



Noise Compatibility Report

2016 1st Quarter

June 16, 2016

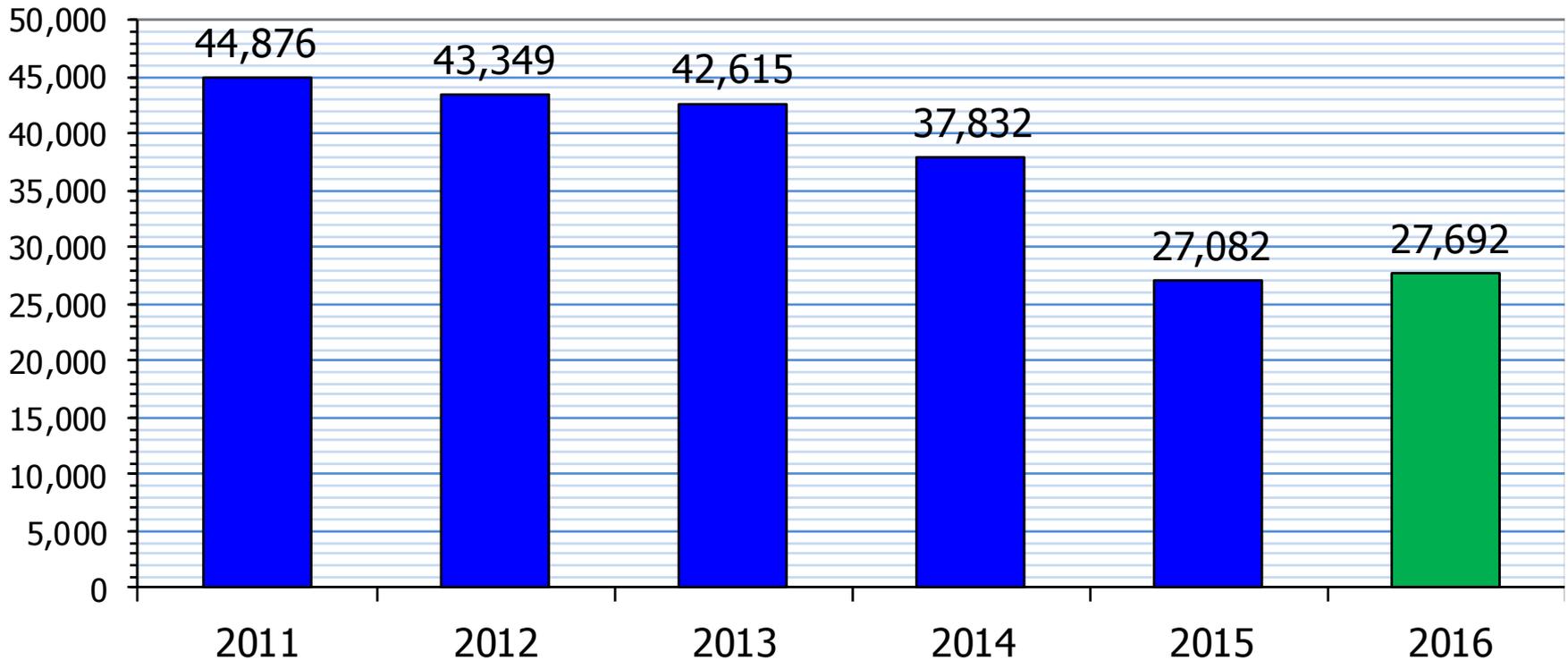
Disclaimer



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

Aircraft Operations

Cleveland 1st Qtr. Operations 2010 - 2015



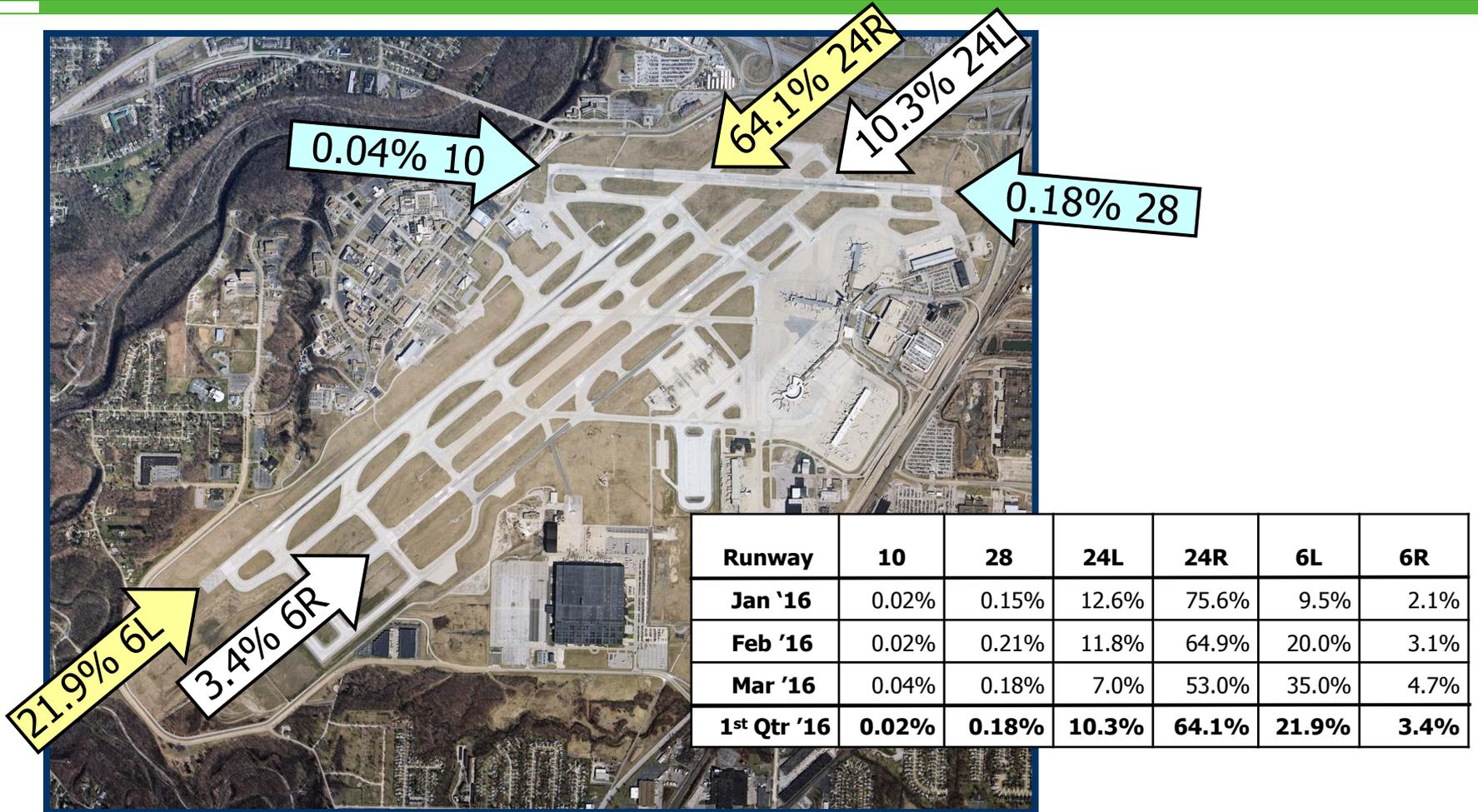
There were 27,692 landings and takeoffs in the 1st Qtr. 2016; this is 2.25% above the 1st Qtr. 2015.

