CHATTANOOGA-HAMILTON COUNTY AIR POLLUTION CONTROL NETWORK REVIEW 2021

Kathy Jones
mkjones@chattanooga.gov

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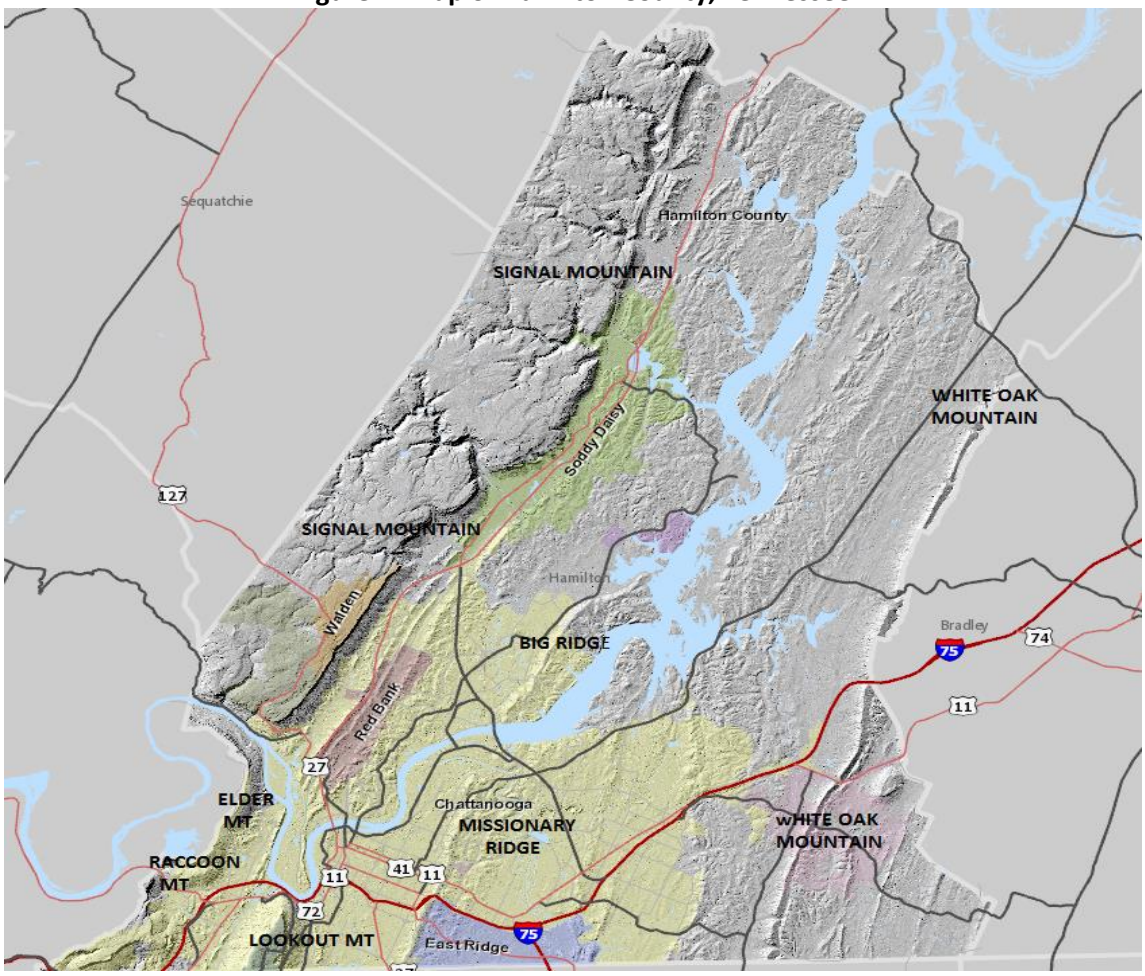
Introduction

Hamilton County, Tennessee, contains the City of Chattanooga and the municipalities of Soddy Daisy; Signal Mountain; Red Bank; East Ridge; Collegedale; Ridgeside; Walden; Lakesite; and Lookout Mountain, Tennessee. It is on the Tennessee, Georgia, Alabama border which means that pollution reduction is a cooperative effort between states. Designation areas for both ozone and particulate contain counties from Tennessee and Georgia.

Geography

Hamilton County is a picturesque Tennessee River valley between White Oak Mountain on the East of the county and Mowbray, Signal, Elder, Raccoon, and Lookout Mountains on the West of the County. The county is divided vertically by Big Ridge and Missionary Ridge, part of the same ridge chain. The Tennessee River flows through the ridge horizontally (where the ridge name changes) and through downtown Chattanooga. The valley, therefore, is shaped similarly to an "A". The topography is a liability for pollution prevention and reduction as frequent temperature inversions trap smoke in the valley.

Figure 1- Map of Hamilton County, Tennessee



Downtown Chattanooga is about 680 feet above sea level. There were at least four floods of downtown Chattanooga in the late 1800s and early 1900s, the most devastating one in 1867. To attempt to remedy the flooding, downtown was filled in from 3 to 15 feet after 1917 or an average of about one story. The fill area started with four central downtown streets and eventually covered about 40 blocks. Begun in

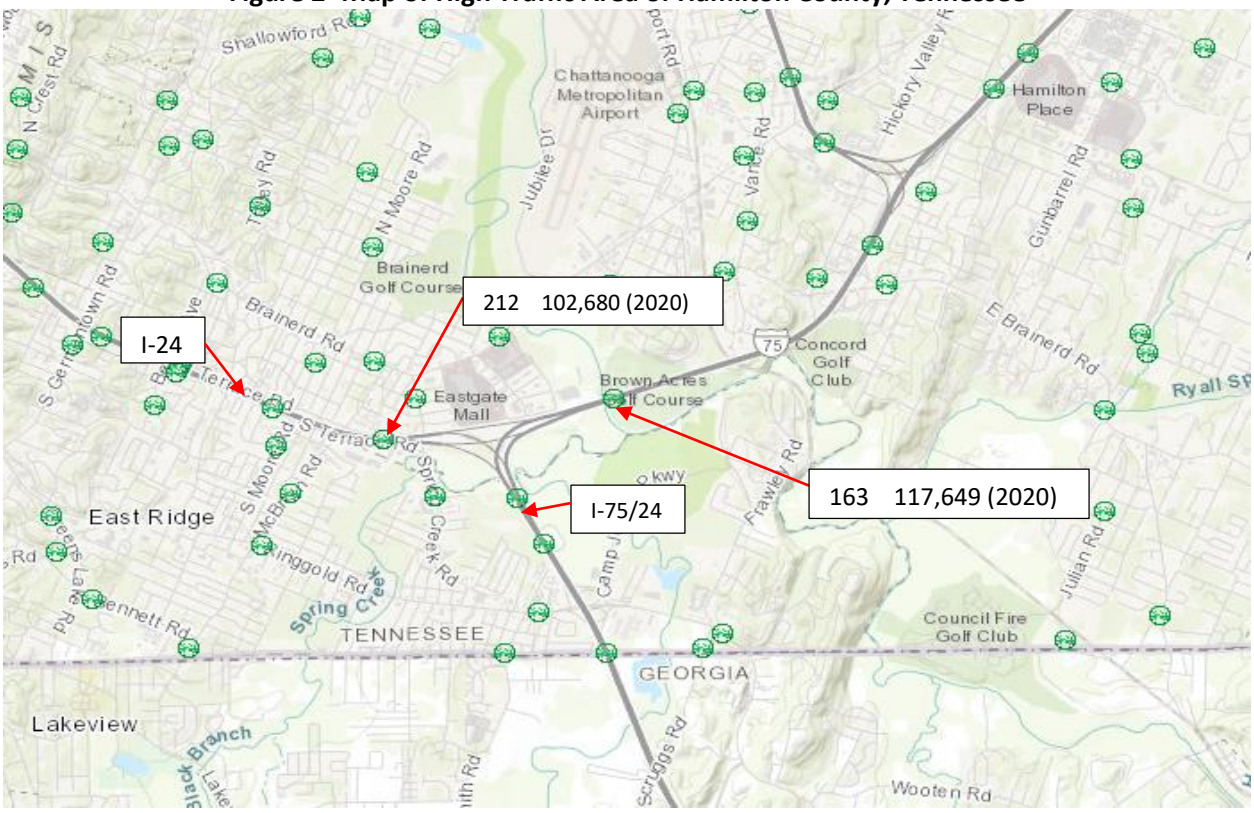
1933, the Tennessee Valley Authority's system of dams and control of the waterways not only provided electricity to the masses, but it improved Chattanooga's flooding plight considerably.

