

Aircraft Operations and Noise Exposure Monthly Report

April 2022



Project Overview

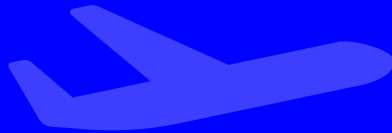
The growth in operations at BWI brings number social and economic impacts to communities surrounding the airport, however, this also results in significant noise impacts, especially for residents of Anne Arundel and Howard counties.

Howard and Anne Arundel Counties hired Vianair to help analyze flight activity in and out of Baltimore/Washington International Airport (BWI). In coordination with representatives from the two counties and support from the BWI Roundtable, Vianair developed the following report which includes the analysis of key elements (operational and acoustic elements) to help the community understand the existing noise exposure and to provide the ability to track changes over time.

While comprehensive, the elements in the report were selected by those who contributed to the report development (representatives from the two counties and the BWI Roundtable).

This report will be published monthly, beginning with March 2022. Report content may change based on input from the contributors and/or the community.

AIRPORT OPERATIONS DATA



Airport Operations Data

Aircraft operations (arrivals and departures) are the source for aircraft noise exposure for communities around BWI. While aircraft noise is the primary concern for most residents, it is important to understand aircraft operations in addition to analyzing aircraft noise. Changes in airport operations (which runways are used, predominant flight paths and routes, etc., affect community noise exposure and these can change over time.

The core operational data sets analyzed in this report include Runway Use and Flight Track Density. Additional, or supplemental operational analyses are included in Appendix I. These include total (daily) operations, operations by aircraft type, daytime versus nighttime operations, and total operations.

Runway Use

BWI has six runways: 10, 15R, 15L, 28, 33R, and 33L. Runway selection is based primarily on wind direction. BWI operates in two flows. When winds are out of the east, aircraft will arrive and depart in an EAST FLOW and when winds are out of the west, aircraft will arrive and depart in a WEST FLOW. Aircraft noise levels vary when below an aircraft landing or taking-off. Runway use also influences routes to and from the airport, which also affects aircraft noise for communities below.



EAST FLOW



WEST FLOW

Runway Use

Runway use is analyzed each month. Operations are broken up into arrivals (landings) and departures (take-offs). This information is presented in two ways, first over an airport aerial map, then using bar graphs.

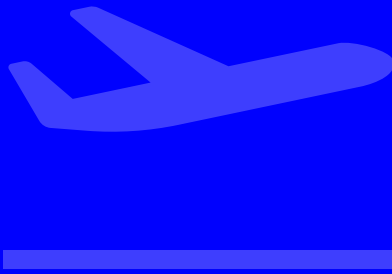
The red arrows in the graphic below depict the percentage of total arrivals for the month. The green arrows in the graphic indicate the percentage of total departures for the month.



The graphics above are for illustrative purposes only. The actual monthly data will be presented later in the report.

AIRPORT OPERATIONS DATA

Monthly Data

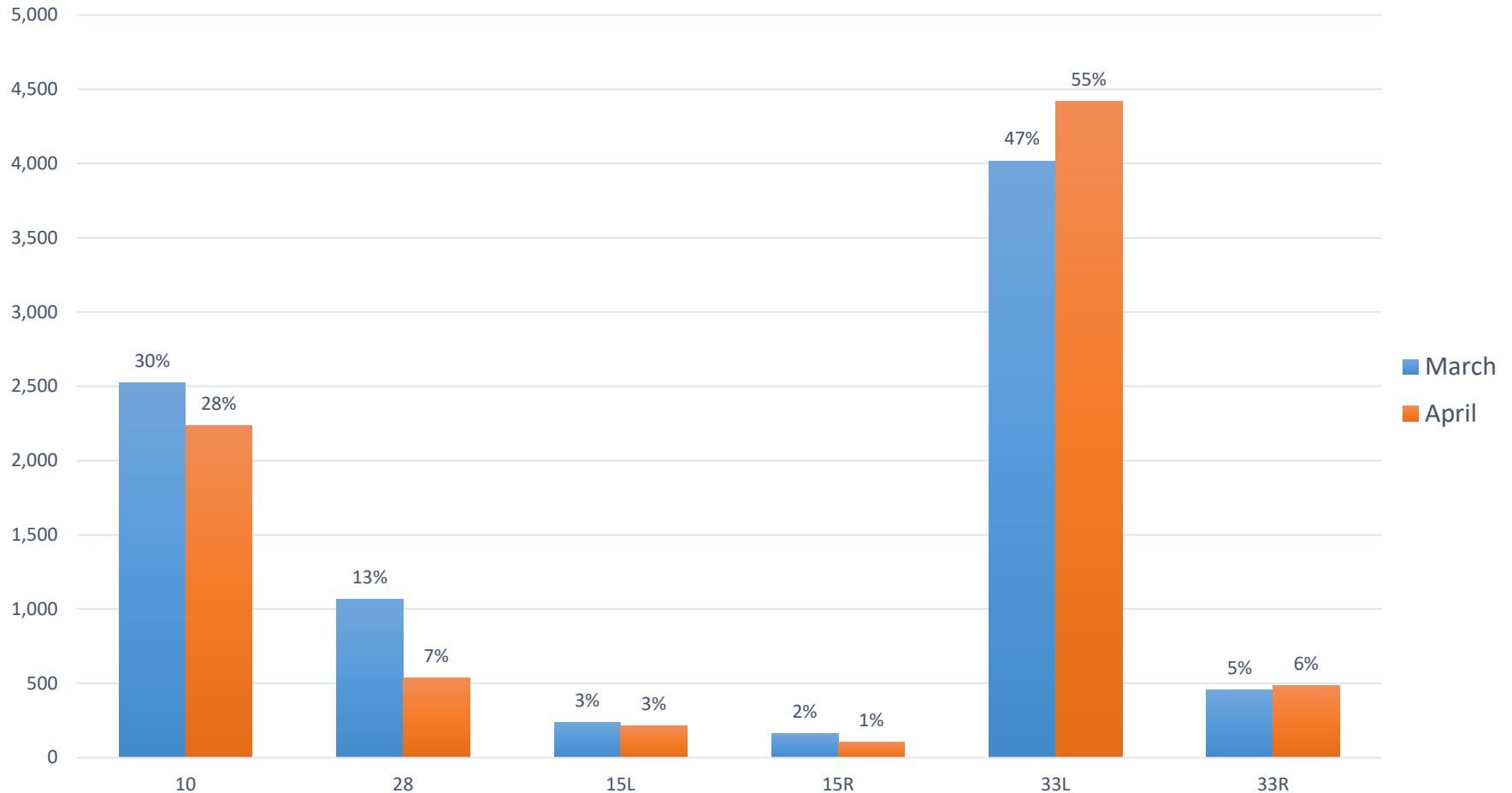


Runway Use - Arrivals



Runway Use - Arrivals

Operations by Runway - Arrivals

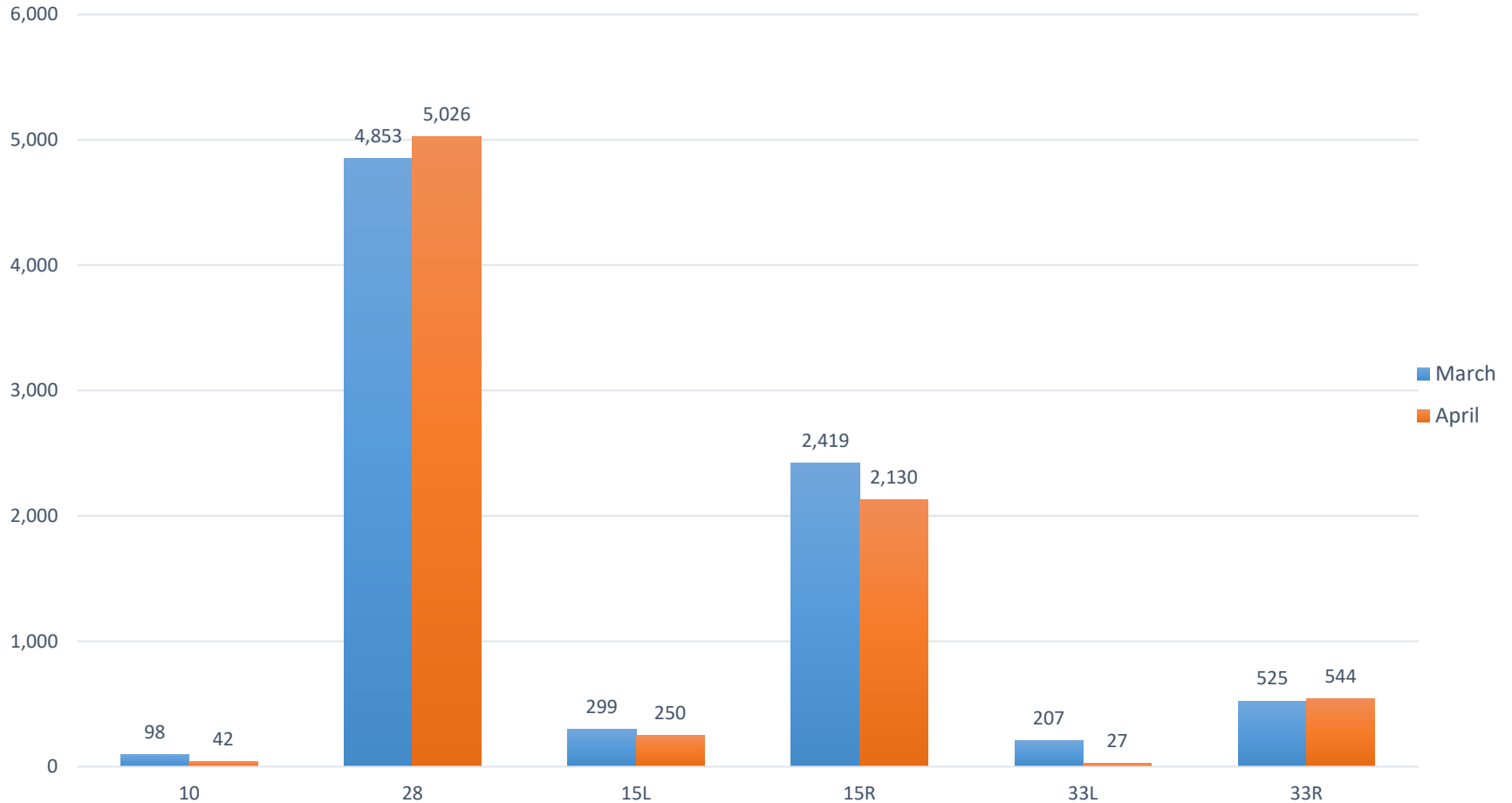


Runway Use - Departures



Runway Use - Departures

Operations by Runway - Departures



Density Analyses

Flight paths to and from the airport will vary based on a number of factors, including weather conditions, runway, flight procedure, aircraft type, and air traffic conditions.

Flight track density analyzes the concentrations of flight activity in and out of BWI. Flight track density is calculated based on reviewing all flights for the month, then analyzing the concentration of flights within the study area. Concentration (or density) is then depicted using color. Red represents the highest density, fading to white as density lowers.

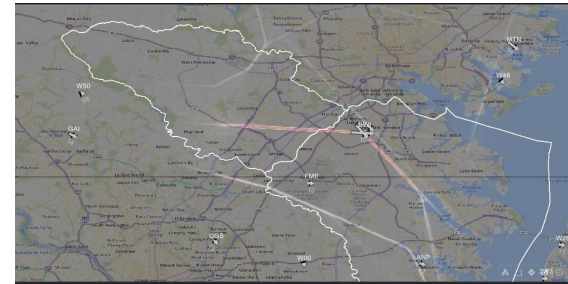
Noise data was added to the density analyses. The noise exposure is based on the “Number-of-Events-Above” metric, which is described in detail on Slides 28-29.



All Flight Tracks



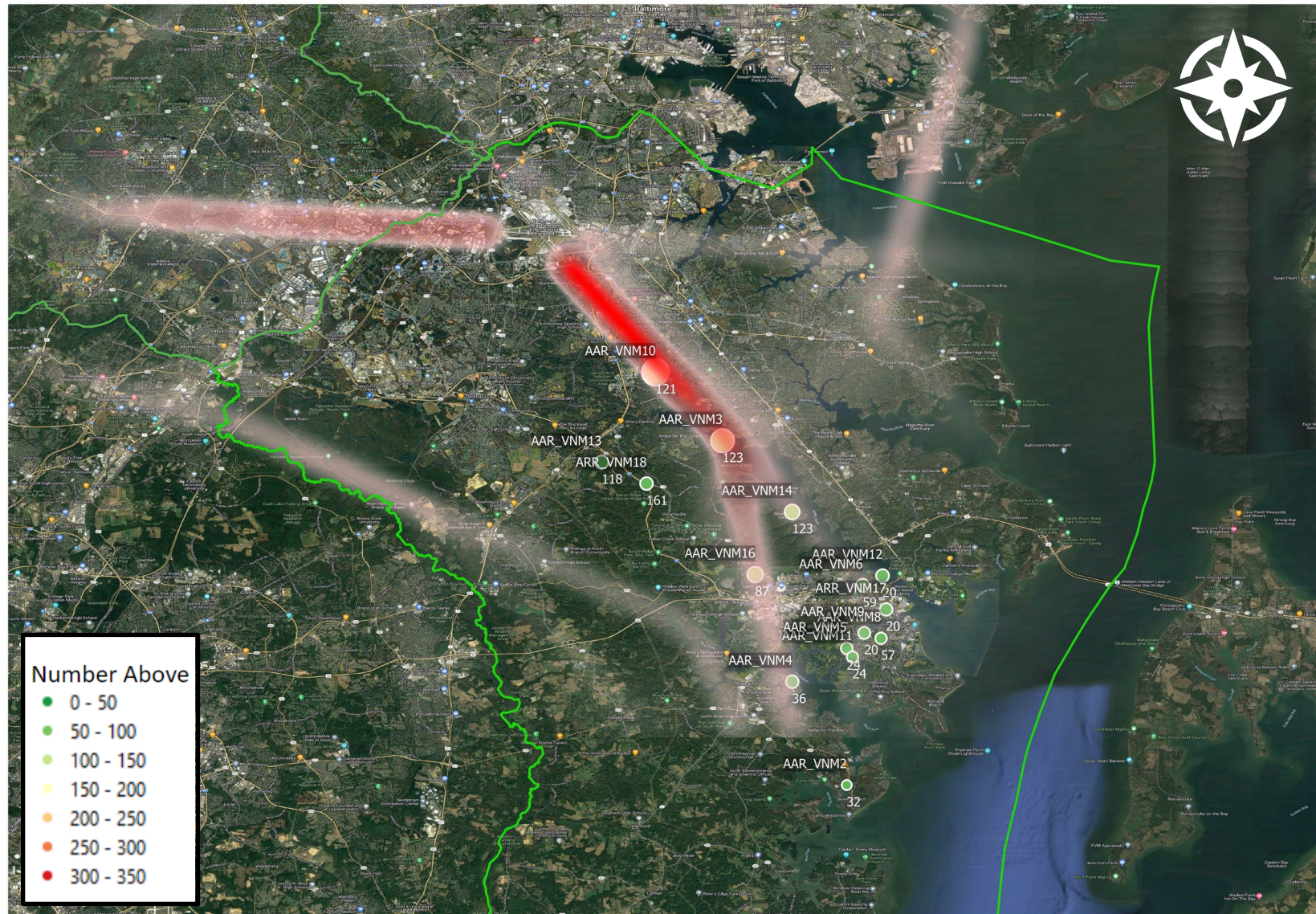
Converting Tracks to Density



Density Analysis

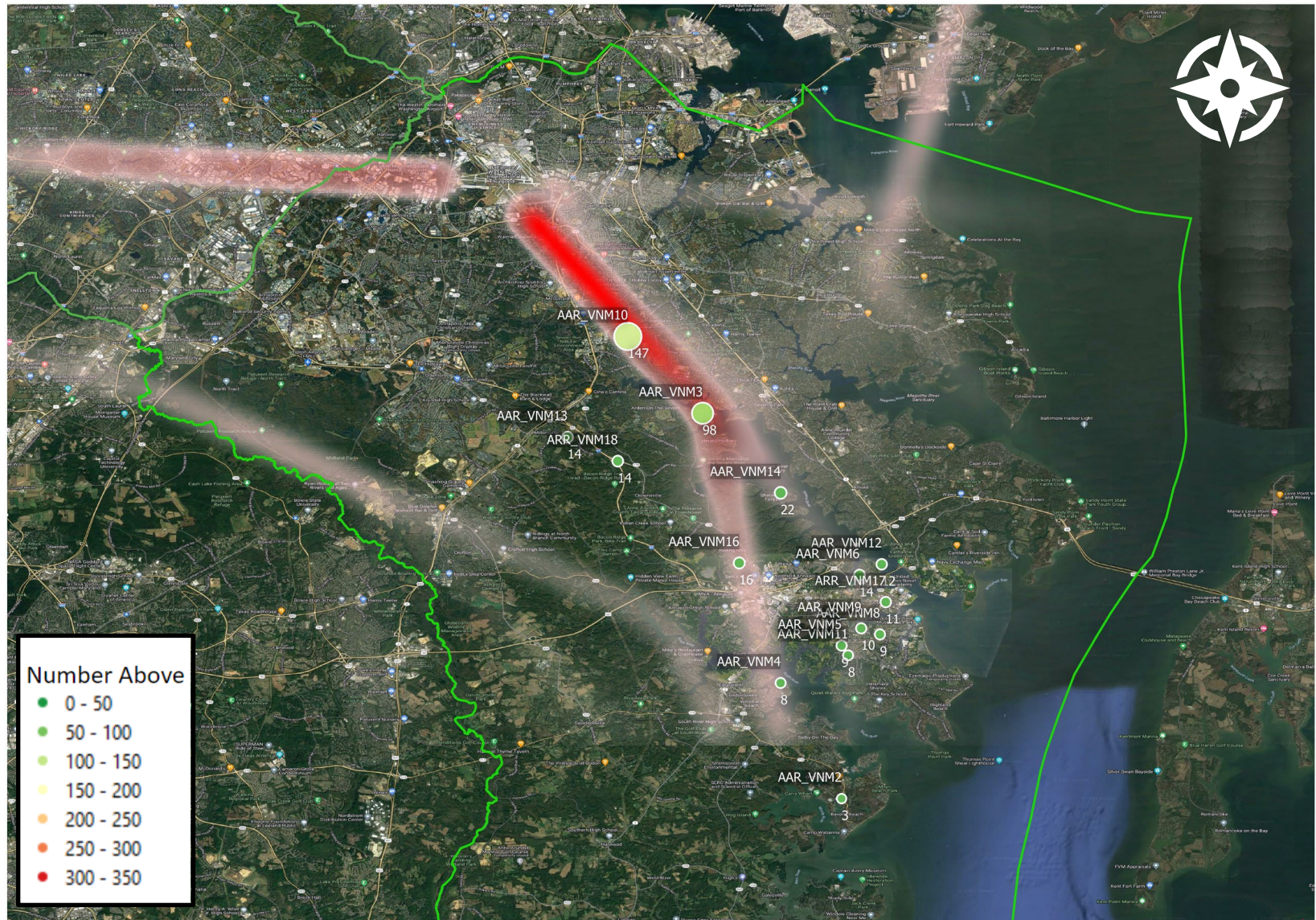
Flight Track Density Analysis – Arrivals (with NA55)

Anne Arundel County



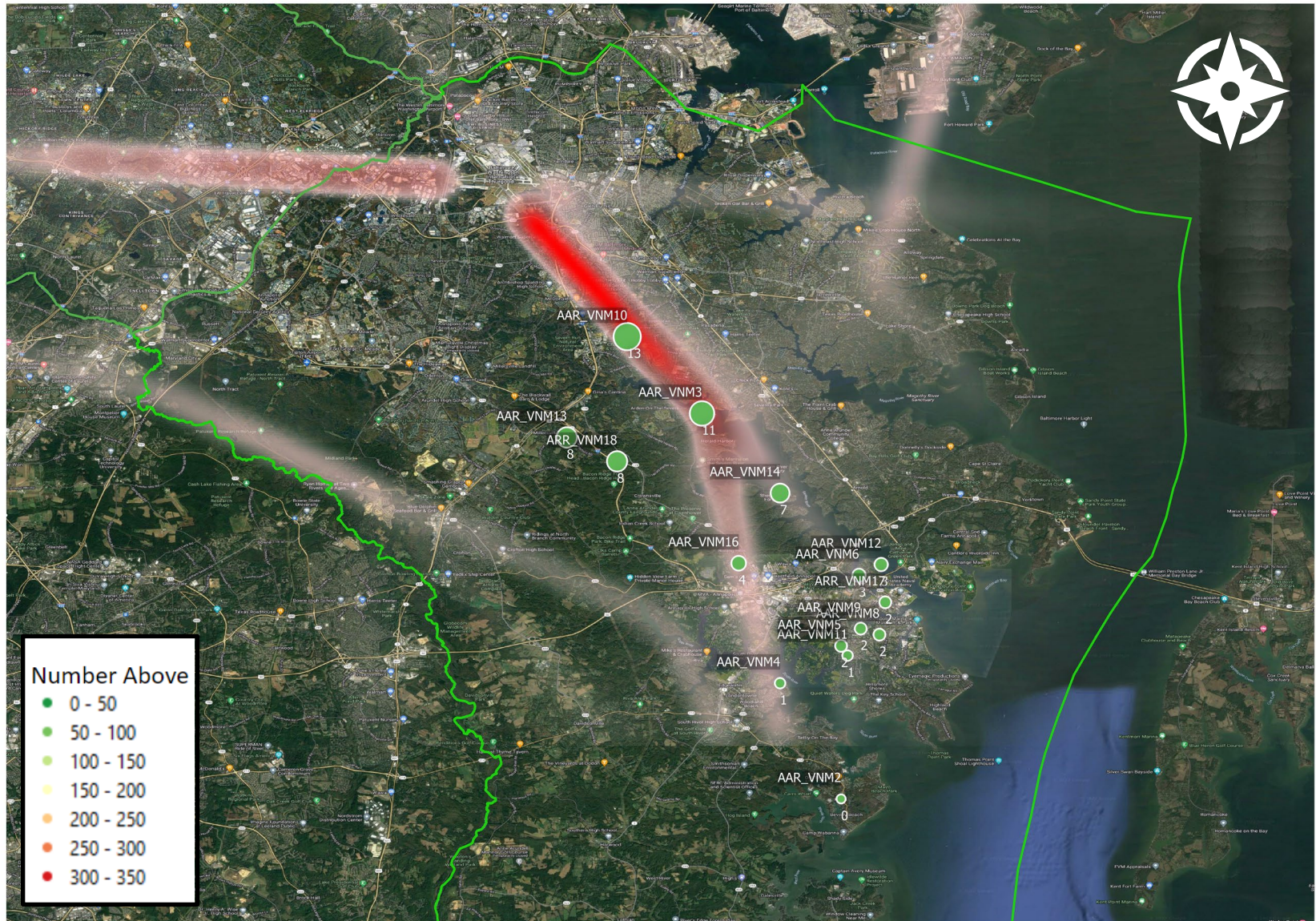
Flight Track Density Analysis – Arrivals (with NA65)