Landings & Takeoffs

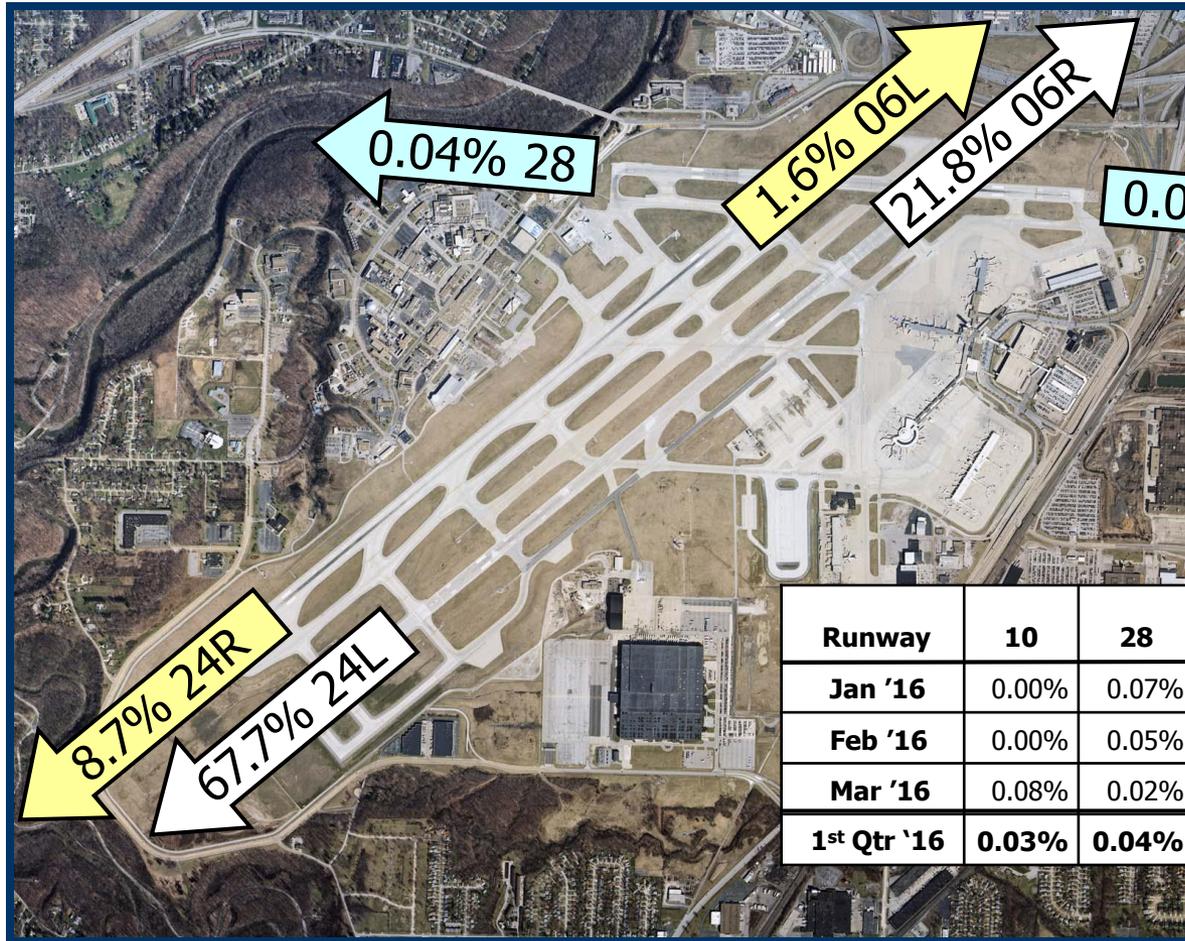
	1 st Qtr., 2016		1 st Qtr., 2015	
Commercial				
-Stage 2 with hush kit	24	0.09%	8	0.03%
-Heavy (excl. all B757s)	402	1.45%	369	1.36%
-MD80 series	1,298	4.69%	1,080	3.99%
-Other Stage 3	15,699	56.69%	14,572	53.81%
-Regional Jet	6,064	21.90%	6,904	25.49%
-Turboprop	1,304	4.71%	1,307	4.82%
Air Taxi	742	2.68%	722	2.67%
General Aviation	2,096	7.57%	2,085	7.70%
Military	63	0.23%	35	0.13%
Total	27,692	100.00%	27,082	100.00%

All aircraft above are Stage 3 certified with the exception of some Military. 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: 1st Qtr, 2016 Arrivals



Runway Use: 1st Qtr, 2016 Departures



Runway	10	28	24L	24R	6L	6R
Jan '16	0.00%	0.07%	79.0%	10.4%	1.0%	9.5%
Feb '16	0.00%	0.05%	69.2%	8.4%	1.8%	20.4%
Mar '16	0.08%	0.02%	56.0%	7.4%	2.0%	34.4%
1st Qtr '16	0.03%	0.04%	67.7%	8.7%	1.6%	21.8%

Departure Headings, 1st Qtr: Day-time

Jet Departures, 6:00 a.m. to 11:00 p.m. 1st Qtr., 2016

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 magnetic 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 magnetic 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.

