

# Whitfield County Stormwater System Data Collection And Evaluation

These procedures describes the approach and methodology used for the collection and evaluation of the existing storm sewer system within the unincorporated urbanized areas of Whitfield County. The discussion includes existing data and infrastructure inventory.

The inventory and data collection effort will identify potential illicit discharges throughout Whitfield County. The inventory collection will be conducted in two phases. The first phase will focus on developing an inventory of the mandated stormwater outfalls. This task will require that all stormwater discharge pipes of 36" diameter within rural and residential areas be documented. Additionally, all 12" stormwater discharge pipes within industrial areas that outfall into state waters will be recorded. The second phase will allow the County to develop a system wide inventory of all stormwater releases and systems in the urban areas. This approach will locate the mandated outfall pipes, at a minimum, to detail possible point source pollution locations in line with the EPA regulations for NPDES Permit Coverage under the phase II rule.

## Existing Information

Existing data available has been collected and inventoried for the County in unincorporated urbanized areas. The existing conditions data has been compiled for all drainage analyses conducted within the County in unincorporated urbanized areas to date. Existing data consists of the following items – buildings, edge of pavement, contours, stream centerlines, road centerlines, survey collection points, pipe networks and drainage swales for each of the listed projects below:

Whitfield County:

- Cleveland Highway Drainage Analysis
- Dug Gap Road Drainage Analysis
- Florence Avenue Drainage Analyses
- Leisure Lake Drainage Analysis and Letter of Map Revision
- Old Grade Road Drainage Analysis
- Poplar Road Drainage Analysis

Additionally, 7.5-minute quadrangle coverage and 1999 Color Infrared Aerials, and the following coverage layers from the State of Georgia Spatial Data Infrastructure were compiled for the base mapping effort:

- Georgia DOT Map – Whitfield County
- Aerials for the following quadrangles – Beavertdale, Calhoun NE, Calhoun North, Catlett, Chatworth, Cohutta, Dalton North, Dalton South, East Ridge, Nickajack Gap, Ringgold, Subligna, Sugar Valley, Tunnel Hill, Villanow
- 7.5-minute quadrangles for the above list
- Contours for the County
- Road network for the County
- Stream centerlines for the County

Additional existing conditions information will be compiled as it becomes available for the Whitfield County. The local Regional Development Center (RDC) is finalizing work on a

countywide base map which includes 2 foot contours, edge of pavement detail, building locations, parcel information, zoning information, stream centerlines, road network, and future land use designations.

As the infrastructure inventory is collected the base mapping will be used to create a geographic database to identify problems; determine additional survey needs and objectives; identify physical watershed characteristics; assess existing water quality; and assess hydrological characteristics of the watershed. Existing data will be sublimated with information obtained from state, federal, and local governments agencies, scientific literature, and other sources, as necessary. The data will be evaluated for completeness, consistency, and accuracy. The data sources that are used will be further outlined in a catalogue of existing information during the 2005 Annual Report.

The following is a listing of the existing data that is to be compiled for the basemap on which the storm sewer inventory map will be developed:

### **Watershed Characteristics**

Whitfield County GIS files and databases  
Current zoning maps  
NRCS soils data  
Streets  
1999 topographic data – 2 foot contours  
Stream/creek centerline flow paths

### **Hydrologic and Hydraulic**

1998 FEMA Flood Insurance Rate Maps (FIRM)  
1998 FEMA Flood Insurance Studies (FIS)  
All available, effective FEMA HEC-2 models  
Subdivision Hydrologic Reports  
Whitfield County/City of Dalton HEC-2/HEC-RAS Studies  
USGS Stream gage data  
Other Hydrologic and Meteorological Data: NOAA, USGS and National Weather Service

### **Water Quality**

Current list of 303(d) Streams for Georgia (\*GA EPD)  
All Notices For The Proposed Addition to the 303(d)  
Biological and Habitat Data

### **General**

Subdivision As-Built information: sewers and detention facilities  
Zoning Resolutions Regarding BMPs

## **Infrastructure Inventory**

The stormwater infrastructure inventory will be essential for the preparation of an Illicit Discharge Detection and Elimination scheme. The location and description of the existing stormwater drainage network is crucial to the development of good housekeeping practices within the County. The information will be used to determine existing levels of service and future needs of the watershed regarding water quality and quantity. The main objective of the storm water infrastructure inventory is to accurately determine the location of all discharge pipes to state waters. The mapping phase will allow the County to determine if the needs of the watershed for both existing and future conditions are being met. Information regarding the condition and extent of the stormwater infrastructure is an important step in determining the proper and efficient management of the County's water resources.

