

National Ambient Air Quality Standards (NAAQS):

National Ambient Air Quality Standards consist of primary and secondary standards. The primary standards define levels of air quality which EPA judges are necessary, with an adequate margin of safety, to protect the public health. The secondary standards define levels of air quality which EPA judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. For PM_{2.5} the levels of the primary and secondary standards are the same.

National Ambient Air Quality Standard for PM_{2.5} - Annual Standard:

The annual standard is designed to provide an appropriate level of protection from long-term exposure to PM_{2.5}. The standard is met when the annual design value is less than or equal to 12 µg/m³. The standard changed from 15 µg/m³ to 12 µg/m³ on March 18, 2013. The annual design value is calculated by averaging the annual means of 3 consecutive complete years of air quality data. The table below compares data collected from 2013 through year-to-date 2019 to the PM_{2.5} annual standard.

PM_{2.5} Annual Means and Annual Design Values

| Site Name | Annual Means µg/m ³ | | | | | | | Annual Design Values | | | | |
|--------------|--------------------------------|------|------|------|------|------|------|----------------------|-------------|------------|------------|------------|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2013-2015 | 2014-2016 | 2015-2017 | 2016-2018 | 2017-2019 |
| Firearms Tr* | 12.3 | 11.2 | 10.4 | 8.3 | 8.3 | 9.5 | 10.2 | 11.3 | 10.0 | 9.0 | 8.7 | 9.4 |
| Durrett Lane | 10.2 | 12.0 | 10.0 | 9.2 | 8.9 | 10.2 | 10.2 | 10.7 | 10.4 | 9.4 | 9.4 | 9.8 |
| Cannons Lane | 11.1 | 11.0 | 9.5 | 7.9 | 7.9 | 9.1 | 9.4 | 10.5 | 9.5 | 8.4 | 8.3 | 8.8 |
| Watson Lane | 12.5 | 12.2 | 10.4 | 8.4 | 8.1 | 10.5 | 9.6 | 11.7 | 10.3 | 9.0 | 9.0 | 9.4 |

Bold: Design value for Louisville

* Firearms Training replaced Southwick in 2018

National Ambient Air Quality Standard for PM_{2.5} - 24-Hour (Daily) Standard:

The 24-hour standard is designed to provide an appropriate level of protection from short-term exposure to PM_{2.5}. The standard is met when the 24-hour design value is less than or equal to 35 µg/m³. The design value is based on 3 consecutive complete years of air quality data and is calculated by taking the average of the 98th percentile value for each of the 3 years. The 98th percentile value is the 24-hour average out of a year of PM_{2.5} monitoring data below which 98 percent of all 24-hour averages fall. The table below compares data collected from 2013 through year-to-date 2019 to the 24-hour standard for PM_{2.5}.

PM_{2.5} Annual 98th Percentiles and 24-Hour Design Values

| Site Name | Annual 98 th Percentile Value µg/m ³ | | | | | | | 24-Hour Design Values | | | | |
|--------------|--|------|------|------|------|------|------|-----------------------|-------------|-------------|-------------|-------------|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2013-2015 | 2014-2016 | 2015-2017 | 2016-2018 | 2017-2019 |
| Firearms Tr* | 24.0 | 24.3 | 22.3 | 17.0 | 17.8 | 23.0 | 21.5 | 23.5 | 21.2 | 19.0 | 19.3 | 20.8 |
| Durrett Lane | 20.6 | 26.0 | 22.1 | 18.7 | 20.7 | 24.7 | 20.0 | 22.9 | 22.3 | 20.5 | 21.4 | 21.8 |
| Cannons Lane | 22.5 | 23.9 | 21.7 | 18.7 | 17.2 | 22.2 | 19.6 | 22.7 | 21.4 | 19.2 | 19.4 | 19.7 |
| Watson Lane | 23.8 | 26.2 | 22.8 | 16.2 | 17.7 | 24.3 | 20.5 | 24.3 | 21.7 | 18.9 | 19.4 | 20.8 |