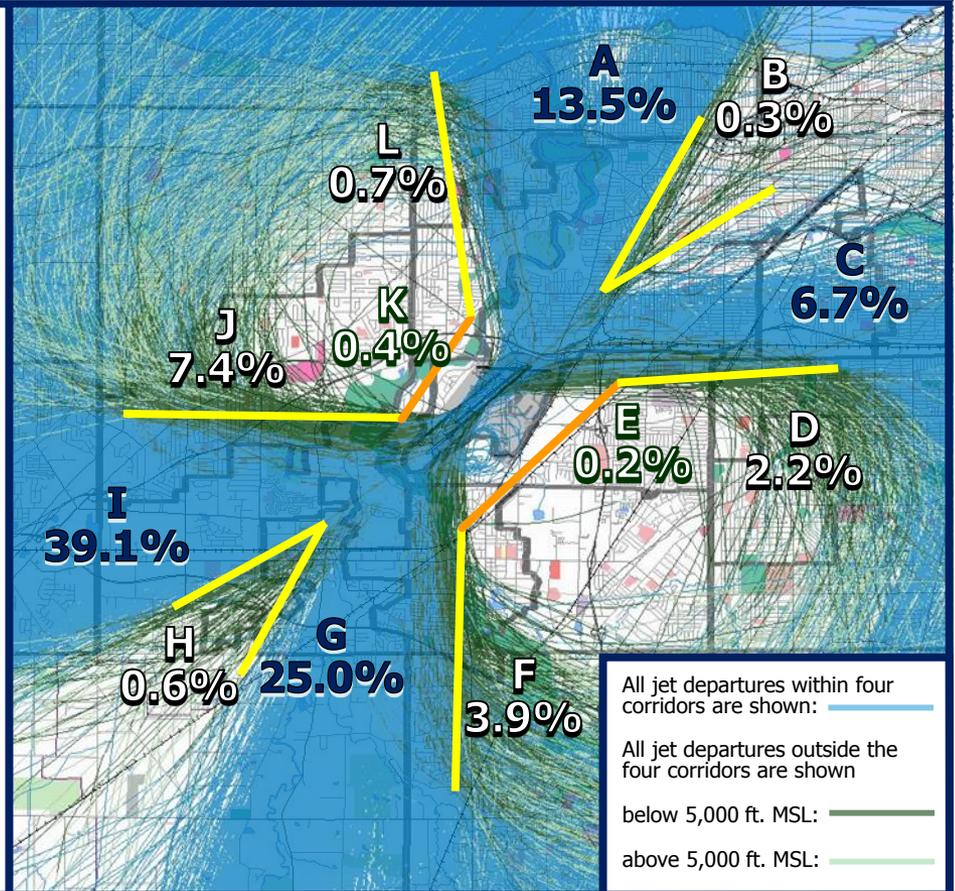
84.3% within corridors

- A. 13.5%:** north corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL
- C. 6.7%:** east corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL
- G. 25.0%:** south corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL
- I. 39.1%:** west corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL

15.7% outside corridors

- B. 0.3%:** flights crossing inner boundaries below 5,000 ft. MSL and then exiting between the north and east corridors
- D. 2.2%:** flights crossing the south boundary below 5,000 ft. MSL
- E. 0.2%:** flights turning south before entering the corridor
- F. 3.9%:** flights crossing the east boundary below 5,000 ft. MSL
- H. 0.6%:** flights crossing inner boundaries below 5,000 ft. MSL and then exiting between the west and south corridors
- J. 7.4%:** flights crossing the north boundary below 5,000 ft. MSL
- K. 0.4%:** flights turning north before entering the corridor
- L. 0.7%:** flights crossing the west boundary below 5,000 ft. MSL

(Percentages do not include Rwy 10/28 departures)



Departure Headings, 1st Qtr : Night-time

Jet Departures, 11:00 p.m. to 6:00 a.m. 1st Qtr., 2016

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.

64.9% within corridors

- A. 10.5%:** 095 corridor, including flights crossing the 095 corridor boundaries above 5,000 ft. MSL
- F. 54.4%:** 200 corridor, including flights crossing the corridor boundaries above 5,000 ft. MSL

