress made assessing individual storm system maps either already in hand or arriving from municipalities.

This assessment included a careful look at the type of maps available (paper or electronic), age of map, source of map, and for each map, which storm system structures were mapped. For electronic maps, if attributes were listed for which data had been collected, that was noted, and labeled an "active" attribute. As maps became available, existing maps were inventoried, and the substance of these maps compared to the Town of Colonie data model and Herkimer-Oneida mapping protocol. Information different than what was already included in the Town of Colonie data model and important given regulatory objectives, was noted and included in the comprehensive list of possible items to include in the storm system data model. This was a time consuming process. Appendix E. Inventory of Existing Storm System Maps describes what was learned about each available map and key elements of all maps were summarized.

The second meeting with the GIS consultant on August 25, 2011 focused on analyzing the work completed to date and deciding whether or not a first draft of the data model could be presented to Coalition members. While the actual draft data model still needed to be developed, it was generally acknowledged that a data model could be ready for discussion by mid-October. Much work had been completed since the municipalities last met and municipalities needed both a project update and to provide some feedback to the GIS Technician regarding which structures to map, in what detail. A Storm System Mapping Meeting with all Coalition members, not just the GIS MS4 Technical Advisory Team was scheduled for October.

This October 13, 2011 Meeting was organized around a powerpoint presentation which included a I. Recap of Project Objectives and Priority Areas; II. Overview of Methodology; III. Summary of Progress To Date; IV. Summary of Key Findings; V. Review and Feedback on Draft Database Design; and VI. Future Steps. When explaining the Draft Database, there was a short explanation of all map layers and attributes available in the Town of Colonie data model, a description of key attributes described in the Herkimer-Oneida protocol, and mention of map layers and attributes found in existing storm system maps from Coalition members. Recognizing that not all of the information potentially collected was useful and necessary, the GIS proposed ways to trim down the Town of Colonie data model and suggested what might be added given MS4 Permit objectives and mapping needs of individual Coalition members as reflected in their existing maps. The mapping protocol described in the Herkimer-Oneida document was considered as well. Some key decisions were made and important issues identified, as follows:

1) Reduce the number of map layers currently in the Town of Colonie Data Model

2) There should be a place in the data model to enter information about maintenance

3) Existing outfall maps describe where stormwater enters a water body or is conveyed to an adjacent MS4s. The actual outfall, however is not always an easily identified structure and in fact takes on different forms (end section, intermunicipal connection). It is however the location where outfall inventories have been taken and where there is information about water quality. The Herkimer-Oneida data model tracks outfall water quality data (odor, debris, etc), however how best to include this information in our data model was unclear. All agreed that it was important and that linking the Coalition data model to the MS4 Web outfall id information which is linked to water quality data might be a way to proceed.

4) Existing maps, particular for municipalities also responsible for CSO Permit, often included an identifier which labeled storm system infrastructure as a separated or combined system. Given flux in the status of this infrastructure, it was important to include a way to label the infrastructure by type.

5) Municipalities with CSO Permits are responsible for mapping their catch basins, noting floatable controls. They were interested in attributes and drop down options related to that task. This could also benefit MS4s without CSO permits.

6) The consultant expressed concerns about creating too complicated a data model and mentioned that various technical issues would need to be addressed, such as connectivity of mapped features, naming of attributes, and topology.

7) The group recognized that municipalities may or may not collect all of the data named in the data model; however having a place holder for this data was important.

Follow up to the October 13 meeting, included a meeting on November 9, 2011 with the consultant, Coalition Program Coordinator, and GIS Technician which focused on further refinements to the data model as discussed by the group. Consultant concerns regarding the purpose and simplicity of the data model were discussed, as were concerns regarding the quality of existing data sets, and the connectivity of map layers. This was a helpful meeting which focused on standard procedures for checking data sets and analyzing the connectivity of map layers. All of these data checks were new to both the GIS Technician and Stormwater Program Coordinator, but their value was clearly understood.

For this particular project each map layer needed to logically connect with the other map layers. As a standalone layer it is often hard to "see" how and if one storm system map layer, catch basins for example, connects with another map layer, say main lines. Yet, in real life, stormwater flows from one structure to another and this connected, system-wide relationship needs to be clearly visible and accurately displayed in the final map. Several core tasks were identified. The first involved securing the necessary ArcView software (ArcInfo) to conduct data and connectivity (topology) checks; sorting out the training needs of the GIS Technician; and revising the draft data model, to be presented in a near final form, early December.

The next version of the draft data model was presented to Coalition members at a meeting on December 6, 2011. This included very clear options regarding the naming of map layers, possible attributes, and what kind of information would be collected about each attribute. Again, a power point format guided the discussion and the GIS Technician systematically went through the six map layers to be included in the data model asking Coalition members which map layer attributes and descriptors they would like to keep or remove. These six map layers are described in Table 3 Stormwater Coalition Data Model Map Layers and Figures 4, 5, and 6; which respectively include Catch Basin, Manhole, and Main Line diagrams illustrate some of the structures to be mapped and attributes of interest. Throughout this project, these hand drawn illustrations by the GIS Technician were useful teaching aides for all involved.

Table 3 Stormwater Coalition Data Model Map Layers

Feature Name	Type	Description of Map Layer	Description of Attributes	Connectivity
Catch Basin	Point	A catch basin is a structure with a framed grate as its cover. This structure is designed to capture stormwater flow.	The attributes included contain information regarding the CWA regulations, ownership, and maintenance. Most attributes are from the recommendations provided by the municipalities.	Connected to: -storm lines
Manhole	Point	A manhole is a structure with a solid cover. This structure is designed to be an access point along the stormwater conveyance system for maintenance purposes.		Connected to: -storm lines
Storm Line	Line	A storm line is a structure designed to convey stormwater through the system.		Connected to: -catch basins -manholes -storm structures -storm lines
Lift/Pump Station	Point	A lift/pump station is designed to pump water/sewage from a lower elevation point to a higher elevation point. Gravity lines convey stormwater to the pump station wet well. Pumps lift the water/sewage upward through a pressurized pipe system to a gravity manhole from where liquids flow again via gravity.		Connected to: -storm lines
Storm Structure (POLY)	Polygon	A storm structure is designed to manage large quanities of water in the stormwater conveyance system. These structures may be used for infiltration or to protect water quality.		Connected to: -storm lines
Storm Structure (POINT)	Point			

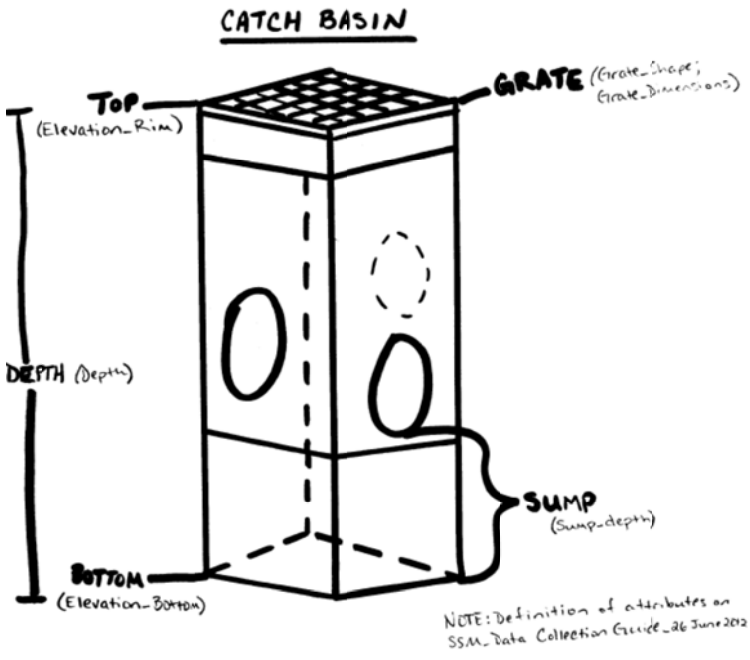


Figure 4
Catch Basin diagram

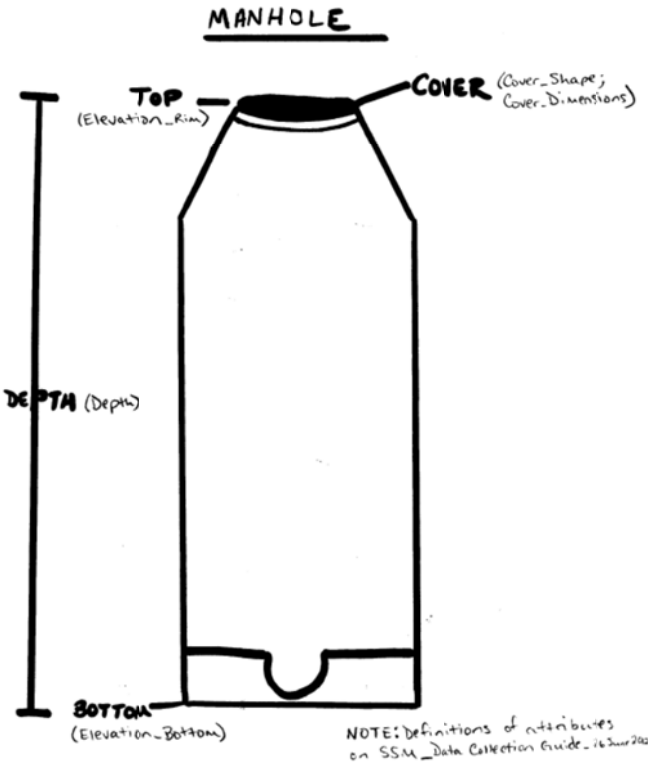
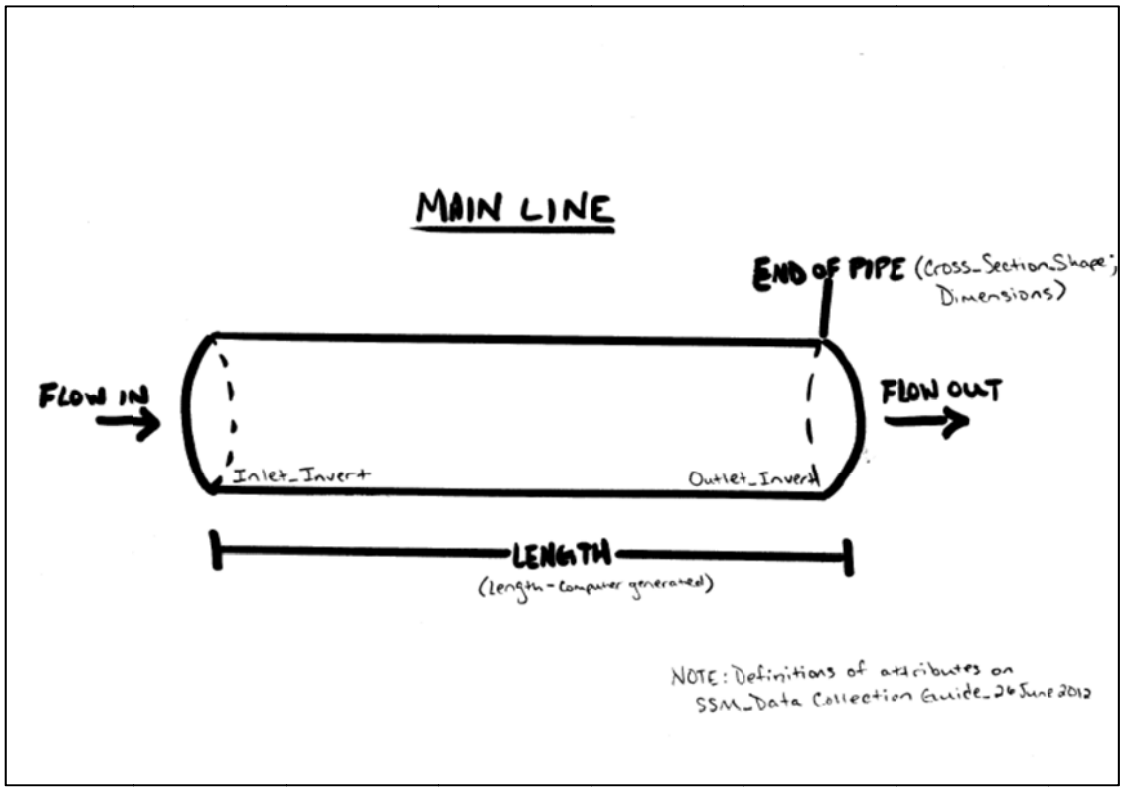


Figure 5
Manhole diagram

Figure 6
Main Line diagram



By the end of December, based on input from the December 6, 2011 meeting, the data model was finalized conceptually and over the next several months, fine-tuned to accommodate technical considerations related to GIS mapping software and field work related concerns. In particular, the storm structure polygon layer was dropped, largely because it was unlikely that anyone would have time to map storm structures, such as ponds. Instead a point location representing a structure was thought to be adequate. Other changes included adding attributes initially thought to be irrelevant, but once in the field, still useful to particular municipal staff, therefore brought back into the data model. Similarly descriptors in the drop down list were added based on field work.

For the final data model see Appendix F. Storm System Data Model. It is a set of spreadsheets, one for each map layer, which describes the characteristics of attributes within each map layer. Some examples include the purpose of the attribute; description of the attribute; name of the attribute; units; domain name; drop down list options for that attribute and the domain name associated with that drop down list, field type, and field length. Eventually this same data model would be uploaded into the Global Positioning Unit (GPS) data dictionary, with the methodical work of developing the data model eliminating the need to think about and create a data dictionary for the GPS unit.

3. Technical Analysis of Existing Data Sets

Time Frame: December 2011 to March 2012

Administrative Activities Itemized In Work Plan:

- Manage Grant and Coordinate Grant Activities

Mapping Activities Itemized in Work Plan:

- Incorporate Coalition Data Model Into Existing Storm System GIS
- Field Check Existing Maps or Create New Maps
- GIS Training Support and Consultant Services

Description of Activities:

By early January, 2012, with the help of the GIS consulting firm; the County Department of Economic Development, Conservation, and Planning; and the County Department of Information Services the GIS Technician was able to access ESRI ArcInfo software. Once accessed, for the next 3 months (January 24, 2012; March 7, 2012; and March 26, 2012), consultant training sessions focused on teaching the GIS Technician how to use ArcInfo software to conduct data integrity and topological checks.

Using the Kromma Kill watershed data as the training set, the GIS Technician completed various data integrity checks on the Village of Menands and the Town of Colonie data sets. These checks identified duplicate features, invalid geometry, and features outside the municipal boundaries (outliers). Topological checks focused on the quality and logic of data relationships between and within data layers. To help accelerate the data analysis process, the consultant also provided Model Builder tools. While the initial focus was learning how to complete these checks and addressing any questions, over time these checks became routine. To help remember these various procedures and for interested municipalities, the GIS Technician created a set of documents which explained how to create a new topology and the logic rules at the core of a topology check analysis. These are included in Appendix G. Data Checks and Analyzing Topology. All of the data processing and analytical steps are summarized in Appendix H. Data Processing Methodology.

In addition to learning how to perform the various data checks, as advised by the consultant, the GIS Technician created a base map which helped guide the data analysis and editing process. Table 4 Base Map describes the layers included in the base map and their purpose.

Table 4. Base Map

Data Layer	Use
Roads/Street Centerlines	Standard reference for locating system features
Railroads	Standard reference for locating system features
Municipal Boundaries	Determination of jurisdictional boundaries of mapping effort
MS4 Boundaries	Determination of jurisdictional boundaries of mapping effort
Aerial Imagery	Standard reference for locating system features, both in-house and in the field
Hydrologic Features	Improved understanding of surface flow and potential outfall locations
Watershed Boundaries	Improved understanding of surface flow
Topography-2 ft. Contours	Improved understanding of surface flow
LiDAR-Hillshade DEM	Improved understanding of surface flow
Tax Parcels	Standard reference for locating system features
Outfalls	Reference for locating system features

Other consultant help focused on various aspects of ESRI software functionality such as how to show the direction of flow and how to create and manage domains, an ArcView functionality used to include attribute drop down lists throughout the data model and data set. Appendix I. Storm Infrastructure Attributes and Drop Down Lists includes two documents related to these technical considerations. The first is “How to create a file geodatabase with domains” and the other is a table titled, “Geodatabase and Data Dictionary Drop Down Options and Associated Codes”. The second document spells out in detail the codes used to collect attribute information using a GPS unit and the related grouping of these same codes into domains included in the data model. Both documents summarize technical GIS information, of particular value to GPS/GIS practitioners. They reflect procedures developed and fine-tuned throughout this project.

On January 27, 2012, there was a “check in” meeting with GIS consulting firm staff, the GIS Technician, and Coalition Program Coordinator. Generally the discussion focused on the topology checks and progress made incorporating the data model into the ESRI software. While the focus continued to be the Kromma Kill watershed, the need to move forward with the other municipal datasets was discussed.

4. Kromma Kill Watershed Data Set and Lessons Learned

Time Frame: March, 2012 to April, 2012

Administrative Activities Itemized In Work Plan:

- Manage Grant and Coordinate Grant Activities

Mapping Activities Itemized in Work Plan:

- Incorporate Coalition Data Model Into Existing Storm System GIS
- Field Check Existing Maps or Create New Maps
- GIS Training Support and Consultant Services

Description of Activities:

As the data integrity and topology checks of the Village of Menands and Town of Colonie data set neared completion, various mapping errors and issues were identified. Of the two data sets, other than a data duplication issue noted during the data integrity check, the Town of Colonie data set was generally intact and the duplication issue easily resolved with the Town of Colonie GIS Coordinator who made the necessary corrections. The Village of Menands data set however proved to be more complicated with more confusing elements.

In particular, data was missing, either because the structures had never been mapped, or there had been new construction since the map was created; the flow direction of drainage lines was unclear, or seemed to be opposite what one would expect; often ownership of the mapped structures was confusing. To address these issues, on April 25, 2012, the GIS Technician and Coalition Program Coordinator met with the Village Highway Foreman and the Village Stormwater Program Coordinator, who also functioned as the Executive Assistant to the Mayor and Code Enforcement Officer. The purpose of the Village of Menands meeting was to investigate mapping errors suggested by the topology checks and to have someone familiar with the storm system infrastructure explain, to the extent possible what was currently known about the infrastructure. Since there was already a map of the Menands storm system completed by a consulting firm, the hope was to avoid re-mapping the entire Village.

To help move the discussion along, the GIS Technician prepared small maps of select areas of the Village which provided a visual prompt to specific questions about the Menands storm system infrastructure. This question and answer session with the Foreman proved to be very helpful. He immediately explained where new construction was located and what storm infrastructure had changed. Confusing ownership of storm structures along the Broadway corridor were discussed and to the extent possible, who owned what, the Village or NYSDOT, was sorted out. Subsequent field visits by the GIS Technician verified the foreman's information and edits were made to the existing GIS data set.

Later in 2012, the Coalition Program Coordinator and GIS Technician met with NYSDOT "map room" staff. The purpose was to address lingering NYSDOT infrastructure questions along Broadway and anticipated for other NYSDOT owned infrastructure. While they eventually provided ongoing and valued access to "as built" drawings, both hard copy and electronic, the data was never used. It proved to be too complicated to access and understand in the time available. Instead, later in the project, the GIS Technician re-mapped a few areas within the Village using a global positioning system (GPS) device. Eventually the Village of Menands data was thought to be adequate and ready for integration with other data sets.

With both the Town of Colonie and Village of Menands data corrected, the general concept for how to integrate these individual MS4s map sets became clear. For mapped watersheds, each municipality would have their own set of storm system data layers and by displaying each set of municipal map layers; the entire inter-municipal, watershed-wide storm system could be displayed. Should the same structure appear to be

owned by two municipalities, relevant municipal staff would be contacted, ownership clarified, and the map data edited accordingly. For those municipalities with a pre-existing GIS data set, the GIS Technician would add to their map layers the Coalition storm system data model formatted as a geodatabase. If available and of adequate quality, existing data would be used to populate the geodatabase. None of the original mapped data would be altered, but it would in effect be re-formatted to fit the shared data model.

In general the Krommakill experience made clear that all data sets needed an acceptable level of accuracy and that checks and related corrections were critical. As we were mapping entire sewersheds, a weak or inaccurate data set from one municipality would affect the quality of the entire storm sewershed map. This fact inspired a closer look at the Inventory of Existing Storm System Maps (Appendix F). Now more aware of what constituted a quality data set, many of the existing maps appeared to have significant issues. Some were seriously outdated, often with limited attributes, and in an electronic format difficult to access and bring into the Coalition data model. The need for extensive field mapping was becoming more apparent.

The Village of Menands meeting with the foreman was particularly productive and the session together suggested efficient ways to go forward mapping other municipalities. Here are some lessons learned:

1) Key individuals within a municipality, often from the highway department, know a tremendous amount about their storm system infrastructure and the mapping project benefits significantly from their participation;

2) One-on-one sessions helped explain to municipal staff the purpose of the storm system mapping project and regulations in general; that the sessions themselves, if well prepared could take place within a short time period, a situation suitable for busy municipal staff;

3) A direct liaison to critical municipal staff, such as the Village Storm Water Program Coordinator, facilitates the coordination of a question/answer map sessions of this type.

5. Field Work- Training, Data Collection, and Data Checks

Time Frame:

Preparation: May, 2012 to July, 2012
GPS Unit Training:
All Coalition Members: June, 2012
Individual Coalition Members: July, 2012 - December, 2012 and April, 2013 - May, 2013
Data Collection: July, 2012 - December, 2012 and April, 2013 - May, 2013
Post Processing and Data Checks: January, 2013 to May, 2013

Administrative Activities Itemized in Work Plan:

- Manage Grant and Coordinate Grant Activities

Mapping Activities Itemized in Work Plan:

- Field Check Existing Maps or Create New Maps
- GPS Training Support and Consultant Services

Description of Activities:

As work analyzing the available Kromma Kill watershed data sets (Town of Colonie and Village of Menands) neared completion, attention moved to the Dry River watershed, the boundaries of which included

the Town of Colonie and City of Watervliet. By now the Dry River portion of the Town of Colonie data set had been corrected and the available City of Watervliet storm system map needed a closer look. In hand was a paper map of the Watervliet sanitary and storm system infrastructure and while some had mentioned that GIS shapefiles of this same map were available electronically, they had yet to materialize.

Consequently, the GIS Technician and the City of Watervliet Storm Water Program Coordinator, decided to evaluate the suitability of converting this paper map into digital files. This could potentially involve scanning, georeferencing and heads up digitizing the map. After comparing the paper map to structures in the field, the paper map proved to be too out of data and that a more current map, based on collecting GPS'd field locations, made more sense. This decision became a catalyst to proceed aggressively purchasing the grant funded GPS unit, arranging for training in how to use the GPS unit, and working with consultants in how best to integrate the Coalition data model with GPS technology and software.

Given grant contract requirements related to Minority and Women Owned Businesses, before purchasing either the GPS Unit or training services, various affirmative action databases needed to be adequately searched and evaluated. This led to some time delays, however eventually various requirements were addressed. Although somewhat late in the data gathering season, on June 27, 2012, Waypoint Technologies provided one day of training at the Village of Green Island. Titled, "Brain for the Day" the training was available to all Coalition members and structured to accommodate all levels of users, with the general goal of teaching everyone how to use a Global Positioning System (GPS) unit.

The training generally covered the following concepts and material:

1. GPS Technology and GIS/GPS Data Dictionaries
    - -Waypoint presentation: GPS Mapping with Trimble Terra Sync Software
2. Description of the Coalition Storm System Mapping Project and Contents of Binder
    - -Binder Content
        - MS4 Permit Requirements
        - Field Collection Guidance Documents
            - Storm System Diagrams
            - Data Collection Guide
            - Data Dictionary Codes
            - Pathfinder Office Version 5.3 Coalition Data Dictionary Print Out
        - Work Flow Spreadsheet
        - Priority Watershed Maps from Albany Internet Mapping System (AIMS)
3. Field Work
    - -Participants Collecting GPS Points
        - Some used their own GPS unit
        - Some used GPS Units provided by Waypoint
4. Demonstration of Post Processing GPS Data and How to Import Points Into a GIS
5. Question and Answer Session
    - -Group and Individual Questions re: Own GPS Unit

While the intent of this training was to focus on storm system mapping, participants attended for a variety of reasons. Seven of the participating Coalition members owned their own GPS unit and brought it with them hoping that with their unit and with this training they could complete a range of mapping tasks throughout the municipality, not just related to the storm system infrastructure. However, after a day of training, most recognized that the process of mapping was more complicated than anticipated. What resulted was a self-selection process such that some municipalities became more interested in developing their own GIS capability, while others decided it was too complicated. Overall, the training highlighted for attendees what needed to happen in the field when collecting GPS data points, making it easier for the GIS Technician

to explain to municipal staff what she needed from them when conducting field work and who best should be part of the data collection field team.

With fall and winter fast approaching, GIS Technician moved quickly setting up mapping sessions with municipalities. Which municipalities received attention first was largely based on how many municipalities were included in a particular watershed, the immediate availability and willingness of municipal staff to begin mapping, and municipal interest in becoming self-sufficient users of their own GPS unit, poised to map areas on their own.

Given the grant deliverable of completing 4 preliminary storm sewershed maps, particular watersheds quickly emerged as watersheds most likely to be finished in the time available. The sequence of mapping within each municipality generally proceeded as listed below and reflected various time driven priorities. This field work spanned from July, 2012 to December, 2012; then picked up again from April, 2013 to May, 2013. Indoor tasks from January, 2013 to March, 2013 focused on data processing and the technical analysis of individual municipal maps.

1) County roads in the Krommakill
2) City of Watervliet infrastructure in the Salt Kill and Dry River watersheds;
3) Green island infrastructure in the Salt Kill;
4) City of Cohoes infrastructure in the Salt Kill;
5) City of Albany infrastructure in Patroon Creek;
6) Village of Colonie infrastructure in Patroon Creek;
7) Village of Voorheesville infrastructure in Vly Creek;
8) Town of Guilderland infrastructure in Vly Creek;
9) Town of New Scotland infrastructure in Vly Creek;
10) County Roads in Patroon Creek

For a description of which municipal staff participated in the field mapping effort, see Appendix J. Field Work and Other Help. In general, how quickly the field work could be completed depended on a variety of factors and these are mentioned in this Appendix. Eventually, to help facilitate the mapping effort, the GIS Technician develop a set of training documents which included diagrams explaining the components of a storm system, what they looked like, why they are being mapped, and how the map will be used to delineate a storm sewershed boundary. Two of the watersheds, the Dry River and Salt Kill are located in a CSO/MS4 areas, therefore the handout includes a description of how the CSO combined sanitary and storm infrastructure differs from the MS4 separated storm infrastructure. Mapping in the urbanized MS4/CSO watersheds was confusing and this CSO/MS4 diagram proved to be particularly helpful. All are included in Appendix K. Field Work Handout #1: What We Are Mapping and Why.

The second set of training documents includes “How To” guides related to Trimble GPS units owned by many of the Coalition members. Specific documents are titled, 1) How to create a data dictionary in Pathfinder Office; 2) GPS File Management; 3) How to collect a main line; and 4) How to post process GPSed data. These can be found in Appendix L. Field Work Handout #2: How To Use Your GPS Unit. The directions are written out in some detail for future reference by MS4/ municipal staff.

In addition to these Field Work Handouts, the GIS Technician also generated a series of maps which included the base map and any existing municipal data (hardcopy and GIS). Prior to field work and in consultation with municipal staff, these maps were used to: 1) identify areas with data missing (data gaps) that were either never mapped or where new construction had occurred since the last mapping; 2) analyze flow direction and determine if the drainage lines are correct (the flow of water goes with gravity in gravity mains, but can go against gravity in pressurized mains); and 3) to determine if the mapped structures accurately represent ownership (municipal, private, state-owned, etc). Based on this information, areas in eed of field work were identified; days to complete the field work estimated; a timeline developed, and field

work dates set. These same maps now marked up from the in-house, pre-field work sessions were used in the field.

Field collection generally involved updating existing GIS data and/or collecting new feature data and related attribute information. All field work began at the top of the drainage area such that the GIS Technician and the municipal staff began GPS-ing structures from where the infrastructure began, and then proceeded in the direction of flow from one storm system structure to another, until the end of the system. Once the data was collected and the points post processed, a geodatabase with associated domains was created using the finalized data model. Each municipality had its own geodatabase and for each geodatabase the data was edited using a series of integrity, topological, and intermunicipal boundary checks. While editing, confusing or inaccurately mapped infrastructure was noted and these "GIS" notes were used to re-check an area or to discuss issues with relevant municipal staff. To help speed up the correction process, on March 14, 2013 several municipal staff met with the GIS Technician to discuss infrastructure ownership issues in the Kromma Kill, Dry River, and Salt Kill watersheds. MS4/municipal representatives from Albany County, the Village of Menands, Town of Colonie, City of Watervliet, and the City of Cohoes participated in this meeting, see Figure 7.

Figure 7. March 14, 2013 Who Owns What Meeting?

Although named in the grant work plan, neither the GIS Technician alone, nor MS4/municipal staff working with the GIS Technician conducted field mapping in the Krumkill watershed. There are several reasons for this. One of the Coalition members with a sizeable portion of the Krumkill watershed dropped out of the Coalition, and then returned; making it difficult in the interim to conceptualize, given this missing storm system data, how the entire watershed could be mapped in general. Another municipality had a staff change from one GIS coordinator to another such that key mapping meetings were missed. Then, once the new GIS coordinator was hired, issues regarding their own GIS work took precedence over the coordinated approach to storm system mapping. Another MS4/municipality faced problems securing the necessary electronic mapping files of their portion of the watershed. Another, although willing, had limited resources therefore focused only on the Patroon Creek watershed.

The Krumkill watershed remains, however a critical watershed potentially well served by an inter-municipal storm system map. Flooding and erosion issues are frequently brought to the attention of MS4/municipal staff from the Town of Guilderland, City of Albany, Town of Bethlehem, Albany County, and University at Albany. Recently collected WAVE data suggests that in addition to impaired water segments located in the headwaters, other downstream segments may have become impaired. A well-executed system map could provide valuable infrastructure data, useful for analyzing and identifying site specific water quality issues and plausible pro-active, next steps. For similar reasons, completing the Patroon Creek storm system map is also a priority.

6. Storm Sewershed Boundaries

Time Frame: July, 2012 to January, 2013 and April, 2013 to May, 2013

System Mapping Work Plan Activities:

- **Storm System Maps and Preliminary Sewershed Delineations**
- **GIS Training Support and Consultant Services**

Administrative Work Plan Activities:

- **Manage Grant and Coordinate Grant Activities**

Description of Activities:

As the storm system infrastructure data for the Dry River watershed municipalities (Town of Colonie and City of Watervliet) reached an appropriate level of accuracy, the data was sent over to the GIS consulting firm for further analysis. While various issues and methods for delineating storm sewersheds had been discussed previously, preferred methods needed to be tested further and eventually used to delineate the intermunicipal sewershed boundary for all the MS4 storm system data sets. In general the intent was to combine digital elevation model (DEM) data derived from LiDAR points collected by NYSDEC and FEMA in 2008 with the actual storm infrastructure data.

As background, LiDAR consists of millions of millions of elevation points collected systematically using aircraft. The data set is huge and typically converted to a more manageable and useable format, known as a digital elevation model or DEM. A DEM consists of a grid of pixels, each the same size, such as 3ft x 3ft, for which there is a representative elevation measurement, such as the average of all elevation points within each pixel. The pixel dimensions of a DEM can vary as does the method used to calculate elevation. Metadata included with the DEM typically describes how the DEM was created. While smaller pixel dimensions result in a more accurate description of elevation, there is more data to process, and managing this data is a tradeoff considered carefully by GIS practitioners specializing in this kind of imagery.

For this particular assignment the GIS consulting firm needed to select the most appropriate DEM and develop the most error free analytical methodology. At the outset, the general idea was to snap pixel elevation data to those storm structures points which collect storm water (catch basins) and have the computer look for ever higher elevation pixels draining to the selected catch basins. To reduce processing time, not all catch basins needed to be analyzed, but a method for selecting preferred catch basins needed to be developed, with the catch basins of interest most likely those positioned on the outer edges of the storm system. Eventually all of the pixels included in the area draining to the selected catch basins would define the storm sewershed area and sewershed boundary polygon. Appendix M. Albany County Storm Sewershed Analysis describes in detail which ESRI software functions were used in what sequence to eventually delineate the Dry River, Krommakill, Salt Kill, and Vly Creek storm sewershed boundaries. The procedures described in the Appendix can be used for other storm sewershed delineations.

When compared, although the topography derived watershed boundaries are similar to the storm sewershed boundaries, there are clear boundary differences (see Appendix N. Storm Sewershed vs. Watershed Boundaries). Stormwater piped by gravity or under pressure to areas outside of the watershed boundary are noticeable. Diversions for other reasons, often familiar to municipal staff, can be observed as well. However, in general, a first look at the storm sewershed boundaries, generally matched the day-to-day understanding of flow internal to each MS4 and across municipal boundaries.

This initial affirmation of ground truth, suggests that the methodology used to delineate storm sewershed boundaries, does a good job of describing what is happening in real life. As with any mapping effort, it is important to remember that the mapping process itself, while attempting to create the most accurate representation of actual infrastructure and actual flow is in fact based on technology, software, and field mapping procedures, all of which are variably accurate and precise. A continuous and intentional check of these mapped products against what is observed in the field will help, over time to identify and address inaccuracies. This includes mapped infrastructure and the use of elevation data to derive storm sewershed boundaries. With sustained use by many, and a steady commitment of resources, the quality and value of the mapped data will continue to improve and reflect the needs of users.

7. Final Map Products

Time Frame: May, 2013 to August, 2013

System Mapping Work Plan Activities:

- **Storm System Maps and Preliminary Sewershed Delineations**
- **GIS Training Support and Consultant Services**

Administrative Work Plan Activities:

- **Manage Grant and Coordinate Grant Activities**

Description of Activities:

As the project neared completion, the GIS Technician and consultant discussed ways to display the map layers, which symbols to use; the color palate; and various strategies for highlighting regulatory outfalls, a key component of the MS4 Permit stormwater regulations. The map layout eventually consisted of feature class layers (catch basin points, manhole points, storm pipe lines, pump station points, and storm structure points) grouped by MS4/municipalities, with those portions of each infrastructure type known to be a regulatory outfall, identified as either an end section or inter-municipal connection, were highlighted using the halo effect.

Directional arrows positioned on storm pipe line layers displayed the direction of flow and all municipal storm infrastructure was assigned the same color. This way when viewing all of the storm system

infrastructure contained within a particular storm sewershed, infrastructure associated with the Town of Colonie for example could be distinguished from the City of Watervliet. To identify the actual storm sewershed boundary, stand-alone map layers were created, one for each of the completed system maps: Dry River, Krommakill, Salt Kill, and Vly Creek.

These sewershed and storm system layers, related symbology, and color choices were then incorporated into the following map products: 1) Albany Internet Mapping System (AIMS); 2) Storm Sewershed Map Books (8.5 x 11 Format); and 3) Large format maps (ANSI E), available as a PDF or as a hard copy. For all map products, with the exception of the Town of Colonie, generally only those structures contained within the storm sewershed of select municipalities were displayed, as those were the only complete, corrected storm system maps. Below is a list of municipalities contributing data to the completed storm sewershed map as indicated in parenthesis.

Albany County (Vly Creek and Krommakill sewershed);
City of Cohoes (Salt Kill sewershed);
Town of Colonie (Krommakill; Dry River; Salt Kill sewersheds) ;
Town of Guilderland (Vly Creek sewershed);
Village of Green Island (Salt Kill sewershed);
Village of Menands (Krommakill sewershed);
Town of New Scotland (Vly Creek sewershed);
Village of Voorheesville (Vly Creek sewershed, entire Village);
City of Watervliet (Dry River and Salt Kill sewershed)

On August 8, 2013, at a routine Coalition Working Group meeting, the GIS Technician and Coalition Program Coordinator demonstrated to Coalition members the map layers posted on AIMS and the content of a typical Map Book (see Appendix O. Map Book Cover Sheets and Sample Map Pages). Large format storm system maps were available for viewing and made available upon request. Coalition members also received a CD ROM which contained map data generally thought to be useful to GIS practitioners within their municipality. The content of the CD ROM is listed below and data unique to each MS4/Municipality is described in Appendix P. Individual MS4/Municipal Data.

1) Original electronic data received from the MS4 at the outset of the project, labeled FROM MS4.

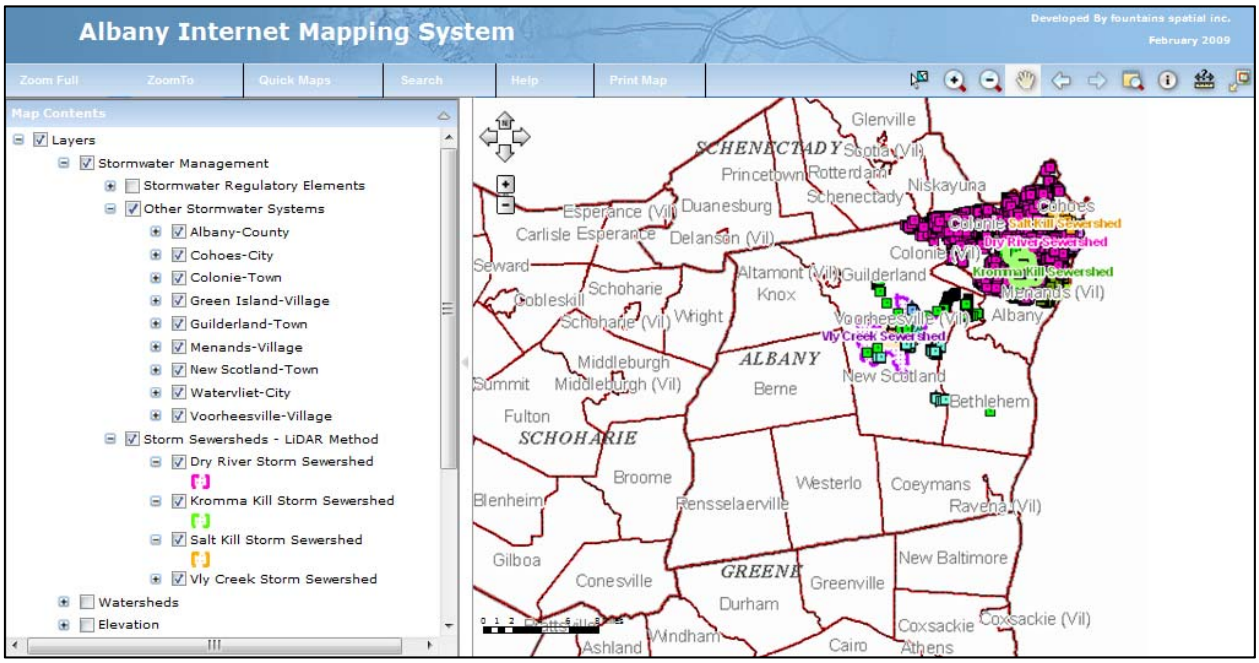
2) For those MS4s for which storm system mapping was completed, a geodatabase of the ESRI files, which if Final and posted on AIMS, was labeled FINAL. If incomplete, the file was labeled, WIP for Work In Progress, which generally meant that the data still needed to be corrected before posting on AIMS.

3) Empty template of the geodatabase used to create the individual MS4 geodatabases; based on Stormwater Coalition Storm System Data Model

4) Empty template of the data dictionary used on GPS units to collect data for individual municipalities.

At the outset, the intent of this project was to develop a “GIS” based storm system data set. While the August 8 meeting explained where and how the storm system data was posted on AIMS, little time was spent explaining storm system related queries now possible using the inter-active AIMS system. Figures 8a; 8b; 8c; 8d; 8e; and 8f. showcase potential queries and the new storm system mapping layers themselves.

Figure 8a. Storm System Mapping Project – New Map Layers & Symbology
Other Stormwater Systems and Storm Sewersheds-LiDAR Method



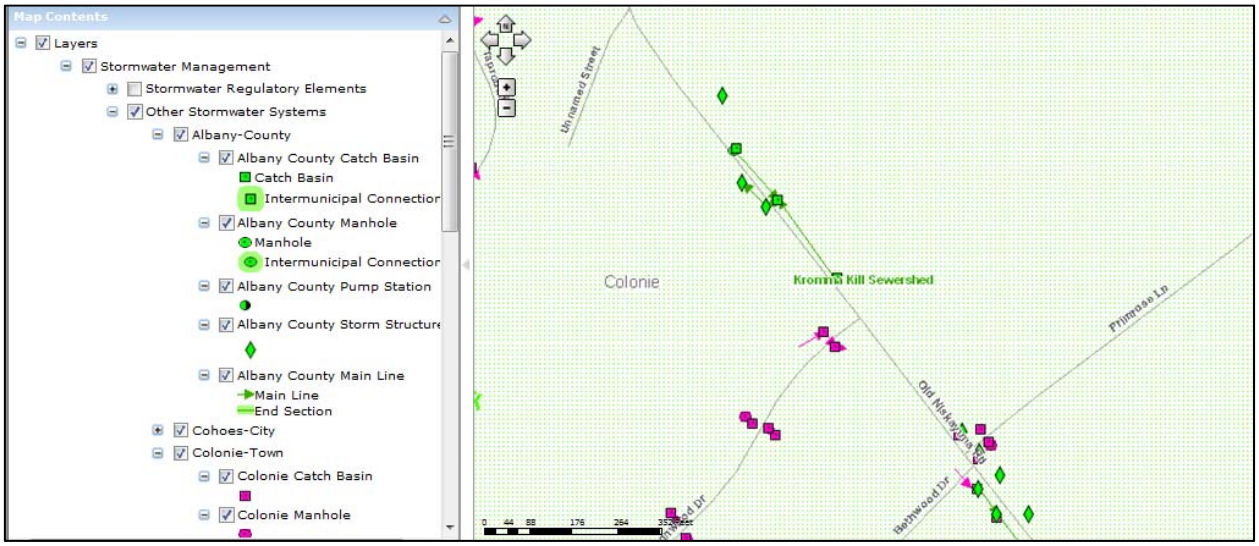
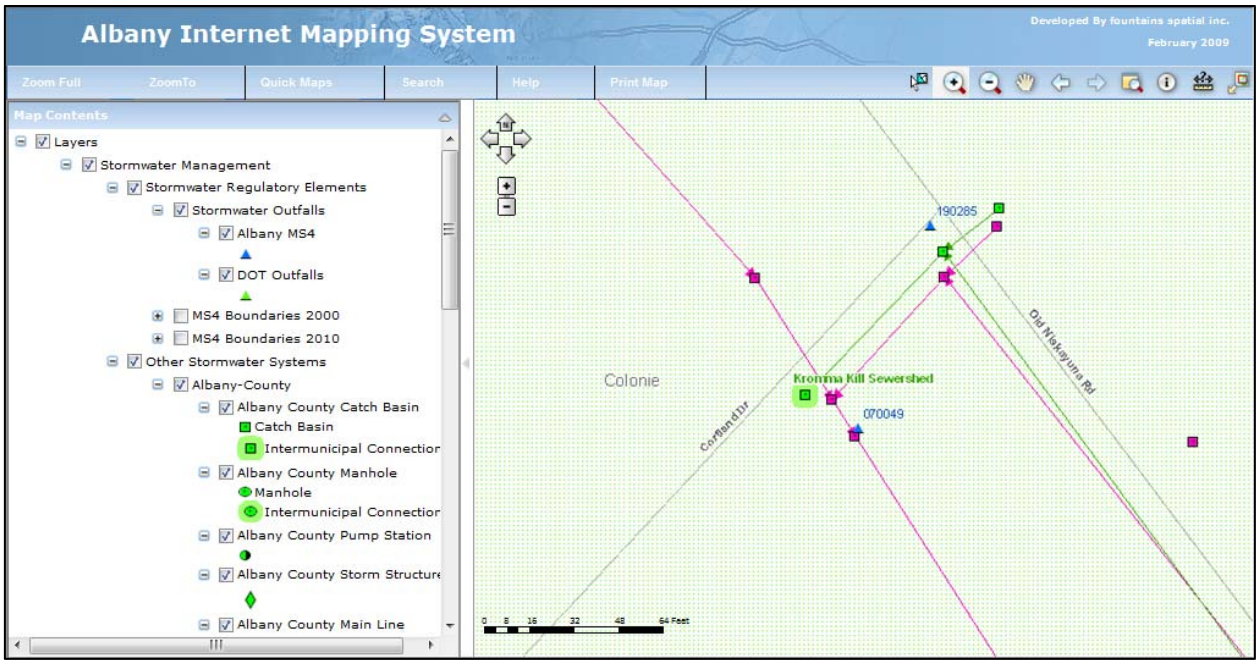


Figure 8b. Storm System Mapping Project – Storm System Infrastructure and Regulatory Outfalls
Possible Queries:
1.The location of regulatory outfalls, in blue with an identification number, are close to, but not at the same location as the storm system outfall, identified as either an end section or intermunicipal connection, why is that?
2. Are they "close enough" for the purpose of pollution track down and locating outfalls when conducting dry weather "ORI" surveys?
3. Is it worth the time to correct these locations? How long would it take? Who would do it?