Traffic Patterns

About 1988 the then largest mall in Tennessee, Hamilton Place, was built in East Brainerd accessible by I-75. This spurred commercial and residential growth around the mall. In one year vehicle miles traveled (VMT) per year increased from about 6 million VMT to over 10 million VMT. The VMT was similar from 2005-2013. There has, however, been a steady increase since 2013 and a significant increase in 2019.

The Interstate 75 corridor, a major north-south route for commercial transport, runs through Chattanooga and connects with I-24 near East Ridge. On either side of the I75-24 split are the highest traffic counts in Hamilton County according to the Tennessee Department of Transportation Data Management System. The latest available posted numbers are from the year 2020 indicating a daily average traffic count of 102,680 as compared to a higher 2019 count of 129,059 at the #212 East Ridge Station which is just west of the I75/24 split. The highest count in Hamilton County is on the east side of the split at #163 is 117,649 in 2020 as opposed to 130,204 in 2019. The I-75/24 split is being reworked by the state, beginning in 2020, to ease some of the traffic congestion as the split is a traffic bottleneck. Easing congestion should reduce vehicle pollution in that area. The decrease in counts for 2020 was probably related to either traffic diverting around the construction project or reduced traffic because of the Coved pandemic. The congestion is anticipated to increase during the construction and will be problematic until the project is completed.

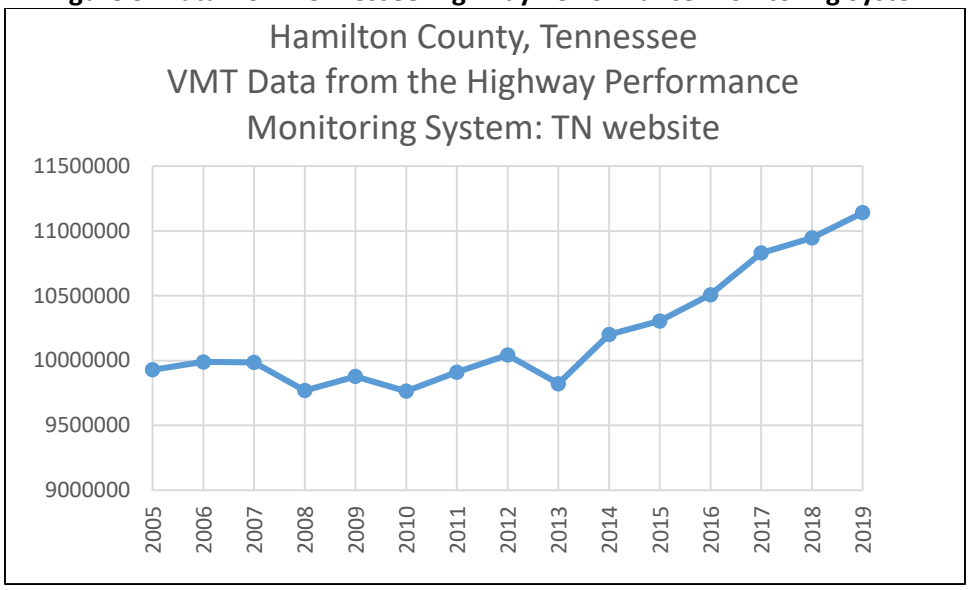
Figure 2- Map of High Traffic Area of Hamilton County, Tennessee



Vehicle Miles Traveled

The latest available data posted on TDOT's website for VMT by county is for the year 2019. The VMT increased in 2019 from 2018 by 195,153 vehicle miles traveled. There has been a steady increase since 2013. From 2013 to 2019 there was over a million VMT increase.

Figure 3- Data from Tennessee Highway Performance Monitoring System



Population

The U.S. Census Bureau population estimate (from the website) for July 1, 2019, for Hamilton County is 367,804 and for 2018 (2019 not available) for the City of Chattanooga is 180,557.

The two areas of the highest population density in Hamilton County are in the municipality of East Ridge and downtown in the University of Tennessee at Chattanooga area. Both areas of the highest density contain particulate monitoring sites for $PM_{2.5}$. The University density is seasonal as the density decreases in the summer months. The population density of East Ridge is 2,534 persons per square mile (2010 census) whereas the City of Chattanooga has a population density of 1,223 (2010) persons per square mile. East Ridge, therefore, is more than twice as dense as the City of Chattanooga. The population density of Hamilton County is 620 (2010) persons per square mile.

The Hamilton County racial demographics for predominant ethnicities for 2019 (most current available from US Census Bureau) of Hamilton County (based on the Vintage 2019 Population Estimates Program) are White only (not Hispanic or Latino) 70.9%; Black only 19.3%; Asian only 2.2%; and Latino/Hispanic only 6.0%. The racial demographics of the City of Chattanooga (based on the 2019 American Community Survey- 5 year estimates) for predominant ethnicities are: White only (not Hispanic or Latino) 57.3%, Black only 31.4%, Asian only 2.7%, and Latino/Hispanic only 6.3%. The Census Bureau cautions against comparisons of geographic area racial demographics because of the methodology differences in data sources.

The 2019 Small Area Income and Poverty Estimates (SAIPE) on the US Census Bureau website estimates the poverty in Hamilton County for 2019 as 12.7%. The poverty estimate for the City of Chattanooga is 17.6% based on the 2019 American Community Survey 5-year estimates. Neither estimation of poverty is comparable to other geographic level poverty estimates because of the methodology differences in data sources.

The Covid-19 pandemic in 2020 increased unemployment and poverty in both the City of Chattanooga and Hamilton County. Large industrial employers, retail stores, restaurants, and nail/hair salons were forced to shut down for the pandemic shelter in place. The temporary or permanent loss of employment affected the most vulnerable populations.

The Chattanooga-Hamilton County CBSA is composed of Hamilton, Marion, and Sequatchie counties in Tennessee and Catoosa, Dade, and Walker Counties in Georgia. The US Census Bureau's 2019 population estimate (most recent available) for the CBSA is 565,194 with an estimated increase of 4,401 over the estimate for 2018. Hamilton is the most urbanized county in the CBSA. The other counties are more rural.

Weather

Hamilton County tends to have frequent temperature inversions.

