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# ***Noise Compatibility***

**2<sup>nd</sup> Quarter, 2014**

Sep 30, 2014

## *Disclaimer*

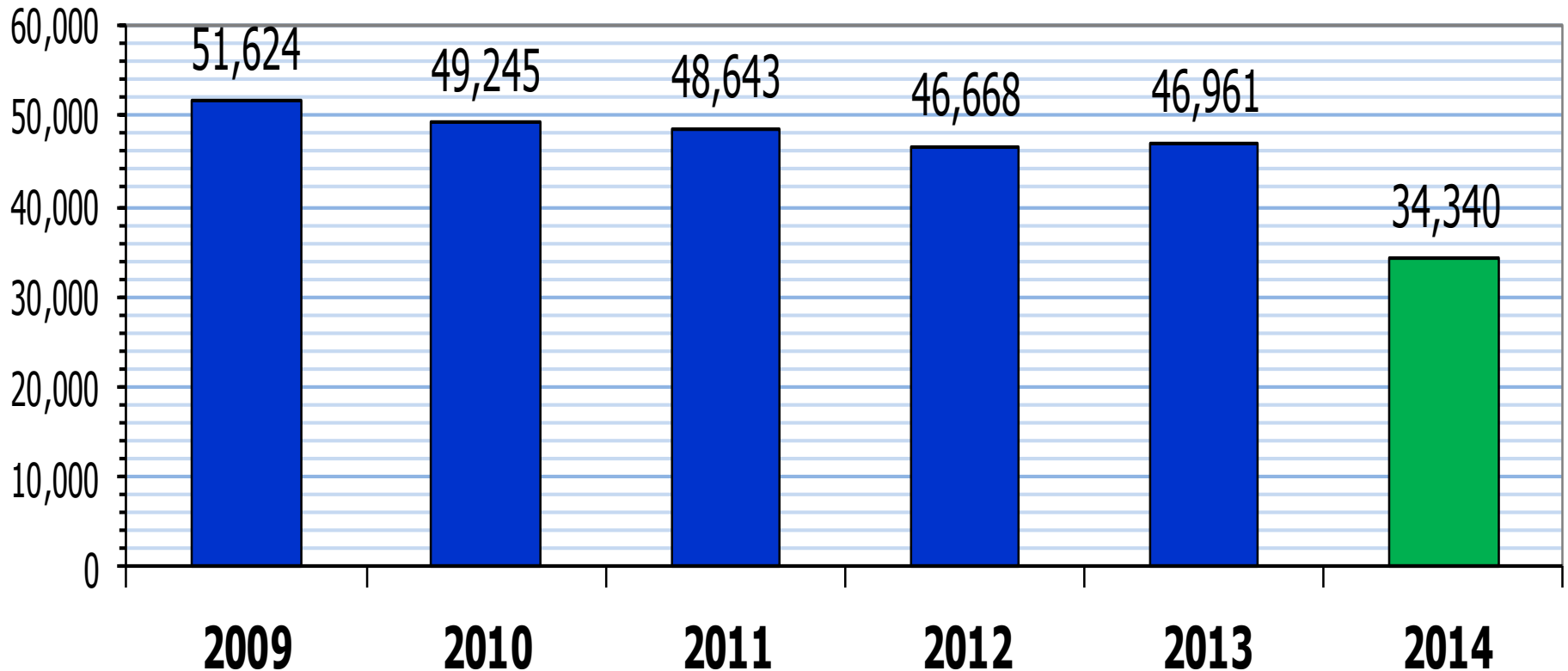


- Adherence to approved noise abatement measures is voluntary and subject to change based on weather, efficiency, and safety.
- Information contained within this report is for informational purposes only. Information cannot be used for enforcement of any Noise Abatement Measure.

# Aircraft Operations



Cleveland 2<sup>nd</sup> Quarter Operations 2009 - 2014



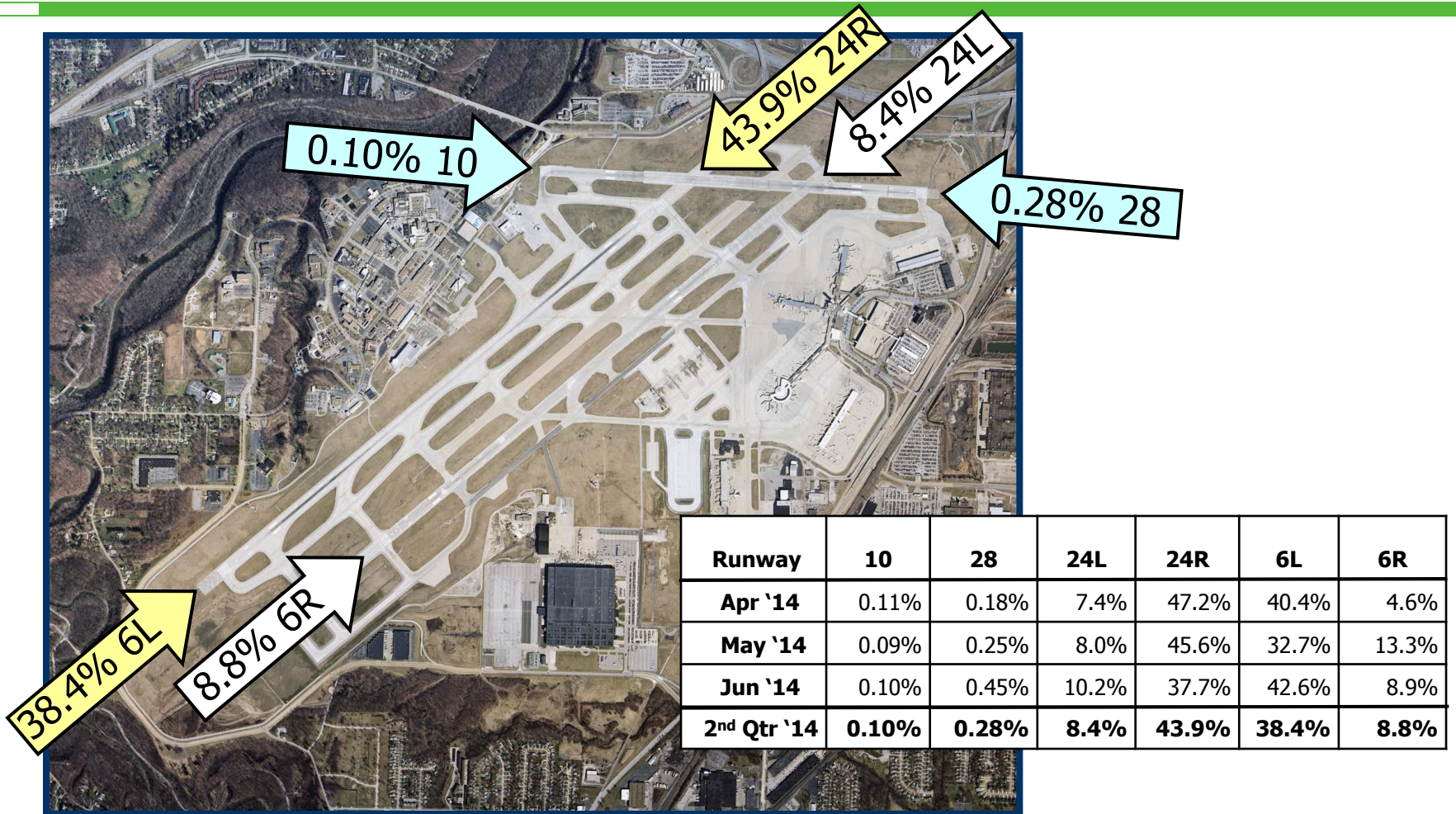
There were 34,340 landings and takeoffs in the 2<sup>nd</sup> Qtr. 2014; this is 26.68% below the 2<sup>nd</sup> Qtr. 2013.