Focus within the un-incorporated areas of Whitfield County will be in the urbanized areas of the Cities of Varnell and Tunnel Hill along with the surrounding areas of the City of Dalton that are not included within the city boundaries. Culvert outfalls that discharge stormwater into state waters are will be inventoried for size, material, structure type, and alignment configuration where multiple pipe outlets exist. Additionally, field data collected will include the location of structures based on State Plane coordinates, and the documentation of the condition of each structure, measure down, and identified obstructions. Similar information will be collected at outlet structures for each of the inventoried detention basins within the County urbanized area.

The infrastructure inventory is to be completed in three main steps:

1. Detailed mapping of drainage patterns and drainage basins, if not determined by existing data;
2. Field-locating, surveying, and mapping of conveyance systems and conveyance connections; and
3. Generating mapping of all drainage structures collected into a countywide map.

Data from existing maps, the county database, and interviews with storm water maintenance staff will be used to complete the inventory. The information collected will also be utilized to identify drainage and conveyance problems and develop an action plan that addresses recommended improvements and maintenance needs.

In the extended scope of Whitfield County's mapping plan additional information concerning the conveyance structures may be collected. This information is detailed in Table 2-C.

## **Project Area Determination**

Drainage patterns were delineated for each project sub-basin based on the location of the drainage conveyance system, topography, land use, and infrastructure. Watershed locations were defined utilizing the Hydrologic Unit Code (HUC.) The un-incorporated urbanized areas of Whitfield County were utilized to verify potentially effected receiving waters. The delineated sub-basins were no more than ten acres in size.

Base maps containing the sub-basin information will be provided to field crews for identification and verification of conveyance properties, problem areas, and GPS monuments.

Drainage pattern delineation was carried out through the following steps:

- A naming convention for basins and sub-basins was developed;
- Basins and sub-basins were delineated in accordance with the approved naming convention. ArcView was used to complete the preliminary delineation based on available Whitfield County GIS themes, including topography, streams, lakes, streets, previously delineated watershed boundaries, and land parcels;

The following process will be utilized to finalize basin delineations during the infrastructure inventory:

- Site visits will be conducted to verify preliminary drainage boundaries;
- Drainage boundaries will be submitted to the County for approval; and
- Using data collected during the stream walk, infrastructure inventory, updated contours and basin delineation site visits, connectivity diagrams will be prepared showing drainage paths in each basin.

Project areas for the un-incorporated urbanized areas of the City of Tunnel Hill, City of Varnell and the surrounding areas of the City of Dalton have been delineated to define large basin collection areas for the Whitfield County area. These basins will be further sub-divided in order to allow field reconnaissance teams to collect all necessary data to facilitate a complete inventory within the un-incorporated urbanized areas of Whitfield County.

## **Data Collection**

A stormwater infrastructure inventory of the items listed in Table 1 will be conducted through following steps:

- Base maps will be prepared for use in the inventory. Maps will be prepared to guide field crews in locating various elements to be inventoried. Base maps will include land use parcels and stream crossings covering the entire project area. Due to the technical limitations of the software that will be used by field crews, the digital base maps will be kept relatively small.
- Digital base maps will be prepared using an arbitrarily established project grid showing the relative positions of adjacent maps for each of the urbanized areas.
- A database to be used by field crews will be prepared. Elements of the database will include those specified in the scope of services, using the convention accepted by the County.
- Additional database elements will be included to facilitate workflow, quality control, reporting of problems observed in the field, and minimize field visits by the project engineer and County staff.