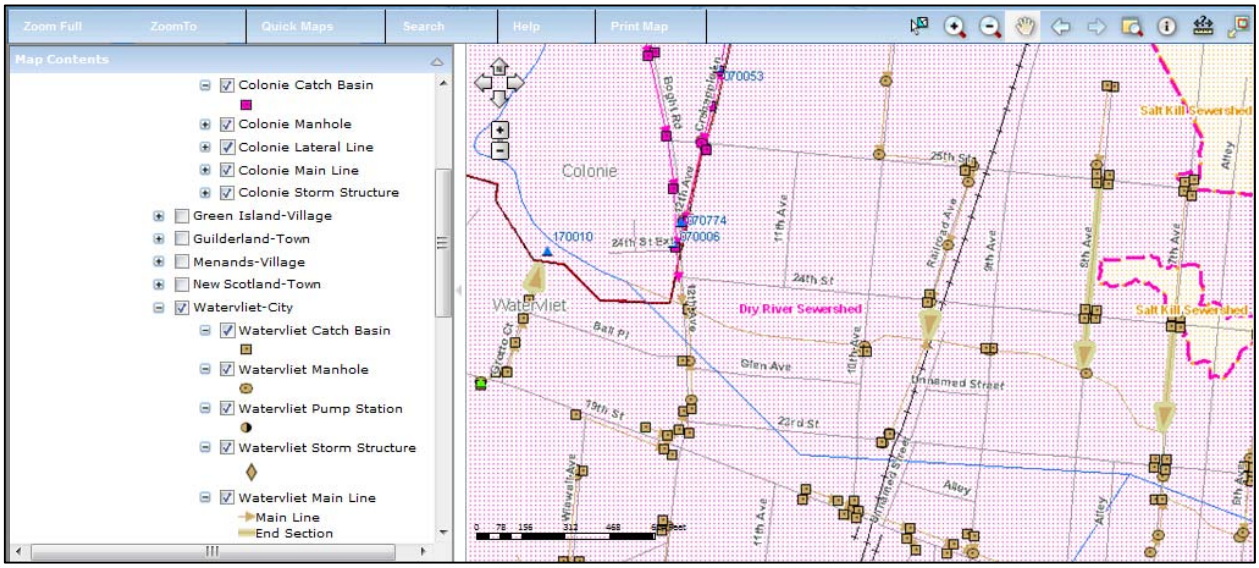


Figure 8c. Other Map Layers-Using the AIMS Mapping System

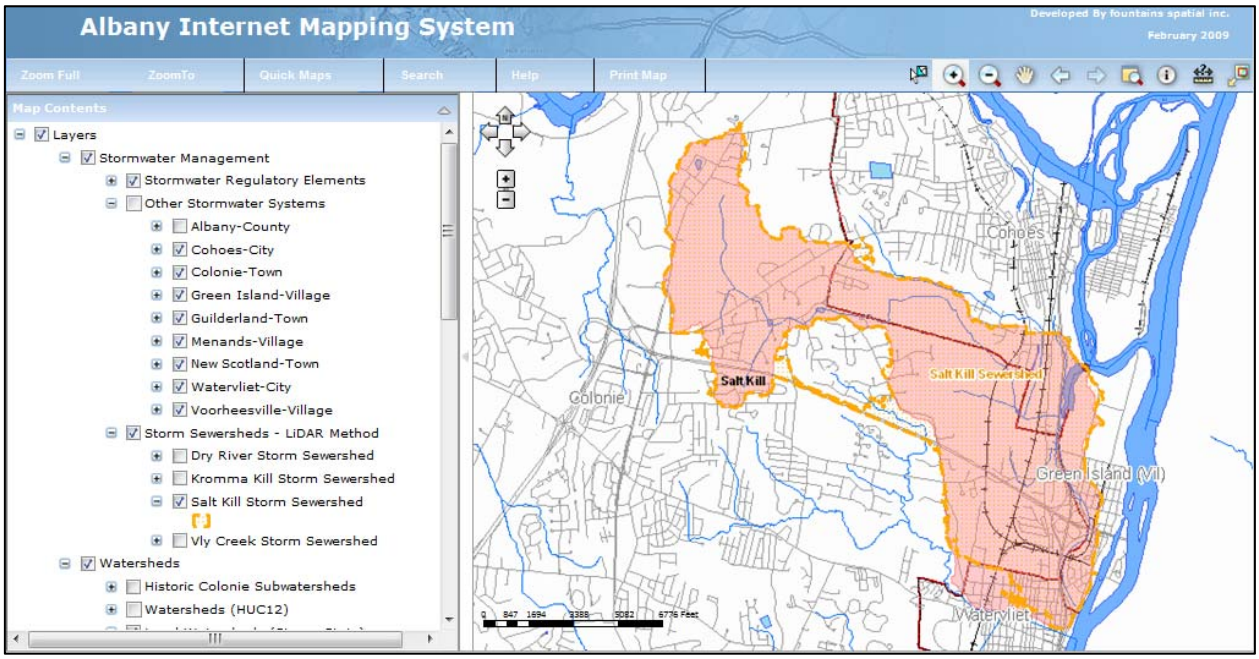
Possible Queries:

1. Which MS4/municipalities own storm infrastructure in the Salt Kill storm sewershed?

2. Is the Salt Kill storm sewershed boundary the same as the StreamStats delineated watershed boundary?

3. Where are the sewershed and watershed boundaries the same? Different? Why?

4. Why is that yellow dotted line associated with the Salt Kill storm sewershed? What is it?



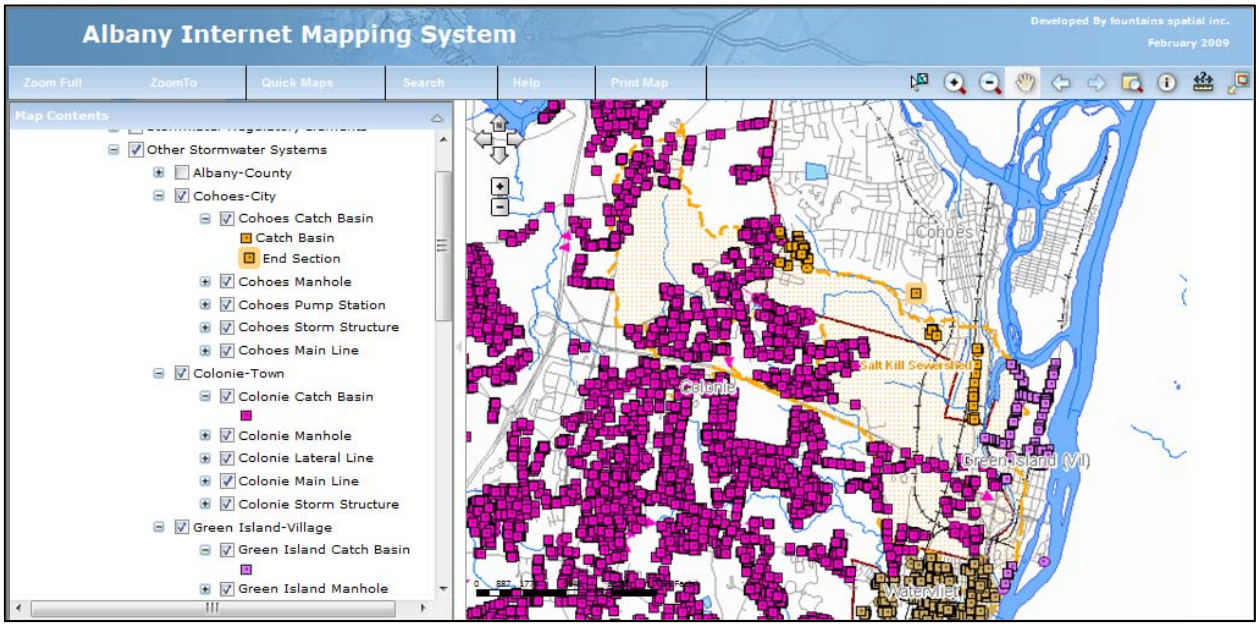
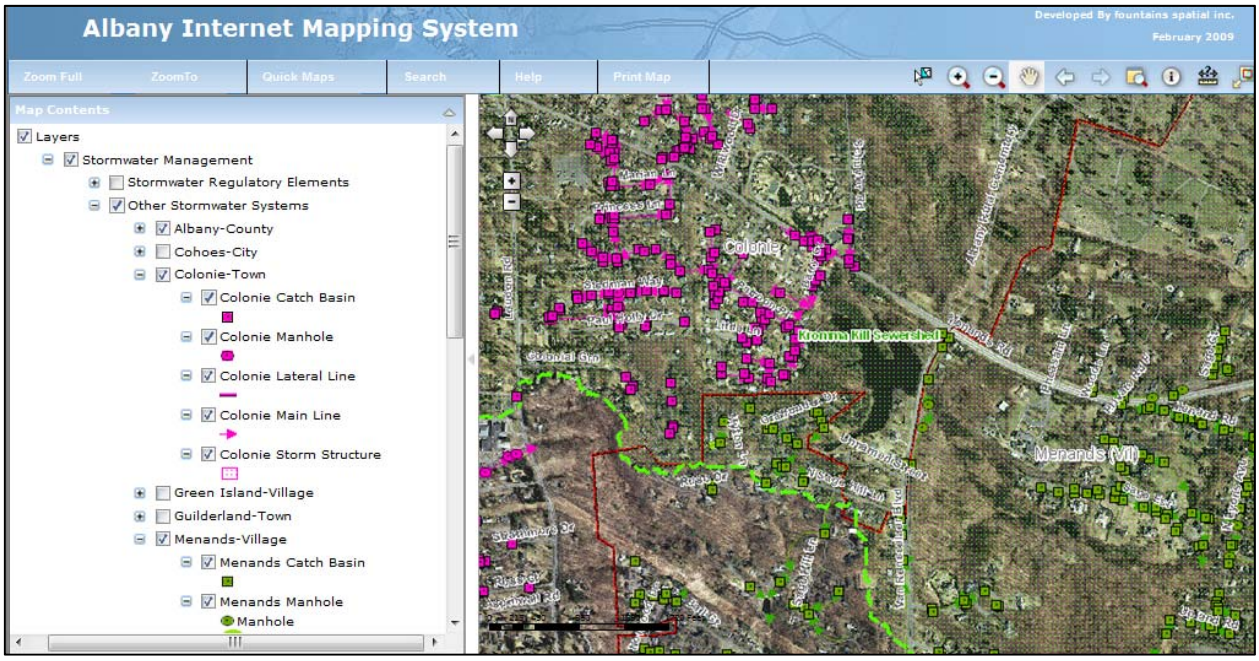
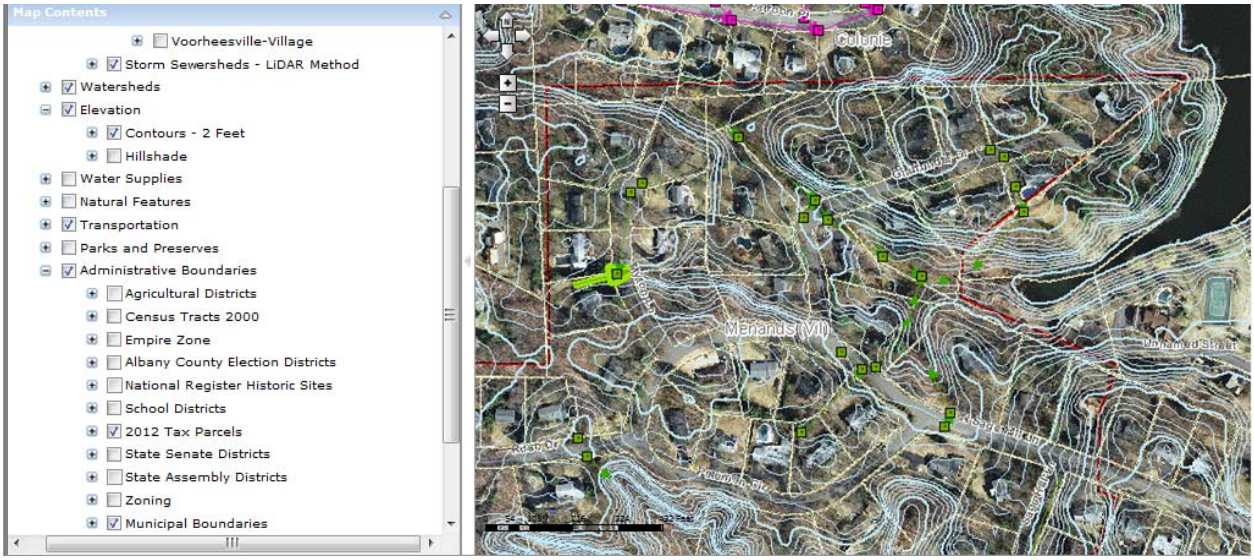


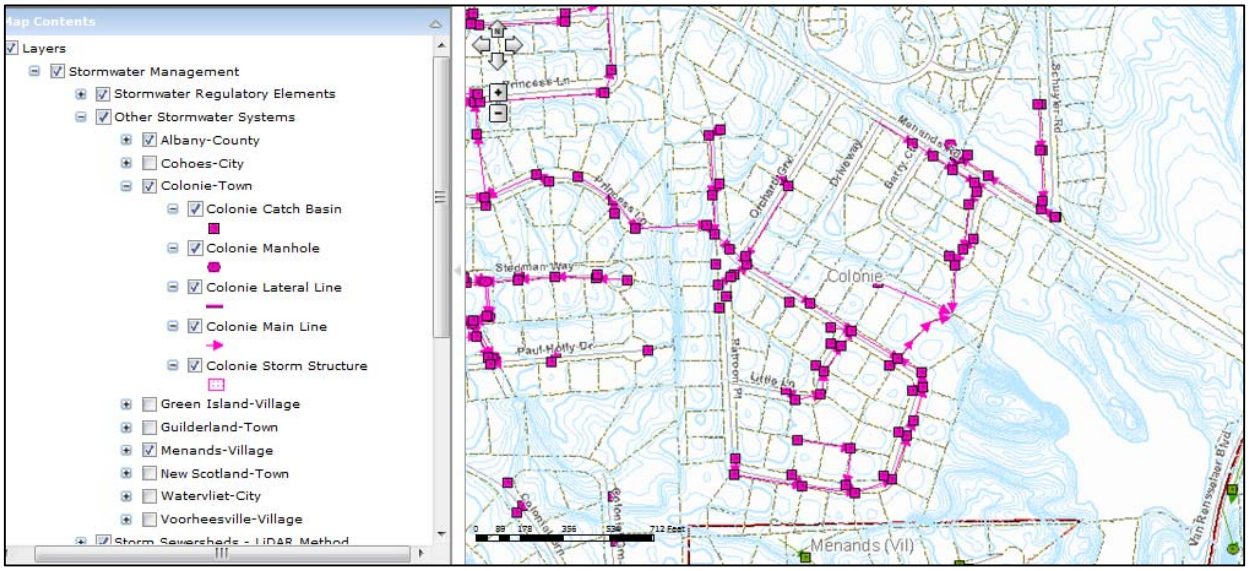
Figure 8d. Other Map Layers-Pollution Track Down "Big Picture" Look and Close In

Possible Queries:

1. Where is stormwater runoff entering this pond? Are there outfalls?
2. Which neighborhoods drain to these outfalls? How many households?
3. Is the drainage area residential? commercial? undeveloped land?
4. Is the vegetative buffer "forever wild"? Who owns the pond?
5. What might be the pollutants of concern for these drainage areas? Pet waste? Goose droppings? Lawn care products?
6. How long would it take to distribute educational material? By foot? By car? Where? Good idea?
7. Has anyone collected water quality data? When? Who? Available? Useful?



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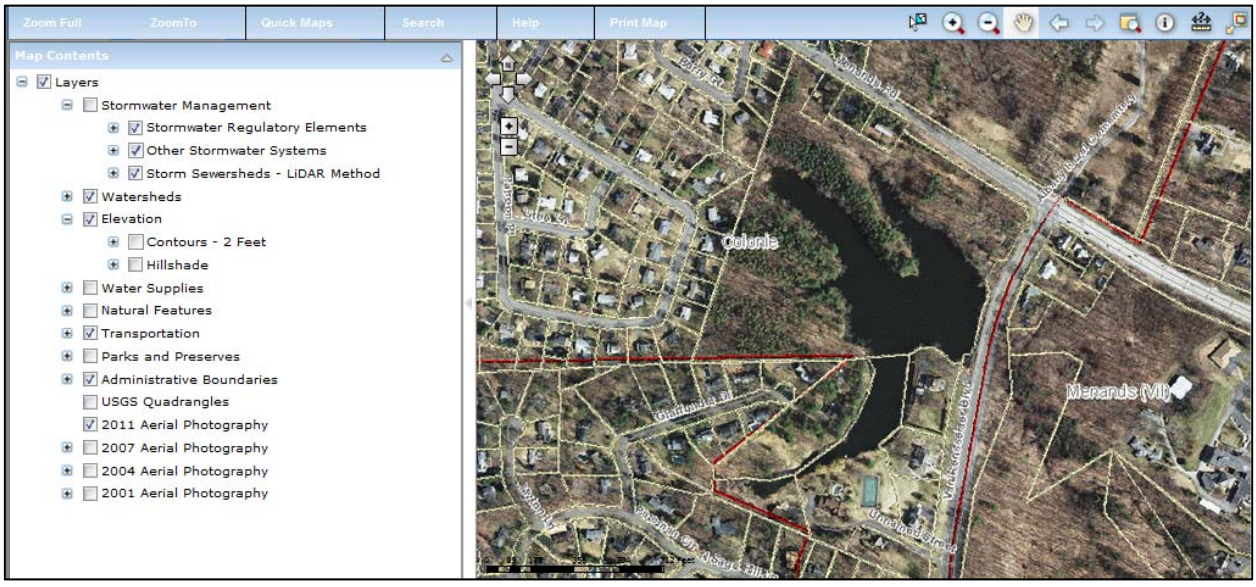
Layers
Stormwater Management
Stormwater Regulatory Elements
Other Stormwater Systems
Albany-County
Cohoes-City
Colonie-Town
Colonie Catch Basin
Colonie Manhole
Colonie Lateral Line
Colonie Main Line
Colonie Storm Structure
Green Island-Village
Guilderland-Town
Menands-Village
New Scotland-Town
Watervliet-City
Voorheesville-Village
Colonie
Menands (Vil)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Map Contents
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Stormwater Regulatory Elements
Other Stormwater Systems
Storm Sewersheds - LiDAR Method
Watersheds
Elevation
Contours - 2 Feet
Hillshade
Water Supplies
Natural Features
Transportation
Parks and Preserves
Administrative Boundaries
USGS Quadrangles
2011 Aerial Photography
2007 Aerial Photography
2004 Aerial Photography
2001 Aerial Photography
Colonie
Menands (Vil)

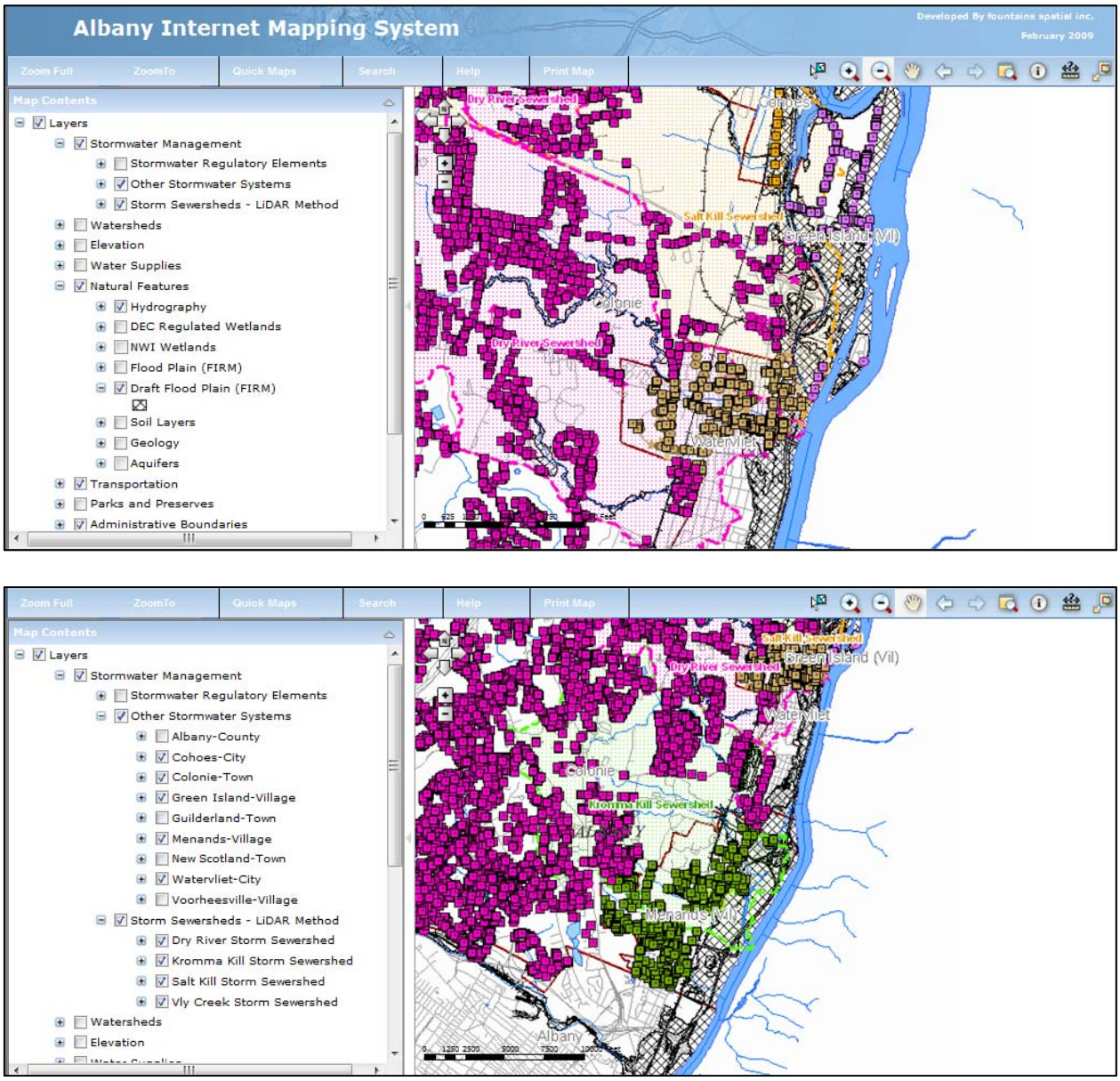
Figure 8e. Other Map Layers-Using the Mapping System-Asset Management

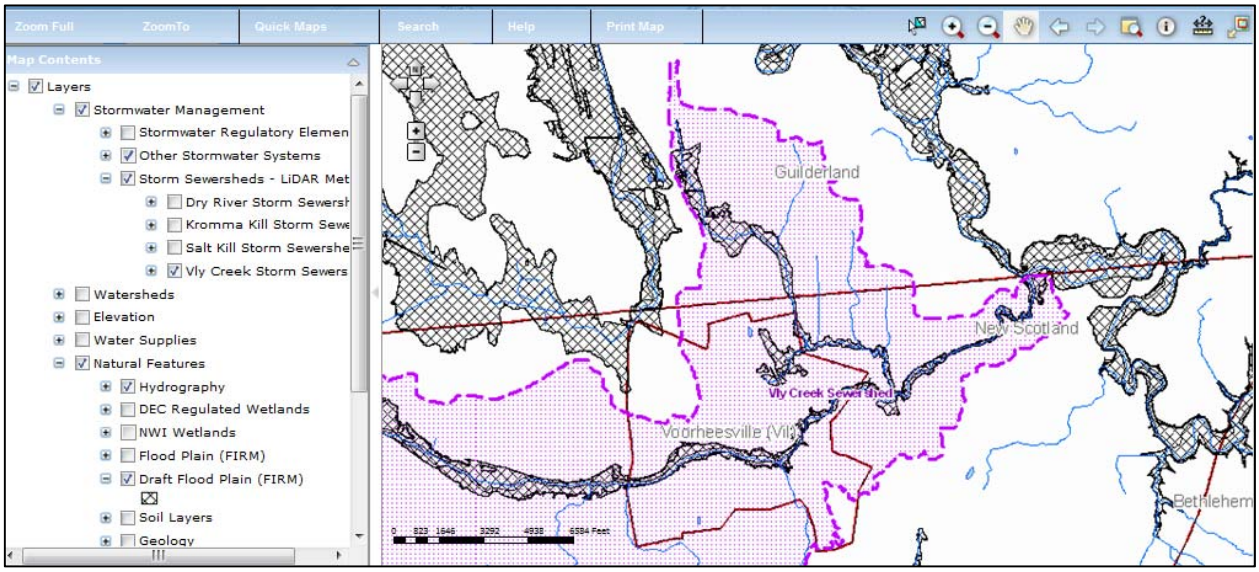
Possible Queries:

1. Is there storm system infrastructure located in the 100 year flood plain (DRAFT FIRM maps)?

2. Where? Who owns it? Is it at risk? Is it maintained? What is it? Catch basins? Pumps? Manholes? Ponds?

3. Would it help to inspect these structures? Which ones first? What happens if a 50 year flood event?

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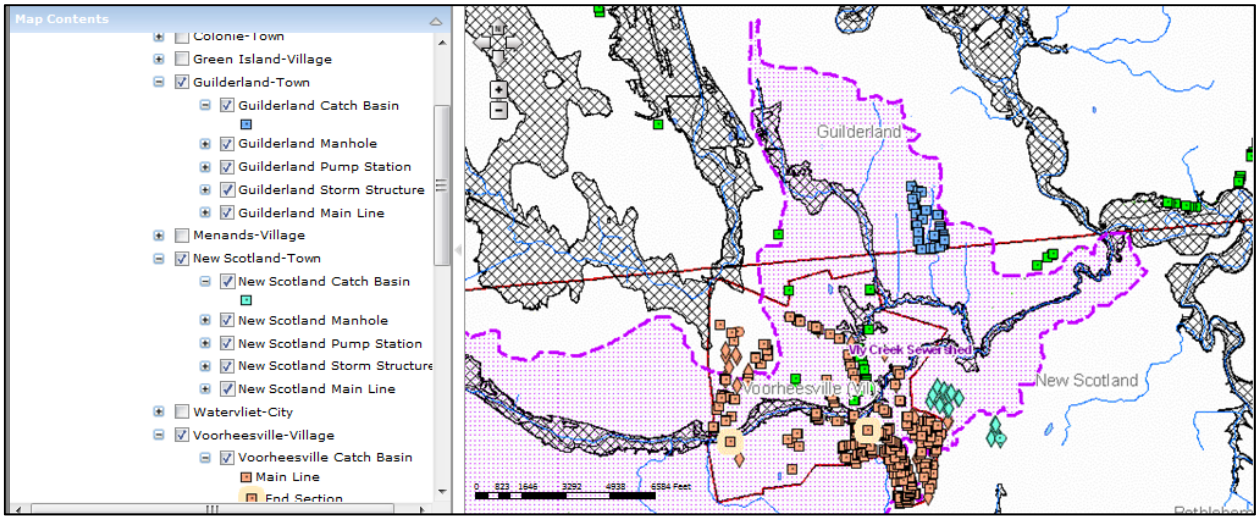
Map Contents
Layers
Stormwater Management
Stormwater Regulatory Elemen
Other Stormwater Systems
Storm Sewersheds - LiDAR Met
Dry River Storm Sewersh
Kromma Kill Storm Sewe
Salt Kill Storm Sewershe
Vly Creek Storm Sewers
Watersheds
Elevation
Water Supplies
Natural Features
Hydrography
DEC Regulated Wetlands
NWI Wetlands
Flood Plain (FIRM)
Draft Flood Plain (FIRM)
Soil Layers
Geology
Guilderland
New Scotland
Vly Creek Sewershed
Voorheesville (Vil)
Bethlehem


Map Contents
Colonie-Town
Green Island-Village
Guilderland-Town
Guilderland Catch Basin
Guilderland Manhole
Guilderland Pump Station
Guilderland Storm Structure
Guilderland Main Line
Menands-Village
New Scotland-Town
New Scotland Catch Basin
New Scotland Manhole
New Scotland Pump Station
New Scotland Storm Structure
New Scotland Main Line
Watervliet-City
Voorheesville-Village
Voorheesville Catch Basin
Main Line
End Section
Guilderland
Vly Creek Sewershed
Voorheesville (Vil)
New Scotland

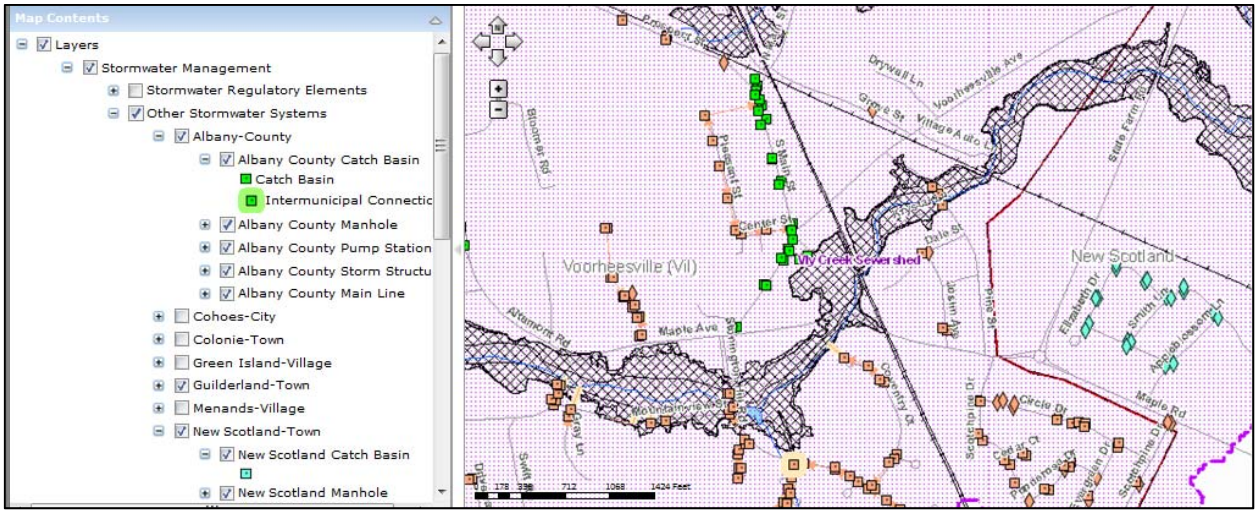

Map Contents
Layers
Stormwater Management
Stormwater Regulatory Elements
Other Stormwater Systems
Albany-County
Albany County Catch Basin
Catch Basin
Intermunicipal Connectic
Albany County Manhole
Albany County Pump Station
Albany County Storm Structu
Albany County Main Line
Cohoes-City
Colonie-Town
Green Island-Village
Guilderland-Town
Menands-Village
New Scotland-Town
New Scotland Catch Basin
New Scotland Manhole
Vly Creek Sewershed
Voorheesville (Vil)
New Scotland

Figure 8f. Other Map Layers-Using the Mapping System-Long Term Planning

Possible Queries:

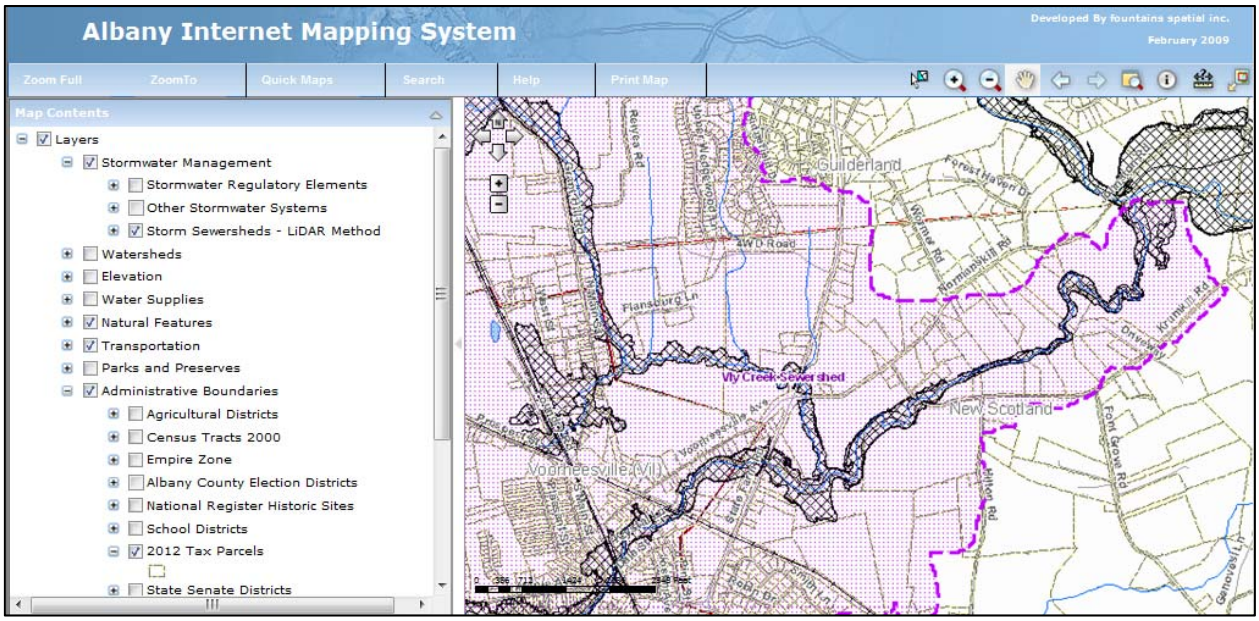
1. Where is development likely to occur in the Vly Creek storm sewershed?

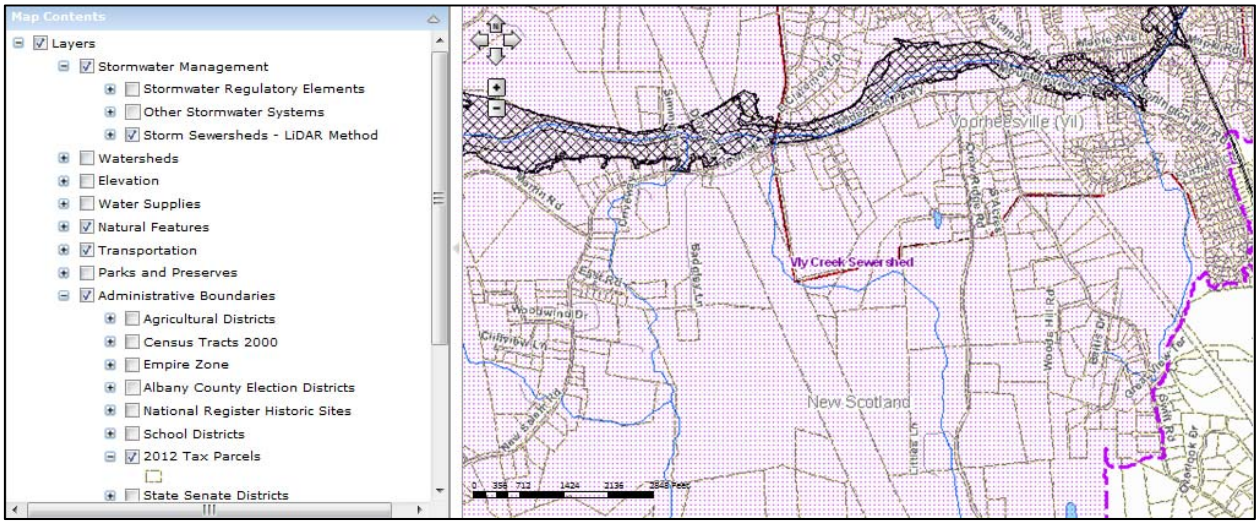
2. How much and what kind of storm infrastructure will be built?

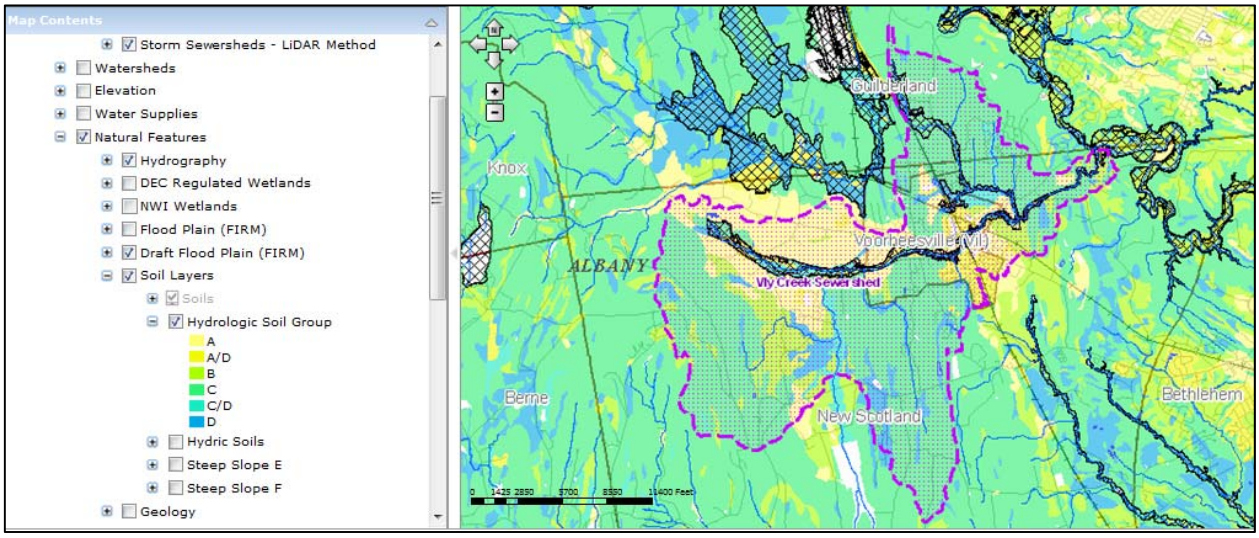
3. How many more structures will need to be mapped? outfalls inspected?

4. What kind of soil is in the undeveloped areas (HSG A, B, C, D)? Well drained? Poorly drained?

5. What kind of green infrastructure practices might be possible?



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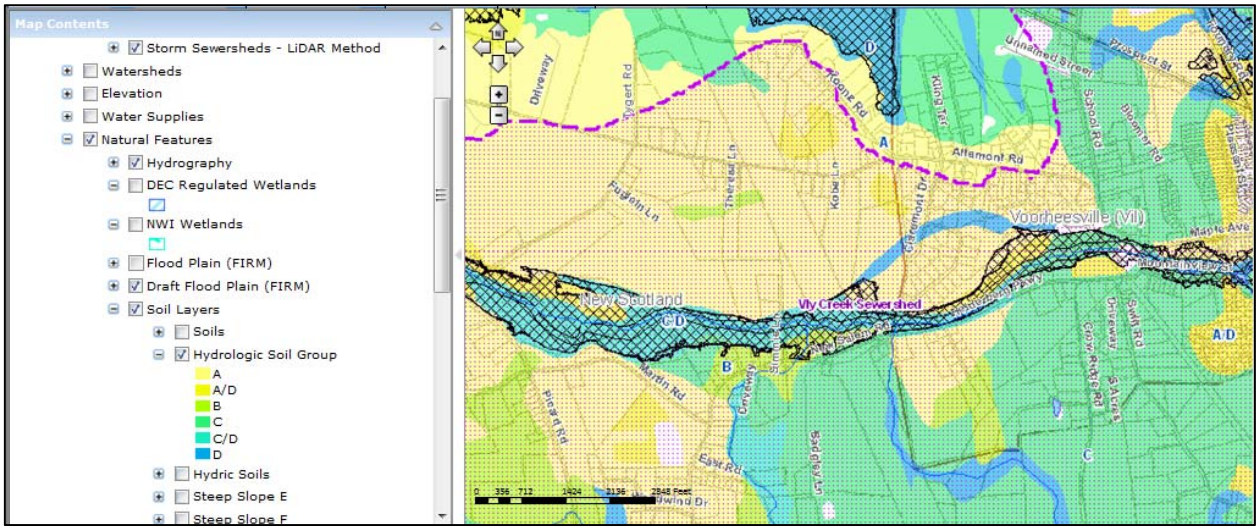
Water Supplies
Natural Features
Hydrography
DEC Regulated Wetlands
NWI Wetlands
Flood Plain (FIRM)
Draft Flood Plain (FIRM)
Soil Layers
Soils
Hydrologic Soil Group
A
A/D
B
C
C/D
D
Hydric Soils
Steep Slope E
Steep Slope F
Geology
Guilderland
Knox
ALBANY
Voorheesville (Vil)
Vly Creek Sewershed
Berne
New Scotland
Bethlehem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Water Supplies
Natural Features
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Draft Flood Plain (FIRM)
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Soils
Hydrologic Soil Group
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A/D
B
C
C/D
D
Hydric Soils
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Steep Slope F
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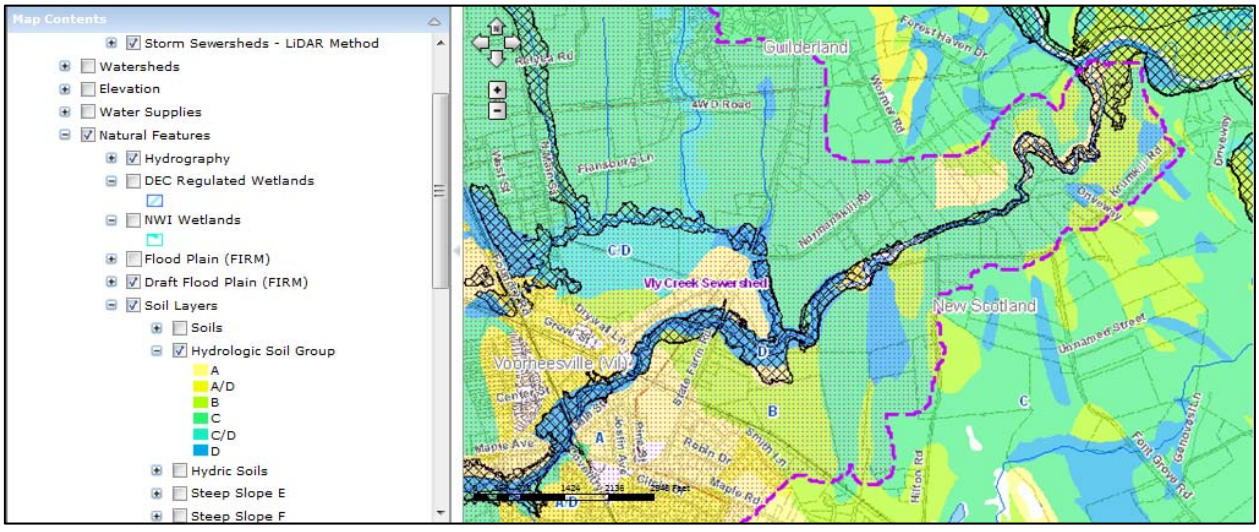
New Scotland
Vly Creek Sewershed
Maple Ave
Martin Rd
East Rd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Soil Layers
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B
C
C/D
D
Hydric Soils
Steep Slope E
Steep Slope F
Guilderland
Vly Creek Sewershed
New Scotland
Voorheesville (Vil)
Maple Ave
Fort Grove Rd

9. Observations and Recommendations

This was a very inclusive project, which required the full support and attention of all Coalition members, particularly those MS4s with infrastructure in the Kromma Kill, Dry River, Salt Kill, Vly Creek, and Patroon Creek watersheds. While considerable time was spent developing the Coalition Storm System data model, the process encouraged a robust debate regarding what we wanted to and needed to map, and this process helped to clarify for everyone the purpose of the mapping project. Consultant services related to creating the data model were critical, as they were able to guide the complicated process of managing diverse data sets, and prevent likely problems associated with data sets of varying quality. Their astute sense of the emerging training needs of the GIS Technician were pointed and well timed.

