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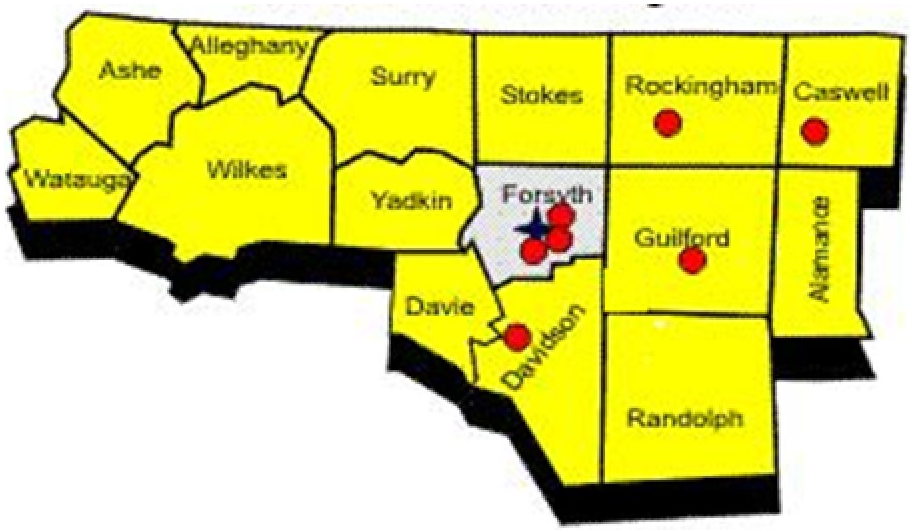
NORTH CAROLINA
Environmental Quality

2021-2022 Annual Monitoring Network Plan for the North Carolina Division of Air Quality

Volume 2

Site Descriptions by Division of Air Quality Regional Office and Metropolitan Statistical Area

B. The Winston-Salem Monitoring Region



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The Winston-Salem Monitoring Region

The Winston-Salem monitoring region of North Carolina, shown in Figure B1, consists of five sections: (1) the eastern mountains - Alleghany, Ashe, Surry, Watauga and Wilkes counties, (2) the Winston-Salem metropolitan statistical area, or MSA - Davidson, Davie, Forsyth, Stokes and Yadkin counties, (3) the Greensboro MSA - Guilford, Randolph and Rockingham counties, (4) the Burlington MSA - Alamance County and (5) Caswell County.

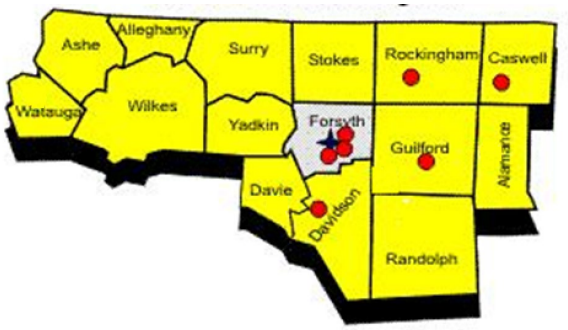

Figure B1. The Winston-Salem monitoring region
The red dots show the approximate locations of most of the monitoring sites in this region.

(1) The Eastern Mountains

The eastern mountains consist of five counties: Alleghany, Ashe, Surry, Watauga and Wilkes. There are no major metropolitan areas in this section of North Carolina. The Boone micropolitan statistical area, or MiSA, is in Watauga County, the Mount Airy MiSA is in Surry County and the North Wilkesboro MiSA is in Wilkes County. The North Carolina Division of Air Quality, or DAQ, does not operate any monitoring sites in the eastern mountains. DAQ shut down the fine-particle monitoring site located at Boone in Watauga County on Dec. 31, 2015.

In 2010, the United States Environmental Protection Agency, or EPA, finalized changes to the expanded **lead-monitoring** network established in 2008 to support the lower lead national ambient air quality standard, or NAAQS, of 0.15 micrograms per cubic meter. [1] In 2010, the EPA focused monitoring efforts on fence line monitoring located at facilities that emit 0.5 ton or more of lead per year, at urban national core, NCore, monitoring sites and at selected airports. [2] In 2016, the EPA removed the requirement for monitoring at NCore sites.[3] The eastern mountains do not have any permitted facilities emitting 0.5 ton or more per year of lead,[4] or any of the selected airports. Thus, the changes to the lead monitoring network requirements did not result in any lead monitoring in the eastern mountains.

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[1] National Ambient Air Quality Standards for Lead, Federal Register, Vol. 73, No. 219, \ Wednesday, Nov. 12, 2008, p. 66964, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2008-11-12/pdf/E8-25654.pdf.

[2] Revisions to Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, p. 81126, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.

[3] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[4] United States Environmental Protection Agency. (2018). *TRI Explorer* (2017 Dataset (released October 2018)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (March 23, 2019).

The 2015 **ozone-monitoring** requirements did not result in additional ozone monitoring in the eastern mountains.[5] This area does not have any MSAs requiring a minimum number of monitors by 40 Code of Federal Regulations, or CFR, Part 58, Appendix D for population exposure monitoring in urban areas.

The eastern mountains did not need to add monitors to comply with the 2010 **nitrogen dioxide monitoring** requirements.[6] The area is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The eastern mountain area also did not need additional monitors to meet the 2010 **sulfur dioxide monitoring** requirements because there are no large sources of sulfur dioxide emissions located within the area.[7] The EPA does not require this area to operate near road **carbon monoxide** and **fine particle** monitors because the population is under one million.[8]

(2) The Winston-Salem MSA

The Winston-Salem MSA consists of five counties: Davidson, Davie, Forsyth, Stokes and Yadkin. The major urban area is Winston-Salem. DAQ currently operates one monitoring site in the Winston-Salem MSA and the Forsyth County Office of Environmental Assistance and Protection, or Forsyth County, operates three. These sites are located at Lexington in Davidson County and Clemmons, Union Cross and Hattie Avenue in Winston-Salem in Forsyth County. Figure B2 displays the locations of these monitors. Volume 1, Appendix C discusses the Forsyth County sites and monitors. This subsection only discusses the DAQ site.

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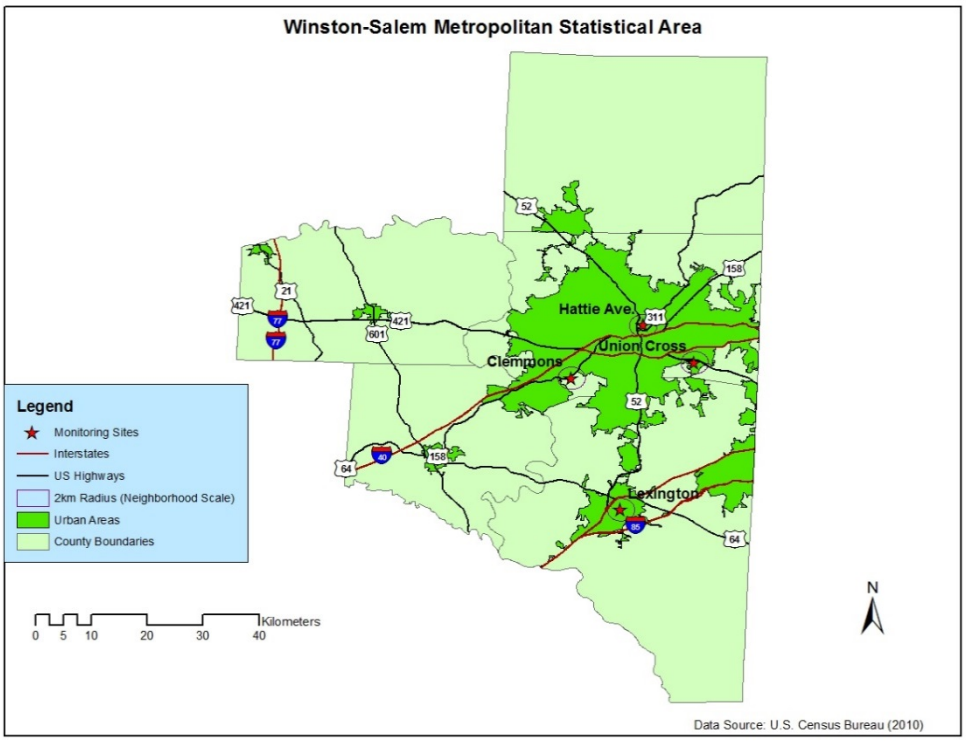
[5] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.

[6] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.

[7] North Carolina Point Source Emission Report, available online at https://xapps.ncdenr.org/aq/ToxicsReportServlet?ibeam=true&year=2016&physical=byCounty&overridetype=All&toxics=264&sortorder=103. Access May 1, 2018.