## Landings & Takeoffs

	2 <sup>nd</sup> Qtr., 2014		2 <sup>nd</sup> Qtr., 2013	
Commercial				
-Stage 2 with hush kit	10	0.03%	182	0.39%
-Heavy (incl. all B757s)	570	1.66%	624	1.33%
-MD80 series	340	0.99%	920	1.96%
-Other Stage 3	13,885	40.43%	12,672	26.98%
-Regional Jet	10,696	31.15%	21,747	46.31%
-Turboprop	5,853	17.04%	7,697	16.39%
Air Taxi	644	1.88%	840	1.79%
General Aviation	2,282	6.65%	2,192	4.67%
Military	60	0.17%	87	0.18%
<b>Total</b>	<b>34,340</b>	<b>100.00%</b>	<b>46,961</b>	<b>100.00%</b>

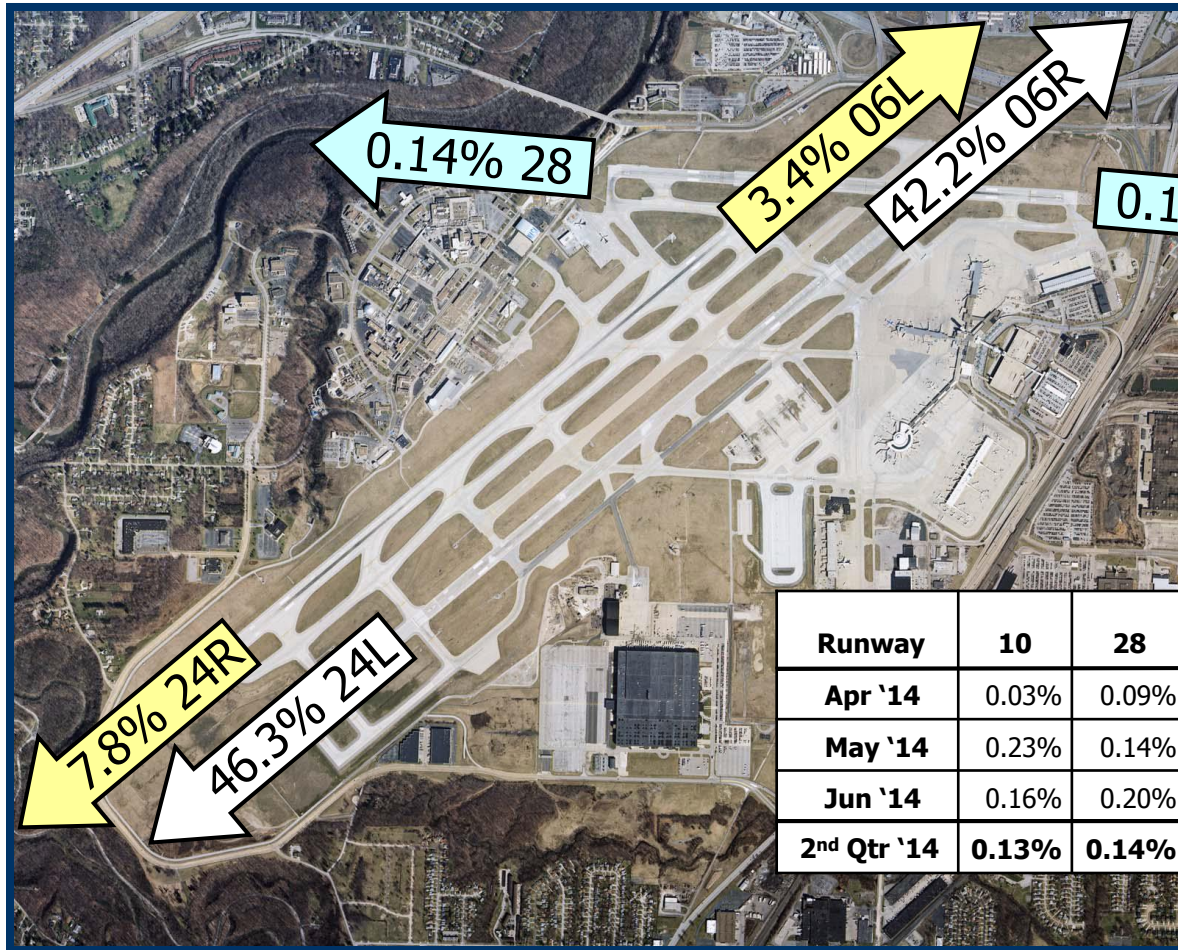
All aircraft above are Stage 3 certified with the exception of some Military and 0.08% of General Aviation (GA) aircraft. Stage 2 GA accordingly is 0.06% of the overall fleet. A hush kit reduces noise enough to meet Stage 3 levels, but well short of the noise level typical of aircraft originally manufactured as Stage 3.

# Runway Use: 2<sup>nd</sup> Qtr, 2014 Arrivals



Totals may be less than 100%, as helicopter operations do not use runways.

# Runway Use: 2<sup>nd</sup> Qtr, 2014 Departures



Runway	10	28	24L	24R	6L	6R
<b>Apr '14</b>	0.03%	0.09%	48.5%	7.7%	3.4%	40.2%
<b>May '14</b>	0.23%	0.14%	45.7%	10.3%	3.3%	40.3%
<b>Jun '14</b>	0.16%	0.20%	44.1%	4.9%	3.6%	47.0%
<b>2<sup>nd</sup> Qtr '14</b>	<b>0.13%</b>	<b>0.14%</b>	<b>46.3%</b>	<b>7.8%</b>	<b>3.4%</b>	<b>42.2%</b>

Totals may be less than 100%, as helicopter operations do not use runways.

# Departure Headings – Day-time

## Jet Departures, 6:00 a.m. to 11:00 p.m.

A voluntary measure of the Noise Compatibility Program calls for jets departing between 6:00 a.m. and 11:00 p.m. from Runways 6L and 6R to take headings between 360° and 35° when turning left and between 65° and 95° when turning right until the jet is either 5 mi. away from the airport or has gained an altitude of 5,000 ft. above Mean Sea Level (MSL).