Figure 4- Thirty Year Averages

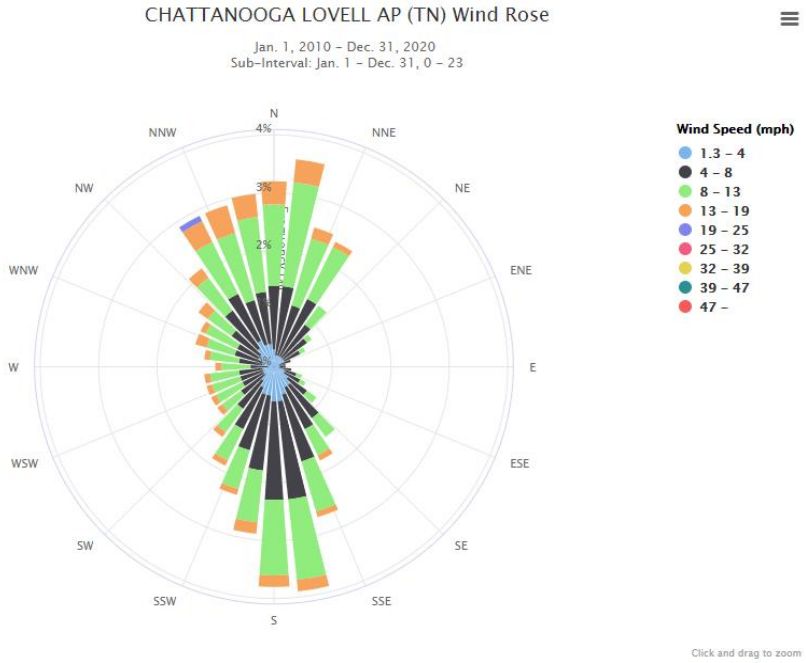
National Weather Service website

('Normals' are thirty year averages based on the period 1981-2010)

Chattanooga Annual Averages	
Precipitation.....52.48 inches	Days with 0.01" or more of precipitation.....119.6
Snowfall.....3.9 inches	Days with 1.0" or more of snowfall.....1
Days with thunderstorms.....54.8	Days at or above 90 F.....47.7
Days with dense fog.....27.3	Days at or below 32 F.....58.3
Average first freeze.....November 4	Average last freeze.....April 1
Average first frost.....October 20	Average last frost.....April 14

Wind speed and direction are of interest in evaluating pollution, emissions, and transport. These wind roses were produced from data collected at the Chattanooga Metropolitan Airport at Lovell Field (Station 13882) using the Midwestern Regional Climate Center's Application Tools Environment.

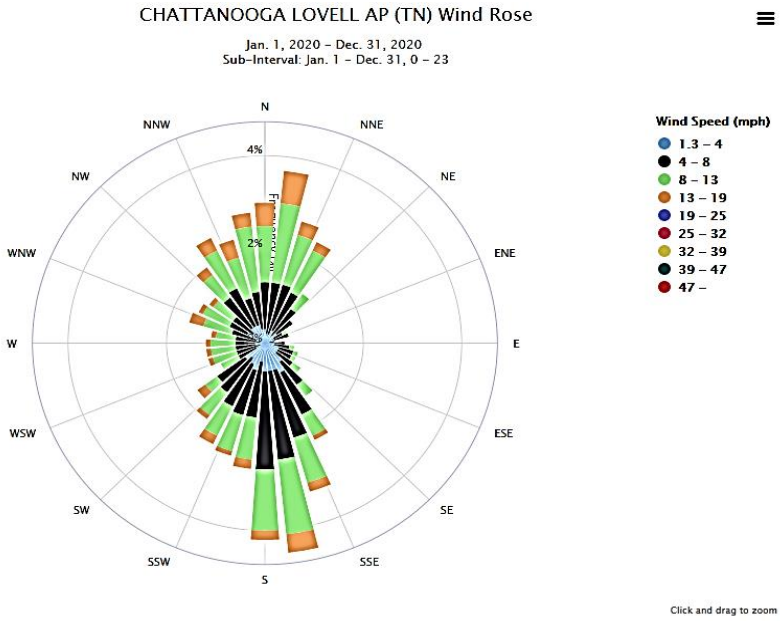
Figure 5- Ten Year Wind Rose for Jan 1, 2010- December 31, 2020



CHATTANOOGA LOVELL AP (TN) - Wind Frequency Table (percentage)

		Sub Interval Windows
Latitude : 35.0311	Start Date : Jan. 1, 2010	Start End
Longitude : -85.2014	End Date : Dec. 31, 2020	Date Jan. 1 Dec. 31
Elevation : 671 ft.	# of Days : 4018 of 4018	Hour 0 23
Element : Mean Wind Speed	# obs : poss : 92907 of 96432	

Figure 6- Wind Rose for 2020



CHATTANOOGA LOVELL AP (TN) - Wind Frequency Table (percentage)

		Sub Interval Windows
Latitude : 35.0311	Start Date : Jan. 1, 2020	Start End
Longitude : -85.2014	End Date : Dec. 31, 2020	Date Jan. 1 Dec. 31
Elevation : 671 ft.	# of Days : 366 of 366	Hour 0 23
Element : Mean Wind Speed	# obs : poss : 8445 of 8784	

Tornados in 2020

On Easter Sunday, April 11, 2020, seven tornados devastated areas of Hamilton County and counties nearby. Three tornados, beginning about 8:15 PM EDT, individually touched down in Walker County, Murray County, and Trenton in Georgia. Then a tornado touched down in Hamilton County. As the Hamilton County storm moved toward Bradley County, Tennessee, three more tornados developed in Bradley County.

According to the National Weather Service release published in the ***Times Free Press*** on April 18, 2020, the EF3 tornado that devastated Hamilton County was 1,500 yards wide and 14.5 miles long. The tornado traveled from southeast Chattanooga to Ooltewah. More than 1,000 buildings were damaged causing millions of dollars in destruction. A subdivision, Holly Hills, in East Brainerd was particularly devastated, and most of the 200 homes were damaged or destroyed.

The Bureau issued "tornado damage" burn permits to extend outdoor burning to June 15 in 2020 with the special permit. Normally burn season ends April 30. The sites are inspected by the Bureau's Inspector before the permit was issued. Burn season returned to the normal dates in 2020/21 of September 1, 2020-April 30, 2021.

Network Review 2021

PM_{10} Site Requirement Waiver

The Chattanooga-Hamilton County Air Pollution Control Bureau (the Bureau) petitioned EPA on August 28, 2014, to delete the collocated PM_{10} site operating on a 6-day monitoring schedule at 3300 South Broad Street (470650006). High volume samplers were operated at the site. EPA approved the site deletion in the approval letter for the 2014 State Air Monitoring Plan dated January 13, 2015. The monitors were shut down after the January 12, 2015, run date. EPA considers the deletion of this site the granting of a waiver of *40 CFR* requirements. The waiver is to be requested and justified in the Five Year Network Review when it is submitted every five (5) years. The next submittal of the Five Year Network Review will be 2025.

Data Comparison to the NAAQS

40 CFR Part 58 requires the Annual Monitoring Network Review to identify sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS. All four Chattanooga-Hamilton County monitoring sites produce data that are suitable to compare against the National Ambient Air Quality Standards. No site is not meeting siting requirements, and all required data are produced by Federal Equivalent or Federal Reference Methods. All sites' data meet data completion requirements and quality control requirements. Ozone and $PM_{2.5}$ particulate data are well below the NAAQS.

Purchase of T640 for $PM_{2.5}$ AQI

The Bureau purchased a Teledyne T640 light scattering instrument in 2016 for continuous $PM_{2.5}$ monitoring. It began operation in 2017 as a Special Purpose Monitor for $PM_{2.5}$ until January 1, 2019, then it was made a SLAMS (retaining the POC 3). It monitors PM_{10} data in addition to $PM_{2.5}$, but the PM_{10} data is not Federal Equivalent.

