Halcrow

Cartographic Design

for Results of a Sewer Network Gap Analysis

Aim

- **Aim**
  - **Demonstrate an effective way to display results of a gap analysis**

Halcrow

Swiss Cheese

- What do we mean by gap analysis?
- *Analyze what "holes" exist in our data*
- How can we display holes?
- *By showing what is around them*

Halcrow

Data Analysis

1. Assess Quality
2. Assess Completeness

Background

- Highlight problem areas for a future sewer modeling program
- Spatial data in a personal geodatabase
  - Gravity mains
  - Pressure mains
  - Manholes
  - Pumping stations
- Associated data in tables: water meters, pumps, wet wells
- 24 parameters
- 60 sub-basins

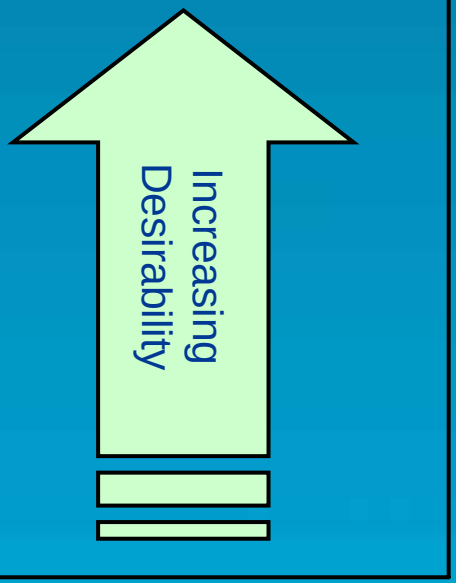
1. Assess Quality

- **Ranking**
  - **Rank is based on the “As Built” status of each record**

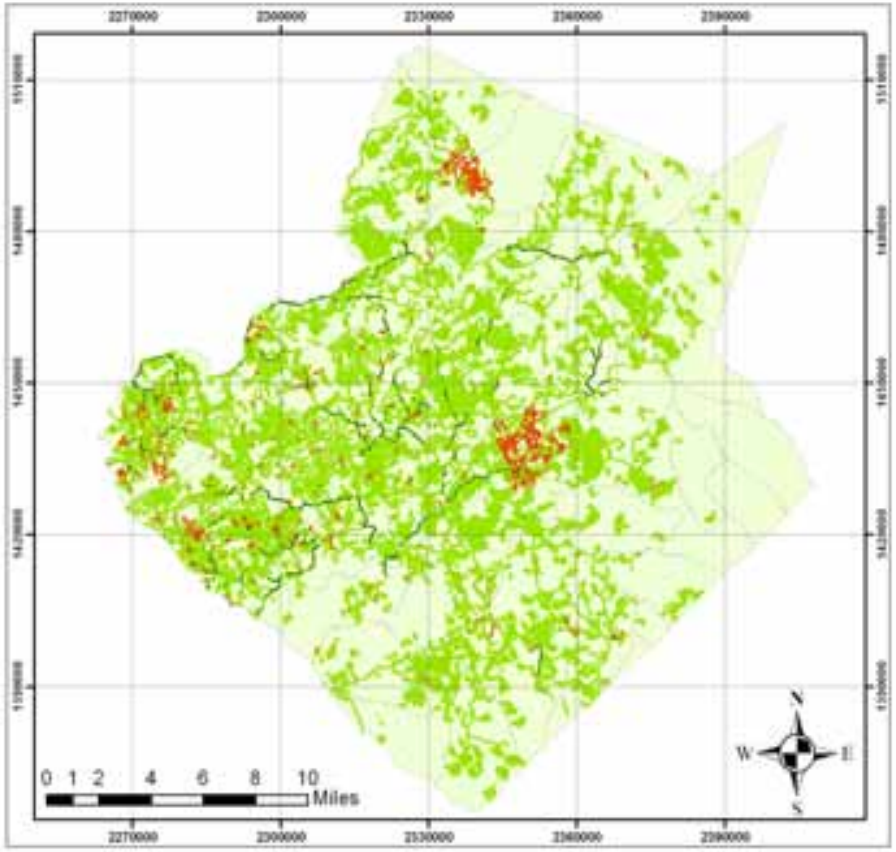
1. Assess Quality

- **Ranking**
  - **Rank is based on the "As Built" status of each record**

Rank 1	**"As built" & GPS**
Rank 2	**"As built"**
Rank 3	**No "As built" & GPS/Field edit**
Rank 4	**No "As built"**
Rank 5	**No data**



