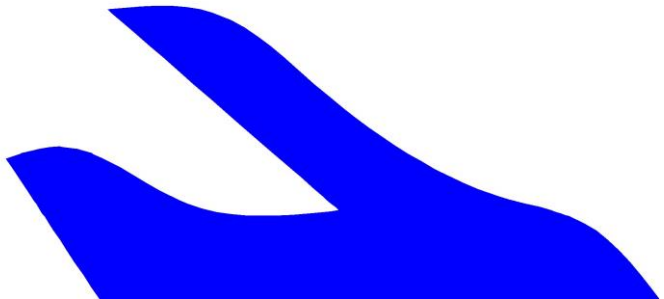
Aircraft Operations and Noise Exposure Monthly Report

June 2022



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Project Overview

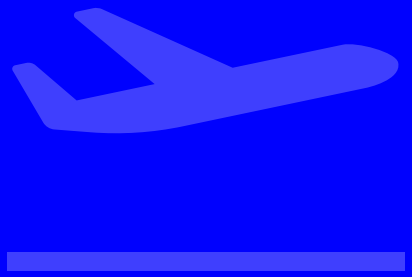
The growth in operations at BWI brings number social and economic impacts to communities surrounding the airport, however, this also results in significant noise impacts, especially for residents of Anne Arundel and Howard counties.

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

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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.

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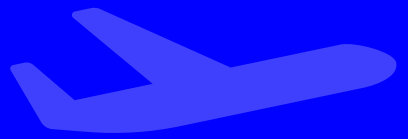
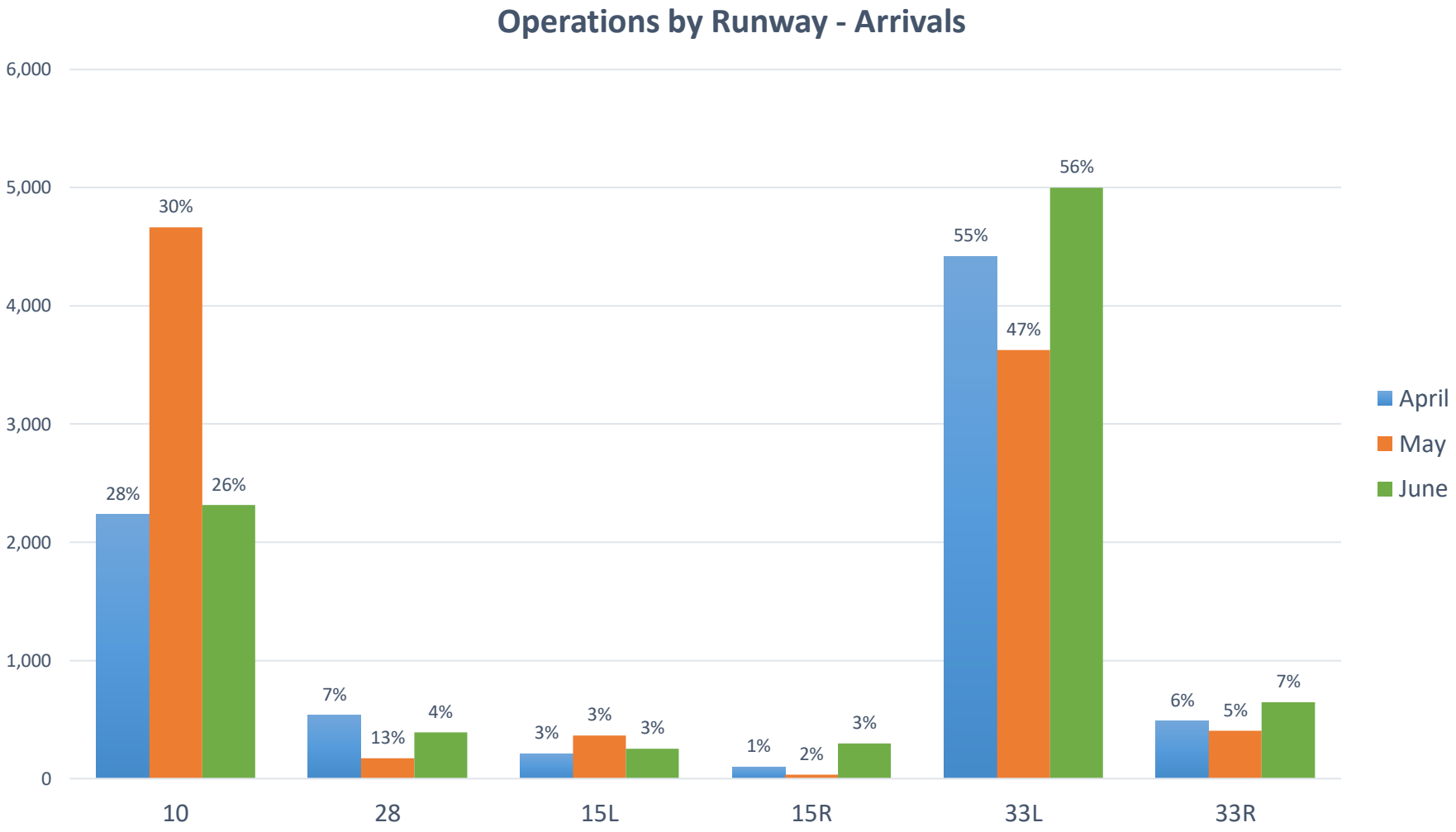
AIRPORT OPERATIONS DATA

Monthly Data



Runway Use - Arrivals



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Runway Use - Arrivals

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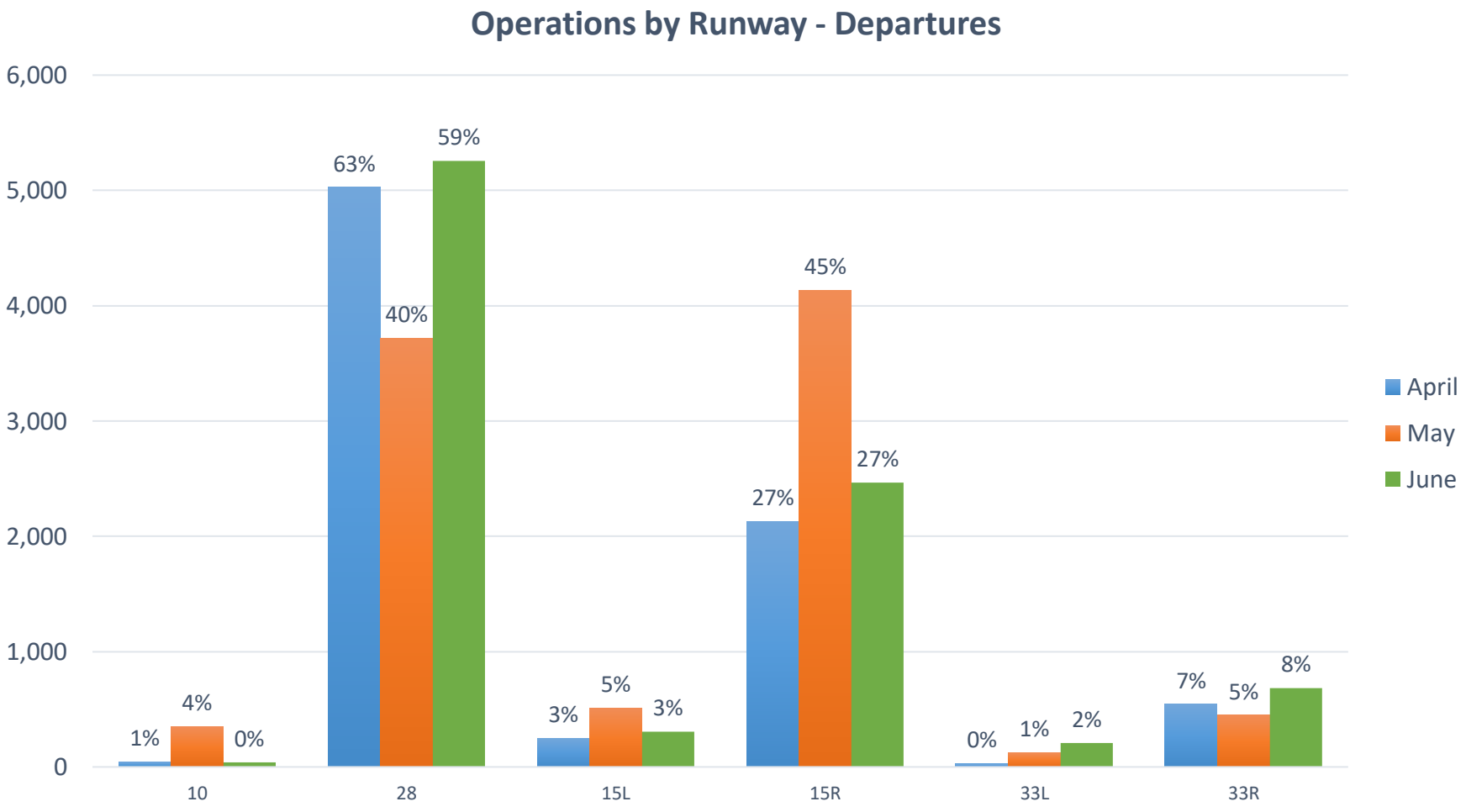
Runway Use - Departures