Bold: Design value for Louisville

* Firearms Training replaced Southwick in 2018

Louisville Metro Air Pollution Control District

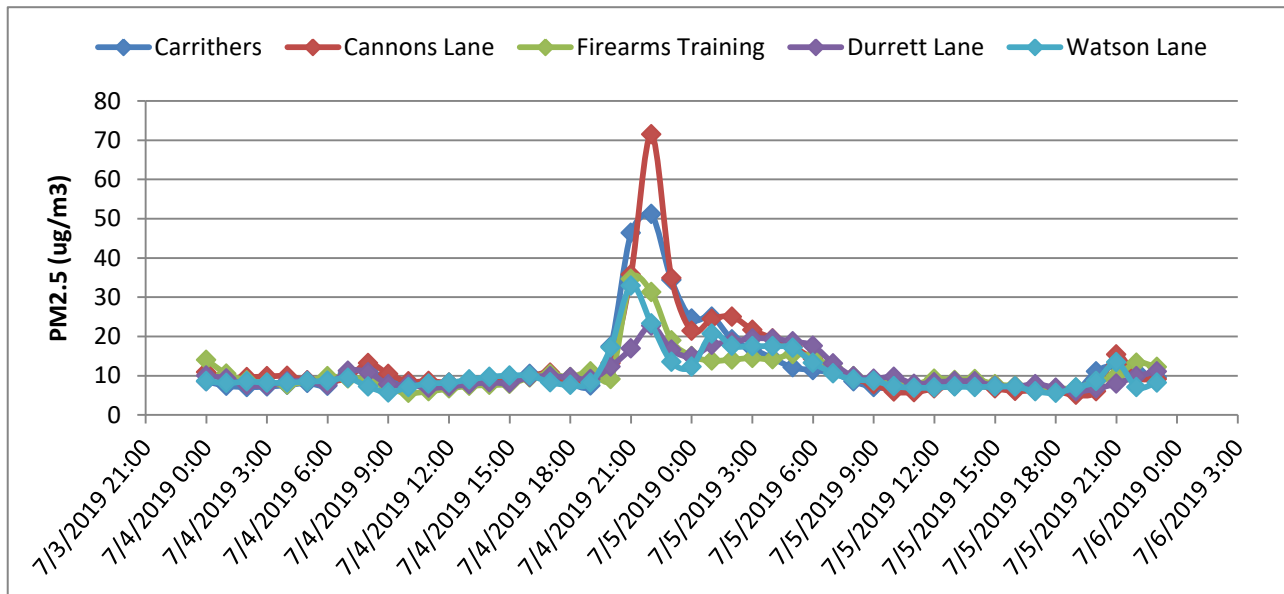
Special Report for PM_{2.5} July 4-5, 2019

This Special Report shows the 24-hour PM_{2.5} averages for July 4th and July 5th. A 24-hour average above 35 µg/m³ exceeds the NAAQS.

| Date | Cannons Lane | Firearms Training | Carrithers | Watson Lane | Durrett Lane |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 24 hr avg (ug/m3) | 24 hr avg (ug/m3) | 24 hr avg (ug/m3) | 24 hr avg (ug/m3) | 24 hr avg (ug/m3) |
| 07/04/19 | 14.4 | 11.2 | 13.2 | 10.6 | 10.1 |
| 07/05/19 | 11.5 | 10.6 | 11.0 | 10.4 | 11.4 |

*see below for an explanation of filter based FRM versus continuous FEM monitors

The NAAQS is a health based standard. The negative health effects of PM_{2.5} are regulated based on 24-hour averages (35 µg/m³) and annual averages (12 µg/m³). The hourly spikes during July 4th are shown below. Cannons Lane had the highest one-hour average of 71.5 µg/m³. PM_{2.5} concentrations slowly declined during the early morning hours of July 5th.



*A **filter based FRM (Federal Reference Method) monitor** pulls ambient air through a filter for 24 hours at a constant flow rate. The filter is weighed before and after the sampling and the concentration is calculated using the mass accumulated on the filter and the volume of air sampled. LMAPCD is using a contract lab to weigh the filters. There is typically a three week lag time between data collection and results. LMAPCD currently operates two filter-based PM_{2.5} FRM monitors. The data presented in this report show data collected from **continuous FEM (Federal Equivalent Method) monitors**. The hourly FEM data are used to update the Air Quality Index (alerts) and allows LMAPCD to evaluate spikes on a higher resolution than the traditional FRM 24-hour average filter method. LMAPCD currently operates five PM_{2.5} continuous FEM monitors and two PM₁₀ FEM continuous monitors.