Figure 7- Active Sites in 2021

Chattanooga-Hamilton County Active Sites	Pollutant	Monitor	AQS #
911 Siskin Drive	*$PM_{2.5}$ Collocated* (Primary-3-day, Secondary 12-day): TEI R & P FRM filter-based *$PM_{2.5}$ Continuous* (FEM) and *PM_{10}* (not FEM): T640	(2) TEI R & P 2025i Seq. Both VSCC models Teledyne T640 Continuous	470654002 CORE $PM_{2.5}$
1517 Tombras Avenue Behind East Ridge City Hall	*$PM_{2.5}$* (Daily collocation from1/1/2009-1/17/2010) 3-day monitoring began 1/20/2010)	TEI R & P 2025 Seq. VSCC Model	470650031
618 Sequoyah Road Soddy-Daisy High School	Ozone Continuous Ozone Calibrator	TECO 49i TECO 49iPS	470651011
3018 Hickory Valley Road Eastside Utility District	Ozone Continuous Ozone Calibrator	TECO 49i TECO 49iPS	470654003

Figure 8- Equipment Evaluation 2021

Equipment	Location	Serial Number	Condition
PM_{10} Stored	0006	1847- decommissioned 1/2015	Good
PM_{10} Stored	0006	1845-decommissioned 1/2015	Good
$PM_{2.5}$ Stored Spare		20781 with VSCC (operational spare)	Good
$PM_{2.5}$	Storage	20775 with VSCC	Poor- Parts only
$PM_{2.5}$	Storage	20772 with VSCC	Poor-Parts Only
$PM_{2.5}$	Spare	20774-decommissioned 12/31/2015	Good
$PM_{2.5}$	0031	2025- 90709	Good
PM2.5	4002 POC1	2025i-with VSCC SN 21084 installed 6/2018	Excellent
PM2.5	4002 POC2	2025i-with VSCC SN 21131 installed 6/2018	Excellent
$PM_{2.5}$ TEOM	Spare	1400A 24452: Eq Unit SES1B 203940211 Sensor Unit 140AB 244520302	Good
$PM_{2.5}$ T640	4002	070600000:83	Excellent
Met One Speciation	4002	a5924/a5910-decommissioned 1/2015	Good
URG 3000	4002	3N-B0768- decommissioned 1/2015	Good
Ozone	1011	49i-143566748-installed 2/2015	Excellent
Ozone	4003	49i-143566747-installed 2/2015	Excellent
Ozone-Spare	1011	49C-58192-316	Good
Ozone-Spare	4003	49C-57404-313	Good
Ozone Calibrator-Spare	1011	49CPS-66337-352	Good
Ozone Calibrator-Spare	4003	49CPS-66338-352	Good
Ozone Calibrator	1011	49iPS- installed 2/2016	Excellent
Ozone Calibrator	4003	49iPS- installed 2/2016	Good
Data logger	1011	ESC 8816-1904	Good
Data logger	4003	ESC 8816-1905	Good
Data logger	Spare	ESC 8816-1906	Parts only
Data logger	4002	ESC 8832 AO994	Good
Data logger	1011	ESC 8832 A 4010 K	Good
Data logger	4003	ESC/Agilaire 8872 installed Aug 2017- 642	Excellent
Data logger	1011	ESC/Agilaire 8872: new April 2018: Installed in 2018, removed, and reinstalled for March 1, 2019- 799	Excellent
Ozone Audit Monitor	1011/4003	49i-0607415796	Good
Chart Recorder	1011	1001685- decommissioned 2/2017	Good
Chart Recorder	4003	1001686- decommissioned 2/2017	Good
Chart Recorder	Spare	Leeds/Northrup Speedomax 165 82-31986-1-1	Good
8 X 14 Shelter	1011	Shelter One 8148 SN21051—Surplussed	Good
8 X 14 Shelter	4003	EKTO 8814 SN 3473-1- Surplussed	Poor
PC with AV Trends	1011	Agilaire software/companion to Airvision	Excellent
PC with AV Trends	4003	Agilaire software/companion to Airvision	Excellent

Equipment	Location	Serial Number	Condition
UPS	1011	8872 needed UPS -installed 2018	Excellent
UPS	4003	8872 needed UPS-installed 2018	Excellent
Siskin Site deck	4002	Installed June 2018	Excellent
8 X 14 Shelter	1011	Shelter One –SN 20206-01 (installed 1/25/21) Model LS814	Excellent
8 X 14 Shelter	4003	Shelter One –SN 20235-01 (installed 1/25/21) Model LS814	Excellent

Changes to Established Sites

The Siskin Drive shelter at the 470654002 (downtown) site was removed because of its poor condition and replaced with a platform in June of 2018. At that time the TEOM was taken out of service. The Teledyne T640 continuous $PM_{2.5}$ monitor reports to AirNow for the Air Quality Index in place of the TEOM. The minishelter in the photograph houses the T640. A separate electrical-type cabinet houses the data logger for the T640 and serves as storage for the site.

When the new deck was installed the filter-based 2025 model instruments were replaced with new 2025i models. The 2025i models have internal VSCCs.

Figure 9- Deck for $PM_{2.5}$ at 911 Siskin Drive

The Bureau ordered new shelters for each of the Eastside Utility and Soddy Daisy sites. The Shelter One shelters were delivered and set in place with a crane January 25, 2021. The shelters were placed on the foundations for the old shelters. The old shelters will be auctioned.

A new address is being used by the Bureau for the Eastside Utility site. The Hickory Valley Road address that was being used was not the physical location of the plant where the ozone monitoring shelter is located. A plant official stated that the Utility is now using 8301 Hickory Valley Road as the plant address

so Bureau documents will reflect this change. There is a half-mile private road, Reservoir Road, to the plant from Hickory Valley Road. The property is gated at Hickory Valley Road. Entry requires either a password or a verbal request to be let in remotely.

Instead of chart recorders the Bureau has installed an additional data logger at each site, spare Agilaire 8816s. Both the primary and secondary loggers are being polled. Both sites also have AV Trends software that captures data from the primary logger on a local PC. AV Trends enables the operator to view previously recorded data during a site visit. Data at the site can be manipulated into graphs using the software.

The Bureau began using Very Sharp Cut Cyclones (VSCCs) for all $PM_{2.5}$ FRMs on January 1, 2017. The Bureau is no longer using WINs Impactors.

Collocation Requirements

Hamilton County's collocation requirements are met by having two FRM $PM_{2.5}$ monitors at the Siskin Drive site. The collocated POC 2 FRM began operating on a 12-day schedule on May 9, 2019. There are two collocations at that site: the T640 is collocated with a filter-based FRM and that FRM is collocated with a second filter-based FRM. Both collocations are required because there is a single FRM at the East Ridge site (470650031).

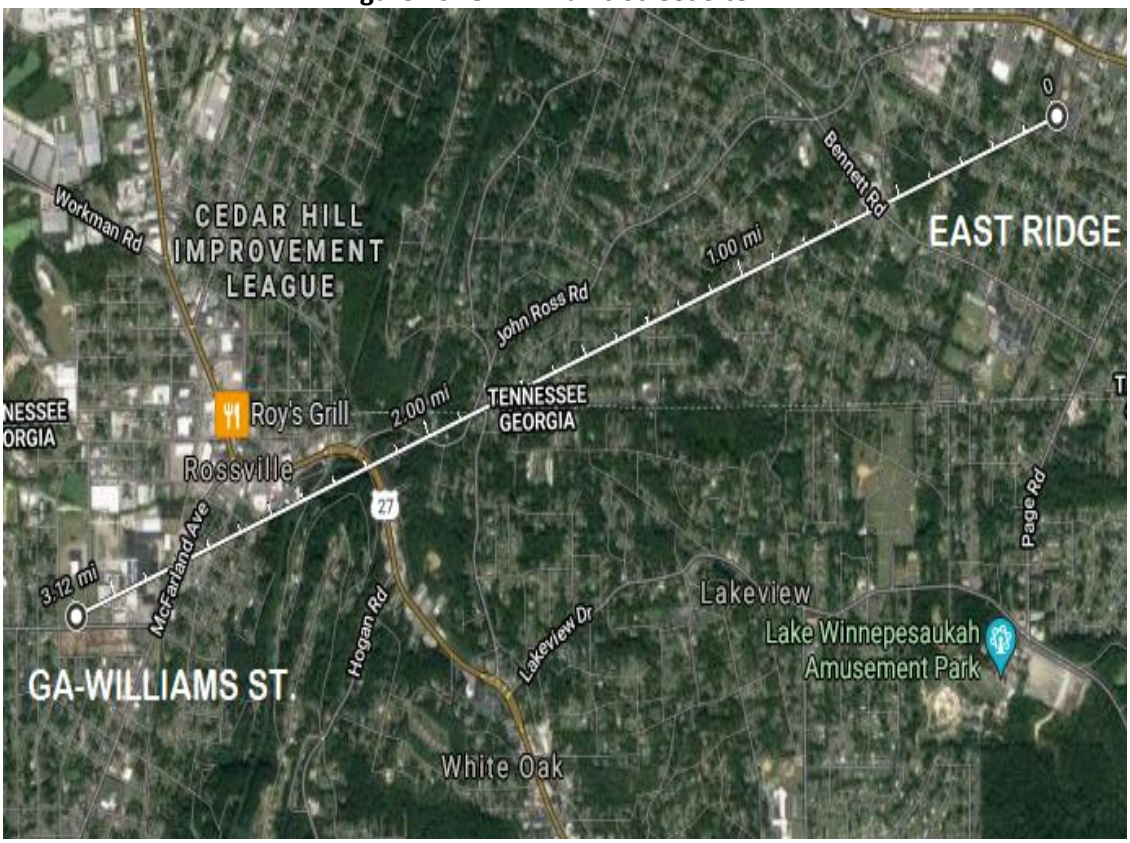
No Expected Site Changes for 2021

The high security at the Eastside Utility site has become more attractive for the existing ozone site as crime has increased in the area. No suitable site was found to move the Eastside Utility shelter. Potential sites investigated were not in safe areas, were too close to trees or buildings, or access to the property was not easily obtainable.