1. Display Quality



Quality ranking of the sewer gravity mains network

Legend

- RANK 1
- RANK 2
- RANK 3
- RANK 4
- Sub basins

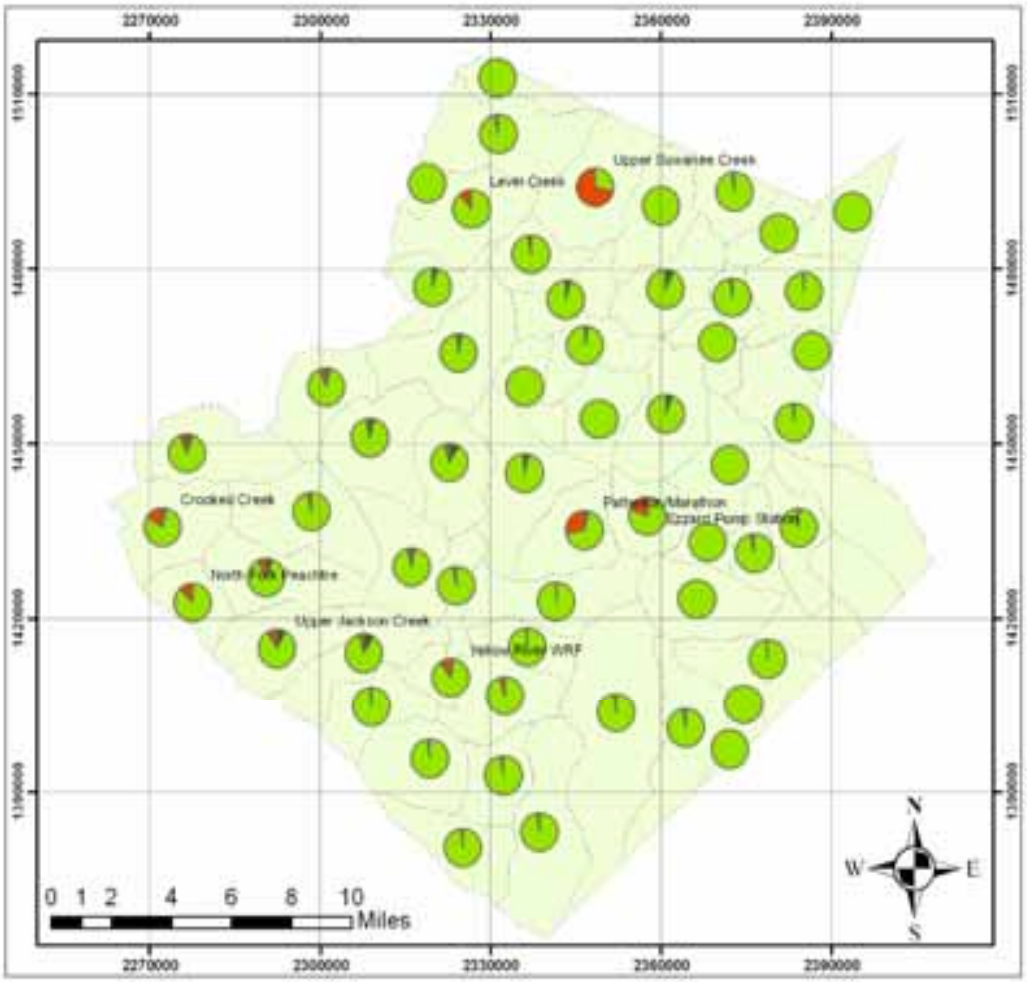
Sub basins with > 8% of records with quality rank of 4 are labelled

Rank 1 - As Built reference and GPS data
Rank 2 - As Built reference
Rank 3 - No As Built (NAB), Field Edit and GPS data
Rank 4 - No As Built
Rank 5 - No data

- **Display of gravity mains quality ranking – for whole area**

Display

- **Display of ranking of gravity mains by sub-basin – as pie-chart**



Quality ranking of the sewer gravity mains network

Legend

Gravity Mains quality ranking

RANK 1

RANK 2

RANK 3

RANK 4

Sub basins

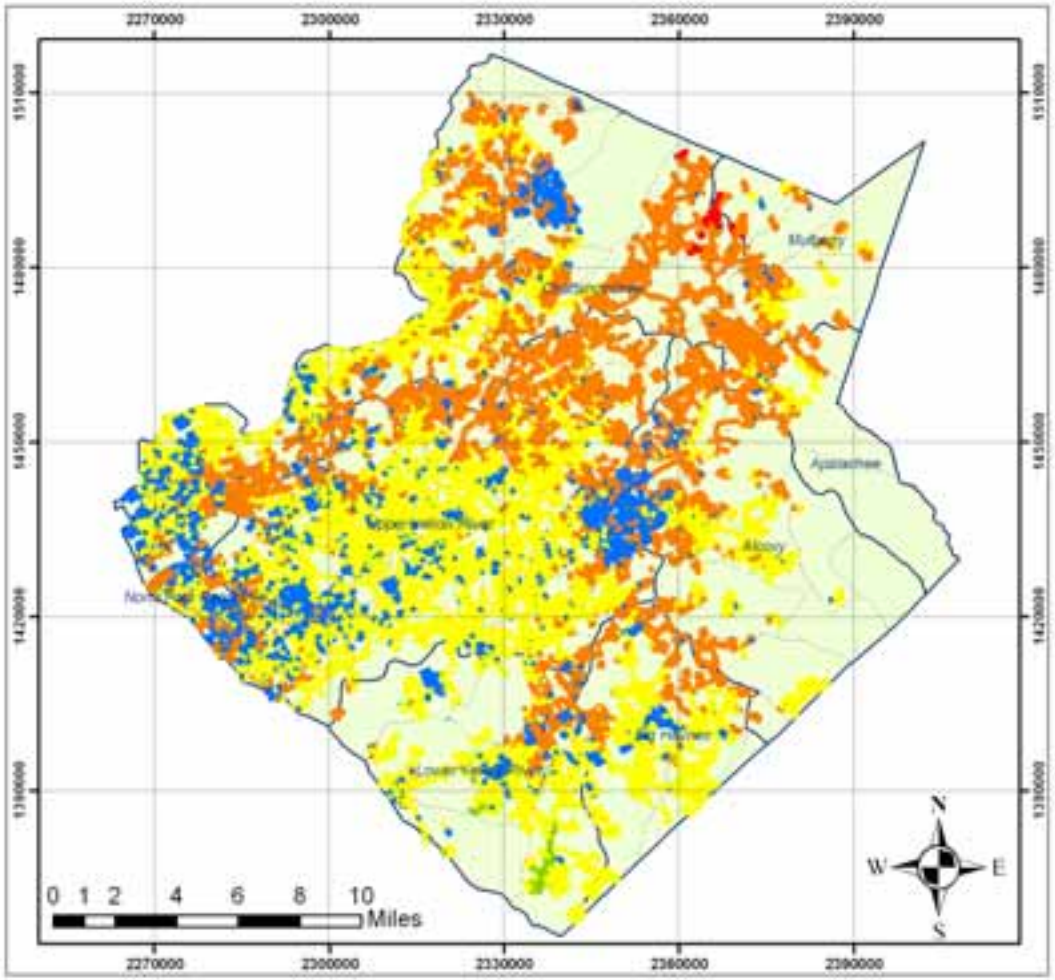
Sub basins with > 5% of records with quality rank of 4 are labelled