[8] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.



Hattie Avenue is a multi-pollutant site; Union Cross is an ozone site; Clemmons School is an ozone and fine particle site and Lexington is a fine particle site. The circles represent the scale (4 Km).

Figure B2. Location of monitoring sites in the Winston-Salem MSA

At the **Lexington** site**,** 37-057-0002, DAQ operates a one-in-six-day fine particle FRM monitor and a continuous fine particle monitor. The division shut down the Met One Super SASS and URG monitors in January 2015 when the EPA stopped funding them. Figure B3 shows the site. Figure B4 through Figure B11 provides views looking north, northeast, east, south, southwest and west. Table B1 summarizes monitoring information for the site.

Figure B3. Lexington water tower fine particle monitoring site, 37-057-0002

Figure B4. Looking north from Lexington site

Figure B6. Looking northeast from Lexington site

Figure B5. Looking northwest from Lexington site

Figure B7. Looking east from Lexington site

Figure B8. Looking west from Lexington site

Figure B9. Looking southwest from Lexington site

Figure B10. Looking southeast from the Lexington site

Figure B11. Looking south from Lexington site

Table B1. Site Table for Lexington

Site Name:	Lexington			**AQS Site Identification Number**	37-057-0002
Location:	938 South Salisbury Street, Lexington, North Carolina				
CBSA:	Winston-Salem, NC			**CBSA #:**	49180
Latitude	35.8145	**Longitude**	-80.2627	**Datum:**	WGS84
Elevation	241 meters				

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
PM 2.5 local conditions, secondary	R & P Model 2025i PM-2.5 Sequential Air Sampler w/VSCC – Gravimetric Analysis	RFPS-1006-145	24-Hour	Every sixth day, year-round
PM 2.5 local conditions, primary	Met One BAM-1020 Mass Monitor w/VSCC, 170	EQPM-0308-170	1-Hour	Hourly, year-round

Date Monitor Established:	PM 2.5 local conditions, secondary monitor	Jan. 1, 1999
	PM 2.5 local conditions, primary continuous monitor	July 22, 2014

Nearest Road:	South Salisbury Street	**Traffic Count:**	1000	**Year of Count:**	2016 Estimate

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
PM 2.5 local conditions, collocated	30 meters	East	SLAMS	Collocated QA monitor to meet Appendix A requirements for BAM 1020 monitors.
PM 2.5 local conditions, primary	30 meters	East	SLAMS	Required for demonstration of maintenance. Compliance w/NAAQS. Real-time AQI reporting & forecasting.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable for Comparison to NAAQS**	**Proposal to Move or Change**
PM 2.5 local conditions, collocated	Population exposure	Neighborhood	Yes	None
PM 2.5 local conditions, primary	Population exposure	Neighborhood	Yes	None

Parameter Name	**Meets Part 58 Requirements for:**			
	Appendix A	**Appendix C**	**Appendix D**	**Appendix E**
PM 2.5 local conditions, collocated	Yes	Yes	Yes - Not required	Yes
PM 2.5 local conditions, primary	Yes	Yes	Yes - Not required	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
PM 2.5 local conditions, collocated	2.4	2.1 meters	>20 meters	None
PM 2.5 local conditions, primary	2.4	2.1 meters	>20 meters	None

On Jan. 1, 2016, DAQ made the continuous fine particle monitor at the site the primary monitor to provide a collocated beta attenuation monitor, BAM 1020, and federal reference method, FRM, monitor site. A collocated BAM 1020 – FRM site was necessary to meet 40 CFR Part 58, Appendix A requirements. On Jan. 1, 2017, the division added a second FRM to the site to provide a second FRM-FRM collocated site, if needed to meet 40 CFR Part58, Appendix A requirements; however, currently, the primary quality assurance organization is not operating enough primary FRMs to make a second FRM-FRM site necessary. Thus, DAQ continues to operate the BAM 1020 monitor as the primary monitor at the site and moved the collocated FRM to another site to replace the collocated FRM-FRM site at the Board of Education in Asheville. On July 1, 2018, the division reduced the sampling schedule for the FRM to one-in-six day.

In 2014, DAQ shut down the seasonal ozone monitor at **Mocksville,** 37-059-0003, because 40 CFR Part 58, Appendix D no longer required the division to operate it. In 2015, the Forsyth

County local program shut down the Peters Creek carbon monoxide monitor and the Shiloh Church ozone monitor. The state implementation plans no longer required the carbon monoxide monitor to demonstrate compliance with the carbon monoxide standard and the ozone monitor was not required by 40 CFR Part 58, Appendix D.

The 2010 changes to the **lead monitoring** requirements did not require lead monitoring in the Winston-Salem MSA. [9] The Winston-Salem MSA does not have any permitted facilities emitting more than 0.5 ton per year of lead.[10]

Starting in 2017, the 2015 changes to the **ozone monitoring** requirements lengthened the monitoring season so that it begins on March 1 instead of April 1. [11] The ozone monitoring changes did not result in additional monitors in the Winston-Salem MSA. This MSA already exceeds the minimum number of monitors required by 40 CFR Part 58, Appendix D for population exposure monitoring in urban areas.

To comply with the 2010 **nitrogen dioxide monitoring** requirements, [12] based on the monitoring rules finalized on March 7, 2013, the Winston-Salem MSA was required to add a monitor by Jan. 1, 2017, because the MSA population exceeded the 500,000-threshold. However, on Dec. 30, 2016, the EPA removed the requirement to establish near-road NO_2 monitoring stations in Core Based Statistical Areas, or CBSAs, having populations between 500,000 and 1,000,000 persons.[13] Currently, the MSA is too small to require area-wide monitors. The EPA designated the existing nitrogen dioxide monitor at Hattie Avenue as one of the monitors required by the administrator to represent vulnerable populations.

The Winston-Salem MSA did not need to add sulfur dioxide monitors to comply with the 2010 **sulfur dioxide monitoring** requirements. In August 2012, the Office of Air Quality Planning and Standards, OAQPS, calculated, based on a revised 2008 emission inventory, that population weighted emission index, PWEI, monitoring was not required in the MSA. Source oriented monitoring was also not required at the Belews Creek Steam Station in Stokes County because the facility showed by modeling that the ambient air near the facility meets the 2010 standard.

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[9] Revisions to Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, p. 81126, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.

[10] United States Environmental Protection Agency. (2018). *TRI Explorer* (2017 Dataset (released October 2018)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (March 23, 2019).

[11] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.

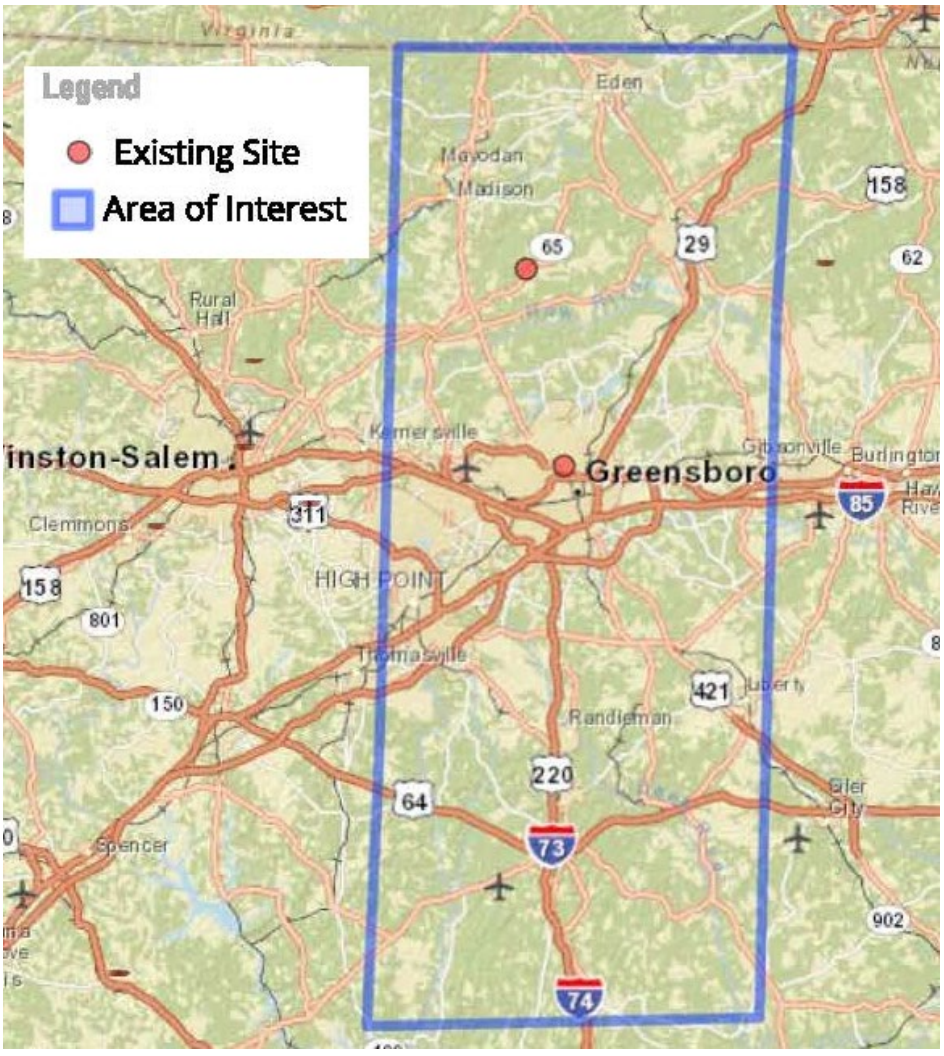
[12] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.