New State of Georgia Site

The State of Georgia has established a new site at the corner of Maple Street and Williams Street in Rossville. The AQS number is 132950004. This site replaces the Maple Street site 132950002 that was moved for construction. The site is now 3.12 miles Southwest from the East Ridge site, 470650031.

Figure 10- GA Williams Street Site



Memorandum of Agreement with the State of Georgia

The Memorandum of Agreement with the State of Georgia was renewed in 2018. A copy is included in Appendix A.

SODDY DAISY HIGH SCHOOL

Rep Org Name	CHATTANOOGA HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU
PQAO	0170
Address	SODDY DAISY HIGH SCHOOL 618 SEQUOYAH ACCESS ROAD
AQS ID	470651011
County Name	HAMILTON
CBSA	CHATTANOOGA/ NORTH GEORGIA
Lat	35.233562
Lon	-85.181591
Parameter Code	44201
Parameter	OZONE
Monitor Type	SLAMS
POC	1
Interval	1
Year	2021
Collection Freq.	HOURLY
Method	047
FRM/FEM	THERMO ENVIRON. 49i
Analysis	UV PHOTOMETRIC
Ref Mtd ID	EQOA-0880-047
Monitor Type	047
Monitor Object.	BACKGROUND
Dominant Source	AREA
Meas. Scale	NEIGHBORHOOD
Land Use Type	COMMERCIAL
Location Setting	RURAL
Elevation	930 FT ABOVE SEA LEVEL
Closest Meteorological Site	CHATTANOOGA METROPOLITAN AIRPORT 1001 AIRPORT RD
Date Site Established	8/01/1978 MOVED TO SDHS 2/1/2002, $PM_{2.5}$ DELETED 12/31/15

The Soddy Daisy High School site is located in the municipality of Soddy-Daisy in North Hamilton County. The site was initially established as an ozone site August 1, 1978, at 9527 West Ridge Trail Road behind the Head Start Building using a chemi-luminescence method. June 1, 1979, the method was changed to UV. The ozone site was moved February 1, 2002, within a mile radius, to a new shelter on a hill behind Soddy Daisy High School. The $PM_{2.5}$ monitor was originally located on the roof of the Sheriff's Annex at 6233 Dayton Boulevard (AQS 470650032) as a Special Purpose Monitor (established 6/5/1999). The monitor was moved to the roof of the new shelter at 470651011 in mid-January 2002- first monitoring date was 1/26/02. In June 2008 the monitor was changed from a WINS Impactor to a Very Sharp Cut Cyclone model while retaining the same method code to designate it FRM. May 20, 2009, the shelter and monitors were moved approximately 100 feet east on the same property to accommodate the building of a girls' softball field. The Bureau shut down the $PM_{2.5}$ SPM at the end of December 2015. The last run date was 12/27/2015. The site is active for ozone monitoring. A new Shelter One 8 X 14 shelter was installed January 25, 2021 on the foundation for the previous shelter.

Soddy Daisy High School, 618 Sequoyah Road 470651011		
Street Name	**Average Daily Traffic Counts: TDOT website**	**Distance**
Sequoyah Road- in front of the school	9,383 2021 (Station #374)	.28 miles, 446 meters
Hyatte Road- behind the site	1,046 (Lovell Road- intersects with Hyatte Rd) 2021 (#306)	.02 mile, 39.74 meters

Direction	**Predominant Land Use (Industry, Residential, Commercial or Agricultural)**
North	School property- boys ball fields
South	Beyond Hyatte Road is residential, rural, agricultural
East	Soddy Daisy High School and Daisy Elementary, 620 Sequoyah Road
West	Girls softball field, beyond the field is Hyatte Road, beyond Hyatte Road is residential, rural, agricultural

Directions	**Trees**	**Height (m)**	**Distance (m)**
North	tree, tree	5.6 m, 9.2 m	26.0 m, 44.3 m
South	Tree Row	12.6 m	30.0 m
East	Tree Row	12.6 m	71.6 m
West	Field House	2 story	7.4 m

Directions	**Topographic Features (hills, valleys, rivers)**	**General Terrain (flat, rolling, rough)**
North	Site is on hill	hill
South	Residential, farms	
East	Student parking lot below site	
West	Two story field house/concessions, parking lot and girls ball field on hill above site	Site is between an upper parking lot and a lower parking lot

Intake Height	
Soddy Daisy ozone	5.2 m

Soddy Daisy High School 470651011
North

Northeast

Soddy Daisy High School-470651011

East

Southeast

Soddy Daisy High School- 470651011
South

Southwest

Soddy Daisy High School 470651011
West

Northwest

EASTSIDE UTILITY

Rep Org Name	CHATTANOOGA HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU
PQAO	0170
Address	RESERVOIR RD (PRIVATE DRIVE TO UTILITY), ADDRESS: 8301 HICKORY VALLEY ROAD
AQSID	470654003, FORMERLY 0028
County name	HAMILTON COUNTY
CBSA	CHATTANOOGA/ NORTH GA
Lat	35.102862
Lon	-85.162243
Parameter Code	44201
Parameter	OZONE
Monitor Type	SLAMS
POC	1
Int	1
Year	2021
Collection Freq	HOURLY
Method	047
FRM/FEM	THERMO ENVIRON. 49i
Analysis	UV PHOTOMETRIC
Ref Mtd ID	EQOA-0880-047
Monitor Objective	TYPICAL CONCENTRATIONS
Dominant Source	AREA
Meas. Scale	URBAN
Land Use Type	INDUSTRIAL
Location Setting	URBAN AND CENTER CITY
Elevation	940 FT ABOVE SEA LEVEL
Closest Met Site	CHATTANOOGA METRO-POLITAN AIRPORT, 1001 AIRPORT ROAD
Date Site Established	6/13/1979 Moved from 0028- 2/2004 for 3/1/2004 season

This ozone site was originally established June 13, 1979, using a UV method on Volunteer Army Ammunition Plant (VAAP) property as site 470650028. According to notes in AQS, the ozone monitor was moved to the Laboratory Building on Patrol Road from 100-200 feet away about 1979. About 1982 the ozone monitor was moved to a trailer across the street and northwest of the lab in a wooded area. It was moved to Eastside Water Utility on the top of a hill in February, 2004, because of a road widening project which utilized the property on which the monitoring module sat. The site was moved more than two (2) miles which required changing the AQS identifying number from 470650028 to a new number, 470654003. The site is inside the Eastside Water Utility high security area which requires an access code or verbal request for admittance. A new 8 X 14 Shelter One shelter was installed January 25, 2021, on the foundation for the old shelter.