Rank 1 - As Built reference and GPS data
Rank 2 - As Built reference
Rank 3 - No As Built (NAB), Field Edit and GPS data
Rank 4 - No As Built
Rank 5 - No data

2. Assess Completeness

- Absolute figures
- Summarized
  - Count the number of records where a relevant parameter has no values and list as % of total for each sub-basin
  - Summarize and get overall % complete

Display Completeness



Completeness of network - Manhole missing key data: Rim elevation

Legend

Manholes

Rim Elevation (ft)

- No data
- 601 - 800
- 801 - 1000
- 1001 - 1200
- 1201 - 1400

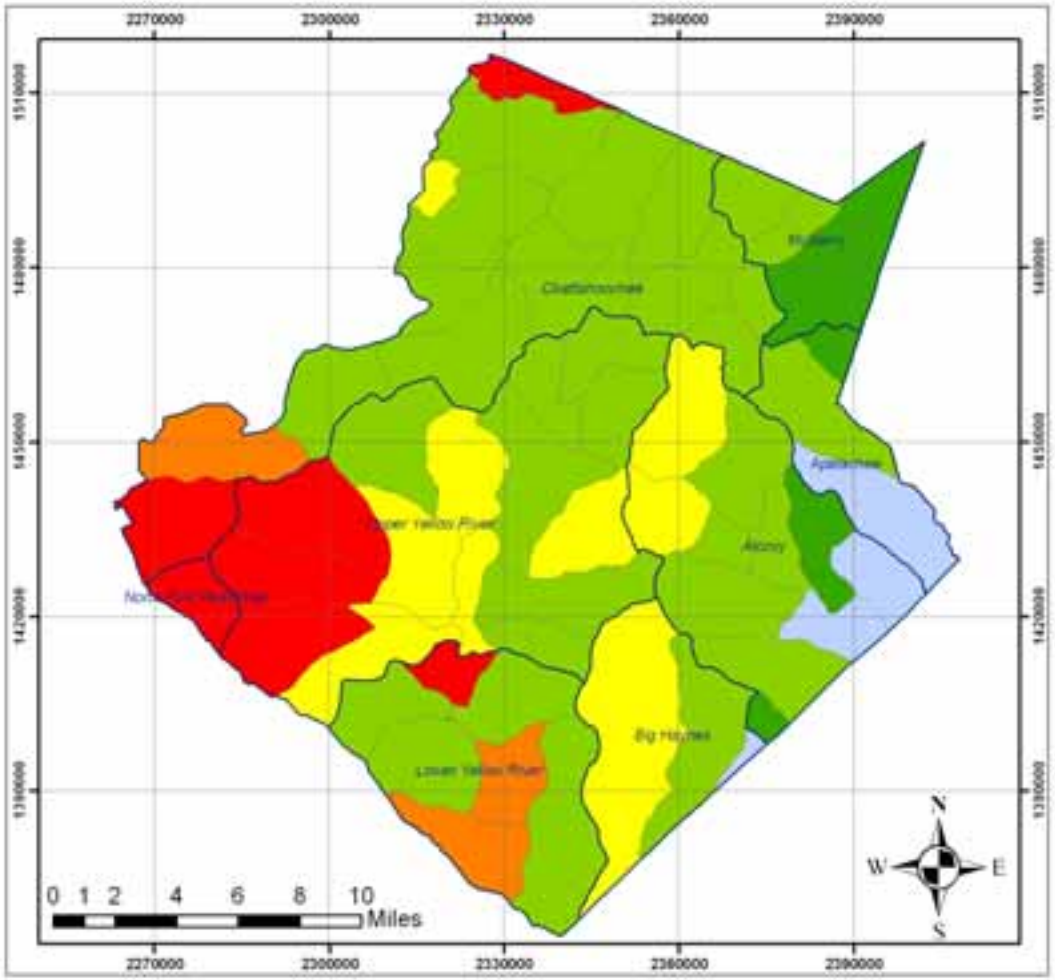
Basin

Sub basins

Missing data showing for whole area

Display Completeness

- Missing data shown as a percentage for each sub-basin



Completeness of network - Manhole missing key data: Rim elevation

Legend

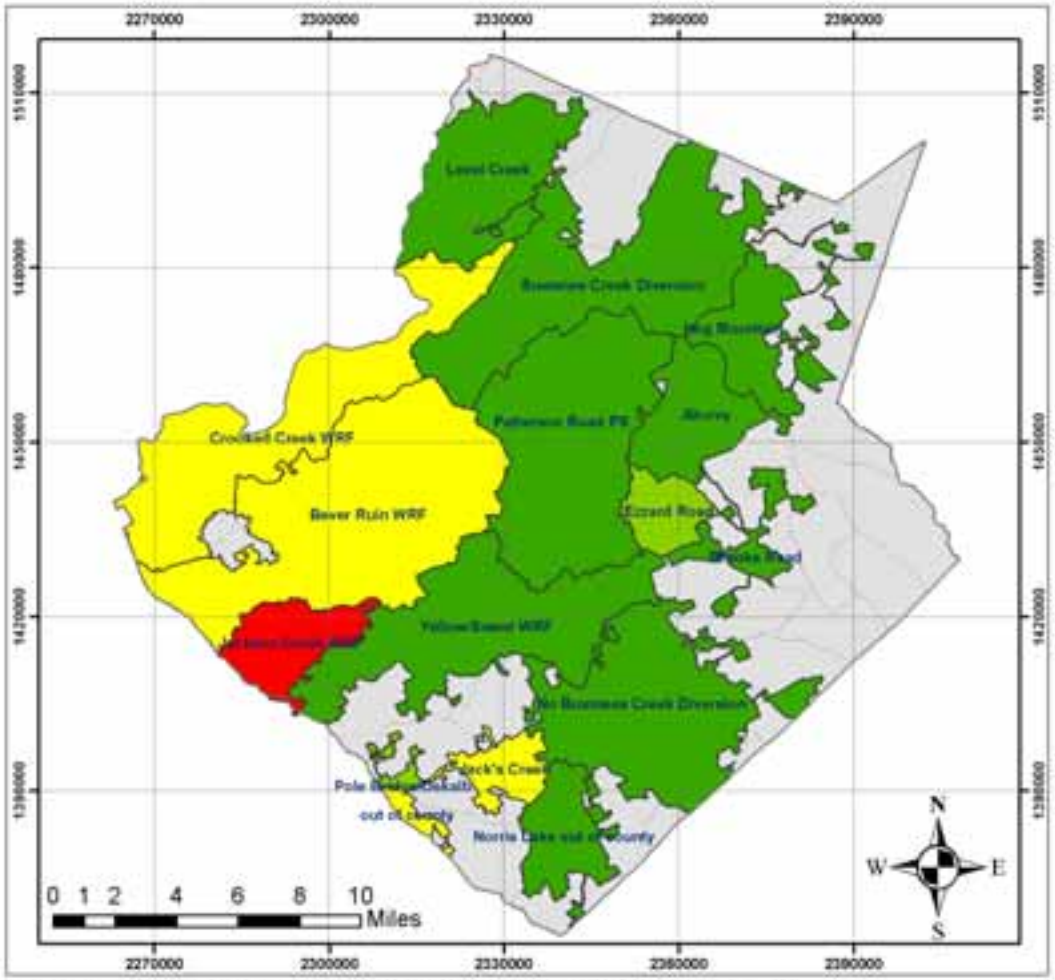
Manholes missing data (% of records)

- 0.0
- 0.1 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 25.0
- Basin
- No Manholes present

Percentages are based on number of records missing the following key attributes required for sewer modeling:
Manhole rim elevation