Louisville Metro Air Pollution Control District
8-Hour Ozone Monitoring Report
July 2019

This report summarizes ozone data collected by Automated Equivalent Method (AEM) ozone analyzers located within the Louisville Metropolitan Statistical Area. Measurements are reported as 8-hour averages in parts-per-billion (ppb). The data are subject to further quality assurance checks and are not final.

2019 8-Hour Ozone Maximum Values and Exceedances through July 14th

| Date | # of 8-Hour Exceeds | # of Days Exceeds | Charlestown Clark County IN | New Albany Floyd County IN | Carrithers Jefferson County KY | Watson Lane Jefferson County KY | Cannons Lane Jefferson County KY | Buckner Oldham County KY | Shepherdsville Bullitt County KY |
|------------------------------|---------------------|-------------------|-----------------------------|----------------------------|--------------------------------|---------------------------------|----------------------------------|--------------------------|----------------------------------|
| 03/28/19 | 0 | 0 | 54.8 | 53.5 | 57.3 | 54.6 | 55.5 | 55.8 | 57.6 |
| 04/04/19 | 0 | 0 | 60.0 | 56.2 | 58.8 | 57.1 | 59.7 | 57.8 | 57.2 |
| 05/06/19 | 0 | 0 | 66.3 | 57.6 | 59.5 | 51.2 | 68.1 | 60.5 | 59.2 |
| 05/17/19 | 0 | 0 | 57.6 | 61.0 | 62.8 | 59.2 | 64.2 | 58.6 | 59.3 |
| 06/26/19 | 0 | 0 | 60.2 | 53.8 | 62.2 | 52.3 | 63.0 | 62.0 | 55.2 |
| 06/27/19 | 0 | 0 | 61.3 | 57.1 | 48.7 | 49.2 | 60.2 | 49.0 | 52.0 |
| 06/28/19 | 1 | 1 | 71.1 | 62.7 | 55.6 | 53.1 | 62.5 | 61.0 | 52.8 |
| 06/29/19 | 0 | 0 | 55.1 | 52.6 | 68.8 | 49.6 | 64.0 | 57.0 | 48.1 |
| 07/02/19 | 0 | 0 | 53.5 | 52.3 | 61.8 | 57.2 | 61.0 | 56.5 | 58.1 |
| 07/10/19 | 1 | 1 | 59.6 | 49.1 | 64.7 | 44.6 | 63.5 | 72.8 | 48.2 |
| 07/13/19 | 2 | 1 | 68.0 | 66.0 | 77.3 | 59.6 | 76.5 | 65.6 | 63.0 |
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| Total Exceeds | 4 | 3 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| Truncated 4th Maximum | | | 61 | 57 | 62 | 57 | 64 | 61 | 58 |

Values in **BOLD/RED** exceed the level of the 2016 ozone standard of 70 ppb (parts-per-billion)
NA - Indicates data were not available.

8-Hour Ozone Exceedances:

The National Ambient Air Quality Standard for ozone is measured as an 8-hour average. An ozone exceedance occurs when the highest 8-hour average for each day is greater than the NAAQS. The NAAQS was lowered from 80 ppb to 75 ppb in 2007 and from 75 ppb to 70 ppb in 2016. The data below lists the number of exceedances based on the NAAQS at the time the data was collected.