[13] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register**,** Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.

The changes to the monitoring requirements also did not require this area to operate near-road **carbon monoxide** and **fine particle** monitors because the population is under one million. [14]

(3) The Greensboro-High Point MSA

The Greensboro-High Point MSA consists of three counties: Guilford, Randolph and Rockingham. The major urban areas are the cities of Greensboro and High Point. DAQ currently operates two monitoring sites in the Greensboro-High Point MSA. These sites are located at Mendenhall in Guilford County and Bethany in Rockingham County. Figure B12 shows the locations of these monitors. DAQ shut down the **Colfax,** 37-081-0014, one-in-three-day fine particle monitoring site at the end of 2014 because 40 CFR Part 58, Appendix D no longer required the division to operate it.



The Mendenhall ozone and particle-monitoring site is in the center; the Bethany ozone monitoring site is to the north.

Figure B12. Location of monitors in the Greensboro-High Point MSA

[14] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.

At the **Mendenhall** site**,** 37-081-0013, DAQ operates seasonal ozone, continuous fine particle and continuous PM_{10} monitors. On March 26, 2019, the division added a rainwater collection sampler to the site. Figure B13 through Figure B21 show the site and views looking north, northeast, east, southeast, south, southwest, west and northwest. The Mendenhall site is the design value ozone-monitoring site for the MSA. At the end of 2017, DAQ shut down the fine particle federal reference one-in-six-day monitor. Site information is in Table B2.

Figure B13. Mendenhall ozone, particle and rainwater monitoring site, 37-081-0013

Figure B14. Looking north from the Mendenhall site

Figure B15. Looking northwest from the Mendenhall site

Figure B16. The Mendenhall site looking northeast

Figure B17. Looking east from the Mendenhall site

Figure B18. Looking west from the Mendenhall site

Figure B19. Looking southwest from the Mendenhall site

Figure B20. Looking southeast from the Mendenhall site

Figure B21. Looking south from the Mendenhall site

Table B2. Site Table for Mendenhall

Site Name:	Mendenhall School	**AQS Site Identification Number**					37-081-0013
Location:	205 Willoughby Blvd, Greensboro, North Carolina						
CBSA:	Greensboro-High Point, NC			**CBSA #:**	24660		
Latitude	36.109167	**Longitude**	-79.801111	**Datum:**	NAD83	**Elevation**	247 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM 2.5 local conditions, BAM	Met One BAM-1022 Mass Monitor w/ VSCC	EQPM-1013-209	1-Hour	Year-round
PM10 Total 0-10 µm STP	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	Year-round

Date Monitor Established:	Ozone	April 15, 2005
Date Monitor Established:	PM 2.5 local conditions, continuous	Dec. 14, 2001
Date Monitor Established:	PM10 Total 0-10 µm STP	Dec. 14, 2001

Nearest Road:	Saint Regis Road	**Traffic Count:**	<1,000	**Year of Count:**	2019 Estimate

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	185 meters	North northwest	SLAMS	Compliance w/ NAAQS; real-time reporting; air quality forecasting.
PM 2.5 local conditions, BAM	185 meters	North northwest	SPM; non-regulatory	Real-time reporting; air quality forecasting.
PM10 Total 0-10 µm STP	185 meters	North northwest	SLAMS	Compliance w/NAAQS

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	General background Population exposure	Urban	Yes	None
PM 2.5 local conditions, BAM	Population exposure General background	Neighborhood	No	Became primary monitor on Jan. 1, 2018
PM10 Total 0-10 µm STP	Population exposure General background	Urban	Yes	None

Parameter Name	**Meets Part 58 Appendix A Requirements**	**Meets Part 58 Appendix C Requirements**	**Meets Part 58 Appendix D Requirements**	**Meets Part 58 Appendix E Requirements**
Ozone	Yes	Yes	Yes	Yes
PM 2.5 local conditions, BAM	Yes	Yes	Yes	Yes
PM10 Total 0-10 µm STP	Yes	Yes	Yes	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3.0	1.1 meters	>20 meters	None
PM 2.5 local conditions, BAM	2.5	2.2 meters	>20 meters	None
PM10 Total 0-10 µm STP	2.5	2.2 meters	>20 meters	None

DAQ operated a BAM 1022 monitor at the site from November 2015 to Dec. 31, 2017, to evaluate how well the BAM and the FRM compare at this location. Figure B22 presents a comparison of the two monitors. Based on the results, through the end of 2017, the two monitors compared well. Thus, DAQ made the BAM the primary monitor at the site on Jan. 1, 2018, and shut down the FRM at the end of 2017.

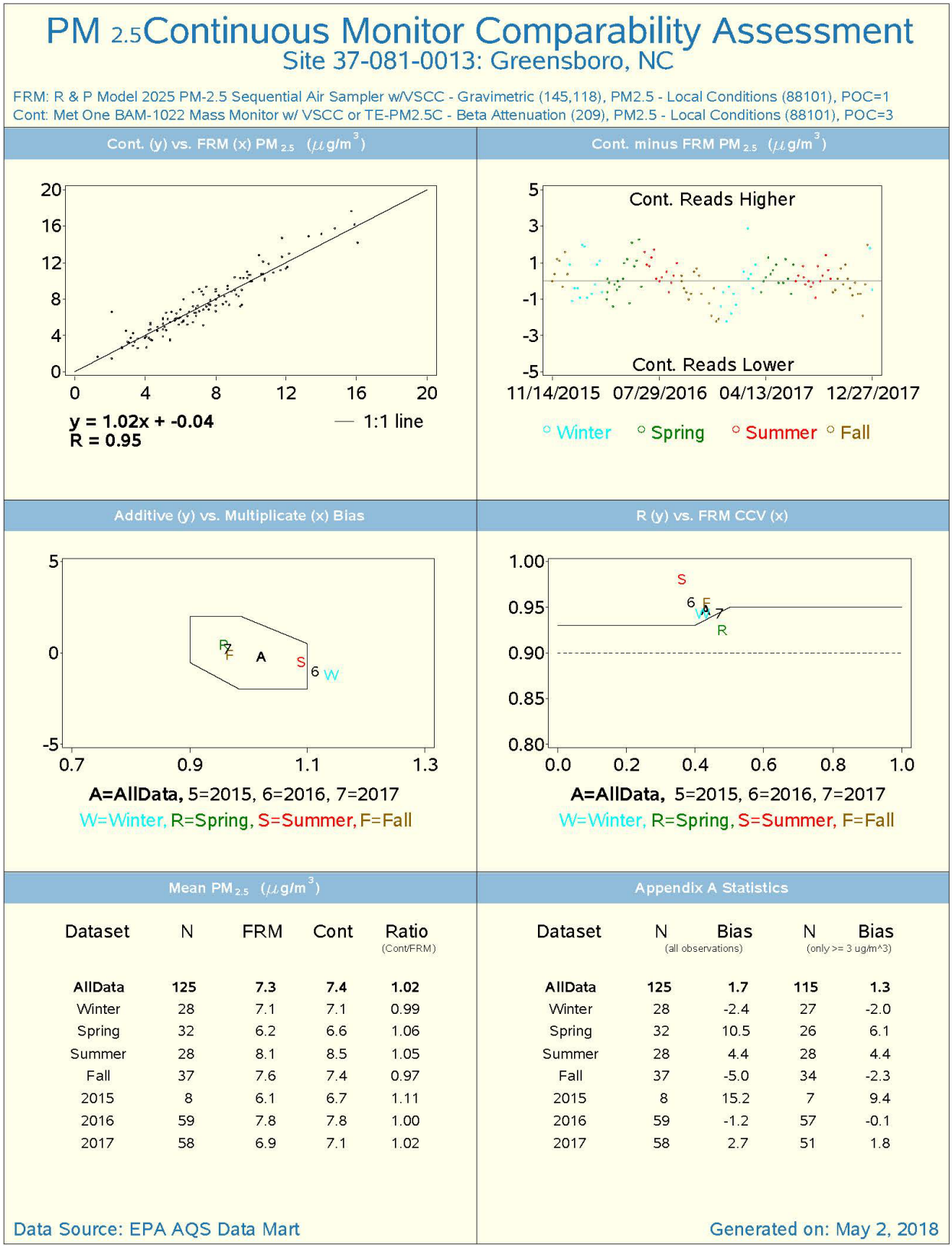


Figure B22. Comparison of the beta attenuation monitor with the federal reference monitor at Mendenhall