Display Completeness

- Missing data shown as a percentage summarized by terminal area



Completeness of network by terminal area- Manhole missing Rim elevation

Legend

% of records missing RIM ELEVATION

- <5.0
- 5.0 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20.1 - 25.0

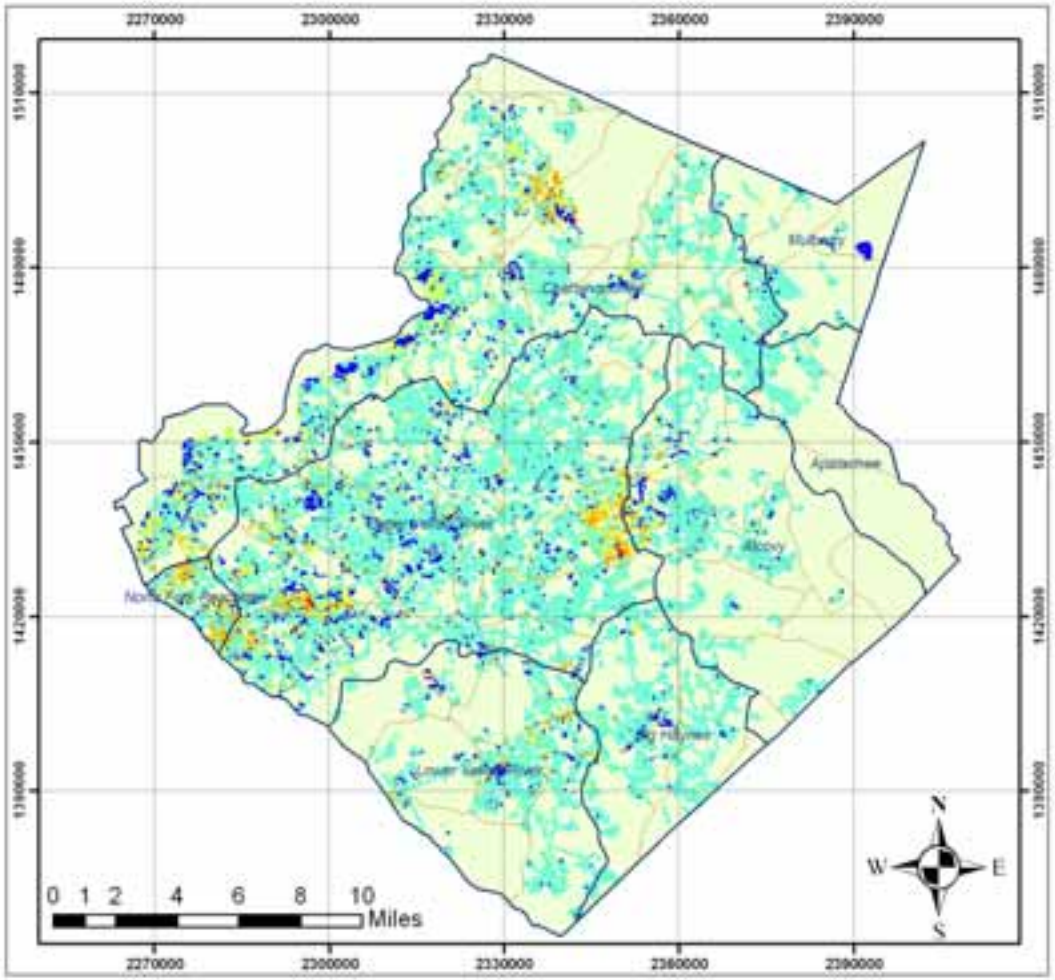
County Boundary

No Gravity Mains

Percentages are based on number of records missing the following key attributes required for sewer modelling:
Manhole rim elevation

Display Completeness

- **Absolute differences in elevation: “As Built” vs. derived from elevation data**



Elevation differences for Manholes in Gwinnett County

Legend

Basin

Subbasins

Manhole legend

Elevation difference (ft)

-1065.7 - -500.0

-499.9 - -100.0

-99.9 - -10.0

-9.9 - 0.0

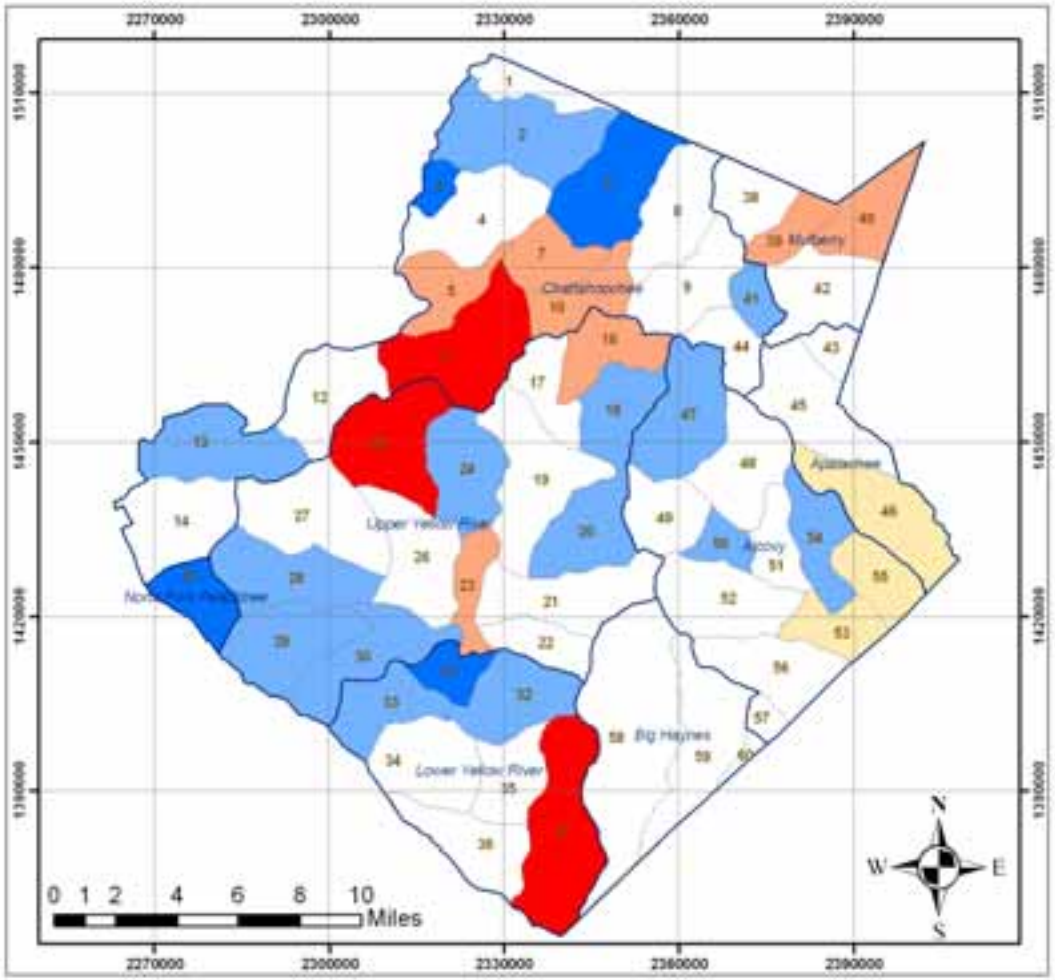
0.1 - 10.0

10.1 - 100.0

Difference in elevation is based on recorded Rim_Elevation of the manholes minus the derived elevation from a Digital Elevation Model (DEM).
Displayed is the absolute difference for each manhole