Another voluntary measure of the Noise Compatibility Program calls for jets departing between 6:00 a.m. and 11:00 p.m. from Runways 24L and 24R to take headings between 190° and 220° when turning left and between 250° and 280° when turning right until the jet is either 5 mi. away from the airport or has gained an altitude of 5,000 ft. MSL.

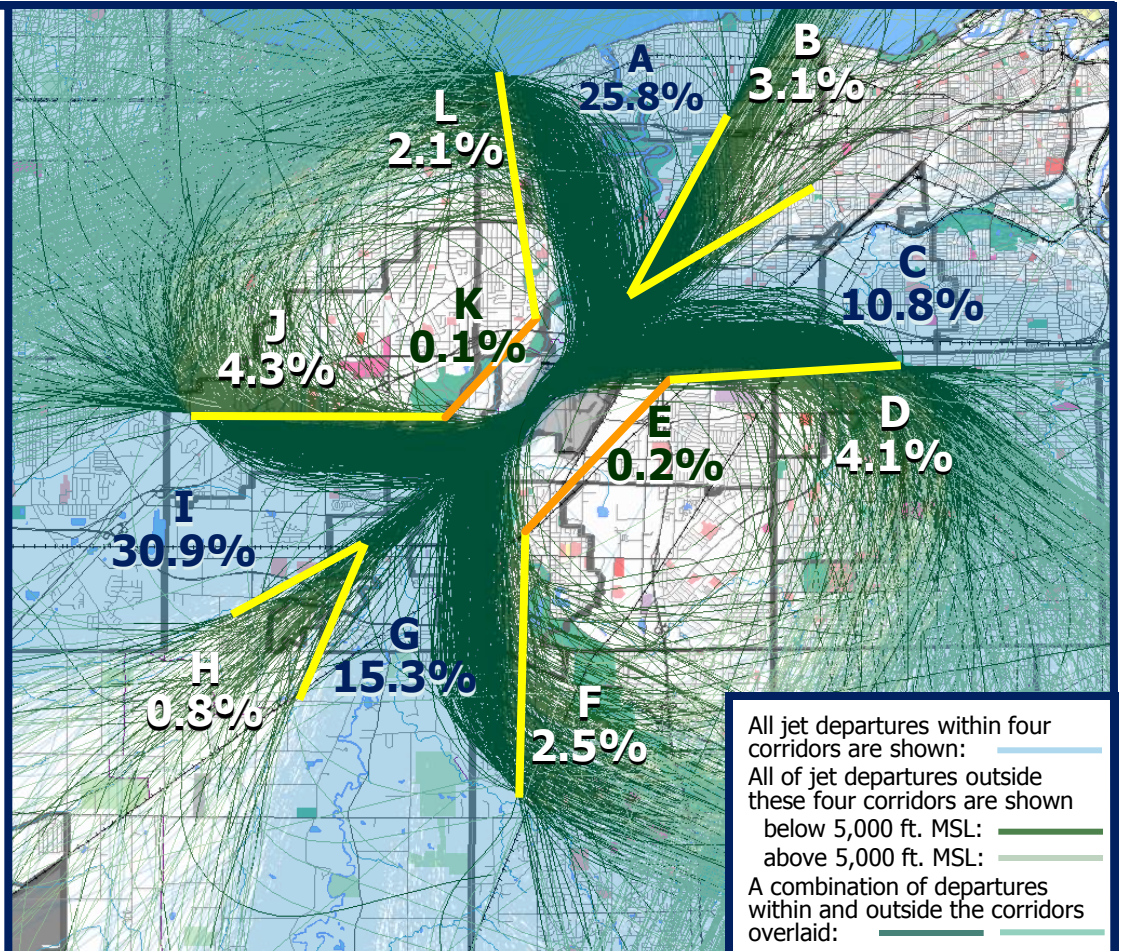
### 82.8% within corridors

- A. 25.8%:** north corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL
- C. 10.8%:** east corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL
- G. 15.3%:** south corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL
- I. 30.9%:** west corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL

### 17.2% outside corridors

- B. 3.1%:** flights crossing inner boundaries below 5,000 ft. MSL and then exiting between the north and east corridors
- D. 4.1%:** flights crossing the south boundary below 5,000 ft. MSL
- E. 0.2%:** flights turning south before entering the corridor
- F. 2.5%:** flights crossing the east boundary below 5,000 ft. MSL
- H. 0.8%:** flights crossing inner boundaries below 5,000 ft. MSL and then exiting between the west and south corridors
- J. 4.3%:** flights crossing the north boundary below 5,000 ft. MSL
- K. 0.1%:** flights turning north before entering the corridor
- L. 2.1%:** flights crossing the west boundary below 5,000 ft. MSL

(Percentages do not include Rwy 10/28 departures)



# Departure Headings – Night-time

## Jet Departures, 11:00 p.m. to 6:00 a.m.

A voluntary measure of the Noise Compatibility Program calls for jets departing between 11:00 p.m. and 6:00 a.m. from Runways 6L and 6R to take headings of roughly 095° to 100° until reaching an altitude of 5,000 ft. MSL.

Another voluntary measure of the Noise Compatibility Program calls for jets departing between 11:00 p.m. and 6:00 a.m. from Runways 24L and 24R to take headings between 200° and 220° until reaching an altitude of 5,000 ft. MSL.