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Runway Use - Departures

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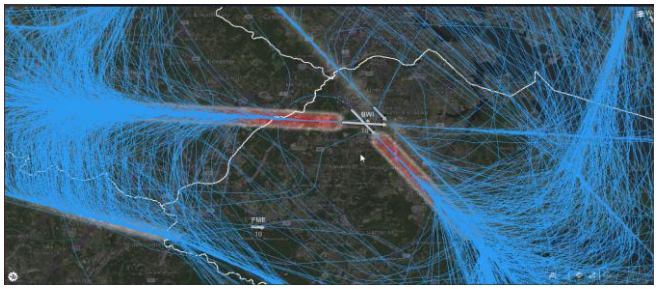
Density Analyses

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

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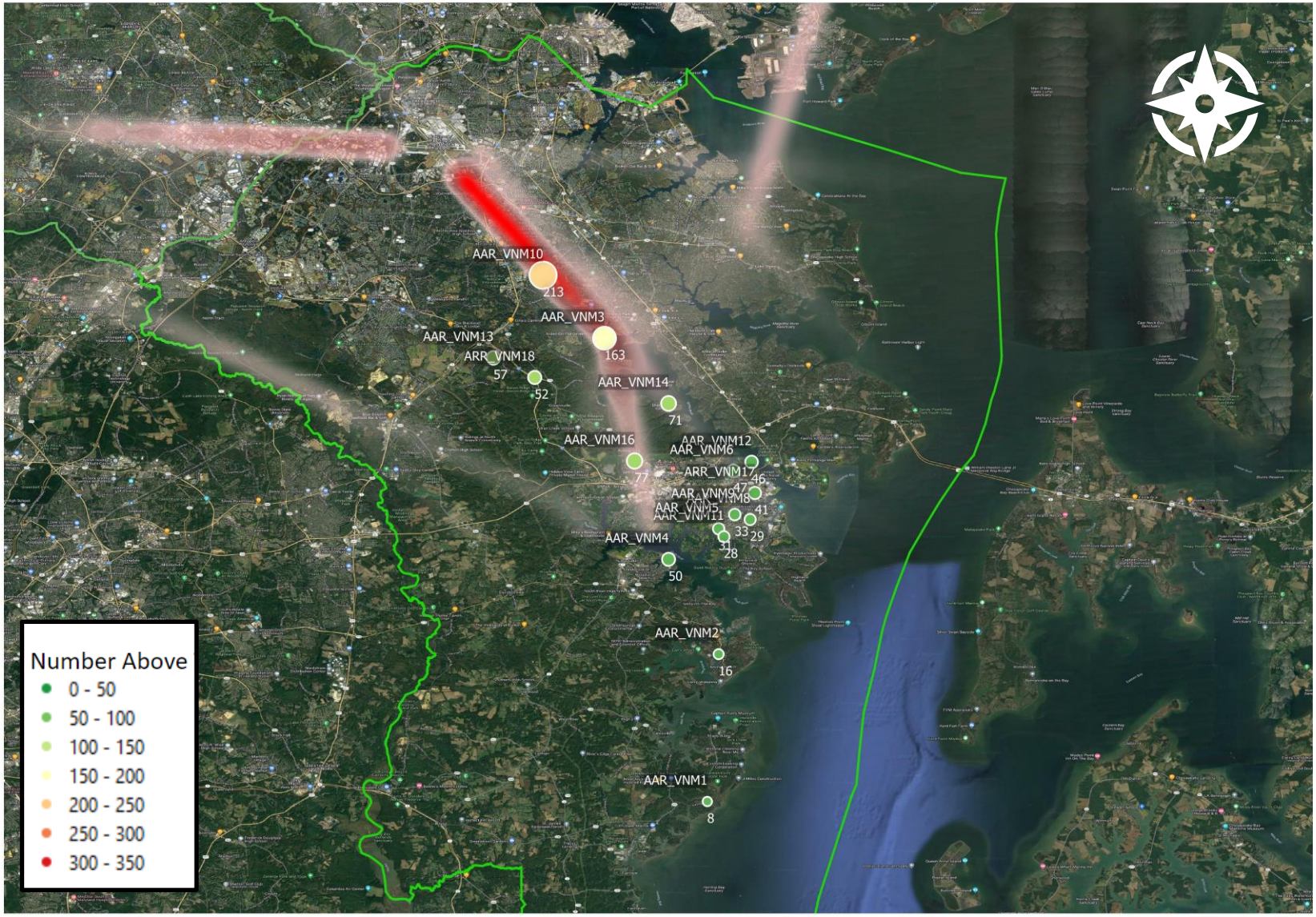
Flight Track Density Analysis – Arrivals (with NA55)