Display Completeness

- Elevation differences categorized



Elevation differences for Manholes in Gwinnett County

Legend

Subbasins

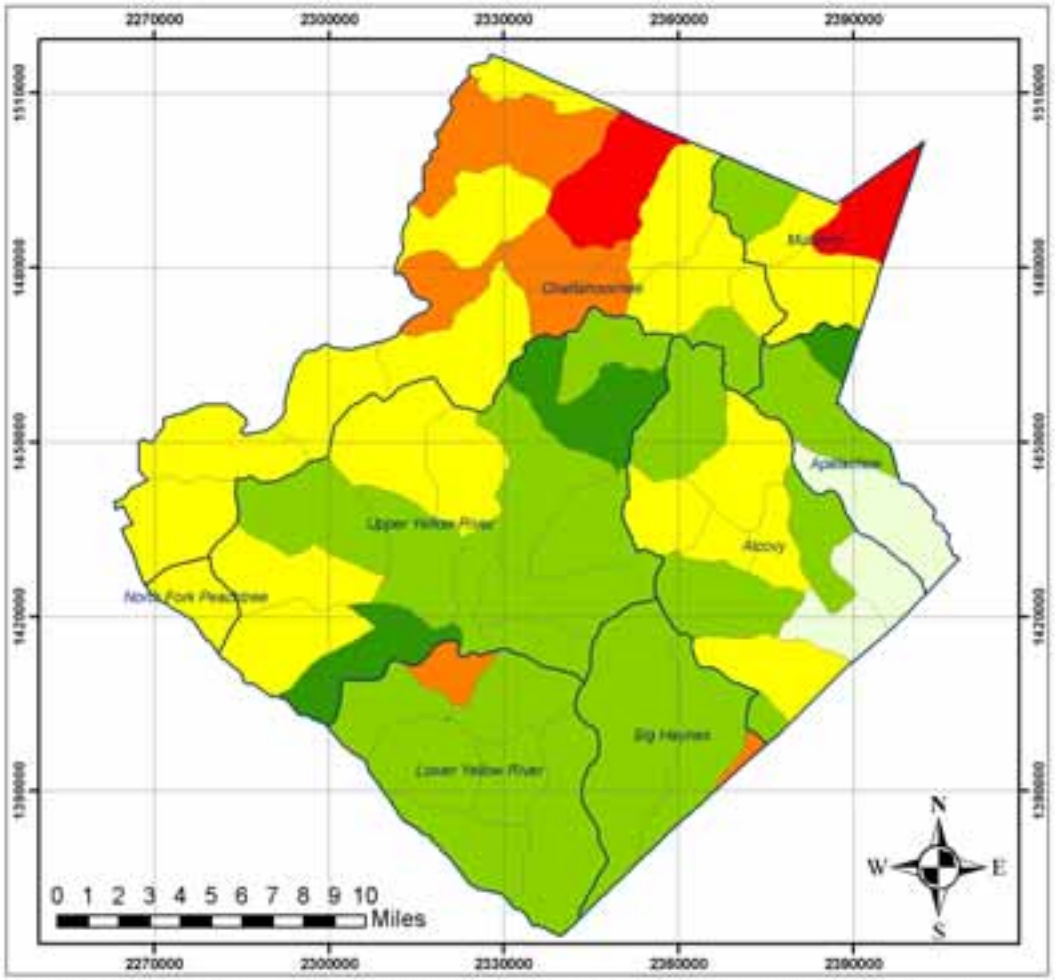
Average difference (ft)

- -182.7 - -25.0
- -24.9 - -2.0
- -1.9 - 2.0
- 2.1 - 25.0
- 25.1 - 577.0
- No Manholes
- Basin

Difference in elevation is based on recorded Rim_Elevation of the manholes minus the derived elevation from a Digital Elevation Model (DEM).
Displayed is the average difference in elevation per sub basin

Display Combination

- **Combine Quality and Completeness**



Percentage of rank 1 and 2 manhole records where the difference between Rim_elevation and DTM is greater than +/- 2 ft