Additional database elements will include:

- o Photographs of all problem areas, unusual structures, outfalls, culvert inlets and outlets, detention/retention ponds (including dams) will be

taken. Photographs will be attached to the database record and annotated with dimensions and short notes where appropriate;

- Names and affiliation of field crew members;
- Date and time of survey;
- Problems observed at structures, including: major/minor structural damage; major/minor erosion; other water quality problems, and major/minor blockage; and
- Data field crews will indicate if there was a need to re-visit a particular site. A final determination regarding the need to re-visit a site will be the responsibility of project engineer and County staff.
- Sketches of the detention basin outfalls will be drawn for the purpose of recording the outlet type. Pictures will also be utilized to verify detention outlet type.
- All field notes, worksheets and sketches will be scanned and a digital file will be created to archive all fieldwork.

**TABLE 1**  
Storm Water Drainage Structure Type

Feature	Code*	Feature	Code*
Bridge	BG	Pipe	SD
Catch Basin	CB	Pipe End	PE
Control Structure	CS	Special Structure	XX
Combined Inlet	CI	Spillway	SP
Grate Inlet	GI	Storage Facility	SF
Headwall	HW	Swale	SW
Manhole	MH	Weir Inlet	WI

### Data Collection Procedures and Training

The field crews will be trained in survey/data collection methodology. The training will address survey/data collection equipment, recognition of drainage infrastructure elements and problems, and fieldwork procedures. These training items are briefly described below:

**Survey/Data Collection Equipment:** The principal method to establish horizontal coordinate of structures is the use of GPS equipment. These units will be of map grade accuracy and will consist of a handheld GPS unit for each crewmember.

**Infrastructure Elements and Problems:** The field crew will include surveyors and junior engineers and/or technicians, trained by registered surveyors and engineers. Crews will also be trained to recognize when additional field observations by the project engineer and/or County staff are required in order to clarify field conditions.

**Field Work Procedures:** Two GPS crewmembers will be equipped to collect data at each structure and establish the location of the structure using GPS. Where GPS handhelds are unable to acquire satellites within a reasonable period of time; the structures will be approximately located using the base map as a guide. In these cases, the surveyor will flag the structure and record for a re-visit. The structure location will then be established using a Total Station method.

**Collect and Reduce Data:** Data collected as described above will be processed to prepare an initial ArcView shape file. The project engineer will supervise the entire data collection and processing on a constant basis as part of the quality control process. The final ArcView themes will be prepared to include all data in the format established for the project, less the additional fields that were introduced to facilitate workflow quality control (Tables 2-A, 2-B, 2-C).

The following is a detailed outline of the data that will be compiled in the final database of outfall and detention structures for each of the project areas. The information included in the tables below detail information that will be collected in the field, data that will be calculated from field collected data and that which will be measured from available geospatial data collected by the North Georgia Regional Development Center (RDC) and available State of Georgia GIS information. Tables 2-A and 2-B will be employed to collect data to meet the NPDES Phase II permitting. In addition, more information about systems may be collected in order to inventory the conveyance structures of the Whitfield County system. In areas that the County decides to collect additional data Table 2-C will be utilized.