Anne Arundel County



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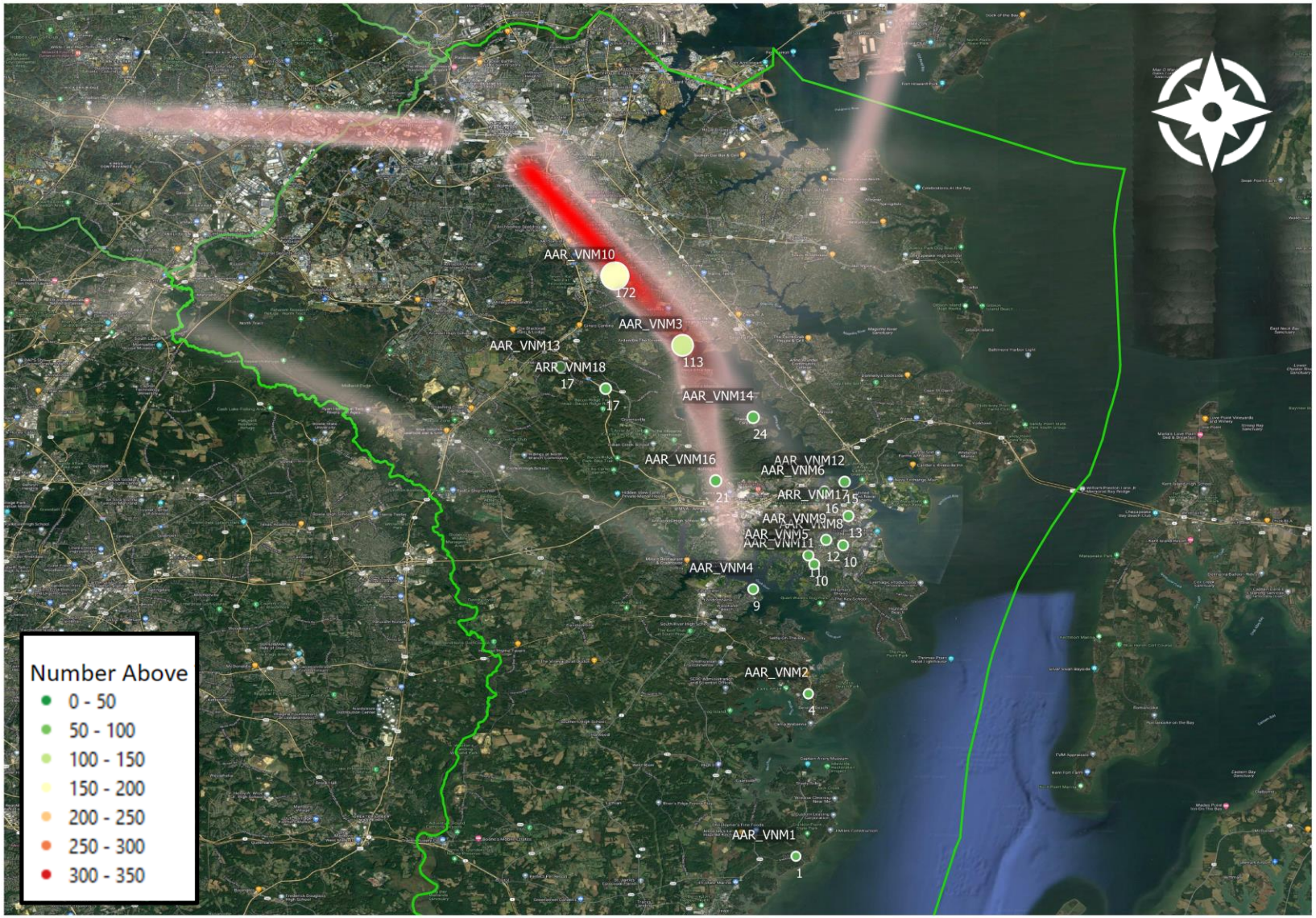
Flight Track Density Analysis – Arrivals (with NA65)

Anne Arundel County



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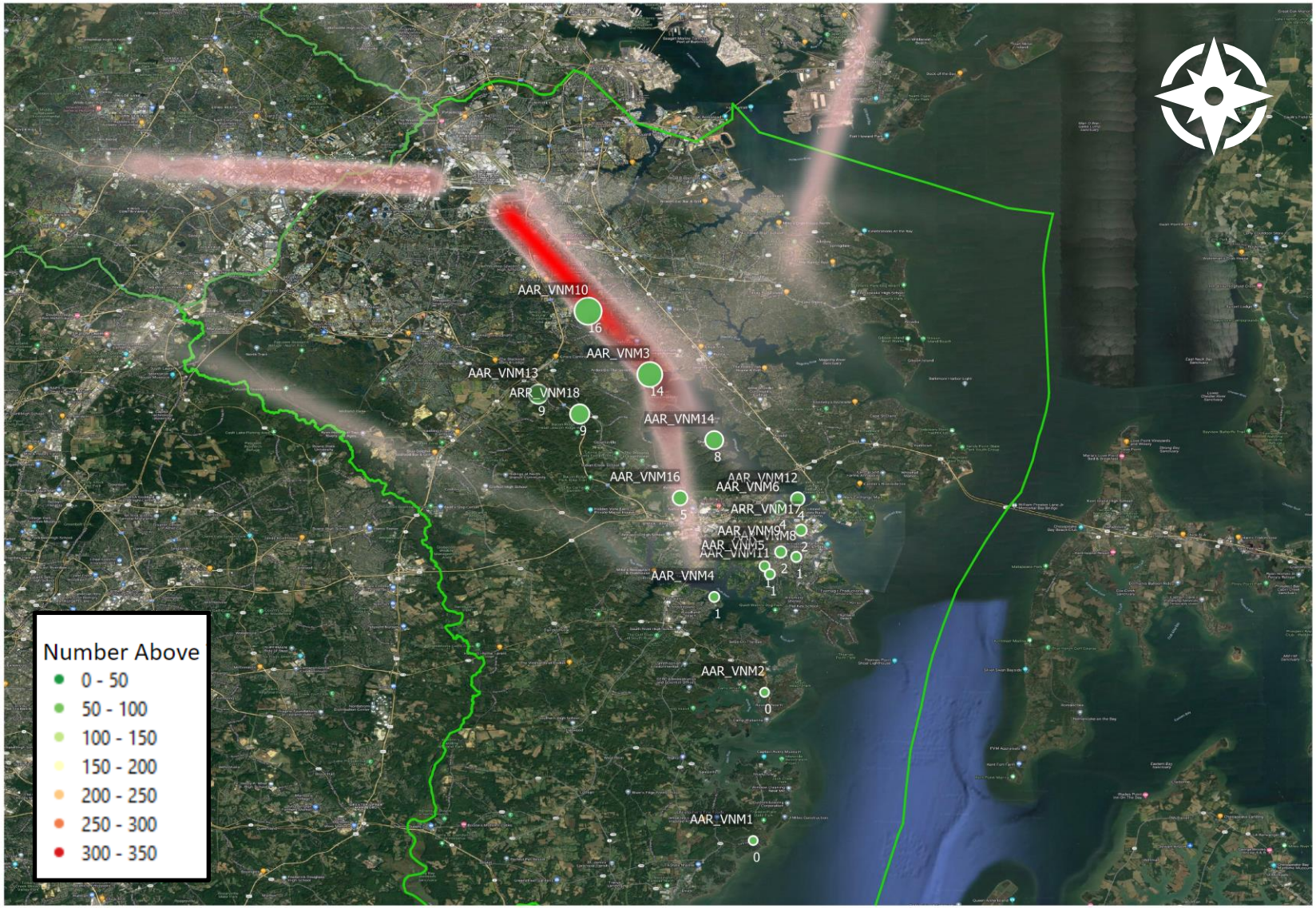
Flight Track Density Analysis – Arrivals (with NA75)