8301 Hickory Valley Road, Eastside Utility 470654003	
Street Name	**Traffic Counts: Average Per Day TDOT webpage**
Highway 58	25,047 2020 (Station #271)
8301 Hickory Valley Road	10,836 2020 (#613)
Reservoir Road – private drive to Eastside Water Utility	3 or 4 vehicles a day and a few trucks as the county is dumping dirt in a hole on the hill
Interstate 75	83,490 2020 (#616)
Highway 153	68,140 2020 (#216) ; 74,023 2020 (#265)

Direction	**Predominant Land Use (Industry, Residential, Commercial or Agricultural)**
North	Commercial along Highway 58, residential beyond Highway 58
South	Undeveloped forest and Commercial/Industrial area
East	Forest
West	Forest to Highway 58, Commercial on Highway 58, then residential beyond

Directions	**Trees/Buildings**	**Height (m)**	**Distance (m)**
North	None		
South	Building- One story	1 story: 3.7 m	12.6 m
East	None		
West	SW- Building Tree behind building	1½ story: top of gable: 5 m 14 m	20.7 m 27.0 m

Directions	**Topographic Features (hills, valleys, rivers)**	**General Terrain (flat, rolling, rough)**
North	Site is on top of a hill at about 900 feet. It is a wilderness area as the entire hill is a gated high-security area. A drive to the site is through a beautiful forest and past a lake. One encounters deer, wild turkeys, hawks, and buzzards. Site is on the north edge of the hill- almost hanging over Highway 58. To the north is looking down the hill.	7,000 acres were a TNT plant (closed in mid 70s) controlled by the military that once housed nitric acid and sulfuric acid plants. About 1,000 acres are developed to the southeast of this monitoring site as a commercial/ industrial area around and including the Volkswagen Plant. The Highway 58 area at the bottom of the hill to the North is Commercial. Highway 58 is a major highway running east/west.
South	One story building- Commercial	Flat on top of hill
East	Looking downhill	
West	Looking downhill	

Intake Height	
Eastside ozone	4.2 m

Eastside Utility -470654003
North

Northeast

Eastside Utility -470654003
East

Southeast, South, Southwest, and West cardinal directional pictures have been removed for security reasons. They have been supplied to EPA.

Northwest

SISKIN DRIVE/ UT Chattanooga

Rep Org Name	CHATTANOOGA-HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU		
PQAO	0170		
Address	911 SISKIN DRIVE		
AQSID	470654002		
County	HAMILTON		
CBSA	CHATTANOOGA/ NORTH GEORGIA		
Lat	35.050918		
Lon	-85.293019		
Parameter	88101	88101	88101
Parameter	$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$ CONTINUOUS
Monitor	SLAMS	SLAMS	SLAMS
POC	1	2	3
Interval	7	7	1
Year	2021	2021	2021
Collection Freq.	3-DAY	12-day beginning 5/9/20	MINUTE HOURLY
Method	145 VSCC	145 VSCC	236
FRM/FEM	R & P 2025i SEQ	R & P 2025i SEQ	T640 REG MODEL
Analysis	GRAVIMETRIC LAB: IML	GRAVIMETRIC LAB: IML	LIGHT SCATTERING
Ref Mtd ID	RFPS-0202-145	RFPS-0202-145	EQPM 0516-236 2.5 only
Objective	POPULATION		
Dom. Source	AREA		
Meas.Scale	URBAN		
Land Use	COMMERCIAL		
Location	URBAN/ CENTER CITY		
Elevation	720 FT ABOVE SEA LEVEL		
Closest Met	CHATTANOOGA METROPOLITAN AIRPORT, 1001 AIRPORT RD		
Date Est.	1/01/1999	1/01/1999	2/15/2017

The Siskin Drive site was initially established January 1, 1999, as a CORE $PM_{2.5}$ site with collocated FRM monitors on the roof of the Davenport Building, 529 Oak Street, on the University of Tennessee at Chattanooga campus. The monitors were moved to the Student Center roof, 650 East 5TH Street, about early 2000; moved to a temporary site behind the University Administration Building at 400 Palmetto Street in late 2003 where the TEOM was first installed; then to a new shelter at the current site March 15, 2004, at 911 Siskin Drive. Met One Speciation was added 12/1/2001; a continuous $PM_{2.5}$ monitor was added 3/26/2004; and a URG3000 was added 10/1/2009. The continuous $PM_{2.5}$ monitor (TEOM) was operated at 30°C and had an SES predryer. The predryer failed in 2013 and was removed. The temperature was then raised to 50°C. A different early model TEOM was used. EPA defunded the Met One speciation and the URG3000 monitors in January 2015, and speciation monitoring ceased. FRMs were converted from WINS to internal VSCC models January 1, 2017. A T640 continuous was added in January, 2017, as an SPM. It began reporting $PM_{2.5}$ to AQS February 15, 2017. The shelter was replaced with a deck in June of 2018. At that time the TEOM was taken out of service and the T640 began reporting to AirNow. The 2025 VSCC FRMs were replaced with 2025i internal VSCC models on the new deck. Beginning January 1, 2019, the T640 status was changed from SPM to SLAMS. The FRM POCs 1 and 2 and T640 data are now combined to compare against the standard. The data from whatever monitors are running each day are averaged for that day. The T640 retains POC 3. The POC 2 FRM changed from 3-day to 12-day monitoring on 5/9/19. Siskin Rehabilitation Hospital has been using the property on which the deck sits as an employee parking lot. Siskin built a parking garage so the site is no longer used for parking as of April 2020.

911 Siskin Drive 470654002
(Former site on University of Tennessee at Chattanooga campus)

Street Names	Average Daily Traffic Counts: TDOT website
Siskin Drive	No counts: side road behind school
Third Street	15,743 2021 (Station #107)
Riverside Drive/Amnicola Highway	29,402 2021 (#108)

Direction	Predominant Land Use (Industry, Residential, Commercial or Agricultural)
North	Commercial –Power Utility Fenced Enclosure for large transformers
South	School baseball field- Erlanger Hospital and Health Department in background
East	Siskin Rehabilitation Facility
West	Commercial-Power Utility Fenced Enclosure. Beyond Siskin Drive to the south are parking lots and buildings for school, Chattanooga School for Arts and Sciences, K-12. The school, parking lots, and athletic fields occupy the entire block bordered by Siskin Drive, Third Street, and Siskin Rehabilitation Facility

Directions	Trees/Buildings	Height (m)	Distance (m)
North	NE-Tree line NW-Tree in Utility Enclosure	10.7 m 9.1 m	33.5 m 30.5 m
South	SW-Tree was removed 6/18		
East			
West			

Directions	Topographic Features (hills, valleys, rivers)	General Terrain (flat, rolling, rough)
North	Site is on a small rise NE	Hill rises to north
South	School facilities	Hill
East	Two story building- Rehabilitation Facility	Hill
West	Transformer Enclosure	Hill

Intake Heights	
Siskin 1 FRM	2.6 m
Siskin 2 FRM	2.6 m
T640	2.8 m

Siskin Drive-470654002

North

Northeast

Siskin Drive-470654002

East

Southeast

Siskin Drive-470654002

South

Southwest

Siskin Drive-470654002
West

Northwest

East Ridge City Hall-Tombras Avenue

Rep Org name	CHATTANOOGA HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU
PQAO	0170
Address	1517 TOMBRAS AVENUE, EAST RIDGE
AQSID	470650031
County Name	HAMILTON
CBSA	CHATTANOOGA/ NORTH GEORGIA
Lat	34.99438
Lon	-85.24293
Parameter Code	88101
Parameter Name	$PM_{2.5}$
Monitor Type	SLAMS
POC	1
Int	7
Year	2020
Collection Frequency	3 DAY
Method	145-VSCC
FRM/FEM instrument	R & P 2025 SEQ
Analysis	GRAVIMETRIC –LAB: IML
Ref Mtd ID	RFPS-0202-145
Monitor Objective	POPULATION EXPOSURE
Dominant Source	AREA
Measurement Scale	NEIGHBORHOOD
Land Use Type	COMMERCIAL
Location Setting	URBAN AND CENTER CITY
Elevation	720 FT ABOVE SEA LEVEL
Closest Meteorological Site	CHATTANOOGA METROPOLITAN AIRPORT 1001 AIRPORT ROAD
Date Site Established	5/6/1999 on POST OFFICE, MOVED 11/20/2007 TO BEHIND ER CITY HALL

The $PM_{2.5}$ site was originally established 5/6/1999 on the roof of the East Ridge Post Office, 1510 Maxwell Road, in the municipality of East Ridge in South Hamilton County near the Georgia border. It was moved to a temporary location behind the East Ridge City Hall on November 20, 2007. It was moved to a permanent location on the same property about 110 feet north on January 1, 2009. This site is roughly 3.12 miles from the Williams Street, North Georgia site, operated by the State of Georgia. The instrument was converted from WINS to VSCC 1/1/2017. On 10/31/2018 a model was placed at the site that had an external VSCC.