**TABLE 2-A**  
Feature Attributes for Storm Water Point Structures

Attribute	Field Name	ArcView Data Type
Structure ID number	STRUCTURE	String
Sub-Basin Identifier	BASIN	String
Structure's Feature Code	FEATURECOD	String
X-coordinate in State Plane, Georgia West	EASTING	Number
Y-coordinate in State Plane, Georgia West	NORTHING	Number
Elevation in feet (NAD83)	ELEVATION	Number
Watershed Identifier	WATERSHED	String
Condition of Structure	CONDITION	String
Measuredown, bottom of structure to point of survey	MEASUREDOW	Number
Is the structure an Outlet?	OUTLET	Boolean
Is there any dry weather flow?	DWF	Boolean
Sheen?	SHEEN	Boolean
Odor?	ODOR	Boolean
% Opening is Obstructed (0-25, 25-50, 50-75, 75-100)	OBSTRUCT	Number
Height of the Inlet Opening	OPENHEIGHT	Number
Width of the Inlet Opening	OPENWIDTH	Number
Diameter of the Inlet Opening	OPENDIAMET	Number
Length of the Grate Opening	GRATELENGT	Number
Width of the Grate Opening	GRATEWIDTH	Number
Detention or Retention Pond	DET_RET	String
Surface Area of Pond	SURFACEARE	Number
Depth of the Pond	DEPTH	Number
Stage 1 Bottom Width of Weir or Diameter of the Orifice	S1_WID_DIA	Number
Stage 1 Top Width of the Weir Opening	S1_TOPWID	Number
Stage 1 Height of the Weir Opening	S1_HEIGHT	Number
Stage 1 Distance from point of survey to bottom of opening	S1_MEASDOW	Number
Stage 2 Bottom Width of Weir or Diameter of the Orifice	S2_WID_DIA	Number
Stage 2 Top Width of the Weir Opening	S2_TOPWID	Number
Stage 2 Height of the Weir Opening	S2_HEIGHT	Number
Stage 2 Distance from point of survey to bottom of opening	S2_MEASDOW	Number
Stage 3 Bottom Width of Weir or Diameter of the Orifice	S3_WID_DIA	Number

Stage 3 Top Width of the Weir Opening	S3_TOPWID	Number
Stage 3 Height of the Weir Opening	S3_HEIGHT	Number
Stage 3 Distance from point of survey to bottom of opening	S3_MEASDOW	Number
Cut of the Pipe End (beveled, mitered, etc.)	CUT	String
Angle of Wing Walls	WWANGLE	Number
Notes	NOTES	String
Date the Structure was Inventoried	INVEN_DATE	Number

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**TABLE 2-B**  
Feature Attributes for Storm Water Storage Facilities

<b>Attribute</b>	<b>Field Name</b>	<b>ArcView Data Type</b>
Storage ID number	STORAGE	Number
Watershed Identifier	WATERSHED	String
Storage Facility Type – DET (dry pond), RET (wet pond)	TYPE	String
Perimeter of Storage Facility	PERIMETER	Number
Area of Storage Facility	AREA	Number
Dam Condition	CONDITION	String
% pond storage Reduced by growth	OBSTRCT	Number
Date the Structure was Inventoried	INVEN_DATE	Number
Notes	NOTES	String

**TABLE 2-C**  
Feature Attributes for Storm Water Conveyance Structures

<b>Attribute</b>	<b>Field Name</b>	<b>ArcView Data Type</b>
Conveyance ID number	CONVEYANCE	Number
Length of line (distance between structures)	LENGTH	Number
Watershed Identifier	WATERSHED	String
Conveyance Type (pipe, swale, etc.)	TYPE	String
Material of conveyance	MATERIAL	String
Invert Elevation at the upstream end	USINVERT	Number
Measure down from invert of conveyance to top of structure	USMEASDOWN	Number
Structure ID of structure at the upstream end	USSTRUCTUR	Number
Condition of the conveyance at the upstream end	USCONDITIO	String
% upstream end Obstructed (0-25, 25-50, 50-75, 75-100)	USOBSTRUCT	Number
Invert Elevation at the downstream end	DSINVERT	Number
Measure down from invert of conveyance to top of structure	DSMEASDOWN	Number
Structure ID of structure at the downstream end	DSSTRUCTUR	Number
Condition of the conveyance at the downstream end	DSCONDITIO	String
% downstream end Obstructed (0-25, 25-50, 50-75, 75-100)	DSOBSTRUCT	Number
Cross-sectional Shape of the conveyance	PIPE_SHAPE	String
Number of barrels	NO_BARRELS	Number
Manning n value of the channel	CHANNEL_N	Number
Top Width or Diameter of the Conveyance	TOPWID_DIA	Number
Bottom Width of the Conveyance	BOTTOMWID	Number
Height of the Conveyance	HEIGHT	Number
Date the Structure was Inventoried	INVEN_DATE	Number
Notes	NOTES	String