Legend

% of total for Rank 1 and 2

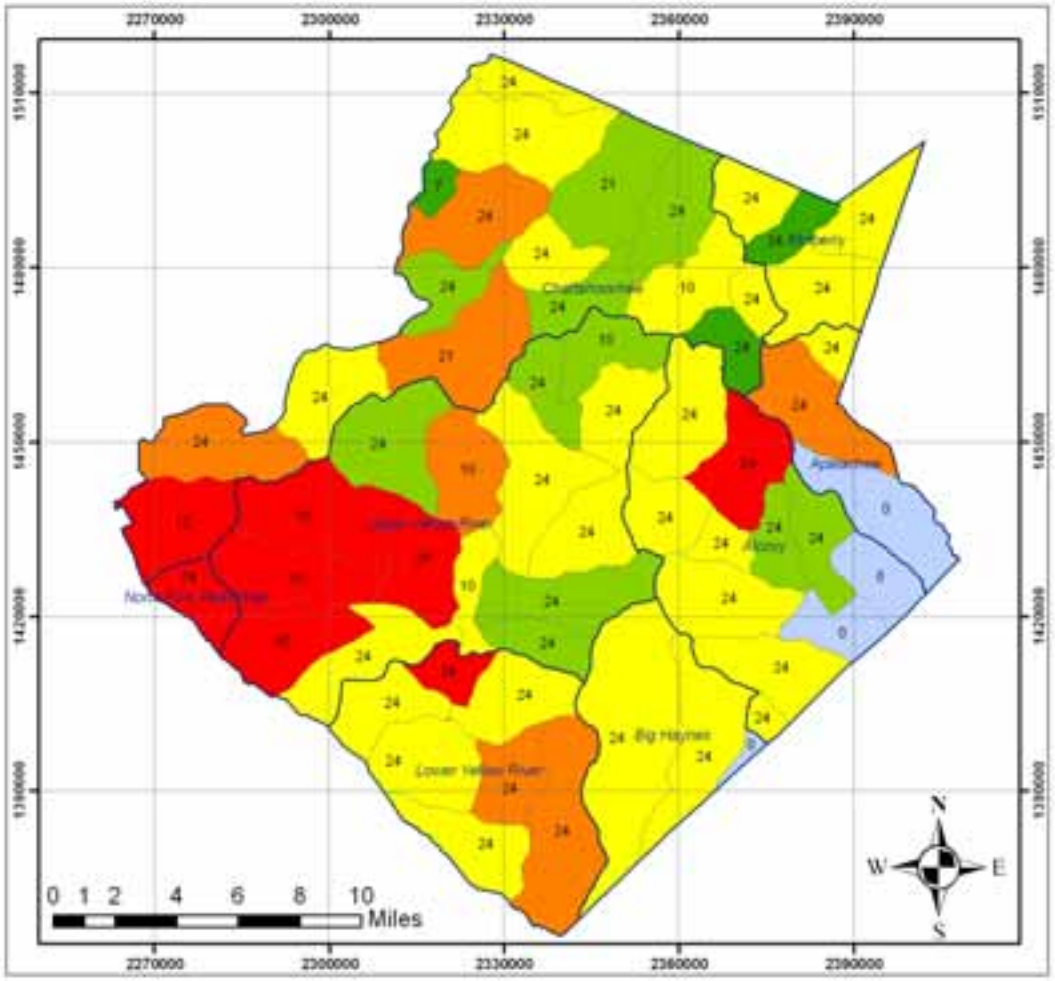
- < 50
- 50.1 - 60.0
- 60.1 - 70.0
- 70.1 - 80.0
- > 80

- No Manholes present
- Basin

This map displays the manholes that show a difference in elevation between Rim_Elevation and the elevation derived from the topography of <= -2ft or >= 2 ft and are of rank 1 or 2 ('As Built'). The percentages are of the total manhole records with rank 1 or 2 for each sub basin

Display Completeness

- % of number of parameters complete
- Labeled with number of parameters in each sub-basin



Overall completeness of network

Legend

Subbasins

(% of number of parameters)

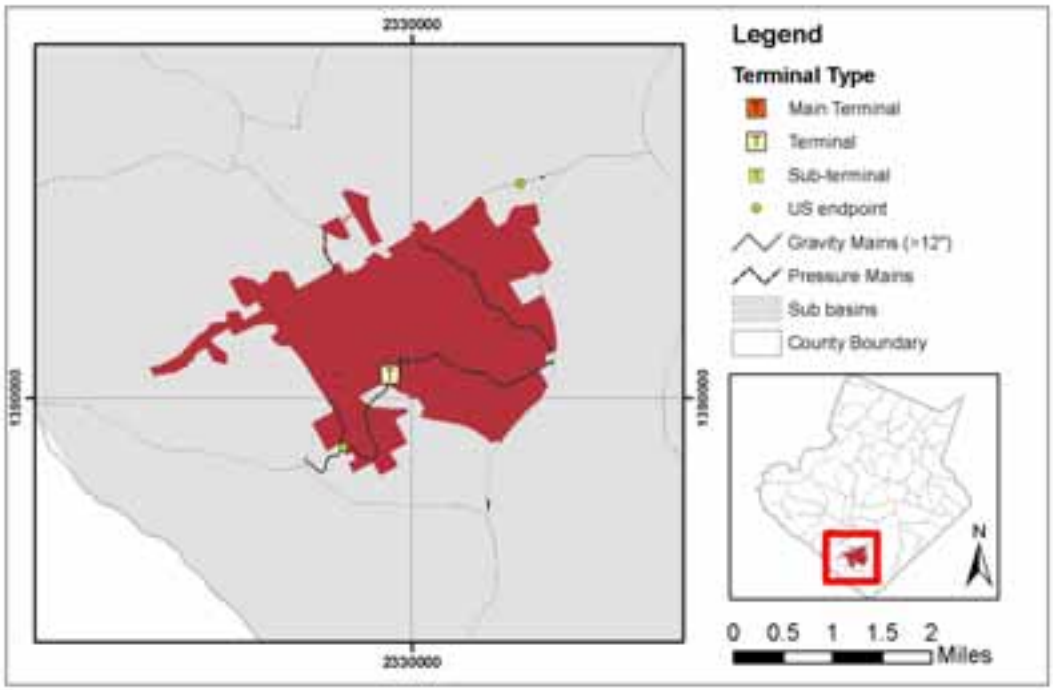
- 30.0 - 50.0
- 50.1 - 60.0
- 60.1 - 80.0
- 80.1 - 90.0
- 90.1 - 100.0