While it may have been unavoidable, considerable time was spent working with existing maps, hoping they were of sufficient quality to avoid field mapping. In retrospect, these same maps were eventually abandoned and replaced with GPS field mapping of structures in the field. Ideally that decision would have been reached sooner, as the actual GPS mapping proved to be relatively simple and a good way to guarantee a quality map.

Once firmly committed to field work, the work itself became more efficient and the time commitment of individual MS4 staff easier to define. Field work teams which included attentive, knowledgeable staff with a deep institutional knowledge of the storm system infrastructure, working with the GIS Technician completed the mapping work quickly. The GPS "Brain For a Day" training in particular provided a valuable overview of GPS and GIS technology, which for some municipalities helped launch a more robust GIS presence within their MS4. For others, the GPS training and field work made it clear that GPS/GIS mapping was too technical a skill for their municipal staff and they were grateful for the technical support provided by the GIS Technician. That various storm system maps proved to be too complicated to map in their entirety (Patroon Creek) or mapped at all (Krumkill) was disappointing.

Finally, the value of building off of the existing Town of Colonie storm system data model and their mapped infrastructure deserves special mention. Their long standing commitment to creating a robust municipal GIS, along with their ongoing attentiveness to working cooperatively with the other Coalition members, provided a significant boost to this mapping project. We all capitalized on the time and effort they had already devoted to mapping their own storm system infrastructure. The other downstream municipalities essentially expanded off of their work, making it possible to finally see what the infrastructure looks like from the high point of the storm system infrastructure, generally located in the Town of Colonie, to the various infrastructure low points, owned and operated by a variety of other municipalities. For the County, the mapping project defined more clearly how and where stormwater flows into and out of their linear storm infrastructure. Without the core data set from the Town of Colonie, given the time and money available, mapping the entire storm systems of four watersheds would not have been possible.

In general, what was accomplished should be recognized as a small, significant validation that small municipalities in New York State can function at an inter-municipal level mapping system infrastructure owned and managed by multiple regulated MS4s. It should also be recognized that the underlying cooperative spirit which makes this possible, depends over time on a strong administrative foundation, adequately and consistently funded. The consequences of grant funding are very real. Once the grant funded ended, for example, the GIS Technician left the project, thus compromising future storm system mapping, particular for those MS4s lacking their own GIS staff, or the resources to hire outside consulting firms. Also, the likelihood of sharing a common data model diminishes as the mapping effort, if it continues at all, becomes fragmented, with each MS4 "doing it their own way".

While the Coalition Board decided to increase membership funding to cover the cost of a second full time staff position, potentially charged with continuing the mapping work, whether or not this cooperative approach to mapping infrastructure continues remains to be seen. This two year project, however established

a useful foundation for future work, and the storm system maps created for four storm sewersheds, provides for practitioners a GIS database potentially of value.

The extent of unmapped storm system infrastructure is, however, daunting. Figure 9a. shows the urbanized area in Albany, subject to MS4 Permit mapping requirements, while Figure 9b. shows the system data available as GIS map layers, now posted on the Albany Internet Mapping System. While MS4 mapping has occurred elsewhere in these urbanized areas and is currently not "postable" on AIMS, the process and related cost of either converting, correcting, and uploading these existing maps is significant. Should these existing maps prove to be inadequate, thus pointing to new maps and related field work, that work in addition to mapping unmapped, urbanized areas represents a significant investment of resources.

These system maps however, make possible a meaningful storm sewershed delineation, which is more extensive and accurate than various watershed delineations (see Appendix N Storm Sewershed vs Watershed Boundaries). These same system maps more accurately connect regulatory outfalls to storm systems often owned by multiple municipalities within a particular storm sewershed. Given these geographic realities, the value of GIS mapping technology to stormwater management in general cannot be underestimated. The challenge, however is to figure out how mapping work of this kind, given MS4/municipal political jurisdictions and constrained MS4/municipal budgets can continue into the future.

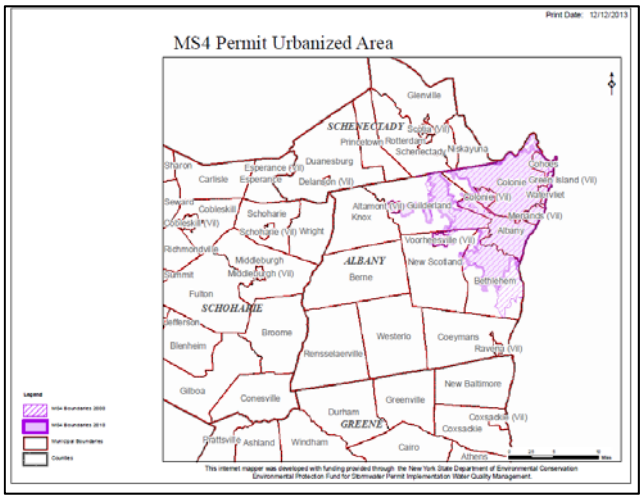


Figure 9a.
AIMS Map of MS4 Permit Urbanized Area in Albany County (2000 and 2010 Census)

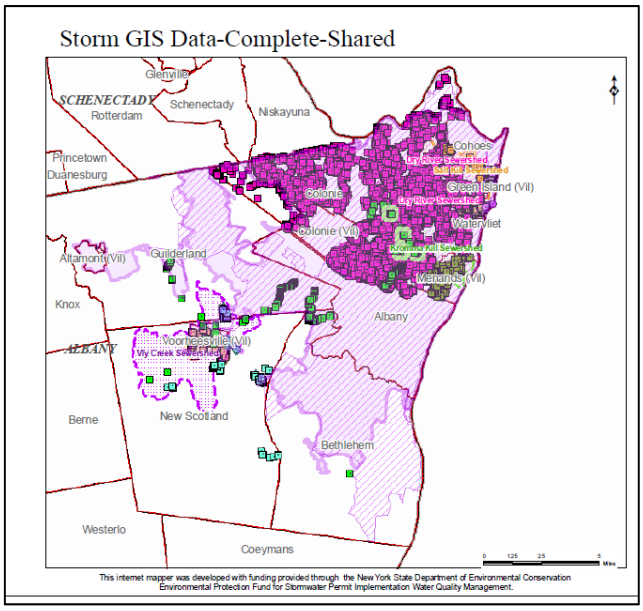


Figure 9b.
AIMS Map of Storm System Infrastructure.

The map layers posted here have been corrected and conform to the file structure and attributes of the Coalition storm system data model.

III. Appendices

Appendix A

Civil Service Job Specification
Technical/Administrative GIS/GPS Technician

ADMINISTRATIVE AND/OR TECHNICAL ASSISTANT (GIS AND GPS)

DISTINGUISHING FEATURES OF THE CLASS: This is a position designed to be used by the Stormwater Coalition of Albany County where the individual will assist staff and members of the Stormwater Coalition of Albany County in implementing the Clean Water Act Phase II Stormwater Regulations. Activities will focus on program needs related to mandated permit requirements, in particular: 1) public education, outreach, and social marketing; 2) public participation and stewardship activities; 3) outfall mapping and dry weather surveys; 4) sewershed and storm system mapping; 5) maintenance of internet mapping system; 6) development of training programs; 7) website development and maintenance; 8) internal administration of Coalition operations. The administrative and/or technical assistant will work under the direction of the Coalition Stormwater Program Coordinator. Given the range of potential activities, the skill set of the individual will be matched to priority activities defined by Stormwater Coalition members. Does related work as required.

TYPICAL WORK ACTIVITIES:

- Assist staff and members of the Stormwater Coalition of Albany County in implementing the Clean Water Act Phase II Stormwater Regulations;
- Assemble database (target audiences);
- Assemble documents for website;
- Research outreach/education opportunities and contacts;
- Research stewardship opportunities and contacts
- Assist with training programs (Better Site Design; Enforcement);
- Set up and organize outreach/education materials for lending library;
- Provide office support which includes filing, processing attendance lists, copying and clipping;
- Update construction activity permit for GIS & Albany Internet Mapping System;
- Provide dry weather outfall survey assistance;
- Provide sewershed map assistance;
- Conduct hot-spot investigations – generating sites;
- Assist in creation of educational videos;
- Provide related support - shapfile editing for Albany Internet Mapping System;
- Complete special projects related to academic work.

FULL PERFORMANCE KNOWLEDGE, SKILLS, ABILITIES, AND PERSONAL CHARACTERISTICS:

- Knowledge of governmental stormwater management regulations;
- Knowledge of stormwater management practices;
- Knowledge of the purposes, principles, terminology, and practices employed in land use and natural resource planning;
- Knowledge of statutes, rules, regulations, professional literature and current problems in stormwater management and planning;
- Knowledge of Geographic Information Systems technology;
- Computer skills including the ability to work in geographic information systems;
- Ability to communicate effectively both orally and in writing;
- Ability to plan;
- Physical condition commensurate with the demands of the position.

MINIMUM QUALIFICATIONS:

A. Graduation from a regionally accredited or New York State registered college or university with a Bachelor's Degree and course work towards a Masters program in Conservation Biology and Policy; Geography, Geographic Information Systems and Planning; Communications; Marketing and Business Administration; Secondary Education-Biology, Chemistry, or Earth Science; and Earth and Soil Science or closely related field; **AND,**

B. One year experience supporting the implementation of Phase II Stormwater Regulations.

Juris Class: Competitive
ACCS Adopted: 4/11/11
Revised:

Appendix B

Grant Budget Worksheet

NYSDEC Stormwater Grant Contract C304384

	GRANT				
	State Funds ($165,000)		**Local Match ($55,000)		❖TOTAL COSTS
BUDGET	Itemized	Total	Itemized	Total	(Entire project covered by this contract)
1. Personal Services					
Salaries & Wages		**$60,000**		**$37,000**	**$97,000**
GIS Tech-Salary (2+ Years @$30,000/yr)	*$60,000*				
Coalition Coordinator (.25 of $50,000 Salary per year)			*$22,000*		
Coalition Members (WG; Sub-Committees-Map'g & GI Local Law)			*$15,000*		
Fringe (45% of Base)		**$26,730**		**$11,711**	**$38,441**
GIS Tech-SSN (7.65% of Base)	*$4,590*				
GIS Tech- Pension (14.9% of Base)	*$8,940*				
GIS Tech-Health and Dental Ins (22% of Base)	*$13,200*				
SW Coor-Fringe (SSN 7.65% of Base)			*$1,683*		
SW Coor-Fringe (Pension 14.9% of Base in 2011)			*$3,278*		
Coalition Member (45% of Total Salary)			*$6,750*		
Indirect Overhead				**$4,800**	**$4,800**
Meeting Space ($200/hr; 2 hr/mtg; 2.0 years; 24 mtgs)			$4,800		
2. Nonpersonal Services					
i. Travel		**$670**			**$670**
GIS Tech-Mileage	*$670*				
ii. Equipment		**$12,060**		**$1,489**	**$13,549**
Computer Work Station (2.33 GHz, 3.5 GB of RAM; Software)			*$1,489*		
Trimble Geo ProX; Field Laptop; Software (Ofce Pathfinder, TerraSynch)	*$9,300*				
ArcView 10.0	*$1,500*				
ArcView Extension-Spatial Analyst	*$630*				
ArcView Extension -3D Analyst	*$630*				
iii. Supplies and Materials		**$1,540**			**$1,540**
Office Supplies	*$840*				
Workshop Supplies	*$700*				
iv. Contracts*					
a. Training					
Mapping Related		**$3,000**			**$3,000**
GPS (All Trimbles)	*$1,500*				
Sewershed Delineations (LiDAR)	*$1,500*				
Green Infrastructure ($9000)		**$9,000**			**$9,000**
Workshop #1 Local GI Bus Tour	*$2,200*				
Workshop #2 Green Inf Course	*$2,700*				
Workshop #3 (Topic from Survey)	*$2,100*				
Workshop #4 (Topic from Survey)	*$2,000*				
b. Consulting					
Storm System Mapping Design and Set Up		**$17,000**			**$17,000**
Inventory, Project Design, Set Up	*$10,000*				
Supplemental Training and Guidance	*$7,000*				
Local Law Dev (Legal Support-$35,000)		**$35,000**			**$35,000**
Consultant (Legal Asst and Engineer Outreach)	*$35,000*				
v. Other					
	$165,000	**$165,000**		**$55,000**	**$220,000**
Grn Inf Local Law		$44,000			
Mapping		$121,000			

*** Contracts To Be Determined**

** The Environmental Protection Fund prohibits using other state or federal grant dollars received for the project as the local match of the project. Indicate where local match will come from to document that it is not from state or federal sources.

❖ The recipient MAY shift UP TO 10% of total costs between expenditure categories. If cumulative changes exceed 10% of the total cost, you must first obtain DEC approval. In NO event shall changes to the budget cause the aggregate costs to exceed the "not to exceed" amount of the authorized State Assistance as set forth in Section 3a of this Contract."

Appendix C

GIS Tech Workstation and Mapping Equipment

GIS Technician Work Station and Mapping Equipment

GIS Technician Work Station

Computer

Source: In Kind Match from Albany County Department of Info Services

Mapping Software

ESRI Arc View 10.1 (Stormwater Coalition license)
ESRI Arc Info 10.1 (Albany County license)

GPS Equipment

Trimble Yuma Tablet with Pro XH Receiver

Trimble Part No. 73859-20 (Packing List and Purchase Order)

Trimble Yuma Tablet (Windows 7)

Trimble Part No. 69560-10 (Packing List)
Sr #RC115U0149

Trimble GPS Pathfinder Pro XH Receiver

Trimble Part No. 52250-00 (Packing List)
Sr # 5151487285

Trimble GPS Pathfinder Office Update

Part No. 34191-95 (Purchase Order)

Trimble TerraSync Professional Software

Part No. 45955-VG (Purchase Order)

2 Meter Carbon Fiber Range Pole

Part No. 53861 (Packing List and Purchase Order)

Rod-2.0 m Carbon Fiber Range Pole without Bipod

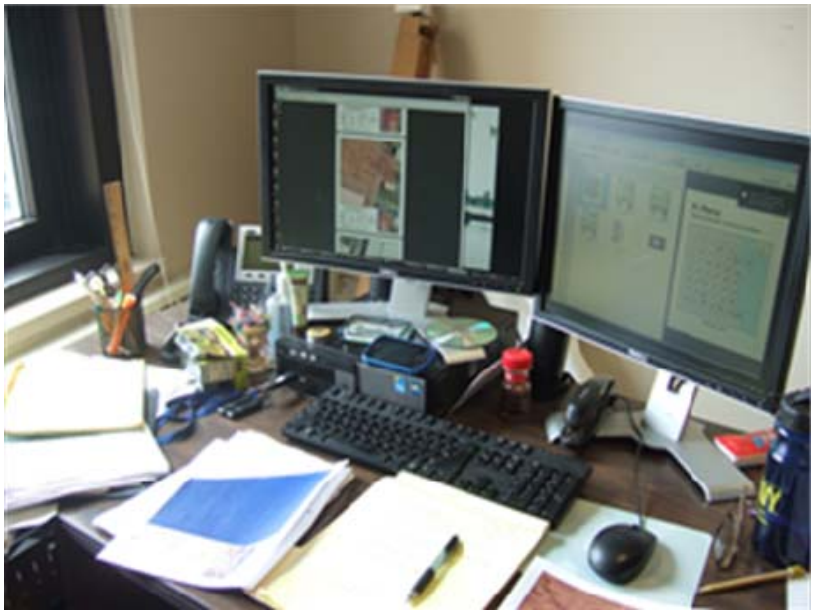
Part No. 43169-10 (Packing List)

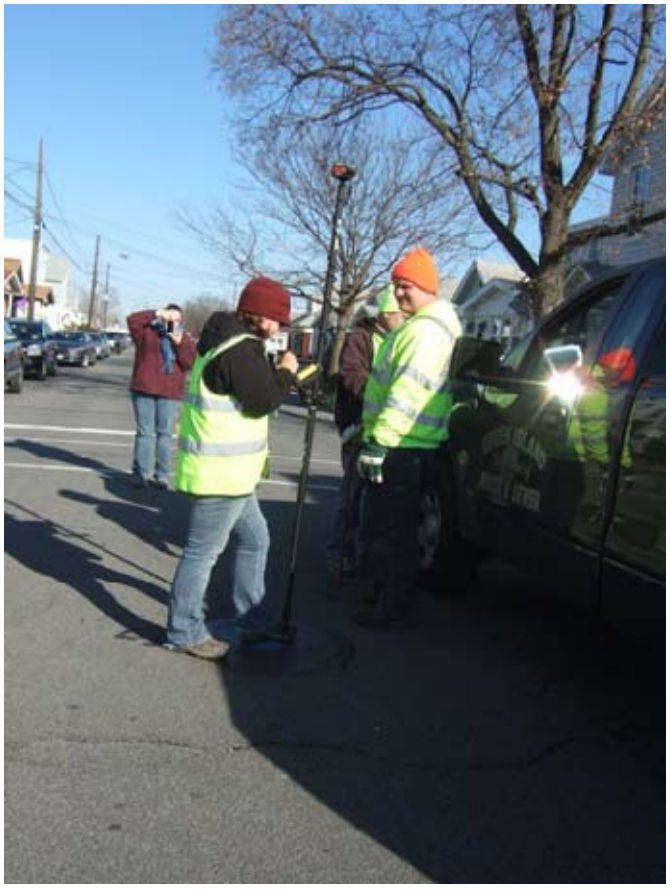
Yuma Pole Mount

Part No. 69572-00 (Packing List and Purchase Order)

Note: All GPS Equipment purchased under NYS Contract PT64163
Group 77201; Award 20191

Photos of Computer Work Station and GPS Unit



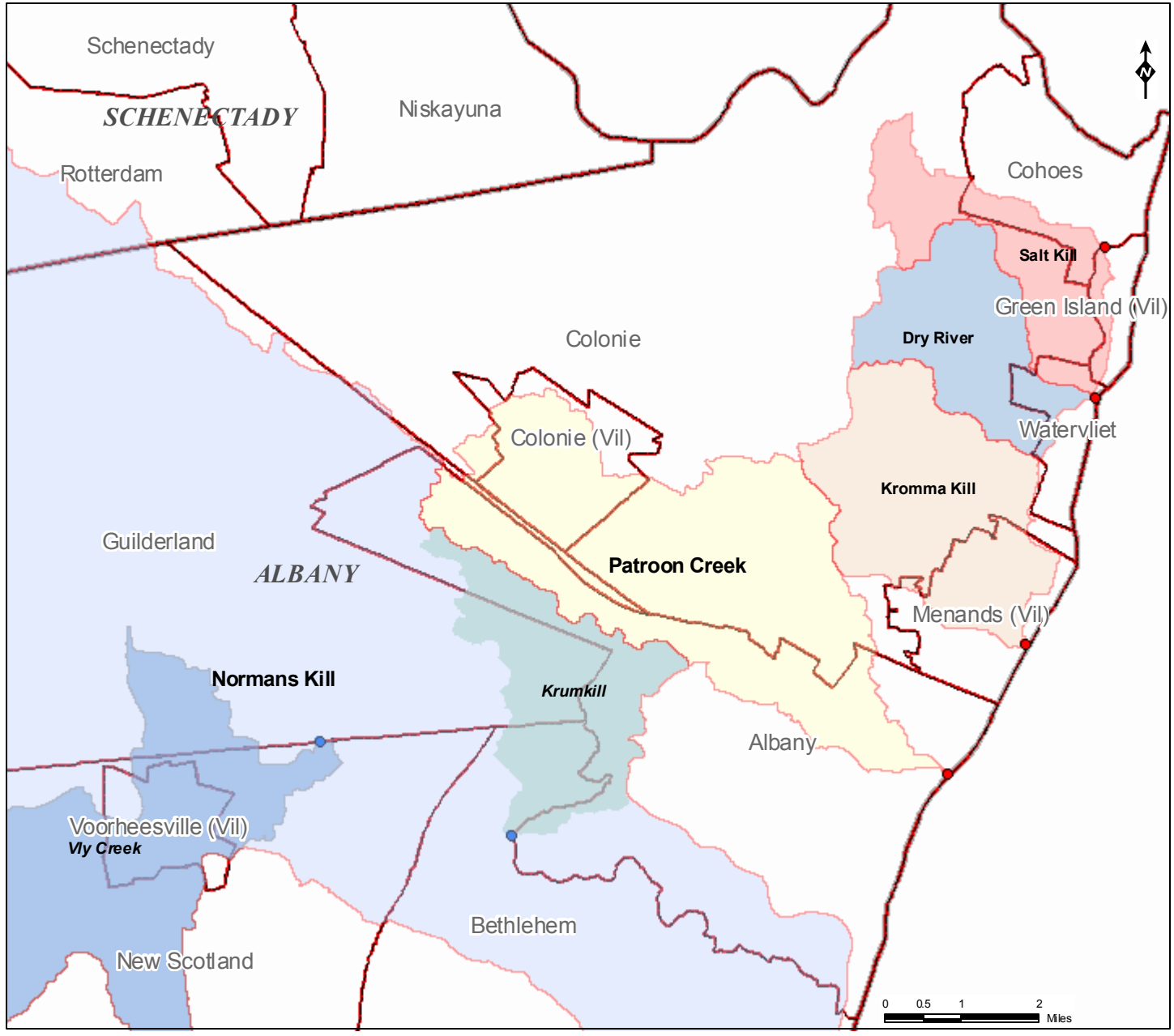


Appendix D

Maps of Priority Watersheds

Print Date: 6/26/2012

SSM_All Priority Watersheds



Legend

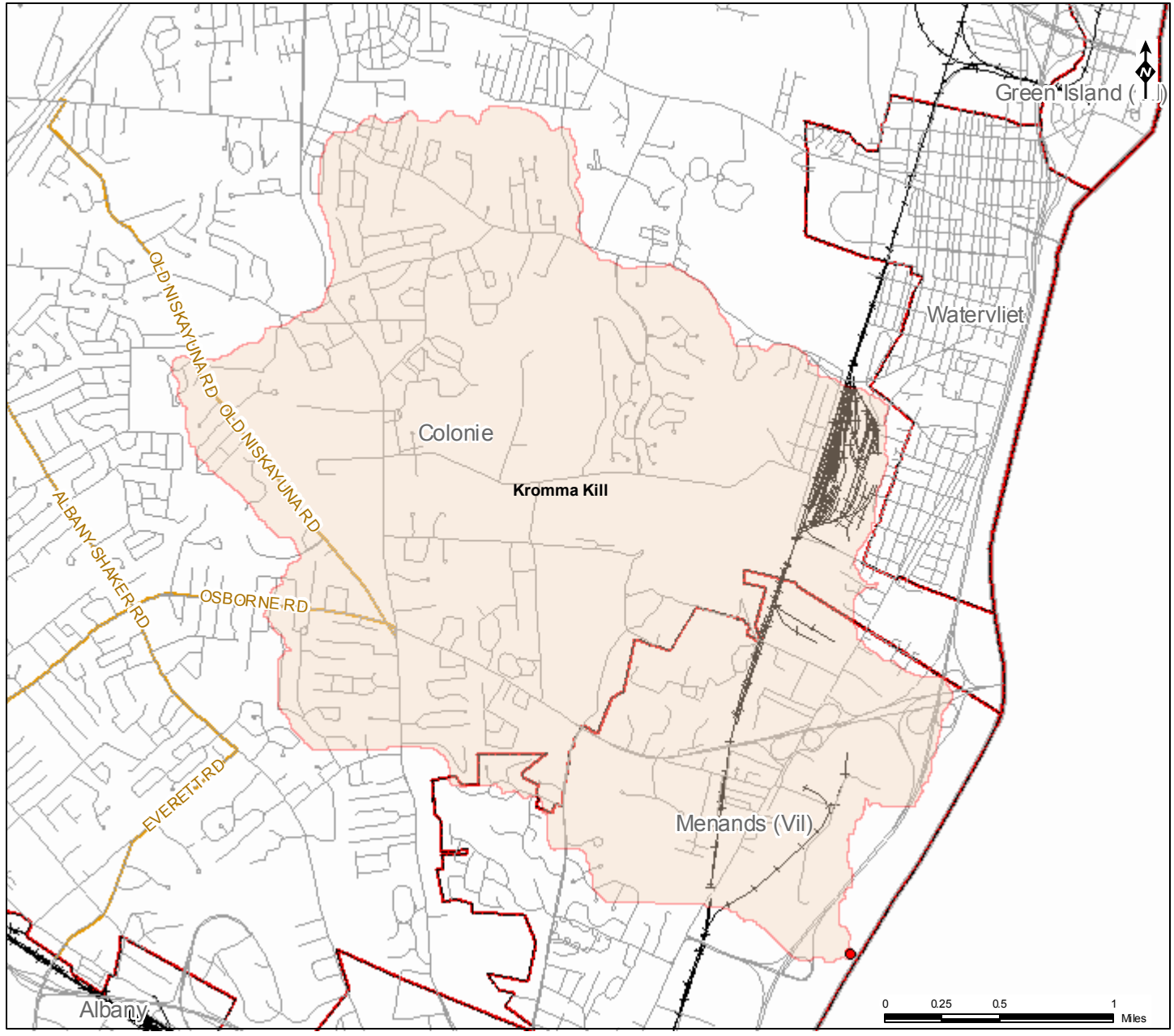
Municipal Boundaries

Counties

This internet mapper was developed with funding provided through the New York State Department of Environmental Conservation Environmental Protection Fund for Stormwater Permit Implementation Water Quality Management.

Print Date: 6/26/2012

SSM_Kromma Kill



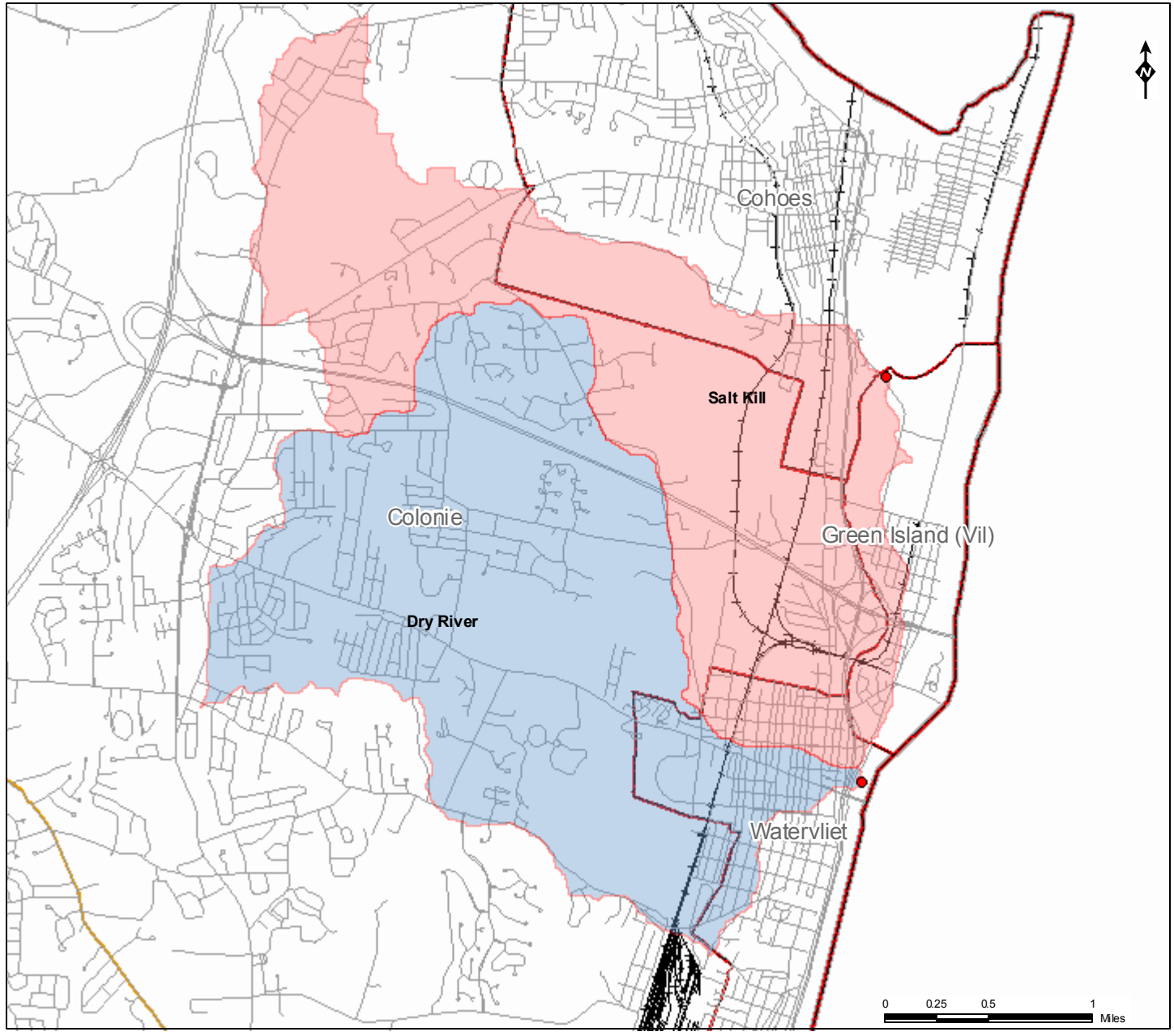
Legend

- Streets
- MS4 County Streets
- Rural County Streets
- Railroads
- Municipal Boundaries
- Counties

This internet mapper was developed with funding provided through the New York State Department of Environmental Conservation Environmental Protection Fund for Stormwater Permit Implementation Water Quality Management.

Print Date: 6/26/2012

SSM_Dry River and Salt Kill



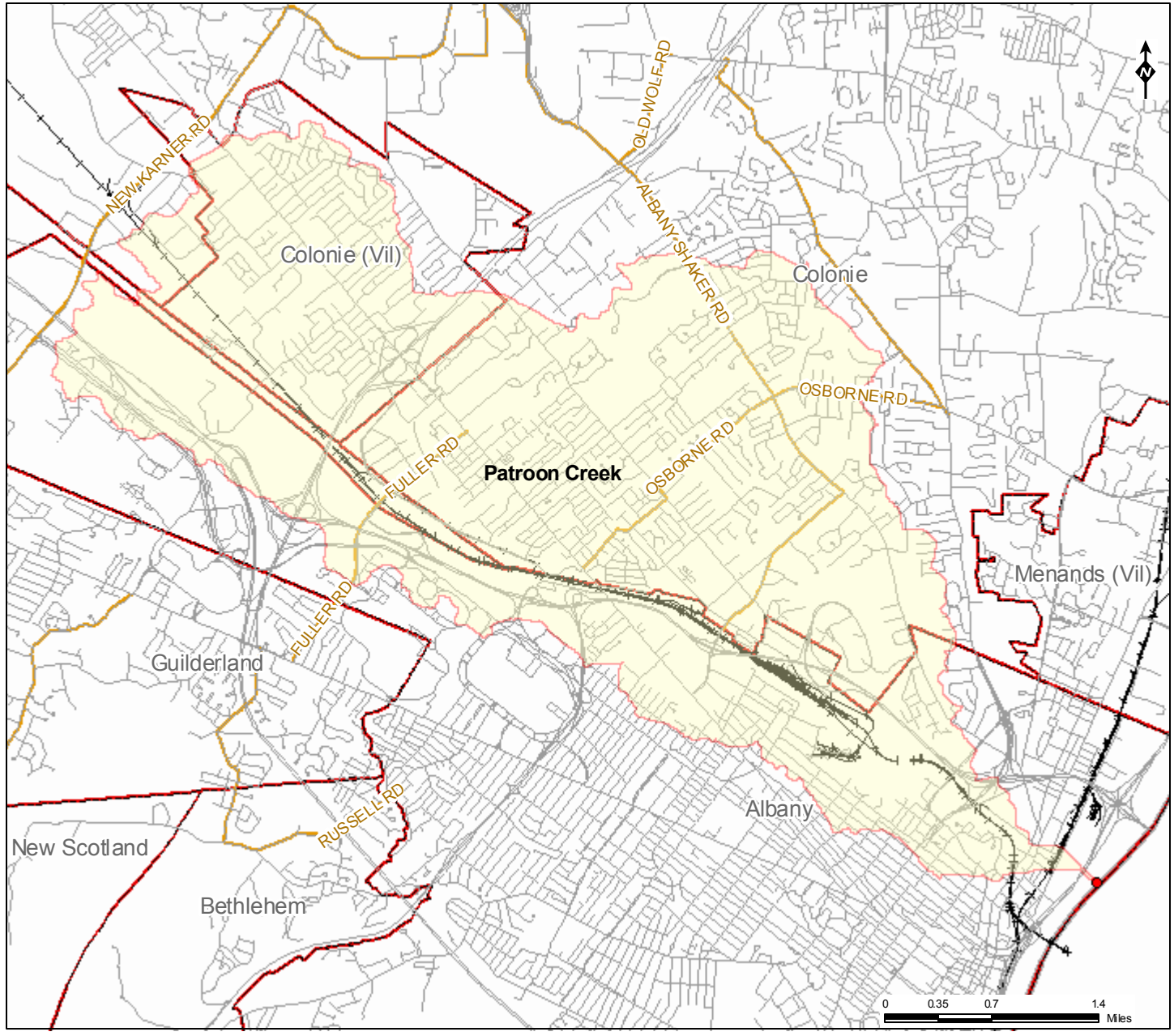
Legend

- Streets
- MS4 County Streets
- Rural County Streets
- Railroads
- Municipal Boundaries
- Counties

This internet mapper was developed with funding provided through the New York State Department of Environmental Conservation Environmental Protection Fund for Stormwater Permit Implementation Water Quality Management.

Print Date: 6/26/2012

SSM_Patroon Creek



Legend

- Streets
- MS4 County Streets
- Rural County Streets
- Railroads
- Municipal Boundaries
- Counties

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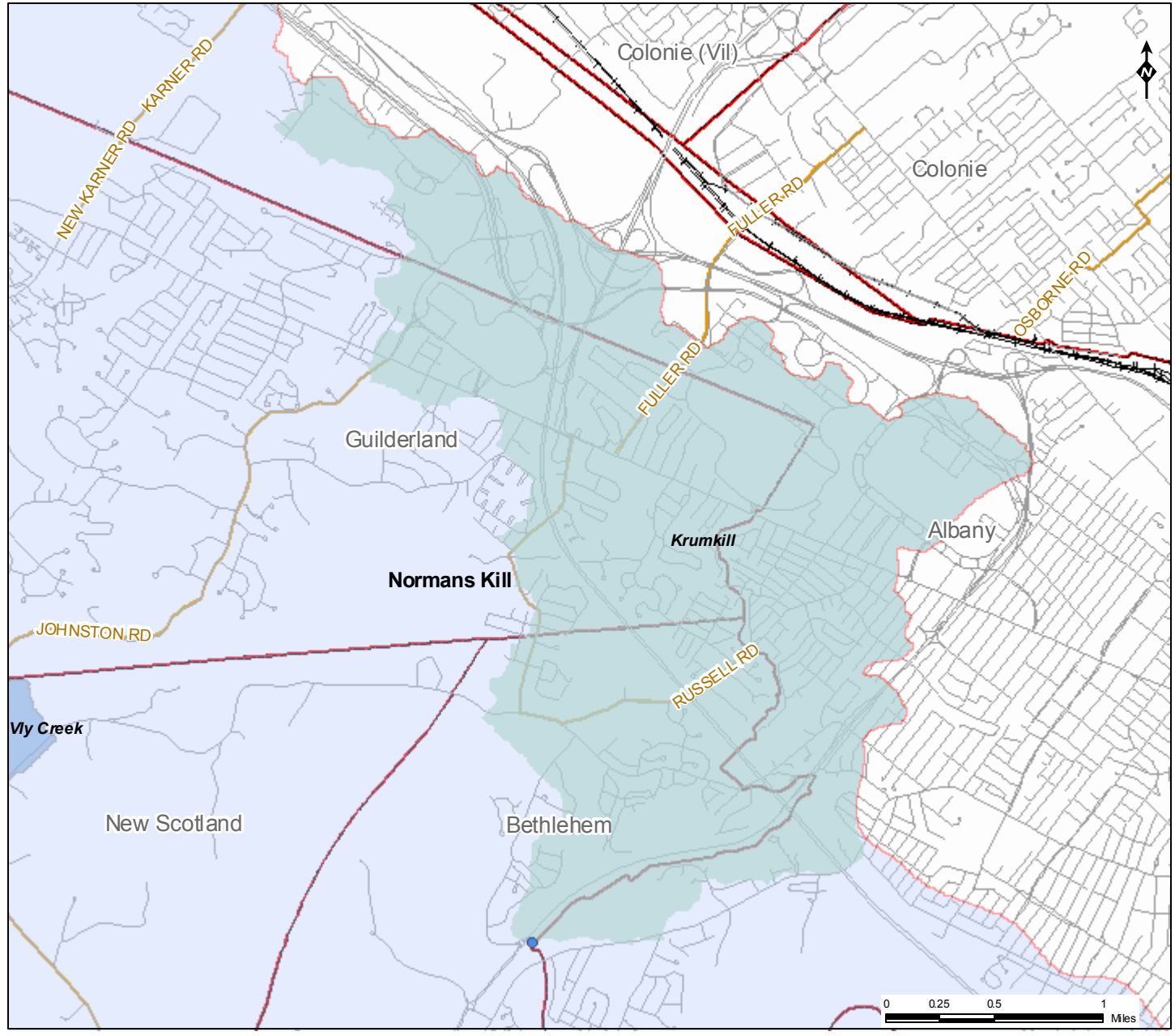
Print Date: 6/26/2012

SSM_Krumkill



Legend

- Streets
- MS4 County Streets
- Rural County Streets
- Railroads
- Municipal Boundaries
- Counties

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Print Date: 6/26/2012

SSM_SUNY Albany Roads-MS4 Area

Legend

- Streets
- MS4 County Streets
- Rural County Streets
- Railroads
- Municipal Boundaries
- Counties

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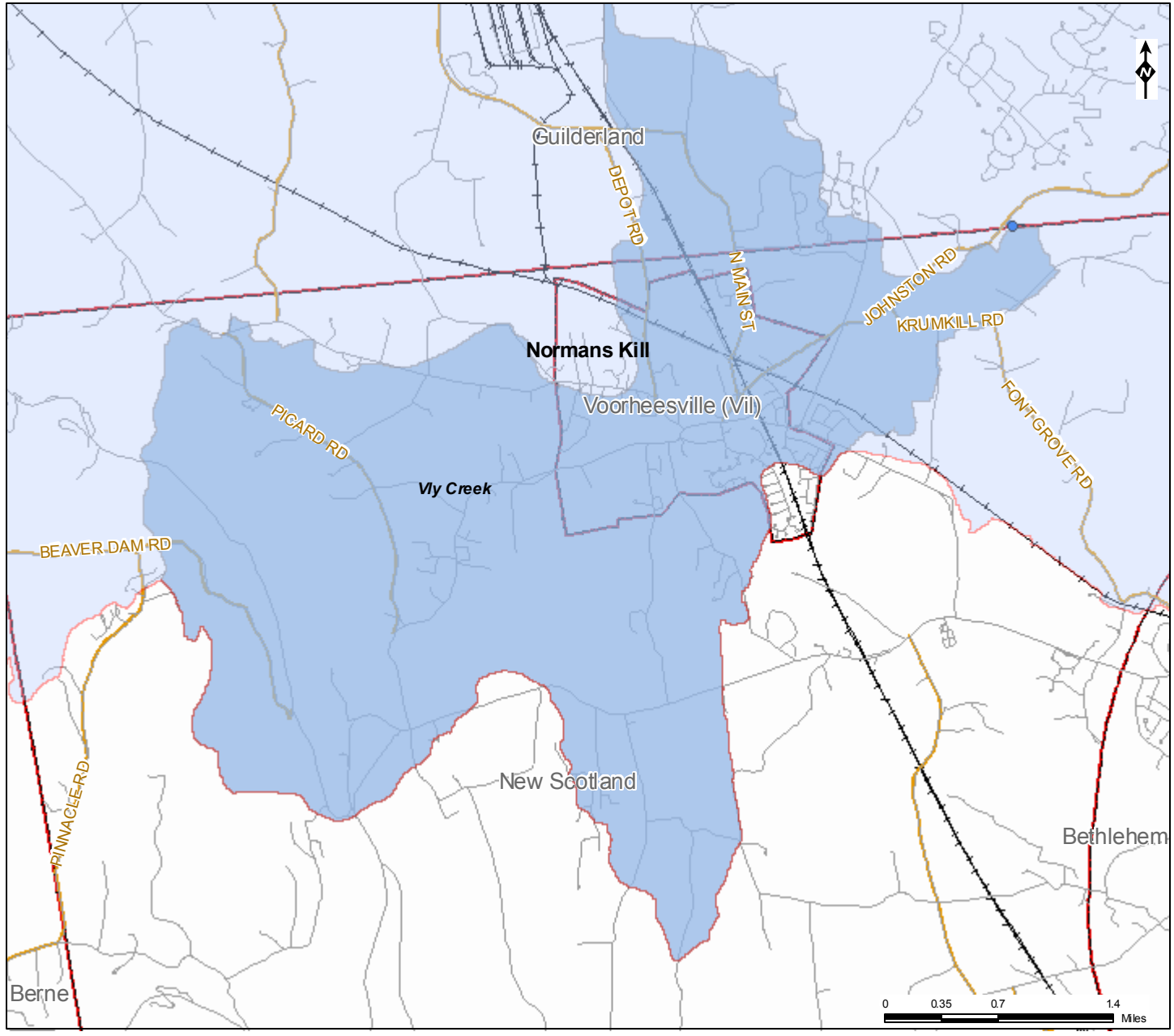
Print Date: 6/26/2012

SSM_Vly Creek



Legend

- Streets
- MS4 County Streets
- Rural County Streets
- Railroads
- Municipal Boundaries
- Counties

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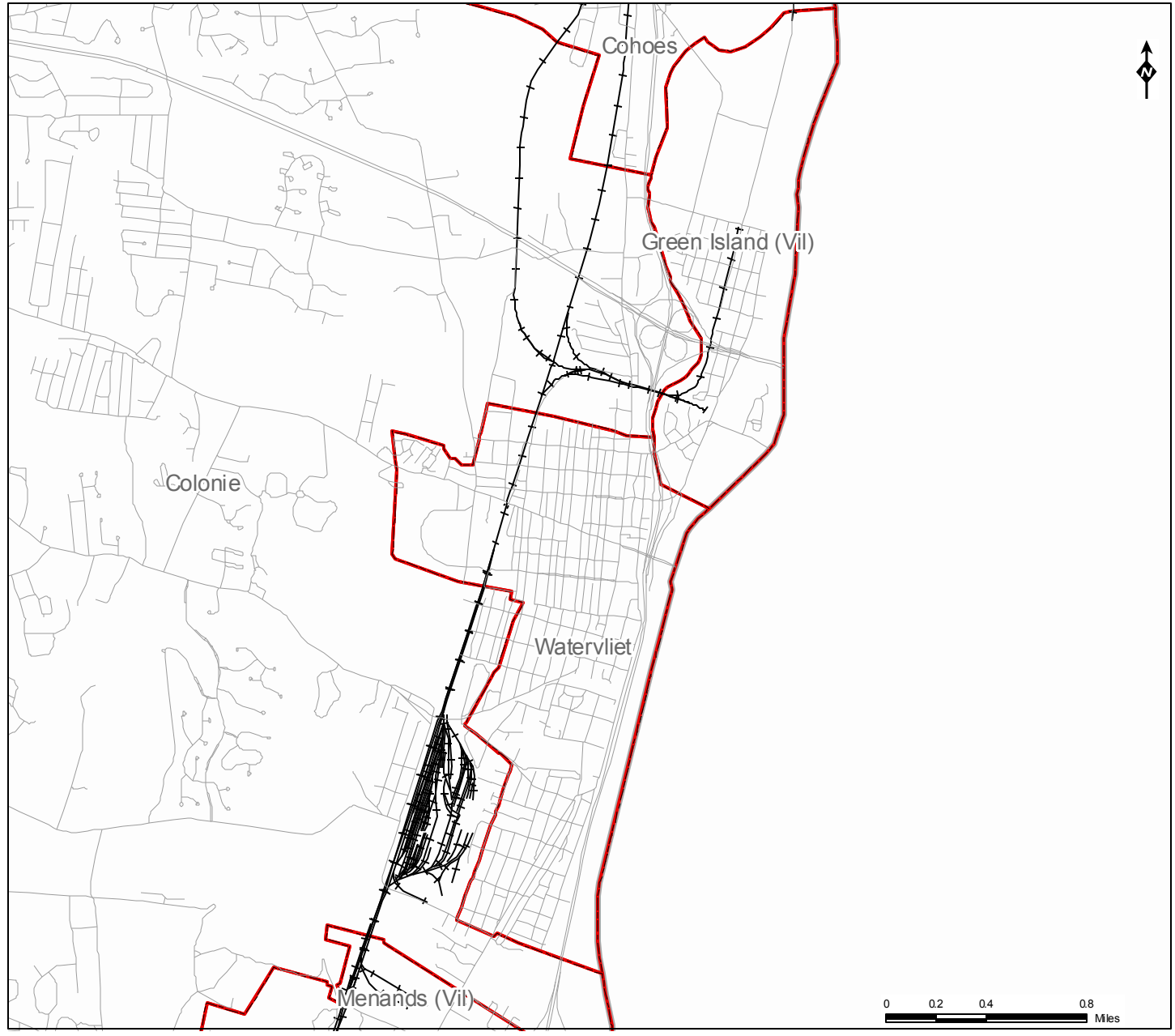
Print Date: 6/26/2012

SSM_CWatervliet-VGreenIsland



Legend

- Streets
- MS4 County Streets
- Rural County Streets
- Railroads
- Municipal Boundaries
- Counties

This internet mapper was developed with funding provided through the New York State Department of Environmental Conservation Environmental Protection Fund for Stormwater Permit Implementation Water Quality Management.