### 53.8% within corridors

**A. 25.0%:** 095 corridor, including flights crossing the 095 corridor boundaries above 5,000 ft. MSL

**F. 28.8%:** 200 corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL

### 46.2% outside corridors

**B. 1.4%:** flights crossing the south boundary below 5,000 ft. MSL

**C. 0.5%:** flights turning south before entering the 095 corridor

**D. 1.0%:** flights departing south without entering the 200 corridor

**E. 8.7%:** flights crossing the east boundary below 5,000 ft. MSL

**G. 5.3%:** flights crossing the west boundary below 5,000 ft. MSL

**H. 13.5%:** flights departing southwest without entering the corridor

**I. 9.1%:** flights departing west without entering the corridor

**J. 4.8%:** flights departing north, not east with the 095 corridor

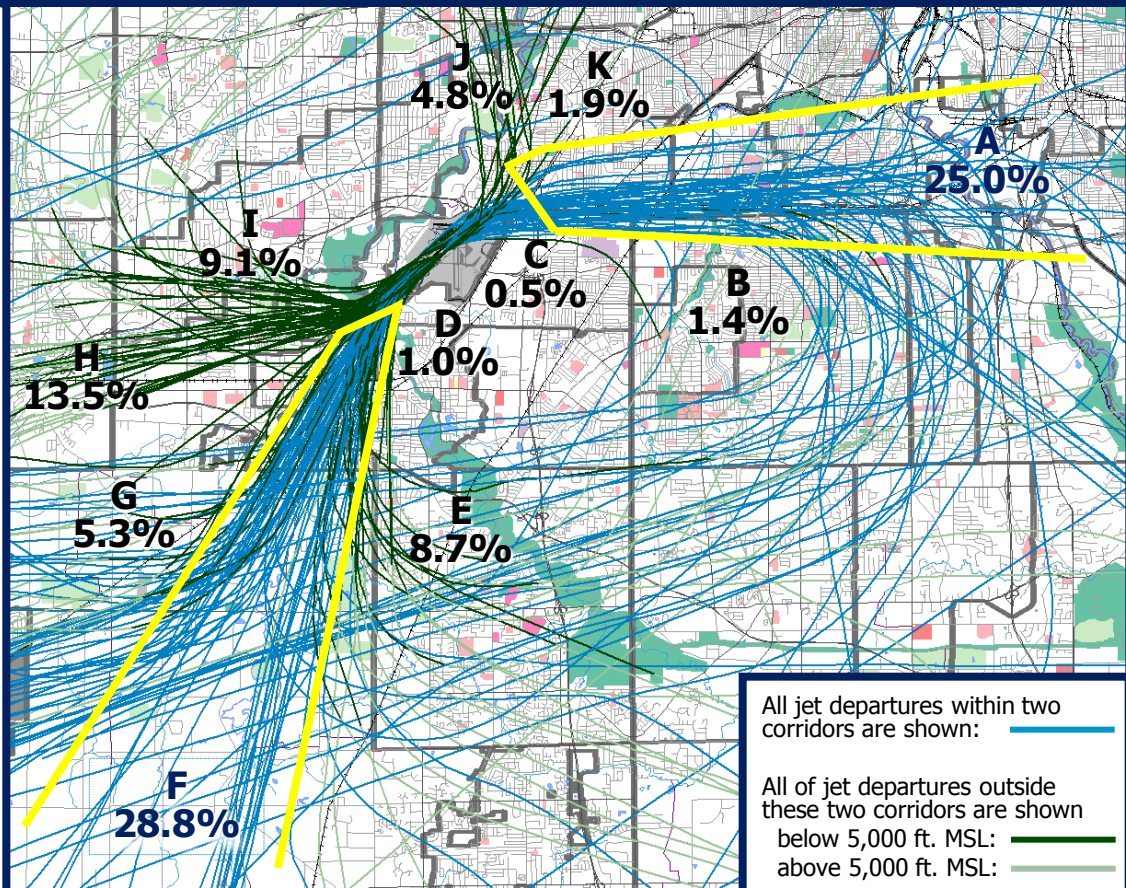
**K. 1.9%:** flights crossing the north boundary below 5,000 ft. MSL

(There were no Rwy 10 or Rwy 28 jet departures between 11:00 p.m. and 6:00 a.m. during the 1<sup>st</sup> Qtr. of 2014.)

The percentage of departures on each runway from 11:00 p.m. to 6:00 a.m. during the 1<sup>st</sup> Qtr. of 2014 were as follows:

Rwy	10	28	24L	24R	6L	6R
For jets:	0.5%	0.0%	58.7%	7.8%	2.4%	30.6%
For all aircraft:	0.4%	0.4%	59.6%	9.4%	2.3%	27.9%

**92.6% of Jet Departures from Rwy 6L/6R are on the preferred Rwy, 6R.**





# Arrival Headings – Night-time

## Arrivals, 10:00 p.m. to 6:59 a.m.

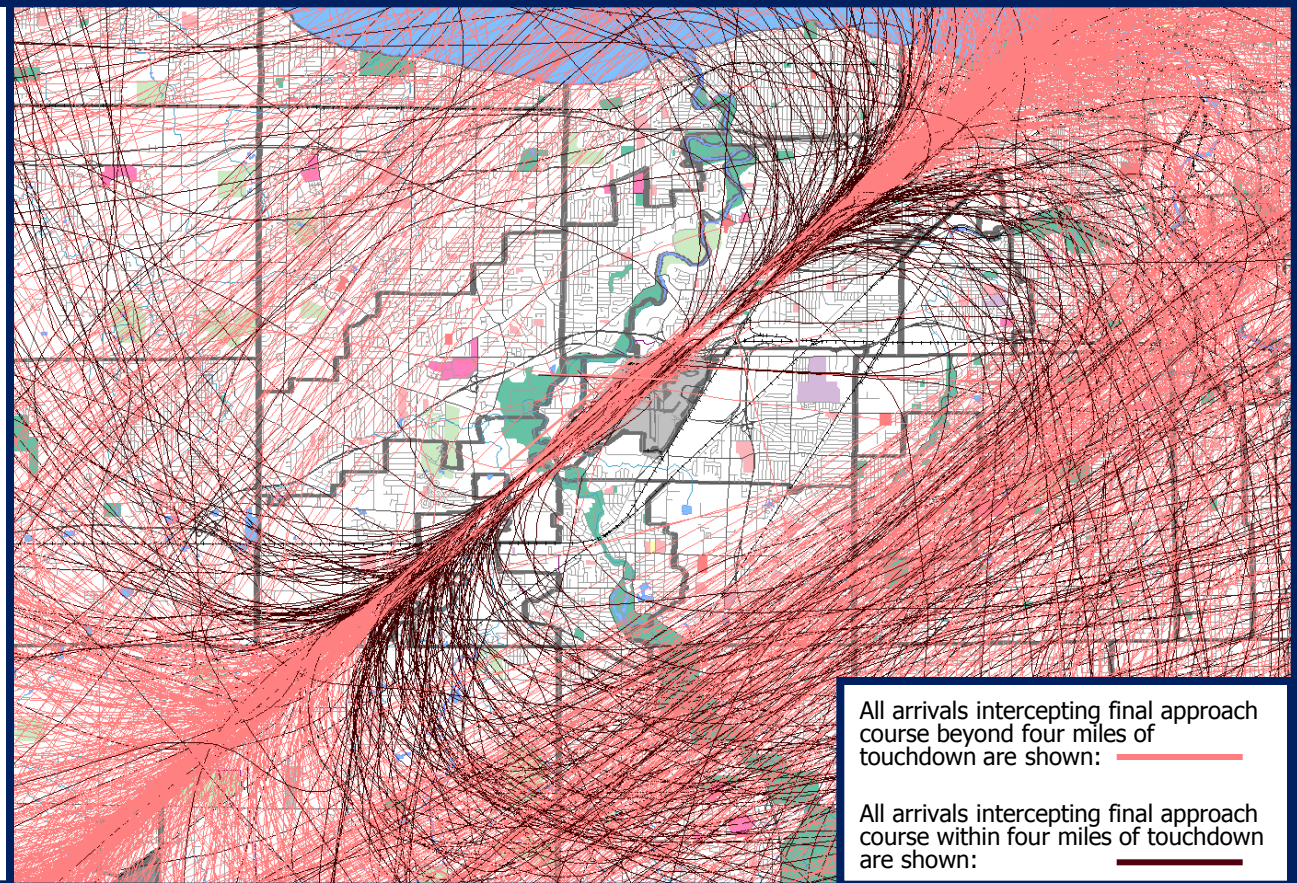
A voluntary measure of the Noise Compatibility Program calls for all aircraft arriving between 10:00 p.m. and 6:59 a.m., wind and weather permitting, to intercept final approach course no closer than four miles before touchdown.