35.1% outside corridors

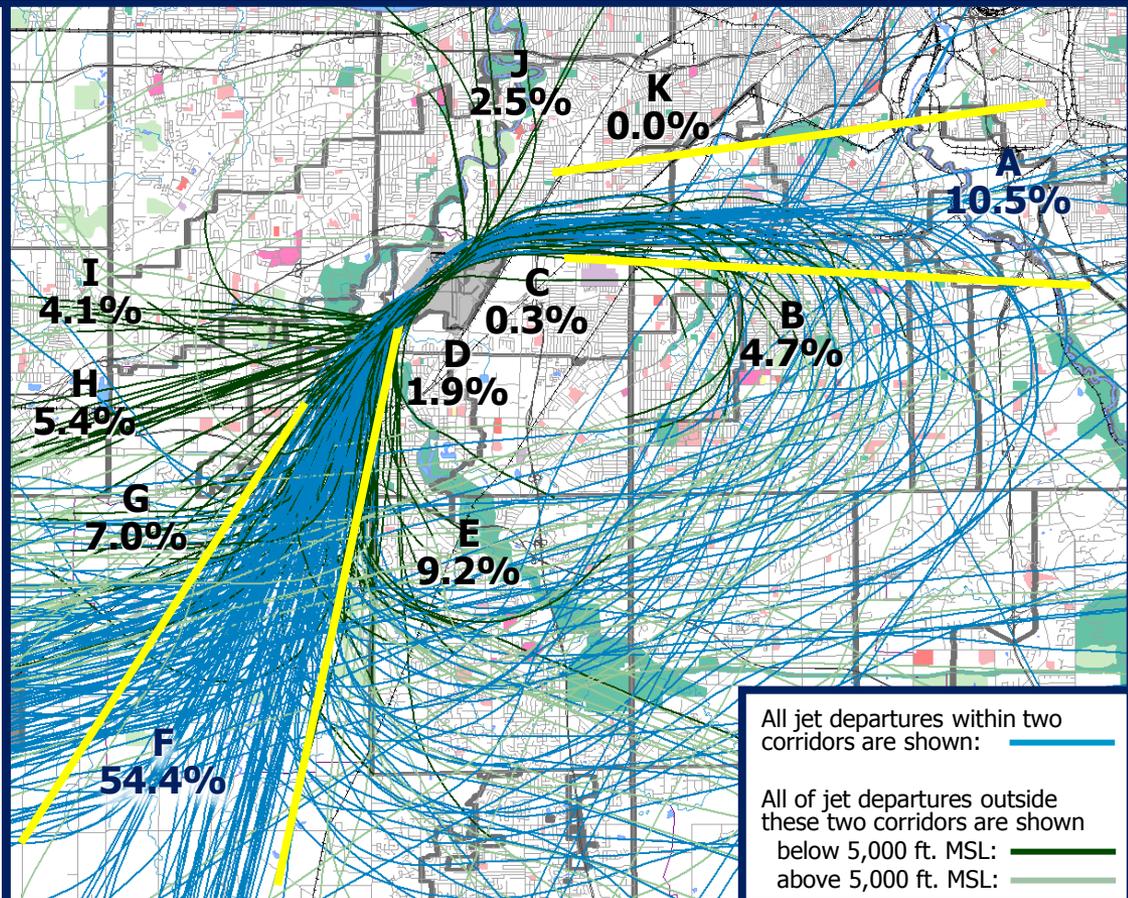
- B. 4.7%:** flights crossing the south boundary below 5,000 ft. MSL
- C. 0.3%:** flights turning south before entering the 095 corridor
- D. 1.9%:** flights departing south without entering the 200 corridor
- E. 9.2%:** flights crossing the east boundary below 5,000 ft. MSL
- G. 7.0%:** flights crossing the west boundary below 5,000 ft. MSL
- H. 5.4%:** flights departing southwest without entering the corridor
- I. 4.1%:** flights departing west without entering the corridor
- J. 2.5%:** flights departing north, not east with the 095 corridor
- K. 0.0%:** flights crossing the north boundary below 5,000 ft. MSL

(There were no Rwy 10 and one Rwy 28 jet departure between 11:00 p.m. and 6:00 a.m. during the quarter.)

The percentage of departures on each runway from 11:00 p.m. to 6:00 a.m. during the quarter were as follows:

Rwy	10	28	24L	24R	6L	6R
For jets:	0.0%	0.3%	73.2%	8.6%	1.5%	16.5%
For all aircraft:	0.0%	0.3%	73.2%	8.8%	1.6%	16.1%

91.1% of Jet Departures from Rwy 6L/6R were on the preferred Rwy, 6R.



Arrival Headings, 1st Qtr : Night-time

Arrivals, 10:00 p.m. to 6:59 a.m. 1st Qtr., 2016

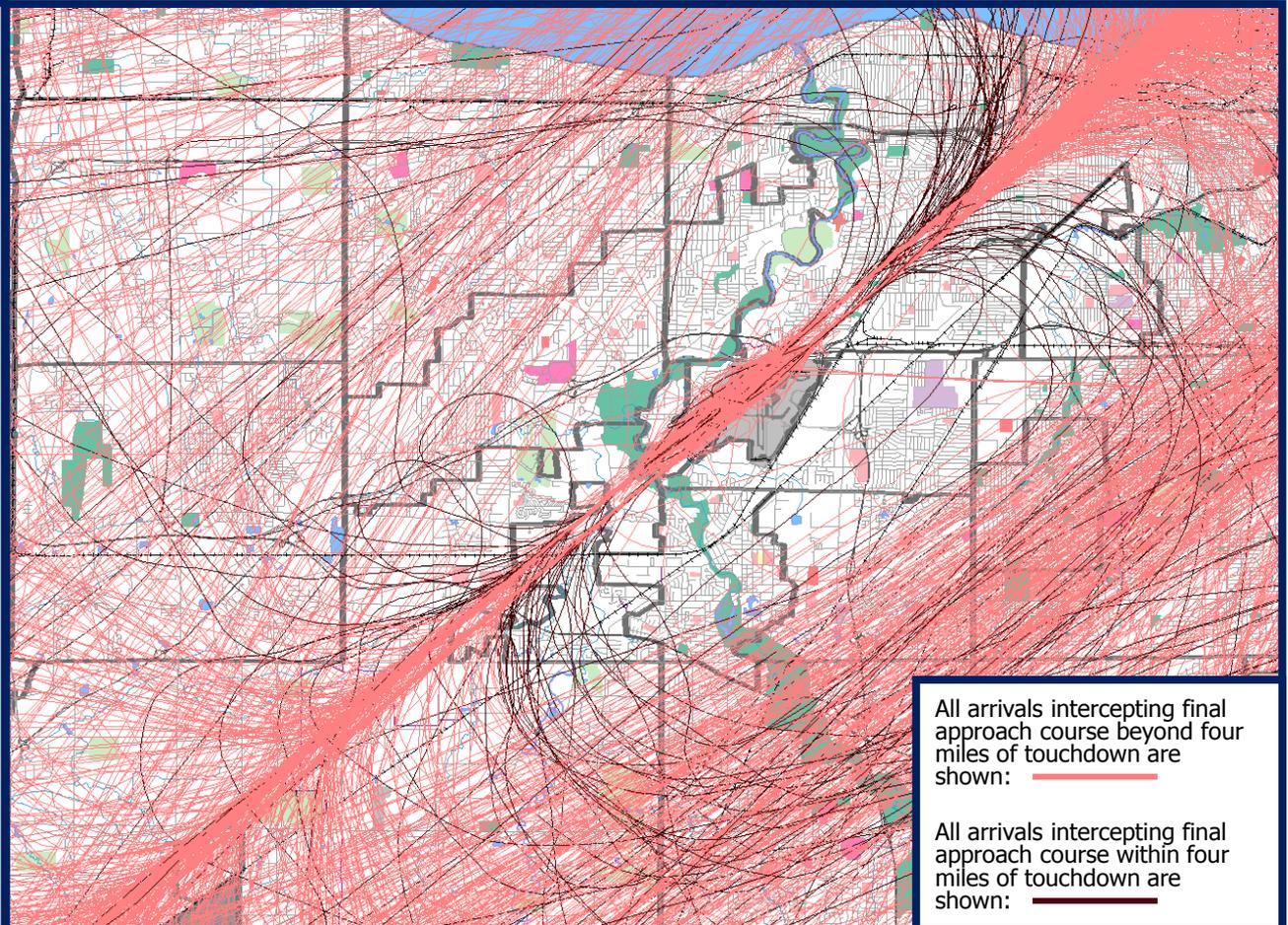
A voluntary measure of the Noise Compatibility Program calls for all aircraft arriving between 10:00 p.m. and 6:59 a.m., wind and weather permitting, to intercept final approach course no closer than four miles before touchdown.