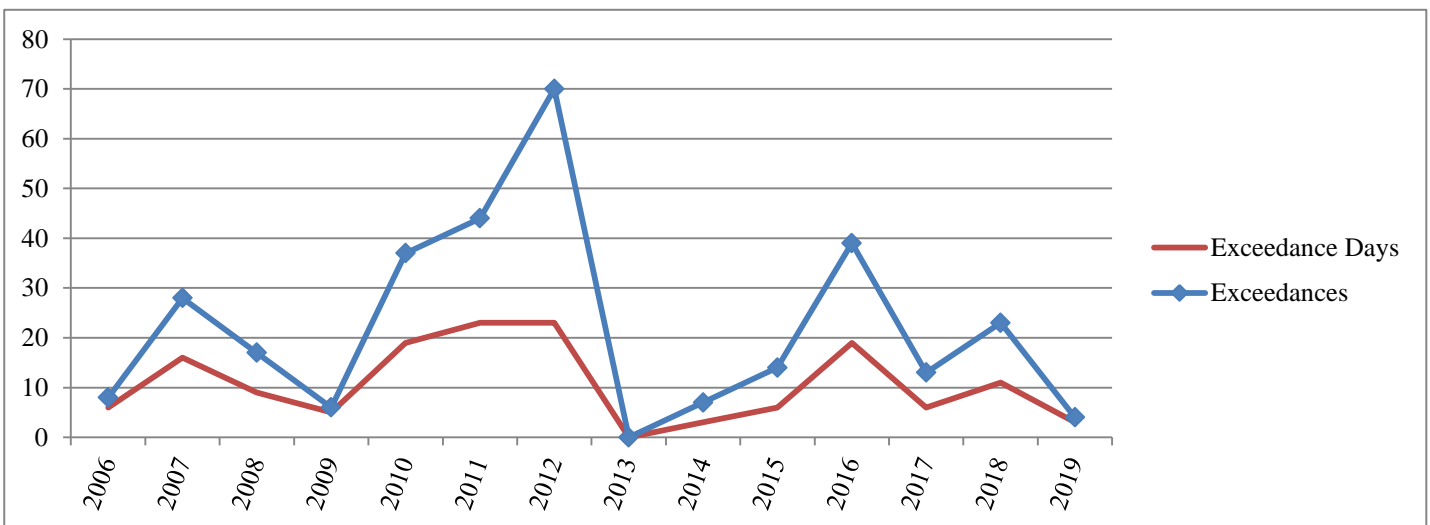
2006-2019 8-Hour Ozone Exceedance Summary through July 14th

| Year | Charles-town | New Albany | Bates & Carrithers | Watson | WLKY & Cannons Lane | Buckner | Shepherds-ville | Louisville MSA Total | | Jefferson County Total | |
|------|--------------|------------|--------------------|--------|---------------------|---------|-----------------|----------------------|------|------------------------|------|
| | | | | | | | | Exceedances | Days | Exceedances | Days |
| 2006 | 3 | 1 | 0 | 1 | 0 | 3 | 0 | 8 | 6 | 1 | 1 |
| 2007 | 8 | 3 | 8 | 4 | 2 | 3 | 0 | 28 | 16 | 14 | 11 |
| 2008 | 3 | 3 | 2 | 2 | 1 | 4 | 2 | 17 | 9 | 5 | 5 |
| 2009 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 6 | 5 | 6 | 5 |
| 2010 | 4 | 2 | 3 | 3 | 15 | 8 | 2 | 37 | 19 | 21 | 15 |
| 2011 | 6 | 5 | 6 | 5 | 8 | 13 | 1 | 44 | 23 | 19 | 14 |
| 2012 | 8 | 13 | 7 | 11 | 13 | 14 | 4 | 70 | 23 | 31 | 17 |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2014 | 1 | 2 | 0 | 2 | 2 | 0 | 0 | 7 | 3 | 4 | 3 |
| 2015 | 3 | 0 | 4 | 1 | 4 | 2 | 0 | 14 | 6 | 9 | 5 |
| 2016 | 7 | 6 | 5 | 3 | 14 | 3 | 1 | 39 | 19 | 22 | 16 |
| 2017 | 1 | 5 | 1 | 1 | 4 | 1 | 0 | 13 | 6 | 6 | 4 |
| 2018 | 4 | 5 | 3 | 2 | 6 | 1 | 2 | 23 | 11 | 11 | 8 |
| 2019 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 4 | 3 | 2 | 1 |

* Cannons Lane replaced WLKY in 2010. Data through 2009 are from WLKY.

* Carrithers replaced Bates in 2018. Data through 2017 are from Bates.