**86.5% beyond four miles and**  
**13.5% within four miles**

There is no comparable NCP measure regarding day-time arrivals.

Runway use by all arriving aircraft from 10:00 p.m. to 6:59 a.m. during the 1<sup>st</sup> Qtr., 2014 was as follows:

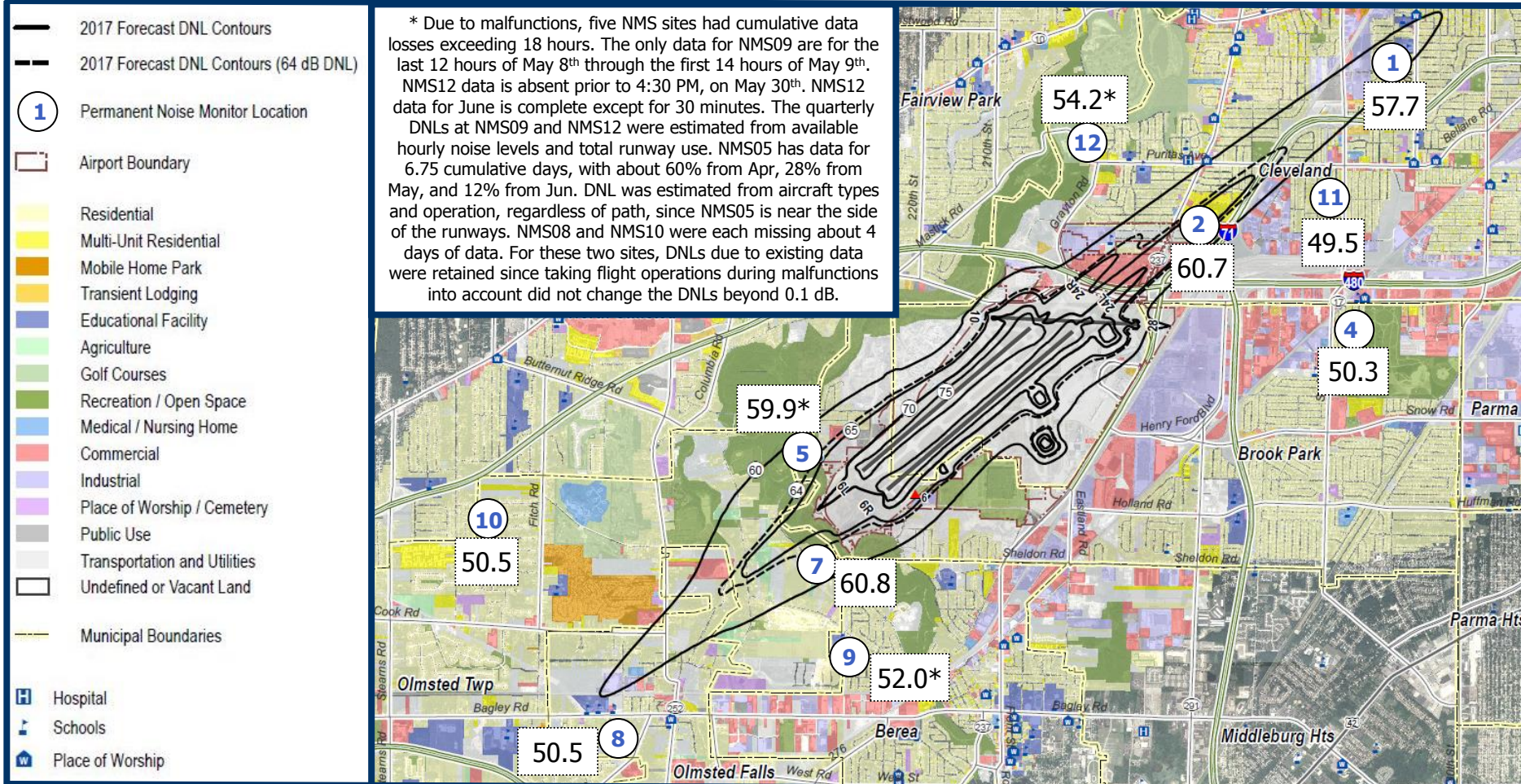
Rwy	Percentage of Arrivals	
	Jets	All Aircraft
<b>10</b>	0.0%	0.1%
<b>28</b>	0.2%	0.3%
<b>24L</b>	13.1%	13.6%
<b>24R</b>	39.6%	40.1%
<b>6L</b>	36.8%	35.8%
<b>6R</b>	10.3%	10.1%



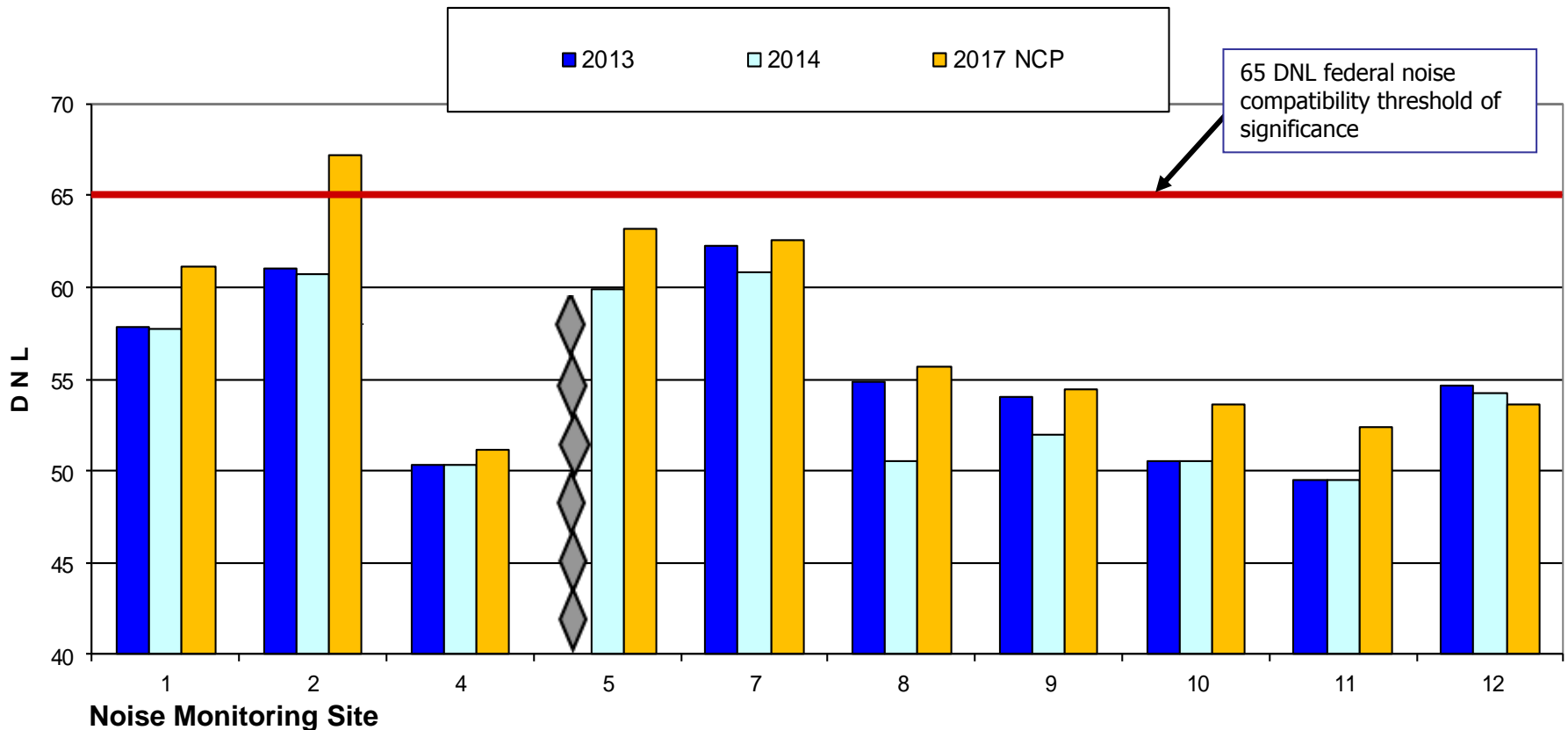
All arrivals intercepting final approach course beyond four miles of touchdown are shown: ———