Appendix E

Inventory of Existing Storm System Maps

ID	MS4-Supporter	Do I have GIS Data?	Do I have a paper map?	Definitions, Descriptions of SW Structures?	GIS Contact	Layers Examined	Attributes Examined	Characteristics of Data	Connectivity of Information?	TO DO	Comments	ISSUE	Metadata
1	Albany_Cnty	Y	N	N	Laura DeGaetano; Margaret DellaRocco	Y	Y	Data is organized based on County route.	From, To	Rename the county routes from number to name (e.g. 154 is Albany Shaker Road)	Have not seen the paper maps yet, but have a sample hard-copy of the catch basin inventory; Need CAD/GIS files		N
2	Albany_City	Y; being updated frequently by JS	Y	Y	Justin Schievelbein	Y	Y	Storm and sanitary information are in the same layer.	Trib_To		Have a couple paper maps (not complete for the City).	Need to separate information based on sanitary or stormwater	N
3	Bethlehem_T	Y	N	N	Jason Baum (no longer works there)	Y	Y				Does not have as much data as anticipated; Is there an entire gdb somewhere?	There are a lot of attributes that do not have obvious definitions	N; but he has it…?
4	Cohoes_C	Y	N; but there are paper maps in the municipality	N		Y	Y			Try to project CSO points	Some catch basin mapping for CSO LTCP, useful?		N
5	Colonie_T	Y	N; but there are paper maps in the municipality	Y	Rob Mateja	Y	Y	There are different attributes for the different layers/structures rather than one complete attribute table that can be separated out based on structure type.			Most advanced storm structure GIS; template for mapping project; has domains and subtypes associated with various layers and attributes.	Many attributes are not used/are for sanitary systems.	N
6	Colonie_V	Y; converted from CAD	Y	N	LaBerge Group	Y	N				CAD files exist, from which paper map was created (has no legend); Scan of Paper Map	Random point from Point_1 layer in MD-Why?	N

ID	MS4-Supporter	Do I have GIS Data?	Do I have a paper map?	Definitions, Descriptions of SW Structures?	GIS Contact	Layers Examined	Attributes Examined	Characteristics of Data	Connectivity of Information?	TO DO	Comments	ISSUE	Metadata
7	Green Island_V	Y	N	N		Y	Y				Some info, catch basins and outfalls; There was data gathered from Green Island and there was also data for Green Island in the Albany County data.	Seems like some data is duplicated in the Albany County data layers.	N
8	Guilderland_T (No longer a member of the Coalition)	Y (EZ), more from TDEs?	N	N		Y (Guild Files); N (Misc. SW Files)	N			Go through the data in the Misc. SW Files-seems like all of the catch basins are merged.	Some storm system GIS data (EZ), perhaps more from consulting firms (?); It seems like all of the catch basins are separated out into different layers somehow; why are there so many layers? Also, some data from Anya-how is this different?		N
9	Menands_V	Y	Y	N		Y	Y				Received both paper map and GIS layers		N
10	New Scotland_T	N	N	N	Keith Menia (Stantec)	N	N						N
11	Voorheesville	N	N; exists; trying to locate	N	Will Smith	N	N				All in paper maps, need to look at them, study legend, possibility of scanning		N
12	Watervliet_C	Y	Y	N	Dave Dressel	Y	N				Interested in catch basin mapping for CSO LTCP; might need field work. Paul Murphy and Nick O. had GIS done in mid 1990s (painted sw structures and did a flyover).	Quality of data?	N

ID	MS4-Supporter	Do I have GIS Data?	Do I have a paper map?	Definitions, Descriptions of SW Structures?	GIS Contact	Layers Examined	Attributes Examined	Characteristics of Data	Connectivity of Information?	TO DO	Comments	ISSUE	Metadata
13	SUNY Albany	N	Y, as .pdf	N	Frank Fazio	N	N				Have .pdf's of SUNY maps of drainage structures, labeled and connected. No GIS files, but they exist	Waiting for GIS data	N
14	Herkimer-Oneida	Y	N	Y (HO Protocol)	Jessica Breiten (Programmatic Q's; Jeff Quackenbush (GIS Q's); Richard Reichert (GIS Q's)	Y	Y	All data is organized into 2 layers-outfalls and Non-outfalls. Attributes are created for all structures and some are not populated for some structures.	Connected structures manually				N
15	Monroe County	N	N	N	Andy Sansone (IDDE Track Down)		Y				Information regarding applicability od SSM efforts		

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	pump	4 attributes in this .shp	No	GIS	Point		Yes	Need definition
2	Sewer_Catch_Basin	9 attributes in this .shp	No	GIS	Point		Yes	Need definition
3	Sewer_Main_Line	10 attributes in this .shp	No	GIS	Line	Has an attribute called "Trib_To" which could indicate direction of flow/connectivity.	Yes	Need definition
4	Sewer_Main_PM	5 attributes in this .shp	No	GIS	Line		Yes	Need definition
5	Sewer_Manhole	6 attributes in this .shp	No	GIS	Point		Yes	Need definition
6	Sewer_Outfall	7 attributes in this .shp	No	GIS	Point		Yes	Need definition
7	Sewer_Pump_Station	4 attributes in this .shp	No	GIS	Point		Yes	Need definition
8	Sewer_Retention Basin	7 attributes in this .shp	No	GIS	Polygon		Yes	Need definition

ID	Notes	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active
1		outfalls_12-22-10	7 attributes in this .shp	No	GIS	Point		Yes
2	J. Baum has metadata but has not sent it yet.	Manholes	17 attributes in this .shp	No	GIS	Point		Yes
3	J. Baum has metadata but has not sent it yet.	Storm_Drains	17 attributes in this .shp	No	GIS	Point		Yes

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	Cohoes_CatchBasins	65 attributes in this .shp	No	GIS	Point		Yes	Need definition
2	Cohoes_Manholes	148 attributes in this .shp	No	GIS	Point		Yes	Need definition
3	Cohoes_Storm_Sewer	7 attributes in this .shp	No	GIS	Line		Yes	Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	dCatchBasin	43 attributes in this .shp	Yes	GIS	Point		Yes	Need definition
2	dChamber	47 attributes in this .shp	Yes	GIS	Point		Yes	Need definition
3	dControlValve	30 attributes in this .shp	Yes	GIS	N/A		No	Need definition; Possibly remove
4	dEndSection	32 attributes in this .shp	Yes	GIS	Point		Yes	Need definition
5	dFitting	29 attributes in this .shp	Yes	GIS	Point		Yes	Need definition
6	dGravityMain	39 attributes in this .shp	Yes	GIS	Line		Yes	Need definition
7	dLateralLine	27 attributes in this .shp	Yes	GIS	Line		Yes	Need definition
8	dLiftStation	43 attributes in this .shp	Yes	GIS	N/A		No	Need definition; Possibly remove
9	dManhole	47 attributes in this .shp	Yes	GIS	Point		Yes	Need definition
10	dPressMain	30 attributes in this .shp	Yes	GIS	N/A		No	Need definition; Possibly remove
11	dPump	43 attributes in this .shp	Yes	GIS	N/A		No	Need definition; Possibly remove
12	dStorageBasin	33 attributes in this .shp	Yes	GIS	N/A		No	Need definition; Possibly remove
13	dSystemValve	38 attributes in this .shp	Yes	GIS	N/A		No	Need definition; Possibly remove
14	dStormStructure	24 attributes in this .shp	Yes	GIS	Polygon		Yes	Need definition
15	dUndrgrndEncl	28 attributes in this .shp	Yes	GIS	N/A		No	Need definition; Possibly remove

ID	CAD	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1		Paper Map		No	Paper Map				Hard-copy of a map created by Laberge Group; No GIS Shapefiles; No Legend
2	VILLAGE_OUTFALL_MAP	Annotation	80 attributes in this .shp	No	CAD File to gdb				Came from CAD file; Need definition
3	VILLAGE_OUTFALL_MAP	Point	63 attributes in this .shp	No	CAD File to gdb	Point		Yes	Came from CAD file; Need definition
4	VILLAGE_OUTFALL_MAP	Polyline	34 attributes in this .shp	No	CAD File to gdb	Line		Yes	Came from CAD file; Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	CatchBas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
2	Junction	25 attributes in this .shp	No	GIS	Point		Yes	Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	guilder_sewershed_bound		No	GIS	Polygon		Yes	Need definition
2	Area_F39		No	GIS	N/A		No	Need definition
3	Area_F47		No	GIS	N/A		No	Need definition
4	Area_F48		No	GIS	N/A		No	Need definition
5	Area_F51		No	GIS	N/A		No	Need definition
6	Area_F54		No	GIS	N/A		No	Need definition
7	Area_Fe8		No	GIS	N/A		No	Need definition
8	Catch_10		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
9	Catch_11		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
10	Catch_12		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
11	Catch_13		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
12	Catch_14		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
13	Catch_15		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
14	Catch_16		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
15	Catch_17		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
16	Catch_18		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
17	Catch_19		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
18	Catch_20		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
19	Catch_21		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
20	Catch_22		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" and "GuildOutfall_OtherSWSystem_May2007" folders
21	Catch_23		No	GIS	Point		Yes	Need definition; Shapefile found in both "GuilderlandOutfalls_CB_Incomplete_ForAIMS_Proto" (does not open) and "GuildOutfall_OtherSWSystem_May2007" folders
22	Catch_24		No	GIS	Point		Yes	Need definition
23	Catch_25		No	GIS	Point		Yes	Need definition
24	Catch_26		No	GIS	Point		Yes	Need definition
25	Catch_27		No	GIS	Point		Yes	Need definition
26	Catch_28		No	GIS	Point		Yes	Need definition
27	Catch_29		No	GIS	Point		Yes	Need definition
28	Catch_30		No	GIS	Point		Yes	Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
29	Catch_31		No	GIS	Point		Yes	Need definition
30	Catch_32		No	GIS	Point		Yes	Need definition
31	Catch_33		No	GIS	Point		Yes	Need definition
32	Catch_34		No	GIS	Point		Yes	Need definition
33	Catch_35		No	GIS	Point		Yes	Need definition
34	Catch_36		No	GIS	Point		Yes	Need definition
35	Catch_B2		No	GIS	Point		Yes	Need definition
36	Catch_B3		No	GIS	Point		Yes	Need definition
37	Catch_B4		No	GIS	Point		Yes	Need definition
38	Catch_B5		No	GIS	Point		Yes	Need definition
39	Catch_B6		No	GIS	Point		Yes	Need definition
40	Catch_B7		No	GIS	Point		Yes	Need definition
41	Catch_B8		No	GIS	Point		Yes	Need definition
42	Catch_B9		No	GIS	Point		Yes	Need definition
43	Catch_Ba		No	GIS	Point		Yes	Need definition
44	Culver10		No	GIS	Point		Yes	Need definition
45	Culver11		No	GIS	Point		Yes	Need definition
46	Culver12		No	GIS	Point		Yes	Need definition
47	Culver13		No	GIS	Point		Yes	Need definition
48	Culver15		No	GIS	Point		Yes	Need definition
49	Culver16		No	GIS	Point		Yes	Need definition
50	Culver18		No	GIS	Point		Yes	Need definition
51	Culver19		No	GIS	Point		Yes	Need definition
52	Culver20		No	GIS	Point		Yes	Need definition
53	Culver21		No	GIS	Point		Yes	Need definition
54	Culver22		No	GIS	Point		Yes	Need definition
55	Culver23		No	GIS	Point		Yes	Need definition
56	Culver25		No	GIS	Point		Yes	Need definition
57	Culver26		No	GIS	Point		Yes	Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
58	Culver27		No	GIS	Point		Yes	Need definition
59	Culver28		No	GIS	Point		Yes	Need definition
60	Culver31		No	GIS	Point		Yes	Need definition
61	Culver32		No	GIS	Point		Yes	Need definition
62	Culver33		No	GIS	Point		Yes	Need definition
63	Culver34		No	GIS	Point		Yes	Need definition
64	Culver35		No	GIS	Point		Yes	Need definition
65	Culvert		No	GIS	Point		Yes	Need definition
66	Culvert2		No	GIS	Point		Yes	Need definition
67	Culvert3		No	GIS	Point		Yes	Need definition
68	Culvert4		No	GIS	Point		Yes	Need definition
69	Culvert5		No	GIS	Point		Yes	Need definition
70	Culvert7		No	GIS	Point		Yes	Need definition
71	Culvert8		No	GIS	Point		Yes	Need definition
72	Culvert9		No	GIS	Point		Yes	Need definition
73	Outfal10		No	GIS	Point		Yes	Need definition
74	Outfal11		No	GIS	Point		Yes	Need definition
75	Outfal12		No	GIS	Point		Yes	Need definition
76	Outfal13		No	GIS	Point		Yes	Need definition
77	Outfal17		No	GIS	Point		Yes	Need definition
78	Outfal18		No	GIS	Point		Yes	Need definition
79	Outfal19		No	GIS	Point		Yes	Need definition
80	Outfal23		No	GIS	Point		Yes	Need definition
81	Outfal24		No	GIS	Point		Yes	Need definition
82	Outfal25		No	GIS	Point		Yes	Need definition
83	Outfal28		No	GIS	Point		Yes	Need definition
84	Outfal29		No	GIS	Point		Yes	Need definition
85	Outfal30		No	GIS	Point		Yes	Need definition
86	Outfal31		No	GIS	Point		Yes	Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
87	Outfal32		No	GIS	Point		Yes	Need definition
88	Outfal33		No	GIS	Point		Yes	Need definition
89	Outfal35		No	GIS	Point		Yes	Need definition
90	Outfal36		No	GIS	Point		Yes	Need definition
91	Outfal37		No	GIS	Point		Yes	Need definition
92	Outfall2		No	GIS	Point		Yes	Need definition
93	Outfall3		No	GIS	Point		Yes	Need definition
94	Outfall4		No	GIS	Point		Yes	Need definition
95	Guild_Catch		No	GIS	Point		Yes	Need definition
96	Guild_Culverts		No	GIS	Point		Yes	Need definition
97	Guild_Outfalls		No	GIS	Polygon		Yes	Need definition
98	Guilderland_Zoning		No	GIS	Polygon		Yes	Need definition
99								

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	StormFeatures	11 attributes in this .shp	No	GIS	Point		Yes	Need definition
2	StormLines	12 attributes in this .shp	No	GIS	Line		Yes	Need definition
3	Catch Basin		No	Paper Map Legend	Point		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
4	Catch Basin (Curb Inlet)		No	Paper Map Legend	Point		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
5	Catch Basin (Round)		No	Paper Map Legend	Point		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
6	Drainage Manhole		No	Paper Map Legend	Point		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
7	End Section		No	Paper Map Legend	Point		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
8	Sluice		No	Paper Map Legend	N/A		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
9	???		No	Paper Map Legend	N/A		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
10	Village Boundary		No	Paper Map Legend	Line		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
11	Storm Sewer		No	Paper Map Legend	Line		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes
12	Tax Parcels		No	Paper Map Legend	Polygon		Yes	Need definition; Need to find out which shapefile this is in; Look at attributes

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	Combined or Sanitary Sewer		No	Paper Map Legend	Line			Need definition; Need to find out which shapefile this is in; Look at attributes
2	Storm Sewer		No	Paper Map Legend	Line			Need definition; Need to find out which shapefile this is in; Look at attributes
3	Sewage Regulator Overflow		No	Paper Map Legend	Line			Need definition; Need to find out which shapefile this is in; Look at attributes
4	Catch Basin into Combined Sewer		No	Paper Map Legend	Point/Line			Need definition; Need to find out which shapefile this is in; Look at attributes
5	Manhole		No	Paper Map Legend	Point/Line			Need definition; Need to find out which shapefile this is in; Look at attributes
6	Sewage Regulator		No	Paper Map Legend	Point/Line			Need definition; Need to find out which shapefile this is in; Look at attributes
7	Albany County Sewer District Trunk Sewer		No	Paper Map Legend	Line			Need definition; Need to find out which shapefile this is in; Look at attributes
8	Albany County Sewer District Meter Chamber		No	Paper Map Legend	Point/Line			Need definition; Need to find out which shapefile this is in; Look at attributes
9	Subsystem Metering Point		No	Paper Map Legend	Point (?)			Need definition; Need to find out which shapefile this is in; Look at attributes
10	Catch Basin into Storm Sewer		No	Paper Map Legend	Point/Line			Need definition; Need to find out which shapefile this is in; Look at attributes
11	Lamphole		No	Paper Map Legend	Point			Need definition; Need to find out which shapefile this is in; Look at attributes
12	Watervliet_CatchBasins	7 attributes in this .shp	No	GIS	Point			Need definition
13	Watervilet_Manholes	8 attributes in this .shp	No	GIS	Point			Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
14	Watervliet_StormPipes	8 attributes in this .shp	No	GIS	Line			Need definition

ID	County Route (Numeric)	Location (Text)	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
1	153		Catchba2	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
2	153		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
3	153		Junction	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
4	153		Point_ge	3 attributes in this .shp	No	GIS	Point		Yes	Need definition
5	155		Catchba2	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
6	155		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
7	201		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
8	201		Cross_Cu	19 attributes in this .shp	No	GIS	Line		Yes	Need definition

ID	County Route (Numeric)	Location (Text)	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
9	201		Junction	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
10	202		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
11	202		Junction	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
12	203		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
13	203		Cross_Cu	19 attributes in this .shp	No	GIS	Line		Yes	Need definition
14	203		Junction	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
15	203		Point_ge	3 attributes in this .shp	No	GIS	Point		Yes	Need definition
16	204		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition

ID	County Route (Numeric)	Location (Text)	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
17	204		CDS_Unit	23 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
18	204		Infiltra	20 attributes in this .shp	No	GIS	Line	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
19	204		Pond	22 attributes in this .shp	No	GIS	Polygon	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
20	208		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
21	306		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
22	306		Cross_Cu	19 attributes in this .shp	No	GIS	Line		Yes	Need definition
23	306		Junction	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition

ID	County Route (Numeric)	Location (Text)	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
24	53		Catchbas	25 attributes in this .shp	No	GIS	Point	Has "From" and "To" attributes which could be used for connectivity.	Yes	Need definition
25		Green Island	Catchbas	25 attributes in this .shp	No	GIS	Point		Yes	Need definition; Need to determine if this is the same shapefile as the one only under Green Island.
26		Green Island	Junction	25 attributes in this .shp	No	GIS	Point		Yes	Need definition; Need to determine if this is the same shapefile as the one only under Green Island.
27		Green Island	Outfall	96 attributes in this .shp	No	GIS	Point		Yes	Need definition; Need to determine if this is the same shapefile as the one only under Green Island.
28		Outfalls	Outfall	62 attributes in this .shp	No	GIS	Point		Yes	Need definition
29			Catchbas	25 attributes in this .shp	No	GIS	Point		Yes	Need definition
30			CDS_Unit	23 attributes in this .shp	No	GIS	Point		Yes	Need definition

ID	County Route (Numeric)	Location (Text)	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes
31			Cross_Cu	19 attributes in this .shp	No	GIS	Line		Yes	Need definition
32			Infiltra	20 attributes in this .shp	No	GIS	Line		Yes	Need definition
33			Junction	25 attributes in this .shp	No	GIS	Point		Yes	Need definition
34			Outfall	96 attributes in this .shp	No	GIS	Point		Yes	Need definition
35			Point_ge	3 attributes in this .shp	No	GIS	Point		Yes	Need definition
36			Pond	22 attributes in this .shp	No	GIS	Polygon		Yes	Need definition

ID	Reference Name for Layer	Description	In T/Col Model?	Format	Feature Type	Connectivity	Active	Notes

Appendix F

Storm System Data Model

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
SSM Grant	Priority_Watershed	Priority_Watershed; the priority watershed in which the structure can be found.	N/A	DomainPriorityWatershed	Kromma Kill, Dry River, Patroon Creek, Krumkill, Vly Creek, Salt Kill, Hudson River, Mohawk River, Shaker Creek, Black Creek, Blaines Bay, Bozen Kill, Cherry Creek, Clipp Road, Cohoes Cres-Bush Kill, Delmar, Delphus Kill, Dowers Kill, Farm Brook, Feuri Spruyt, Glenmont, Hackett, Hannacrois Creek, Hunger Kill, Lisha Kill, Macaffer, Normans Kill, Onesquethaw-Coeymans, Phillipin Kill, Red Creek, Sand Creek, Slingerlands, Upper Coeymans, Vloman Kill, Vly Road, Western Ave Cohoes. Other, Unknown	String	30	Yes
CWA Regulations	Outfall_Type	Outfall_Type; description of the outfall.	N/A	DomainOutfallType	Intermunicipal Connection, End Section, Not Applicable, Unknown	String	30	Yes
	Outfall_ID	Outfall_ID; identification used on AIMS.	N/A		Unknown	String	20	Yes
Ownership/Management	Owner	Owner; who owns the structure.	N/A	DomainOwner	Albany County, City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Village of Colonie, Town/Village of Green Island, Town of Guilderland, Village of Menands, Town of New Scotland, Village of Voorheesville, City of Watervliet, SUNY Albany Private, Intermunicipal Line, New York State Department of Transportation, Other, Unknown	String	60	Yes
	Structure_ID	Structure_ID; ID number given to the structure as a unique identifier.	N/A		Unknown	String	20	Yes
	Location	Location; the street or address that the structure is located on.	N/A		Unknown	String	100	Yes
	GPS_Verified	GPS_Verified; structure has been GPSed.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	GPS_Date	GPS_Date; the date the structure was GPSed	N/A			Date	N/A	Yes
	System_Type	System_Type; type of system this structure is a part of.	N/A	DomainSystemType	Storm, Combined, Sanitary, Unknown	String	10	Yes
	Sub_Type	Sub_Type; different variations on the standard catch basin.	N/A	DomainCBSubType	Standard, Junction Box, Monitoring Well, Yard Basin, Settling Chamber, Pipe Basin, Other, Unknown	String	20	Yes
	Tributary_To	Tributary_To; destination of the flow.	N/A		Name of Waterbody/MS4, Name of Sewer Regulator/Meter Pit/Pump Station, Unknown	String	60	Yes
	Notes	Notes; additional information about the structure.	N/A		Active/Inactive	String	230	Yes

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
Maintenance/Physical Characteristics	Install_ Date	Install_Date; the date the structure was installed and/or replaced.	N/A		Unknown	Date	N/A	Yes
	Last_Cleaned	Last_Cleaned; the date for the last time the structure was cleaned.	N/A		Unknown	Date	N/A	Yes
	Last_Repaired	Last Repaired; the date for the last time the structure was repaired.	N/A		Unknown	Date	N/A	Yes
	Debris_Type	Debris_Type; the type of debris found in the structure.	N/A	DomainDebrisType	Dirt, Leaves, Garbage, Clean, Other, Unknown	String	20	Yes
	Material	Material; construction material for the structure.	N/A	DomainCBMaterial	Red Brick, Concrete Block, Concrete Precast, Fiberglass, Other, Unknown	String	20	Yes
	Grate_Shape	Grate_Shape; the shape of the grate.	N/A	DomainGrateCoverShape	Square, Rectangular, Circular, Unknown	String	20	Yes
	Grate_Dimensions_Inches	Grate_Dimensions_Inches; dimensions of the grate.	Inches			String	50	Yes
	Floatable_Control	Floatable Control; type of floatable control present in the structure.	N/A	DomainFloatableControl	None, Hood, Grate, PVC Elbow, Vent, Unknown	String	20	Yes
	Input_Number	Input_Number; the number of pipes or channels flowing in to a structure.	N/A			Short	N/A	Yes
	Elevation_Datum	Elevation_Datum; the vertical datum used to measure the elevation.	N/A	DomainElevationDatum	NAVD 88, NGVD 29, Unknown	String	20	Yes
	Elevation_Bottom_Feet	Elevation_Bottom_Feet; the elevation above sea level of the bottom of the structure.	Feet			Double	N/A	Yes
	Elevation_Rim_Feet	Elevation_Rim_Feet; the elevation above sea level of the top of the frame.	Feet			Double	N/A	Yes
	Depth_Feet	Depth_Feet; the measurement from the top of the frame to the bottom of the structure.	Feet			Double	N/A	Yes
	Sump_Depth_Feet	Sump_Depth_Feet; the depth from the invert out to the bottom of the structure.	Feet			Double	N/A	Yes

Priamry Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
SSM Grant	Priority_Watershed	Priority_Watershed; the priority watershed in which the structure can be found.	N/A	DomainPriorityWatershed	Kromma Kill, Dry River, Patroon Creek, Krumkill, Vly Creek, Salt Kill, Hudson River, Mohawk River, Shaker Creek, Black Creek, Blaines Bay, Bozen Kill, Cherry Creek, Clipp Road, Cohoes Cres-Bush Kill, Delmar, Delphus Kill, Dowers Kill, Farm Brook, Feuri Spruyt, Glenmont, Hackett, Hannacrois Creek, Hunger Kill, Lisha Kill, Macaffer, Normans Kill, Onesquethaw-Coeymans, Phillipin Kill, Red Creek, Sand Creek, Slingerlands, Upper Coeymans, Vloman Kill, Vly Road, Western Ave Cohoes. Other, Unknown	String	30	Yes
CWA Regulations	Outfall_Type	Outfall_Type; description of the outfall.	N/A	DomainOutfallType	Intermunicipal Connection, End Section, Not Applicable, Unknown	String	30	Yes
	Outfall_ID	Outfall_ID; identification used on AIMS.	N/A		Unknown	String	20	Yes
Ownership/Management	Owner	Owner; who owns the structure.	N/A	DomainOwner	Albany County, City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Village of Colonie, Town/Village of Green Island, Town of Guilderland, Village of Menands, Town of New Scotland, Village of Voorheesville, City of Watervliet, SUNY Albany Private, Intermunicipal Line, New York State Department of Transportation, Other, Unknown	String	60	Yes
	Structure_ID	Structure_ID; ID number given to the structure as a unique identifier.	N/A		Unknown	String	20	Yes
	Location	Location; the street or address that the structure is located on.	N/A		Unknown	String	100	Yes
	GPS_Verified	GPS_Verified; structure has been GPSed.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	GPS_Date	GPS_Date; the date the structure was GPSed	N/A			Date	N/A	Yes
	System_Type	System_Type; type of system this structure is a part of.	N/A	DomainSystemType	Storm, Combined, Sanitary, Unknown	String	10	Yes
	Sub_Type	Sub_Type; different variations on the standard manhole.	N/A	DomainManholeSubType	Standard, Outlet Control Structure, Diversion Structure, Hydrodynamatic Separator, Other, Unknown	String	50	Yes
	Tributary_To	Tributary_To; destination of the flow.	N/A		Name of Waterbody/MS4, Name of Sewer Regulator/Meter Pit/Pump Station, Unknown	String	60	Yes
	Notes	Notes; additional information about the structure.	N/A		Relined, Buried, Active/Inactive	String	230	Yes

Priamry Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
Maintenance/Physical Characteristics	Install_Date	Install_Date; the date the structure was installed and/or replaced.	N/A		Unknown	Date	N/A	Yes
	Last_Cleaned	Last_Cleaned; the date for the last time the structure was cleaned.	N/A		Unknown	Date	N/A	Yes
	Last_Repaired	Last Repaired; the date for the last time the structure was repaired.	N/A		Unknown	Date	N/A	Yes
	Condition	Condition; physical condition of the structure overall.	N/A	DomainCondition	Good, Fair, Poor, Desperate, Failed, Unknown	String	10	Yes
	Material	Material; construction material used for interior of structure.	N/A	DomainManholeMaterial	Brick, Concrete, Red Brick, Concrete Block, Concrete Precast, Fiberglass, Other, Unknown	String	20	Yes
	Cover_Shape	Cover_Shape; the shape of the cover.	N/A	DomainGrateCoverShape	Square, Rectangular, Circular, Unknown	String	20	Yes
	Cover_Dimensions_Inches	Cover_Dimensions_Inches; dimensions of the cover.	Inches			String	50	Yes
	Input_Number	Input_Number; the number of pipes or channels flowing in to a structure.	N/A			Short	N/A	Yes
	Elevation_Datum	Elevation_Datum; the vertical datum used to measure the elevation.	N/A	DomainElevationDatum	NAVD 88, NGVD 29, Unknown	String	20	Yes
	Elevation_Bottom_Feet	Elevation_Bottom_Feet; the elevation above sea level of the bottom of the structure.	Feet			Double	N/A	Yes
	Elevation_Rim_Feet	Elevation_Rim_Feet; the elevation above sea level of the top of the frame.	Feet			Double	N/A	Yes
	Depth_Feet	Depth_Feet; the measurement from the top of the frame to the bottom of the structure.	Feet			Double	N/A	Yes
	Sump_Depth_Feet	Sump_Depth_Feet; the depth from the invert out to the bottom of the structure.	Feet			Double	N/A	Yes

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
SSM Grant	Priority_Watershed	Priority_Watershed; the priority watershed in which the structure can be found.	N/A	DomainPriorityWatershed	Kromma Kill, Dry River, Patroon Creek, Krumkill, Vly Creek, Salt Kill, Hudson River, Mohawk River, Shaker Creek, Black Creek, Blaines Bay, Bozen Kill, Cherry Creek, Clipp Road, Cohoes Cres-Bush Kill, Delmar, Delphus Kill, Dowers Kill, Farm Brook, Feuri Spruyt, Glenmont, Hackett, Hannacrois Creek, Hunger Kill, Lisha Kill, Macaffer, Normans Kill, Onesquethaw-Coeymans, Phillipin Kill, Red Creek, Sand Creek, Slingerlands, Upper Coeymans, Vloman Kill, Vly Road, Western Ave Cohoes. Other, Unknown	String	30	Yes
CWA Regulations	Outfall_Type	Outfall_Type; description of the outfall.	N/A	DomainOutfallType	Intermunicipal Connection, End Section, Not Applicable, Unknown	String	30	Yes
	Outfall_ID	Outfall_ID; identification used on AIMS.	N/A		Unknown	String	20	Yes
Ownership/Management	Owner	Owner; who owns the structure.	N/A	DomainOwner	Albany County, City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Village of Colonie, Town/Village of Green Island, Town of Guilderland, Village of Menands, Town of New Scotland, Village of Voorheesville, City of Watervliet, SUNY Albany Private, Intermunicipal Line, New York State Department of Transportation, Other, Unknown	String	60	Yes
	Structure_ID	Structure_ID; ID number given to the structure as a unique identifier.	N/A		Unknown	String	20	Yes
	Location	Location; the street or address that the structure is located on.	N/A		Unknown	String	100	Yes
	GPS_Verified	GPS_Verified; structure has been GPSed.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	GPS_Date	GPS_Date; the date the structure was GPSed	N/A			Date	N/A	Yes
	System_Type	System_Type; type of system this structure is a part of.	N/A	DomainSystemType	Storm, Combined, Sanitary, Unknown	String	10	Yes
	Flow_Type	Flow_Type; type of storm line.	N/A	DomainFlowType	Gravity, Pressure, Unknown	String	10	Yes
	Sub_Type	Sub_Type; different variations on the standard main line.	N/A	DomainMLSubType	Closed Pipe, Open Channel, Swale, Ditch, Natural Drainage/Channels, Underdrain, Collector, Unknown	String	60	Yes
	Lateral	Lateral; identifies if the structure is a lateral line.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	Tributary_To	Tributary_To; destination of the flow.	N/A		Name of Waterbody/MS4, Name of Sewer Regulator/Meter Pit/Pump Station	String	60	Yes
	Notes	Notes; additional information about the structure.	N/A		Paved Invert, Exterior Coating, Interior Coating, Active/Inactive	String	230	Yes

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
Maintenance/Physical Characteristics	Install_ Date	Install_Date; the date the structure was installed and/or replaced.	N/A		Unknown	Date	N/A	Yes
	Material	Material; construction material for the structure.	N/A	DomainMLMaterial	Acrylonitrile Butadiene Styrene (ABS), ADS, Aluminum, CAP, Cast Iron, CMP, Concrete, Ductile Iron, Galvanized Iron, HCAP, HDPE, HCMP, HCP, OGBG, Perfads, PLST, PVC, RCP, TRNST, VCP (clay), SICPP, Brick and Slate, Circular Brick, Elliptical Brick, Truss, Steel, Asphalt, Rip Rap, Vegetated, Earthen, Other, Unknown	String	50	Yes
	Cross_Section_Shape	Cross_Section_Shape; the shape of the pipe.	N/A	DomainMLShape	Circular, Elliptical, Box, Helical, Other, Unknown	String	20	Yes
	Dimensions_Inches	Dimensions_Inches; the dimensions of the structure.	Inches			String	50	Yes
	Length_Feet	Length_Feet; the length of the structure (as build).	Feet			String	50	Yes
	Elevation_Datum	Elevation_Datum; the vertical datum used to measure the elevation.	N/A	DomainElevationDatum	NAVD 88, NGVD 29, Unknown	String	20	Yes
	Inlet_Invert_Feet	Inlet_Invert_Feet; Invert upstream.	Feet			Double	N/A	Yes
	Outlet_Invert_Feet	Outlet_Invert_Feet; Invert downstream.	Feet			Double	N/A	Yes

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
SSM Grant	Priority_Watershed	Priority_Watershed; the priority watershed in which the structure can be found.	N/A	DomainPriorityWatershed	Kromma Kill, Dry River, Patroon Creek, Krumkill, Vly Creek, Salt Kill, Hudson River, Mohawk River, Shaker Creek, Black Creek, Blaines Bay, Bozen Kill, Cherry Creek, Clipp Road, Cohoes Cres-Bush Kill, Delmar, Delphus Kill, Dowers Kill, Farm Brook, Feuri Spruyt, Glenmont, Hackett, Hannacrois Creek, Hunger Kill, Lisha Kill, Macaffer, Normans Kill, Onesquethaw-Coeymans, Phillipin Kill, Red Creek, Sand Creek, Slingerlands, Upper Coeymans, Vloman Kill, Vly Road, Western Ave Cohoes. Other, Unknown	String	30	Yes
CWA Regulations	Outfall_Type	Outfall_Type; description of the outfall.	N/A	DomainOutfallType	Intermunicipal Connection, End Section, Not Applicable, Unknown	String	30	Yes
	Outfall_ID	Outfall_ID; identification used on AIMS.	N/A		Unknown	String	20	Yes
Ownership/Management	Owner	Owner; who owns the structure.	N/A	DomainOwner	Albany County, City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Village of Colonie, Town/Village of Green Island, Town of Guilderland, Village of Menands, Town of New Scotland, Village of Voorheesville, City of Watervliet, SUNY Albany Private, Intermunicipal Line, New York State Department of Transportation, Other, Unknown	String	60	Yes
	Structure_ID	Structure_ID; ID number given to the structure as a unique identifier.	N/A		Unknown	String	20	Yes
	Name	Name; what the pump station is referred to as.	N/A		Unknown	String	60	Yes
	Station_Number	Station_Number; the number associated with the pump station.	N/A		Unknown	Short	N/A	Yes
	Location	Location; the street or address that the structure is located on.	N/A		Unknown	String	100	Yes
	GPS_Verified	GPS_Verified; structure has been GPSed.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	GPS_Date	GPS_Date; the date the structure was GPSed	N/A			Date	N/A	Yes
	System_Type	System_Type; type of system this structure is a part of.	N/A	DomainSystemType	Storm, Combined, Sanitary, Unknown	String	10	Yes
	Structure_Type	Structure_Type; kind of pump station present.	N/A	DomainPSStructureType	Building, Vault, Unknown	String	20	Yes
	Alarmed	Alarmed; presence of an alarm at the pump station indicating high water/sewage levels or emergency conditions.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	Backup_Power	Backup_Power; presence of backup power to run pumps.	N/A	DomainPSBackupPower	None, Electrical, Gas Generator, Diesel Generator, Unknown	String	20	Yes
	Tributary_To	Tributary_To; destination of the flow.	N/A		Name of Waterbody/MS4, Name of Sewer Regulator/Meter Pit/Pump Station, Unknown	String	60	Yes
	Notes	Notes; additional information about the structure.	N/A		Active/Inactive	String	230	Yes

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
Maintenance/Physical Characteristics	Install_Date	Install_Date; the date the structure was installed and/or replaced.	N/A		Unknown	Date	N/A	Yes
	Last_Cleaned	Last_Cleaned; the date for the last time the structure was cleaned.	N/A		Unknown	Date	N/A	Yes
	Last_Repaired	Last Repaired; the date for the last time the structure was repaired.	N/A		Unknown	Date	N/A	Yes
	Pump_Size_1_horsepower	Pump_Size_1_horsepower; the pump size.	Horsepower		Unknown	Short	N/A	Yes
	Pump_Size_2_horsepower	Pump_Size_2_horsepower; the pump size.	Horsepower		Unknown	Short	N/A	Yes
	Pump_Size_3_horsepower	Pump_Size_3_horsepower; the pump size.	Horsepower		Unknown	Short	N/A	Yes
	Pump_Size_4_horsepower	Pump_Size_4_horsepower; the pump size.	Horsepower		Unknown	Short	N/A	Yes
	Ave_Pumping_Capacity_GalMin	Ave_Pumping_Capactiy_GalMin; the average volume the pumps can pump, combined.	Gallons/minute		Unknown	Float	N/A	Yes
	Max_Pumping_Capacity_GalMin	Max_Pumping_Capactiy_GalMin; the max volume the pumps can pump, combined.	Gallons/minute		Unknown	Float	N/A	Yes
	Overflow_Size_Inches	Overflow_Size_Inches; dimensions of the overflow pipe.	Inches		Unknown	String	50	Yes
	Number_of_Pumps	Number_of_Pumps; number of pumps at the station.	N/A		Unknown	Short	N/A	Yes
	Pump_Types	Pump_Types; kinds of pumps in the pump station.	N/A	DomainPSPumpTypes	Submersible, Centrifical, Both, Other, Unknown	String	20	Yes
	Elevation_Datum	Elevation_Datum; the vertical datum used to measure the elevation.	N/A	DomainElevationDatum	NAVD 88, NGVD 29, Unknown	String	20	Yes
	Lead_Pump_Elevation_Feet	Lead_Pump_Elevation_Feet; the elevation of water in well that turns the first pump on.	Feet		Unknown	Float	N/A	Yes
	Lag_Pump_Elevation_1_Feet	Lag_Pump_Elevation_1_Feet; the elevation of water in well that turns the second pump on.	Feet		Unknown	Float	N/A	Yes
	Lag_Pump_Elevation_2_Feet	Lag_Pump_Elevation_2_Feet; the elevation of water in well that turns the third pump on.	Feet		Unknown	Float	N/A	Yes
	Lag_Pump_Elevation_3_Feet	Lag_Pump_Elevation_3_Feet; the elevation of water in well that turns the fourth pump on.	Feet		Unknown	Float	N/A	Yes
	Pump_Off_Elevation_Feet	Pump_Off_Elevation_Feet; the elevation of water in well that turns pumps off.	Feet		Unknown	Float	N/A	Yes