Anne Arundel County



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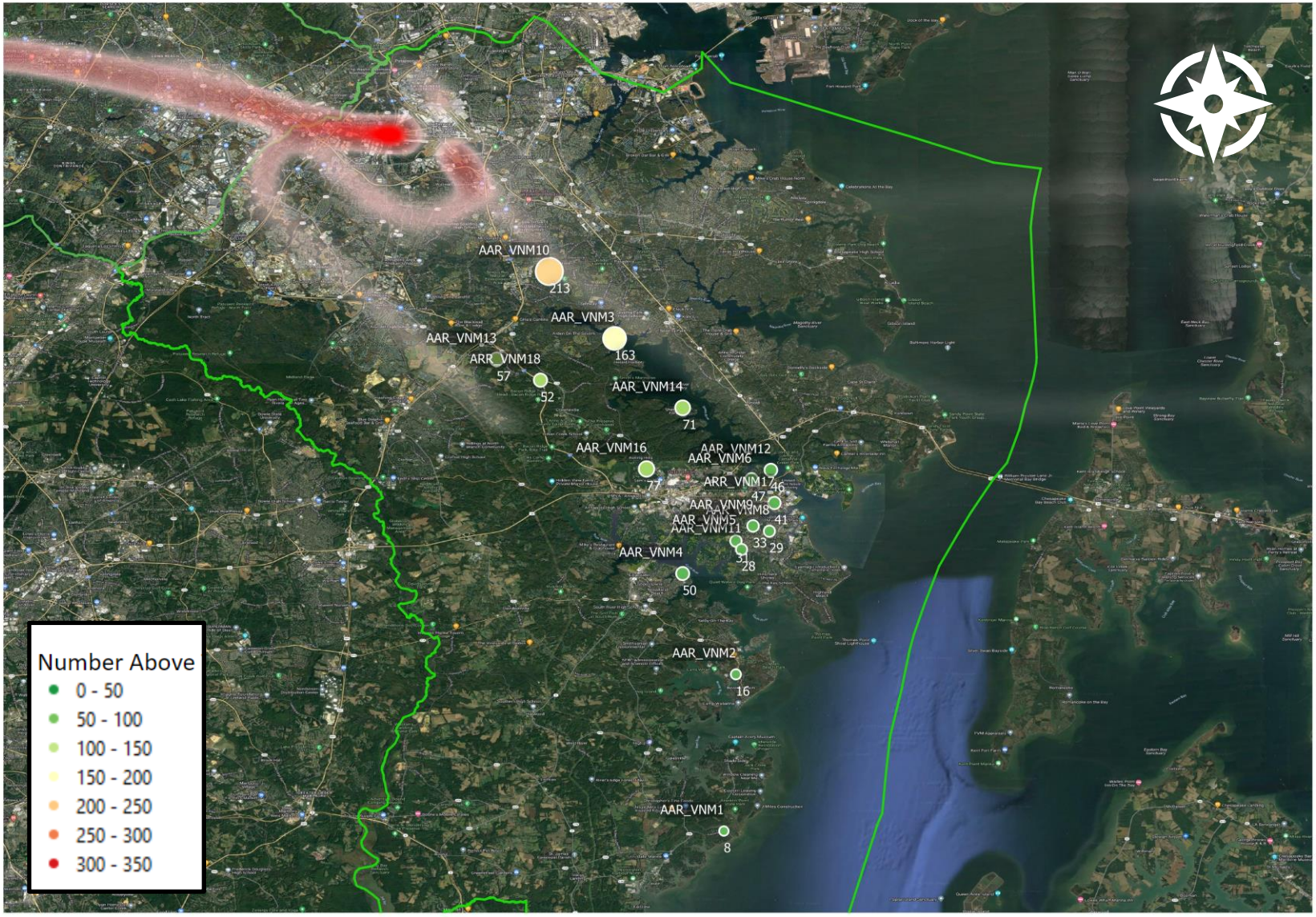
Flight Track Density Analysis – Departures (with NA55)

Anne Arundel County



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Flight Track Density Analysis – Departures (with NA65)

Anne Arundel County

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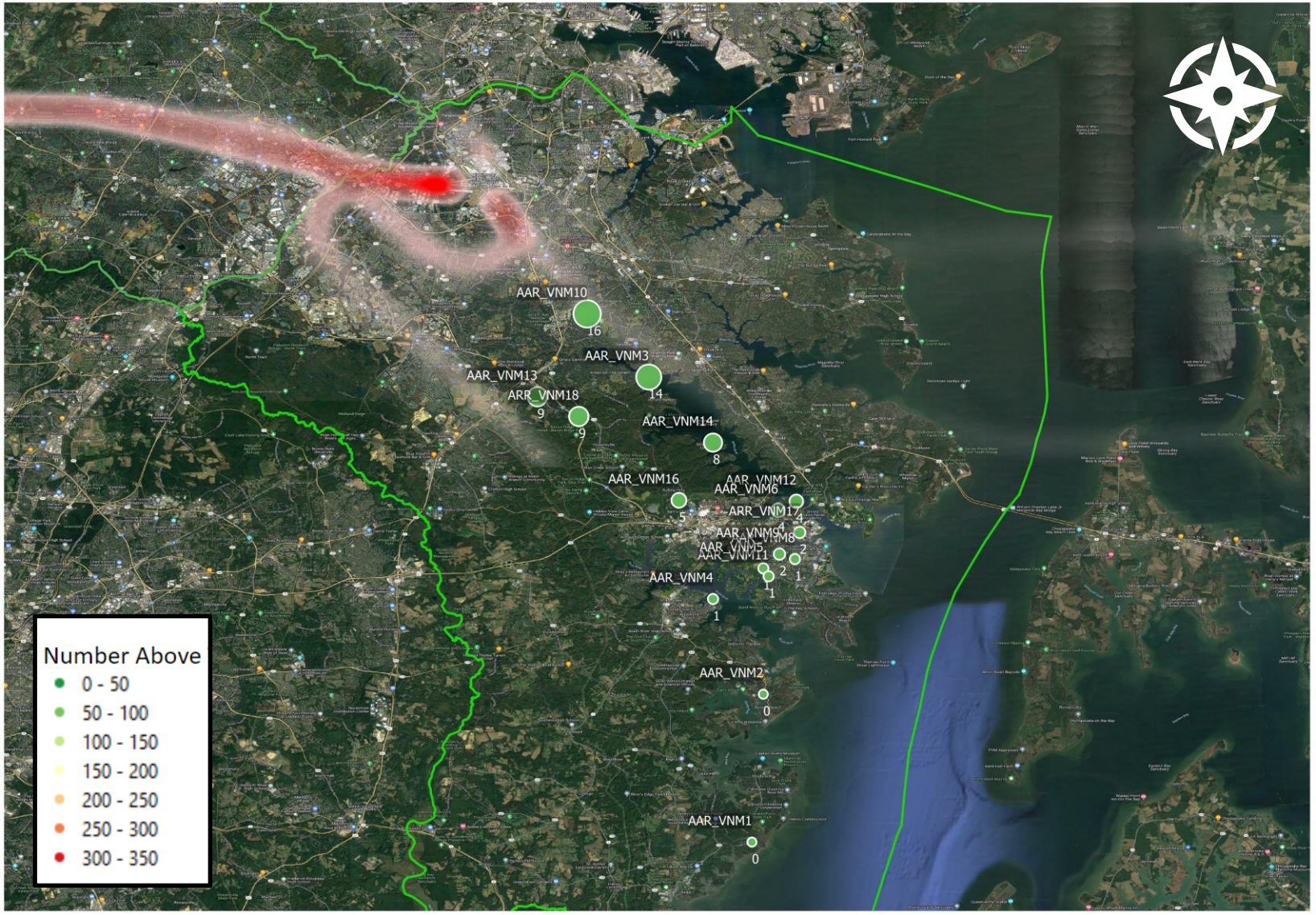
Flight Track Density Analysis – Departures (with NA75)

Anne Arundel County



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Flight Track Density Analysis – Arrivals (with NA55)