Anne Arundel County



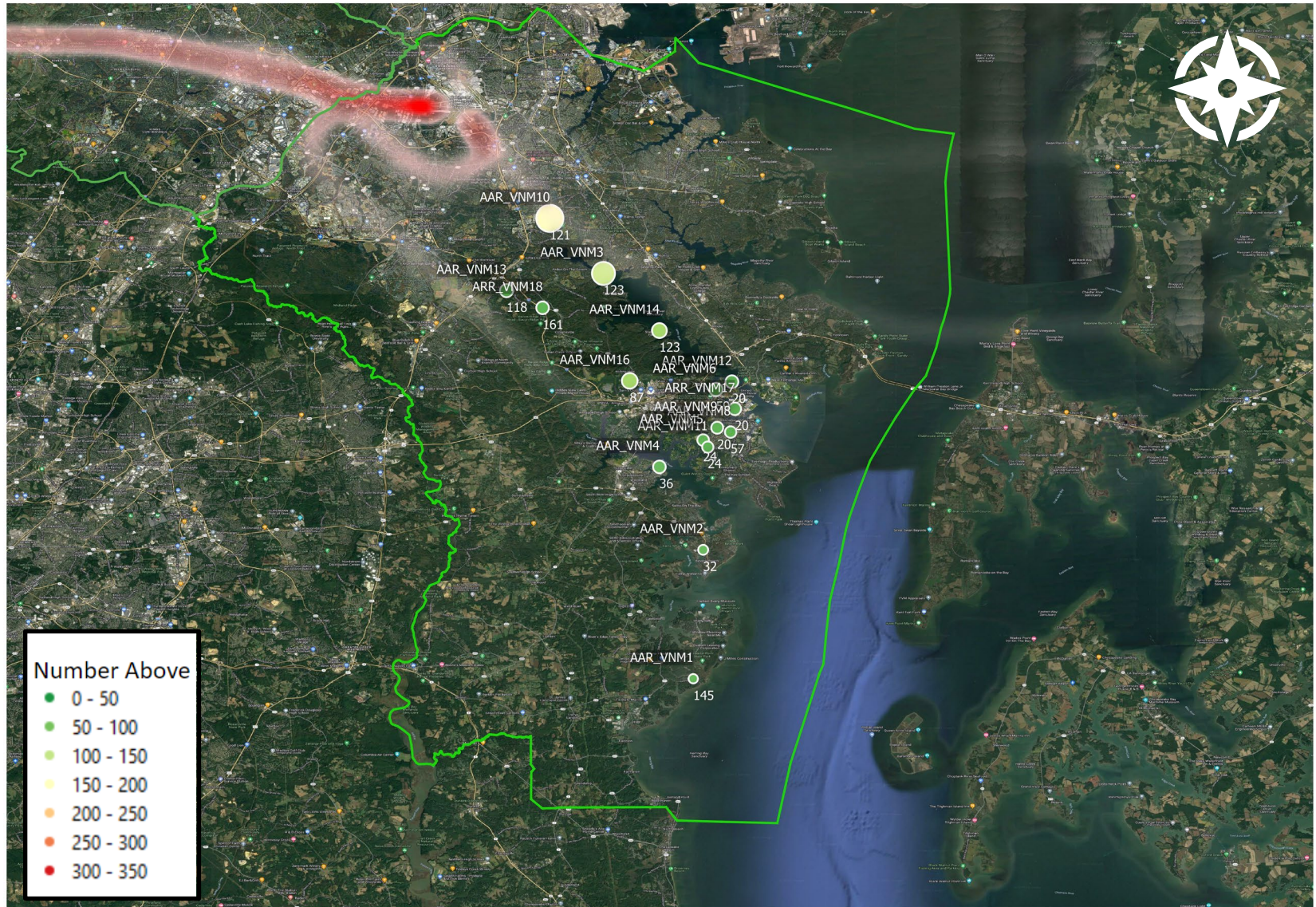
Flight Track Density Analysis – Arrivals (with NA75)

Anne Arundel County



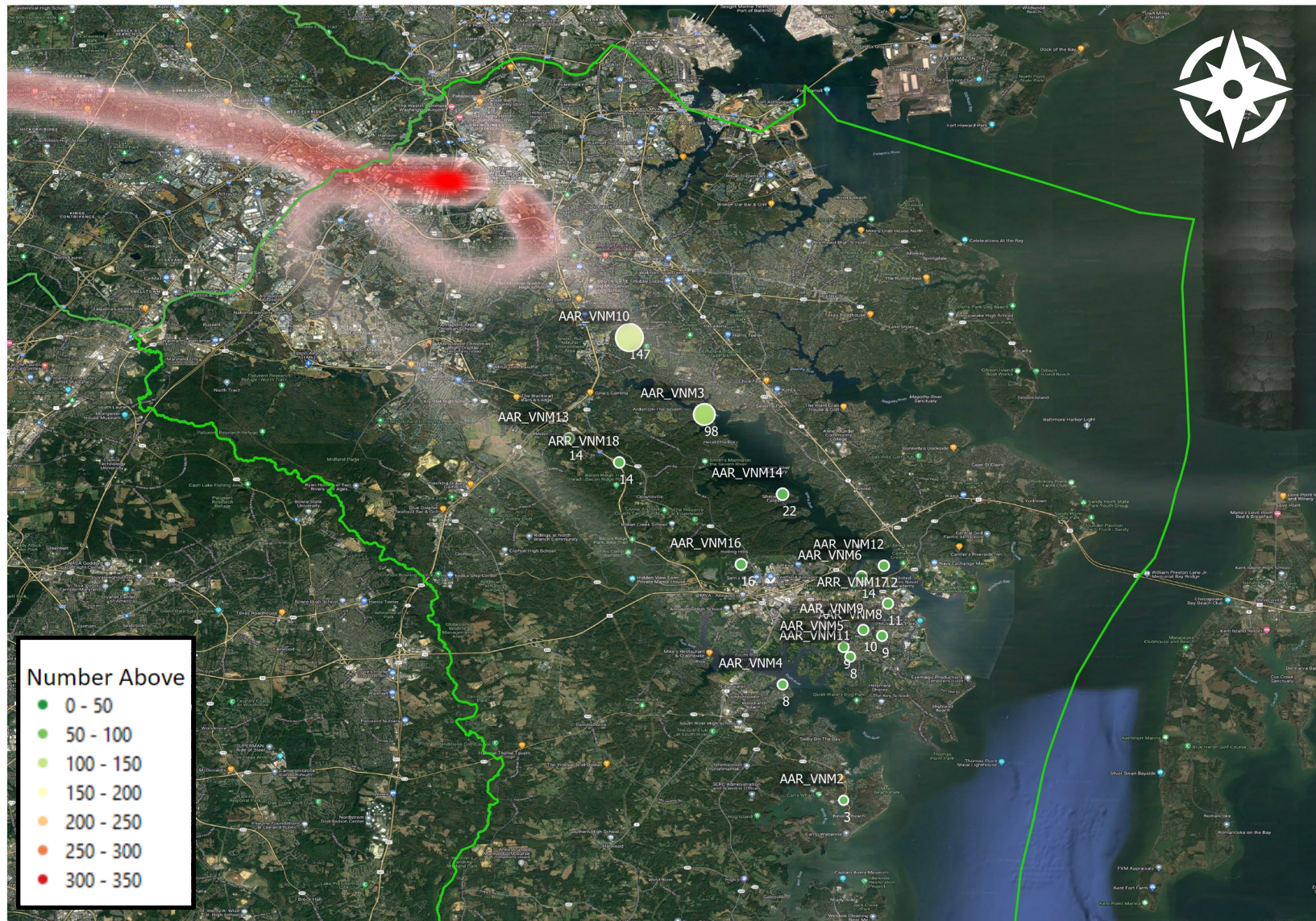
Flight Track Density Analysis – Departures (with NA55)

Anne Arundel County



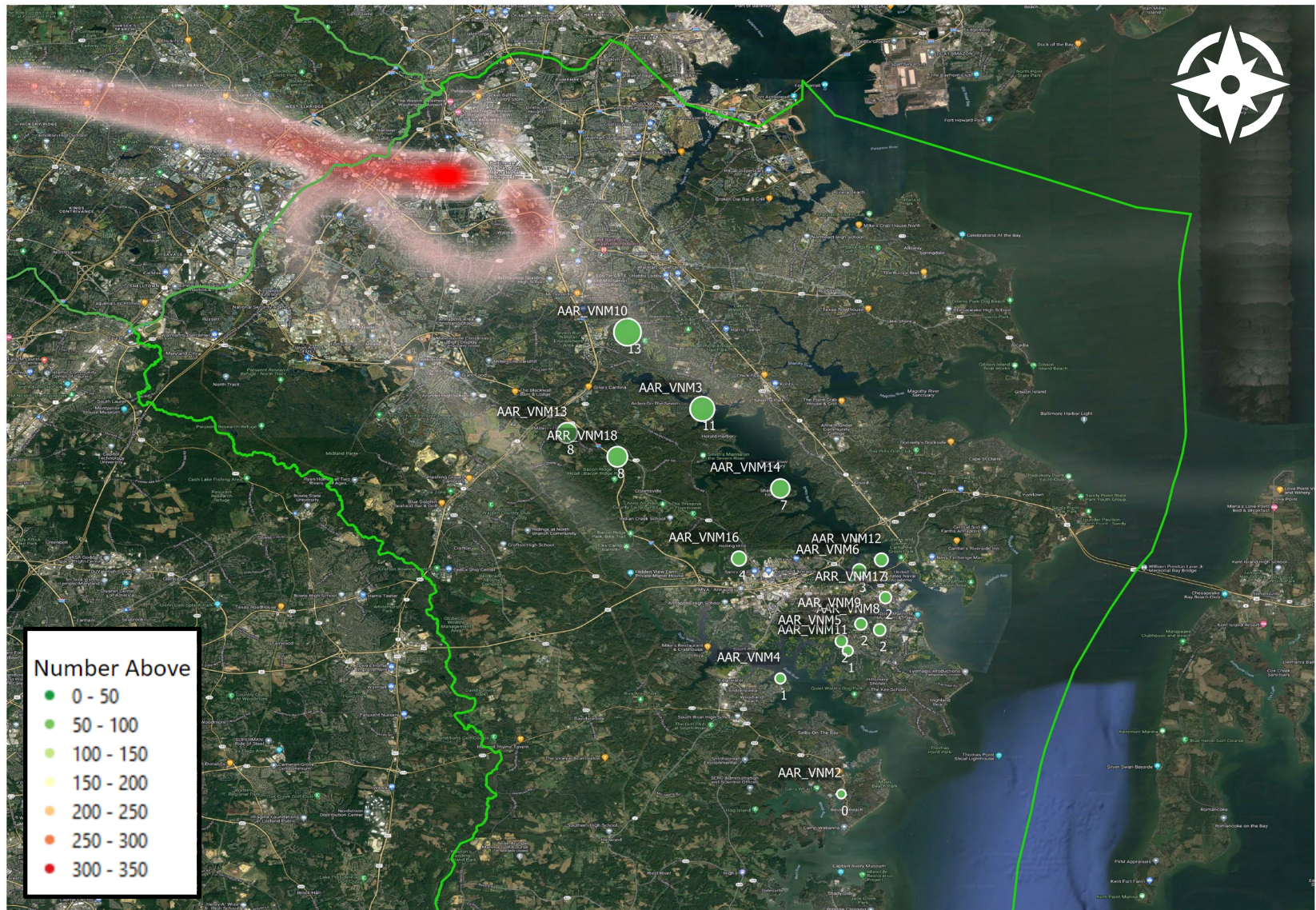
Flight Track Density Analysis – Departures (with NA65)

Anne Arundel County



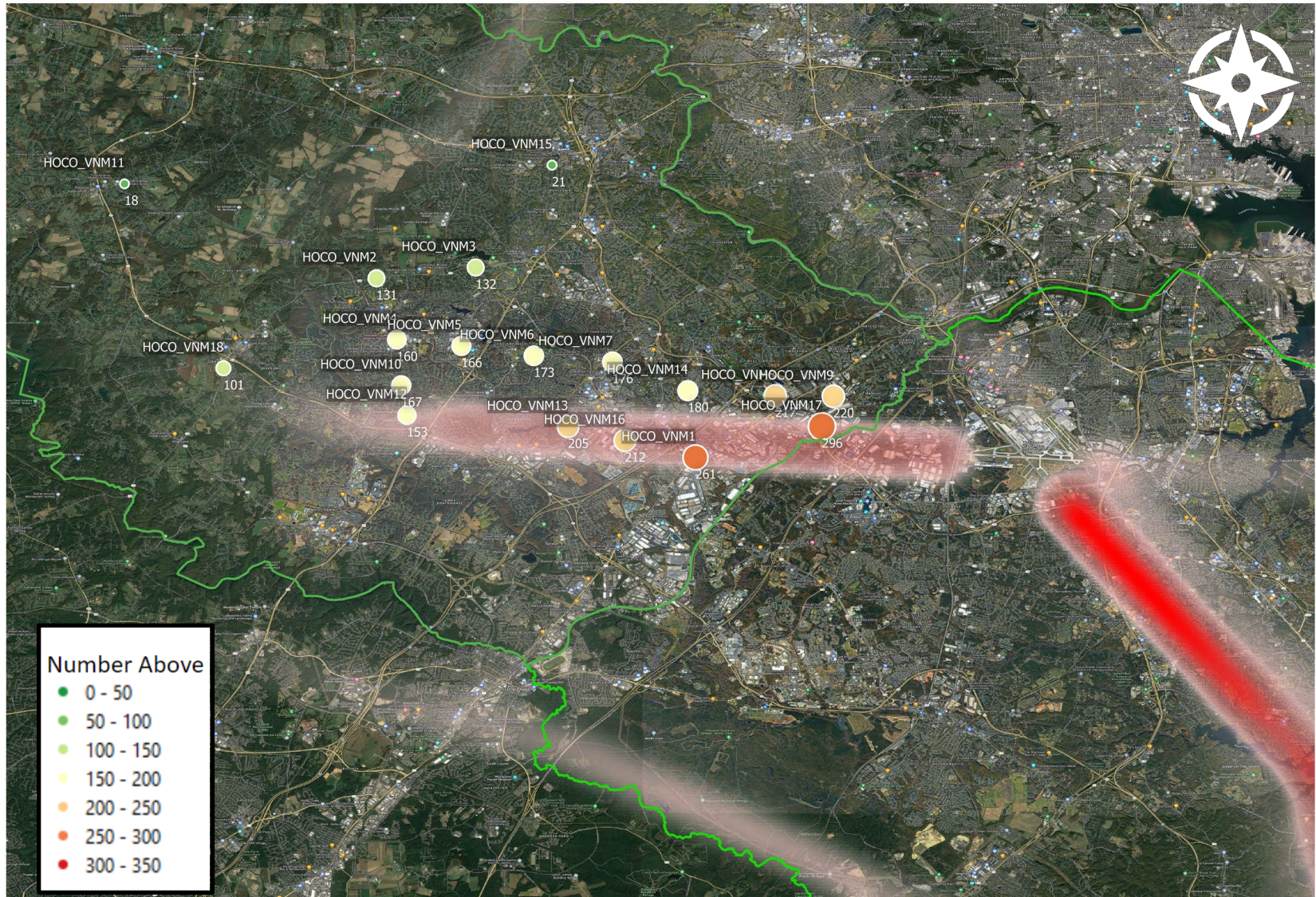
Flight Track Density Analysis – Departures (with NA75)

Anne Arundel County



Flight Track Density Analysis – Arrivals (with NA55)

Howard County



Flight Track Density Analysis – Arrivals (with NA65)

Howard County



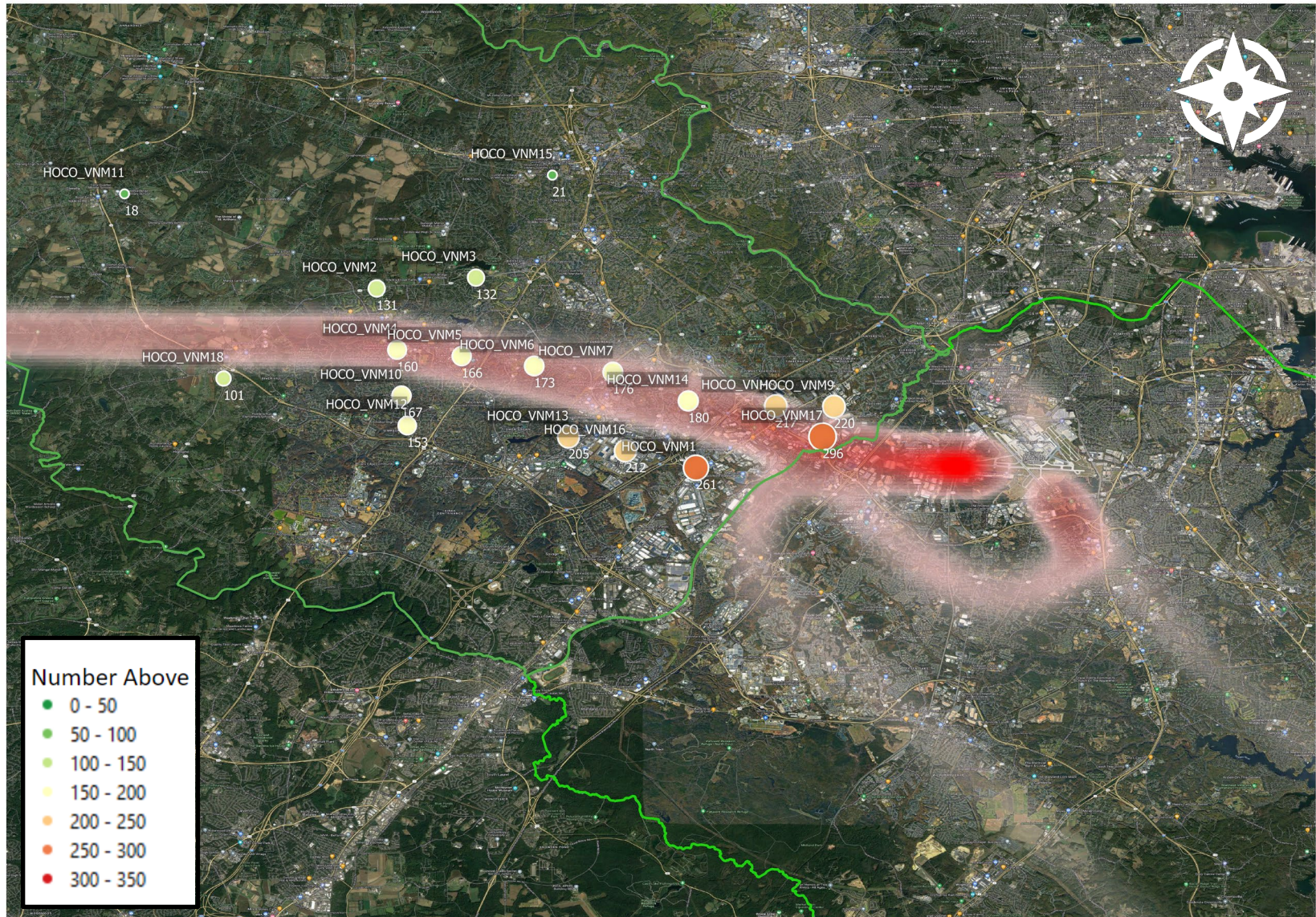
Flight Track Density Analysis – Arrivals (with NA75)