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
SSM Grant	Priority_Watershed	Priority_Watershed; the priority watershed in which the structure can be found.	N/A	DomainPriorityWatershed	Kromma Kill, Dry River, Patroon Creek, Krumkill, Vly Creek, Salt Kill, Hudson River, Mohawk River, Shaker Creek, Black Creek, Blaines Bay, Bozen Kill, Cherry Creek, Clipp Road, Cohoes Cres-Bush Kill, Delmar, Delphus Kill, Dowers Kill, Farm Brook, Feuri Spruyt, Glenmont, Hackett, Hannacrois Creek, Hunger Kill, Lisha Kill, Macaffer, Normans Kill, Onesquethaw-Coeymans, Phillipin Kill, Red Creek, Sand Creek, Slingerlands, Upper Coeymans, Vloman Kill, Vly Road, Western Ave Cohoes. Other, Unknown	String	30	Yes
CWA Regulations	Outfall_Type	Outfall_Type; description of the outfall.	N/A	DomainOutfallType	Intermunicipal Connection, End Section, Not Applicable, Unknown	String	30	Yes
	Outfall_ID	Outfall_ID; identification used on AIMS.	N/A		Unknown	String	20	Yes
Ownership/Management	Owner	Owner; who owns the structure.	N/A	DomainOwner	Albany County, City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Village of Colonie, Town/Village of Green Island, Town of Guilderland, Village of Menands, Town of New Scotland, Village of Voorheesville, City of Watervliet, SUNY Albany Private, Intermunicipal Line, New York State Department of Transportation, Other, Unknown	String	60	Yes
	Structure_ID	Structure_ID; ID number given to the structure as a unique identifier.	N/A		Unknown	String	20	Yes
	Location	Location; the street or address that the structure is located on.	N/A		Unknown	String	100	Yes
	GPS_Verified	GPS_Verified; structure has been GPSed.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	GPS_Date	GPS_Date; the date the structure was GPSed	N/A			Date	N/A	Yes
	Feature_Type	Feature_Type; the kind of feature represented in this shapefile.	N/A	DomainFeatureType	Point, Polygon, Unknown	String	10	Yes
	System_Type	System_Type; type of system this structure is a part of.	N/A	DomainSystemType	Storm, Combined, Sanitary, Unknown	String	10	Yes
	Type	Type; the kind of structure installed.	N/A	DomainSSType	Weir, Dry Well, Other, Detention, Retention, Unknown	String	20	Yes
	Sub_Type	Sub_Type; different variations on the standard.	N/A	DomainSSSubType	Surface, Subsurface, Unknown	String	20	Yes
	SM_Practice	Stormwater management practice; management practice as described on the general maintenance cards.	N/A	DomainSMPractice	Micropool Extended Detention (P-1), Wet Pond (P-2), Pocket Pond (P-5), Surface Sand Filter (F-1), Underground Sand Filter (F-2), Filters-Bioretention (F-5), Wetland-Pond/Wetland System (W-3), Wetland-Pocket Wetland (W-4), Infiltration-Infiltration Trench (I-1), Infiltration-Infiltration Basin (I-2), Open Channels-Dry Swale (O-1), Open Channels-Wet Swale (O-2), Unknown	String	50	Yes
	Tributary_To	Tributary_To; destination of the flow.	N/A		Name of Waterbody/MS4, Name of Sewer Regulator/Meter Pit/Pump Station	String	60	Yes
	Notes	Notes; additional information about the structure.	N/A		Active/Inactive	String	230	Yes

Primary Purpose	Attribute Name	Description	Units	Domain	Attribute Drop-Downs/Options	Field Type	Field Length	Allow NULL Values?
Maintenance/Physical Characteristics	Install_ Date	Install_Date; the date the structure was installed and/or replaced.	N/A		Unknown	Date	N/A	Yes
	Material	Material; construction material for the structure.	N/A	DomainSSptMaterial	Concrete, Metal Plate, Brick, Concrete Block, Plastic, Fiberglass, Other, Unknown	String	20	Yes
	Volume_CubicFeet	Volume_CubicFeet; the volume of the structure.	Cubic Feet		Unknown	Double	N/A	Yes
	Emergency_Overflow	Emergency_Overflow; indicates if an emergency overflow is present.	N/A	DomainYesNo	Yes, No, Unknown	String	10	Yes
	Elevation_Datum	Elevation_Datum; the vertical datum used to measure the elevation.	N/A	DomainElevationDatum	NAVD 88, NGVD 29, Unknown	String	20	Yes
	Elevation_Bottom_Feet	Elevation_Bottom_Feet; the elevation above sea level of the bottom of the structure.	Feet			Double	N/A	Yes
	Elevation_Rim_Feet	Elevation_Rim_Feet; the elevation above sea level of the top of the frame.	Feet			Double	N/A	Yes

Appendix G

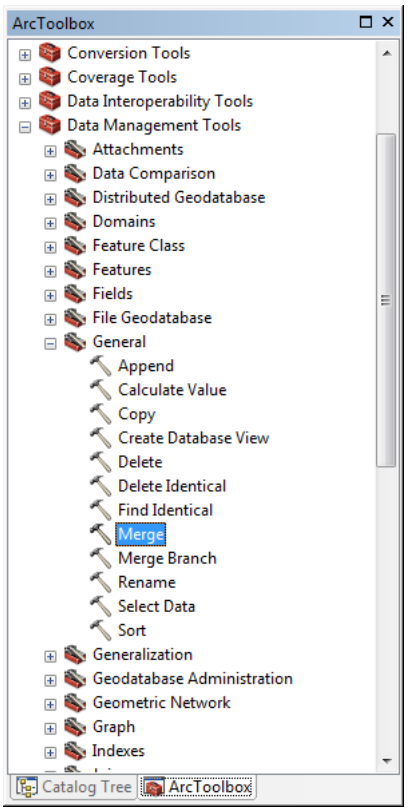
Data Checks and Analyzing Topology

How to create a new topology

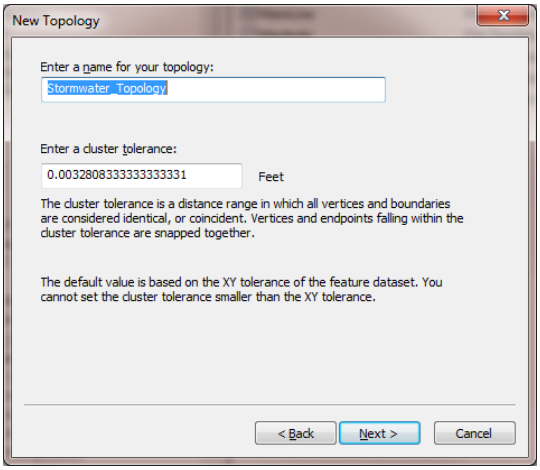
The methodology to create a new topology used for data checks

NOTE: A topology can only be run in a feature dataset using ArcInfo and is used to confirm the relationship between different feature classes.

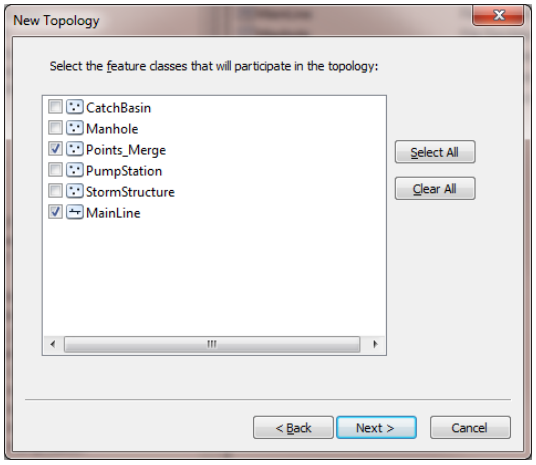
1. Open ArcCatalog
    a. For the purposes of this project, all of the point features were merged into one feature class as they would all have a similar relationship with the line features.
        i. ArcToolbox→Data Management Tools→General→Merge



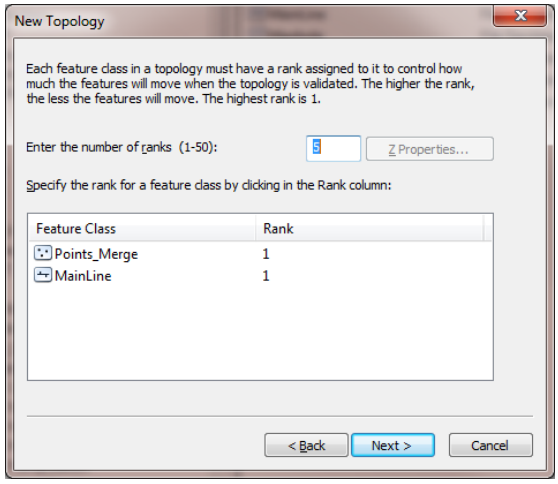
        ii. Save the merged data in the feature dataset with the rest of the data.
    b. Right click on the feature dataset that contains all of the data you want to check
        i. Scan to NEW→Topology
            1. Follow the Topology Wizard
            2. Name the topology



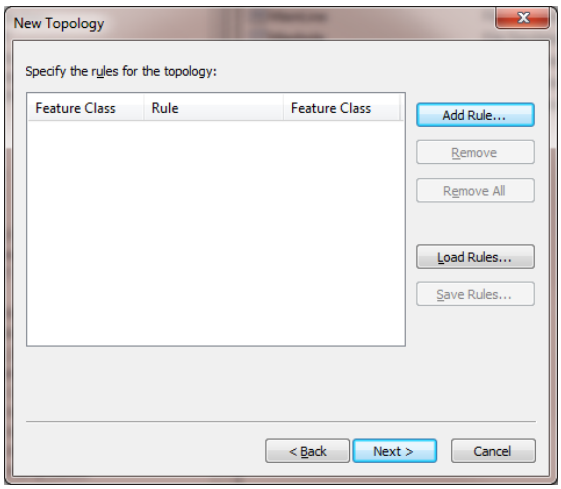
3. Select the feature classes that you want to include in the topological checks
    a. For this, the merged points and the lines



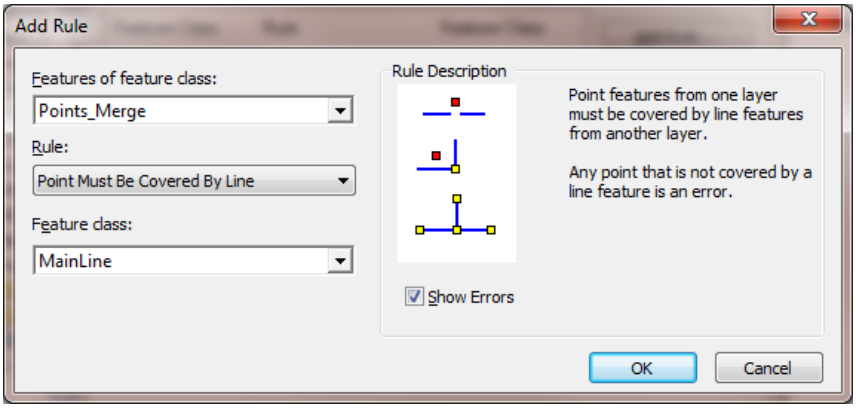
4. There is an option to rank the features – accept the default



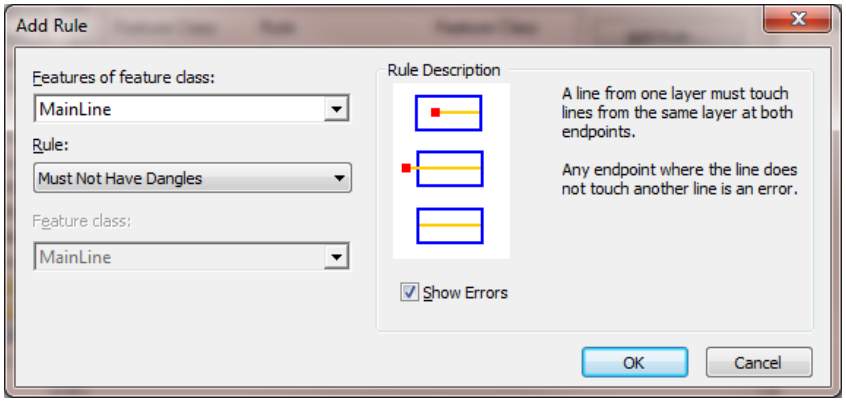
5. Create new rules for the topology



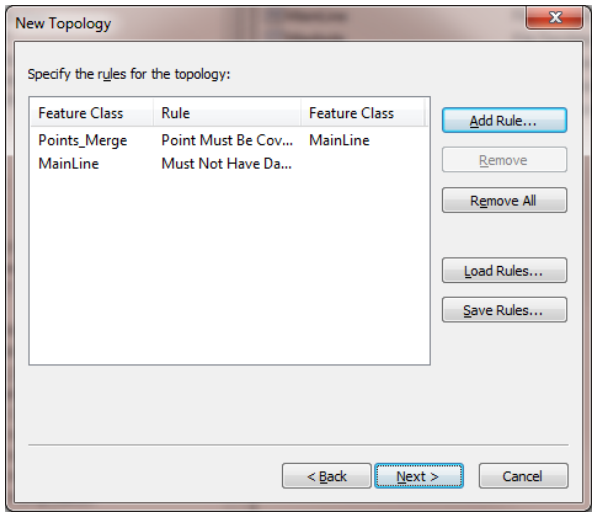
a. Points must be covered by a line



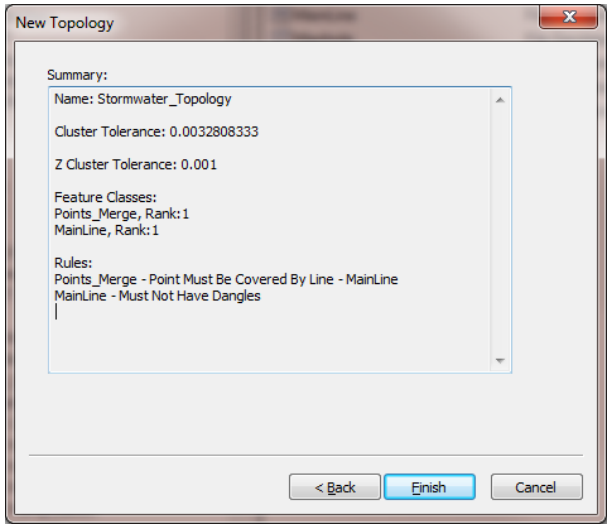
b. Lines must not have dangles

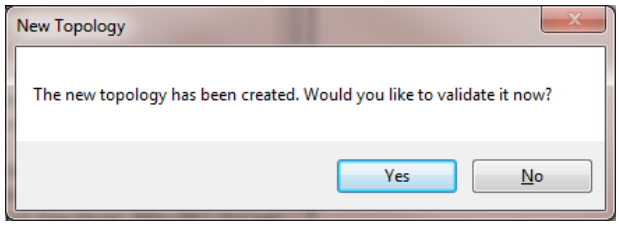


6. You will now have a new topology

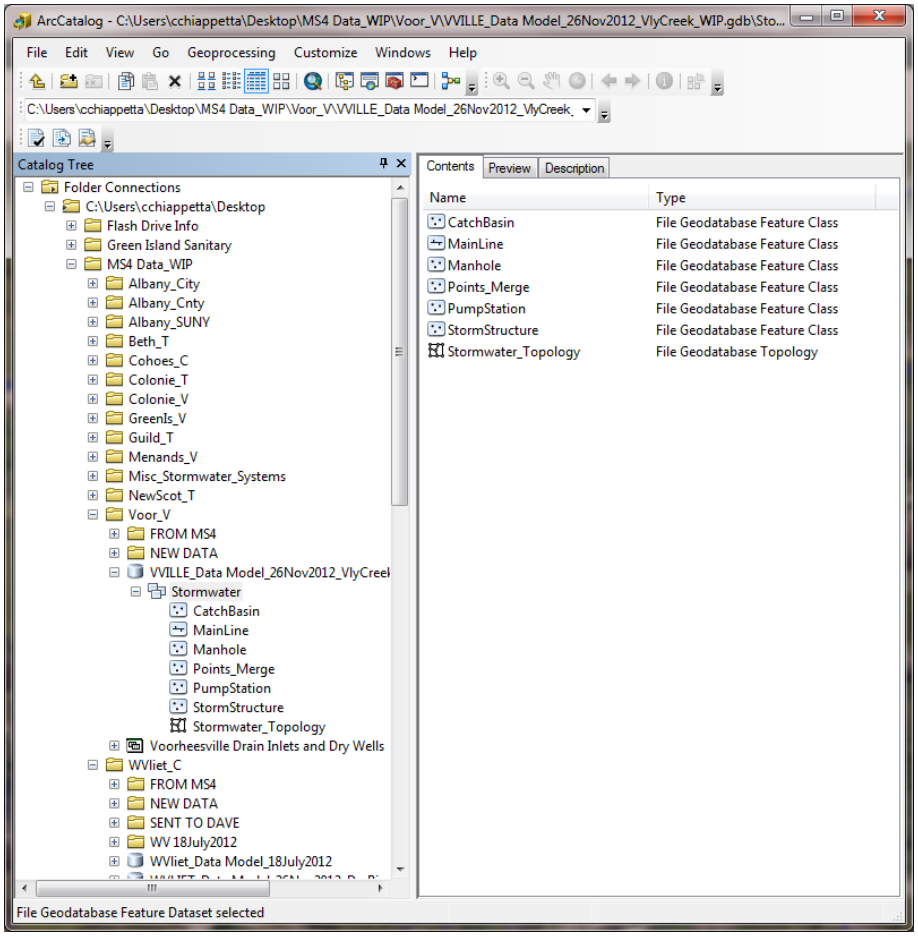


7. Confirm and validate the topology

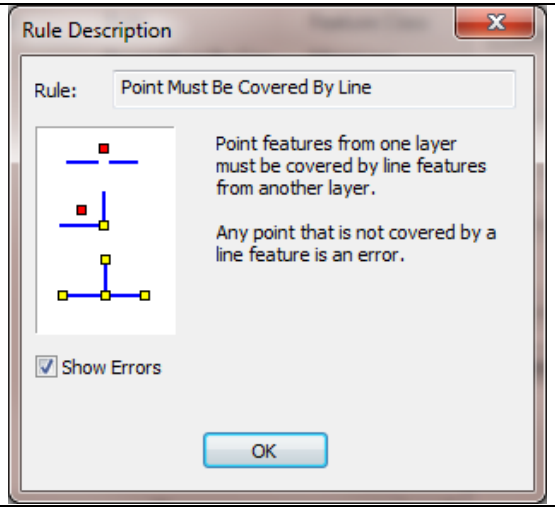
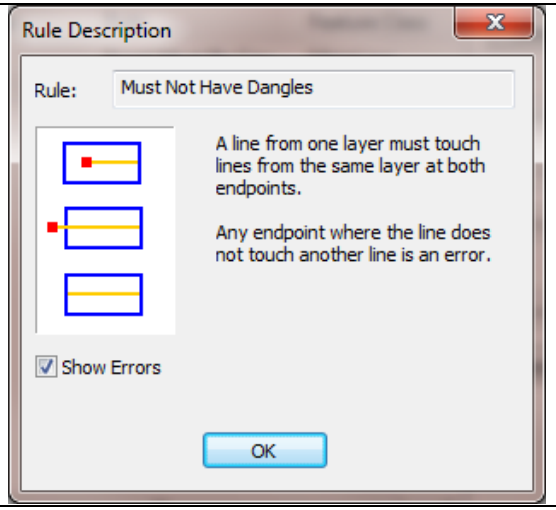
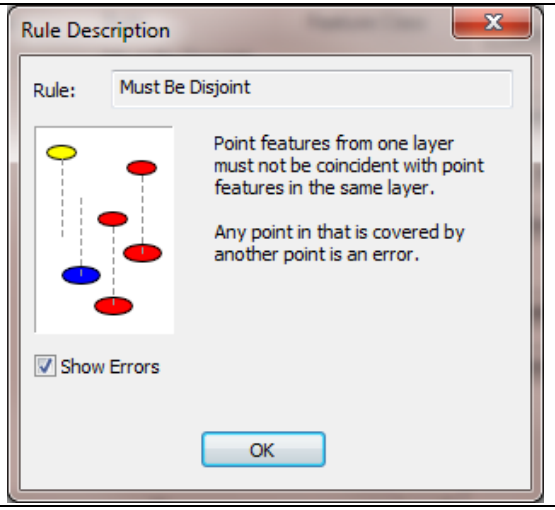




c. In ArcCatolog, there will be a new topology in the feature dataset


ArcCatalog - C:\Users\cchiappetta\Desktop\MS4 Data_WIP\Voor_V\VVILLE_Data Model_26Nov2012_VlyCreek_WIP.gdb\Sto...
File Edit View Go Geoprocessing Customize Windows Help
C:\Users\cchiappetta\Desktop\MS4 Data_WIP\Voor_V\VVILLE_Data Model_26Nov2012_VlyCreek_
Catalog Tree
Folder Connections
C:\Users\cchiappetta\Desktop
Flash Drive Info
Green Island Sanitary
MS4 Data_WIP
Albany_City
Albany_Cnty
Albany_SUNY
Beth_T
Cohoes_C
Colonie_T
Colonie_V
GreenIs_V
Guild_T
Menands_V
Misc_Stormwater_Systems
NewScot_T
Voor_V
FROM MS4
NEW DATA
VVILLE_Data Model_26Nov2012_VlyCreek
Stormwater
CatchBasin
MainLine
Manhole
Points_Merge
PumpStation
StormStructure
Stormwater_Topology
Voorheesville Drain Inlets and Dry Wells
WVliet_C
FROM MS4
NEW DATA
SENT TO DAVE
WV 18July2012
WVliet_Data Model_18July2012
Contents Preview Description
Name Type
CatchBasin File Geodatabase Feature Class
MainLine File Geodatabase Feature Class
Manhole File Geodatabase Feature Class
Points_Merge File Geodatabase Feature Class
PumpStation File Geodatabase Feature Class
StormStructure File Geodatabase Feature Class
Stormwater_Topology File Geodatabase Topology
File Geodatabase Feature Dataset selected

SSM Topological Checks: Explanations

Check #1	Check #2	Check #3
		
Structures represented as points (catch basins, manholes, pump stations, and storm structures) must be attached to lines (main lines). If a point is not attached to a line, the point will appear red to indicate that it is an error. The yellow points represent points that are correct.	Lines (main lines) must touch/connect to other lines in the same layer (other main lines) at both ends of the line segment. If a line does not touch/is not connected to another line, the end will appear red to indicate that it is an error. The bottom (third) example in the diagram above represents no errors.	Structures represented as points (catch basins, manholes, pump stations, and storm structures) must not be directly on top of another point in the same layer. If a point is on top of a point of the same layer, the point will appear red to indicate that it is an error. The yellow points represent points that are correct.
Errors would indicate: 1. A point not falling on a line directly. a. The point may be 'off' so the point location needs to be adjusted b. The line may be 'off' so the line needs to be snapped to the point c. A dry well or another structure that is not always meant to be connected directly to the rest of the system i. These are correct and should be marked as 'exceptions' d. The point may be part of a combined/sanitary system i. This is incorrect and should be reclassified 2. A missing line segment/connection to the rest of the stormwater system. a. A line (main line) needs to be added to connect the structure to the system	Errors would indicate: 1. A gap between two lines (main lines) which should connect the entire storm system. a. A line (main line) is missing and needs to be added to connect the entire system b. The two lines need to be snapped to a common point (i.e. catch basin) 2. This is the beginning of the mapped drainage system. a. These can be correct and should be marked as 'exceptions' if an associated point is not missing i. Can be a type of open channel 3. This is the end of the mapped drainage system a. These can be correct and should be marked as 'exceptions' if an associated point is not missing i. Can be an outfall 4. A line segment is isolated from other line segments. a. There are missing line segments to connect the entire drainage network b. These can be correct if it is a culvert and should be marked as an 'exception'	Errors would indicate: 1. Two points from the same layer are on top of each other a. One point was mapped repeatedly i. This is incorrect and only one point should remain after attribute reconciliation b. Two or more points existed in close proximity, but were mapped on top of each other i. This is correct, but due to GPS accuracies. Points can move moved to more accurate locations using reference maps (orthoimagery)

Appendix H

Data Processing Methodology

Data Processing Methodology

The following procedure should be used to process the source data from each of the contributing organizations

Step 1: Conduct Initial Evaluation of Each Layer of Source Data

- Compile information on layer characteristics:
  - Dataset description
  - Original file name
  - File format (shapefile, table, CAD drawing, etc)
  - Feature type (point, line, polygon)
  - Number of features
  - Area covered (e.g. municipality)
  - Watershed(s)
  - Source organization and contact information
  - Metadata availability
  - Vintage
  - Positional accuracy or collection method
  - Projection
  - Key attributes present
  - Notes/ Comments

- Load data into a temporary working geodatabase

- Open the layer in ArcMap. Check if the layer has a defined projection and that it overlays correctly with the rest of the data. If it is not projected and you can figure out the correct projection, define its projection. If not, contact the municipality.

- Conduct initial data integrity checks (automated)
  - Duplicate Features and Invalid Geometry – use the "Checks for invalid features and duplicates" model developed by Fountains Spatial
  - Outliers – use "select by location"to determine if features are outside of the municipal boundaries
  - Duplicate attribute values – use the Find Identical tool
    - Will find features that have identical attributes

- Create and Check Topology:

  List of layers:
  - Catch Basins (Point)
  - Main Lines (Line)
  - Manholes (Point)
  - Pump Stations (Point)
  - Storm Structure (Point)

  Topology Rules:
  - **Main Lines (Lines) must not have dangles**
  - Must Be Disjoint (this checks for overlaps-has also been checked by the integrity checks)
  - **Must Be Covered By Endpoint Of Main Lines** (makes sure that the point is not just there by itself)

- Conduct data limitation checks (manual/automated) - Identify limitations in terms of geometry (missing, incomplete, incorrect) and/or attributes (missing, incomplete, incorrect)

  Geometry (incomplete and/or incorrect):
  - Visual inspection using orthoimagery and basemap overlay
  - Check with the data provider (and/or metadata) to identify any potential missing or incorrect features

Attributes (incomplete and/or incorrect):
- Review of the list of attribute ranges for core attributes
  - This was done by summarizing each field and/or sorting each field to discover anomalies
- Visual inspection of the attribute table and comparison to the data model
- Check with the data provider (and/or metadata) to identify any potential missing or incorrect attributes

- Track progress and record results in the Tracking database. Information should be recorded on which steps have been completed and any key results.

- At the end of the step, data integrity issues and limitations (incomplete geometry and/or attributes) should be identified.

Step 2: Evaluate Results from Step 1
- Review any data integrity and/or data limitation issues.

- Determine what action, if any, is needed to address any of these issues.

Step 3: Attempt to Resolve Data Integrity and/or Limitation Issues
- When needed, meeting with the data source organization to review all identified data integrity and gap issues and determine how these should be resolved (e.g., GPS field collection to fill key data gaps).

- Record any revisions within the feature class using the following attribute fields: (have not done this)
  - Date (record the date of modification)
  - ChangeType: New, Geometry, Attribute, Geometry&Attribute, To be removed
    - Create a domain

- Features that are removed from the feature class need to be placed into a new "deleted features log" feature class to keep a record.

Step 4: Create Data Import Cross-Reference
This document will describe in sufficient detail how the source data will be imported into the Albany Storm System Map (SSM) geodatabase template. This will include cases where a single source data layer is imported into a single SSM layer, a single source data layer is used to populate all or parts of multiple SSM layers, etc.

Preprocessing Steps:
- Assign projection if needed
- Make sure all data integrity issues have been resolved.

Import Data into the file GDB:
- Loading data into the SSM geodatabase template
- Matching original attribute values to the existing domain codes.

Step 5: Initial Import of Digital Data
Follow cross-referencing strategy to import source data into the SSM layers.

Step 6: Fill Data Gaps
When needed, implement GPS field work and/or other techniques to address any identified data gaps.
- Results to be incorporated into appropriate SSM layers.

- Make appropriate entries in change log fields.

Step 7: Run Final Integrity Check and Calculate Updated Profile
- The same data profiling and data integrity checks developed earlier (steps 1 and 2) should be run again at this stage in the process.

- For most municipalities, this is only done once because the data was collected freshly rather than from pre-existing data.

- Intermunicipal Boundary Checks
  - Want to select a feature from one municipality that is within a certain distance from a feature in an adjacent municipality-create a buffer for MS4s to see if they intersect with each other
    - Buffer points and lines of MS4_1 (~20ft)→merge the polygons
      - Call it MS4_1_SW_Buffer
    - Do the same for MS4_2
      - Call it MS4_2_SW_Buffer
    - Select by location
      - Select from MS4_2_ SW_Buffer that are within MS4_1_SW_Buffer
    - This will highlight overlapping/connecting storm systems

- Record results in the Tracking database.

- Meet with relevant municipalities

- Compile metadata

Appendix I

Storm Infrastructure Attributes and Drop Down Lists

How to create a file geodatabase with domains

The methodology to create a file geodatabase with domains in ArcGIS to facilitate filling in and editing attributes

1. Create an empty file geodatabase
    a. Right click on the GDB
    b. Click on ‘Properties’
    c. In the Database Properties window, click on the ‘Domains’ tab
        i. Create all of the necessary domains (drop-down lists) that you need for all of the feature classes you create
            1. Fill in the domain name, domain description, domain properties, and coded values
            2. **The field type for the domain needs to match the field type for the associated attribute
    d. Create all of the feature classes within a feature dataset in the geodatabase
        i. Add all of the attributes for each feature class
        ii. **Make sure to include domains when needed.

Domain	Attribute Drop-Downs/Options	Drop-down Codes	Field Type	Field Length	Allow NULL Values?
DomainCBMaterial	Red Brick	RB	String	20	Yes
	Concrete Block	CB			
	Concrete Precast	CP			
	Fiberglass	FG			
	Other	OTH			
	Unknown	UNK			
DomainCBSubType	Standard	STND	String	20	Yes
	Junction Box	JB			
	Monitoring Well	MW			
	Yard Basin	YB			
	Settling Chamber	SC			
	Pipe Basin	PB			
	Other	OTH			
	Unknown	UNK			
DomainCondition	Good	G	String	10	Yes
	Fair	F			
	Poor	P			
	Desperate	D			
	Failed	FAIL			
	Unknown	UNK			
DomainDebrisType	Dirt	D	String	20	Yes
	Leaves	L			
	Garbage	G			
	Clean	C			
	Other	OTH			
	Unknown	UNK			
DomainElevationDatum	NAVD 88	NAVD88	String	20	Yes
	NGVD 29	NGVD29			
	Unknown	UNK			
DomainFeatureType	Point	PT	String	10	Yes
	Polygon	POLY			
	Unknown	UNK			

Domain	Attribute Drop-Downs/Options	Drop-down Codes	Field Type	Field Length	Allow NULL Values?
DomainFloatableControl	Hood	HOOD	Sting	20	Yes
	Grate	GRATE			
	PVC Elbow	PVCEL			
	Vent	VENT			
	None	NONE			
	Unknown	UNK			
DomainFlowType	Gravity	G	String	10	Yes
	Pressure	P			
	Unknown	UNK			
DomainGrateCoverShape	Square	SQ	String	20	Yes
	Rectangular	RECT			
	Circular	CIRC			
	Unknown	UNK			
DomainManholeMaterial	Brick	BRK	String	20	Yes
	Concrete	CON			
	Red Brick	RB			
	Concrete Block	CB			
	Concrete Precast	CP			
	Fiberglass	FG			
	Other	OTH			
	Unknown	UNK			
DomainManholeSubType	Standard	STND	String	50	Yes
	Outlet Control Structure	OCS			
	Diversion Structure	DS			
	Hydrodynamic Separator	HS			
	Other	OTH			
	Unknown	UNK			

Domain	Attribute Drop-Downs/Options	Drop-down Codes	Field Type	Field Length	Allow NULL Values?
DomainMLMaterial	ABS-Acrylonitrile Butadiene Styrene	ABS	String	50	Yes
	ADS	ADS			
	Aluminum	ALUM			
	CAP	CAP			
	Cast Iron	CI			
	CMP-Corrugated Metal Pipe	CMP			
	Concrete	CON			
	Ductile Iron	DUCT			
	Galvanized Iron	GALV			
	HCAP	HCAP			
	HDPE-High Density Polyethylene Pipe	HDPE			
	HCMP	HCMP			
	HCP	HCP			
	OGBG	OGBG			
	Perfads	PERF			
	PLST	PLST			
	PVC	PVC			
	RCP-Reinforced Concrete Pipe	RCP			
	TRNST	TRNST			
	Vitrified Clay Pipe	VCP			
	SICPP-Smooth Interior Corrugated Plastic Pipe	SICPP			
	Brick and Slate	BS			
	Circular Brick	CB			
	Elliptical Brick	EB			
	Truss	T			
	Steel	S			
	Asphalt	A			
	Rip Rap	RR			
	Vegetated	V			
	Earthen	E			
	Other	OTH			
	Unknown	UNK			

Domain	Attribute Drop-Downs/Options	Drop-down Codes	Field Type	Field Length	Allow NULL Values?
DomainMLShape	Circular	CIRC	String	20	Yes
	Elliptical	ELLI			
	Box	BOX			
	Helical	HELI			
	Other	OTH			
	Unknown	UNK			
DomainMLSubType	Closed Pipe	CP	String	60	Yes
	Open Channel	OC			
	Swale	S			
	Ditch	D			
	Natural Drainage/Channels	NAT			
	Underdrain	U			
	Collector	C			
	Unknown	UNK			
DomainOutfallType	Intermunicipal Connection	IC	String	30	Yes
	End Section	ES			
	Not Applicable	NA			
	Unknown	UNK			
DomainOwner	Albany County	ALBCO	String	60	Yes
	City of Albany	CALB			
	Town of Bethlehem	TBETH			
	City of Cohoes	CCOHO			
	Town of Colonie	TCOL			
	Village of Colonie	VCOL			
	Town/Village of Green Island	TVGI			
	Town of Guilderland	TGUILD			
	Village of Menands	VMEN			
	Town of New Scotland	TNEWS			
	Village of Voorheesville	VVILLE			
	City of Watervliet	CVLIET			
	SUNY Albany	SUNY			
	Private	P			
	Intermunicipal Line	IL			
	New York State Department of Transportation	NYSDOT			
	Other	OTH			
	Unknown	UNK			

Domain	Attribute Drop-Downs/Options	Drop-down Codes	Field Type	Field Length	Allow NULL Values?
DomainPriorityWatershed	Kromma Kill	KROM	String	30	Yes
	Dry River	DRY			
	Patroon Creek	PAT			
	Krumkill	KRUM			
	Vly Creek	VLY			
	Salt Kill	SALT			
	Shaker Creek	SHAKER			
	Hudson River	HUD			
	Mohawk River	MOH			
	Black Creek	BLACK			
	Blaines Bay	BLAIN			
	Bozen Kill	BOZEN			
	Cherry Creek	CHERRY			
	Clipp Road	CLIPP			
	Cohoes Cres-Bush Kill	CCBK			
	Delmar	DELMAR			
	Delphus Kill	DELPH			
	Dowers Kill	DOWERS			
	Farm Brook	FARM			
	Feuri Spruyt	FEURI			
	Glenmont	GLEN			
	Hackett	HACK			
	Hannacrois Creek	HANN			
	Hunger Kill	HUNGER			
	Lisha Kill	LISHA			
	Macaffer	MAC			
	Normans Kill	NORM			
	Onesquethaw-Coeymans Creek	OC			
	Phillipin Kill	PHIL			
	Red Creek	RED			
	Sand Creek	SAND			
	Slingerlands	SLING			
	Upper Coeymans	UPCOEY			
	Vloman Kill	VLOMAN			
	Vly Road	VLYRD			
	Western Ave Cohoes	WAC			

Domain	Attribute Drop-Downs/Options	Drop-down Codes	Field Type	Field Length	Allow NULL Values?
	Other	OTH			
	Unknown	UNK			
DomainPSBackupPower	Electrical	E	Sting	20	Yes
	Gas Generator	G			
	Diesel Generator	DG			
	None	NONE			
	Other	OTH			
	Unknown	UNK			
DomainPSPumpTypes	Submersible	SUB	String	20	Yes
	Centrifical	CENT			
	Both	BOTH			
	Other	OTH			
	Unknown	UNK			
DomainPSStructureType	Building	BUILD	String	20	Yes
	Vault	VAULT			
	Unknown	UNK			
DomainSMPractice	Micropool Extended Detention (P-1)	P1	String	50	Yes
	Wet Pond (P-2)	P2			
	Pocket Pond (P-5)	P5			
	Surface Sand Filter (F-1)	F1			
	Underground Sand Filter (F-2)	F2			
	Filters-Bioretention (F-5)	F5			
	Wetland-Pond/Wetland System (W-3)	W3			
	Wetland-Pocket Wetland (W-4)	W4			
	Infiltration-Infiltration Trench (I-1)	I1			
	Infiltration-Infiltration Basin (I-2)	I2			
	Open Channels-Dry Swale (O-1)	O1			
	Open Channels-Wet Swale (O-2)	O2			
	Unknown	UNK			

Domain	Attribute Drop-Downs/Options	Drop-down Codes	Field Type	Field Length	Allow NULL Values?
DomainSSptMaterial	Concrete	CON	String	20	Yes
	Metal Plate	MP			
	Brick	B			
	Concrete Block	CB			
	Plastic	PLST			
	Fiberglass	FG			
	Other	OTH			
	Unknown	UNK			
DomainSSSubType	Surface	SURF	Long	N/A	Yes
	Subsurface	SUB			
	Unknown	UNK			
DomainSSType	Weir	W	String	20	Yes
	Dry Well	DW			
	Other	OTH			
	Detention	D			
	Retention	R			
	Unknown	UNK			
DomainSystemType	Storm	STORM	String	10	Yes
	Combined	COMB			
	Sanitary	SAN			
	Unknown	UNK			
DomainYesNo	Yes	Y	String	10	Yes
	No	N			
	Unknown	UNK			

Appendix J

Field Work and Other Help

	Kromma Kill			
	MS4 in W'shed?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County	X	Bob Counihan, Margaret Della Rocco, Laura DeGaetano	3.5 days	Mainly went out with Bob. He was very helpful esp. reading plans and diverting traffic. Margaret helped by organizing the appropriate plans to facilitate the field work.
Albany City				
Albany-SUNY				
Bethlehem-T				
Cohoes-C				
Colonie-T	X	John Dzialo, Ray Marone	2	Only met with them to go over their current data in the Kromma Kill
Colonie-V				
Green Is-V				
Guilderland-T				
Menands-V	X	Patty Shultis, Tim Boyd (Supervisor-DPW), Paul Reuss	7 days	Field work with Patty. Met with Tim for ~6hrs for field work prep and data review. For first municipality assessed so there was a big learning curve.
New Scotland-T				
Voorheesville-V				
Watervliet-C				
NYSDOT	X	Craig Bock		Have some maps/emails.

	Dry River			
	MS4 in W'shed?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County				
Albany City				
Albany-SUNY				
Bethlehem-T				
Cohoes-C				
Colonie-T	X	John Dzialo, Ray Marone	2	GIS Tech met with both to go over their current data in the Kromma Kill
Colonie-V				
Green Is-V				
Guilderland-T				
Menands-V				
New Scotland-T				
Voorheesville-V				
Watervliet-C	X	Dave Dressel	7 days	Helpful and knowledable assistance. Worked through a lot of infrastrucutre issues (CSO vs SW). Issues noted and easily came up with appropriate solutions
NYSDOT	X	Craig Bock		Have maps/emails.
NYS Thruway Authority	X ?			

	Salt Kill			
	MS4 in W'shed?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County				
Albany City				
Albany-SUNY				
Bethlehem-T				
Cohoes-C	X	Barbara Decker	2 days	In house Cohoes staff facilitated the mapping process by meeting with City Engineer to determine where focus should be. Many CSO and SW issues to cover.
Colonie-T				
Colonie-V				
Green Is-V	X	SEE GREEN ISLAND SHEET		
Guilderland-T				
Menands-V				
New Scotland-T				
Voorheesville-V				
Watervliet-C	X	Dave Dressel	1 day	Worked through various issues (CSO vs SW) with ease., knowledge of infrastructure key.
NYSDOT	X	Craig Bock		Have maps/emails.

	Vly Creek			
	MS4 in W'shed?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County	X			Used pre-existing data
Albany City				
Albany-SUNY				
Bethlehem-T				
Cohoes-C				
Colonie-T				
Colonie-V				
Green Is-V				
Guilderland-T	X	Ken Darpino	2 days	Guild wasn't part of the Coalition for the GPS training or the initial stages of the project. Filled in GPS training needs as needed. Benefit of centralized training at the outset appreciated.
Menands-V				
New Scotland-T	X	Ken Guyer (Highway Superintendent)	1.5 days	Record-breaking amount of data collected for the amount of time and area covered. Highway Supertintendent knew here everything was-v. valuable.
Voorheesville-V	X	Glenn Hebert, Will Smith	8 days	A lot of area was covered, but speed of process depended on knowledge of highway and drainage infrastructure. Highway supervisor available as needed when there were questionable ngbhds and to review data that was collected.
Watervliet-C				
NYSDOT				

	Patroon Creek			
	MS4 in W'shed?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County	X	Bob Counihan, Tony Fernandez	0.5 day	Mainly went out with Bob, v. helpful esp. reading plans and diverting traffic. Tony came for a couple hours as a refresher. Tony and Bob prepared to complete the mapping in Patroon without Coalitiion assistance.
Albany City	X	Mary Bell, Justing Scheivelbein	5 days	Met with Mary to determine field work locations. Field work with Justin - his knowledgable of the area key. (CSOvsSW issues), well prepared as well.
Albany-SUNY	X			
Bethlehem-T				
Cohoes-C				
Colonie-T	X			No meetings about Patroon Creek
Colonie-V	X	Carl Fleshman, Les, Chris, Chris Ciota	12 days	Met with Supt of Highways, as needed, v. knowledgeable. Went out with Les and Chris for training; did field work with Chris Ciota. Big effort, lots of sw infrastructure.
Green Is-V				
Guilderland-T	X			Never did this.
Menands-V				
New Scotland-T				
Voorheesville-V				
Watervliet-C				
NYSDOT	X ?			
NYS Thruway Authority	X ?			