At the **Bethany** site**,** 37-157-0099, DAQ operates a seasonal ozone monitor, the second required ozone-monitoring site for the MSA. The division added a background sulfur dioxide monitor for background PSD modeling to this site Jan. 1, 2011. The monitor operates for 12 months every three years. It operated from March 26, 2020 until April 1, 2021. Figure B23 through Figure B27 present a picture of the site as well as views looking north, east, south and west. Site information is in Table B3.

Figure B23. Bethany ozone and sulfur dioxide monitoring site, 37-157-0099

Figure B24. Looking north from the Bethany site

Figure B26. Looking east from the Bethany site

Figure B25. Looking west from the Bethany site

Figure B27. Looking south from the Bethany site

Table B3. Site Table for Bethany School

Site Name:	Bethany School	**AQS Site Identification Number**				37-157-0099	
Location:	6371 NC 65 @ Bethany School, Reidsville, NC 27320						
CBSA:	Greensboro-High Point, NC			**CBSA #:**	24660		
Latitude	36.308608	**Longitude**	-79.859315	**Datum:**	WGS84	**Elevation**	277 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
Sulfur dioxide	Instrumental with pulsed fluorescence, 060	EQSA-0486-060	1-Hour	12 months Every third year

Date Monitor Established:	Ozone	July 7, 1993
Date Monitor Established:	Sulfur dioxide	Jan. 1, 2011

Nearest Road:	Bethany Road	**Traffic Count:**	1200	**Year of Count:**	2018

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	15 meters	West southwest	SLAMS	Compliance w/ NAAQS; real-time reporting; air quality forecasting.
Sulfur dioxide	15 meters	West southwest	Special purpose	PSD modeling.

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	Population exposure, transport, welfare related impacts	Urban	Yes	None
Sulfur dioxide	General background	Urban	Yes	Started 03/26/2020 and operated through 04/1/2021

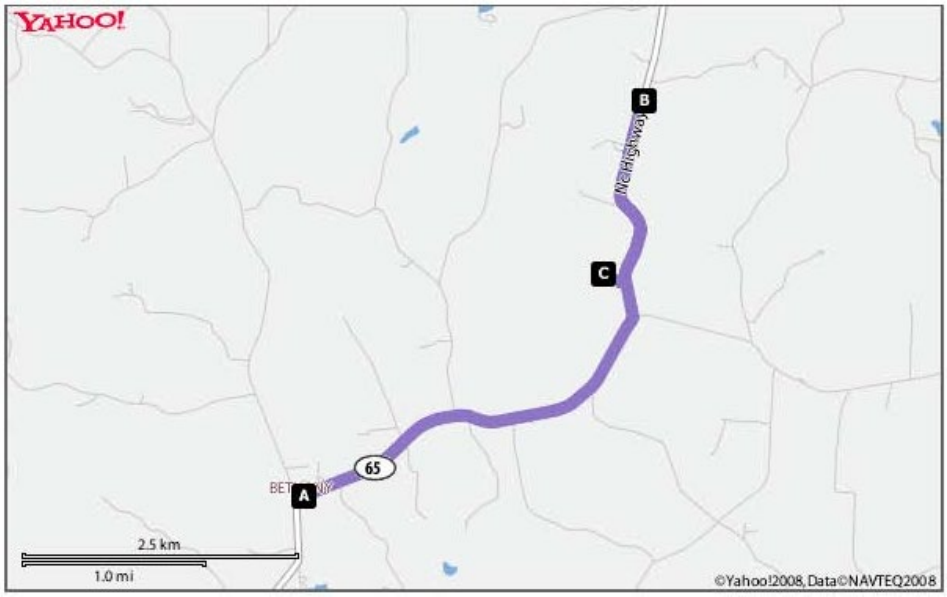
Parameter Name	**Meets Part 58, Appendix A Requirements**	**Meets Part 58, Appendix C Requirements**	**Meets Part 58, Appendix D Requirements**	**Meets Part 58, Appendix E Requirements**
Ozone	Yes	Yes	Yes	Yes
Sulfur dioxide	Yes	Yes	Yes - Not required	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3	1.0 meter	>20 meters	None
Sulfur dioxide	3	1.0 meter	>20 meters	None

As shown in Figure B28 the site is located near two emission sources: Duke Energy Carolinas, LLC - Rockingham County Combustion Turbine, permit number 08731T15, is located about 3 kilometers to the northeast and Transcontinental Gas Pipeline Corporation - Compressor Station 160, permit 09113T12, is located about 5 kilometers to the north northeast. In 2019, the Duke Energy Carolinas facility emitted 244.41 tons of nitrogen oxides, 10.9 tons of volatile organic compounds, or VOC, and 3.02 tons of sulfur dioxide.[15] Transcontinental Gas Pipeline emitted 1,340.51 tons of nitrogen oxides, 73.24 tons of VOC and 0.22 tons of sulfur dioxide.[16]

[15] **North Carolina Reported and Assumed Emission Inventories.** Available online at https://deq.nc.gov/about/divisions/air-quality/air-quality-science-and-data/emission-inventories/reported-and-assumed. Accessed May 2, 2021.

[16] **North Carolina Reported and Assumed Emission Inventories.** Available online at https://deq.nc.gov/about/divisions/air-quality/air-quality-science-and-data/emission-inventories/reported-and-assumed. Accessed May 2, 2021.



A is the Bethany ozone monitoring Site; B is Transcontinental Gas Pipeline Corp. - Compressor Station 160; C is Duke Energy Carolinas, LLC - Rockingham Co. Comb. Turbine

Figure B28. Location of the Bethany ozone site in relation to nearby emission sources

DAQ issued a new permit, 10494R00, for a power green-field plant on July 14, 2017.[17] Figure B29 presents the latitude and longitude coordinates for the facility, NTE Carolinas Reidsville Energy Center (Facility ID:7900182), relative to the Bethany monitoring site. The Bethany monitoring site is approximately 3.2 Km southwest from where the new plant will be constructed. The facility submitted a letter to DAQ on Nov. 30, 2018, requesting an extension of the 18-month period to commence construction of the facility. DAQ received the letter on Dec. 3, 2018. DAQ sent a letter to the facility on Dec. 18, 2018, stating that their letter included adequate justification and as such, the division was granting an additional 18 months to commence construction. The revised date by which the facility shall commence construction is July 14, 2020; however due to COVID-19, the facility will not be able to meet this date. As a result, DAQ received another request from the facility on April 9, 2020, to extend the date by which the facility shall commence construction. DAQ sent a letter to the facility on June 8, 2020, stating that their letter included adequate justification and as such the DAQ was granting an additional 18 months to commence construction. The most recent revised date by which construction shall be commenced is January 14, 2022.

[17] North Carolina Division of Air Quality Permitted Facilities. Available online at https://files.nc.gov/ncdeq/Air%20Quality/permits/aapa_reports/all_permitted.pdf. Accessed May 7, 2018.