Howard County



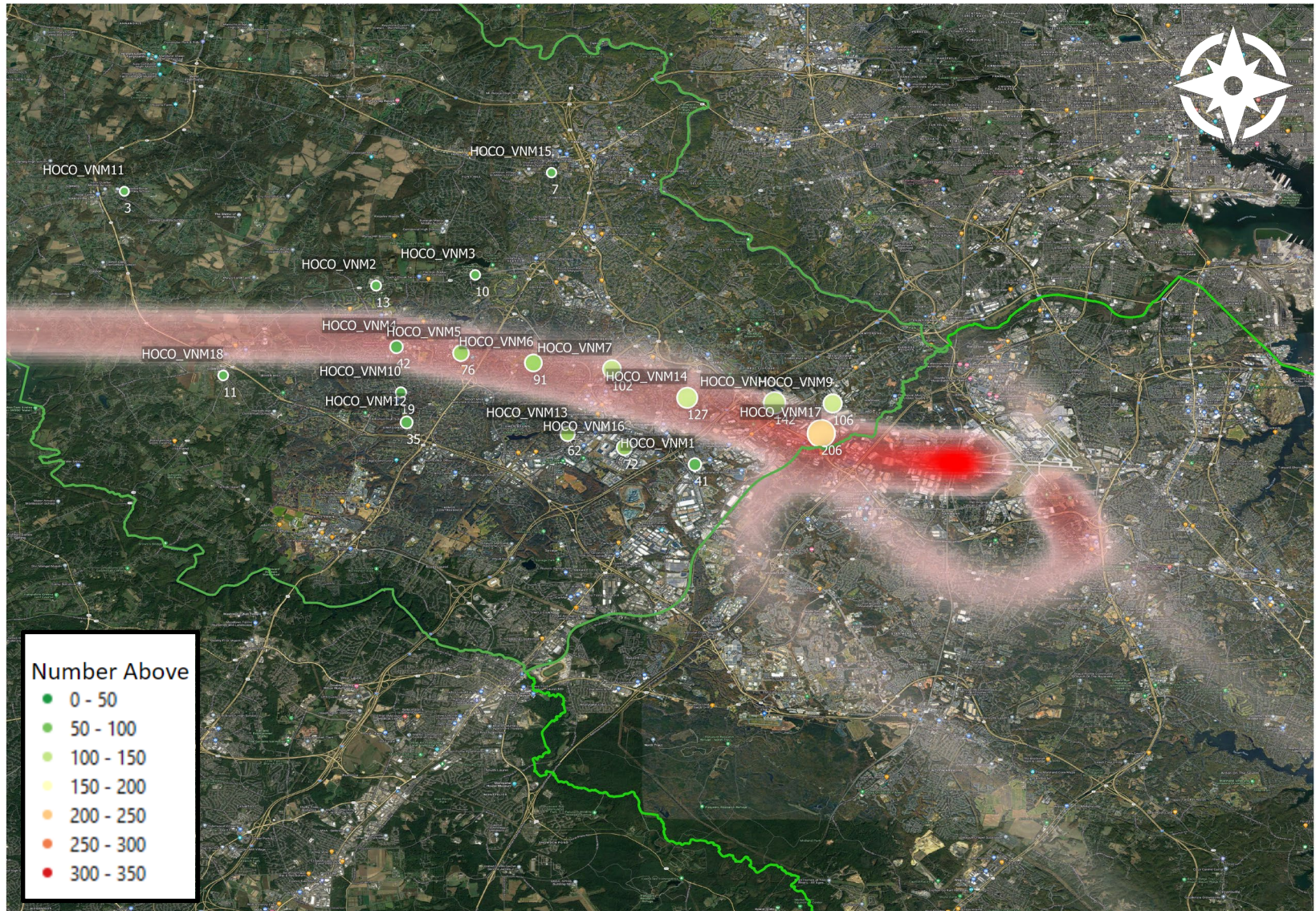
Flight Track Density Analysis – Departures (with NA55)

Howard County



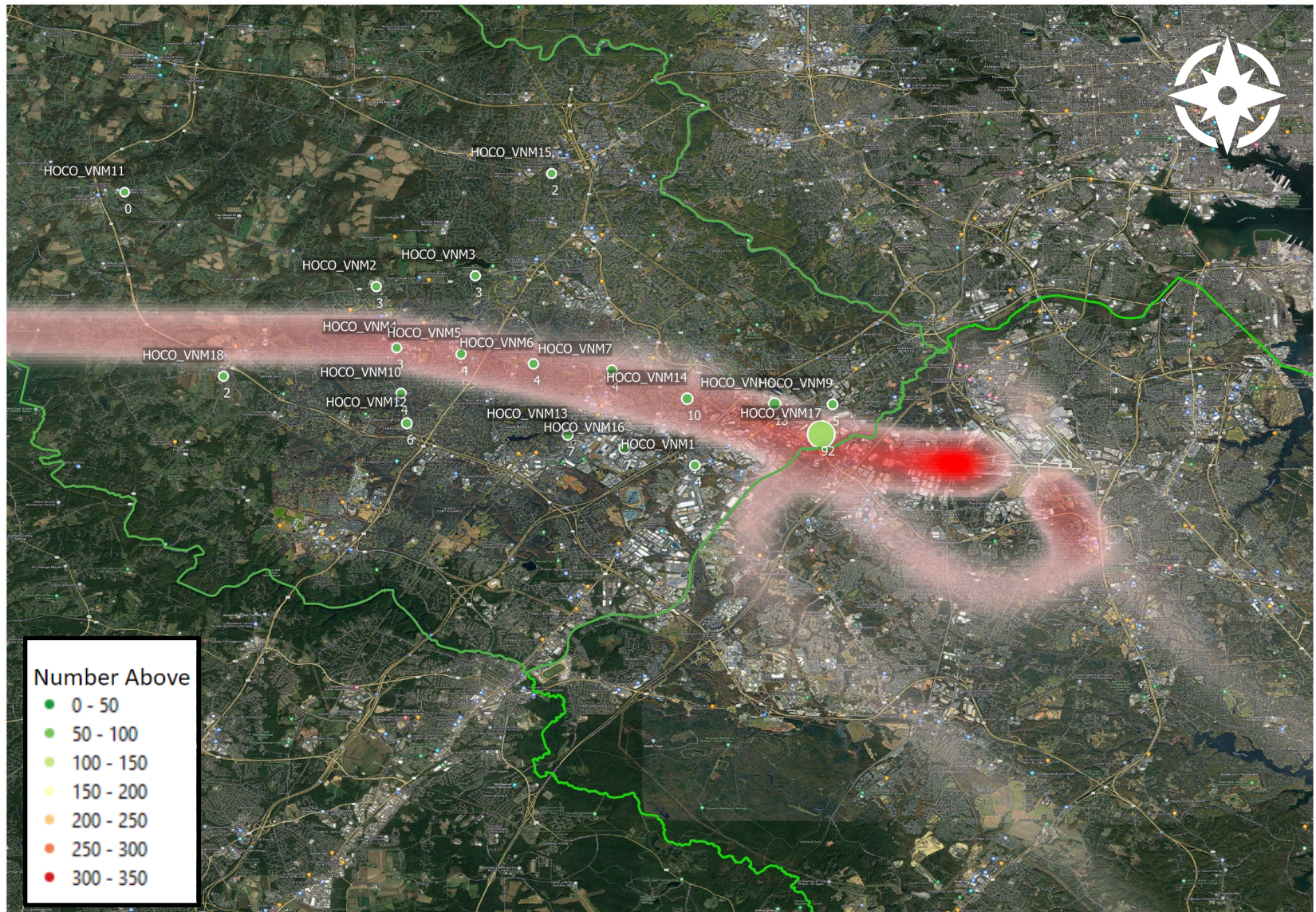
Flight Track Density Analysis – Departures (with NA65)

Howard County



Flight Track Density Analysis – Departures (with NA75)

Howard County



NOISE EXPOSURE

Virtual Noise Analysis - Introduction



Noise Analysis - Overview

BWI maintains noise monitors deployed in communities surrounding the airport. Noise monitors are very effective at collecting aircraft noise data, however, there are limitations.

For this project, Vianair is using noise modelling technology that calculates noise based on aircraft operations. Flight data is collected from the Federal Aviation Administration. This data (primarily radar data) is processed by the Vianair software platform and computes the noise exposure along the flight path. Calculations incorporate aircraft type, altitude, airspeed, etc. The noise modelling and analysis technology used by Vianair is consistent with that used by the Federal Aviation Administration and aviation regulators worldwide. The Vianair software platform uses the same algorithms used by the FAA's Aviation Environmental Design Tool (AEDT) which is a global standard for aircraft noise modelling and analyses.

Noise Analysis - Overview

Noise monitoring allows more flexibility and the selection of locations for which to analyze aircraft noise. While BWI hosts 16 monitors, for this analysis, a grid was established with a total of 89 monitors covering most of Anne Arundel and Howard Counties. An additional 36 locations were selected, representing specific areas of interest or “landmarks”. This results in a total of 125 discrete locations for which aircraft noise data is collected and analyzed. These locations are referred to as “virtual noise monitor locations” in this report.

Noise Exposure - Overview

Noise is defined as “unwanted sound.” There are many ways to measure noise. Two common metrics will be used in these reports: Day-Night Level (DNL) and Number-of-Events-Above (NA).

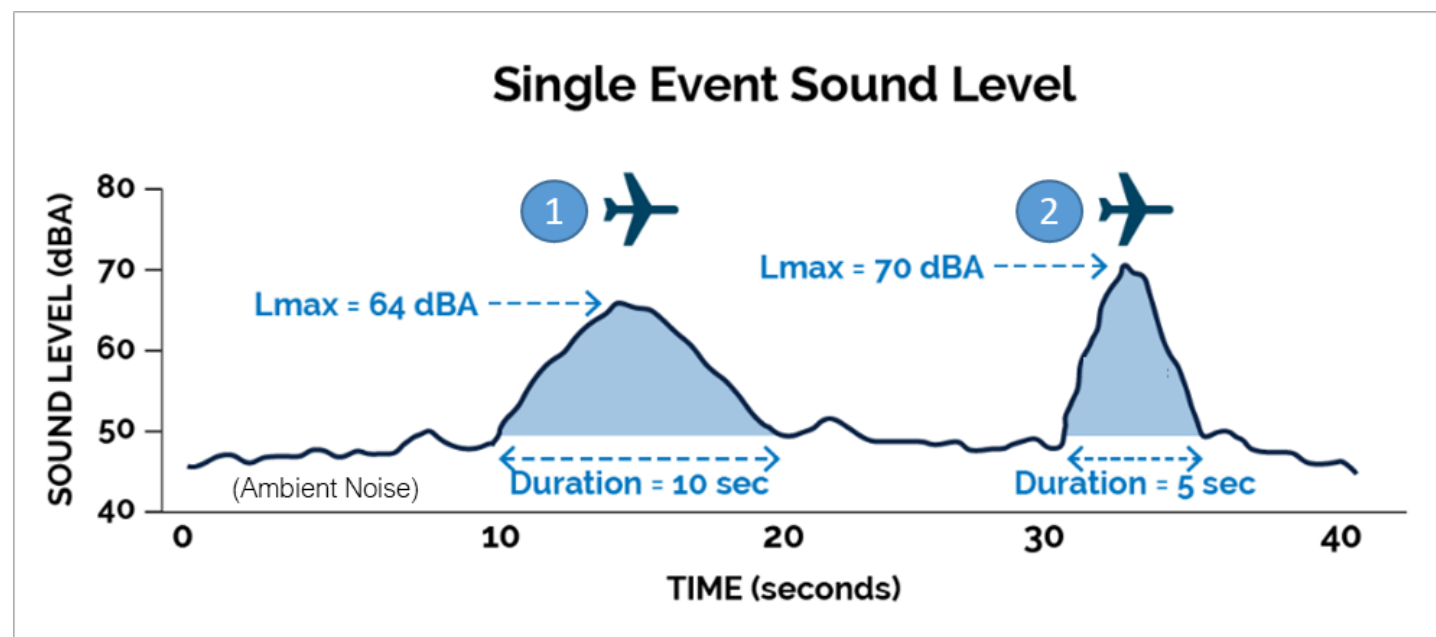
DNL is the standard metric used by the Federal Aviation Administration as required by federal regulation. The problem with DNL is it is difficult to understand and doesn't seem to reflect what residents experience on a daily basis.

The Number-of-Events-Above metric calculates the number of times an aircraft overflight exceeds a specific maximum noise level. For this report, events above 55 decibels, 65 decibels, and 75 decibels were selected. This will indicate how many times aircraft noise exceeded 55, 65, or 75 decibels. These are calculated for the reporting month and daily average.

Number-of-Events-Above (NA) Metric

The graphic below represents two aircraft overflights/noise events. The maximum noise level of the first overflight was 64 decibels (shown as 64 dBA). The maximum noise level of the second event was 70 decibels (shown as 70 dBA).

The NA noise metric counts the number of times the noise level exceeds a specific threshold. In this report, 55, 65, and 75 decibels was selected.



Graphic adapted from *Aircraft Noise Overview*. Boston Logan RNAV (GPS) RWY 4L Environmental Assessment. March 2021. <https://faabostonworkshops.com/project-information/aircraft-noise-overview/>

Noise Levels

The scale below is intended to provide a basic understand of noise levels which are expressed in decibels (dB or dBA). As indicated, the typical sound level for people speaking (3 ft apart) is 64-65 decibels. Other common noise sources are also listed.

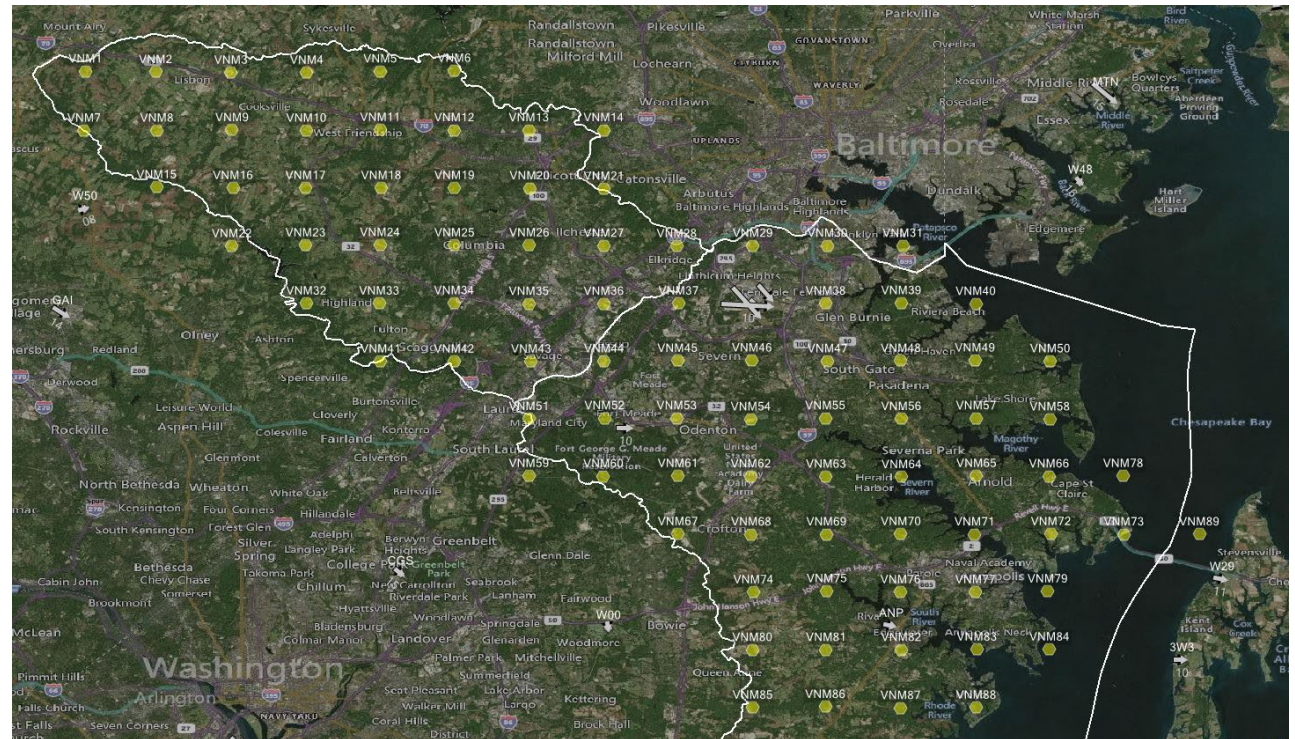


Source: Fundamentals of Noise and Sound. (n.d.). Retrieved July 2022, from https://www.faa.gov/regulations_policies/policy_guidance/noise/basics

Noise Exposure – Virtual Noise Monitor Locations

In order to provide ample coverage of the communities in both Anne Arundel and Howard Counties, a large grid was developed and applied to the two-county area. This resulted in complete coverage of the study area.

A map with the study grid, and the additional selected (landmark) locations are described in the following tables and graphics.



NOISE EXPOSURE

Virtual Noise Analysis – Monthly Data



Noise Exposure – Virtual Noise Monitor Locations

(89 Monitor Points - Two-County, 2.5 mile grid)

ID	Latitude	Longitude	Elevation
VNM61	39.05088	-76.722369	160
VNM62	39.050612	-76.669745	135
VNM63	39.050343	-76.615511	161
VNM64	39.050075	-76.561008	37
VNM65	39.05088	-76.507042	123
VNM66	39.050612	-76.454687	78
VNM67	39.008996	-76.722369	59
VNM68	39.008728	-76.669477	125
VNM69	39.008728	-76.615243	146
VNM70	39.008996	-76.561545	87
VNM71	39.008728	-76.508385	59
VNM72	39.008996	-76.453345	11
VNM73	39.008728	-76.400721	0
VNM74	38.967112	-76.667866	115
VNM75	38.967918	-76.614974	55
VNM76	38.967112	-76.561814	87
VNM77	38.967112	-76.507848	20
VNM78	39.05088	-76.401258	78
VNM79	38.967649	-76.455761	20
VNM80	38.925497	-76.668672	110

ID	Latitude	Longitude	Elevation
VNM81	38.925497	-76.615511	55
VNM82	38.925497	-76.561277	89
VNM83	38.925765	-76.506774	57
VNM84	38.925765	-76.454419	32
VNM85	38.883881	-76.668403	129
VNM86	38.884418	-76.616048	228
VNM87	38.883613	-76.561814	32
VNM88	38.883881	-76.507311	32
VNM89	39.008795	-76.346353	12

Noise Exposure – Virtual Noise Monitor Locations

(Landmark Locations)

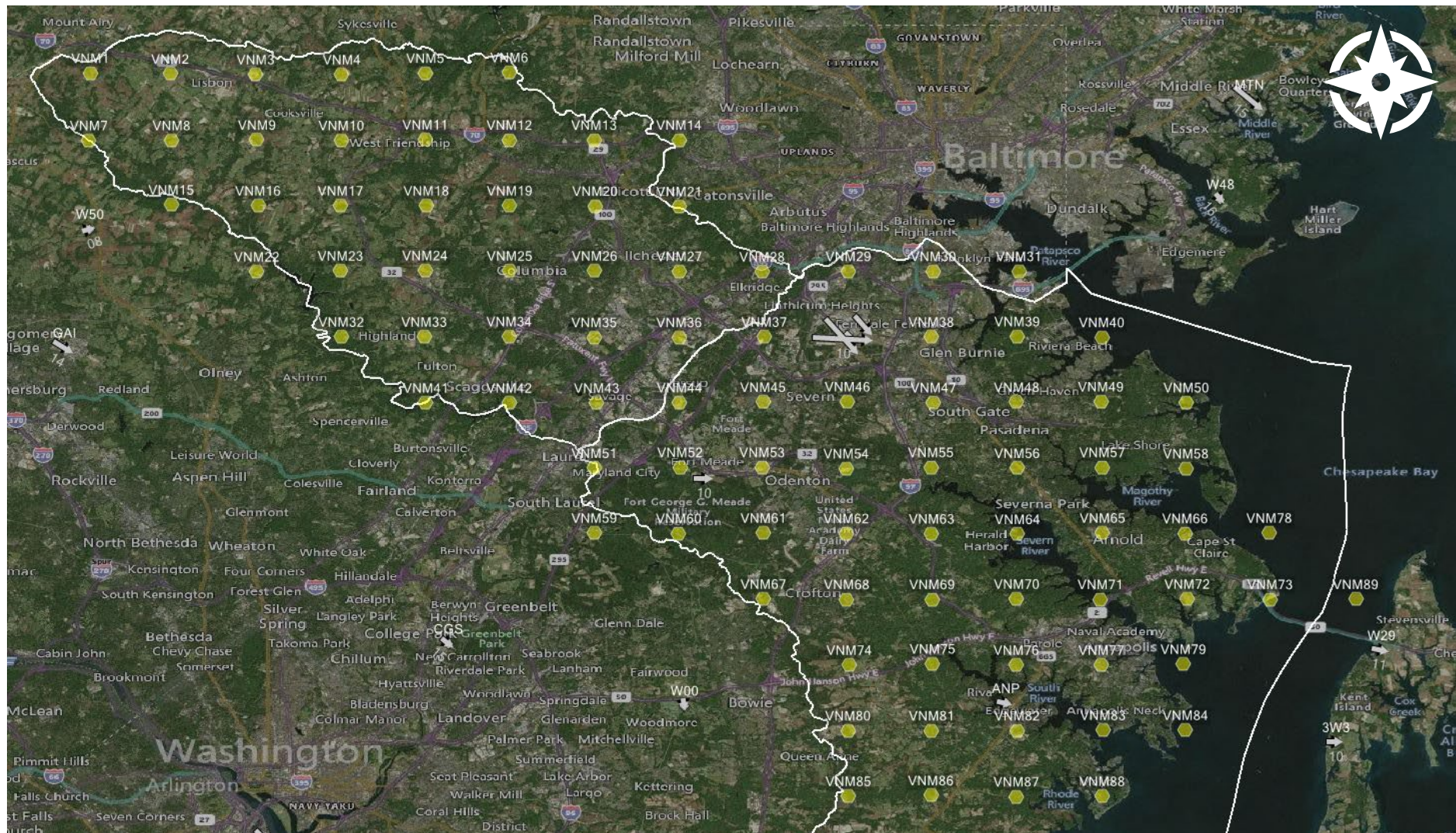
Howard County

Name	Latitude	Longitude	Elevation	Location
HOCO_VNM1	39.17369	-76.78301	270	Howard Square Apartments
HOCO_VNM2	39.234427	-76.891275	458	HCPSS Administration Campus
HOCO_VNM3	39.238088	-76.857598	448	Centennial Park
HOCO_VNM4	39.213634	-76.884347	327	HoCo General Hospital
HOCO_VNM5	39.211508	-76.862455	399	Merriweather Post Pavilion
HOCO_VNM6	39.208174	-76.837858	327	Oakland Mills HS
HOCO_VNM7	39.206077	-76.81119	327	Long Reach HS
HOCO_VNM8	39.194622	-76.755931	427	Troy Park
HOCO_VNM9	39.194418	-76.736216	139	Harwood Park N'hood
HOCO_VNM10	39.198125	-76.88285	218	Abiding Savior Lutheran
HOCO_VNM11	39.266476	-76.97678	448	Tridelphia Ridge ES
HOCO_VNM12	39.187977	-76.880921	596	Atholton HS
HOCO_VNM13	39.184075	-76.82624	369	Christ Church Episcopal
HOCO_VNM14	39.196329	-76.785616	427	Mayfield Woods MS
HOCO_VNM15	39.272817	-76.831701	309	Manor Woods ES
HOCO_VNM16	39.179411	-76.806934	320	Gateway Site
HOCO_VNM17	39.184212	-76.740088	327	Oxford Square Neighborhood
HOCO_VNM18	39.203936	-76.9432	218	St. Louis Catholic