Basin

No features present

Final Display

- **Summary by terminal area**



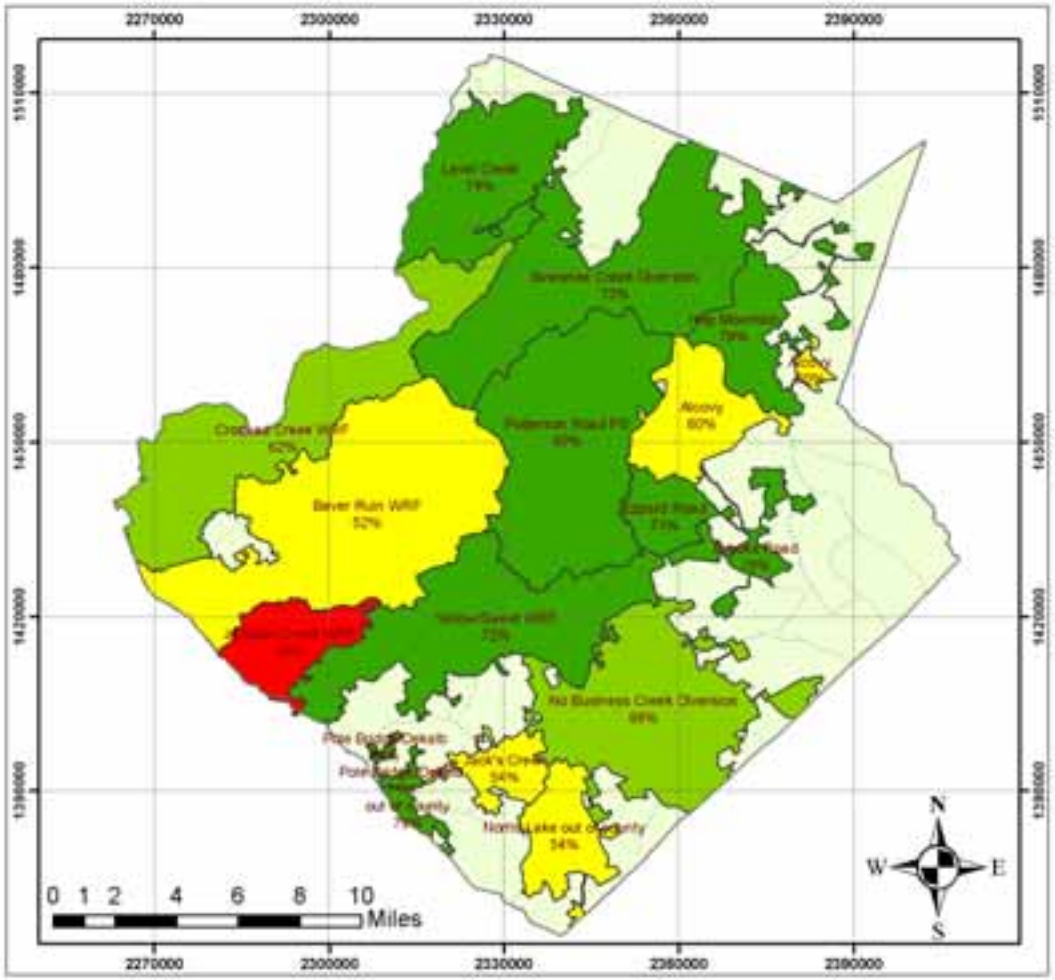
Jack's Creek

Total area (square miles)	5.3
Total area (acres)	3402
Total Length (miles)	
Gravity Mains	57.6
Pressurized Mains	5.1
Terminals	**3**
(= PumpStations except F.Wayne Hill WRF)	
Main	0
Terminal	1
Sub-Terminal	0
Upstream Endpoint	2
Sewer Flow meters	**1**
With data	1
Without data	0

Data missing	Total number of features	Features missing data	% missing of total	% missing 'As Built'
Gravity Mains	**1580**			
Inv_In		213	13%	84%
Inv_Out		216	14%	84%
Material		334	21%	26%
Pressurized Mains	**15**			
Size		3	20%	0%
Tieln_elevation		10	67%	100%
Material		0	0%	
Manholes	**1556**			
Rim_elevation		284	18%	86%
Cover_type		127	8%	69%
Pumping Stations	**3**			
Number of Pumps		1	33%	0%
Top Elevation		1	33%	100%
Water Meters	**5625**			
Water usage		647	12%	

Final Display

- **Summary of completeness by terminal areas**



Overall completeness of network by terminal area

Legend

% of number of parameters 90% complete

- 30.0 - 40.0
- 40.1 - 50.0
- 50.1 - 60.0
- 60.1 - 70.0
- 70.1 - 81.0

County Boundary

Sub basins

The measure is calculated as the average percentage of the total number of parameters in a terminal area (as labeled) that are at least 90% complete. The average is taken from the data for each sub basin.

Halcrow

Conclusion

- Choice of cartographic display of data is vital for decision making, planning and public understanding
- No hard and fast rules for complex data analysis: finding the right display is a matter of trial and error