Historical Graph of 8-Hour Ozone Exceedances



National Ambient Air Quality Standard for Ozone - 8-Hour Standard:

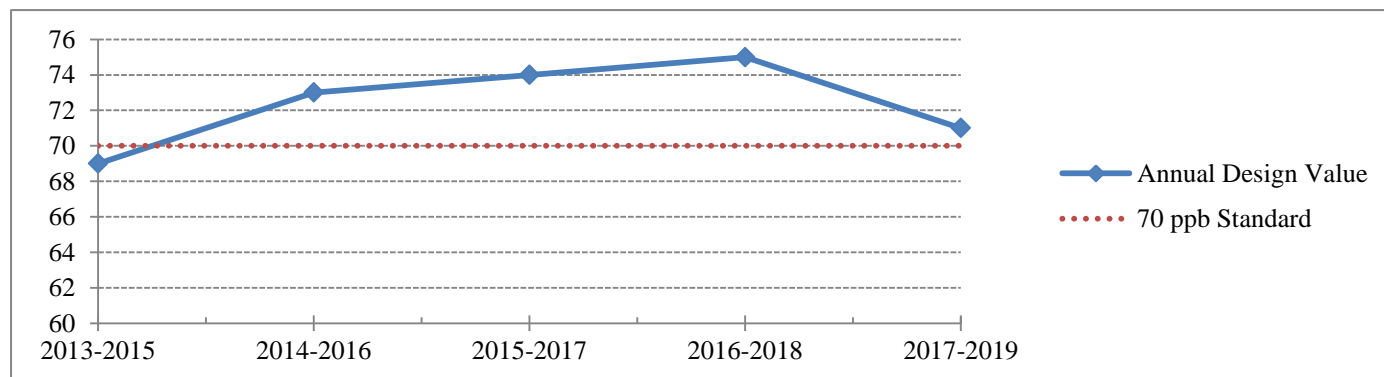
Attainment of the 8-hour standard for ozone at an individual monitor is achieved when the three-year average of the annual fourth-highest daily maximum (4th maximum) 8-hour average ozone concentration is less than 71 ppb. This three-year average is the design value for that monitor. The Louisville MSA row represents the largest 4th maximum and design value* for all monitors within the MSA.

8-Hour Ozone 4th Maximums and Design Values through July 14th

| Site Name | 4 th Maximums | | | | | | | 8-Hour Design Values | | | | |
|-----------------------|--------------------------|------|------|------|------|------|------|----------------------|-----------|-----------|-----------|-----------|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2013-2015 | 2014-2016 | 2015-2017 | 2016-2018 | 2017-2019 |
| Charlestown | 67 | 66 | 74 | 73 | 68 | 71 | 61 | 69 | 71 | 71 | 70 | 67 |
| New Albany | 68 | 66 | 67 | 73 | 74 | 73 | 57 | 67 | 68 | 71 | 73 | 68 |
| Bates/Carrithers | 64 | 65 | 71 | 73 | 65 | 70 | 62 | 66 | 69 | 69 | 69 | 66 |
| Watson Lane | 65 | 69 | 69 | 70 | 66 | 69 | 57 | 67 | 69 | 68 | 68 | 64 |
| Cannons Lane | 64 | 68 | 76 | 76 | 72 | 77 | 64 | 69 | 73 | 74 | 75 | 71 |
| Buckner | 64 | 68 | 73 | 69 | 64 | 69 | 61 | 68 | 70 | 68 | 67 | 65 |
| Shepherdsville | 64 | 65 | 67 | 67 | 63 | 68 | 58 | 65 | 66 | 65 | 66 | 63 |
| Louisville MSA | 68 | 69 | 76 | 76 | 74 | 77 | 64 | 69 | 73 | 74 | 75 | 71 |

* Design Value calculations are approximations based on preliminary summary data and may differ from official design value calculations

8-Hour Ozone Design Value Trend Chart



**Louisville Metro Air Pollution Control District
Air Monitoring Report for Sulfur Dioxide (SO₂)
July 2019**

On June 2, 2010, EPA strengthened the primary National Ambient Air Quality Standard for SO₂. Specifically, EPA replaced the existing annual (30 ppb) and 24-hour (140 ppb) primary standards with a new 1-hour standard set at 75 ppb. The 1-hour standard was set to better protect public health by reducing exposure to high short-term concentrations of SO₂. The new standard took effect August 23, 2010.