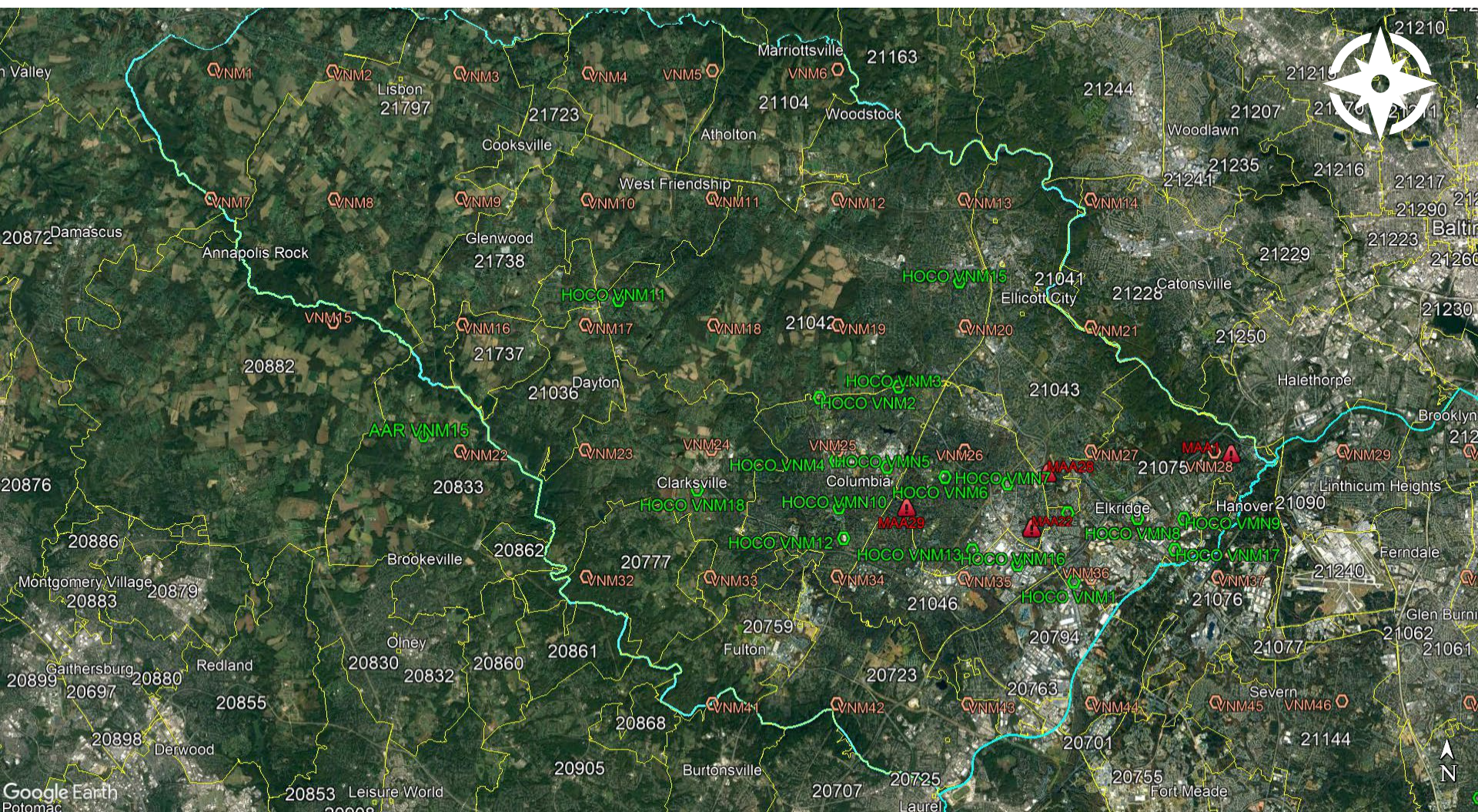
Anne Arundel County

Name	Latitude	Longitude	Elevation	Location
AAR_VNM1	38.8044	-76.518	145	RAVNN
AAR_VNM2	38.8877	-76.5116	32	JETNA
AAR_VNM3	39.0663	-76.5761	123	Arden on the Severn
AAR_VNM4	38.9413	-76.5399	36	London Public House
AAR_VNM5	38.9586	-76.5116	24	Annapolis Middle School
AAR_VNM6	38.9913	-76.5033	59	West Annapolis Elementary
AAR_VNM7	39.0538	-76.0688	23	Herald Harbor
AAR_VNM8	38.9638	-76.4938	57	Eastport Terrace
AAR_VNM9	38.9666	-76.5025	20	Truxton Park
AAR_VNM10	39.1019	-76.6108	121	Shipley's Choice Elementary
AAR_VNM11	38.9541	-76.5086	24	Robinwood
AAR_VNM12	38.9963	-76.493	20	Wardour Bluffs
AAR_VNM13	39.0552	-76.6388	118	Millersville Elementary School
AAR_VNM14	39.0294	-76.5399	123	Sherwood Forest
ARR_VNM15	39.2213	-77.0597	500	Brookeville, Montgomery County
AAR_VNM16	38.9969	-76.5591	87	Rolling Knolls
ARR_VNM17	38.9788	-76.4911	20	Maryland State House
ARR_VNM18	39.0441	-76.6155	161	I-97 and MD 178 Crownsville

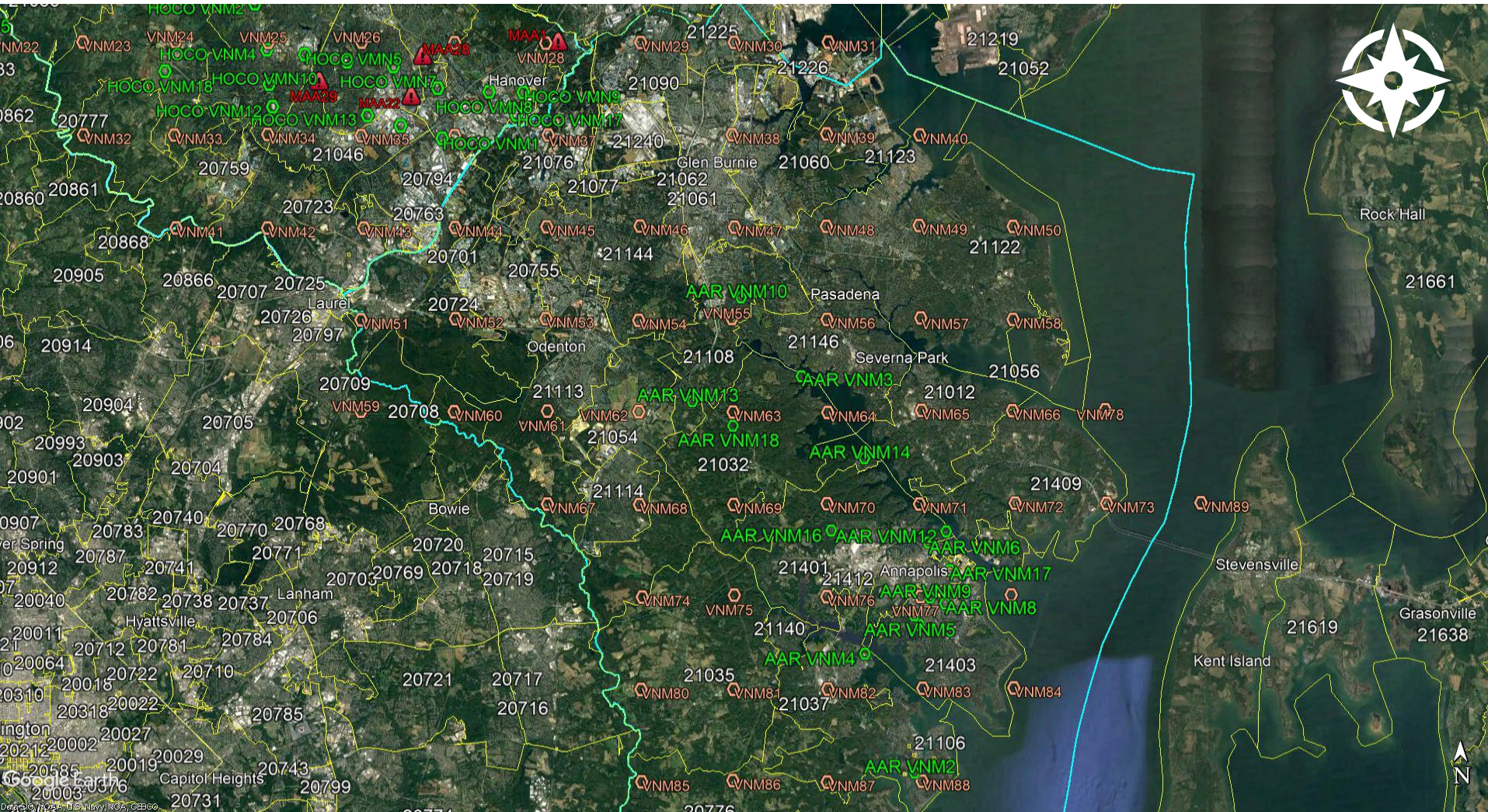
Noise Exposure – Virtual Noise Monitor Locations



Virtual Noise Monitor Locations – Howard County



Virtual Noise Monitor Locations – Anne Arundel County



Noise Event Data

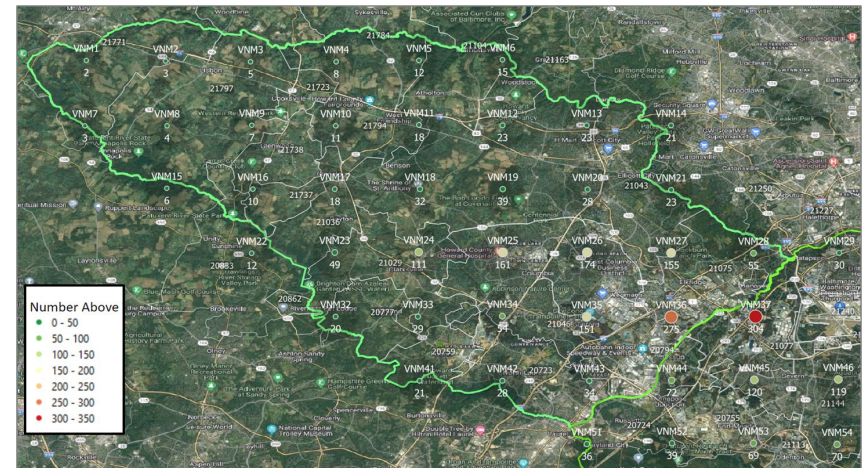
Number-of-Events-Above

The following slides include aircraft noise exposure levels at each of the 125 locations based on the Number-of-Events-Above metric (NA), and thresholds of 55 decibels, 65 decibels, and 75 decibels. The tables include both a total count for the reporting period (month) as well as the daily average for the month.

In addition to providing the data in tabular form, it is also provided in a map-based, graphical format.

Locations closest to the airport and/or concentrated flight corridors will typically see the highest noise exposure, in this case, highest DNL levels.

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM1	65	2	2	0	0	0
VNM2	82	3	4	0	1	0
VNM3	144	5	6	0	1	0
VNM4	259	8	9	0	2	0
VNM5	380	12	38	1	2	0
VNM6	460	15	122	4	8	0
VNM7	78	3	2	0	0	0
VNM8	135	4	4	0	1	0
VNM9	226	7	9	0	1	0
VNM10	349	11	29	1	3	0
VNM11	547	18	111	4	7	0
VNM12	699	23	174	6	18	1
VNM13	710	23	153	5	16	1
VNM14	666	21	114	4	21	1
VNM15	171	6	6	0	0	0
VNM16	297	10	24	1	2	0
VNM17	569	18	73	2	5	0
VNM18	985	32	195	6	13	0
VNM19	1,204	39	314	10	23	1
VNM20	859	28	303	10	26	1
VNM21	706	23	186	6	14	0
VNM22	377	12	31	1	1	0
VNM23	1,510	49	173	6	7	0
VNM24	3,433	111	442	14	43	1
VNM25	4,976	161	1,279	41	79	3



Noise Exposure: Number-of-Events-Above

(89 Monitor Points - Two-County, 2.5 mile grid)

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM1	102	3	5	0	0	0
VNM2	139	5	9	0	0	0
VNM3	26	1	22	1	0	0
VNM4	251	8	48	2	0	0
VNM5	302	10	58	2	0	0
VNM6	108	4	83	3	2	0
VNM7	124	4	9	0	0	0
VNM8	198	7	23	1	0	0
VNM9	246	8	47	2	0	0
VNM10	312	10	70	2	5	0
VNM11	427	14	103	3	7	0
VNM12	216	7	155	5	13	0
VNM13	585	20	166	6	26	1
VNM14	562	19	177	6	30	1
VNM15	229	8	38	1	1	0
VNM16	302	10	64	2	7	0
VNM17	499	17	99	3	7	0
VNM18	826	28	187	6	22	1
VNM19	1017	34	254	8	51	2
VNM20	680	23	248	8	61	2
VNM21	532	18	226	8	56	2
VNM22	350	12	74	2	8	0
VNM23	1600	53	168	6	16	1
VNM24	3533	118	352	12	56	2
VNM25	4782	159	1404	47	91	3

Noise Exposure: Number-of-Events-Above

(89 Monitor Points - Two-County, 2.5 mile grid)

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM26	5074	169	1266	42	113	4
VNM27	4399	147	381	13	109	4
VNM28	1334	44	360	12	87	3
VNM29	707	24	316	11	68	2
VNM30	579	19	272	9	47	2
VNM31	661	22	270	9	42	1
VNM32	534	18	155	5	16	1
VNM33	936	31	283	9	65	2
VNM34	1716	57	480	16	112	4
VNM35	4649	155	642	21	99	3
VNM36	8202	273	3707	124	180	6
VNM37	8957	299	7919	264	6555	219
VNM38	1296	43	828	28	168	6
VNM39	1159	39	389	13	131	4
VNM40	1208	40	385	13	85	3
VNM41	647	22	259	9	41	1
VNM42	759	25	333	11	95	3
VNM43	850	28	441	15	126	4
VNM44	2081	69	1023	34	121	4
VNM45	3404	113	1170	39	153	5
VNM46	3134	104	1897	63	1218	41
VNM47	4242	141	1155	39	251	8
VNM48	1156	39	503	17	235	8
VNM49	1835	61	624	21	166	6
VNM50	1122	37	374	12	86	3

Noise Exposure: Number-of-Events-Above

(89 Monitor Points - Two-County, 2.5 mile grid)

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM51	1085	36	346	12	54	2
VNM52	896	30	361	12	67	2
VNM53	1950	65	937	31	113	4
VNM54	1927	64	422	14	197	7
VNM55	3721	124	702	23	157	5
VNM56	2130	71	734	24	163	5
VNM57	1460	49	597	20	231	8
VNM58	1113	37	421	14	114	4
VNM59	581	19	242	8	14	0
VNM60	1666	56	342	11	25	1
VNM61	820	27	312	10	63	2
VNM62	1514	50	413	14	154	5
VNM63	995	33	425	14	224	7
VNM64	3708	124	981	33	233	8
VNM65	1554	52	561	19	204	7
VNM66	941	31	368	12	95	3
VNM67	1065	36	250	8	37	1
VNM68	1580	53	331	11	74	2
VNM69	1195	40	390	13	140	5
VNM70	2159	72	576	19	168	6
VNM71	1514	50	443	15	116	4
VNM72	885	30	308	10	78	3
VNM73	525	18	181	6	14	0
VNM74	889	30	230	8	34	1
VNM75	1353	45	303	10	68	2

Noise Exposure: Number-of-Events-Above

(89 Monitor Points - Two-County, 2.5 mile grid)

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM76	1889	63	326	11	82	3
VNM77	980	33	293	10	58	2
VNM78	648	22	223	7	36	1
VNM79	685	23	197	7	28	1
VNM80	496	17	124	4	0	0
VNM81	661	22	159	5	5	0
VNM82	543	18	167	6	9	0
VNM83	470	16	160	5	8	0
VNM84	429	14	123	4	4	0
VNM85	360	12	88	3	0	0
VNM86	376	13	92	3	0	0
VNM87	389	13	102	3	0	0
VNM88	381	13	98	3	1	0
VNM89	409	14	109	4	1	0

Noise Exposure: Number-of-Events-Above

(Anne Arundel County Landmark VNMs)

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
AAR_VNM1	222	7	19	1	0	0
AAR_VNM2	387	13	100	3	1	0
AAR_VNM3	4314	144	2933	98	324	11
AAR_VNM4	1211	40	238	8	32	1
AAR_VNM5	887	30	270	9	49	2
AAR_VNM6	1351	45	409	14	96	3
AAR_VNM7	124	4	10	0	0	0
AAR_VNM8	840	28	257	9	46	2
AAR_VNM9	977	33	289	10	56	2
AAR_VNM10	5552	185	4422	147	376	13
AAR_VNM11	781	26	242	8	43	1
AAR_VNM12	1269	42	364	12	94	3
AAR_VNM13	1353	45	416	14	229	8
AAR_VNM14	1857	62	652	22	218	7
ARR_VNM15	303	10	68	2	5	0
AAR_VNM16	2097	70	483	16	129	4
ARR_VNM17	1129	38	321	11	69	2
ARR_VNM18	1214	40	425	14	233	8

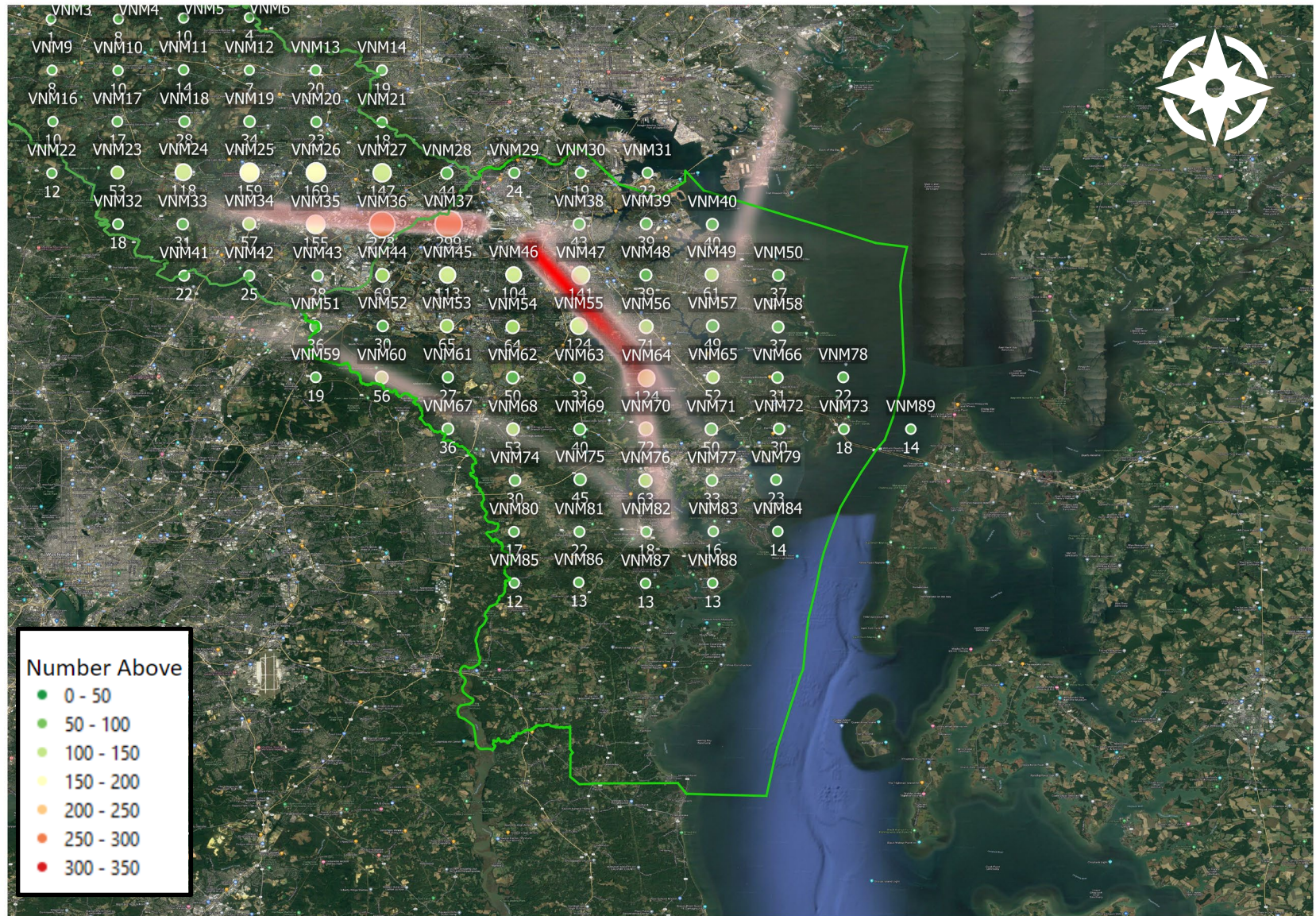
Noise Exposure: Number-of-Events-Above

(Howard County Landmark VNMs)

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
HOCO_VNM1	7829	261	1221	41	122	4
HOCO_VNM2	3940	131	401	13	83	3
HOCO_VNM3	3958	132	306	10	92	3
HOCO_VNM4	4785	160	1250	42	93	3
HOCO_VNM5	4988	166	2291	76	113	4
HOCO_VNM6	5199	173	2720	91	119	4
HOCO_VNM7	5280	176	3050	102	109	4
HOCO_VNM8	6517	217	4268	142	376	13
HOCO_VNM9	6597	220	3184	106	141	5
HOCO_VNM10	5006	167	567	19	118	4
HOCO_VNM11	530	18	103	3	10	0
HOCO_VNM12	4591	153	1055	35	171	6
HOCO_VNM13	6141	205	1865	62	217	7
HOCO_VNM14	5401	180	3803	127	294	10
HOCO_VNM15	624	21	202	7	46	2
HOCO_VNM16	6355	212	2171	72	224	7
HOCO_VNM17	8888	296	6170	206	2754	92
HOCO_VNM18	3042	101	336	11	61	2