Howard County

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Flight Track Density Analysis – Arrivals (with NA65)

Howard County

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Flight Track Density Analysis – Arrivals (with NA75)

Howard County

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Flight Track Density Analysis – Departures (with NA55)

Howard County

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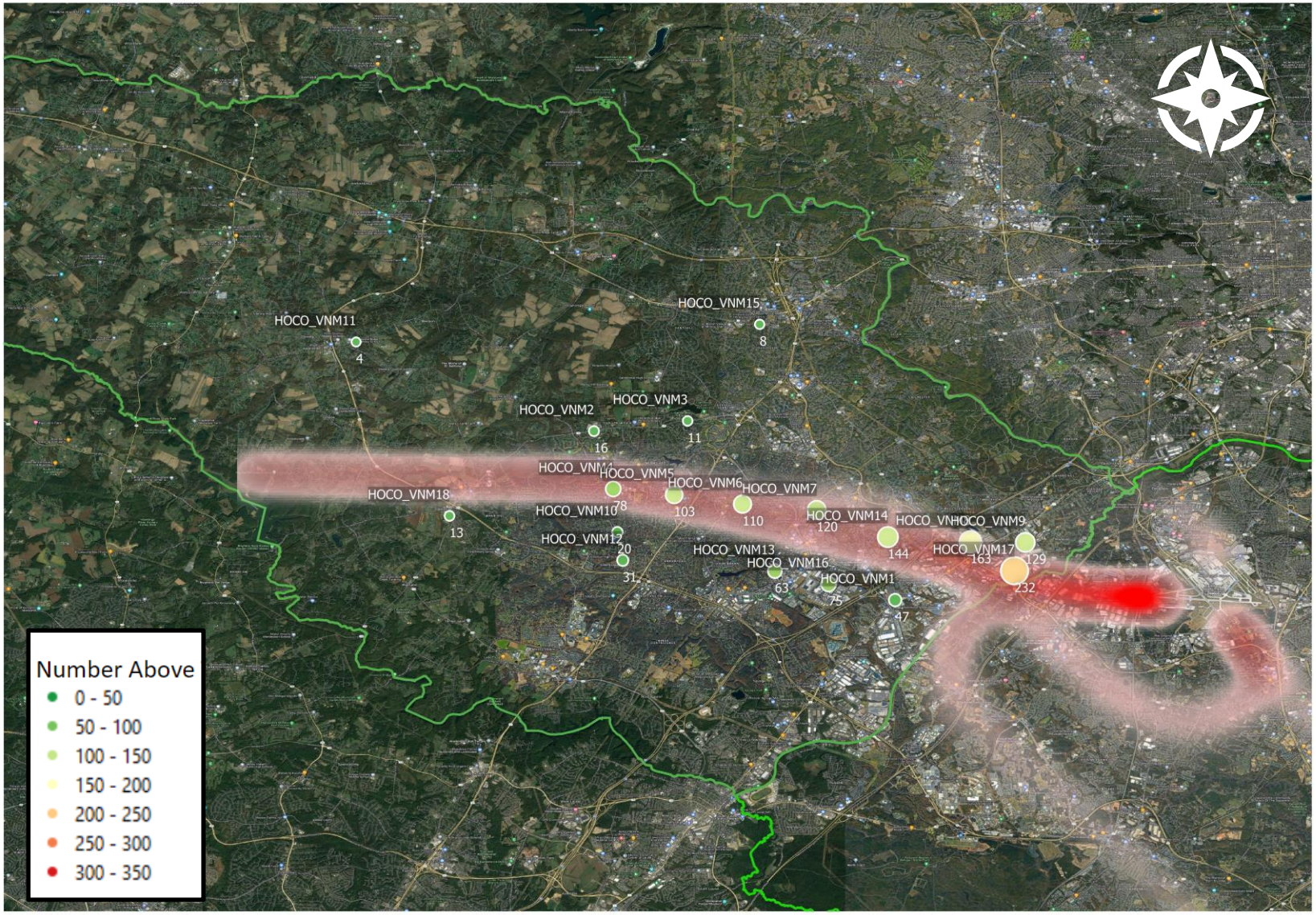
Flight Track Density Analysis – Departures (with NA65)

Howard County



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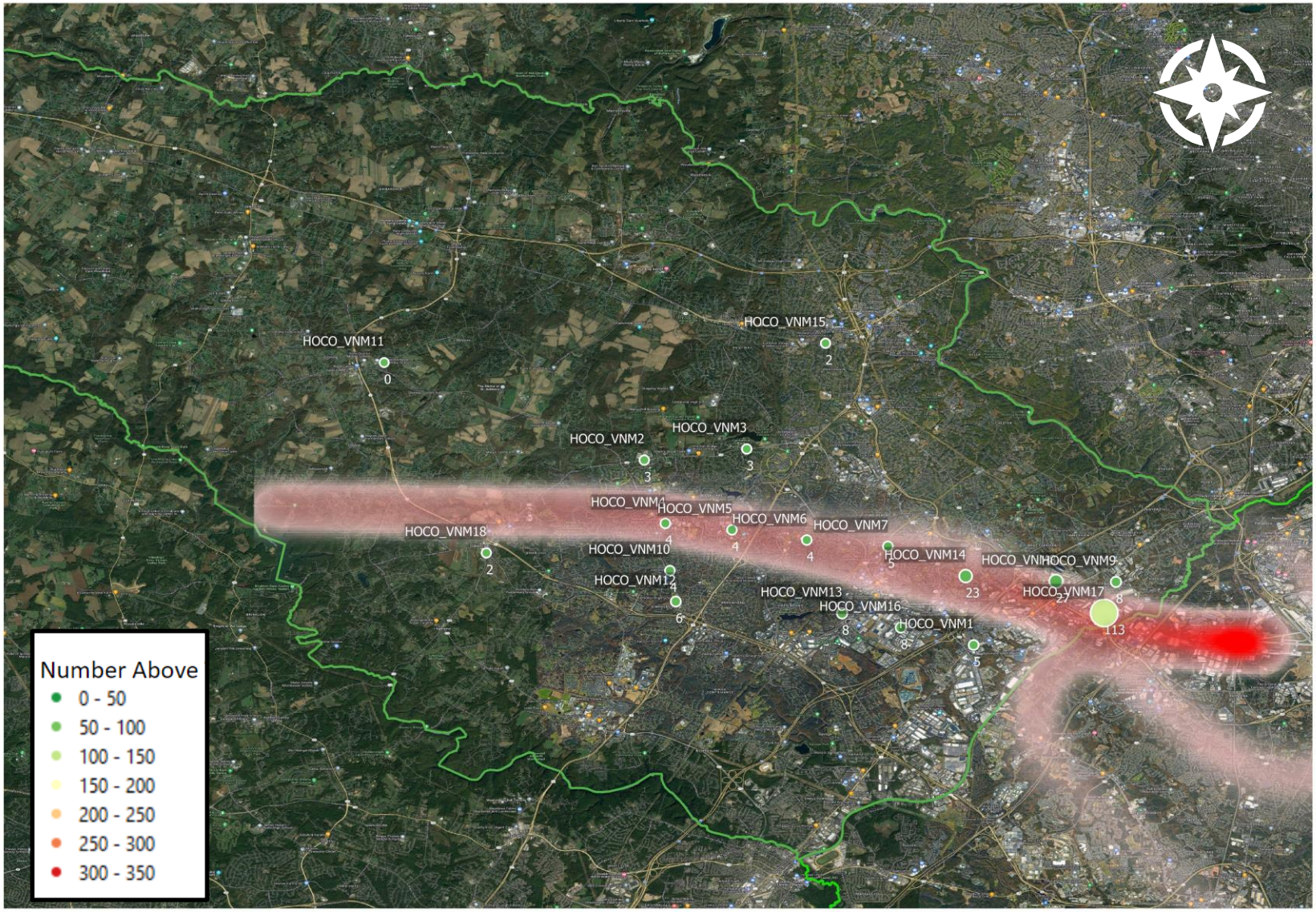
Flight Track Density Analysis – Departures (with NA75)

Howard County



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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.