**95.5% beyond four miles and
4.5% 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 quarter was as follows:

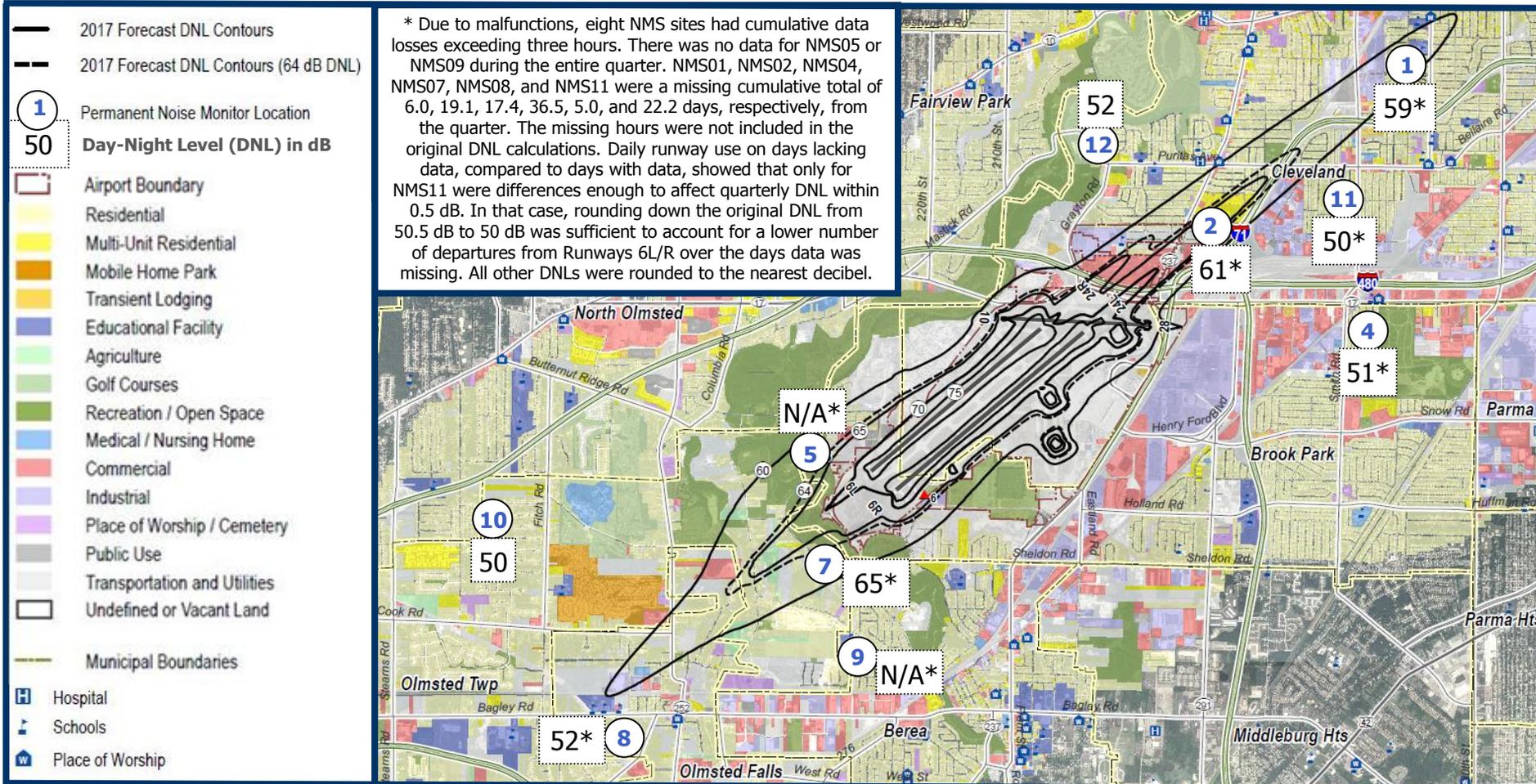
Rwy	Percentage of Arrivals	
	Jets	All Aircraft
10	0.0%	<0.1%
28	0.3%	0.3%
24L	14.0%	14.0%
24R	58.5%	58.3%
6L	23.0%	22.9%
6R	4.3%	4.3%