1517 Tombras Avenue 470650031

(Former site at East Ridge Post Office, 1510 Maxwell Road)

Street Name	Average Daily Traffic Counts: TDOT website	Approximate Distance
Tombras Avenue	About 3,317 (Bennett Road) 2020 (Station #488)	.06 mile or 100 meters
Ringgold Road	18,247 2020 (#133)	.17 mile or 269 meters

Direction	Predominant Land Use (Industry, Residential, Commercial or Agricultural)
North	East Ridge High School (134 m), NE ER Community Center (64.8 m- 1 story)
South	Residential
East	City Hall, beyond City Hall is residential
West	Residential – municipality has highest population density in Hamilton County

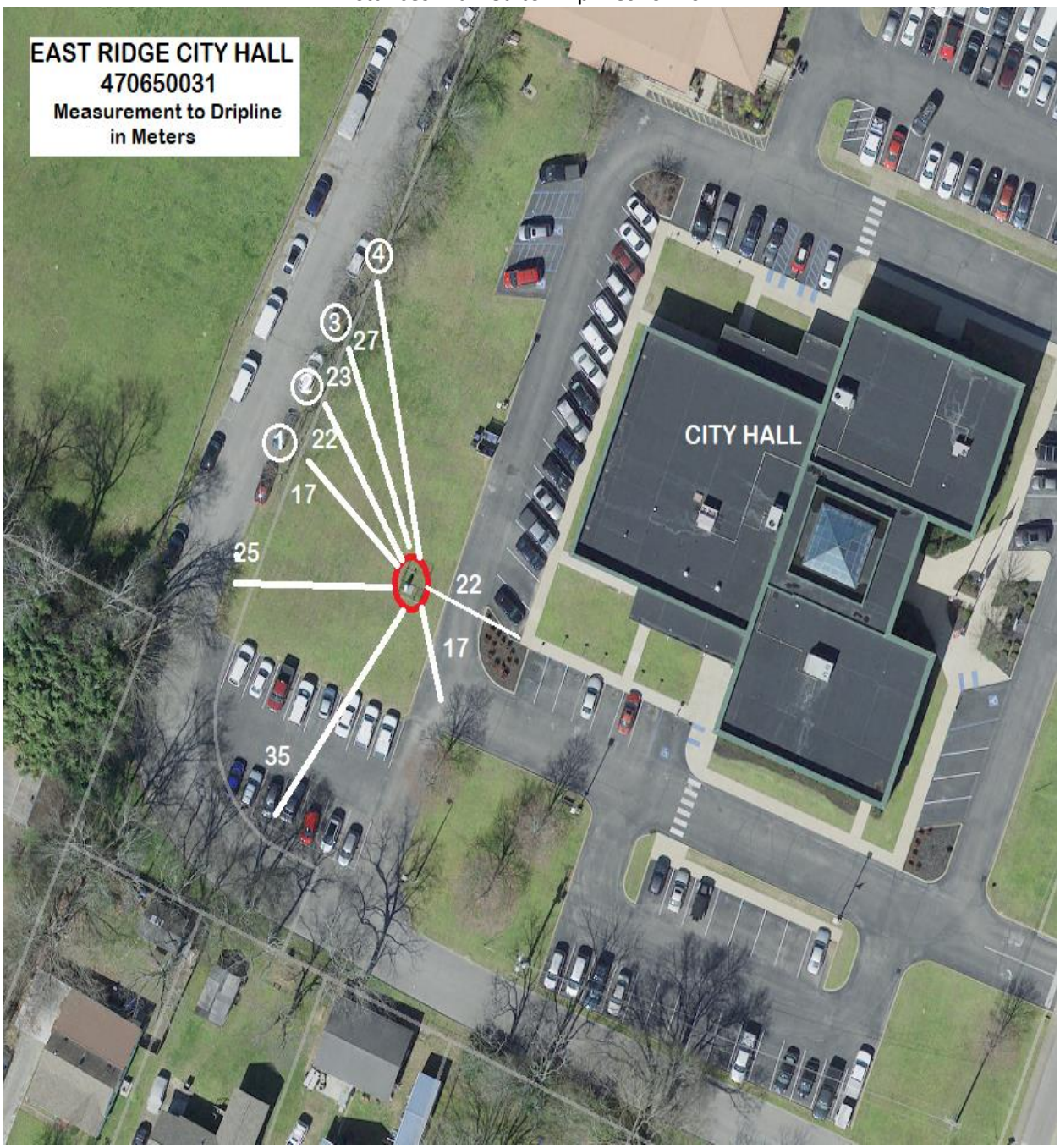
Directions	Trees/Buildings	Height (m)	Distance (m)
Northwest	NW-Treeline Closest trees (1)	9.4 m	17 m
	(2)	12.8 m	22 m
South, SE	SE-3 Trees 1,2,3 S-Treeline	9.5 m; 9.0 m; 9.5 m 15.2 m	17.0 m; 29.3 m; 31 m 37.5 m
East	One story building (City Hall)	3.7 m	22.5 m
West	Tree line	18.2	25.0
Southwest	Tree line	15.2	35.0

Directions	Topographic Features (hills, valleys, rivers)	General Terrain (flat, rolling, rough)
North	Flat	Flat
South	Flat	Flat
East	Flat	Flat
West	Flat	Flat

Intake Height	
East Ridge FRM	2.4 m

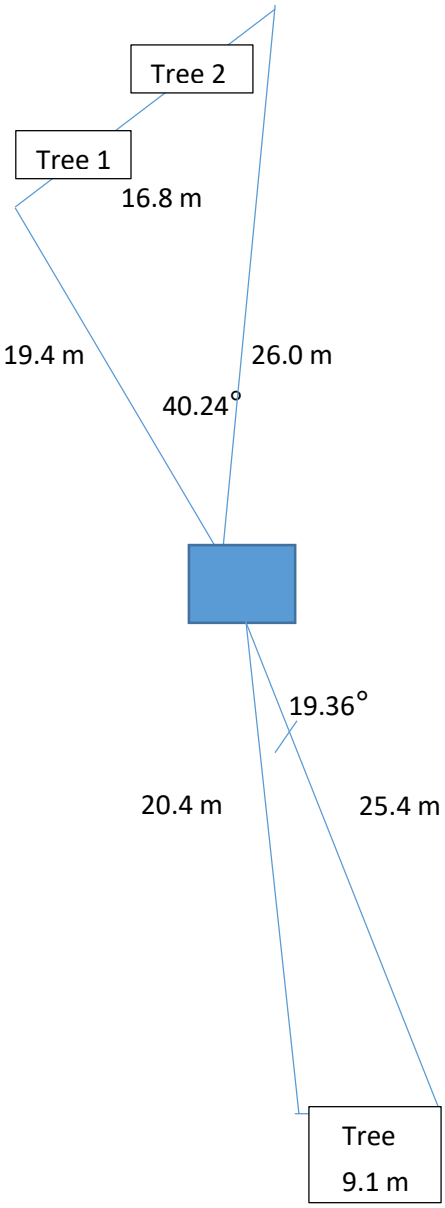
Figure 11- Aerial View of East Ridge City Hall Site 2020

Distances Marked to Driplines for 2021



Two trees to the Northwest of the site can be classified as obstructions and one tree to the south. In 2021 Tree 2 to the Northwest measured greater than 20 meters to the drip line but it is included because it did not measure that far in 2020. A variance in foliage may change the measurement to the dripline to within 20 meters. A calculation was required to determine how much of the 90° quadrant was obstructed by the trees to the Northwest. The angle is calculated in 2021 as 40.24°. The angle for the tree to the South is 19.36°. This means the air flow is obstructed 59.60°. Photographs are included to illustrate that the three trees in question are obstructing less than 90°. In the picture labeled Northwest, the left two trees are the ones obstructing as indicated by the imposed triangle. In the South view it is the central tree.