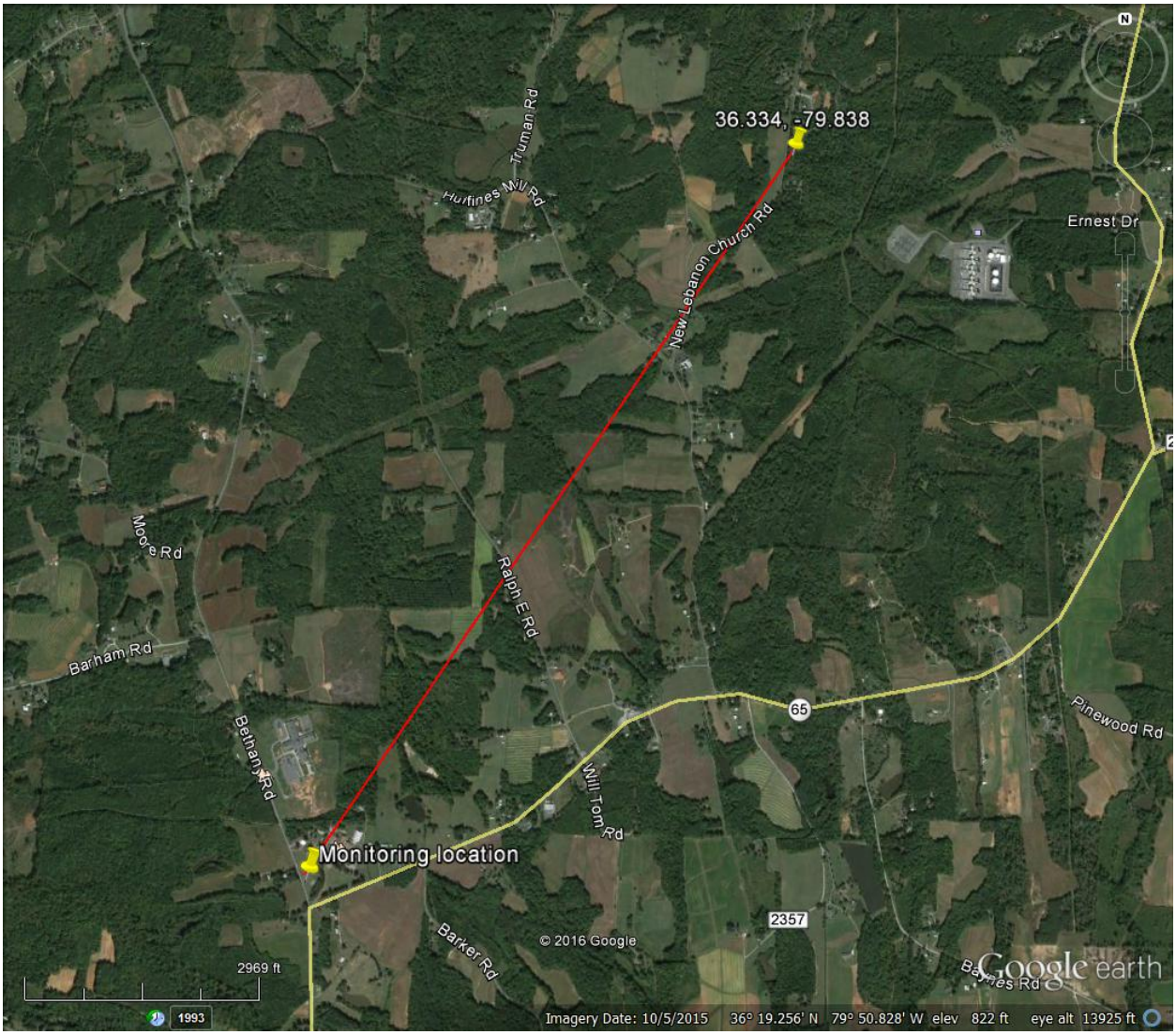


Figure B29. Location of new facility relative to the existing Bethany ozone and sulfur dioxide monitoring station

In 2008 the EPA expanded the **lead monitoring** network to support the lower lead NAAQS of 0.15 micrograms per cubic meter. [18] In 2010, the EPA focused monitoring efforts on fenceline monitoring located at facilities that emit 0.5 or more tons of lead per year and at NCore monitoring sites in urban areas. [19] In 2016, the EPA removed the requirement for monitoring at

[18] National Ambient Air Quality Standards for Lead, Federal Register, Vol. 73, No. 219, \ Wednesday, Nov. 12, 2008, p. 66964, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2008-11-12/pdf/E8-25654.pdf.

[19] Revisions to Lead Ambient Air Monitoring Requirements, Federal Register, Vol. 75, No. 247, Monday, Dec. 27, 2010, p. 81126, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2010-12-27/pdf/2010-32153.pdf#page=1.

NCore sites.[20] The revised lead monitoring requirements did not require DAQ to do lead monitoring in the Greensboro-High Point MSA because the area does not have any permitted facilities emitting 0.5 or more tons per year of lead.[21]

The 2015 **ozone monitoring** requirements did not result in additional monitors in the Greensboro-High Point MSA.[22] This MSA meets the minimum monitoring requirements in 40 CFR Part 58, Appendix D for population exposure monitoring in urban areas. However, starting in 2017, the monitoring season begins one month earlier on March 1 instead of April 1.

To comply with 2010 **nitrogen dioxide monitoring** requirements,[23] the March 7, 2013, monitoring rules required the Greensboro-High Point MSA to add a monitor by Jan. 1, 2017, because the MSA population exceeds the 500,000-threshold. However, on Dec. 30, 2016, the EPA removed the requirement to establish near-road NO_2 monitoring stations in CBSAs having populations between 500,000 and 1,000,000 persons.[24]

The 2010 **sulfur dioxide monitoring** requirements ended up not requiring additional monitoring in this area because the OAQPS released revised PWEI calculations in August 2012. The August 2012 calculations resulted in the Greensboro MSA not needing a PWEI monitor. The regulations also do not require this MSA to operate near-road **carbon monoxide** and **fine particle** monitors because the population is less than one million. [25]

(4) The Burlington MSA

The Burlington MSA consists of the county of Alamance. The major metropolitan area is the city of Burlington. DAQ currently does not operate any monitoring sites in the Burlington MSA. The division shut down the Hopedale fine particle-monitoring site in 2015. Title 40 CFR Part 58, Appendix D did not require DAQ to continue operating this fine-particle monitoring site.

The changes made to the **lead monitoring** requirements in December 2010 did not require additional monitoring in the Burlington MSA because the MSA does not have any permitted

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[20] Revisions to Ambient Monitoring Quality Assurance and Other Requirements, Federal Register, Vol. 81, No. 59, Monday, March 28, 2016, p. 17248, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-03-28/pdf/2016-06226.pdf.

[21] United States Environmental Protection Agency. (2018). *TRI Explorer* (2017 Dataset (released October 2018)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (March 23, 2019).

[22] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.

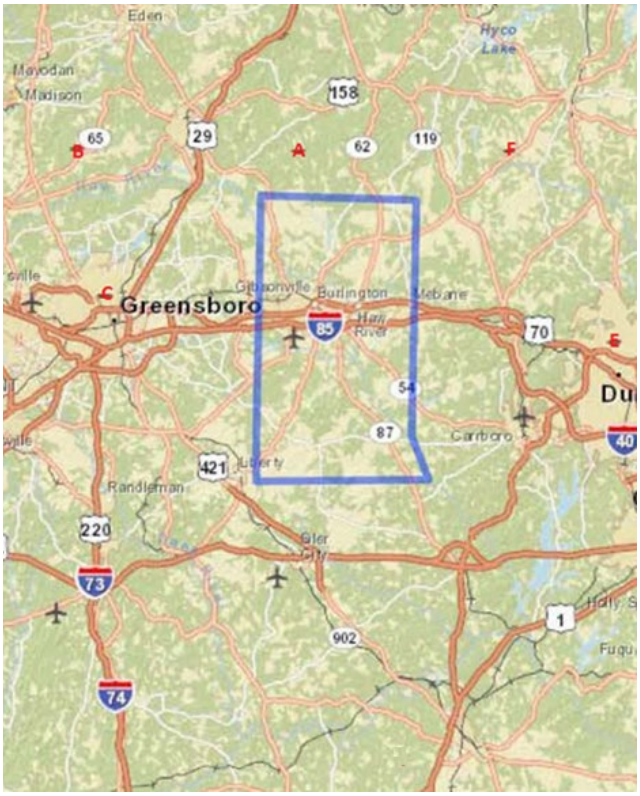
[23] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.

[24] Revision to the Near-road NO2 Minimum Monitoring Requirements, Federal Register**,** Vol. 81, No. 251, Dec. 30, 2016, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/pdf/2016-31645.pdf.

[25] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.

facilities emitting 0.5 tons or more of lead per year.[26] The 2010 **nitrogen dioxide monitoring** requirements did not require the Burlington MSA to monitor for nitrogen dioxide.[27] The MSA is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. The 2010 **sulfur dioxide monitoring** requirements also did not result in additional monitoring in the MSA because there are no large sources emitting sulfur dioxide within its bounds. The regulations also do not require this area to operate near-road **carbon monoxide** and **fine particle** monitors because the population is under one million.[28]

DAQ plans to make no changes to the Burlington MSA ozone-monitoring network. Currently, the division does not monitor for ozone in Burlington because there are ozone monitors in the neighboring counties of Caswell, Guilford and Rockingham. Figure B30 shows the locations of these monitors in relation to the Burlington MSA. DAQ established the monitor at Bushy Fork in Person County, also shown in Figure B30, as a downwind monitor for the Burlington MSA.