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

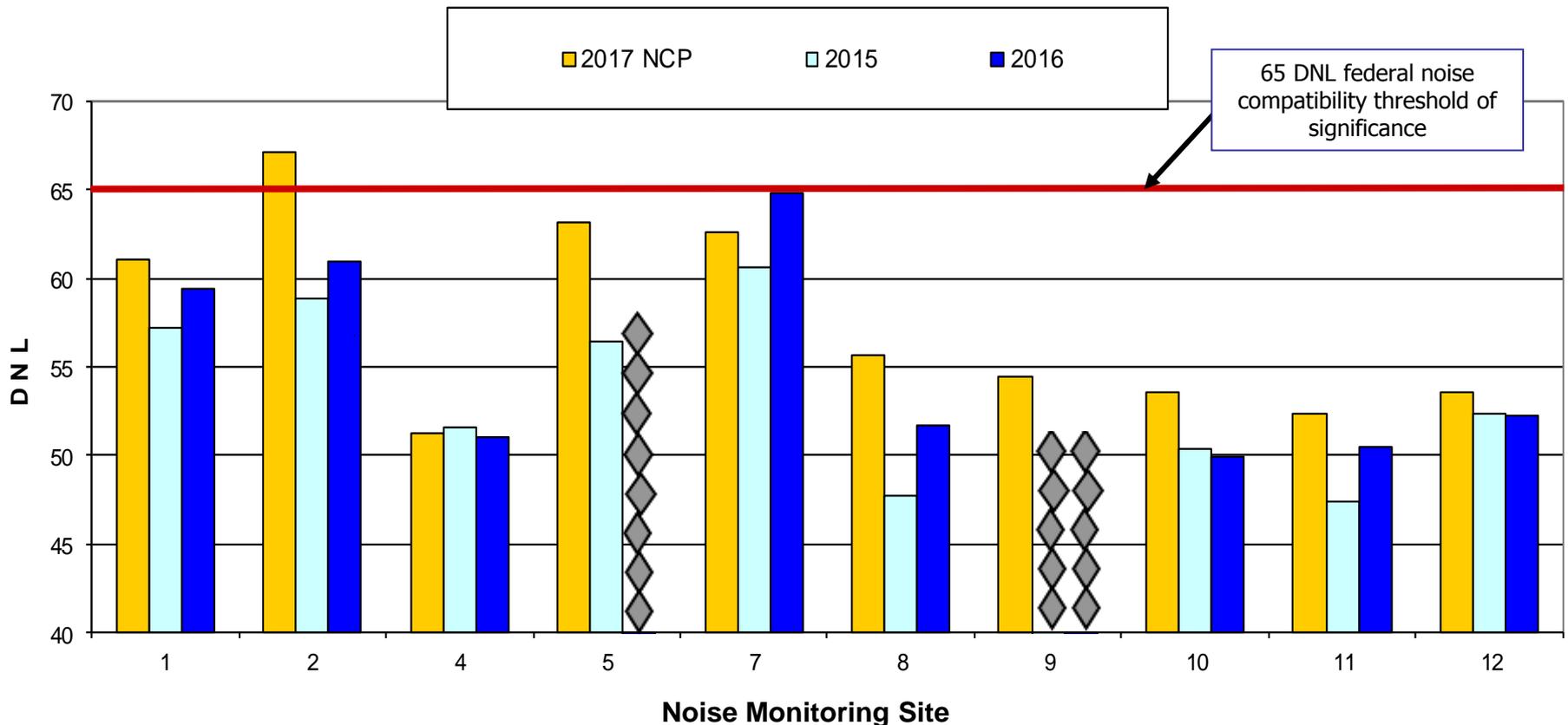
All arrivals intercepting final approach course within four miles of touchdown are shown: 

Aircraft Noise: DNL by Noise Monitoring Site



* Due to malfunctions, eight NMS sites had cumulative data losses exceeding three hours. There was no data for NMS05 or NMS09 during the entire quarter. NMS01, NMS02, NMS04, NMS07, NMS08, and NMS11 were a missing cumulative total of 6.0, 19.1, 17.4, 36.5, 5.0, and 22.2 days, respectively, from the quarter. The missing hours were not included in the original DNL calculations. Daily runway use on days lacking data, compared to days with data, showed that only for NMS11 were differences enough to affect quarterly DNL within 0.5 dB. In that case, rounding down the original DNL from 50.5 dB to 50 dB was sufficient to account for a lower number of departures from Runways 6L/R over the days data was missing. All other DNLs were rounded to the nearest decibel.