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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.

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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).

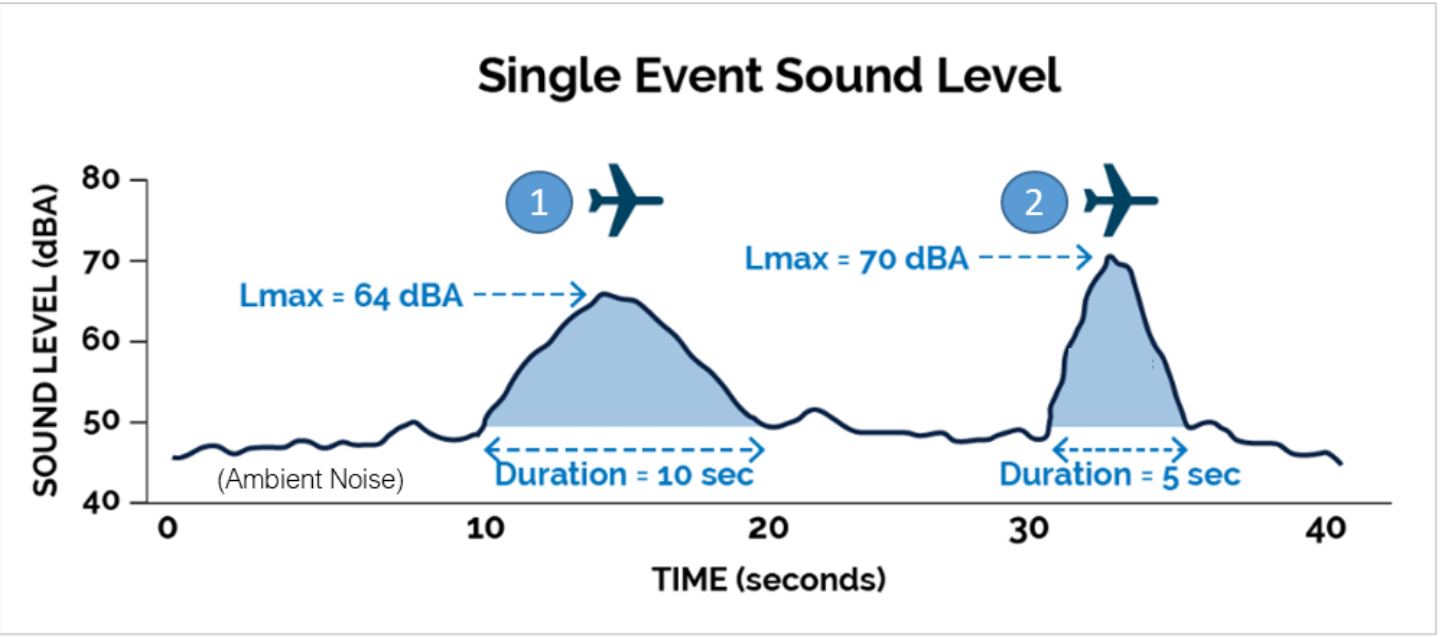
DNL is the standard metric used by the Federal Aviation Administration as required by federal regulation. The problem with DNL is it is difficult to understand and doesn’t seem to reflect what residents experience on a daily basis.

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/

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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

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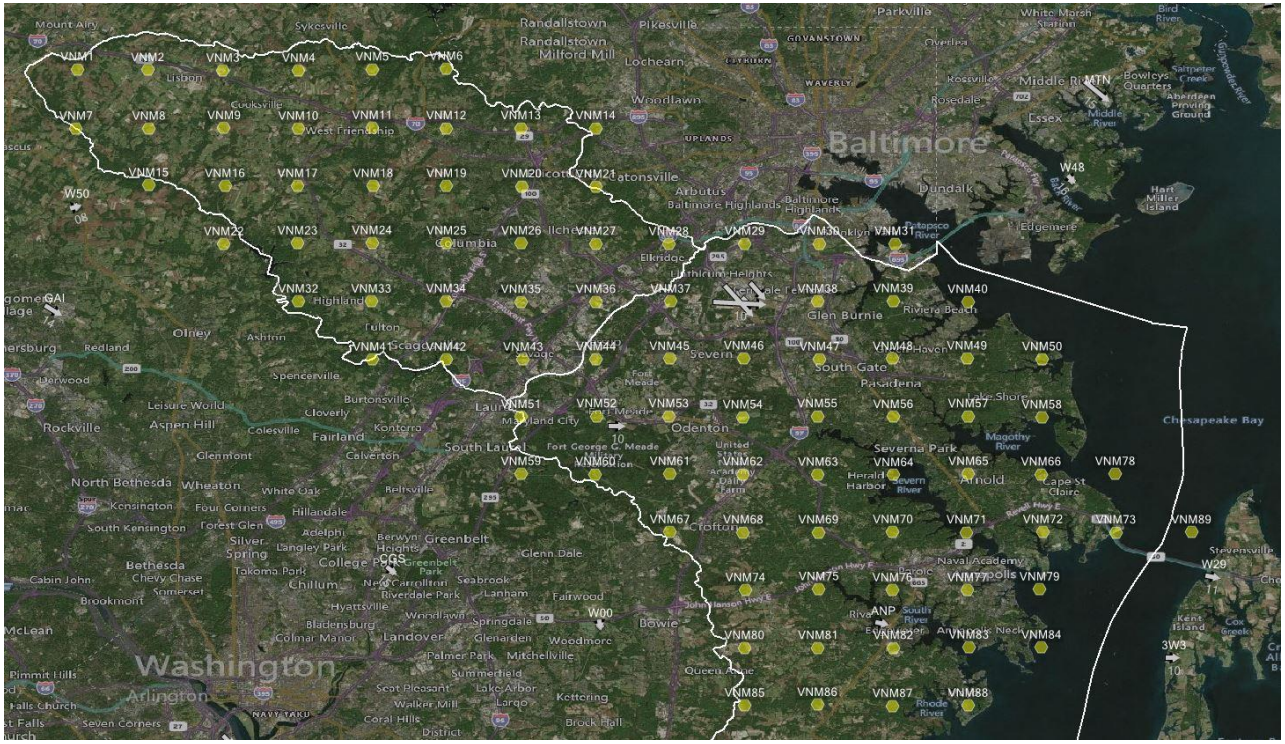
Noise Exposure – Virtual Noise Monitor Locations

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

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Noise Exposure – Virtual Noise Monitor Locations

(Landmark Locations)