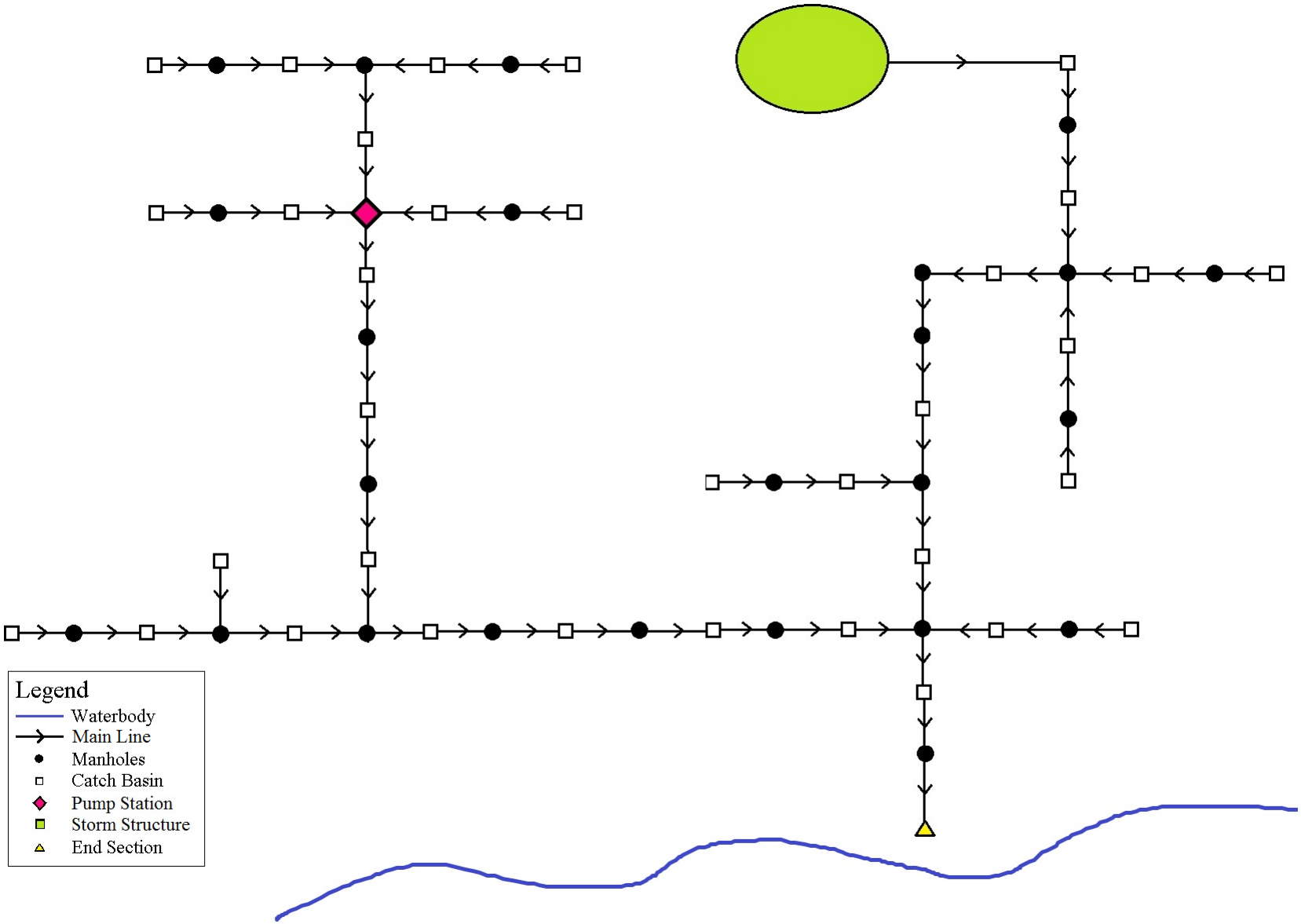
	City of Watervliet			
	MS4 in W'shed?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County	NA			
Albany City	NA			
Albany-SUNY	NA			
Bethlehem-T	NA			
Cohoes-C	NA			
Colonie-T	NA			
Colonie-V	NA			
Green Is-V	NA			
Guilderland-T	NA			
Menands-V	NA			
New Scotland-T	NA			
Voorheesville-V	NA			
Watervliet-C	NA			See notes for Salt Kill and Dry River.
NYSDOT	X ?			
NYS Thruway Authority	X ?			

	Village of Green Island			
	Other MS4s?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County	X ?			
Albany City	NA			
Albany-SUNY	NA			
Bethlehem-T	NA			
Cohoes-C	NA			
Colonie-T	NA			
Colonie-V	NA			
Green Is-V		Tony Caesar, John Heffern	3 days	Worked mainly with Tony. no maps previously, so there were some CSOvsSW issues. Tony was very knowledgable; field workcompleted quickly.
Guilderland-T	NA			
Menands-V	NA			
New Scotland-T	NA			
Voorheesville-V	NA			
Watervliet-C				
NYSDOT	X ?			

	Krumkill			
	MS4 in W'shed?	**Field Work Partner(s). Name, Title**	**Field Work Dates, How Long?**	**Other Assistance? From Whom? What?**
Albany County	X			
Albany City	X			
Albany-SUNY	X			
Bethlehem-T	X			
Cohoes-C				
Colonie-T				
Colonie-V				
Green Is-V				
Guilderland-T	X			
Menands-V				
New Scotland-T				
Voorheesville-V				
Watervliet-C				
NYSDOT	X ?			
NYS Thruway Authority	X ?			

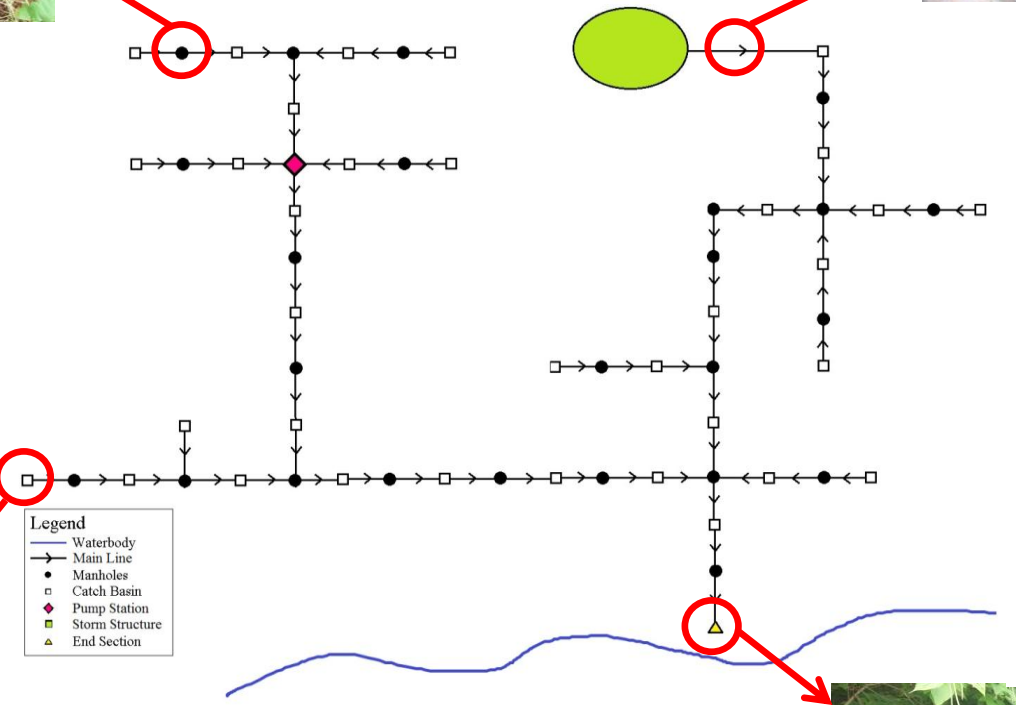
Appendix K

Field Work Handout #1: What We Are Mapping and Why


Legend
Waterbody
Main Line
Manholes
Catch Basin
Pump Station
Storm Structure
End Section

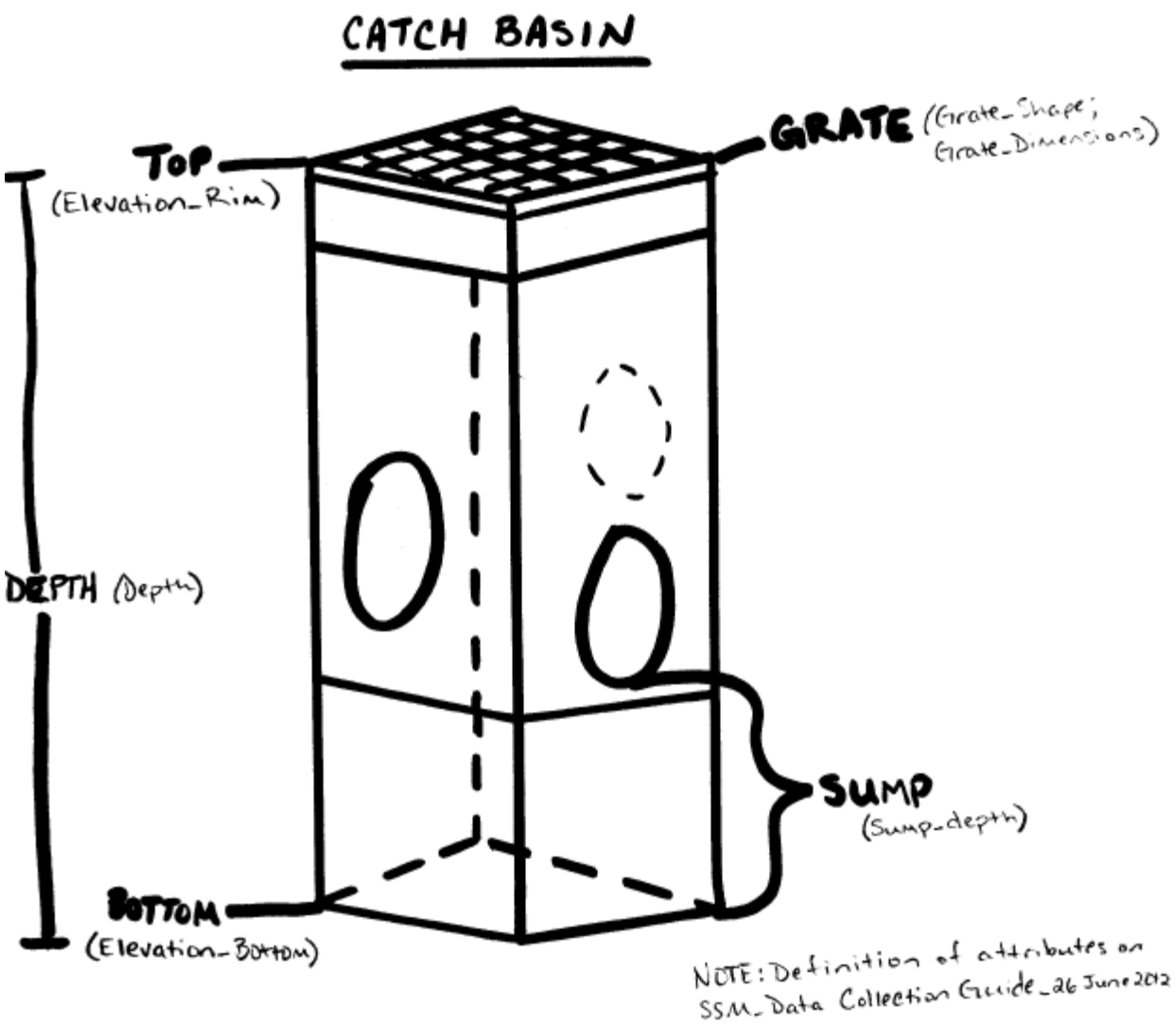
Manhole

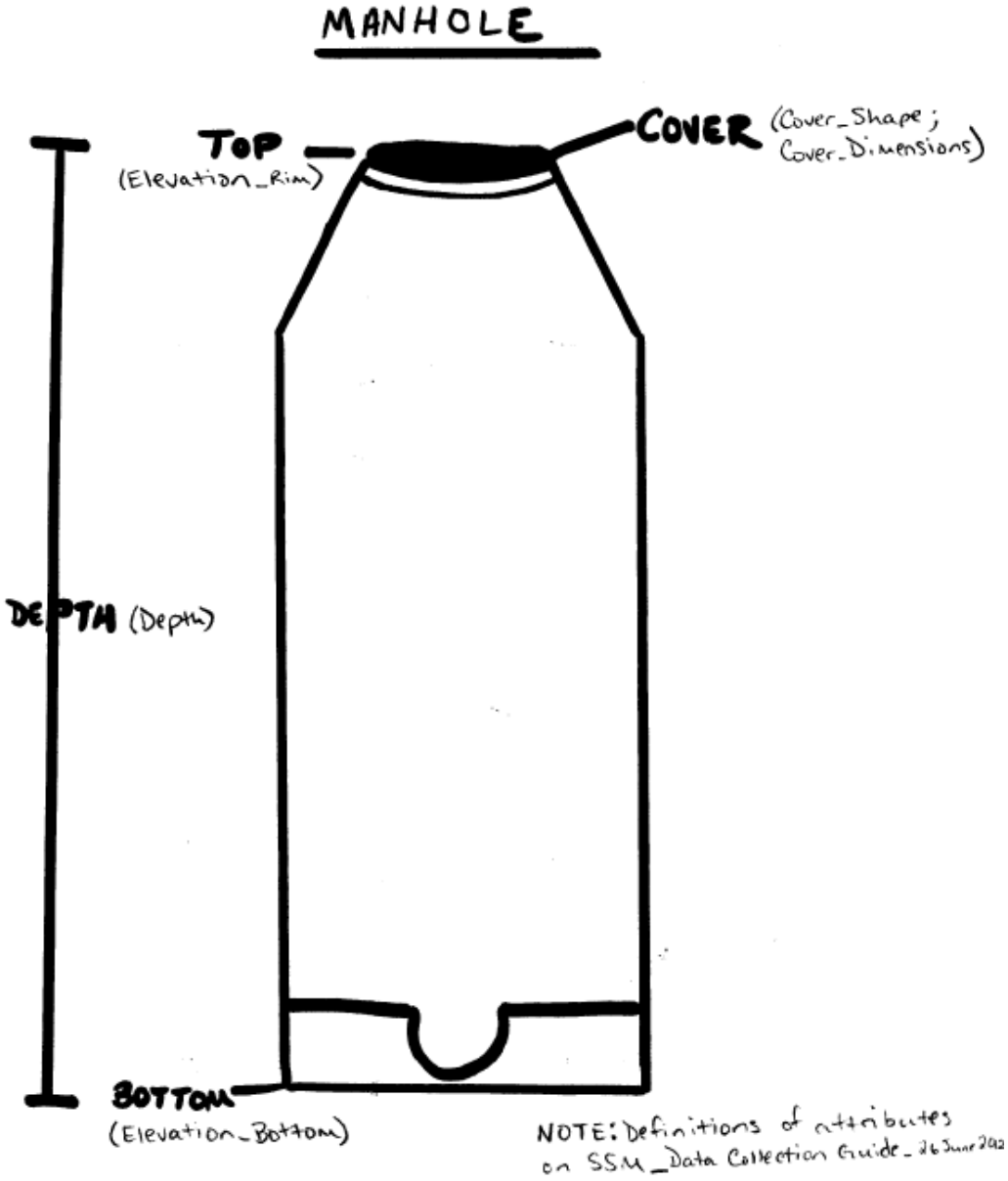
Main Lines

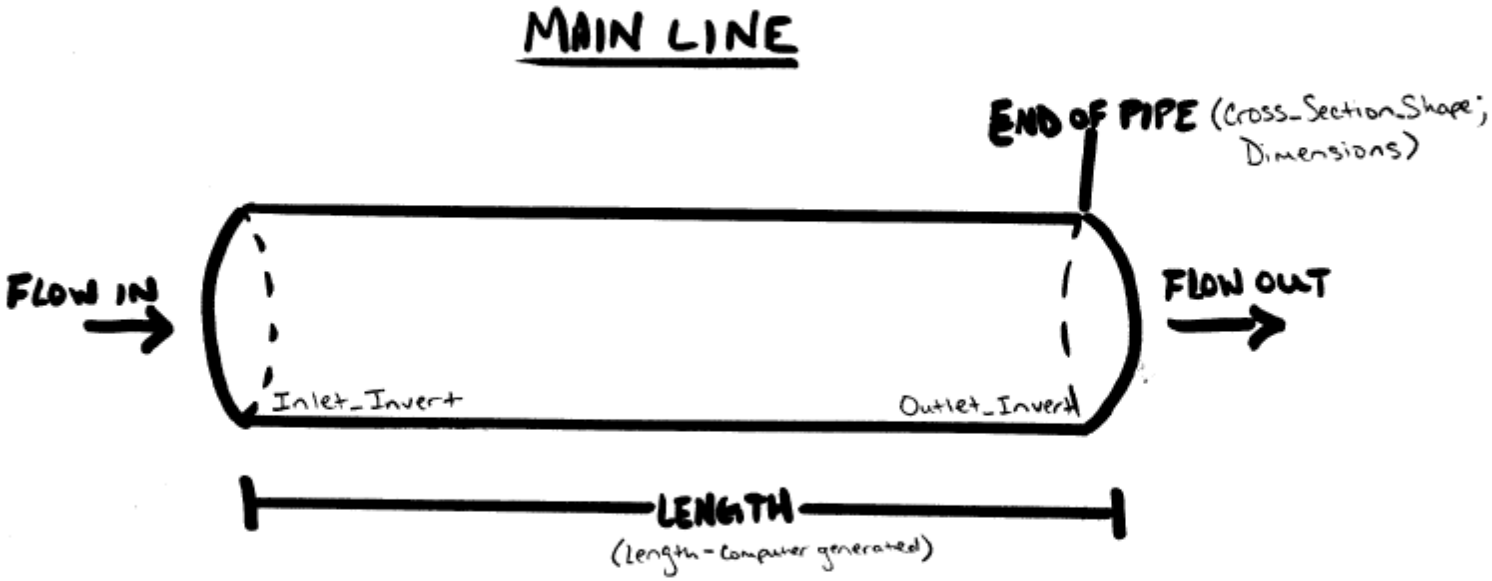


Catch Basin

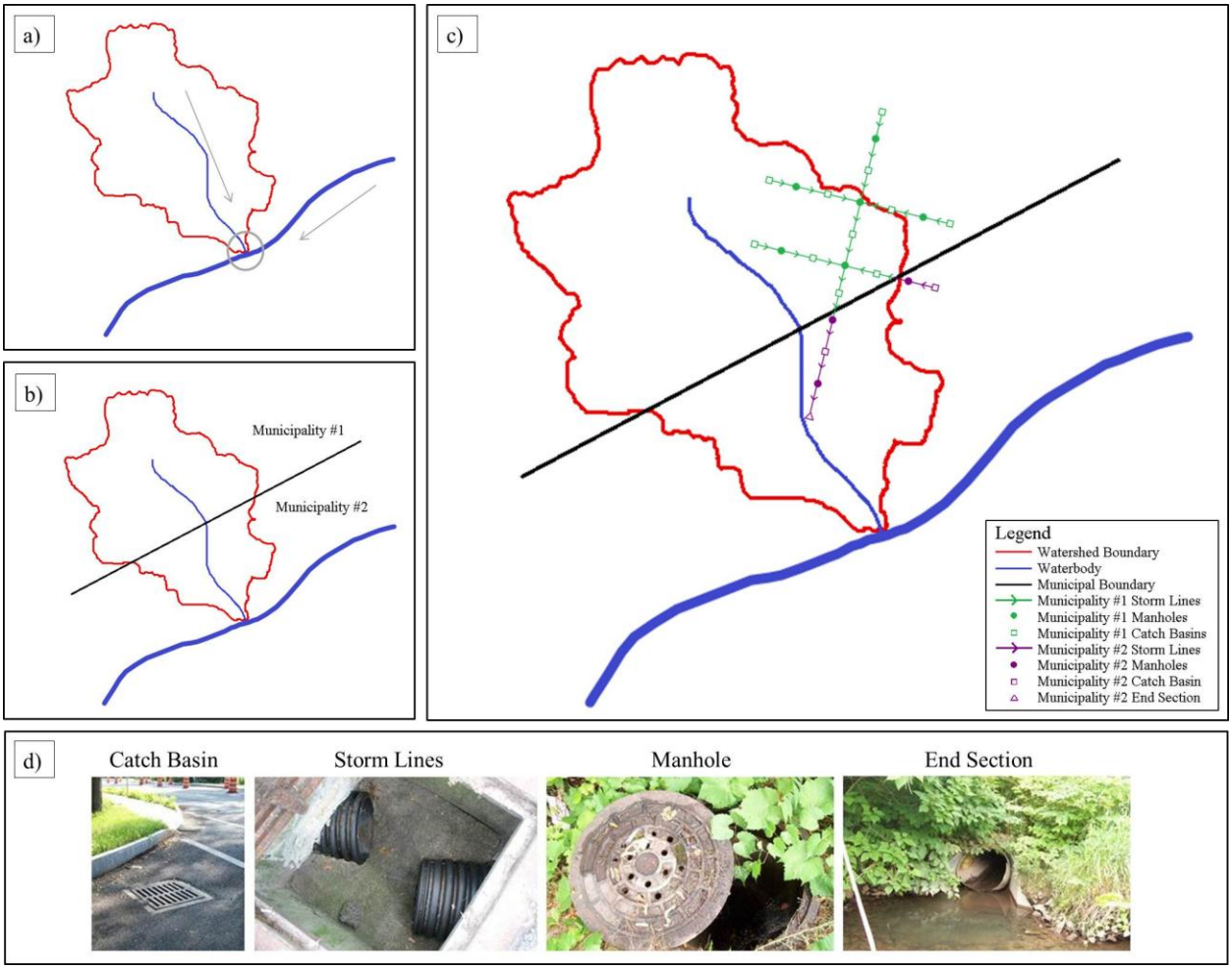
End Section


CATCH BASIN
TOP
(Elevation_Rim)
GRATE (Grate_Shape; Grate_Dimensions)
DEPTH (Depth)
SUMP
(Sump_depth)
BOTTOM
(Elevation_Bottom)
NOTE: Definition of attributes on SSM_Data Collection Guide_26 June 2012

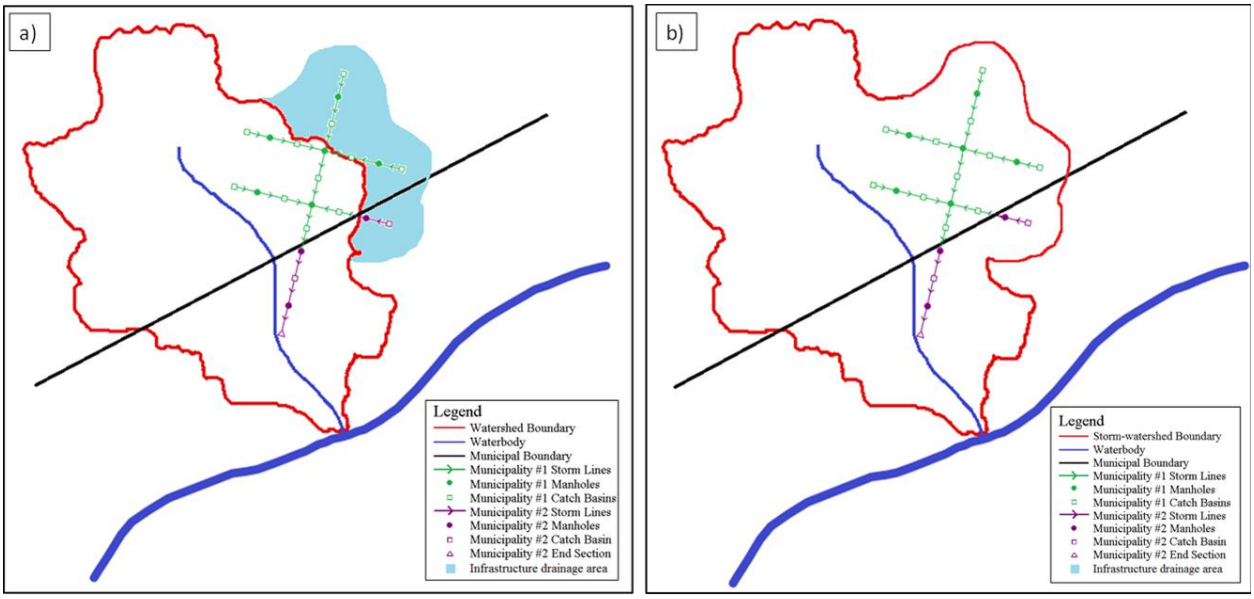

MANHOLE
TOP
(Elevation_Rim)
COVER
(Cover_Shape; Cover_Dimensions)
DEPTH (Depth)
BOTTOM
(Elevation_Bottom)
NOTE: Definitions of attributes on SSM_Data Collection Guide_26June2012



NOTE: Definitions of attributes on SSM_Data Collection Guide_26June2012



Explanation of a “storm-watershed.” a) A watershed. The grey arrows indicate direction of flow of the water. The grey circle indicates a hydraulic junction. b) An intermunicipal watershed. The same watershed crosses over municipal boundaries. c) A “storm-watershed.” The arrows on the main lines indicate direction of flow. d) Stormwater conveyance system structures.

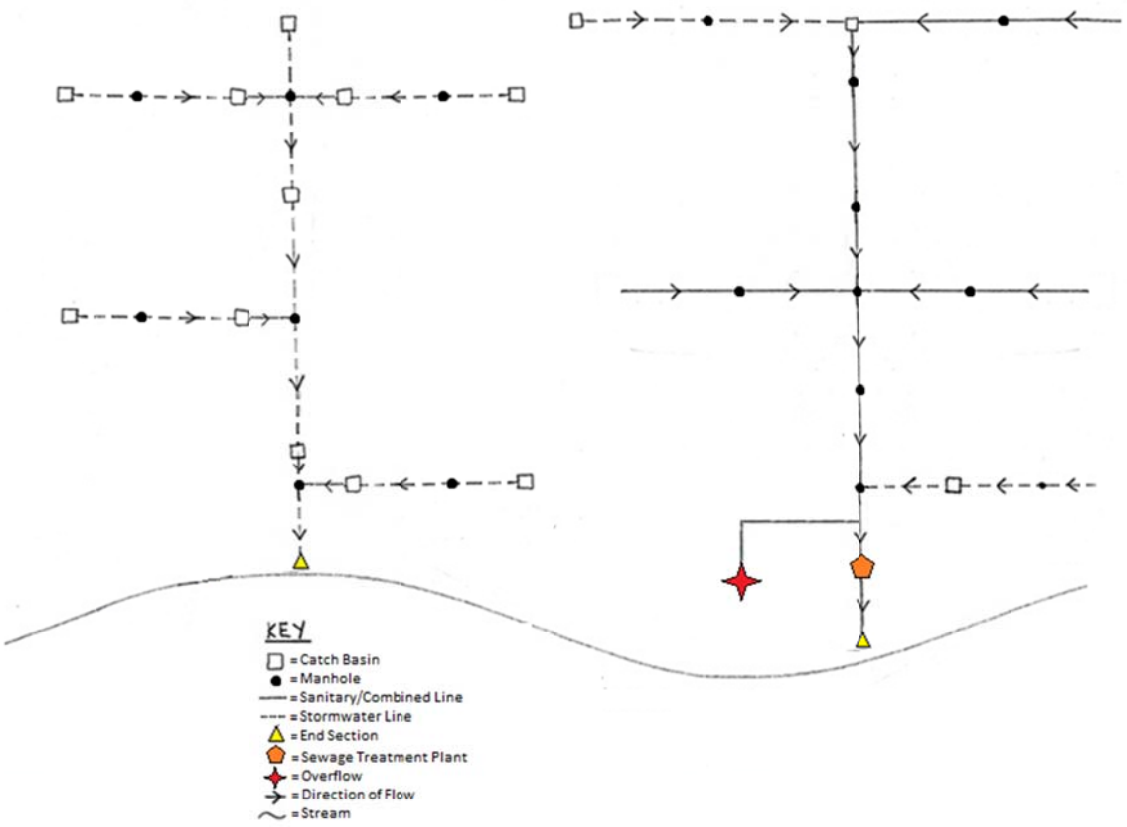


The delineation of a stormwatershed. a) A natural watershed with additional drainage due to stormwater infrastructure. b) Delineated storm-watershed. The storm-watershed is comprised of both the natural watershed and the drainage area due to infrastructure. They function as part of the same drainage area.

Conveyance System Differentiation Diagram

Separated Stormwater Conveyance System

Sanitary/Combined Conveyance System



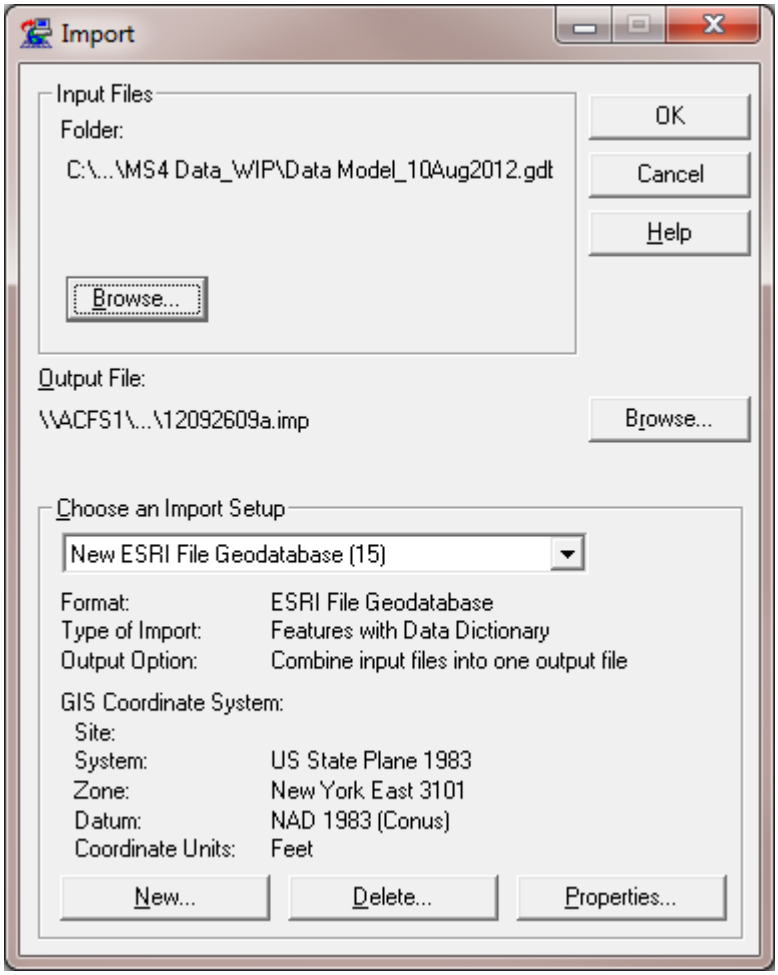
Appendix L

Field Work Handout #2: How To Use Your GPS Unit

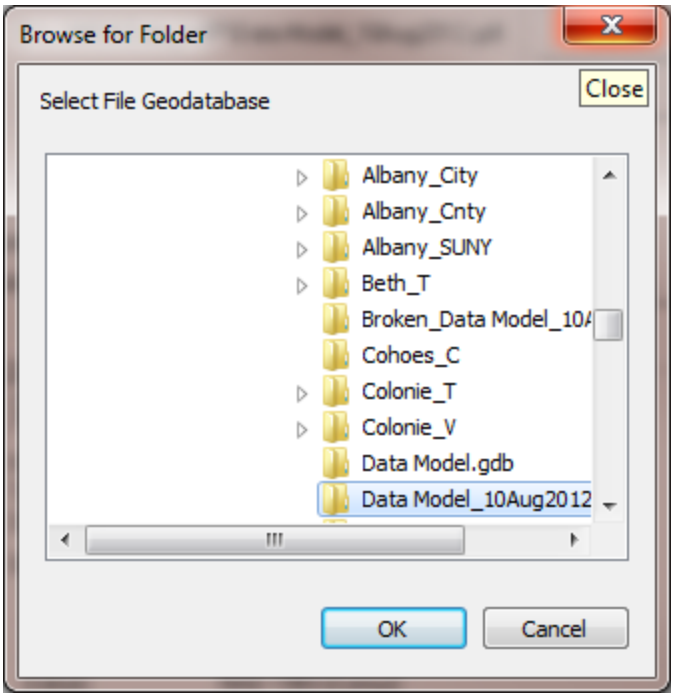
How to create a data dictionary in Pathfinder Office from a file geodatabase

The methodology for creating a data dictionary in Pathfinder Office from a pre-existing file geodatabase in ArcGIS.

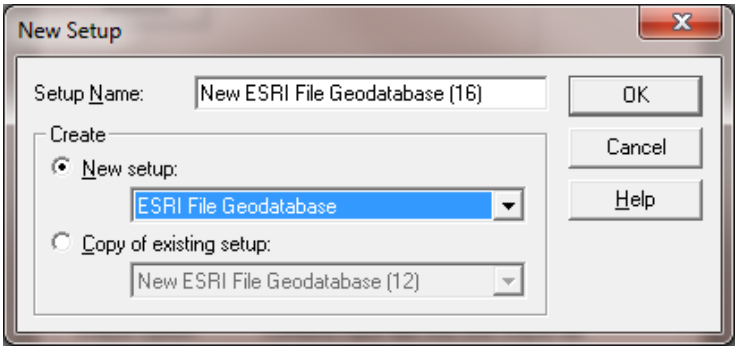
1. Open Pathfinder Office
2. Create a new project with a new destination folder if necessary. If not, choose your project from the drop-down list (SSM Project)
3. Under the Utilities tab, click on IMPORT



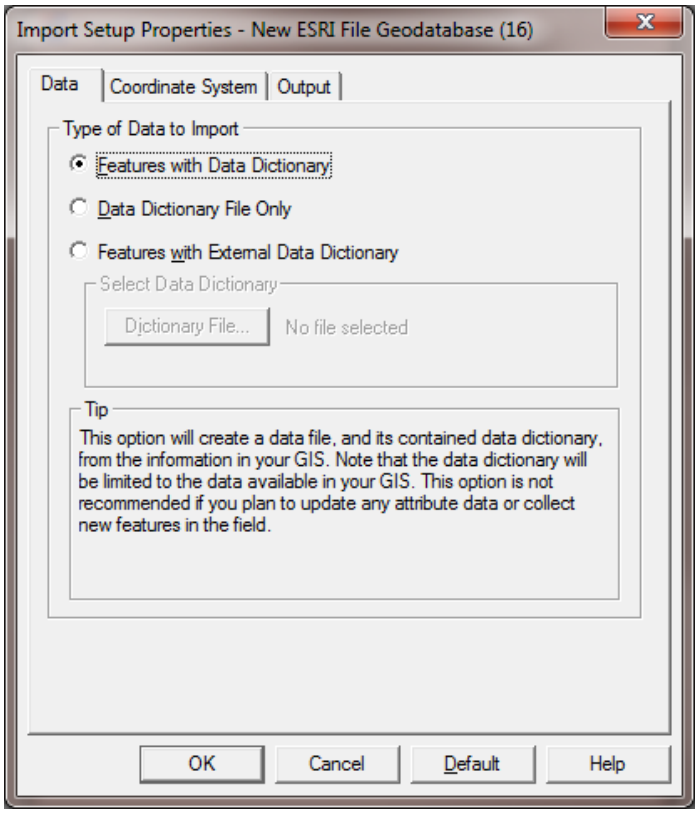
   a. Click on BROWSE and find the current geodatabase to import
      i. Click OK



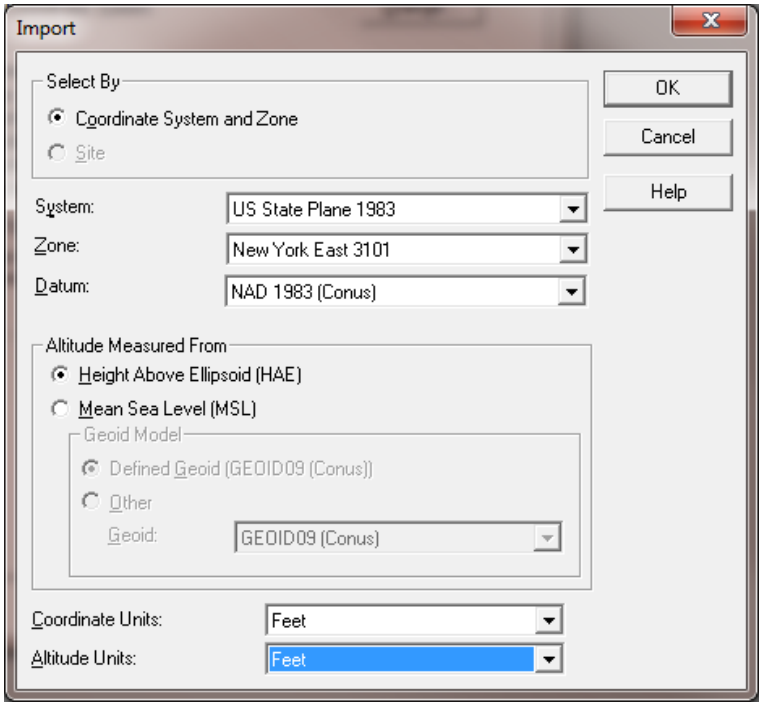
b. In the Import window under Choose an Import Setup, there is a drop-down box. Select to import a New ESRI File Geodatabase.
c. In the import window, click NEW at the bottom
    i. In the New Setup window, make sure everything is set for a new file Geodatabase



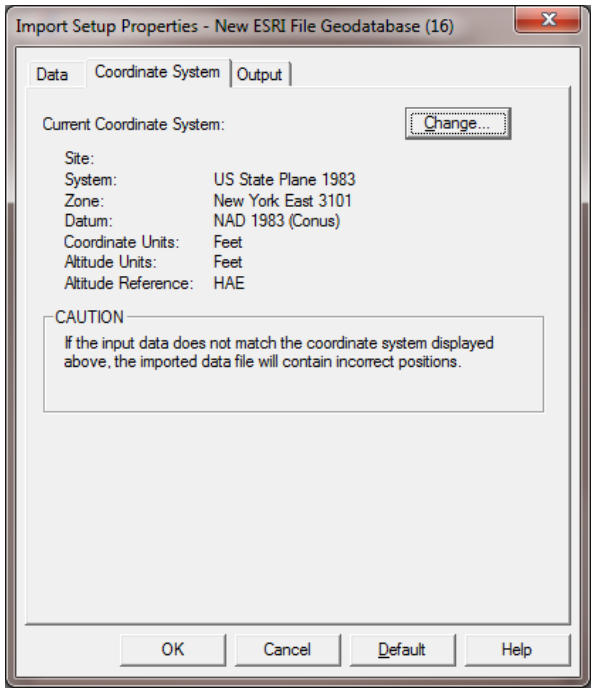
    ii. Click OK.
d. When the Import Setup Properties window opens, select the Data tab.
    i. Since this is a blank geodatabase (template with no data), select the radio button to import 'Features with Data Dictionary'



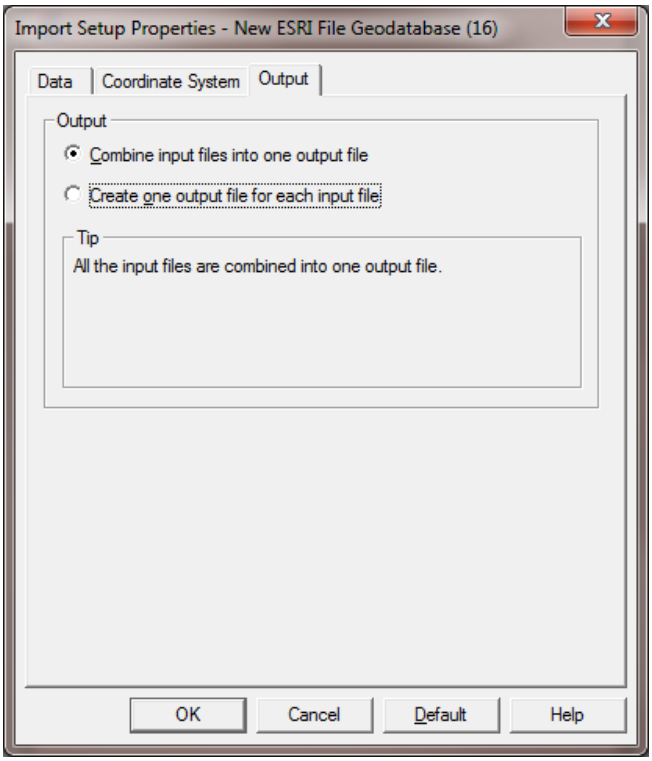
e. Select the Coordinate System Tab
    i. Click CHANGE
        1. Change the coordinate system to State Plane NAD 83 NY East
            a. Make sure Coordinate Unites and Altitude Units are in Feet



f. Click OK; the window should now look like this:

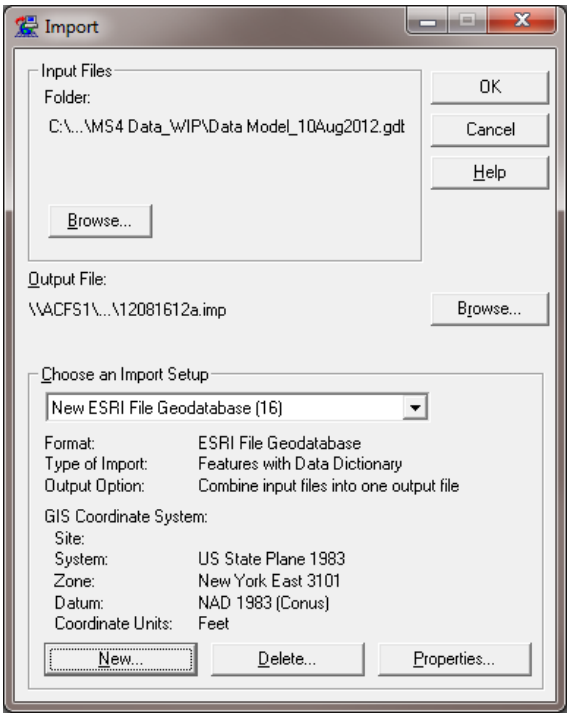


Select the Output Tab→Select the radio button that says “Combine input files into one output file”



Click “OK”

The final Import window should look like this:



Click “OK”

Click on the tab that read Utilities→Data Dictionary Editor→File→Import from Data File→Find the file with the .imp (import) extension that has the date for the day you did the import process→Open that file

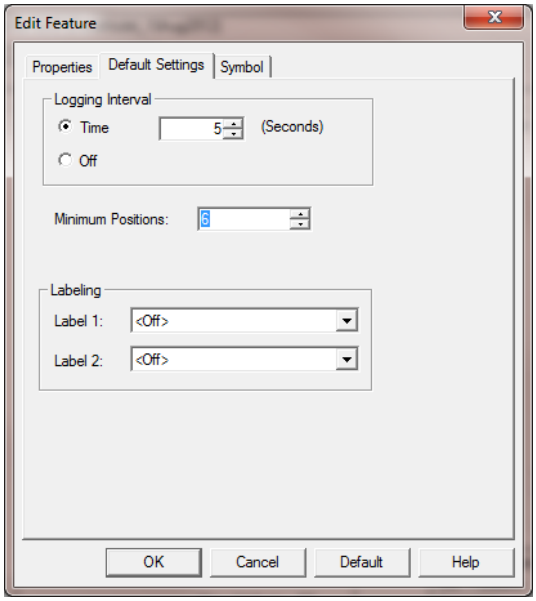
Now, the data dictionary should show up. Rename it/add a comment as needed.