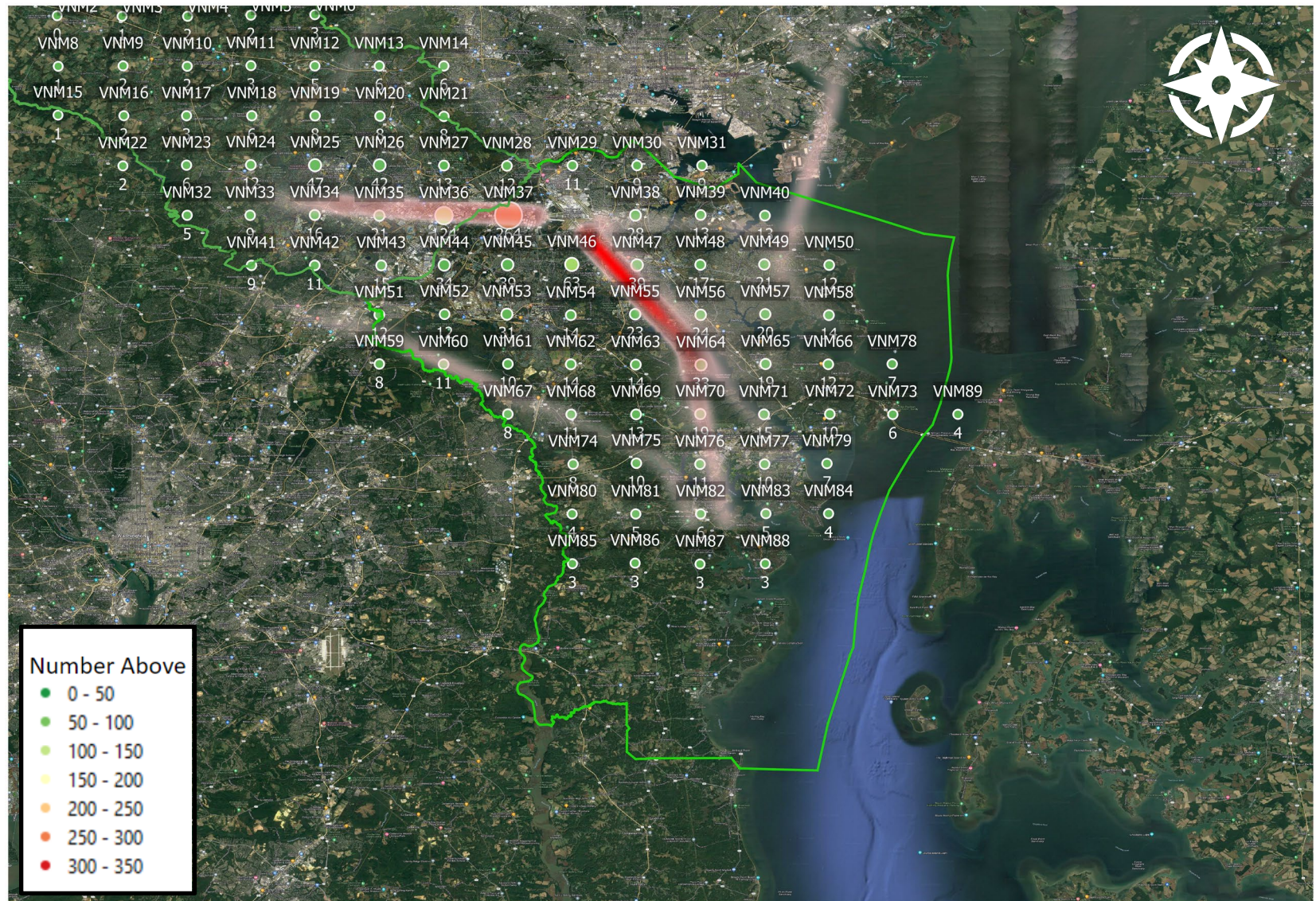
Noise Exposure: Number-of-Events-Above 55 dBA (Daily Average)

Anne Arundel County - Arrivals



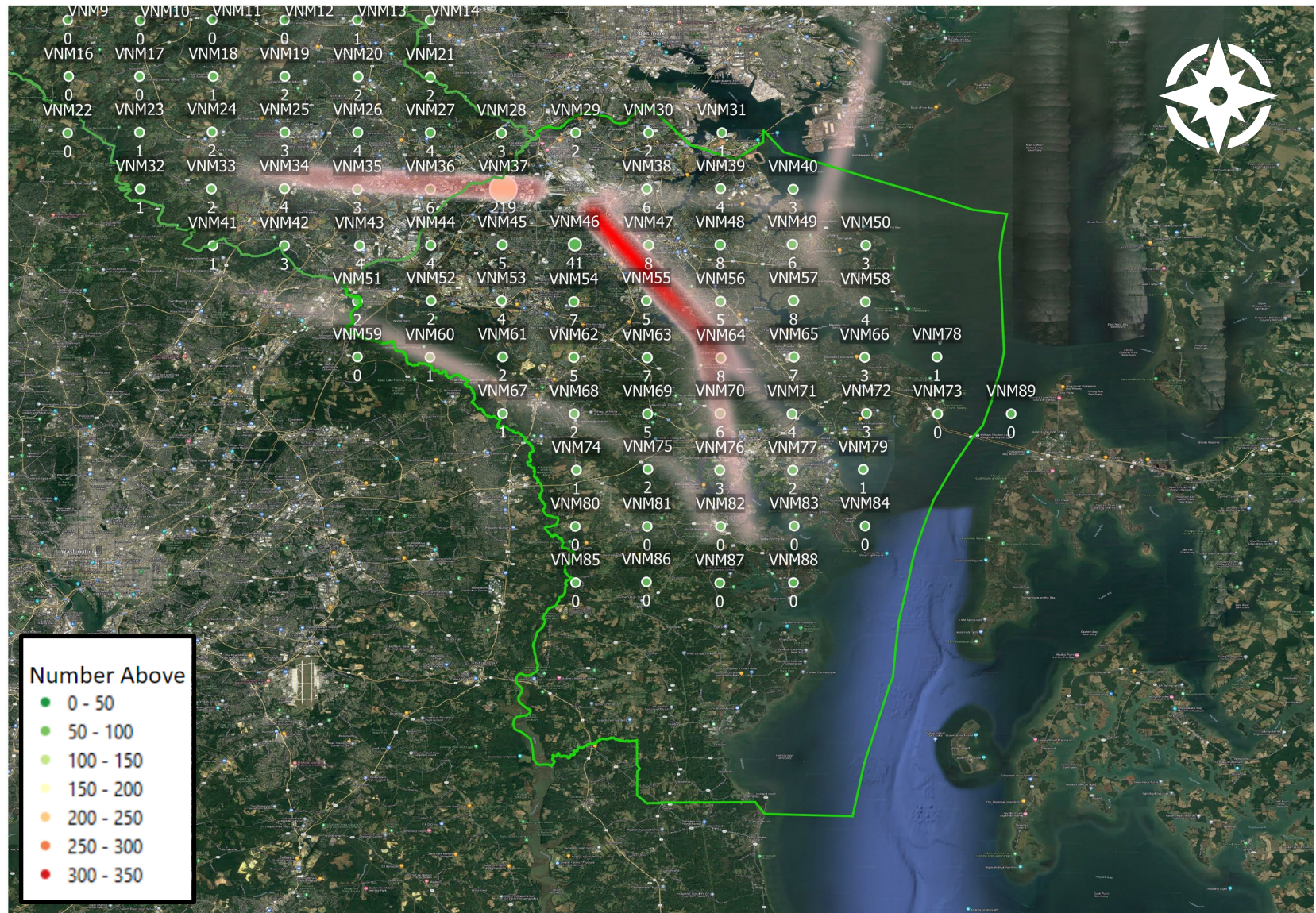
Noise Exposure: Number-of-Events-Above 65 dBA (Daily Average)

Anne Arundel County - Arrivals



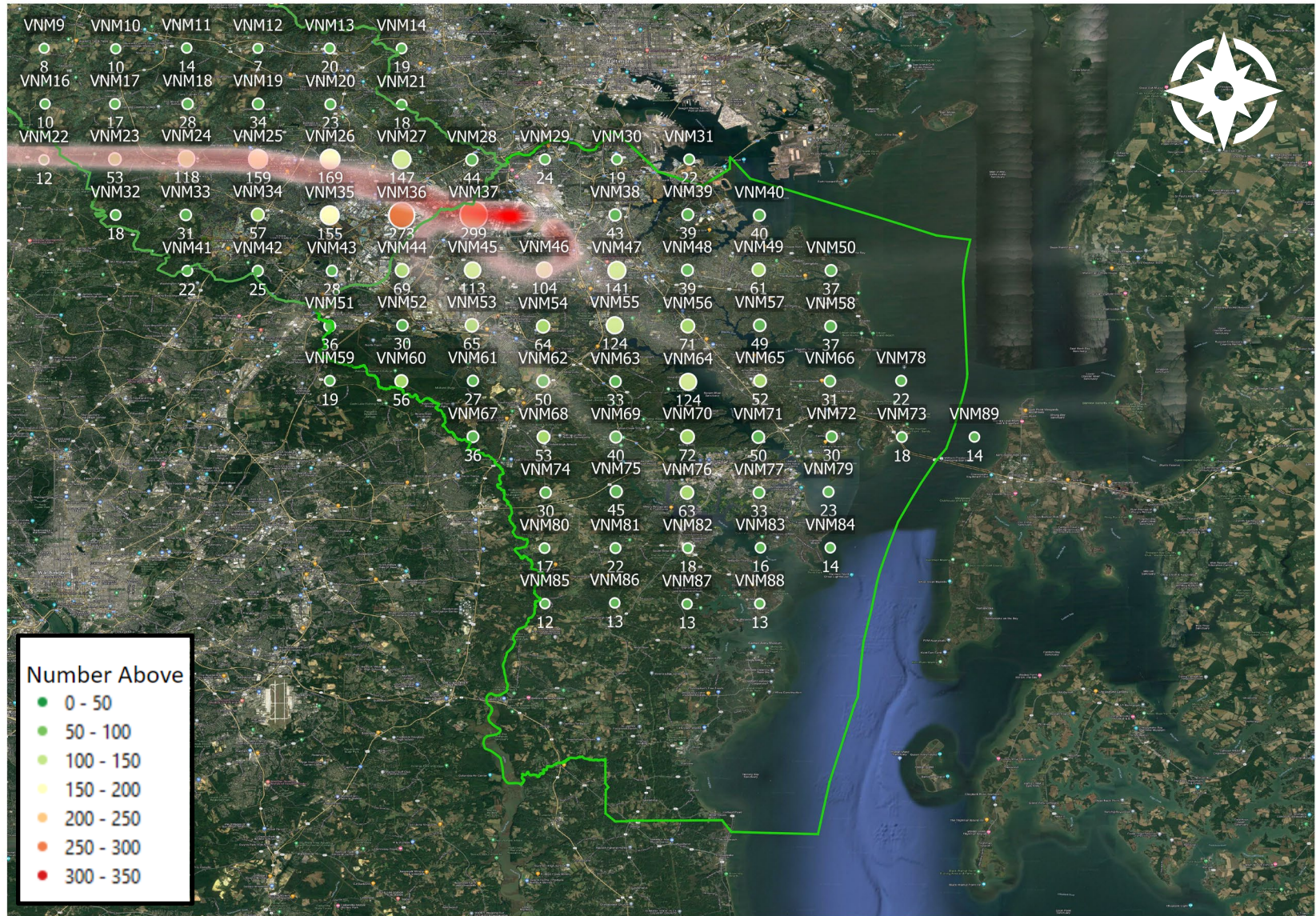
Noise Exposure: Number-of-Events-Above 75 dBA (Daily Average)

Anne Arundel County - Arrivals



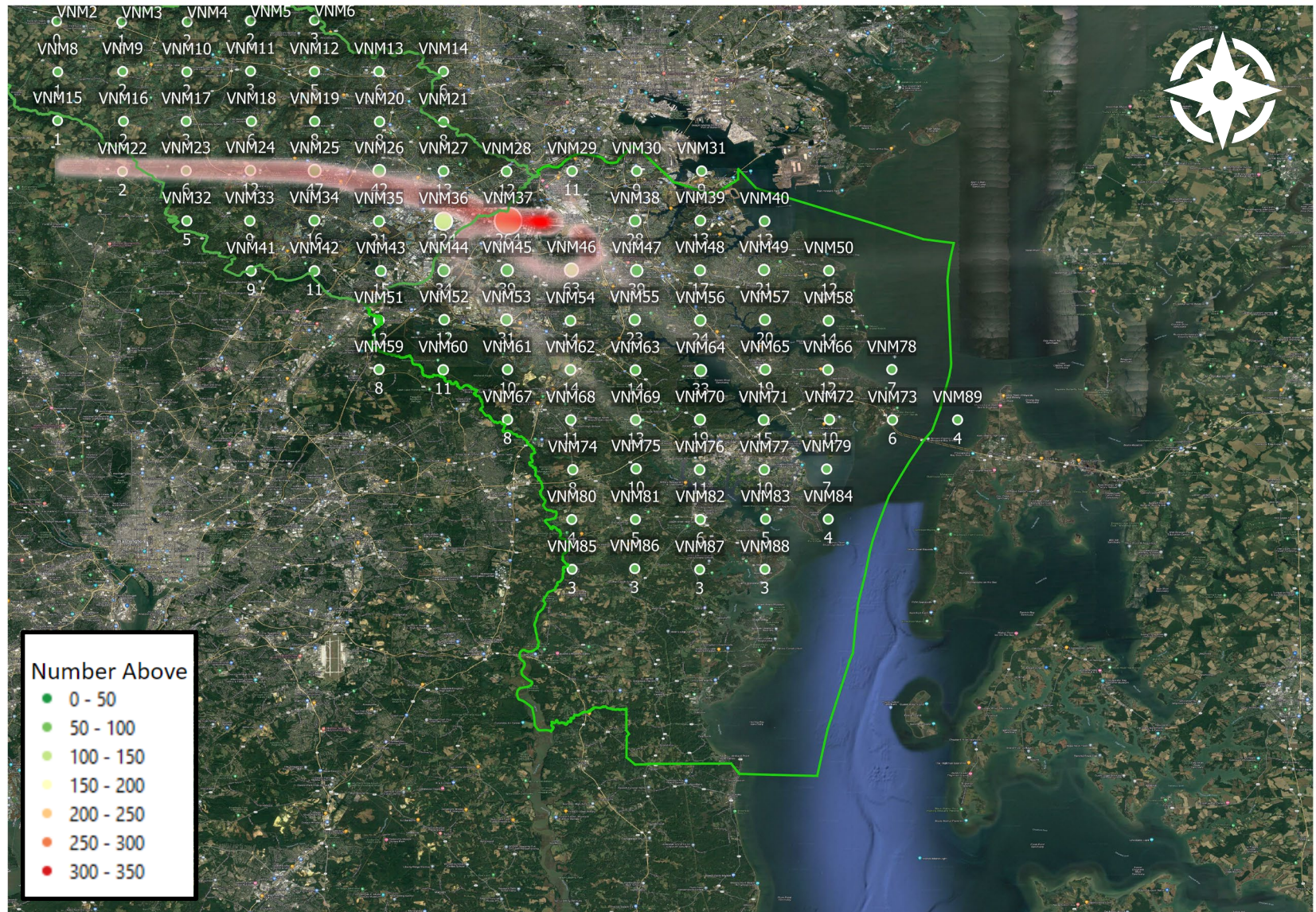
Noise Exposure: Number-of-Events-Above 55 dBA (Daily Average)

Anne Arundel County - Departures



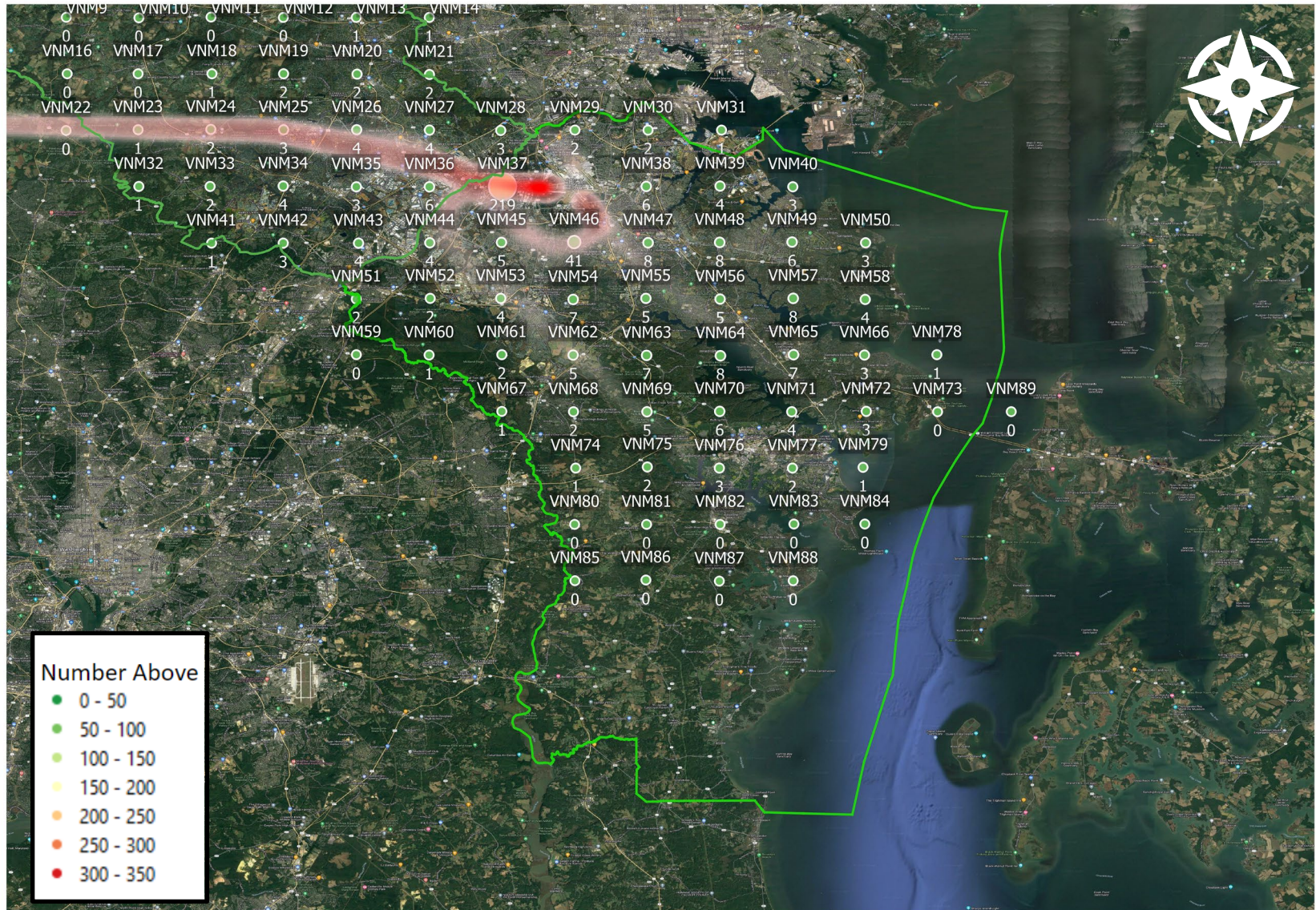
Noise Exposure: Number-of-Events-Above 65 dBA (Daily Average)

Anne Arundel County - Departures



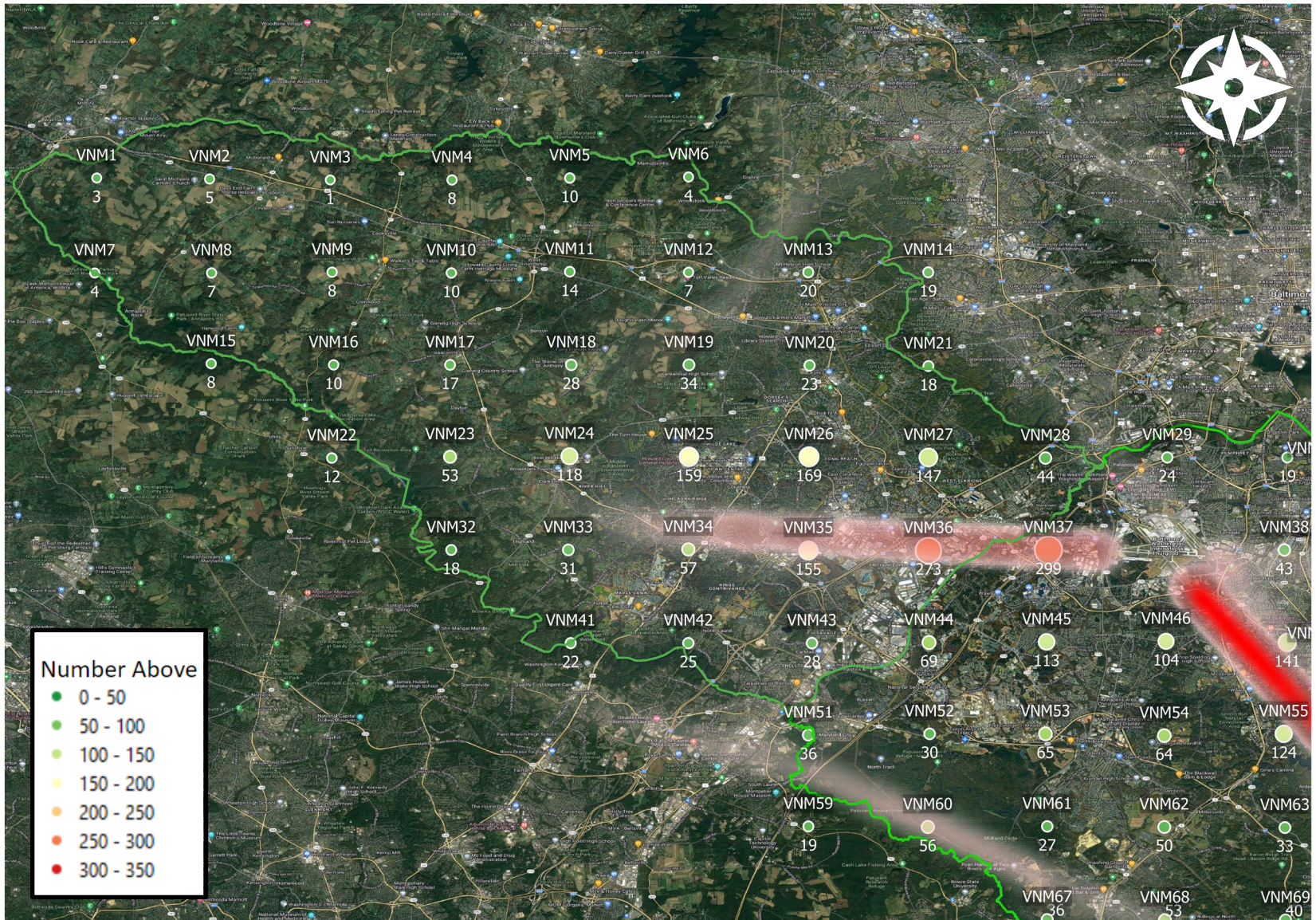
Noise Exposure: Number-of-Events-Above 75 dBA (Daily Average)