All arrivals intercepting final approach course within four miles of touchdown are shown: ———

# Aircraft Noise – DNL by Noise Monitoring Site

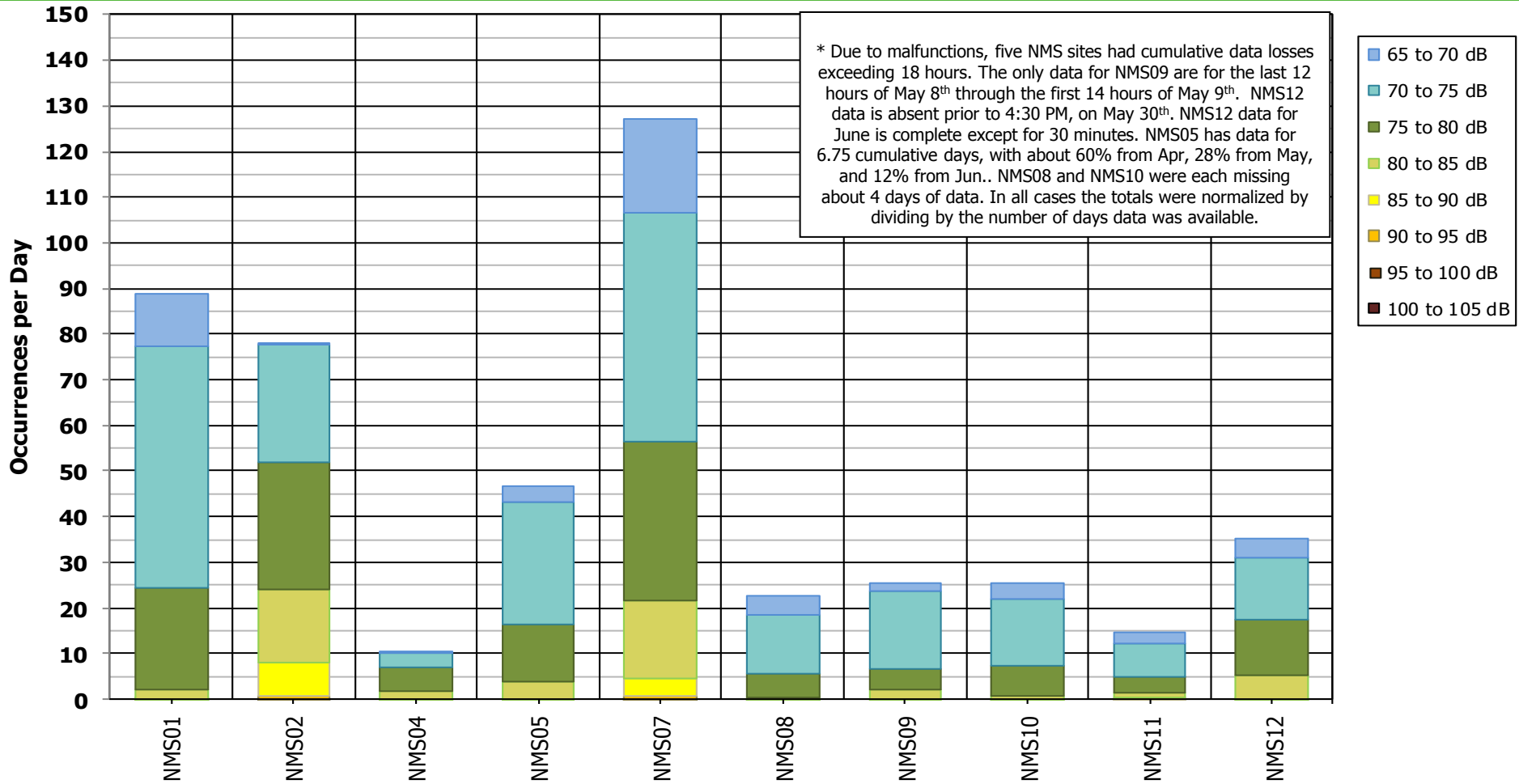


# DNL: 2<sup>nd</sup> Qtr, 2014 vs. 2<sup>nd</sup> Qtr, 2013



\* Due to malfunctions, five NMS sites had cumulative data losses exceeding 18 hours. The only data for NMS09 are for the last 12 hours of May 8<sup>th</sup> through the first 14 hours of May 9<sup>th</sup>. NMS12 data is absent prior to 4:30 PM, on May 30<sup>th</sup>. NMS12 data for June is complete except for 30 minutes. The quarterly DNLs at NMS09 and NMS12 were estimated from available hourly noise levels and total runway use. NMS05 has data for 6.75 cumulative days, with about 60% from Apr, 28% from May, and 12% from Jun. DNL was estimated from aircraft types and operation, regardless of path, since NMS05 is near the side of the runways. NMS08 and NMS10 were each missing about 4 days of data. For these two sites, DNLs due to existing data were retained since taking flight operations during malfunctions into account did not change the DNLs beyond 0.1 dB.