Double click on one of the features in the left panel (or click on it and then click the edit feature button below)

Everything under the properties tab should be accurate as that information was from the GDB

Under the tab that reads Default settings:

1) If the feature is a point, change the logging interval to 5 seconds and minimum positions should be 6 (standard).

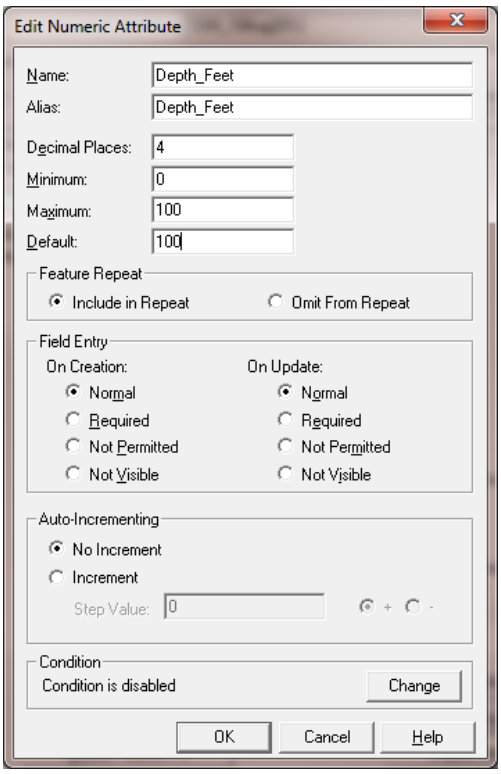


2) If the feature is a line, change the logging interval to 1 second and minimum positions should be 6 (standard).

Edit symbology under the symbol tab as needed.

Click “OK”

Within each feature, the numeric attributes decimal places/min/max/defaults need to be edited. You can double click on the attribute (or click on the attribute and then click on the edit attribute button below) to edit these things.



GPS File Manangement

Creating a new file and opening an existing file

NOTE: Once you create a file and you are collecting data, it can be added to or information can be edited for up to one week.

Open TerraSync on your GPS.

1. Creating a new file:

   There is a drop-box with the word 'Data' in it. Below that, there is a drop-box with the word 'New (T)' in it.

   Click on the 'Create' button to create a new file for data collection.

   When you create a new file, include the date, name of the MS4, and the watershed you are collecting data in.

   Ex: For data collected by Albany County in the Patroon Creek on January 12, 2013)

   R011213_AlbanyCounty_Patroon

   (the 'R' at the beginning of the file name is a default)

   You can now collect data.

2. Opening/Editing an existing file:

   There is a drop-box with the word 'Data' in it. Below that, there is a drop-box with the word 'New (T)' in it.

   Click the drop arrow and select 'Existing file.'

   Select the file you want to open and click on the 'Open' button to continue your data collection.

How to collect a Main Line

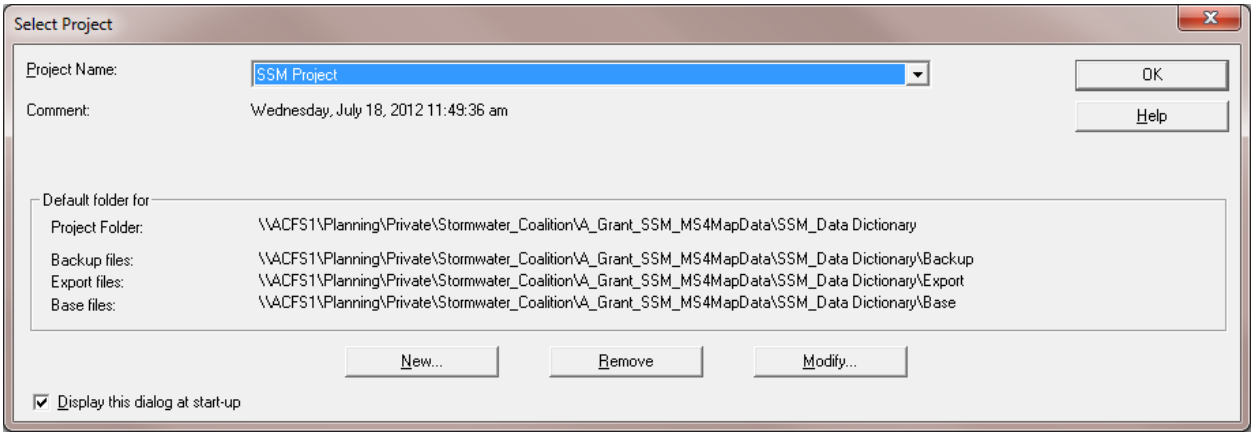
How to collect a main line using a GPS unit as to avoid getting a 'pile' of verticies

1) Make sure you are under the DATA Menu with the COLLECT FEATURE tab
2) COLLECT FEATURE→MAIN LINE→CREATE
3) When the Main Line data collection screen comes up, click PAUSE
4) Then, click OPTIONS→NEW VERTEX
    a. A small header that says 'Vertex 1, Remain stationary' will pop up
    b. Fill out the information about the main line
    c. **Remain stationary until at least 10 points are collected (approx.. 10 seconds)
5) Click OK once to complete the collection of Vertex 1.
6) Walk to the other end of the main line segment you are mapping.
7) Click OPTIONS→NEW VERTEX
    a. A small header that says 'Vertex 2, Remain stationary' will pop up
    b. **Remain stationary until at least 10 points are collected (approx.. 10 seconds)
8) Click OK once to complete the collection of Vertex 2.
9) Click OK again to complete the collection of the main line.

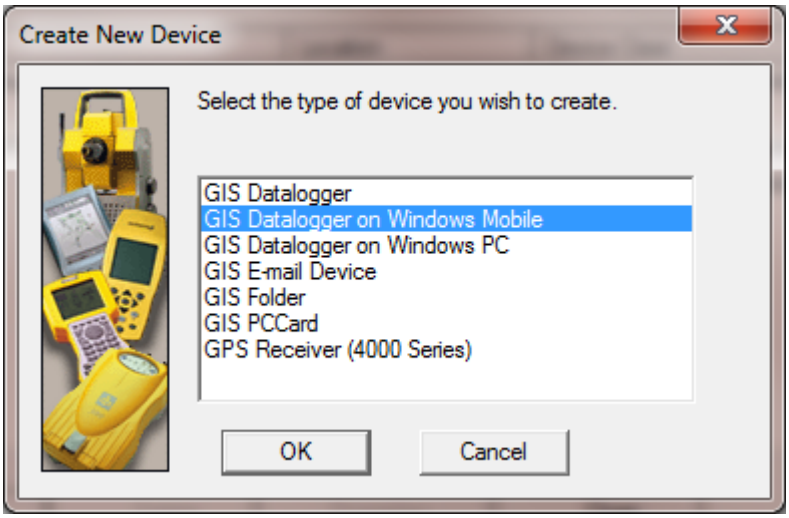
How to post process GPSed data

The methodology to post process data that was collected (GPSed) and convert them to a GIS shapefile

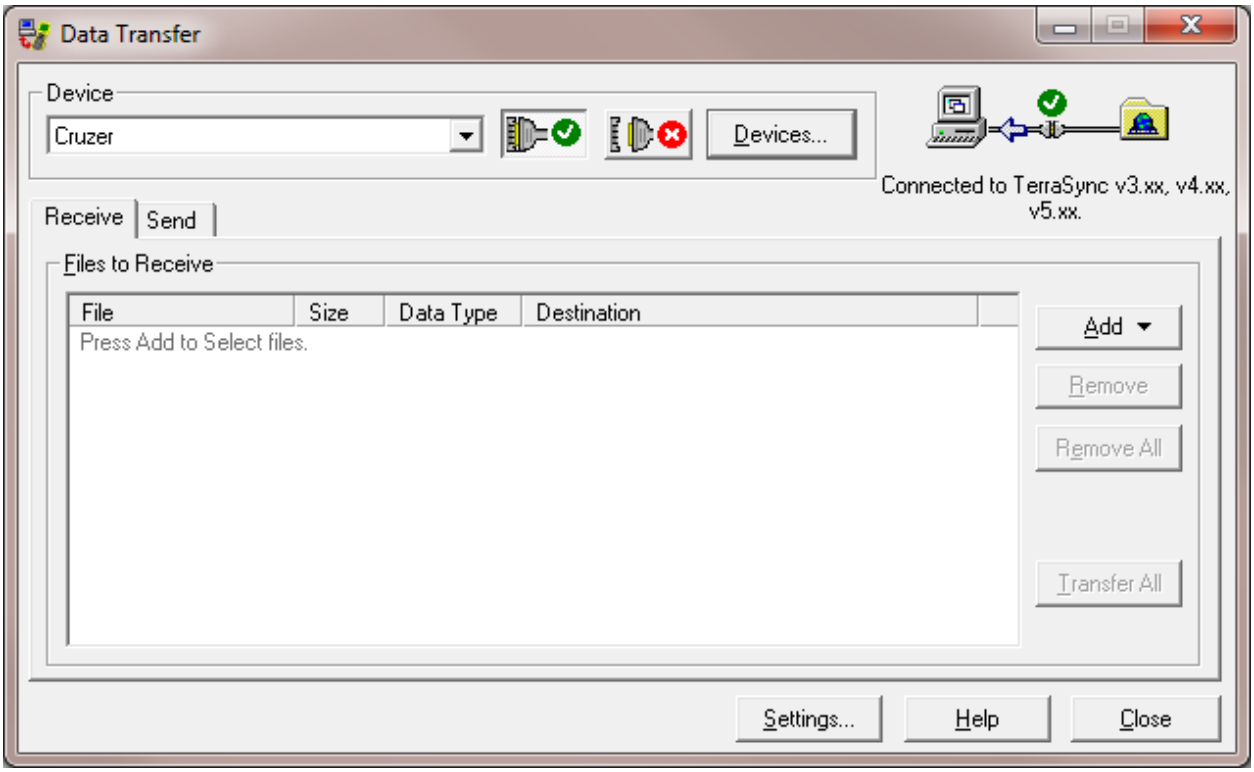
1. Open Pathfinder
    a. Find the project you are working on in Pathfinder and click OK



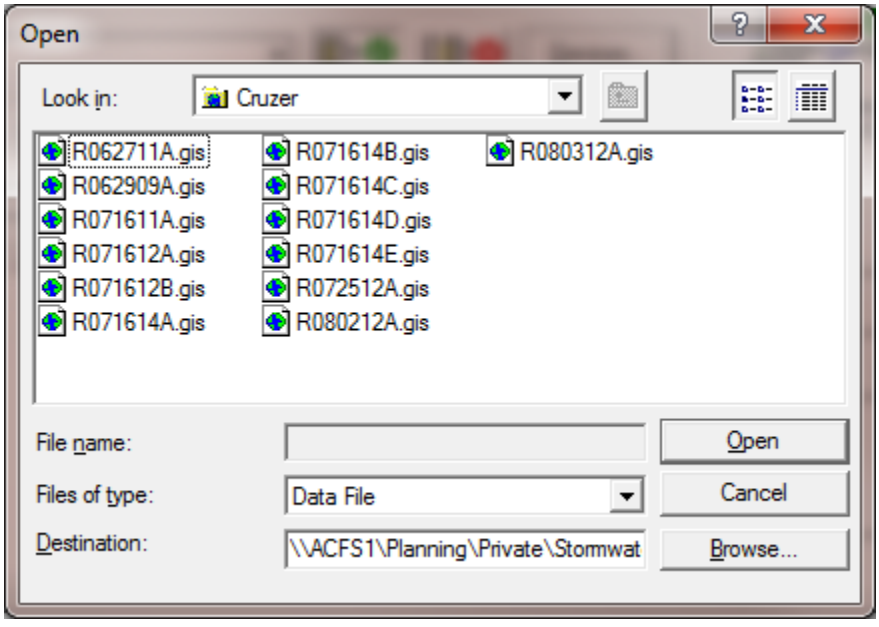
2. Turn on unit and plug it in to computer
3. In Pathfinder under the Utilities tab, click on DATA TRANSFER
    a. Click on DEVICES
        i. Click on NEW
            1. Most devices will be a 'GIS Datalogger on Windows Mobile' Device



            2. Click OK
            3. Specify a name for the unit and click FINISH
            4. The name of the unit should now show up in the Devices window
            5. Click CLOSE on the Devices window
    b. In the Data Transfer window under Device, there is a drop-down box. Select the device you just created.
    c. Click on the button that looks like a plug with a green circle and check mark to connect to your device



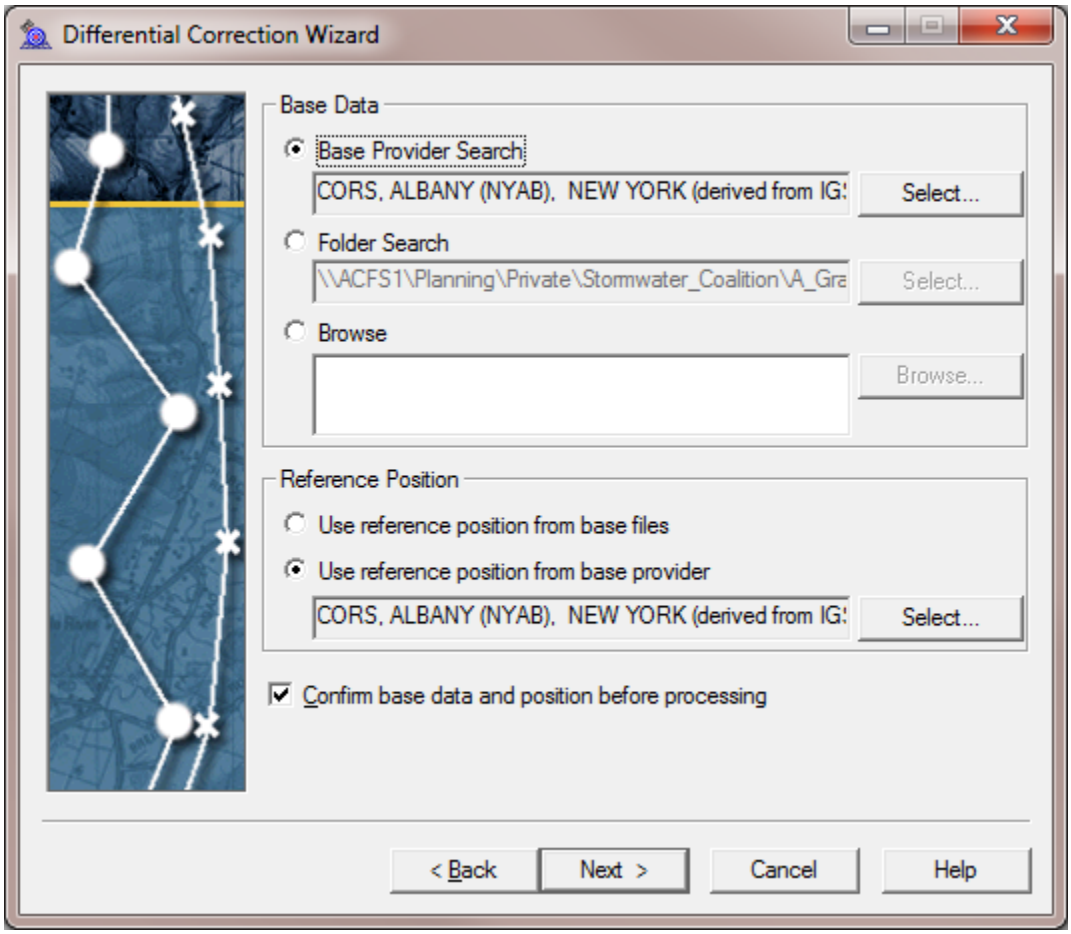
d. Once connected, in the data transfer window, the Receive tab should be selected
e. Click on the ADD button which has a drop arrow
    i. Select DATA FILE



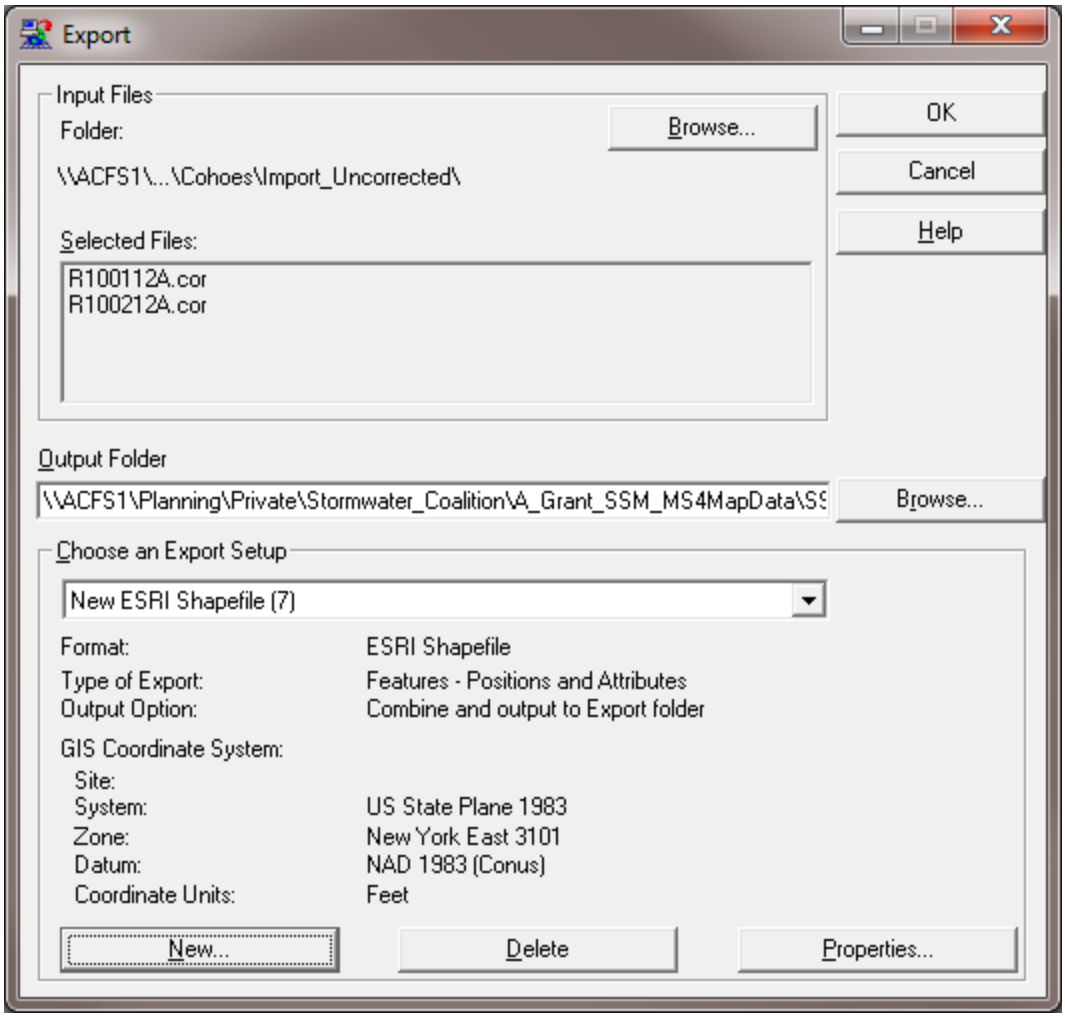
f. Find the appropriate files and click OPEN
g. In the Data Transfer window, Click TRANSFER ALL
h. Close the Data Transfer Window

4. The files need to be Differentially Corrected

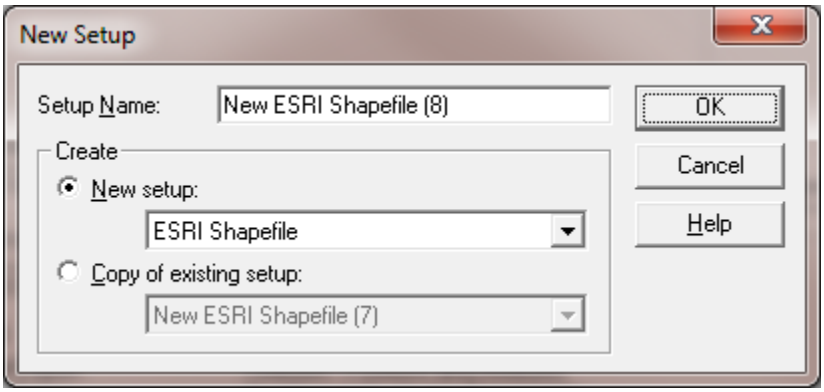
a. In Pathfinder, under the Utilities tab, click on DIFFERENTIAL CORRECTION
    i. The Differential Correction Wizard will open
        1. Follow the instructions
        2. Make sure that when you get to the page that has the Base Data, the closest provider is selected



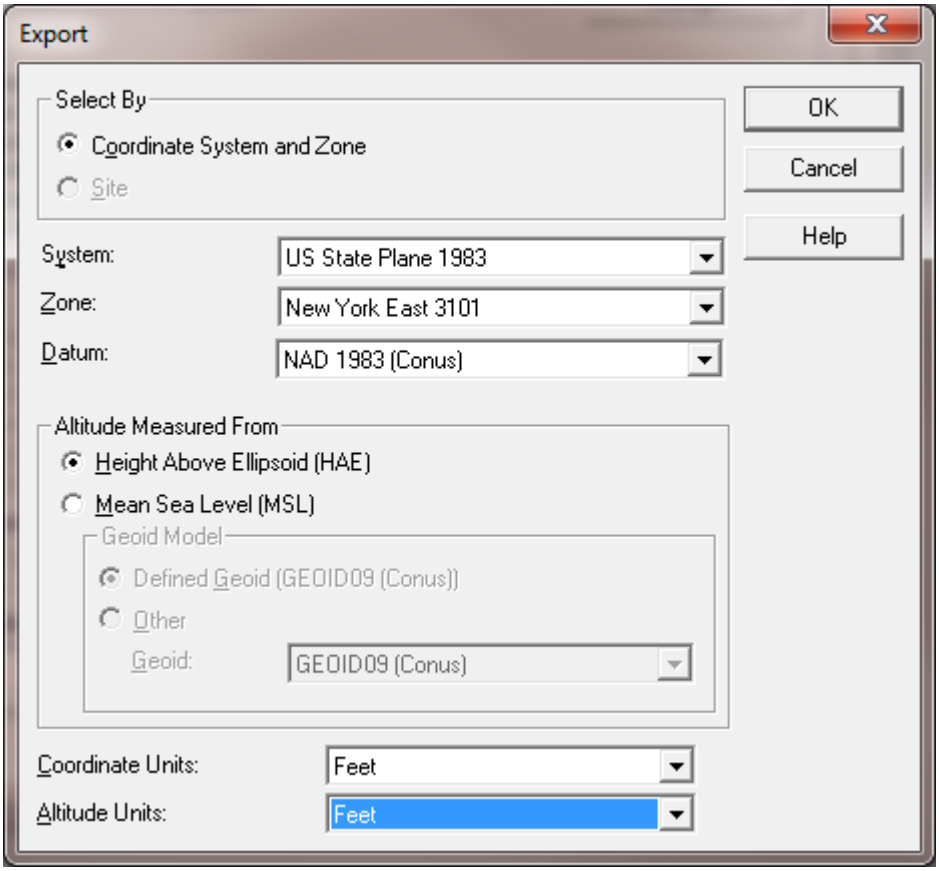
5. The differentially corrected files need to be exported to shapefiles
    a. In Pathfinder, under the Utilities tab, click on EXPORT
        i. The Export window will open



ii. Under the Input Files section, click on BROWSE and find the differentially corrected file(s) to export
    1. Click OPEN
iii. Under the Output Folder section, click on BROWSE to find the folder you want the shapefile(s) to go to
iv. In the Export window under Choose an Export Setup, there is a drop-down box. Select to export a New ESRI Shapefile
v. In the export window, click NEW at the bottom
    1. In the New Setup window, make sure everything is set for a new shapefile



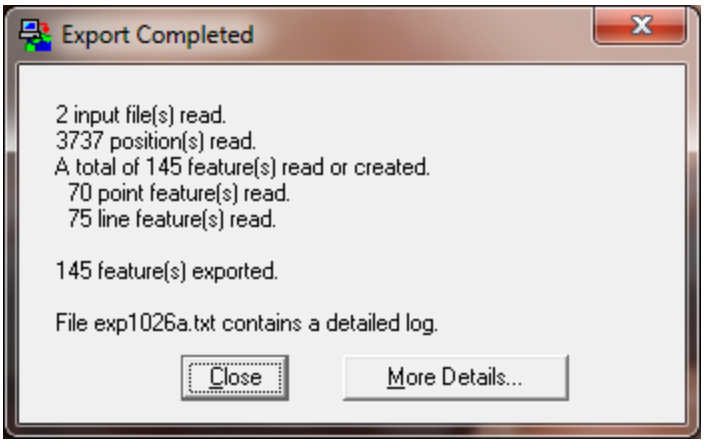
2. Click OK.
3. The Export Setup Properties window will open
    a. Under Attribute tab, click date recorded and data dictionary name
    b. Under the Units tab, Click the radio button that says USE EXPORT UNITS; everything should be in feet, acres, and miles per hour
    c. Under the Coordinate System tab, click the radio button that says USE EXPORT COORDINATE SYSTEM; select for US State Plane 1983 NY East 3101



    d. For other tabs, accept the defaults
    e. Click OK

vi. In the Export Window, click OK

b. A window that says EXPORT COMPLETED will appear



i. Click CLOSE

6. Close Pathfinder
7. Open ArcCatalog
    a. Make sure that the exported files (from Pathfinder) have the correct coordinate system
        i. Define Coordinate System for each shapefile
8. Create a copy of the current geodatabase for the specific municipality
9. Load the exported data into their respective features in the geodatabase
10. The data can now be added to ArcMap for editing

Appendix M

Albany County Storm Sewershed Analysis

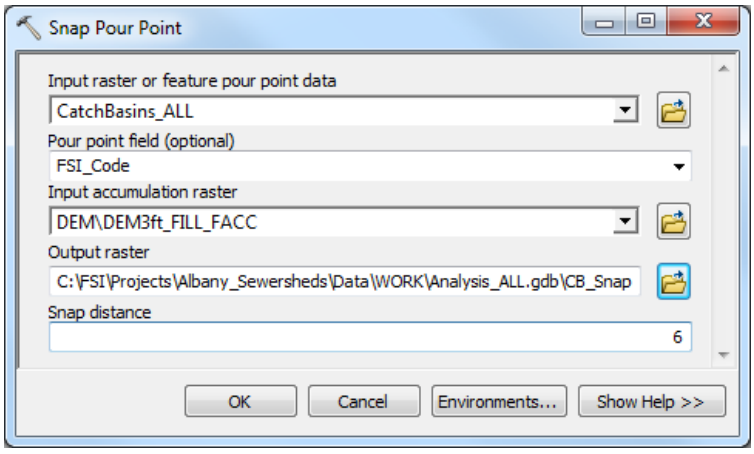
Albany County Sewershed Analysis

Overview

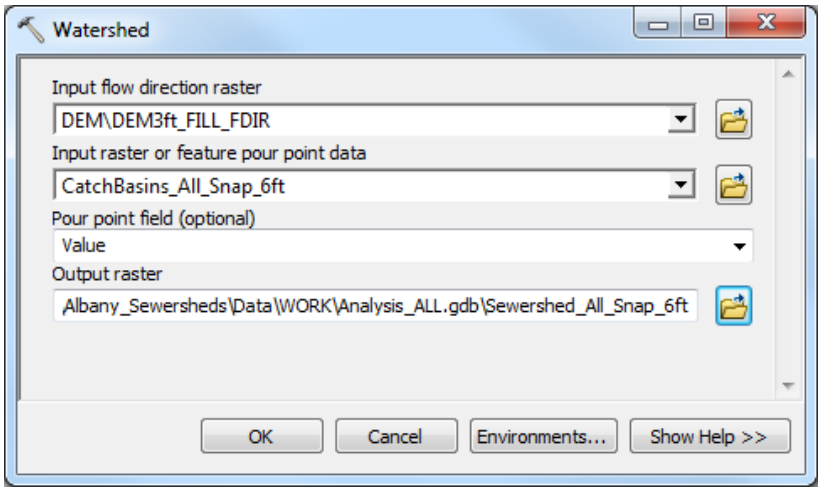
The 3ft DEM was preprocessed to generate the requisite flow direction and accumulation grids. These county wide layers can be used for all further sewershed analyses within the county, should any additional analysis be needed. After preprocessing, input catch basins were snapped to the cell of highest flow accumulation within a 6ft radius. This step is necessary to account for misalignment/inherent errors in the data. Other radii were investigated but the 6ft radius was found to produce the best results while minimizing the introduction of additional errors. After the catch basins were snapped, sewershed boundaries were produced and were converted to polygons. These were merged with the existing topography-based sewersheds to create sewersheds that represent the topography and sewer infrastructure in the county.

Details

1. Get all catch basins into a single catch basin layer
2. Make sure all catch basins are coded by sewershed name
3. Use the **Snap Pour Point** function of Spatial Analyst to automate the snapping of catch basins to the cell of highest flow accumulation within a specified radius:
    a. Within the **Spatial Analyst Tools** toolset, expand **Hydrology** and double-click on **Snap Pour Point.** The **Snap Pour Point** tool opens.
    b. Select the layer containing the catch basins of interest as the **Input raster or feature pour point data.**
    c. Select the Pour point field. This is the field that uniquely identifies the pour points.
    d. Select the **Flow accumulation raster** produced during the preprocessing.
    e. Provide a name and storage location for the output raster. We recommend storing the output in a file geodatabase to improve processing speed.
    f. Next, enter a value of **6** as the **Snap distance.**
    g. Click **OK** to run the **Snap Pout Point** tool.

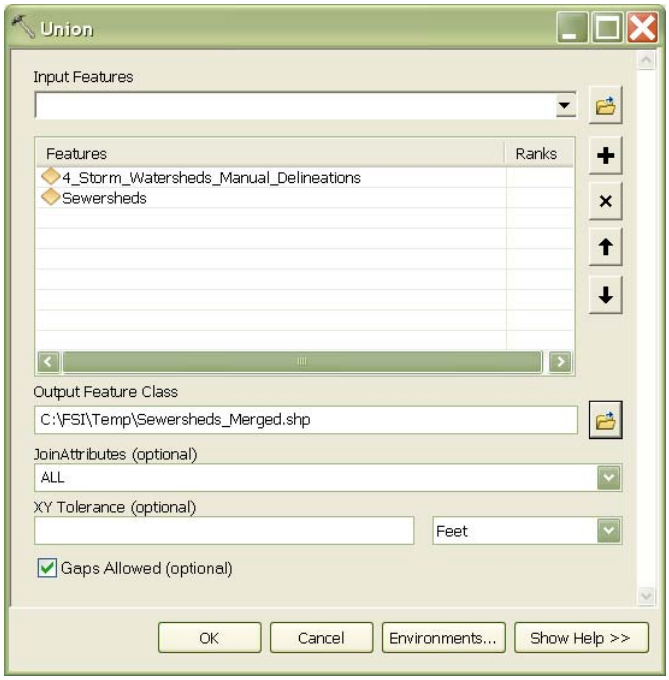


4. Next, run the **Watershed** function to produce sub sewersheds for each catch basin.
    a. Within the **Hydrology** Toolset, double-click on the **Watershed** function.
    b. Select the flow direction grid created during the preprocessing as the **Input flow direction raster**.
    c. Select the snapped catch basins as the **Input raster or feature pour point data**.
    d. By default "Value" will populate into the **Pour point** field.
    e. Specify a name and storage location for the output raster.
    f. Click **OK** to run the **Watershed** command.



5. Convert the raster results to polygons using the **Raster to Polygon** tool.
    a. Within the ArcToolbox panel, expand the **Conversion Tools > From Raster** toolset.
    b. Double-click on the **Raster to Polygon** tool.
    c. Select the Input raster. This is the dataset created above.
    d. By default the Value field will be selected from the field dropdown list. This is the appropriate field, leave the selection as it is.
    e. Provide an output name and storage location for the retults.
    f. Click **OK** to run the tool

6. Use the **Union** tool to combine the existing topography based sewersheds with the catchbasin based sewersheds.
    a. Within the ArcToolbox panel, expand the **Analysis Tools > Overlay** toolset. Double-click on the **Union** tool.
    b. Specify the topography based sewersheds and the catch basin sewershed analysis polygon layer as inputs to this tool.
    c. Specify a name and storage location for the output.
    d. Accept all other defaults and click the **OK** button to run the tool.

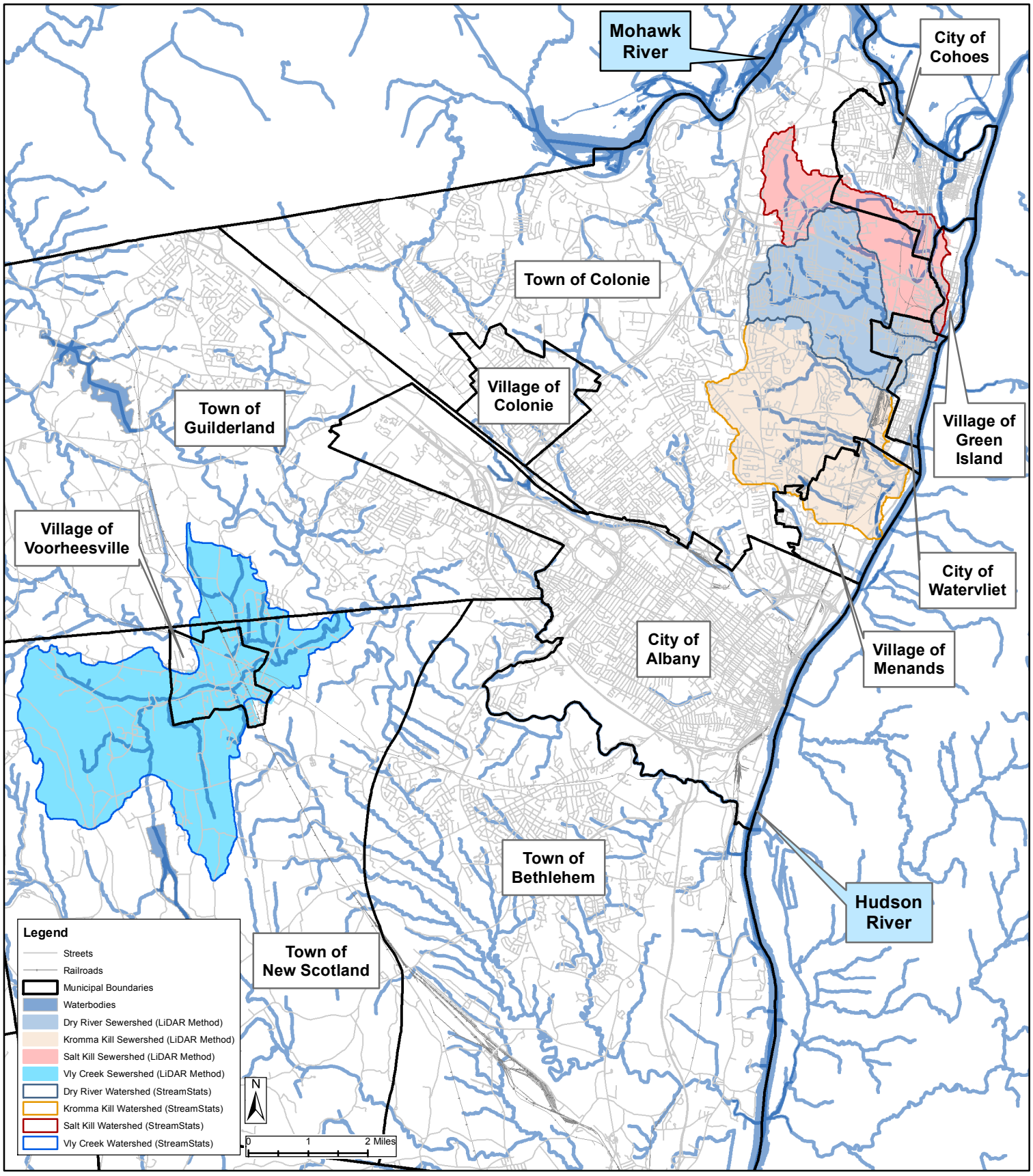


7. Check for errors and manually merge erroneous polygons to the appropriate sewershed during an edit session. Simply select the polygon of interest and the sewershed to which it should belong and merge them together using the **Edit > Merge** function on the **Editor** toolbar.
8. Delete and unnecessary fields from the layer attribute table and add a name field to record the name of each sewershed, if desired.