Anne Arundel County - Departures



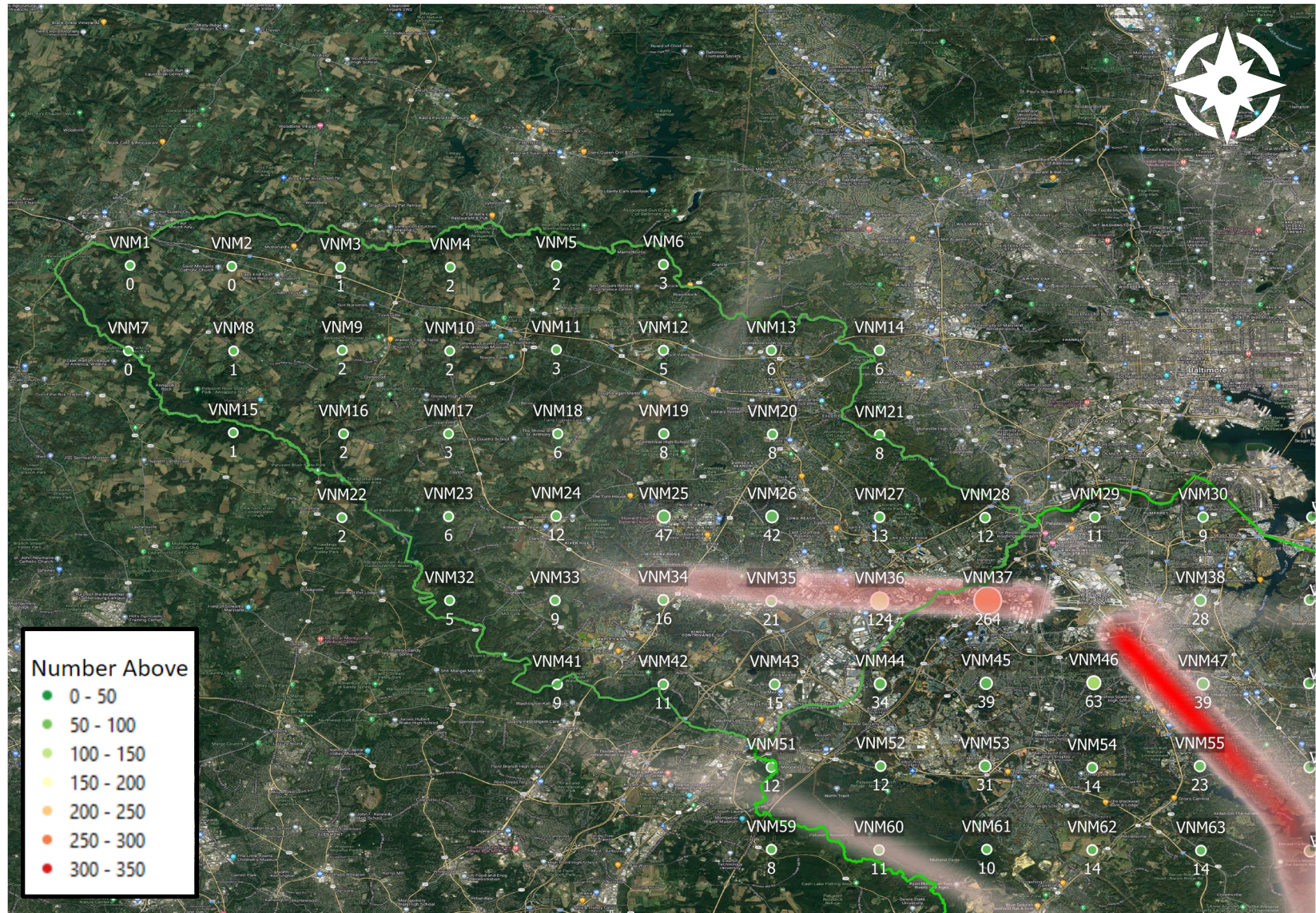
Noise Exposure: Number-of-Events-Above 55 dBA (Daily Average)

Howard County – Arrivals



Noise Exposure: Number-of-Events-Above 65 dBA (Daily Average)

Howard County – Arrivals



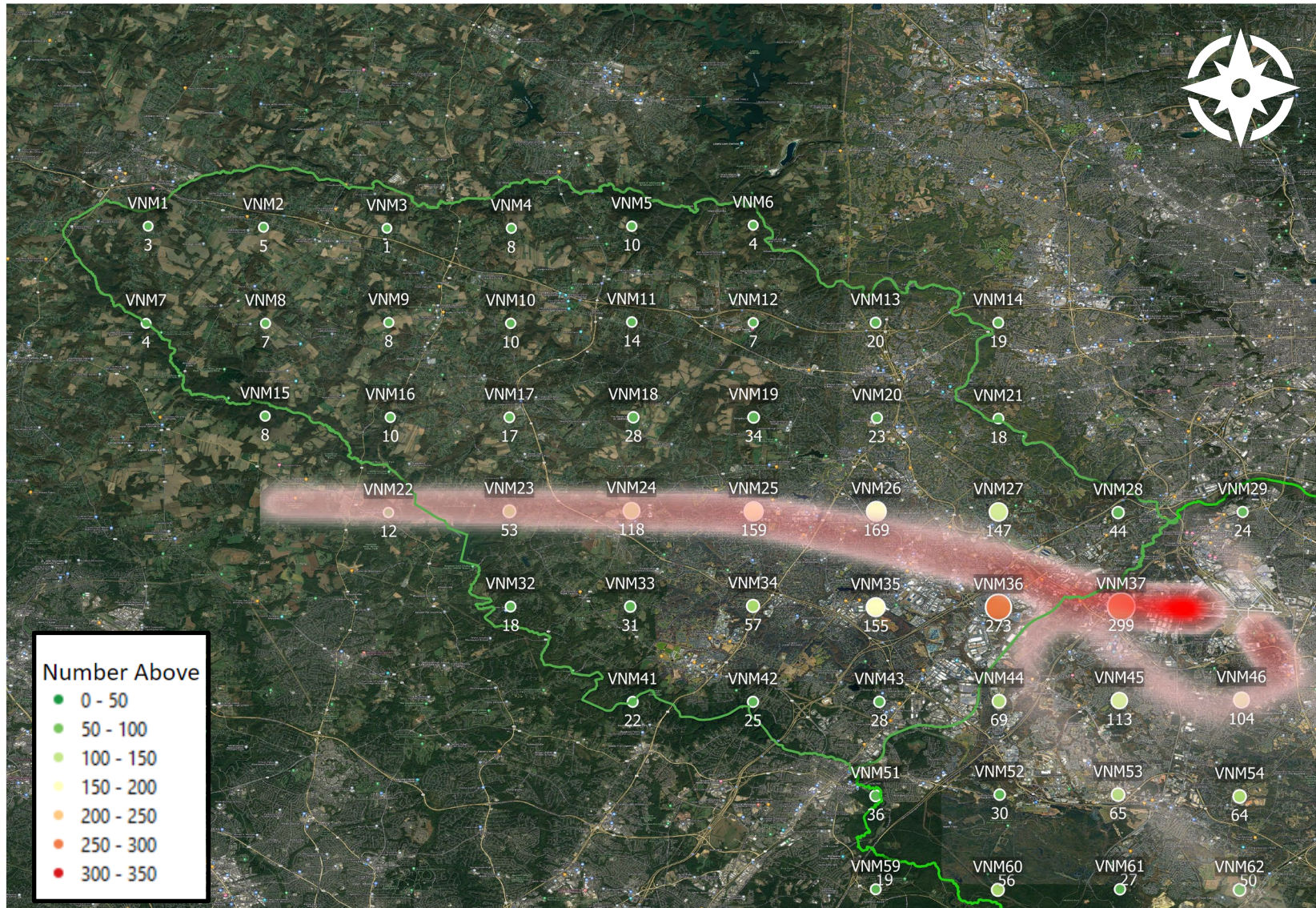
Noise Exposure: Number-of-Events-Above 75 dBA (Daily Average)

Howard County – Arrivals



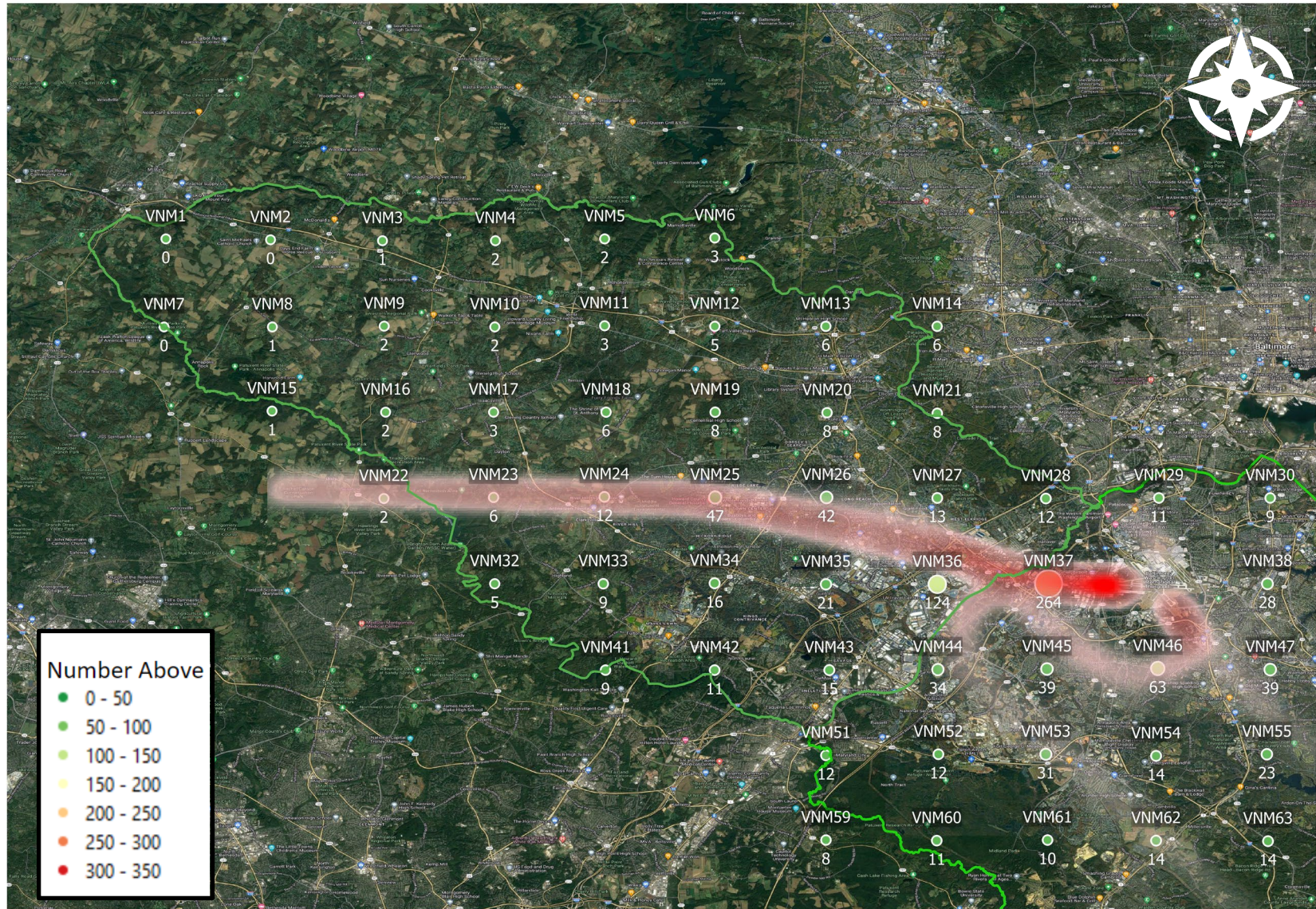
Noise Exposure: Number-of-Events-Above 55 dBA (Daily Average)

Howard County – Departures



Noise Exposure: Number-of-Events-Above 65 dBA (Daily Average)

Howard County – Departures



Noise Exposure: Number-of-Events-Above 75 dBA (Daily Average)

Howard County – Departures



Noise Event Data

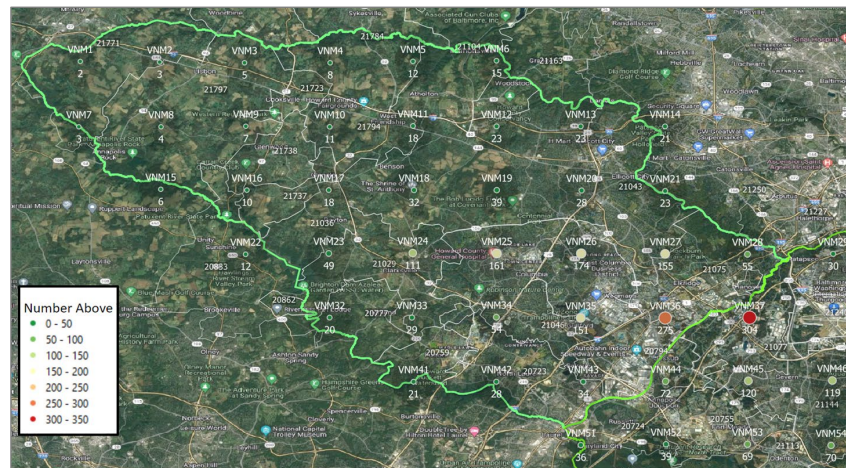
DNL

The following slides include aircraft noise exposure levels at each of the 125 locations based on the Day-Night Level (DNL) metric. The average daily DNL level for each location is included in the tables.

In addition to providing this data in tabular form, it is also provided in a map-based format. The maps include DNL values at the “Landmark” locations identified by the Roundtable and DNL contour maps which represent the noise exposure for the counties.

Locations closest to the airport and/or concentrated flight corridors will typically see the highest noise exposure, in this case, highest DNL levels while the contour maps provide DNL levels for the county.

Name	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM1	65	2	2	0	0	0
VNM2	82	3	4	0	1	0
VNM3	144	5	6	0	1	0
VNM4	259	8	9	0	2	0
VNM5	380	12	38	1	2	0
VNM6	460	15	122	4	8	0
VNM7	78	3	2	0	0	0
VNM8	135	4	4	0	1	0
VNM9	226	7	9	0	1	0
VNM10	349	11	29	1	3	0
VNM11	547	18	111	4	7	0
VNM12	699	23	174	6	18	1
VNM13	710	23	153	5	16	1
VNM14	666	21	114	4	21	1
VNM15	171	6	6	0	0	0
VNM16	297	10	24	1	2	0
VNM17	569	18	73	2	5	0
VNM18	985	32	195	6	13	0
VNM19	1,204	39	314	10	23	1
VNM20	859	28	303	10	26	1
VNM21	706	23	186	6	14	0
VNM22	377	12	31	1	1	0
VNM23	1,510	49	173	6	7	0
VNM24	3,433	111	442	14	43	1
VNM25	4,976	161	1,279	41	79	3



Noise Exposure: DNL (Daily Average)

(89 Monitor Points - Two-County, 2.5 mile grid)

Name	DNL
VNM1	24.95
VNM2	23.77
VNM3	25.14
VNM4	28.87
VNM5	31.67
VNM6	38
VNM7	23.34
VNM8	26.31
VNM9	29.03
VNM10	32.34
VNM11	38.69
VNM12	43.86
VNM13	42.83
VNM14	63.68
VNM15	38.02
VNM16	43.18
VNM17	40.99
VNM18	45.66
VNM19	47.14
VNM20	46.51
VNM21	45.31
VNM22	36.12
VNM23	44.37
VNM24	51.67
VNM25	55.62

Name	DNL
VNM26	56.72
VNM27	54.08
VNM28	49.51
VNM29	49.18
VNM30	43.51
VNM31	39.75
VNM32	42.06
VNM33	47.31
VNM34	52.07
VNM35	56.11
VNM36	60.17
VNM37	72.13
VNM38	53.29
VNM39	48.98
VNM40	48.6
VNM41	43.98
VNM42	47.66
VNM43	51.73
VNM44	54.66
VNM45	55.11
VNM46	63.93
VNM47	62.41
VNM48	55.97
VNM49	51.66
VNM50	47.34

Name	DNL
VNM51	47.04
VNM52	45.41
VNM53	50.59
VNM54	51.5
VNM55	55.86
VNM56	65.92
VNM57	52.94
VNM58	47.65
VNM59	39.71
VNM60	48.84
VNM61	45.97
VNM62	50.03
VNM63	53.96
VNM64	62.03
VNM65	51.68
VNM66	46.71
VNM67	44.64
VNM68	47.34
VNM69	46.78
VNM70	58.27
VNM71	49.75
VNM72	45.2
VNM73	40
VNM74	43.13
VNM75	45.17

Name	DNL
VNM76	47.8
VNM77	42.94
VNM78	40.59
VNM79	40.02
VNM80	35.11
VNM81	36.69
VNM82	35.5
VNM83	32.13
VNM84	33.85
VNM85	28.96
VNM86	28.49
VNM87	27.56
VNM88	27.27
VNM89	31.31

Noise Exposure: DNL (Daily Average)

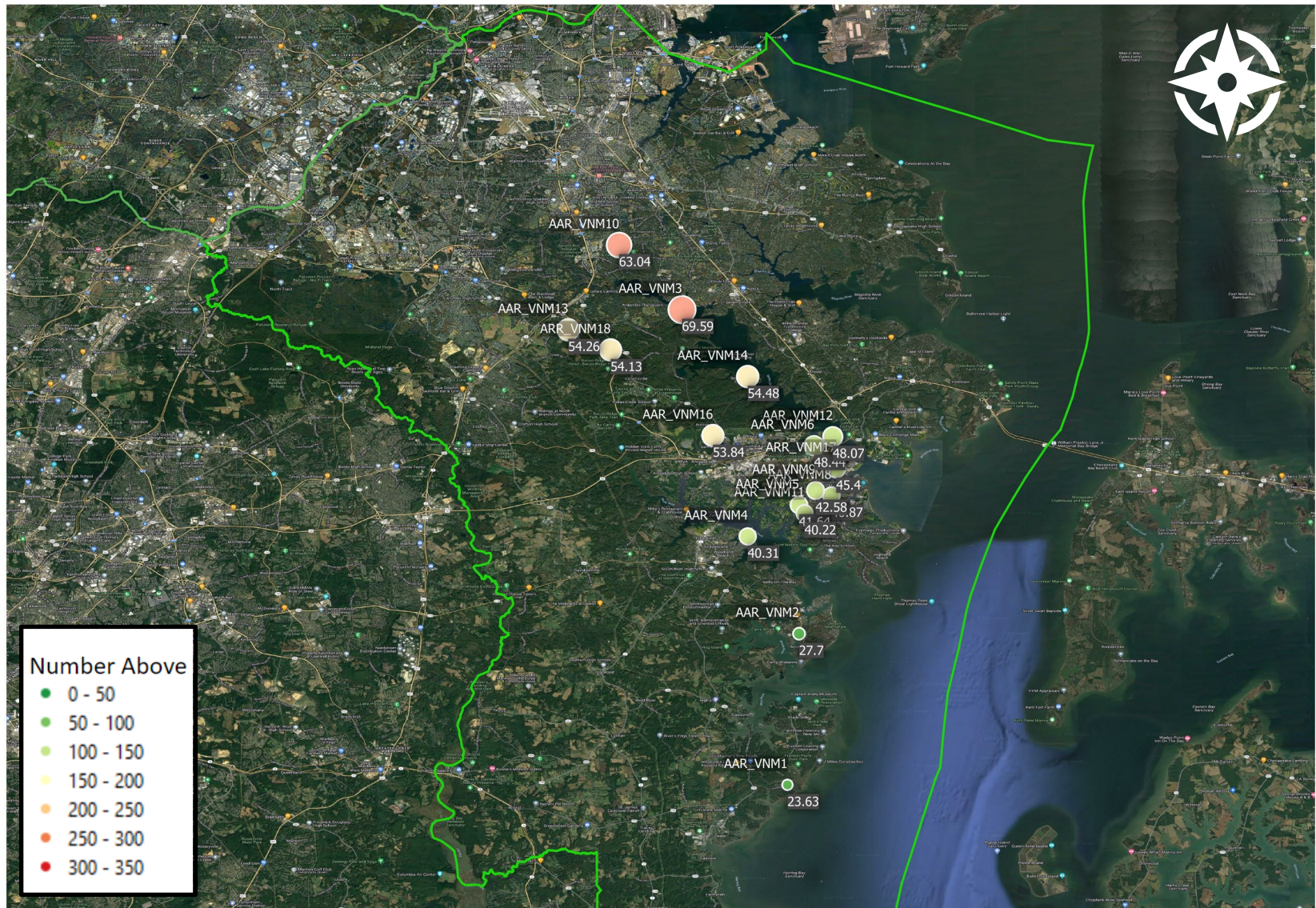
Landmark VNMs

Name	DNL
AAR_VNM1	23.63
AAR_VNM2	27.7
AAR_VNM3	69.59
AAR_VNM4	40.31
AAR_VNM5	41.64
AAR_VNM6	48.44
AAR_VNM7	19.67
AAR_VNM8	40.87
AAR_VNM9	42.58
AAR_VNM10	63.04
AAR_VNM11	40.22
AAR_VNM12	48.07
AAR_VNM13	54.26
AAR_VNM14	54.48
ARR_VNM15	33.9
AAR_VNM16	53.84
ARR_VNM17	45.4
ARR_VNM18	54.13