The heavy blue line outlines the Burlington MSA. A, to the north, is the Cherry Grove monitor; B to the northwest, is the Bethany monitor; C, to the west, is the Mendenhall monitor; E, to the east, is the Durham monitor; F, to the northeast, is the Bushy Fork monitor. The scale of representation for these monitors is urban, four to 50 Km, for all but the Durham monitor, which is neighborhood scale– 0.5 to 4 Km.

Figure B30. Locations of ozone monitors near the Burlington MSA.

[26] United States Environmental Protection Agency. (2018). *TRI Explorer* (2017 Dataset (released October 2018)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (March 23, 2019).
[27] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.
[28] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.

(5) Caswell County

Caswell County has no metropolitan or micropolitan statistical areas. DAQ currently operates one monitoring site in this county, located on Cherry Grove Road. Figure B31 shows the location of this ozone and rotating particle-monitoring site. At the **Cherry Grove** site**,** 37-033-0001, the division operates a seasonal ozone monitor and a continuous every third year PM_{10} monitor. Fine particle monitoring at the site ended on Jan. 5, 2016.

Figure B31. Location of the Cherry Grove monitoring site

A is the Cherry Grove ozone and fine particle site. The circle approximates the urban scale of representation, 4 to 50 Km, for ozone and particles.

Figure B32 shows the site. Table B4 summarizes information for the site. Figure B33 through Figure B38 present views looking north, northeast, east, south, southwest and west. DAQ operates a background PM_{10} monitor at this site. The monitor operates on a one-in-three-year schedule to provide data for prevention of significant deterioration modeling for industrial expansion. The PM_{10} monitor operated from Dec. 18, 2019, through the end of 2020. It will operate again in 2023.

Figure B32. Cherry Grove ozone and particle monitoring Site, 37-033-0001

Table B4. Site Table for Cherry Grove

Site Name:	Cherry Grove	**AQS Site Identification Number**					37-033-0001
Location:	7074 Cherry Grove Road, Reidsville, North Carolina						
MSA:	Not in an MSA			**MSA #:**	00000		
Latitude	36.307033	**Longitude**	-79.467417	**Datum:**	WGS84	**Elevation**	241 meters

Parameter Name	**Method**	**Method Reference ID**	**Sample Duration**	**Sampling Schedule**
Ozone	Instrumental with ultra violet photometry, 047	EQOA-0880-047	1-Hour	March 1 to Oct. 31
PM10 Total 0-10 µm STP	Met One Beta Attenuation BAM-1020	EQPM-0798-122	1-Hour	For 12 months, Every third year
Date Monitor Established:	Ozone			April 1, 1993
Date Monitor Established:	PM10 Total 0-10 µm STP			Jan. 1, 2013

Nearest Road:	Cherry Grove Road	**Traffic Count:**	1,200	**Year of Count:**	2018

Parameter Name	**Distance to Road**	**Direction to Road**	**Monitor Type**	**Statement of Purpose**
Ozone	49 meters	Northeast	SLAMS	Compliance w/ NAAQS. Air quality forecasting.
PM10 Total 0-10 µm STP	49 meters	Northeast	Special purpose	Industrial expansion monitoring

Parameter Name	**Monitoring Objective**	**Scale**	**Suitable to Compare to NAAQS**	**Proposal to Move or Change**
Ozone	Transport, welfare related impacts	Urban	Yes	None
PM10 Total 0-10 µm STP	Population exposure, general background, transport	Urban	Yes	Operating Dec. 18, 2019 to Dec. 31, 2020

Parameter Name	**Meets Part 58 Appendix A Requirements**	**Meets Part 58 Appendix C Requirements**	**Meets Part 58 Appendix D Requirements**	**Meets Part 58 Appendix E Requirements**
Ozone	Yes	Yes	Yes - Not required	Yes
PM10 Total 0-10 µm STP	Yes	Yes	Yes - Not required	Yes

Parameter Name	**Probe Height in meters**	**Distance to Support**	**Distance to Trees**	**Obstacles**
Ozone	3	1.1 meters	>20 meters	None
PM10 Total 0-10 µm STP	2.4	2.2 meters	>20 meters	None

Figure B33. Looking north from Cherry Grove site

Figure B36. Looking southwest from Cherry Grove site

Figure B34. Looking northeast from Cherry Grove site

Figure B37. Looking east from Cherry Grove site

Figure B35. Looking west from Cherry Grove site

Figure B38. Looking south from Cherry Grove site

The **lead monitoring requirements** did not add any lead monitoring in Caswell County because the county does not have any permitted facilities located within its bounds that emit 0.5 tons or

more of lead per year.[29] Caswell County also will not need additional ozone monitors to comply with the 2015 **ozone monitoring requirements**. [30] This county does not have an MSA that must meet the minimum monitoring requirements in 40 CFR Part 58, Appendix D for population exposure monitoring in urban areas. Since 2017, ozone monitoring starts on March 1 instead of April 1.

The 2010 **nitrogen dioxide monitoring requirements** did not result in additional monitoring in Caswell County.[31] The county is too small to require area-wide monitors and does not have any roadways with average annual daily traffic above the threshold for near roadway monitoring. This area will not need additional sulfur dioxide monitors to comply with the 2010 **sulfur dioxide monitoring** requirements because it does not have any large sulfur dioxide sources within its bounds. This area also does not need to operate near-road **carbon monoxide** and **fine particle** monitors because the population is under one million. [32]

[29] United States Environmental Protection Agency. (2018). *TRI Explorer* (2017 Dataset (released October 2018)) [Internet database]. Retrieved from https://www.epa.gov/triexplorer, (March 23, 2019).
[30] National Ambient Air Quality Standards for Ozone, Final Rule, Federal Register**,** Vol. 80, No. 206, Oct. 26, 2015, available on the worldwide web at https://www.gpo.gov/fdsys/pkg/FR-2015-10-26/pdf/2015-26594.pdf, accessed on May 7, 2017.
[31] Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Federal Register**,** Vol. 75, No. 26, Feb. 9, 2010, available on the worldwide web at https://www3.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf.
[32] "Appendix D to Part 58—Network Design Criteria for Ambient Air Quality Monitoring," 4.2 Carbon Monoxide (CO) Design Criteria, 4.2.1 General Requirements, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&r=PART&n=40y6.0.1.1.6#ap40.6.58_161.d, accessed on April 22, 2017.

Appendix B.1 Annual Network Site Review Forms for 2020

Lexington

Mendenhall in Greensboro

Bethany

Cherry Grove

Site Review Form Calendar Year 2020

Site Information

Region WSRO	**Site Name** Lexington	**AQS Site # 37-057-0002**
Street Address- 938 S.Salisbury St.	**City** Lexington	
Urban Area LEXINGTON	**Core-based Statistical Area** Winston-Salem, NC	
Enter Exact		
Latitude -80.262700	**Longitude** 35.814500	**Method of Measuring:** Google Earth
In Decimal Degrees	In Decimal Degrees	**Matches Web Map**: Yes ☒ No ☐
Elevation Above/below Mean Sea Level (in meters) 242.31		**Method of Measuring:** **Google Earth**

Name of nearest road to inlet probe S. Main St. ADT Latest available 14000 Year 2019

Distance of PM inlet to nearest traffic lane (m) 80 Direction from inlet to nearest traffic lane NW

Comments: NCDOT Annual Avg Daily Traffic (AADT) Mapping Application

Name of nearest major road S.Main St ADT 14000 Year latest available 2019

Distance of site to nearest major road (m) 80.00 Direction from site to nearest major road NW

Comments: NC DOT Annual Avg Daily Traff (AADT) Mapping Application

Site located near electrical substation/high voltage power lines?		Yes ☐ No ☒
Distance of site to nearest railroad track	(m) 136 Direction to RR ESE	☐NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) ____ Direction ___	
Distance between site and drip line of water tower (m) **3** Direction from site to water tower **SSW**		☐**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

Railroad Tracks

Instructions:

Address: Sometimes local addresses change. Confirm the local address of the site using a 911 locator or the address used by the local utility company, community or county to identify the site location.

Urban Area: If the monitor is located within the bounds of an urban area (an incorporated area with a population of 10,000 or more people), select the appropriate urban area from the list. Otherwise select "Not in an Urban Area".