Appendix N

Storm Sewershed vs. Watershed Boundaries

Storm System Mapping Project
Storm Sewersheds vs. Watersheds



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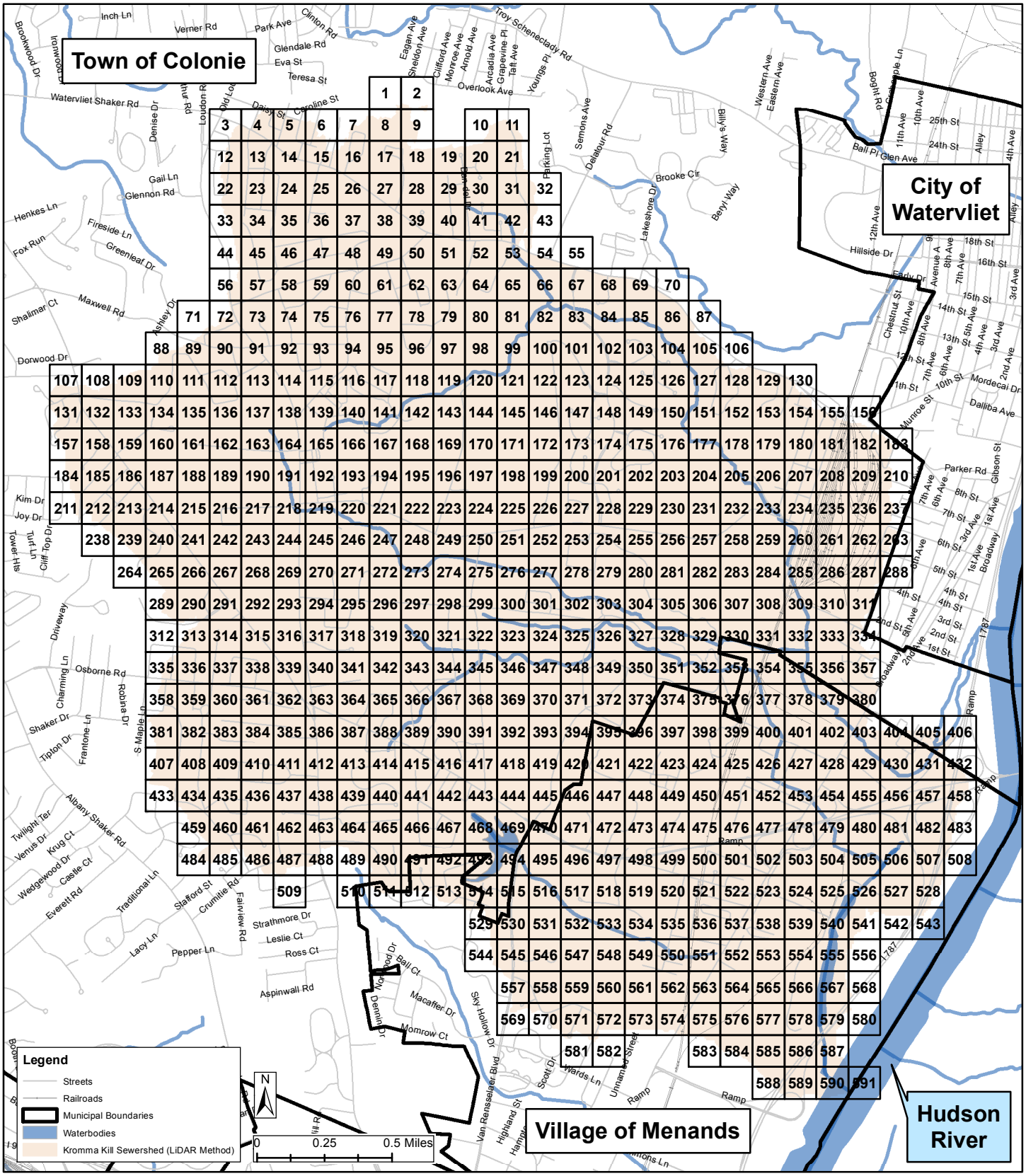
Albany County, City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Village of Colonie, Village of Green Island, Town of Guilderland, Village of Menands, Town of New Scotland, Village of Voorheesville, City of Watervliet, SUNY Albany

Prepared by the Stormwater Coalition of Albany County
Date: June 2013 Location: Albany County, NY
File Name: SSM_Sewersheds_June2013.mxd

Appendix O

Map Book Cover Sheets & Sample Page

Storm Sewershed Map Book
Kromma Kill



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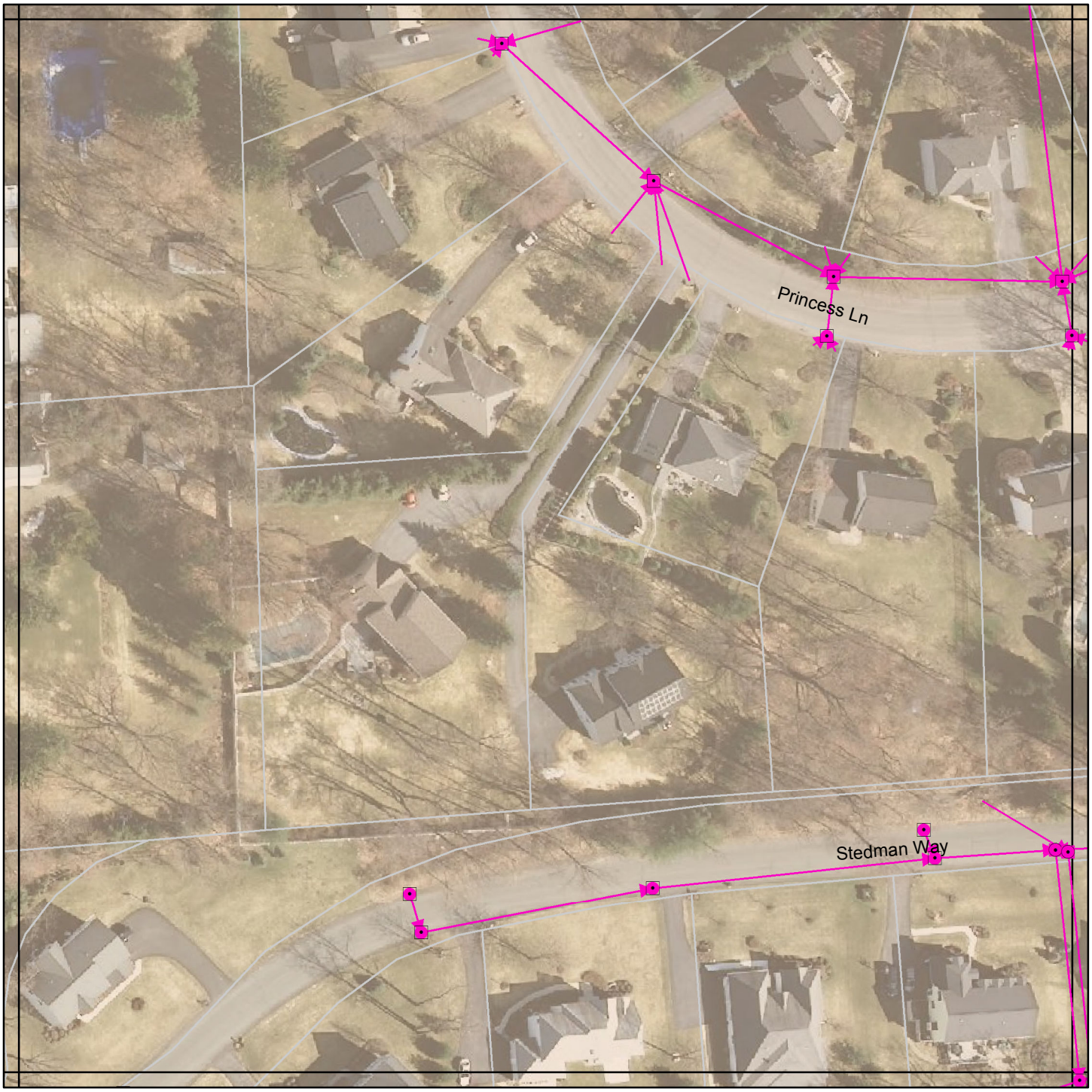
Prepared by the Stormwater Coalition of Albany County
Date: June 2013 Location: Albany County, NY
File Name: SSM_KrommaKill_MapBook_June2013.mxd

413

438

440



464

Storm Sewershed Map Book
Kromma Kill

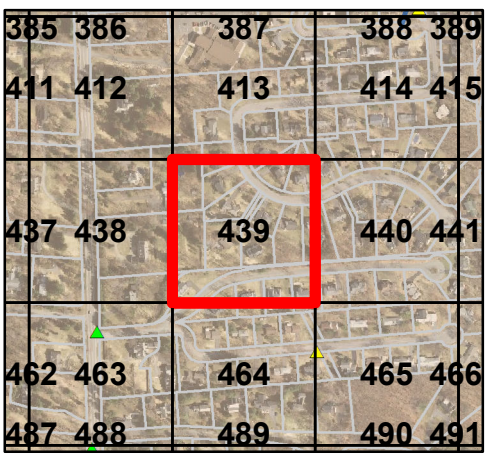
0 0.005 0.01 Miles

N

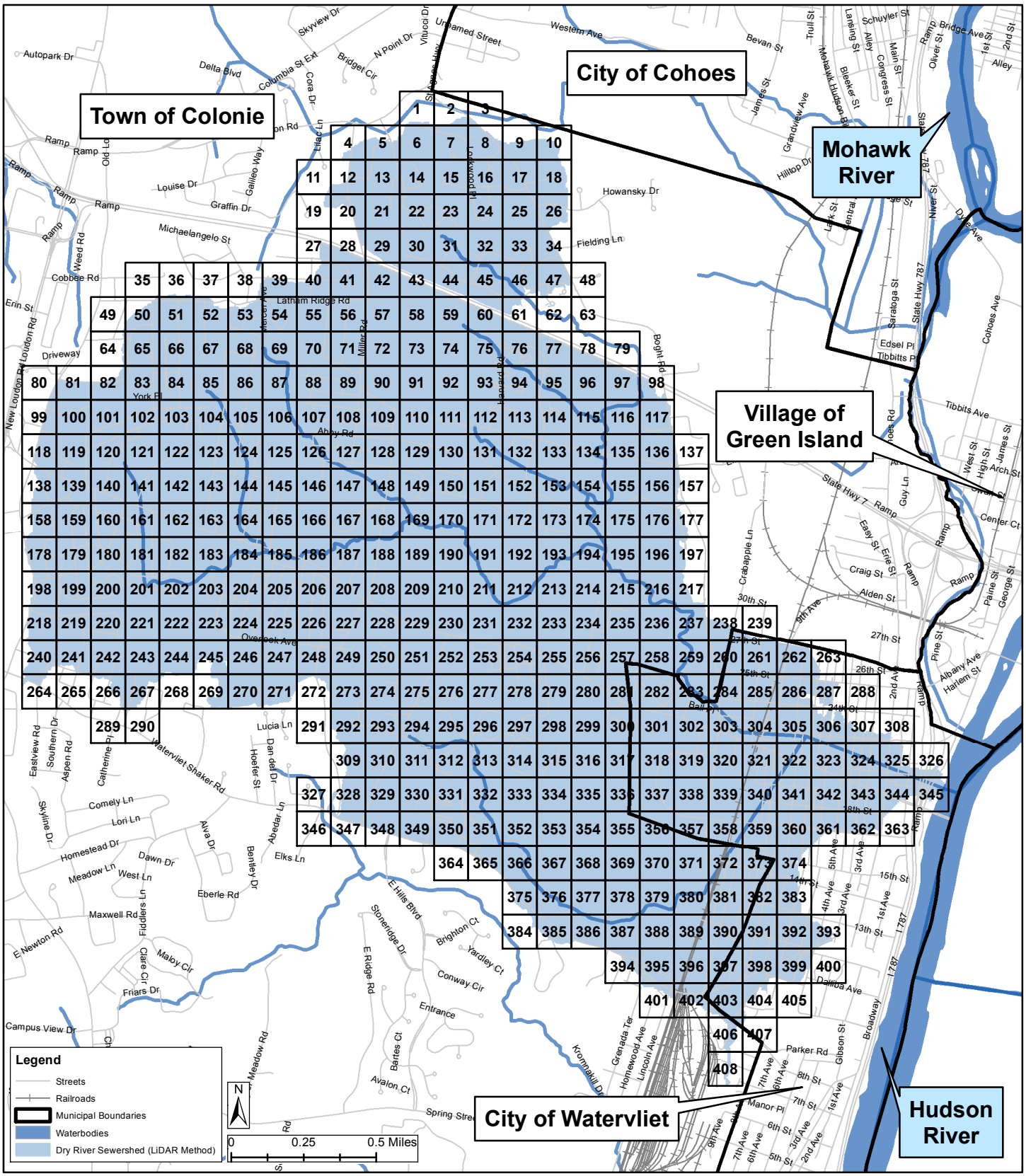
Legend

- Outfalls (AIMS)
- NYS DOT Outfalls
- Tax Parcels (AIMS)
- Municipal Boundaries
- Waterbodies
- Kromma Kill Sewershed (LiDAR Method)
- Albany County Catch Basin
- Albany County Intermunicipal Connection (OF)
- Albany County Manhole
- Albany County Intermunicipal Connection (OF)
- Albany County Pump Station
- Albany County Storm Structure
- Albany County Main Line
- Albany County End Section (OF)
- T/Colonie Catch Basin
- T/Colonie Manhole
- T/Colonie Lateral Line
- T/Colonie Main Line
- T/Colonie Storm Structure
- Menands Catch Basin
- Menands Manhole
- Menands Intermunicipal Connection (OF)
- Menands Pump Station
- Menands Storm Structure
- Menands Main Line
- Menanads End Section (OF)

(OF = MS4 regulated outfall)



Storm Sewershed Map Book
Dry River



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Prepared by the Stormwater Coalition of Albany County
Date: June 2013 Location: Albany County, NY
File Name: SSM_DryRiver_MapBook_June2013.mxd

259

282

284

302

Storm Sewershed Map Book
Dry River

0 0.005 0.01 Miles

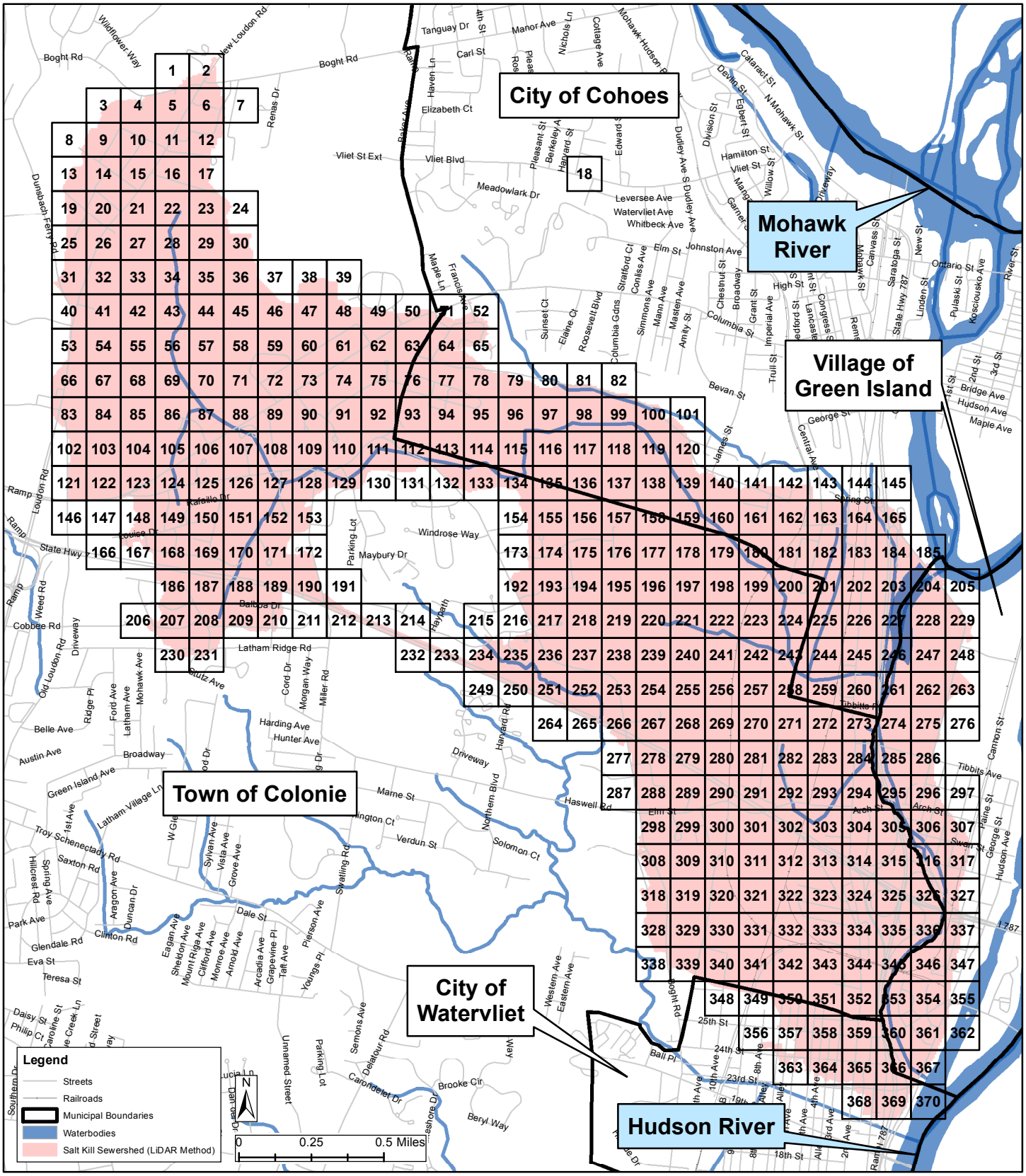
N

Legend

- Outfalls (AIMS)
- NYS DOT Outfalls
- Tax Parcels (AIMS)
- Municipal Boundaries
- Waterbodies
- Dry River Sewershed (LiDAR Method)
- T/Colonie Catch Basin
- T/Colonie Manhole
- T/Colonie Lateral Line
- T/Colonie Main Line
- T/Colonie Storm Structure
- Watervliet Catch Basin
- Watervliet Manhole
- Watervliet Pump Station
- Watervliet Storm Structure
- Watervliet Main Line
- Watervliet End Section (OF)

(OF = MS4 regulated outfall)

Storm Sewershed Map Book
Salt Kill



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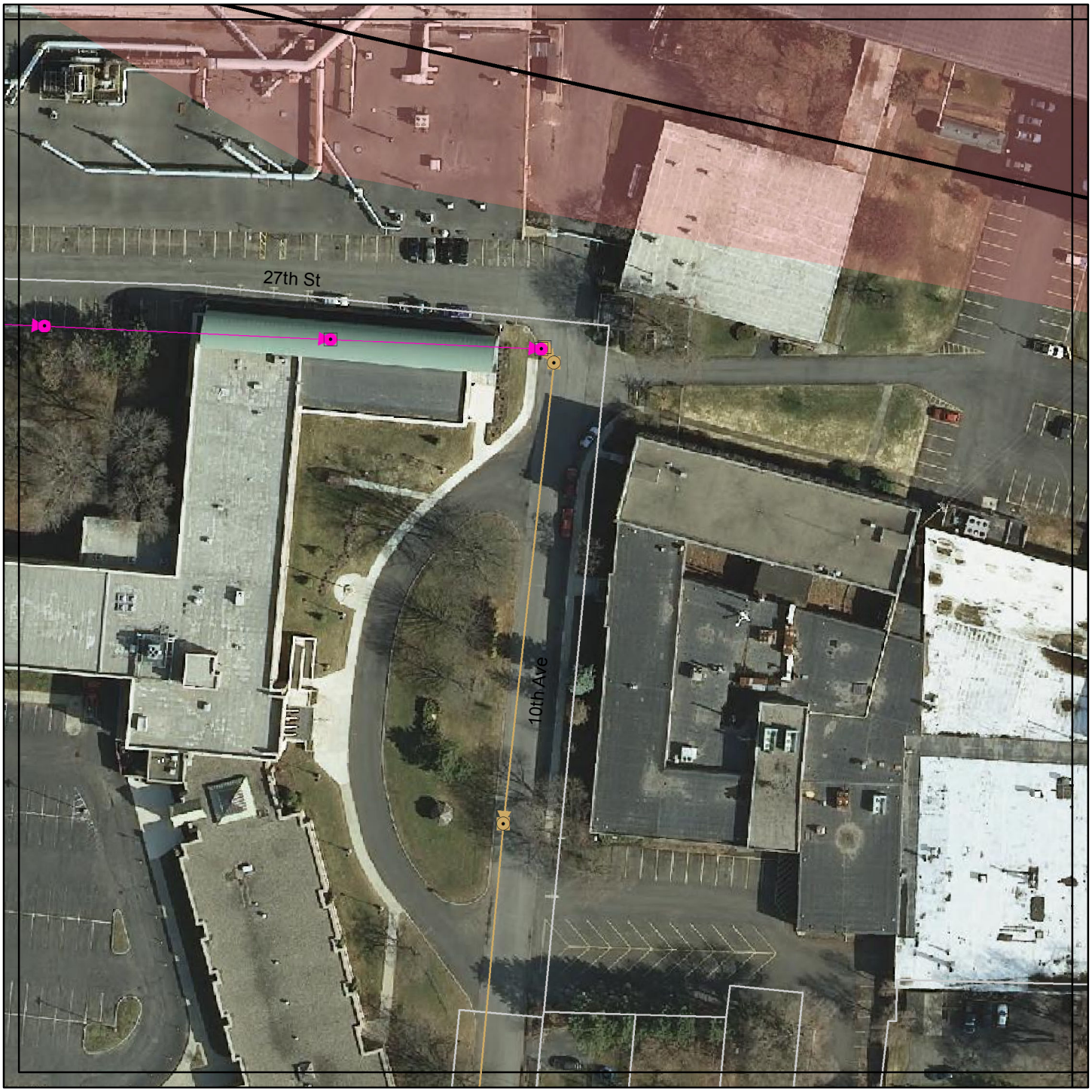
Date: June 2013 Location: Albany County, NY
File Name: SSM_SaltKill_MapBook_June2013.mxd

340

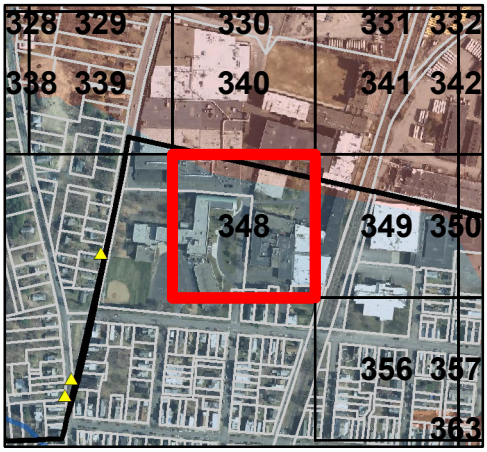


349

Storm Sewershed Map Book
Salt Kill

0 0.005 0.01 Miles

N

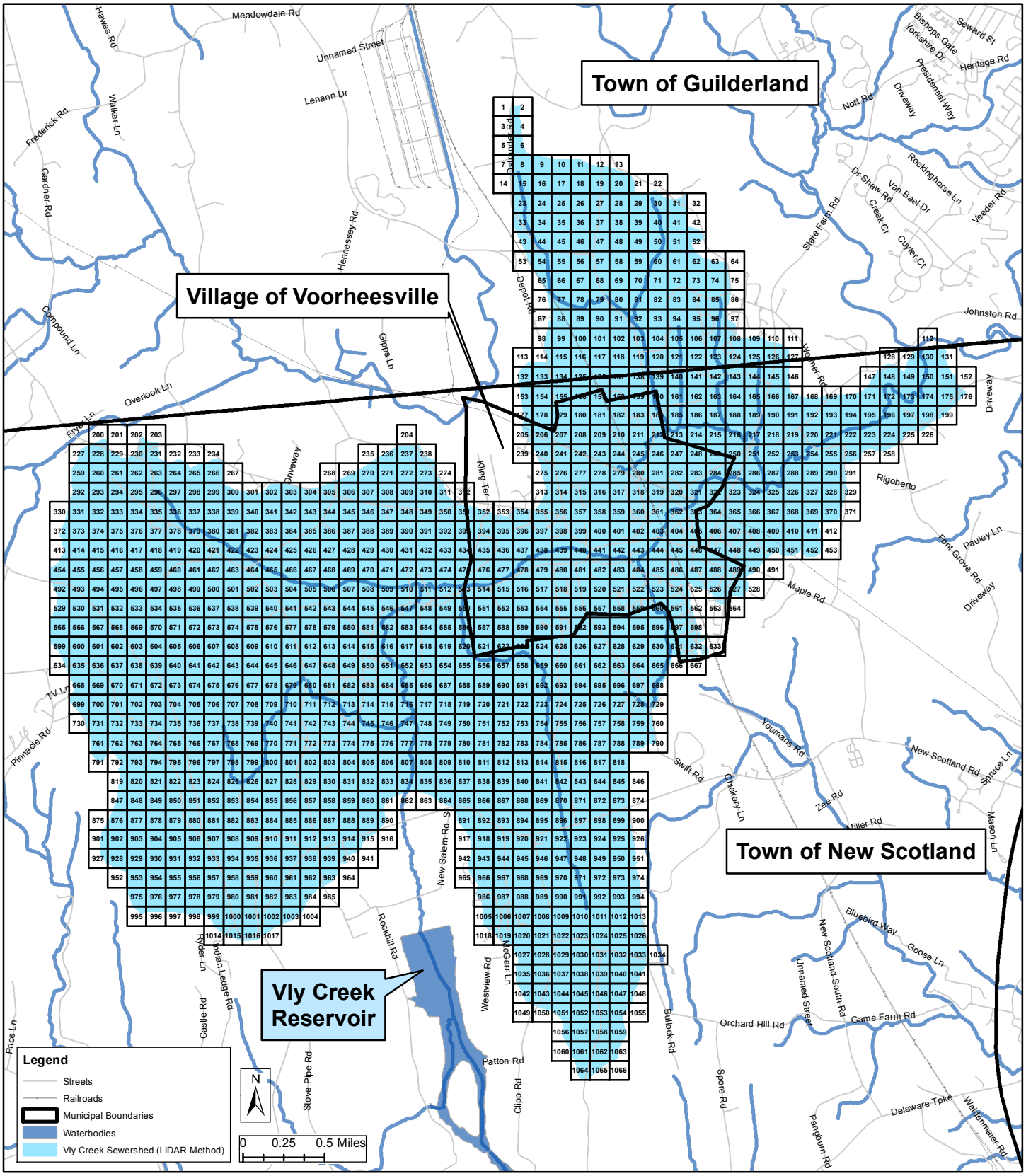


Legend

- Outfalls (AIMS)
- NYS DOT Outfalls
- Tax Parcels (AIMS)
- Municipal Boundaries
- Waterbodies
- Salt Kill Sewershed (LiDAR Method)
- Cohoes Catch Basin
- Cohoes End Section (OF)
- Cohoes Manhole
- Cohoes Pump Station
- Cohoes Storm Structure
- Cohoes Main Line
- Cohoes End Section (OF)
- T/Colonie Catch Basin
- T/Colonie Manhole
- T/Colonie Lateral Line
- T/Colonie Main Line
- T/Colonie Storm Structure
- Green Island Catch Basin
- Green Island Manhole
- Green Island Pump Station
- Green Island Storm Structure
- Green Island Main Line
- Green Island End Section (OF)
- Green Island Intermunicipal Connection (OF)
- Watervliet Catch Basin
- Watervliet Manhole
- Watervliet Pump Station
- Watervliet Storm Structure
- Watervliet Main Line
- Watervliet End Section (OF)

(OF = MS4 regulated outfall)

Storm Sewershed Map Book
Vly Creek



Stormwater Coalition of Albany County
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Prepared by the Stormwater Coalition of Albany County
Date: June 2013 Location: Albany County, NY
File Name: SSM_VlyCreek_MapBook_June2013.mxd

Storm Sewershed Map Book
Vly Creek

359

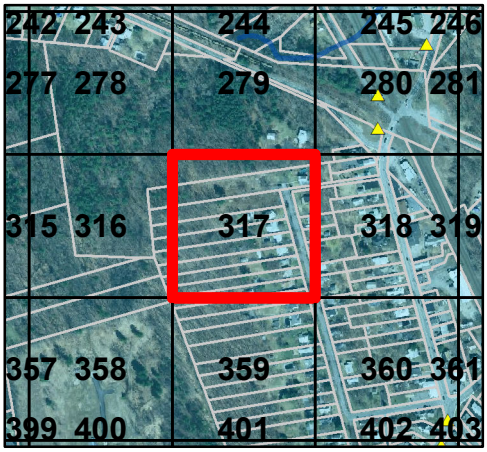
0 0.005 0.01 Miles

N

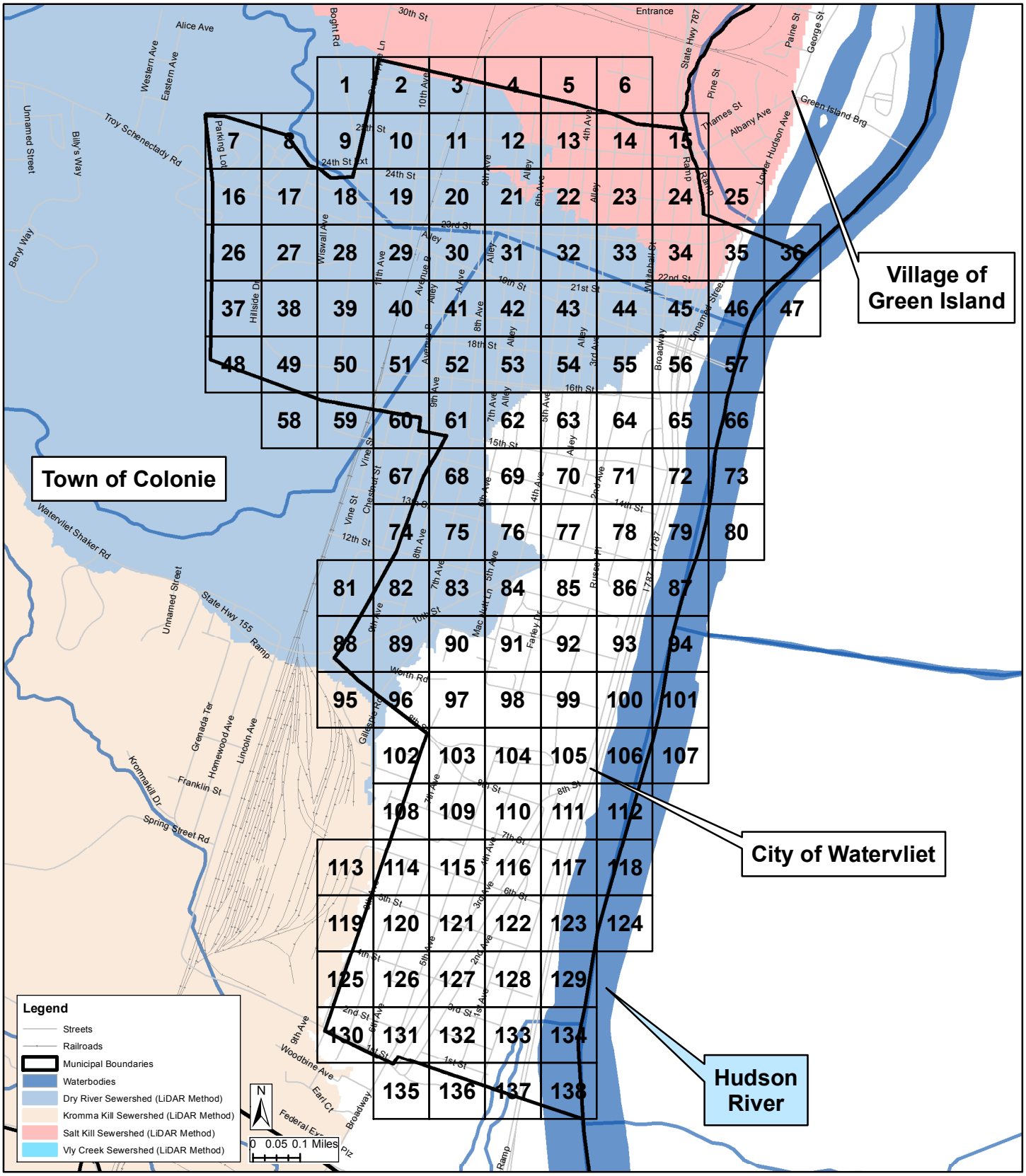
Legend

- Outfalls (AIMS)
- NYS DOT Outfalls
- Tax Parcels (AIMS)
- Municipal Boundaries
- Waterbodies
- Vly Creek Sewershed (LiDAR Method)
- Albany County Catch Basin
- Albany County Intermunicipal Connection (OF)
- Albany County Manhole
- Albany County Intermunicipal Connection (OF)
- Albany County Pump Station
- Albany County Storm Structure
- Albany County Main Line
- Albany County End Section (OF)
- Guilderland Catch Basin
- Guilderland Manhole
- Guilderland Pump Station
- Guilderland Storm Structure
- Guilderland Main Line
- Guilderland End Section (OF)
- Guilderland Intermunicipal Connection (OF)
- New Scotland Catch Basin
- New Scotland Manhole
- New Scotland Pump Station
- New Scotland Storm Structure
- New Scotland Main Line
- New Scotland End Section (OF)
- New Scotland Intermunicipal Connection (OF)
- Voorheesville Catch Basin
- Voorheesville End Section (OF)
- Voorheesville Intermunicipal Connection (OF)
- Voorheesville Manhole
- Voorheesville Pump Station
- Voorheesville Storm Structure
- Voorheesville Main Line
- Voorheesville End Section (OF)

(OF = MS4 regulated outfall)



Storm System Infrastructure Map Book
City of Watervliet



Stormwater Coalition of Albany County
Albany County, City of Albany, Town of Bethlehem, City of Cohoes, Town of Colonie, Village of Colonie, Village of Green Island, Town of Guilderland, Village of Menands, Town of New Scotland, Village of Voorheesville, City of Watervliet, SUNY Albany

Prepared by the Stormwater Coalition of Albany County
Date: June 2013 Location: Albany County, NY
File Name: SSM_WV_MapBook_June2013.mxd

Storm System Infrastructure Map Book
City of Watervliet

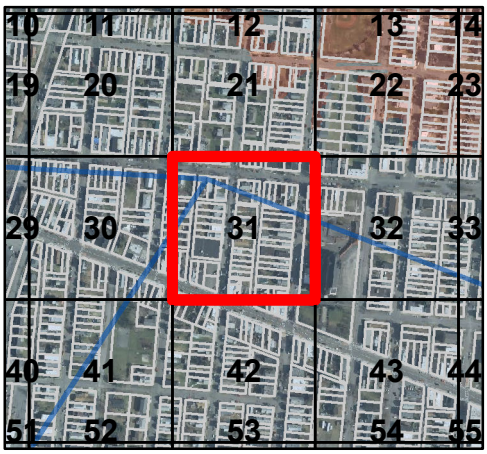
Legend

- Outfalls (AIMS)
- NYS DOT Outfalls
- Tax Parcels (AIMS)
- Municipal Boundaries
- Waterbodies
- Dry River (LiDAR Method)
- Kromma Kill (LiDAR Method)
- Salt Kill (LiDAR Method)
- Vly Creek (LiDAR Method)
- Catch Basin
- Manhole
- Pump Station
- Storm Structure
- Main Line
- End Section (OF)

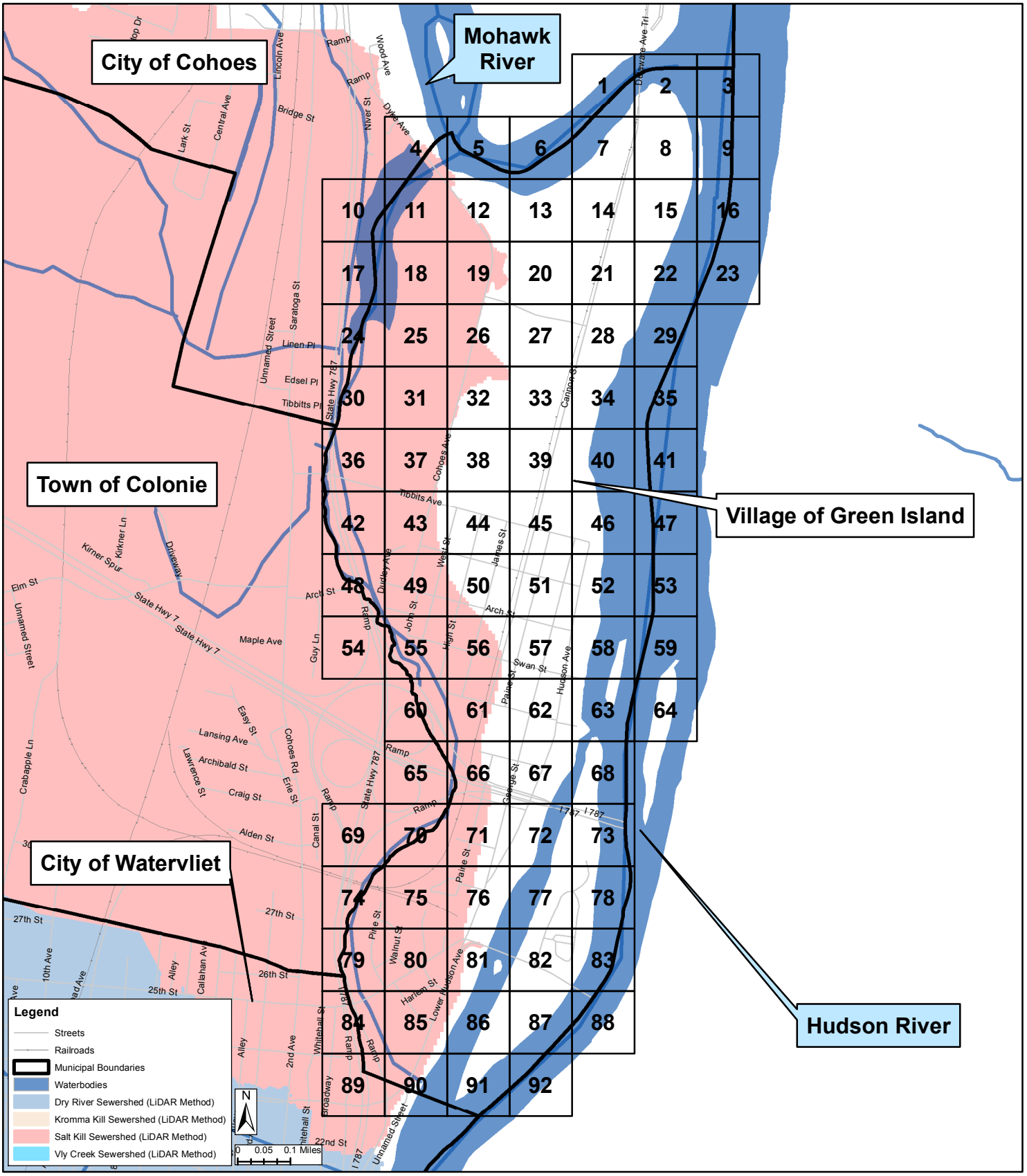
(OF = MS4 regulated outfall)

N

0 0.005 0.01 Miles



Storm System Infrastructure Map Book
Village of Green Island



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Prepared by the Stormwater Coalition of Albany County
Date: June 2013 Location: Albany County, NY
File Name: SSM_GI_MapBook_June2013.mxd

Storm System Infrastructure Map Book
Village of Green Island

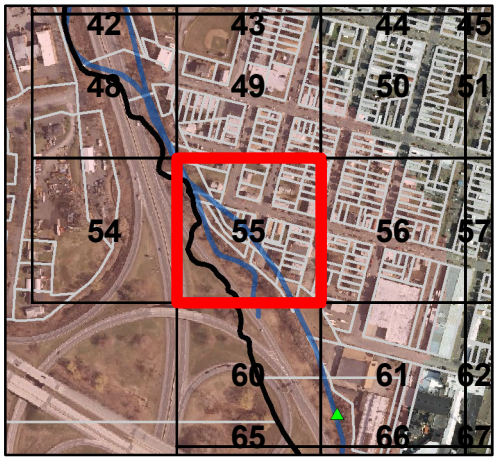
Legend

- Outfalls (AIMS)
- NYS DOT Outfalls
- Tax Parcels (AIMS)
- Municipal Boundaries
- Waterbodies
- Dry River Sewershed (LiDAR Method)
- Kromma Kill Sewershed (LiDAR Method)
- Salt Kill Sewershed (LiDAR Method)
- Vly Creek Sewershed (LiDAR Method)
- Catch Basin
- Manhole
- Pump Station
- Storm Structure
- Main Line
- End Section (OF)
- Intermunicipal Connection (OF)

(OF = MS4 regulated outfall)

N

0 0.005 0.01 Miles



Appendix P

Individual MS4/Municipal Data

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
CITY OF ALBANY

Files which are included on this CD:

1. SSM_CiALB_WIP_13June13.gdb
    a. This geodatabase contains the all of the newly collected stormwater infrastructure data for the City of Albany.
    b. This data was not posted on AIMS.
    c. Status of the Data (SSM_CiALB_13June13.gdb):
        i. Data Gaps and Unedited Data
            1. New data which was recently collected was put in the geodatabase.
            2. This data was for the Patroon Creek area.
            3. This data was not edited (integity, topological checks, etc.).
            4. This data is incomplete.

2. FROM MS4
    a. This folder contains all of the data which was given to the Stormwater Coalition by the MS4 at the beginning of the project.
    b. Data which was collected before 2011 was not edited or checked for completeness including areas outside of the Kromma Kill, Dry River, Salt Kill, and Vly Creek.
    c. This data was not merged into the Stormwater Coalition data model.
    d. This data was not posted on AIMS.

3. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

4. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
TOWN OF BETHLEHEM

Files which are included on this CD:

1. FROM MS4
    a. This folder contains all of the data which was given to the Stormwater Coalition by the MS4 at the beginning of the project.
    b. Nothing was done with this data.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
CITY OF COHOES

Files which are included on this CD:

1. SSM_COHOES_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the all of the stormwater infrastructure data for the City of Cohoes in the Salt Kill sewershed. The data that the City of Cohoes had prior to this project was not merged into this geodatabase.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_COHOES_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. All of the data in this geodatabase was fully edited.
        ii. Data Gaps and Unedited Data
            1. Data outside of the Salt Kill sewershed is not included in this geodatabase.

2. FROM MS4
    a. This folder contains all of the data which was given to the Stormwater Coalition by the MS4 at the beginning of the project.
    a. Data which was collected before 2011 was not edited or checked for completeness including areas outside of the Kromma Kill, Dry River, Salt Kill, and Vly Creek.
    b. This data was not merged into the Stormwater Coalition data model.
    c. This data was not posted on AIMS.

3. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

4. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
TOWN OF COLONIE

Files which are included on this CD:

1. StormWater9May2012.mdb
    a. This geodatabase contains the all of the stormwater infrastructure data that was given to the Stormwater Coalition.
    b. This data was not edited by Stormwater Coalition staff; any changes that needed to be made were relayed to the Town of Colonie GIS staff, Rob Mateja, and made in-house.
    c. All of this data was posted on AIMS (July 2013).
    d. Status of the Data (StormWater9May2012.mdb):
        i. This data is already outdated as the Town of Colonie is constantly updating their GIS. For the most recent version, see the Town directly.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
VILLAGE OF COLONIE

Files which are included on this CD:

1. SSM_VCOL_WIP_13June13.gdb
    a. This geodatabase contains the all of the newly collected stormwater infrastructure data for the Village of Colonie.
    b. This data was not posted on AIMS.
    c. Status of the Data (SSM_VCOL_13June13.gdb):
        i. Data Gaps and Unedited Data
            1. New data which was recently collected was put in the geodatabase.
            2. This data was for the Patroon Creek area.
            3. This data was not edited (integity, topological checks, etc.).
            4. This data is incomplete.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
VILLAGE OF GREEN ISLAND

Files which are included on this CD:

1. SSM_GI_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the all of the stormwater infrastructure data for the Village of Green Island.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_GI_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. All of the data in the Village of Green Island was fully edited.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
TOWN OF GUILDERLAND

Files which are included on this CD:

1. SSM_GUILD_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the all of the stormwater infrastructure data for the Town of Guilderland in the Vly Creek sewershed. The data that the Town of Guilderland had prior to this project was not merged into this geodatabase.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_GUILD_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. All of the data in this geodatabase was fully edited.
        ii. Data Gaps and Unedited Data
            1. Data outside of the Vly Creek sewershed is not included in this geodatabase.

2. FROM MS4
    a. This folder contains all of the data which was given to the Stormwater Coalition by the MS4 at the beginning of the project.
    a. Data which was collected before 2011 was not edited or checked for completeness including areas outside of the Kromma Kill, Dry River, Salt Kill, and Vly Creek.
    b. This data was not merged into the Stormwater Coalition data model.
    c. This data was not posted on AIMS.

3. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

4. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
VILLAGE OF MENANDS

Files which are included on this CD:

1. SSM_VMEN_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the all of the stormwater infrastructure data for Village of Menands. The data that the Village of Menands had prior to this project and new data was merged to create this geodatabase.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_VMEN_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. Data for the Kromma Kill was fully edited.
        ii. Data Gaps and Unedited Data
            1. Data which was collected before 2011 was not edited or checked for completeness including areas outside of the Kromma Kill, Dry River, Salt Kill, and Vly Creek, but was posted on AIMS.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
TOWN OF NEW SCOTLAND

Files which are included on this CD:

1. SSM_NEWSCOT_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the all of the stormwater infrastructure data for the Town of New Scotland.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_NEWSCOT_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. All of the data in the Town of New Scotland was fully edited.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
VILLAGE OF VOORHEESVILLE

Files which are included on this CD:

1. SSM_VVILLE_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the all of the stormwater infrastructure data for the Village of Voorheesville.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_VVILLE_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. All of the data in the Village of Voorheesville was fully edited.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
CITY OF WATERVLIET

Files which are included on this CD:

1. SSM_WVLIET_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the all of the stormwater infrastructure data for the City of Watervliet in the Dry River and Salt Kill sewersheds.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_WVLIET_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. All of the data in this geodatabase was fully edited.
        ii. Data Gaps and Unedited Data
            1. Data outside of the Dry River and Salt Kill sewersheds is not included in this geodatabase.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
ALBANY COUNTY

Files which are included on this CD:

1. SSM_ALBCNTY_FINAL_AIMS_13June13.gdb
    a. This geodatabase contains the most of the stormwater infrastructure data for Albany County (See #2-Patroon_Raw). The data that Albany County had prior to this project and new data was merged to create this geodatabase.
    b. All of this data was posted on AIMS (July 2013).
    c. Status of the Data (SSM_ALBCNTY_FINAL_AIMS_13June13.gdb):
        i. Completed Data
            1. Data for the Kromma Kill and Vly Creek was fully edited.
        ii. Data Gaps and Unedited Data
            1. The main lines for the storm system infrastructure in the Vly Creek are missing. These were going to be manually added in, but time did not allow.
            2. Data which was collected before 2011 was not edited or checked for completeness including areas outside of the Kromma Kill, Dry River, Salt Kill, and Vly Creek, but was posted on AIMS.

2. Patroon_Raw
    a. This folder contains all of the raw GPS data which was given to the Stormwater Coalition by the MS4 towards the end of the project.
    a. This data was not post-processed or edited.
    b. This data was not merged into the Stormwater Coalition data model.
    c. This data was not posted on AIMS.

3. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

4. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.

Stormwater Coalition of Albany County
NYS DEC Grant – C304384
Storm System Mapping Project
2011-2013
SUNY AT ALBANY

Files which are included on this CD:

1. FROM MS4
    a. This folder contains all of the data which was given to the Stormwater Coalition by the MS4 at the beginning of the project.
    b. Nothing was done with this data.

2. SSM_26Nov2012.gdb
    a. This is an empty template of the geodatabase which was used to create the individual MS4 geodatabases.
    b. It follows the Stormwater Coalition data model.
    c. All of the domains are included.
    d. It was last revised on November 26, 2012.
    e. It stores the shapefiles in a feature dataset so topological checks can be completed.
    f. This can be used in municipalities with Arc GIS (including Arc View and Arc Info).

3. SSM_26Nov2012.ddf
    a. This is an empty template of the data dictionary used on the GPS units to collect the data for individual municipalities.
    b. It follows the Stormwater Coalition data model.
    c. All of the menu options are included.
    d. It was last revised on November 26, 2012.
    e. This can be loaded onto GPS units and used to collect additional data by individual municipalities.