Figure 12- Obstruction Determination



TRIANGLES ARE NOT TO SCALE

East Ridge City Hall- Tombras Avenue-470650031
North

Northeast

East Ridge City Hall- Tombras Avenue-470650031

East

Southeast

East Ridge City Hall- Tombras Avenue-470650031
South

Southwest

East Ridge City Hall- Tombras Avenue-470650031
West

Northwest

Appendix A
Memorandum of Understanding with State of Georgia

MEMORANDUM OF AGREEMENT

ON AIR QUALITY MONITORING FOR CRITERIA POLLUTANTS FOR

THE CHATTANOOGA-WALKER COUNTY

METROPOLITAN STATISTICAL AREA MSA

December 28, 2017

Participating Agencies:

Georgia
Georgia Department of Natural Resources (GA DNR)
Environmental Protection Division GA EPD APB

Tennessee
Chattanooga-Hamilton County Air Pollution Control Bureau (CHCAPCB)

I. PURPOSE/OBJECTIVES/GOALS

The purpose of the Memorandum of Agreement (MOA) is to establish the Chattanooga-Hamilton County-Walker County Metropolitan Statistical Area (MSA) Criteria Pollutant Air Quality Monitoring Agreement between CHCAPCB and GAEPDAPB (collectively referred to as the "affected agencies") to collectively meet United States Environmental Protection Agency (EPA) minimum monitoring requirements for particles of an aerodynamic diameter of 10 micrometers and less (PM10), particles of an aerodynamic diameter of 2.5 micrometers and less (PM2.5), and ozone; as well as other criteria pollutant air quality monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all parties. This MOA will establish the terms and conditions of this collective agreement to provide adequate criteria pollutant monitoring for the Chattanooga –Hamilton County-Walker Co, GA MSA as required by 40 CFR 58 Appendix D, Section 2, (e) (March 28, 2016)[1].

II. BACKGROUND

The Chattanooga-Hamilton Co-Walker Co, GA MSA consists of the following counties: Dade, Walker, Catoosa, Hamilton, Marion, and Sequatchie. GA EPD APB has jurisdiction over Dade, Walker, and Catoosa Counties in Georgia and CHCAPCB has jurisdiction over Hamilton County, Tennessee. The State of Tennessee has jurisdiction over Marion and Sequatchie Counties in Tennessee, but does not have any permanent air monitoring sites in those counties. The CHCAPCB and GA EPD APB are required by the Clean Air Act to measure for certain criteria pollutants in the ambient air in the Chattanooga-Hamilton County-Walker Co, GA Metropolitan Statistical Area (MSA). The United States Environmental Protection Agency (EPA) has established minimum monitoring requirements based on the size of the MSA and the quality of the air in the

MSA for particles of an aerodynamic diameter of 10 micrometers and less (PM10), particles of an aerodynamic diameter of 2.5 micrometers and less (PM2.5), and ozone.

40 CFR 58 Appendix D, Section 2, (e)[1] states (in part):

"...The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator."[1]

Currently each air pollution control agency (affected agency) conducts monitoring in its respective jurisdiction and coordinates its monitoring with the other air pollution control agencies within the MSA.

I. ROLES AND RESPONSIBILITIES

The parties agree to the following terms and conditions:

- CHCAPCB and GA EPD APB (the "affected agencies") commit to conducting appropriate monitoring in their respective jurisdictions of the MSA; as needed, to collectively meet EPA minimum monitoring requirements for the entire MSA for PM10, PM2.5, and ozone, as well as other criteria air pollutant monitoring deemed necessary to meet the needs of the MSA as determined reasonable by all affected agencies. The minimum air quality monitoring requirement (for PM10, PM2.5, and ozone described in 40 CFR 58) for the MSA shall apply to the MSA in its entirety and shall not apply to any sole affected agency within the MSA unless agreed upon by all affected agencies.

- The affected agencies commit to coordinating monitoring "...responsibilities and requirements...to achieve an effective network design..."[1] regarding criteria air pollutant monitoring conducted in the MSA and commit to communicate unexpected or unplanned changes in monitoring activities within their jurisdictions to the other affected agencies of this MOA. As conditions warrant, the affected agencies may conduct telephone conference calls, meetings, or other communications to discuss monitoring activities for the MSA. Each affected agency shall inform the other affected agencies via telephone or e-mail of any monitoring changes occurring in its jurisdiction of the MSA at its earliest convenience after learning of the need for the change or making the changes. Such unforeseen changes may include evictions from monitoring sites, destruction of monitoring sites due to natural disasters, or similar occurrences that result in a loss of more than 25% data in a quarter or a permanent change in the monitoring network. At least once a year in the second quarter of the year or before June 15th, each agency shall make available to the other agencies who are a party to this agreement, a copy of its proposed monitoring plan for the MSA for the next

year. The CHCAPCB will submit the network review that is submitted to the State of Tennessee for inclusion in the State's monitoring plan.

- Each party reserves the right to revoke or terminate this MOA at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

III. LIMITATIONS

A. All commitments made in this MOA are subject to the availability of appropriated funds and each party's budget priorities. Nothing in this MOA, in and of itself, obligates CHCAPCB or GA EPD APB to expend appropriations or to enter into any contract, assistance agreement, interagency agreement or other financial obligation.

B. This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimburse or contribution of funds between parties to this MOA will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements that will be effected in writing by representatives of the parties.

C. Except as provided in Section III, this MOA does not create any right or benefit, substantive or procedural, enforceable by law or equity against CHCAPCB or GA EPD APB, their officers or employees, or any other person. This MOA does not direct or apply to any person outside CHAPCD or GAEPD APB.

V. PROPRIETARY INFORMATION AND INTELLECTUAL PROPERTY

No proprietary information or intellectual property is anticipated to arise out of this MOA.

VI. POINTS OF CONTACT

The following individuals are designated points of contact for the MOA:

GA EPD APB

DeAnna G. Oser
GAEPD APB Ambient Monitoring Program
4244 International Parkway, Suite 120
Atlanta, GA 30354

DeAnna.Oser@dnr.ga.gov
Voice: (404) 363-7004
FAX: (404) 363-7100

CHCAPCB

Robert Colby
CHCAPCB
6125 Preservation Dr
Chattanooga, Tn 37416

bcolby@chattanooga.gov
Voice: (423) 643-5999
FAX: (423) 643-5972

VII. MODIFICATION/DURATION/TERMINATION

This MOA will be effective when signed by all parties. This MOA may be amended at any time by the mutual written consent of the parties. The parties will review this MOA at least once every 10 years to determine whether it should be revised, renewed, or cancelled. This MOA may be revoked or terminated by an affected agency at any time and for any reason by giving thirty (30) days written notice prior to the date of termination.

VIII. REFERENCE

1 – United States Environmental Protection Agency, Title 40 Code of Federal Regulations, Part 58, Appendix D, "Network Design Criteria for Ambient Air Quality Monitoring", Section 2 (e), "General Monitoring Requirements".

IX. APPROVALS

Georgia Department of Natural Resources, Environmental Protection Division
Air Protection Branch (GA EPD APB)

BY: _____

TITLE: DIRECTOR

DATE: 1/24/18

Chattanooga-Hamilton County Air Pollution Bureau (CHCAPCB)

BY: _____

TITLE: Director

DATE: January 3, 2018