Core-Based Statistical Area (CBSA): If the monitor is located in a county that belongs to a metropolitan statistical area (MSA) or a micropolitan statistical area (MiSA), then it is in a core-based statistical area. If the monitoring station is located in a county included in a MSA or MiSA, select the CBSA from the list. Otherwise select "None".

Longitude and Latitude: Determine the longitude and latitude using Google Earth. Report the longitude and latitude that matches up with the exact location of the monitoring shelter or monitor if no shelter is at the site. The longitude and latitude should be entered in decimal degrees. Use a conversion program, such as http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html, to convert to decimal degrees if needed.

Road Information: For the nearest road to the inlet probe, list whatever roadway that carries vehicles closest to the probe, whether it is a named or public road and even if it has very little traffic. Use the comments space to describe the road or the source of the annual average daily traffic (AADT) counts. If the monitor is located near an unnamed, little used, private road, use the nearest major road space to list the closest named public road to the site. Include the distance and direction of the nearest major road from the site and the AADT if available. If the closest road is a small public road but there is a large major roadway such as an interstate highway, divided highway, major thoroughfare, etc., near the monitoring station use the nearest major road space to list the information about this major roadway. Include the distance and direction of the major road from the site and the AADT. The AADT for state roads can be obtained from the North Carolina Division of Transportation at http://www.ncdot.gov/travel/statemapping/trafficvolumemaps/default.html. For AADT values for local roadways contact the appropriate local governments.

Any Sources of Potential Bias: Use this space to record information about the site that is not requested elsewhere. Especially note any changes that occurred near the site in the past year, such as road construction, building construction, new businesses, businesses closing, or changes in traffic patterns, crops or other agricultural activities.

Site Review Form Calendar Year 2020

Parameters	Monitoring Objective	Scale	Monitor Type
Air flow < 200 L/min ☒ PM2.5 FRM ☐ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM1020) ☐ PM2.5 Cont. (BAM1022) ☐ PM2.5 Cont. (T640X)	☐ General/Background_____ ☐ Highest Concentration_____ ☒ Population Exposure_____ ☐ Source Oriented_____ ☐ Transport_____ ☐ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☒ Neighborhood _____ ☐ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ ☐ Nonregulatory_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m_____
Actual measured distance from probe inlet to ground (meters) 2.4

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.1

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater?	Yes ☒ No ☐ NA ☐
Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site?	*Yes ☒ (answer *'d questions) No ☐ NA ☐
* Entire inlet opening of collocated PM 2.5 samplers (X) within 1 to 4 m of each other?	Yes ☒ No ☐ Give actual (meters): 2.2
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other?	Yes ☒ No ☐ Give actual (meters): 0.1
Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5?	*Yes ☐ (answer *'d questions) No ☐ NA ☒
* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other?	Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other?	Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐
*Width of obstacle in terms of degrees blocked (see instructions) _____

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective: _____) No ☐
*3) Change scale of representativeness? Yes ☐ (enter new scale:) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments: _____

Date of Last Site Pictures: January 23, 2020 New Pictures Submitted? Yes ☐ No ☒

Reviewer Kimberly Hornberger_____Date: October 22, 2020

Ambient Monitoring Coordinator Chengqing Xiao_____Date: December 31, 2020

Site Review Form Calendar Year 2020

Site Information

Region WSRO	**Site Name** Mendenhall	**AQS Site # 37-081-0013**
Street Address 205 Willougby Blvd		**City** Greensboro
Urban Area GREENSBORO	**Core-based Statistical Area** Greensboro-High Point, NC	
Enter Exact		
Latitude -79.802314	**Longitude** 36.109006	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	___ **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		**244**

Name of nearest road to inlet probe Saint Regis Road ADT <1000 Year Choose an item 2019

Comments: NC DOT Annual Avg Daily Traffic (AADT) Mapping Application - Estimate

Distance of site to nearest major road (m) 340.00 Direction from site to nearest major road S

Name of nearest major road W Cone Blvd ADT 23500 Year 2019

Comments: NC DOT Annual Avg Daily Traffic (AADT) Mapping Application

Site located near electrical substation/high voltage power lines?	Yes ☐ No ☒
Distance of site to nearest railroad track (m) _____ Direction to RR ___	☒NA
OPTIONAL Distance of site to nearest power pole w/transformer (m) ____ Direction ___	
Distance between site and drip line of water tower (m) _____ Direction from site to water tower _____	☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

N/A

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☒General/Background_____ ☐Highest Concentration_____ ☐Max O3 Concentration_____ ☒Population Exposure_____ ☐Source Oriented_____ ☐Transport_____ ☐Upwind Background_____ ☐Welfare Related Impacts _____	☐Micro_____ ☐Middle_____ ☐ Neighborhood_____ ☒Urban_____ ☐Regional_____	☒SLAMS _____ ☐SPM_____ **Monitor Network Affiliation** ☐NCORE_____ ☐Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.00

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.10

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 185 Direction from probe to nearest traffic lane W

Site Review Form Calendar Year 2020

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☒ PM2.5 Cont. (BAM)	☒General/Background _____ ☐Highest Concentration _____ ☒Population Exposure _____ ☐Source Oriented _____ ☐Transport _____ ☐Welfare Related Impacts _____	☐Micro _____ ☐Middle _____ ☒Neighborhood PM2.5 BAM ☒Urban PM10 BAM ☐Regional _____	☒SLAMS PM10 BAM ☒SPM_PM2.5 BAM_____ **Monitor NAAQS Exclusion** ☒ NONREGULATORY PM2.5 BAM

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.2 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☒ No ☐ NA ☐

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 185 Direction from probe to nearest traffic lane NW

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures January 2020 New Pictures Submitted? Yes ☐ No ☒

Reviewer Kimberly Hornberger Date October 22, 2020

Ambient Monitoring Coordinator Chengqing Xiao DateDecember 31, 2020

Site Review Form Calendar Year 2020

Site Information

Region WSRO	**Site Name** Bethany		**AQS Site # 37-157-0099**
Street Address-6371 NC HWY 65			**City Reidsville**
Urban Area Not in an Urban Area		**Core-based Statistical Area**	Greensboro-High Point, NC
Enter Exact			
Latitude -79.8593	**Longitude 36.3086**	**Method of Measuring**	
In Decimal Degrees	In Decimal Degrees	___	**Explanation: GoogleEarth**
Elevation Above/below Mean Sea Level (in meters)			**274.00**

Name of nearest road to inlet probe Bethany ADT 1200 Year Choose an item 2018
Comments: None
Distance of site to nearest major road (m) 121.00 Direction from site to nearest major road SSE
Name of nearest major road NC HWY 65 ADT 2400 Year latest available 2019
Comments: None

Site located near electrical substation/high voltage power lines?		Yes ☐ No ☒
Distance of site to nearest railroad track	(m) _____ Direction to RR ___	☒NA
OPTIONAL Distance of site to nearest power pole w/transformer	(m) _____	Direction ___
Distance between site and drip line of water tower (m) _____	Direction from site to water tower _____	☒**NA**

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

_____

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☒ Ozone (O_3)	☐ General/Background ☐ Highest Concentration ☐ Max O3 Concentration ☒ Population Exposure ☐ Source Oriented ☒ Transport ☐ Upwind Background ☒ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☒ Urban ☐ Regional	☒ SLAMS ☐ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.00
Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐
Actual measured distance from outer edge of probe to supporting structure (meters) 1.00
Distance of outer edge of probe inlet from other gas monitoring probe inlets > 0.25 m? Yes ☒ No ☐ NA ☐
Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)
*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____
Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒
*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐
Distance of probe to nearest traffic lane (m) 15 Direction from probe to nearest traffic lane W

Site Review Form Calendar Year 2020

OZONE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: SO2 monitor began on April 1, 2020 on a 3-year cycle

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ SO_2 (DRR) ☒ SO_2 (NAAQS) ☐ SO_2 (trace-level)	☒ General/Background ☐ Highest Concentration ☐ Population Exposure ☐ Source Oriented ☐ Transport ☐ Upwind Background ☐ Welfare Related Impacts	☐ Micro ☐ Middle ☐ Neighborhood ☒ Urban ☐ Regional	☐ INDUSTRIAL ☐ SLAMS ☒ SPM

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) _____

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.0

Distance of outer edge of probe inlet from other monitoring probe inlets > 0.25 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 15 Direction from probe to nearest traffic lane W

SULFUR DIOXIDE MONITOR RECOMMENDATIONS:

1) Maintain current monitor status? Yes ☒ *No ☐ (answer *'d questions)