Exceedances of the 1-Hour SO₂ Standard:

An exceedance occurs when a measured 1-hour average is greater than 75 ppb. Since up to twenty-four 1-hour averages are recorded each day, multiple exceedances may occur in one day. However, only the maximum 1-hour average (Daily Max) for each day is used in determining if the area is in compliance with the standard. The table below indicates the number of exceedances and the daily maximums reported thus far this year. The data are subject to further quality assurance checks and are not final.

SO₂ Daily Maximums and Exceedances through June 30th

| Date | Fire Arms Training | | Watson Lane Elementary | | Cannons Lane NCore | | New Albany Indiana | |
|-----------------------------|--------------------|-----------|------------------------|-----------|--------------------|-----------|--------------------|-----------|
| | Exceeds | Daily Max | Exceeds | Daily Max | Exceeds | Daily Max | Exceeds | Daily Max |
| 01/08/19 | | 2.0 | | 6.0 | | 2.4 | | 0.8 |
| 01/31/19 | | 4.0 | | 1.6 | | 3.9 | | 22.4 |
| 02/09/19 | | 4.6 | | 2.5 | | 1.4 | | 4.0 |
| 02/14/19 | | 1.6 | | 4.1 | | 1.4 | | 2.2 |
| 02/25/19 | | 1.1 | | 1.9 | | 1.4 | | 9.6 |
| 02/27/19 | | 2.1 | | 2.3 | | 5.5 | | 2.2 |
| 03/07/19 | | 2.2 | | 1.3 | | 6.2 | | 3.2 |
| 03/15/19 | | 2.3 | | 0.5 | | 1.2 | | 1.1 |
| 03/30/19 | | 1.5 | | 6.8 | | 3.1 | | 1.2 |
| 04/02/19 | | 2.5 | | 2.4 | | 2.5 | | 3.8 |
| 04/10/19 | | 4.3 | | 7.3 | | 0.9 | | 1.3 |
| 04/17/19 | | 1.2 | | 2.4 | | 6.0 | | 1.9 |
| 05/17/19 | | 1.7 | | 2.5 | | 2.7 | | 0.5 |
| 05/23/19 | | 2.5 | | 9.2 | | 4.0 | | 0.0 |
| 05/25/19 | | 1.2 | | 3.3 | | 18.0 | | -0.1 |
| 06/10/19 | | 6.1 | | 0.4 | | 0.6 | | -0.6 |
| 06/12/19 | | 2.3 | | 1.6 | | 1.5 | | 7.3 |
| 06/14/19 | | 4.0 | | 4.1 | | 8.3 | | 0.5 |
| 06/26/19 | | 1.8 | | 7.0 | | 4.3 | | -0.1 |
| Totals/Max | 0 | 6.1 | 0 | 9.2 | 0 | 18.0 | 0 | 22.4 |
| 99 th Percentile | | 4.6 | | 7.3 | | 8.3 | | 9.6 |

NA - Indicates data were not available

Attainment of the SO₂ Standard:

Attainment of the new standard is achieved when the 3-year average of the 99th percentile annual distribution of the daily maxima is less than or equal to 75 ppb. Since this value can be calculated from historical data, the chart below indicates those values based on 2013-2019 data.

SO₂ Annual 99th Percentiles and Annual Design Values

| Site Name | Annual 99 th Percentiles (ppb) | | | | | | | Annual Design Values | | | | |
|--------------|---|------|------|------|------|------|------|----------------------|-----------|-----------|-----------|-----------|
| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2013-2015 | 2014-2016 | 2015-2017 | 2016-2018 | 2017-2019 |
| Watson Lane | 93 | 149 | 54 | 26 | 14 | 16 | 7 | 99 | 76 | 31 | 19 | 12 |
| Fire Arms | 37 | 42 | 25 | 16 | 11 | 12 | 5 | 35 | 28 | 17 | 13 | 9 |
| Cannons Lane | 27 | 29 | 19 | 8 | 7 | 8 | 8 | 25 | 19 | 11 | 8 | 8 |
| New Albany | 21 | 44 | 26 | 11 | 8 | 9 | 10 | 30 | 27 | 15 | 9 | 9 |

* Design Value calculations are approximations based on preliminary summary data and may differ from official design value calculations