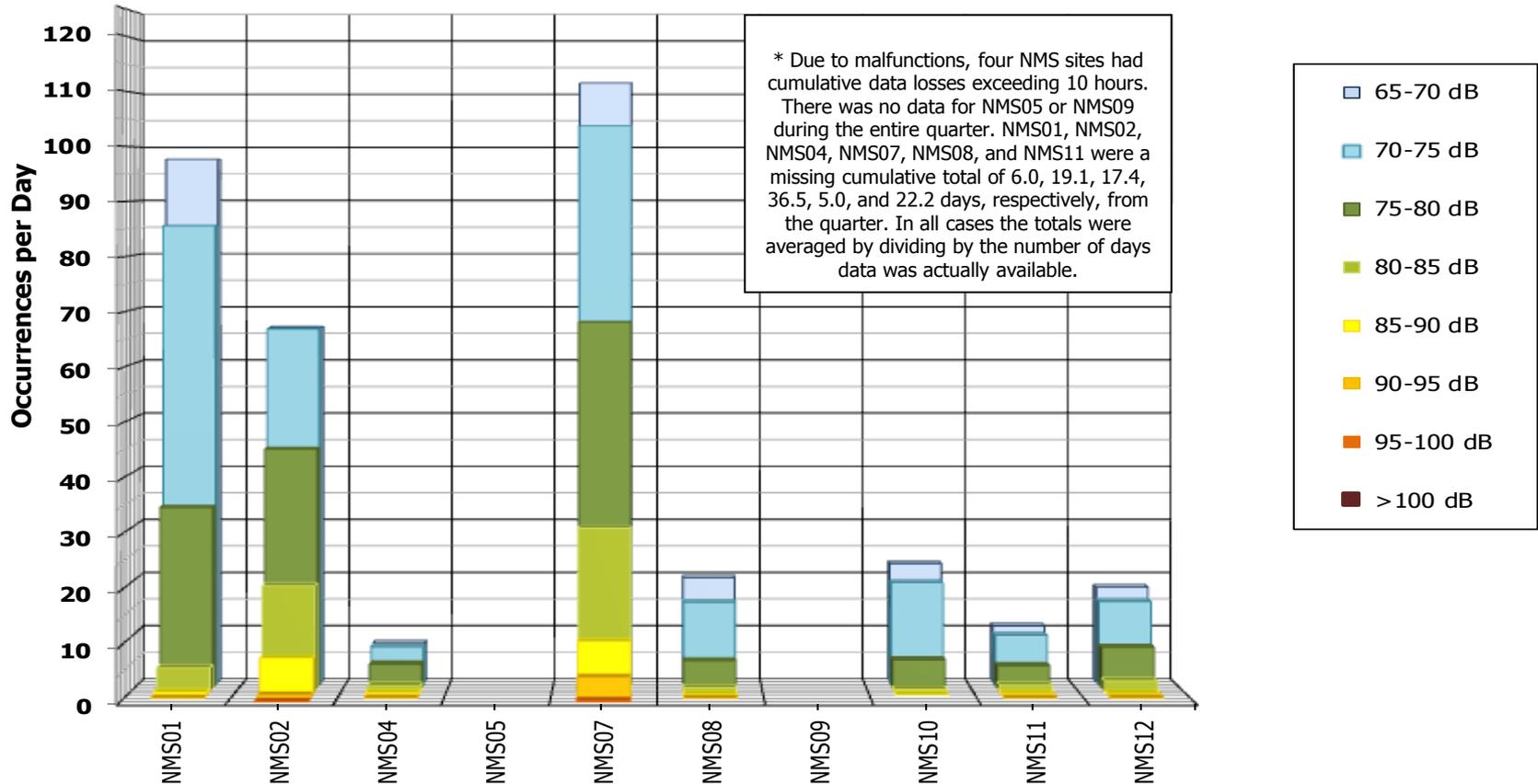
DNL: 1st Qtr, 2016 vs. 1st Qtr, 2015



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Average Daily Number of Aircraft Noise Occurrences Above Each 5 dB Increment

1st Qtr. Noise Event Lmax Distribution



Top Three Lmaxs at Each NMS

Three highest aircraft decibel levels at each Noise Monitoring Site during the 1st Qtr., 2015, p. 1

NMS	Lmax (dB)	Aircraft	Operation	Time and date	Sound Exposure Level (dB)¹	Duration (sec)
NMS01 ²	92.6	B737-900	Go-Around Rwy 24L (Arrives 24L)	2/28/16 10:56 PM	99.5	43.5
NMS01 ²	90.7	MD-88	Arrival on Rwy 24R	1/8/16 4:18 PM	93.9	26.0
NMS01 ²	88.2	MD-88	Arrival on Rwy 24R	1/12/16 12:01 PM	94.6	24.0
NMS02 ³	98.8	B737-200	Departure off Rwy 6R	3/15/16 9:53 PM	105.1	48.5
NMS02 ³	95.1	MD-88	Departure off Rwy 6R	2/24/16 1:57 PM	100.7	32.5
NMS02 ³	94.4	MD-82	Departure off Rwy 6R	3/20/16 12:35 PM	101.4	31.5
NMS04 ⁴	90.7	MD-88	Departure off Rwy 6R	1/4/16 6:13 AM	97.6	35.0
NMS04 ⁴	90.4	MD-88	Departure off Rwy 6R	1/23/16 6:33 AM	95.7	27.5
NMS04 ^{4,5}	89.9	MD-88	Departure off Rwy 6R	3/15/16 12:59 PM	96.8	25.5
NMS07 ⁶	96.9	MD-88	Departure off Rwy 24L	2/1/16 8:02 AM	103.1	33.0
NMS07 ⁶	96.9	MD-82	Departure off Rwy 24R	2/21/16 5:51 AM	102.3	23.5
NMS07 ⁶	96.4	MD-88	Departure off Rwy 24L	2/1/16 6:26 AM	103.1	35.0

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

² Due to equipment malfunctions, data was lost for NMS01 between January 26 and February 1.

³ Due to equipment malfunctions, data was lost for NMS02 between January 25 and 28, and between February 1 and 17.

⁴ Due to equipment malfunctions, data was lost for NMS04 between February 22 and March 10.

⁵ Due to equipment malfunctions, no data is available for NMS05 within the 1st Quarter of 2016.

⁶ Due to equipment malfunctions, data was lost for NMS07 between February 24 and March 31.

Top Three Lmaxs at Each NMS

Three highest aircraft decibel levels at each Noise Monitoring Site during the 1st Qtr., 2015, p. 2						
NMS	Lmax (dB)	Aircraft	Operation	Time and date	Sound Exposure Level (dB)¹	Duration (sec)
NMS08 ²	90.5	MD-83	Departure off Rwy 24L	2/25/16 6:14 AM	96.7	36.5
NMS08 ²	88.7	MD-82	Departure off Rwy 24L	2/8/16 5:47 AM	95.2	35.5
NMS08 ^{2,3}	88.4	MD-88	Departure off Rwy 24L	2/8/16 11:29 AM	95.2	35.0
NMS10	87.3	MD-83	Departure off Rwy 24L	3/3/16 6:01 AM	93.9	28.5
NMS10	83.9	DC 9-10	Departure off Rwy 24L	2/8/16 8:59 PM	92.4	38.0
NMS10	83.9	B737-800	Departure off Rwy 24L	1/11/16 7:57 AM	88.6	22.5
NMS11 ⁴	92.4	MD-88	Departure off Rwy 6R	2/24/16 1:57 PM	98.4	39.0
NMS11 ⁴	89.3	MD-88	Departure off Rwy 6R	3/1/16 11:00 AM	94.5	27.0
NMS11 ⁴	87.5	MD-88	Departure off Rwy 6R	3/23/16 1:12 PM	95.0	25.0
NMS12	91.7	MD-82	Departure off Rwy 6R	3/19/16 11:27 AM	99.1	33.0
NMS12	91.5	MD-83	Go-Around Rwy 6L (Arrives 6L)	3/4/16 6:17 AM	98.2	34.0
NMS12	91.4	MD-82	Departure off Rwy 6R	1/23/16 12:07 PM	97.8	35.5