# Average Daily Occurrences of Aircraft Noise, Grouped by Maximum Decibel Level



# Top 3 Lmaxs at each NMS, (1 of 2)

<b>NMS</b>	<b>Lmax (dB)</b>	<b>Aircraft</b>	<b>Operation</b>	<b>Time and date</b>	<b>Sound Exposure Level (dB)<sup>1</sup></b>	<b>Duration (sec)</b>
NMS01	90.4	Airbus A300-600	Arrival on Rwy 24R	5/1/14 5:40 AM	97.1	38.5
NMS01	87.3	MD-88	Arrival on Rwy 24R	6/24/14 8:35 PM	96.5	44.5
NMS01	86.7	MD-83	Arrival on Rwy 24R	6/24/14 9:30 PM	93.9	39.0
NMS02	95.1	Airbus A300-600	Arrival on Rwy 24L	6/24/14 6:13 AM	99.7	20.0
NMS02	95.0	MD-88	Departure off Rwy 6R	6/27/14 7:21 AM	100.7	23.0
NMS02	94.7	Airbus A300-600	Arrival on Rwy 24L	6/24/14 5:46 AM	99.1	20.0
NMS04	88.8	MD-88	Departure off Rwy 6R	4/6/14 2:49 PM	95.9	28.5
NMS04	88.5	B737-700	Arrival on Rwy 28	5/9/14 11:17 PM	96.7	36.5
NMS04	87.9	MD-88	Departure off Rwy 6R	6/19/14 2:33 PM	95.7	23.0
NMS05 <sup>2</sup>	85.9	MD-88	Departure off Rwy 6R	6/7/14 7:30 AM	95.4	44.5
NMS05 <sup>2</sup>	84.4	MD-11	Departure off Rwy 24R	4/15/14 10:30 PM	92.9	28.5
NMS05 <sup>2</sup>	83.6	B737-700	Departure off Rwy 24L	4/6/14 9:09 AM	91.8	28.0
NMS07	97.9	MD-88	Departure off Rwy 24L	6/13/14 5:03 PM	102.3	30.0
NMS07	96.1	MD-88	Departure off Rwy 24L	5/26/14 12:38 PM	101.4	25.0
NMS07	95.9	MD-88	Departure off Rwy 24L	5/12/14 12:43 PM	101.7	31.0

<sup>1</sup> Sound Exposure Level is a measure that takes into account all noise over the entire duration of an event.

<sup>2</sup> Due to equipment malfunctions, data for NMS05 is available for a cumulative total of 6.75 days of the quarter.

## Top 3 Lmaxs at each NMS, (2 of 2)

<b>NMS</b>	<b>Lmax (dB)</b>	<b>Aircraft</b>	<b>Operation</b>	<b>Time and date</b>	<b>Sound Exposure Level (dB)<sup>1</sup></b>	<b>Duration (sec)</b>
NMS08 <sup>3</sup>	88.4	MD-88	Departure off Rwy 24L	4/30/14 3:00 PM	95.2	29.5
NMS08 <sup>3</sup>	86.5	Dash 8-300 Turboprop	Arrival on Rwy 6R	5/23/14 10:37 AM	91.1	15.0
NMS08 <sup>3</sup>	83.6	MD-88	Departure off Rwy 24R	5/9/14 12:48 PM	90.3	25.0
NMS09 <sup>4</sup>	81.3	B737-700	Departure off Rwy 24L	5/9/14 8:36 AM	90.0	30.0
NMS09 <sup>4</sup>	81.1	B737-300	Departure off Rwy 24R	5/9/14 6:20 AM	89.0	25.5
NMS09 <sup>4</sup>	80.8	Embraer ERJ-170	Departure off Rwy 24R	5/9/14 12:29 PM	88.3	29.0
NMS10	86.9	Gulfstream II Business Jet	Departure off Rwy 24L	4/12/14 12:07 PM	94.6	38.5
NMS10	86.9	B727-200	Departure off Rwy 24L	6/1/14 6:37 PM	93.7	29.0
NMS10	84.5	B737-900	Departure off Rwy 24L	5/15/14 8:38 AM	90.8	24.0
NMS11	91.8	MD-88	Departure off Rwy 6R	5/28/14 12:40 PM	97.8	31.0
NMS11	91.1	MD-88	Departure off Rwy 6R	4/23/14 2:54 PM	97.4	39.5
NMS11	89.9	MD-88	Departure off Rwy 6R	6/27/14 7:22 AM	97.4	31.5
NMS12 <sup>5</sup>	86.5	MD-11	Departure off Rwy 6L	6/5/14 10:37 PM	95.4	34.5
NMS12 <sup>5</sup>	86.1	MD-11	Departure off Rwy 6R	6/4/14 10:39 PM	94.7	32.0
NMS12 <sup>5</sup>	85.8	B737-300	Departure off Rwy 6L	6/19/14 1:44 PM	91.2	18.5

<sup>1</sup> Sound Exposure Level is a measure that takes into account all noise over the entire duration of an event.

<sup>3</sup> Due to equipment malfunctions, data for NMS08 is unavailable for the first three days and seventeen hours of the quarter.

<sup>4</sup> Due to equipment malfunctions, data is available for NMS09 for only between 11:46 AM, May, 8 and 2:00 PM, May 9 within the quarter.

<sup>5</sup> Due to equipment malfunctions, data is unavailable for NMS12 prior to 4:42 PM, May 30.

# Noise Complaints



City	Apr	May	Jun	2 <sup>nd</sup> Q '14 Calls	%	2 <sup>nd</sup> Q '13 Calls	%	2 <sup>nd</sup> Q '14 Callers	%	2 <sup>nd</sup> Q '12 Callers	%
Berea	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Brook Park	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Cleveland	3	5	4	12	80.0%	82	89.1%	5	62.5%	10	52.6%
Fairview Park	0	0	1	1	6.7%	6	6.5%	1	12.5%	5	26.3%
Lakewood	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Middleburg Hts.	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
North Olmsted	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Olmsted Falls	0	0	0	0	0.0%	3	3.3%	0	0.0%	3	15.8%
Olmsted Twp.	1	0	1	2	13.3%	1	1.1%	2	25.0%	1	5.3%
Parma	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Parma Heights	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Rocky River	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Westlake	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other	0	0	0	0	0.0%	0	0.0%	0	0.0%	0	0.0%
<b>Totals</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>15</b>	<b>100.0%</b>	<b>92</b>	<b>100.0%</b>	<b>8</b>	<b>100.0%</b>	<b>19</b>	<b>100.0%</b>