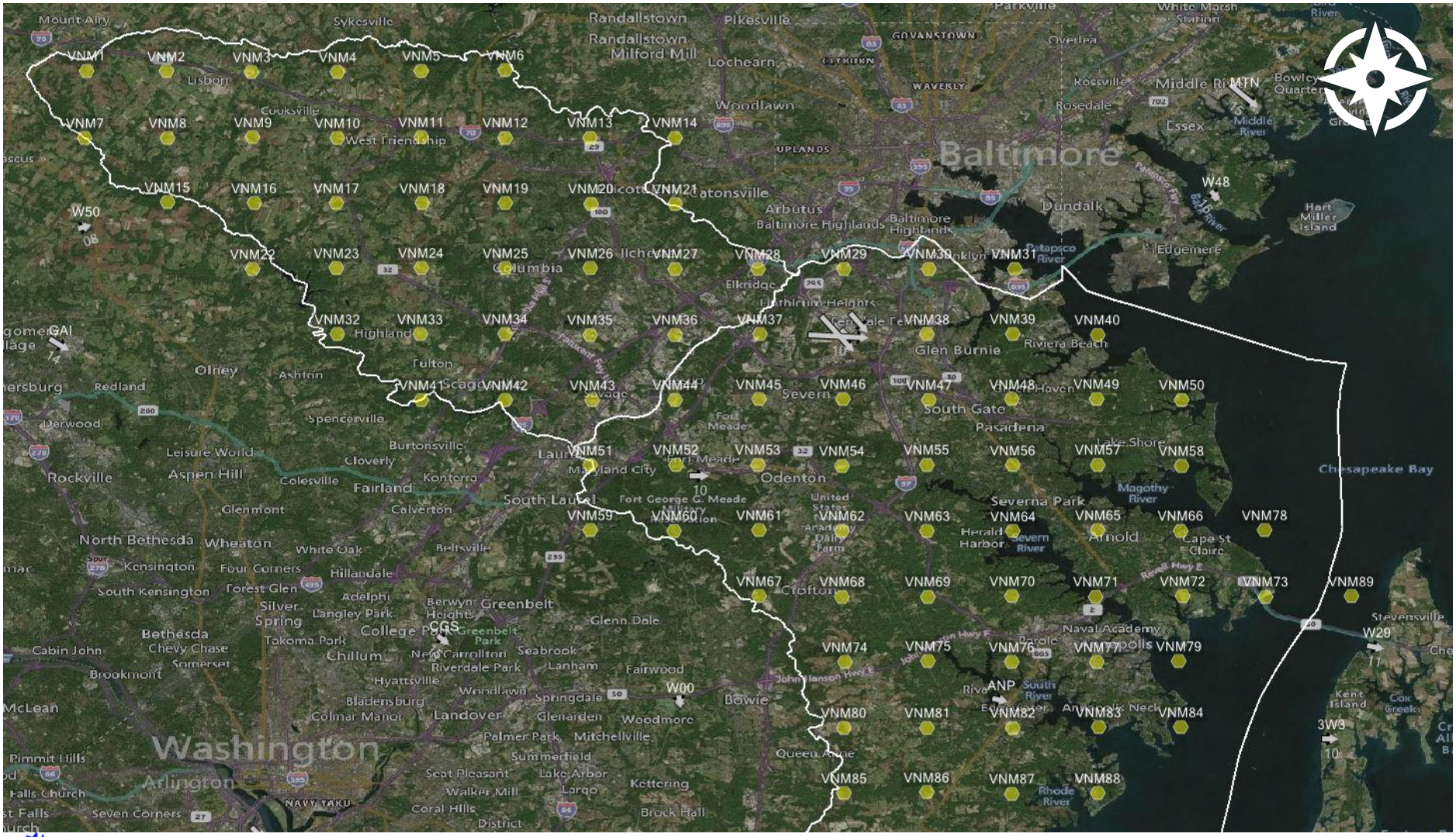
Howard County

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

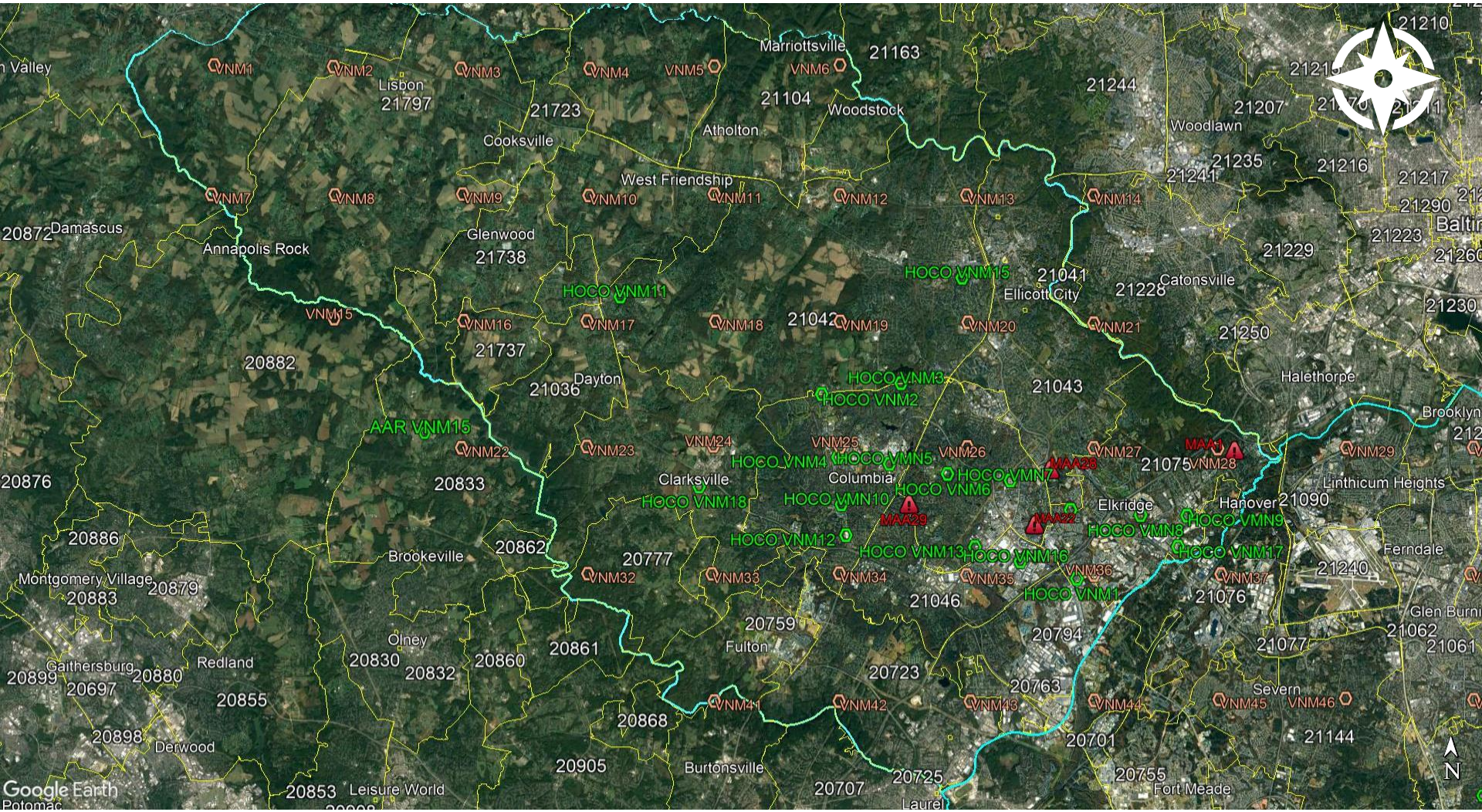
Anne Arundel County

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



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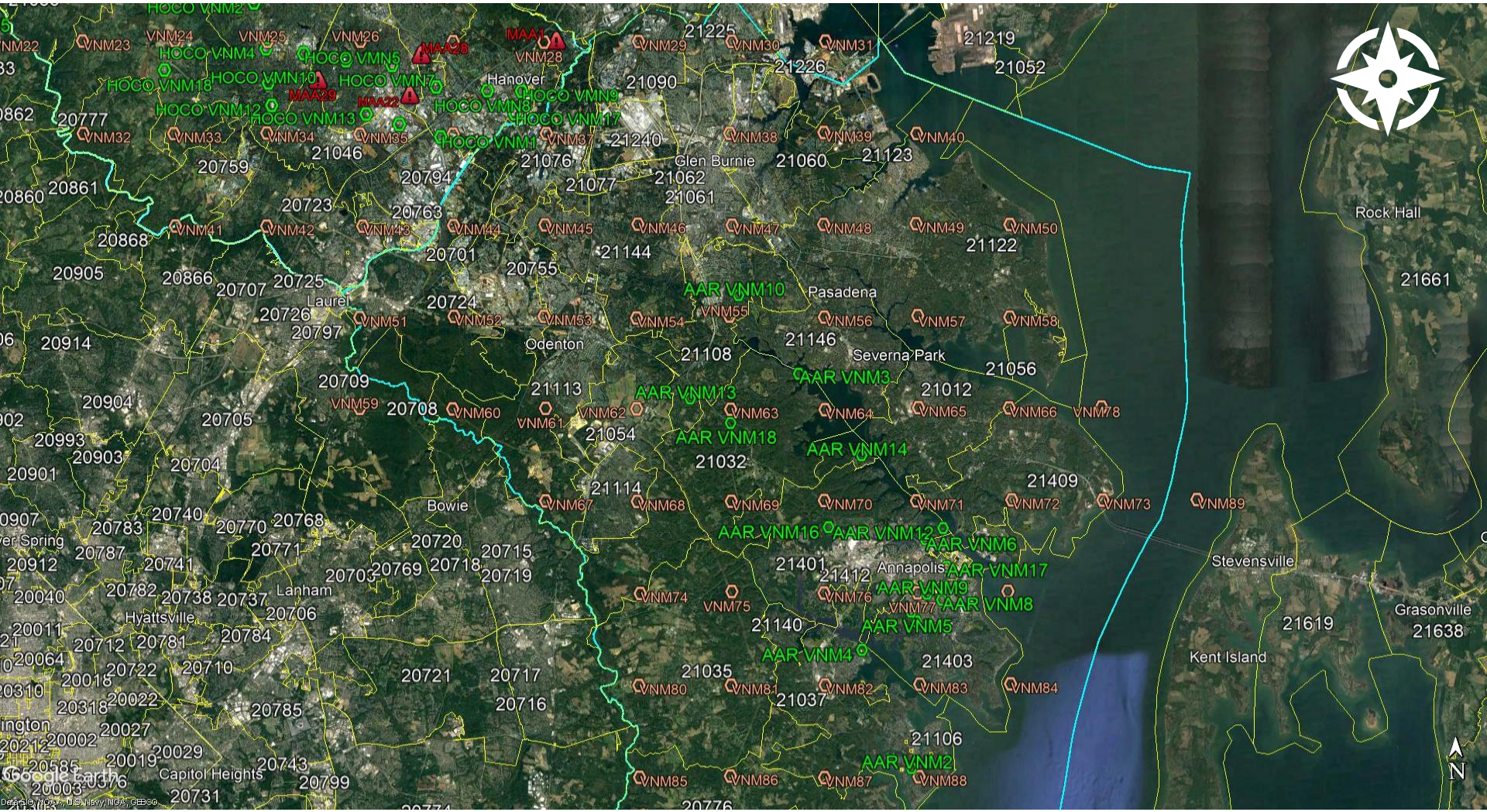
Virtual Noise Monitor Locations – Anne Arundel County



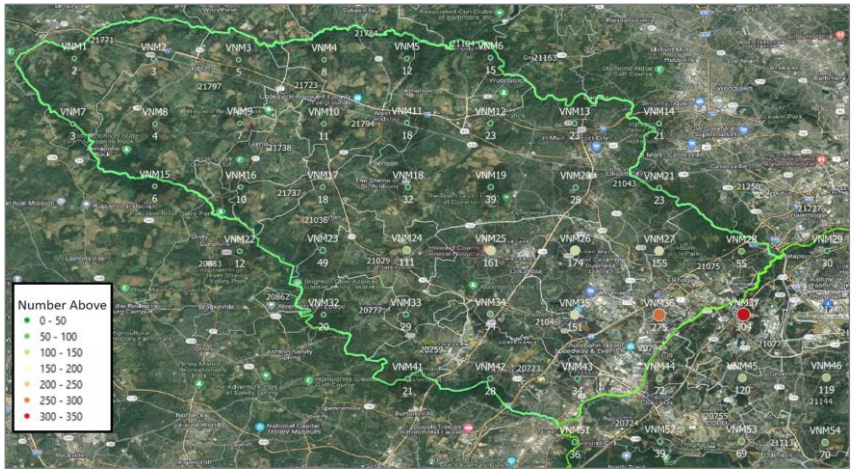
Noise Event Data
Number-of-Events-Above

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.

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	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



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Noise Exposure: Number-of-Events-Above

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

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM1	102	3	8	0	0	0
VNM2	145	5	8	0	0	0
VNM3	214	7	15	1	0	0
VNM4	291	10	48	2	0	0
VNM5	351	12	69	2	1	0
VNM6	455	15	92	3	7	0
VNM7	130	4	9	0	0	0
VNM8	201	7	14	0	0	0
VNM9	265	9	35	1	0	0
VNM10	344	11	73	2	2	0
VNM11	472	16	116	4	4	0
VNM12	640	21	177	6	12	0
VNM13	681	23	189	6	23	1