Name	DNL
HOCO_VNM1	58.49
HOCO_VNM2	52.12
HOCO_VNM3	51.36
HOCO_VNM4	55.57
HOCO_VNM5	57.07
HOCO_VNM6	58.31
HOCO_VNM7	58.95
HOCO_VNM8	61.56
HOCO_VNM9	60.1
HOCO_VNM10	54.8
HOCO_VNM11	40.31
HOCO_VNM12	56.92
HOCO_VNM13	61.21
HOCO_VNM14	61.46
HOCO_VNM15	44.24
HOCO_VNM16	61.18
HOCO_VNM17	67.7
HOCO_VNM18	50.22

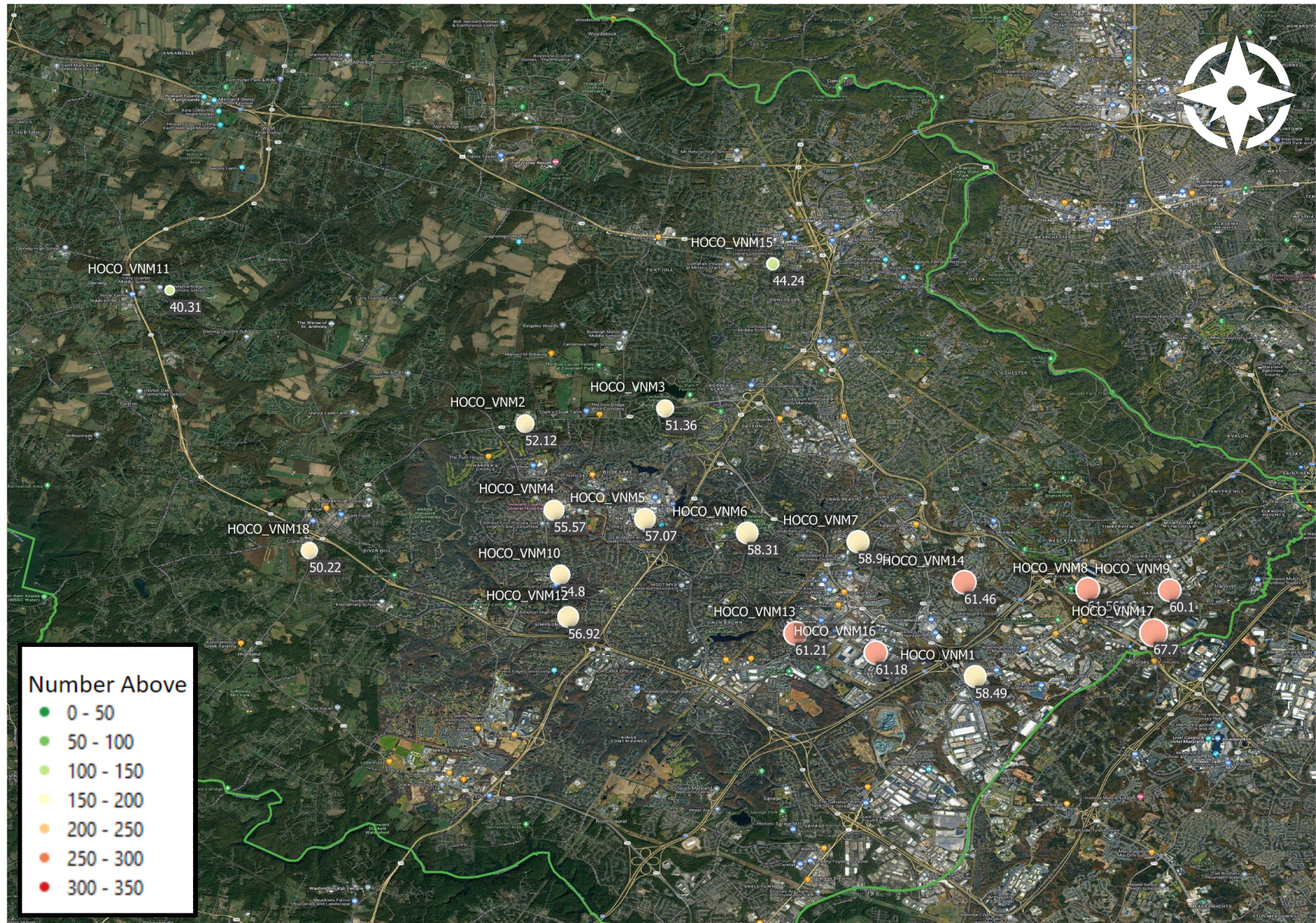
Noise Exposure: DNL (Daily Average)

Anne Arundel County – Landmark Locations



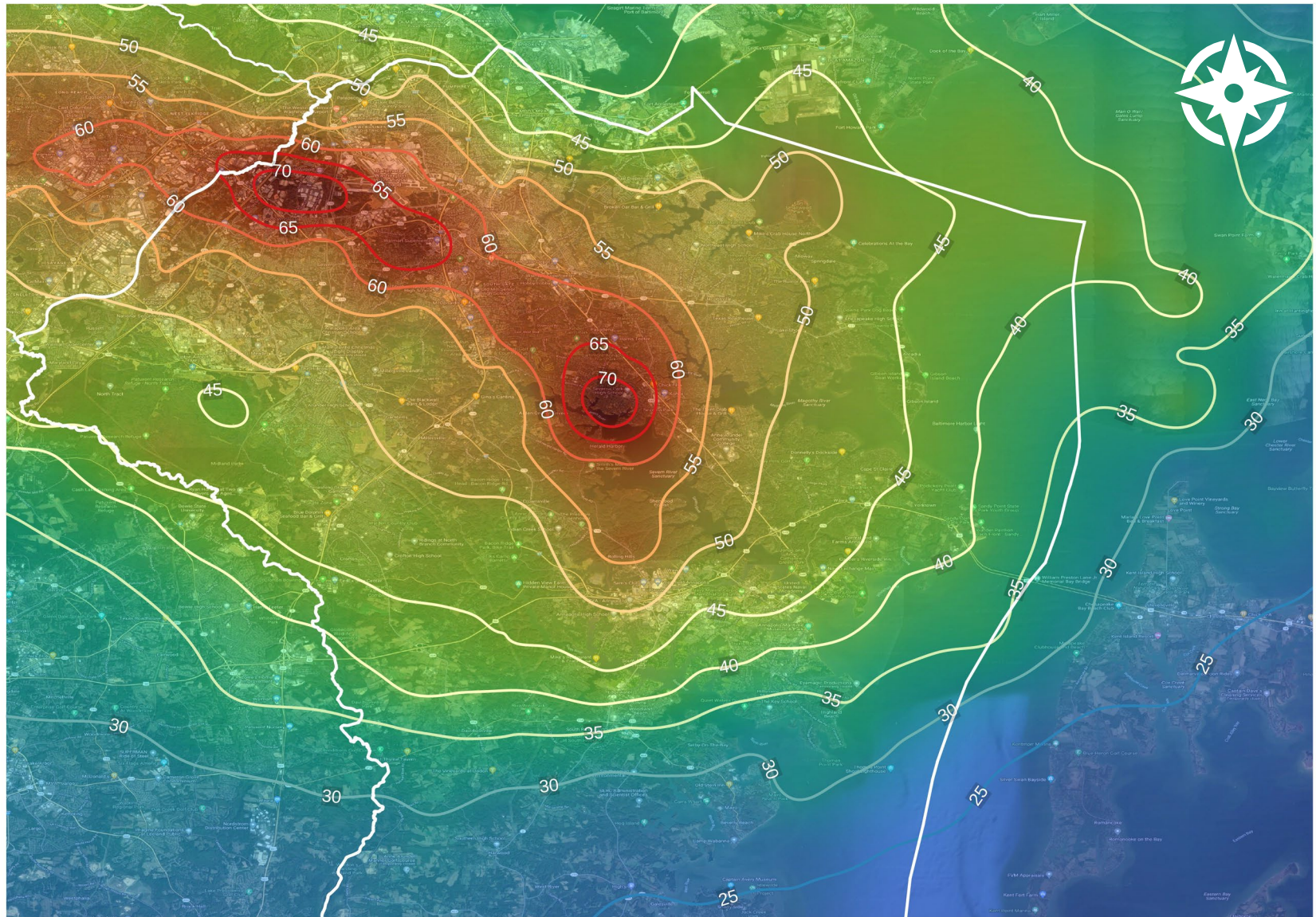
Noise Exposure: DNL (Daily Average)

Howard County – Landmark Locations



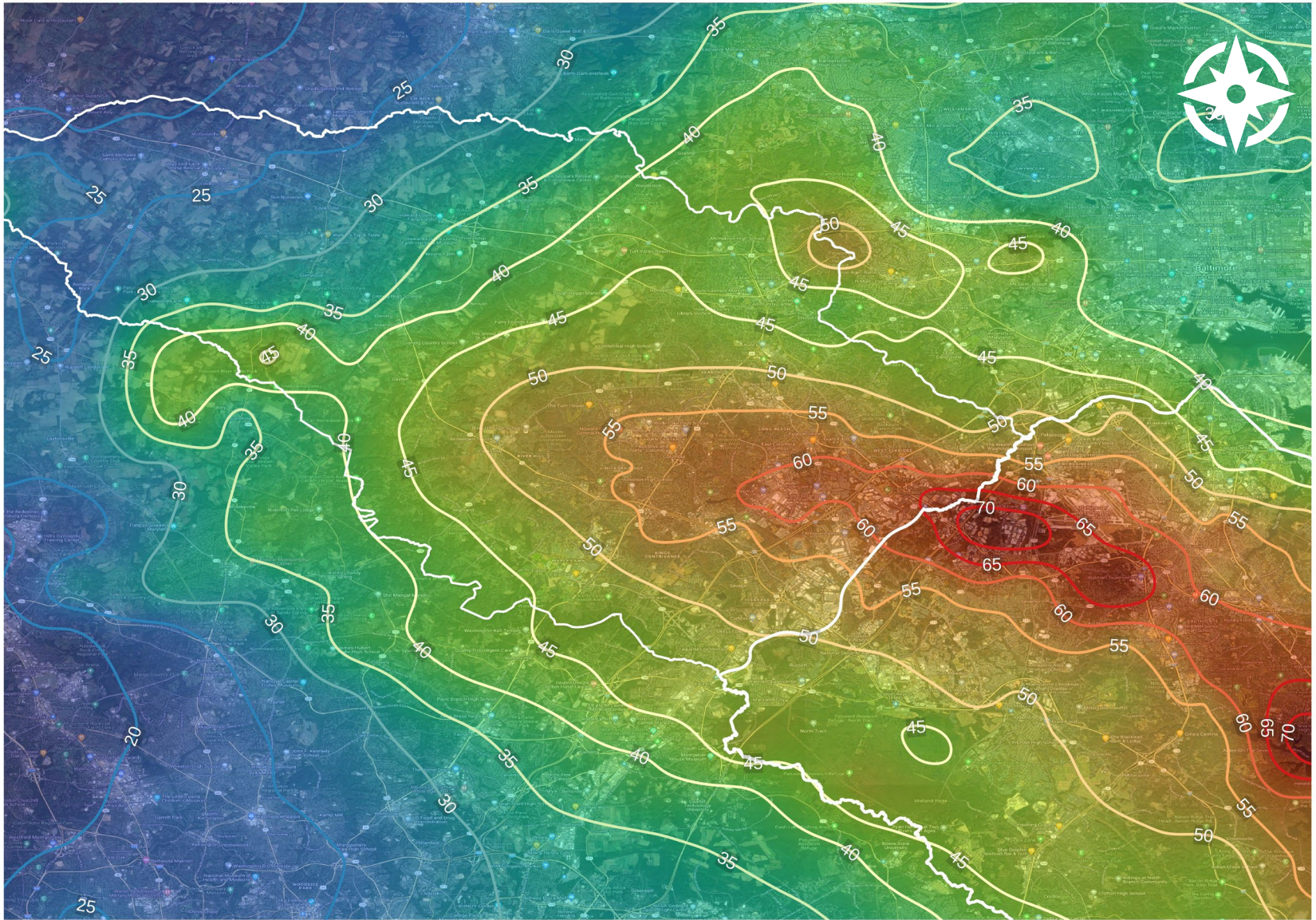
Noise Exposure: DNL Contours (Daily Average)

Anne Arundel County



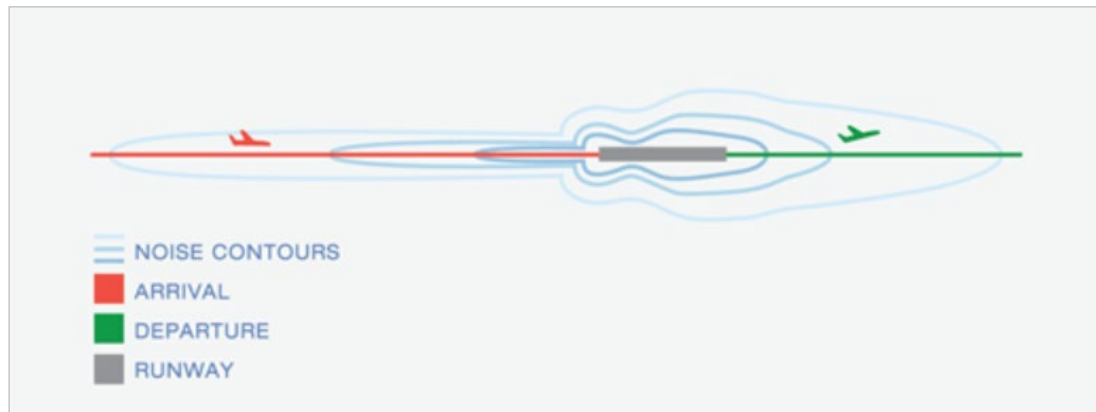
Noise Exposure: DNL Contours (Daily Average)

Howard County



Noise Exposure – Single Event Noise Contours

There was interest in understanding the noise exposure associated with single flights as opposed to the daily/monthly data provided in the original report. Single event contours can be produced, which illustrate the noise exposure associated with an aircraft landing or taking off. The graphic below is an example of noise exposure (shown in contours) of an aircraft arrival (red) and departure (green).

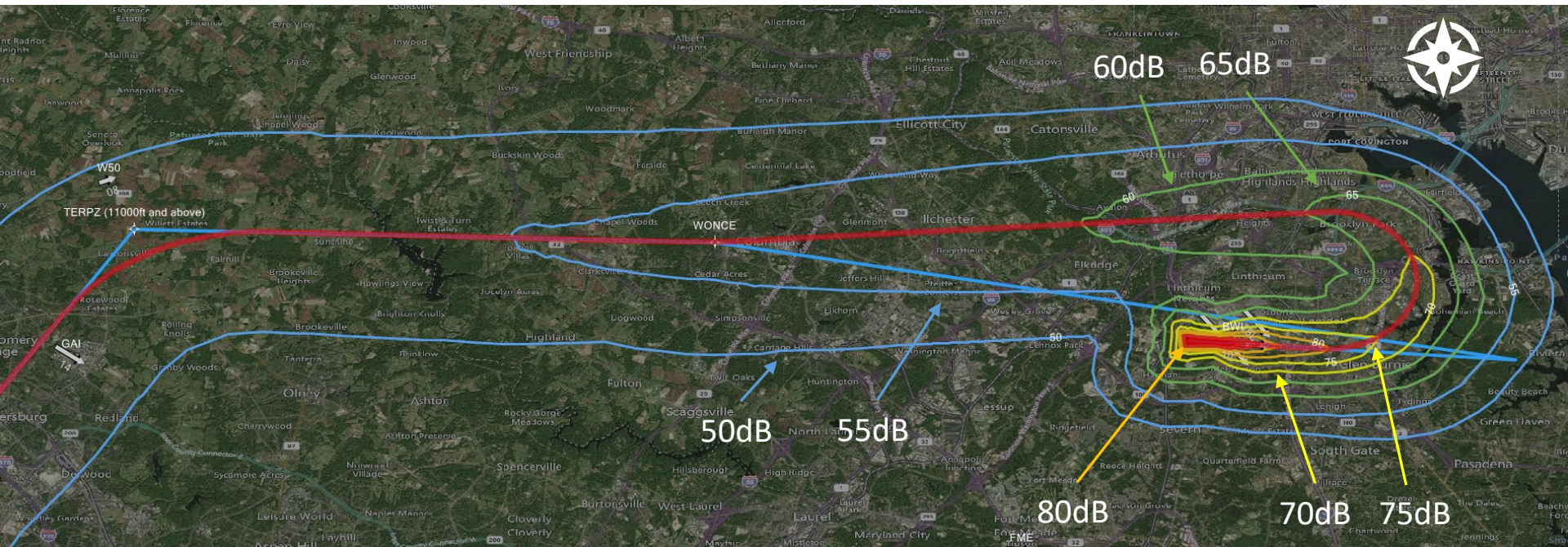


Source: Federal Aviation Administration (https://www.faa.gov/regulations_policies/policy_guidance/noise/basics)

The most common aircraft (based on total operations) at BWI is the Boeing 737-700. Vianair calculated the noise exposure for a single departure from both Runway 10 and Runway 28, illustrating the typical noise exposure experienced for communities below. This is shown on the next two slides.

Single Event Noise Contours

L_{max} 737-700 Departure RWY 10



Aircraft Type: B737-700

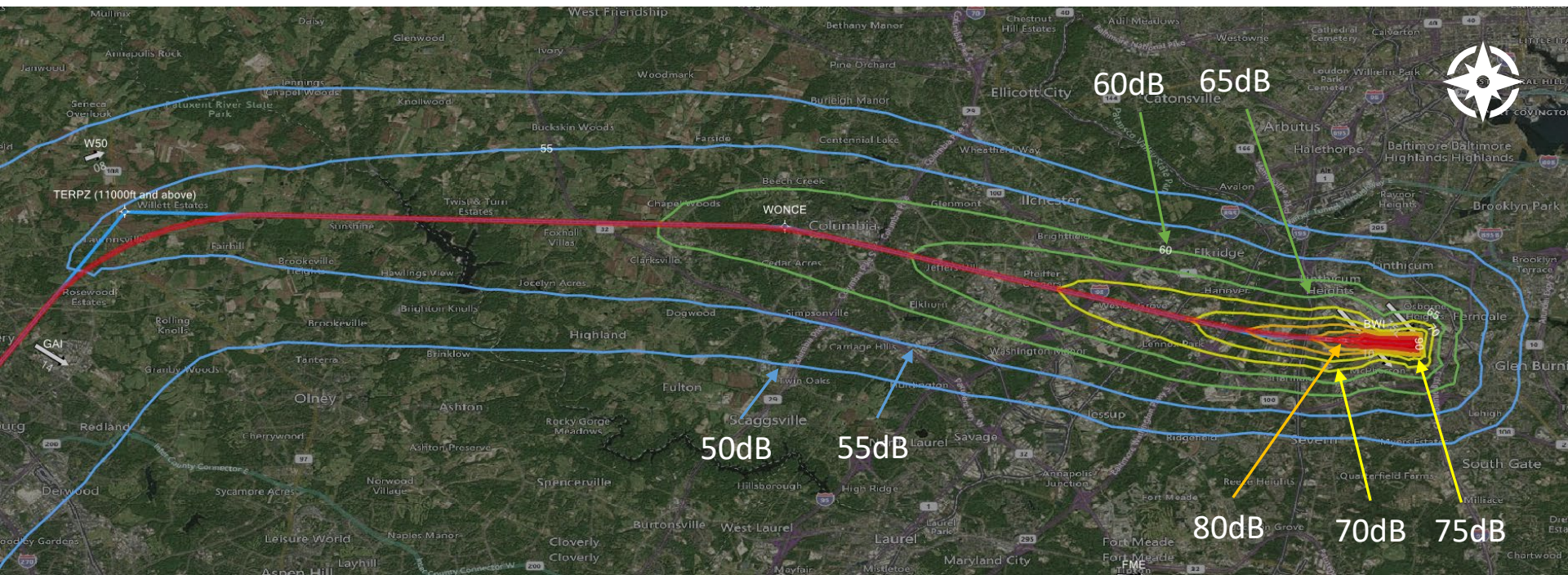
Stage Length: 3

Standard Profile

Noise contours based on A-weighted decibels (dBA)

Single Event Noise Contours

L_{max} 737-700 Departure RWY 28



Aircraft Type: B737-700

Stage Length: 3

Standard Profile

Noise contours based on A-weighted decibels (dBA)

For More Information...