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

² Due to equipment malfunctions, data was lost for NMS08 between March 10 and 15.

³ Due to equipment malfunctions, no data is available for NMS09 within the 1st Quarter of 2016.

⁴ Due to equipment malfunctions, data was lost for NMS11 between January 26 and February 17.

Noise Complaints



City	Jan	Feb	Mar	1 st Q '16 Calls	%	1 st Q '15 Calls	%	1 st Q '16 Callers	%	1 st Q '15 Callers	%
Brook Park	0	0	1	1	12.5%	0	0.0%	1	20.0%	0	0.0%
Cleveland	2	0	0	2	25.0%	10	83.3%	1	20.0%	2	50.0%
Fairview Park	0	0	3	3	37.5%	1	8.3%	1	20.0%	1	25.0%
Olmsted Falls	0	1	0	1	12.5%	1	8.3%	1	20.0%	1	25.0%
Rocky River	0	1	0	1	12.5%	0	0.0%	1	20.0%	0	0.0%
Totals	2	2	4	8	100.0%	12	100.0%	5	100.0%	4	100.0%

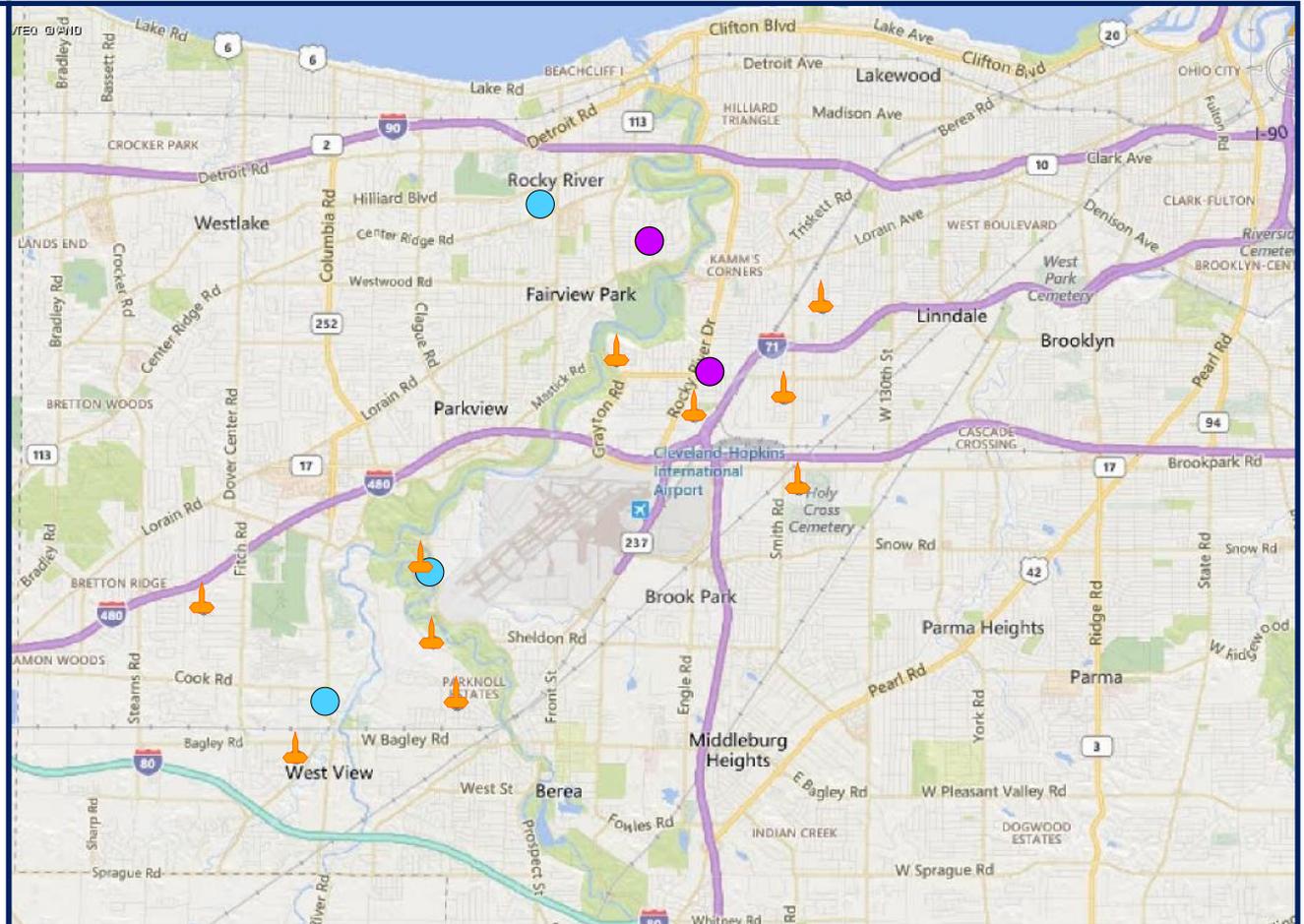
Noise Hotline – (216) 898-5220

1st Quarter Complaint Map

LEGEND

Complaints per household

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



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