*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐-

*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐

*4) Relocate monitor? Yes ☐ No ☐

Comments: None

Date of Last Site Pictures December 19, 2017 New Pictures Submitted? Yes ☐ No ☒

Reviewer Blair Palmer Date December 22, 2020

Ambient Monitoring Coordinator Chengqing Xiao Date 12/30/2020

Revised 2021-05-02

Site Review Form Calendar Year 2020

Site Information

Region WSRO	**Site Name** Cherry Grove	**AQS Site # 37-033-0001**
Street Address-7074 Cherry Grove Road, Reidsville, NC27320		**City** Reidsville
Urban Area REIDSVILLE	**Core-based Statistical Area** Greensboro-High Point, NC	
Enter Exact		
Latitude -79.4674	**Longitude** 36.3070	**Method of Measuring**
In Decimal Degrees	In Decimal Degrees	___ **Explanation: Google Earth**
Elevation Above/below Mean Sea Level (in meters)		235.60

Name of nearest road to inlet probe **Friendly, Raccoon Ct, Deer Trail ADT <____ Year Choose an item _____

Comments: **Friendly, Raccoon Ct, and Deer Trail have no ADT;

Distance of site to nearest major road (m) 123 Direction from site to nearest major road S

Name of nearest major road Cherry Grove Road ADT 1200 Year 2018

Comments: NCDOT Interactive Traffic Volume Map

Site located near electrical substation/high voltage power lines? Yes ☐ No ☒

Distance of site to nearest railroad track (m) _____ Direction to RR ___ ☒NA

OPTIONAL Distance of site to nearest power pole w/transformer (m) ____ Direction ___

Distance between site and drip line of water tower (m) _____ Direction from site to water tower _____ ☒NA

Explain any sources of potential bias; include cultivated fields, loose bulk storage, stacks, vents, railroad tracks, construction activities, fast food restaurants, and swimming pools.

N/A

ANSWER ALL APPLICABLE QUESTIONS:

Parameters	Monitoring Objective	Scale	Monitor Type
☐ NA ☐ SO_2 (NAAQS) ☐ SO_2 (trace-level) ☐ NO_2 (NAAQS) ☐ $HSNO_y$ ☒ O_3 ☐ NH_3 ☐ Hydrocarbon ☐ Air Toxics ☐ CO (trace-level)	☐ General/Background_____ ☐ Highest Concentration_____ ☐ Max O3 Concentration_____ ☐ Population Exposure_____ ☐ Source Oriented_____ ☒ Transport_____ ☐ Upwind Background_____ ☒ Welfare Related Impacts _____	☐ Micro_____ ☐ Middle_____ ☐ Neighborhood_____ ☒ Urban_____ ☐ Regional_____	☒ SLAMS _____ ☐ SPM_____ **Monitor Network Affiliation** ☐ NCORE_____ ☐ Unofficial PAMS_____

Probe inlet height (from ground) 2-15 m? Yes ☒ No ☐ Give actual measured height from ground (meters) 3.00

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (roof) supporting structure > 1 m? Yes ☒ No ☐

Actual measured distance from outer edge of probe to supporting structure (meters) 1.10

Distance of outer edge of probe inlet from other monitoring probe inlets > 1 m? Yes ☒ No ☐ NA ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____

*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle _____ Distance from probe inlet (m) _____ Direction from probe inlet to obstacle ___

*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 50 Direction from probe to nearest traffic lane E

Site Review Form Calendar Year 2020

Parameters	Monitoring Objective	Scale	Site Type
☐ NA Air flow < 200 L/min ☐ PM2.5 FRM ☐ PM10 FRM ☒ PM10 Cont. (BAM) ☐ PM10-2.5 FRM ☐ PM10-2.5 BAM ☐ PM2.5 Cont. (BAM)	☒ General/Background _____ ☐ Highest Concentration _____ ☒ Population Exposure _____ ☐ Source Oriented _____ ☒ Transport _____ ☐ Welfare Related Impacts _____	☐ Micro _____ ☐ Middle _____ ☐ Neighborhood _____ ☒ Urban PM10 BAM ☐ Regional _____	☐ SLAMS _____ ☒ SPM_PM10 BAM_____ **Monitor NAAQS Exclusion** ☐ NONREGULATORY_____

Probe inlet height (from ground) ☐ < 2 m _____ ☒ 2-7m _____ ☐ 7-15 m _____ ☐ > 15 m _____
Actual measured distance from probe inlet to ground (meters) 2.5

Distance of outer edge of probe inlet from horizontal (wall) and/or vertical (platform or roof) supporting structure > 2 m?
Actual measured distance from outer edge of probe inlet to supporting structure (meters) 2.1 Yes ☒ No ☐

Distance (Y) between outer edge of probe inlets of any low volume monitor and any other low volume monitor at the site = 1 m or greater? Yes ☐ No ☐ NA ☒

Are collocated PM2.5 Monitors (Two FRMs, FRM & BAM, BAM & BAM) Located at Site? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM 2.5 samplers (X) within 2 to 4 m of each other? Yes ☐ No ☐ Give actual (meters) _____
*Are collocated PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐ Give actual (meters) _____

Is a low-volume PM10 monitor collocated with a PM2.5 monitor at the site to measure PM10-2.5? *Yes ☐ (answer *'d questions) No ☒ NA ☐

* Entire inlet opening of collocated PM10 and PM2.5samplers for PM10-2.5 (X) within 2 to 4 m of each other? Yes ☐ No ☐
*Are collocated PM10 and PM2.5 sampler inlets within 1 m vertically of each other? Yes ☐ No ☐

Is probe > 20 m from the nearest tree drip line? Yes ☒ *No ☐ (answer *'d questions)

*Is probe > 10 m from the nearest tree drip line? Yes ☐ *No ☐ *Number of trees within 10 meters _____
*Distance from probe to closest tree (m) _____ Direction from probe to tree ___ *Height of tree above probe (m) _____

Are there any obstacles to air flow? *Yes ☐ (answer *'d questions) No ☒

*Identify obstacle ____ Distance from probe inlet (m) _____Direction from probe inlet to obstacle ___
*Is distance from inlet probe to obstacle at least twice the height that the obstacle protrudes above the probe? Yes ☐ No ☐

Distance of probe to nearest traffic lane (m) 50 Direction from probe to nearest traffic lane E

RECOMMENDATIONS:

1) Maintain current site status? Yes ☒ *No ☐ (answer *'d questions)
*2) Change monitoring objective? Yes ☐ (enter new objective _____) No ☐-
*3) Change scale of representativeness? Yes ☐ (enter new scale _) No ☐
*4) Relocate site? Yes ☐ No ☐

Comments:

Date of Last Site Pictures February 1, 2016 New Pictures Submitted? Yes ☐ No ☒

Reviewer Chris Bryant Date December 8, 2020

Ambient Monitoring Coordinator Chengqing Xiao DateDecember 31, 2020

Appendix B-2. Scale of Representativeness

Agencies must describe each station in the monitoring network in terms of the physical dimensions of the air parcel nearest the station throughout which actual pollutant concentrations are reasonably similar. Area dimensions or scales of representativeness used in the network description are:

a) Microscale - defines the concentration in air volumes associated with area dimensions ranging from several meters up to about 100 meters, or m.
b) Middle scale - defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 m to 0.5 kilometers, or Km.
c) Neighborhood scale – defines concentrations within an extended area of a city that has relatively uniform land use with dimensions ranging from about 0.5 to 4.0 Km.
d) Urban scale - defines an overall citywide condition with dimensions from 4 to 50 Km.
e) Regional Scale - defines air quality levels over areas having dimensions of 50 to hundreds of Km.

Closely associated with the area around the monitoring station where pollutant concentrations are reasonably similar are the basic monitoring exposures of the station.

There are six basic exposures:

a) Sites located to determine the highest concentrations expected to occur in the area covered by the network.
b) Sites located to determine representative concentrations in areas of high population density.
c) Sites located to determine the impact on ambient pollution levels of significant sources or source categories.
d) Sites located to determine general background concentration levels.
e) Sites located to determine the extent of regional pollutant transport among populated areas.
f) Sites located to measure air-pollution impacts on visibility, vegetation damage or other welfare-based impacts and in support of secondary standards.

The design intent in siting stations is to match correctly the area dimensions represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the station. The following relationship of the six basic objectives and the scales of representativeness are appropriate when siting monitoring stations:

Table B5. Site Type Appropriate Siting Scales

1. Highest concentration	Micro, middle, neighborhood, sometimes urban or regional for secondarily formed pollutants
2. Population oriented	Neighborhood, urban
3. Source impact	Micro, middle, neighborhood
4. General/background & regional transport	Urban, regional
5. Welfare-related impacts	Urban, regional