*If you have questions about this report,
please contact Howard County at:*

transportation@howardcountymd.gov



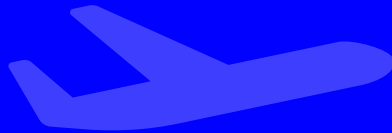
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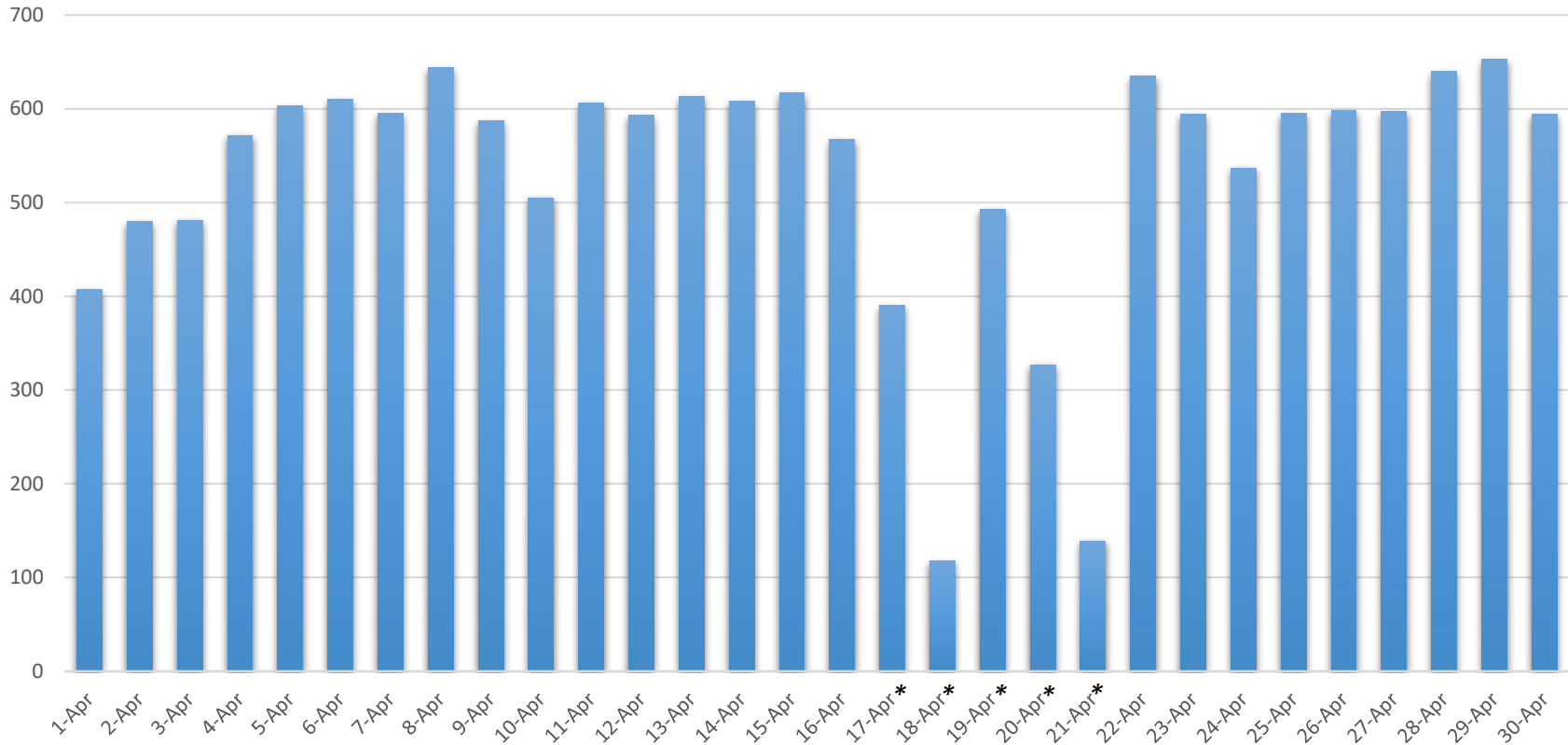
APPENDIX I:

SUPPLEMENTAL OPERATIONAL STATISTICS



Total Operations

Daily Operations



Total Monthly Operations

16,099

Average Daily Operations

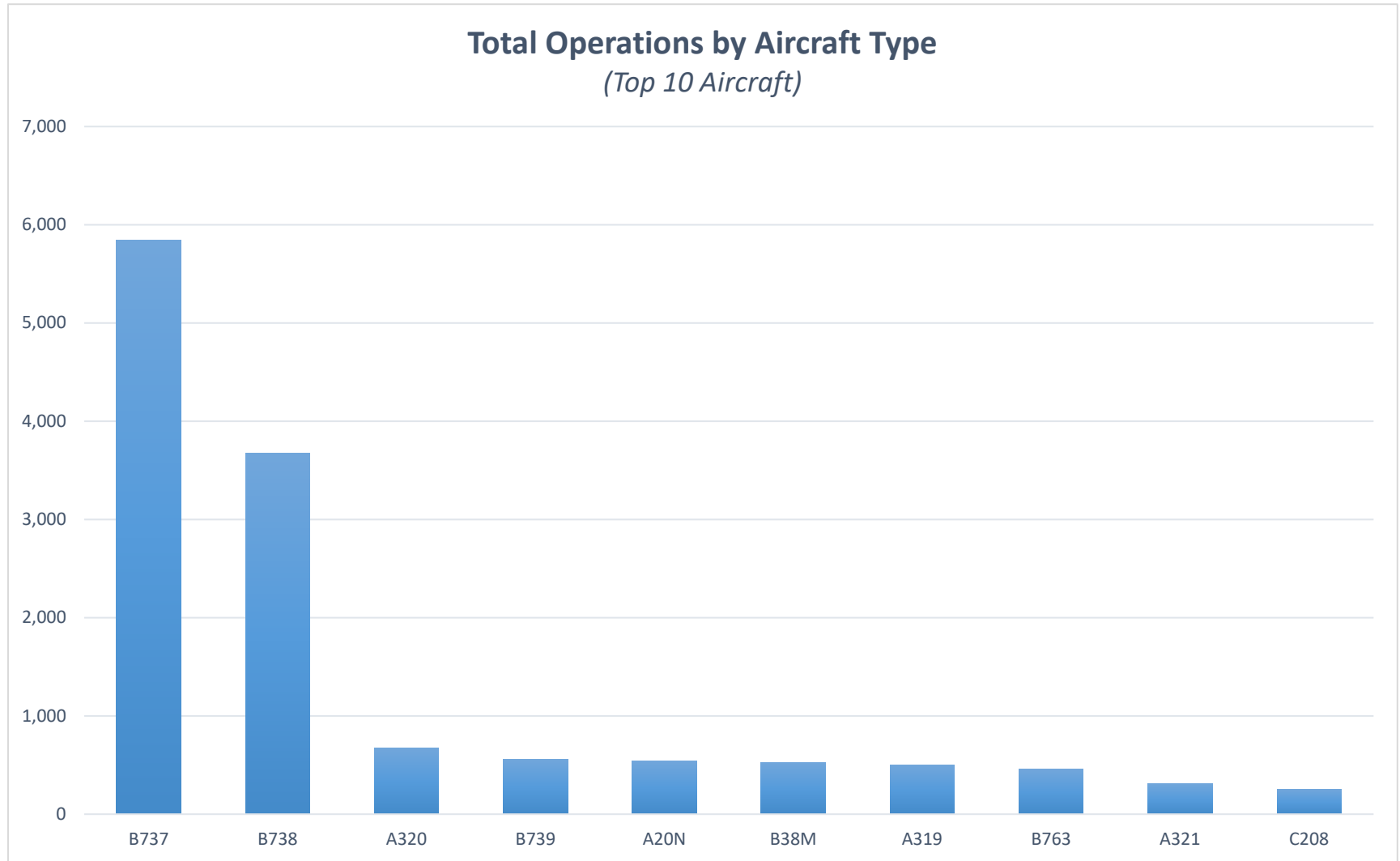
537



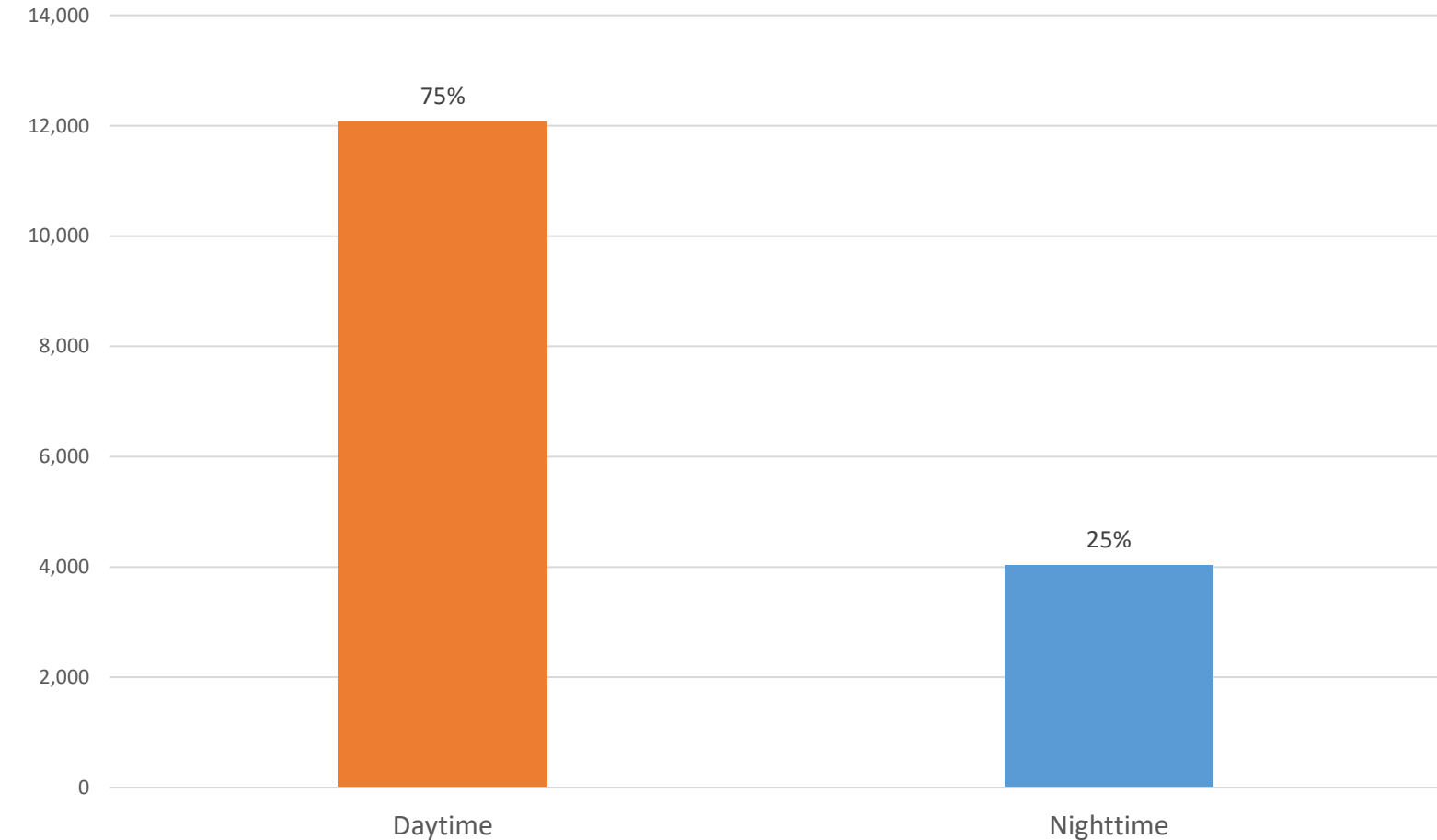
vianair

**Note: Daily operations for April 17-21 may be under-counted. For the monthly analyses, this is statistically insignificant.*

Fleet Mix: Operations by Aircraft Type

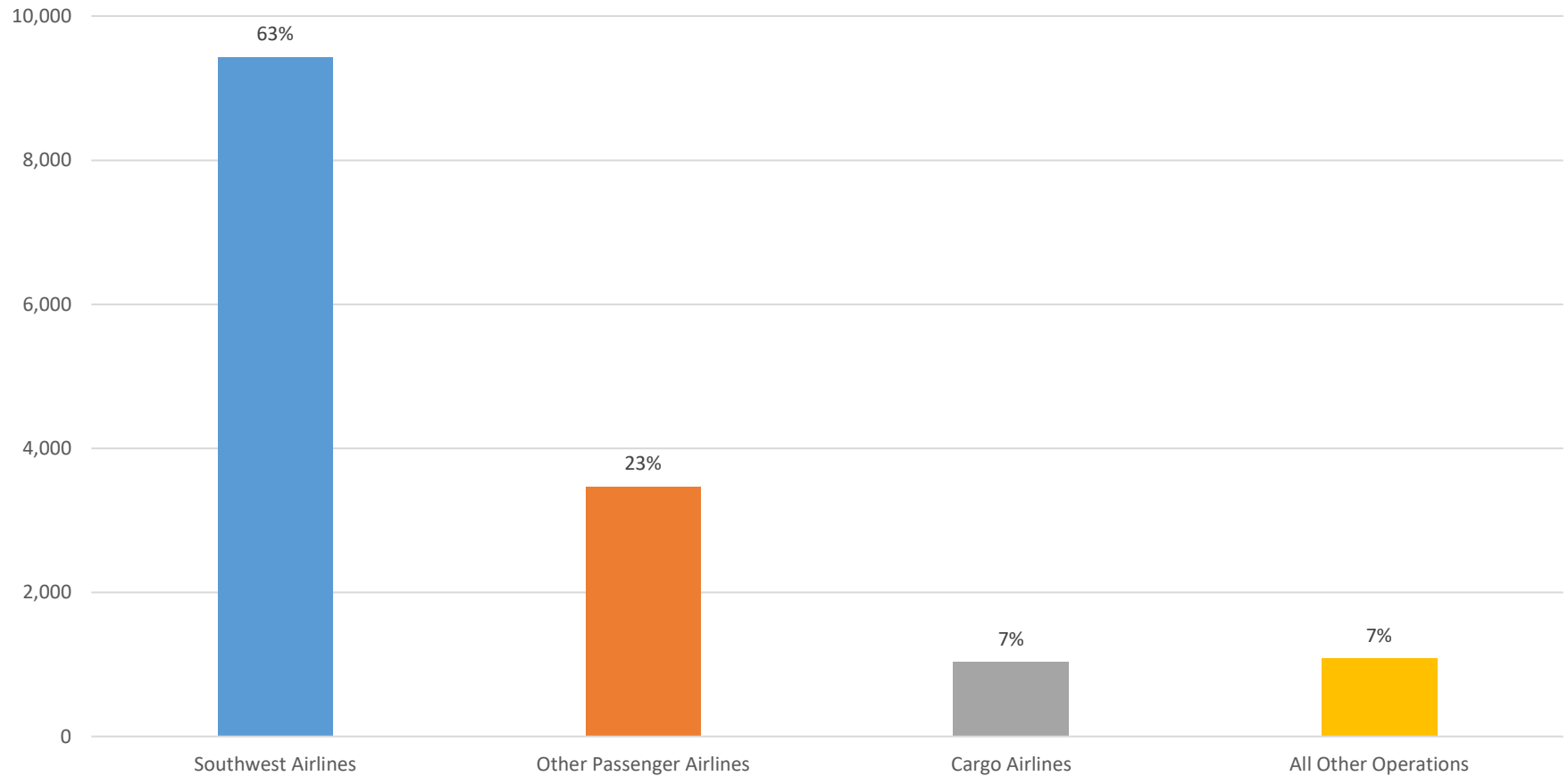


Total Operations: Daytime vs. Nighttime

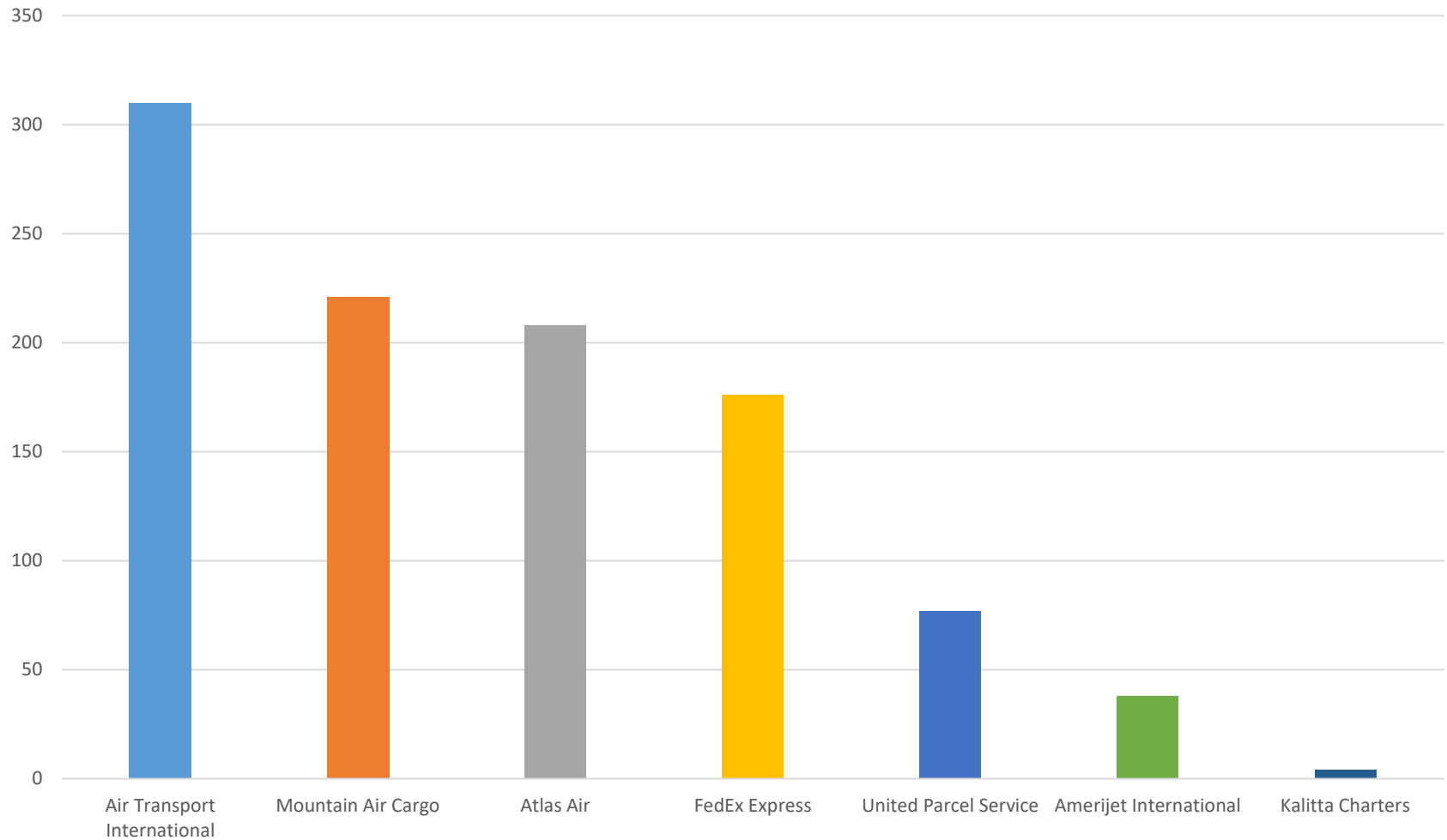


"Nighttime Hours" are from 10PM - 7AM

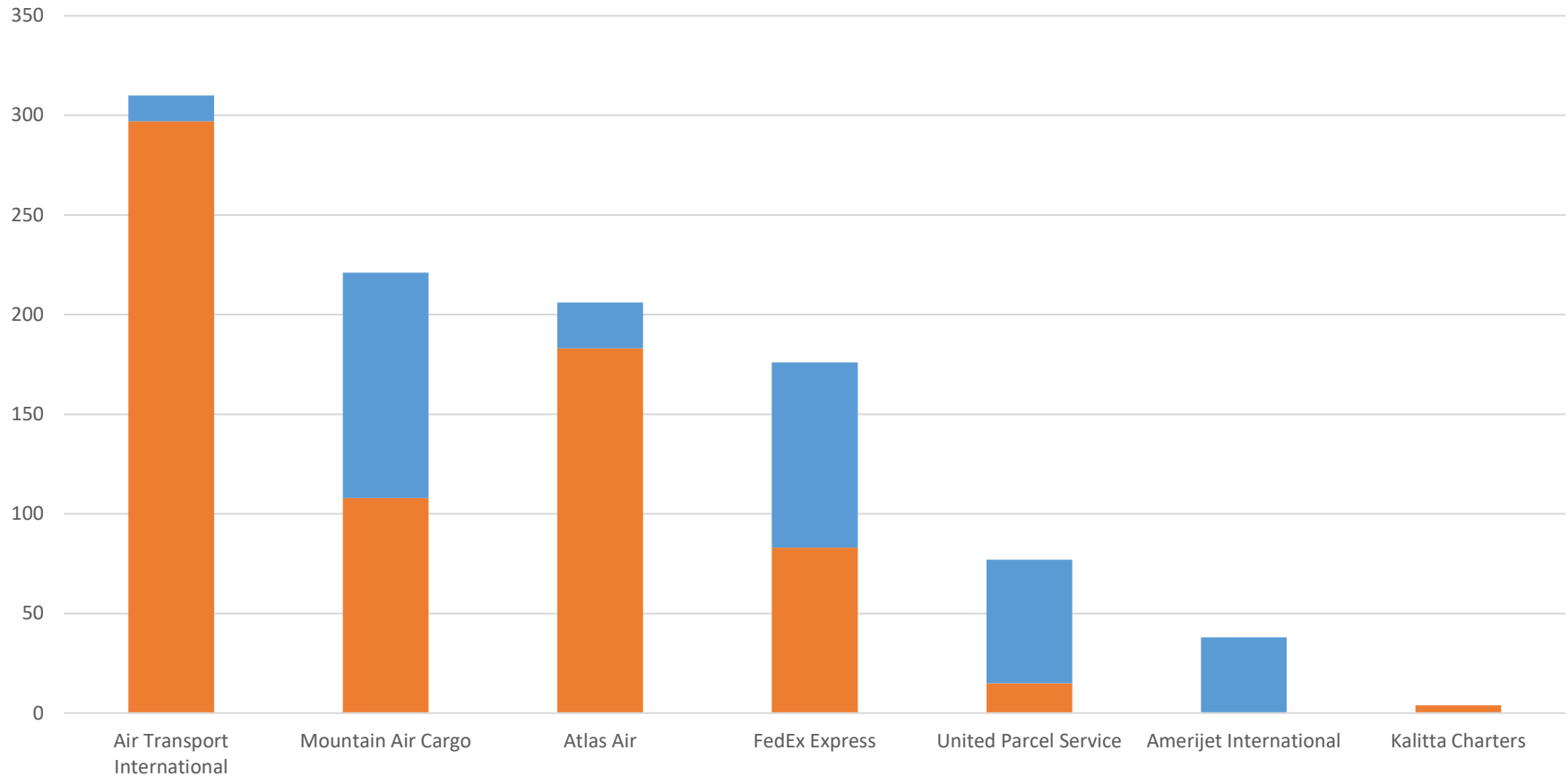
Total Operations: Southwest Airlines vs. Other



Total Operations: Cargo Operators



Cargo Operations: Daytime vs. Nighttime



"Nighttime Hours" are from 10PM - 7AM