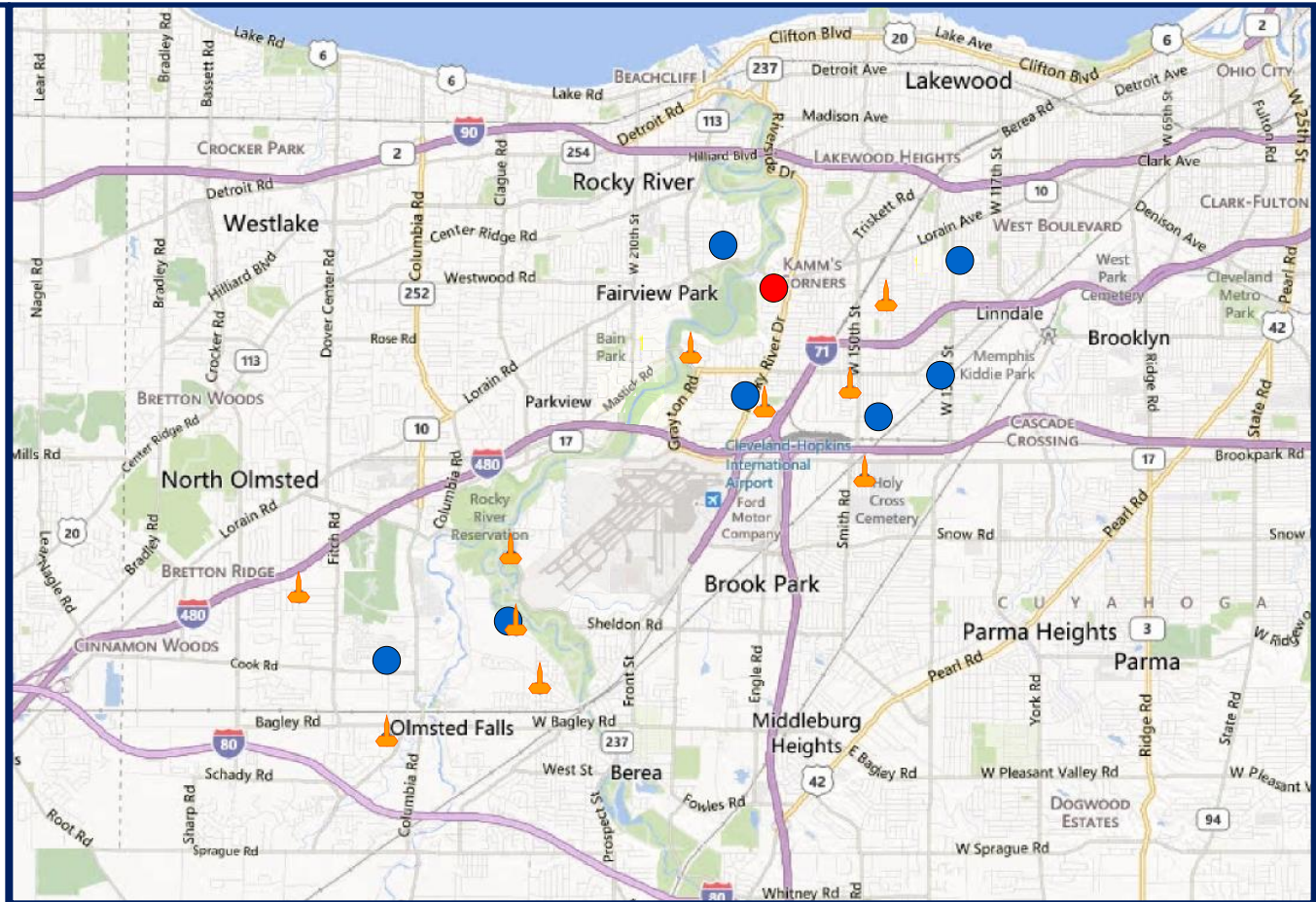
Noise Hotline – (216) 898-5220

# Complaint Map

## LEGEND

Complaints per household

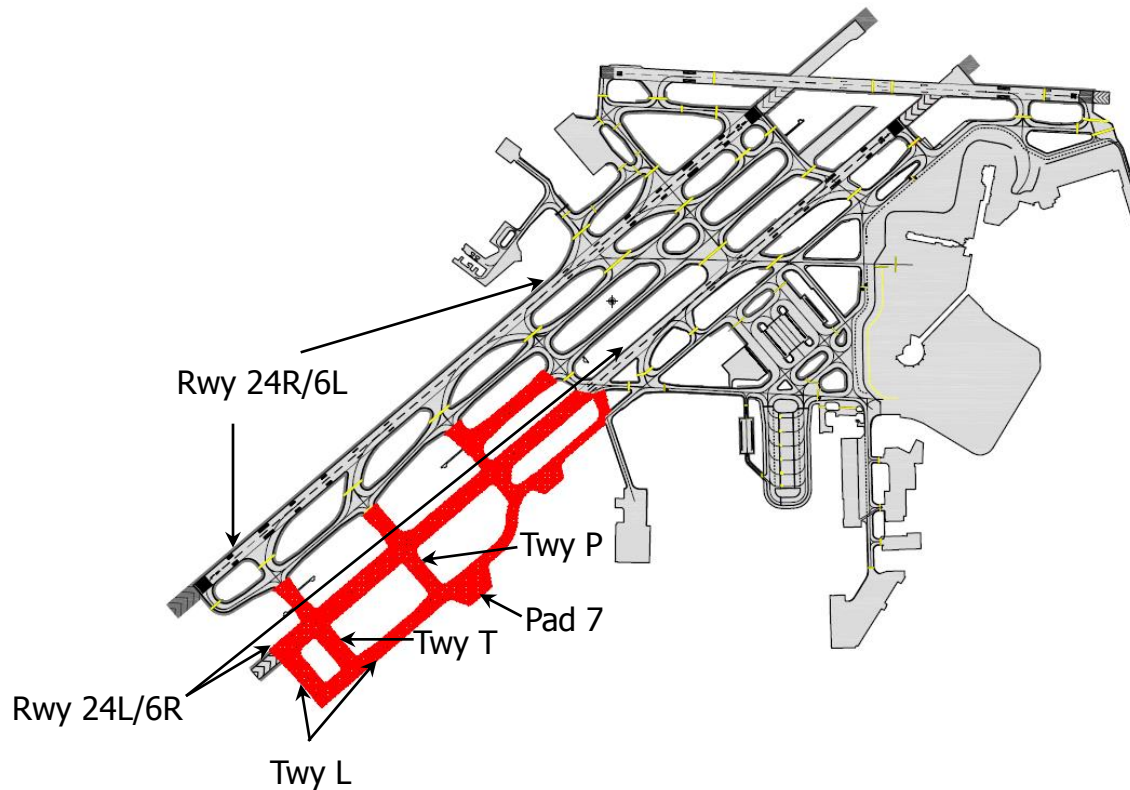
- 1 complaint
- 2 to 5 complaints
- 6 or more complaints
- 📍 Noise Monitoring Station





# Pavement Closures

From approximately July 7 through September 30, 2014, Runway 24L/6R and portions of Taxiways L, T, and P will be closed for rehabilitation. No landings or departures will take place on this runway during that period. In addition, Pad 7 will not be accessible and will be unavailable for aircraft engine run-ups.



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