VNM14	888	30	226	8	24	1
VNM15	232	8	23	1	1	0
VNM16	316	11	69	2	3	0
VNM17	611	20	103	3	6	0
VNM18	961	32	204	7	20	1
VNM19	1200	40	294	10	60	2
VNM20	804	27	280	9	73	2
VNM21	674	22	258	9	70	2
VNM22	394	13	74	2	5	0
VNM23	3067	102	206	7	10	0
VNM24	4477	149	495	17	47	2
VNM25	5551	185	2511	84	103	3

Noise Exposure: Number-of-Events-Above

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

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM26	5655	189	1771	59	118	4
VNM27	5037	168	493	16	130	4
VNM28	1831	61	500	17	128	4
VNM29	1142	38	461	15	93	3
VNM30	776	26	349	12	56	2
VNM31	852	28	325	11	54	2
VNM32	621	21	150	5	12	0
VNM33	973	32	285	10	58	2
VNM34	1738	58	521	17	132	4
VNM35	5000	167	731	24	115	4
VNM36	9066	302	4472	149	231	8
VNM37	9828	328	8594	286	7262	242
VNM38	1456	49	815	27	225	8
VNM39	1213	40	435	15	150	5
VNM40	1413	47	440	15	89	3
VNM41	638	21	256	9	46	2
VNM42	888	30	389	13	94	3
VNM43	1050	35	511	17	126	4
VNM44	2383	79	1113	37	150	5
VNM45	3937	131	1443	48	177	6
VNM46	3672	122	2196	73	1400	47
VNM47	5140	171	1643	55	305	10
VNM48	1477	49	621	21	273	9
VNM49	2454	82	764	25	188	6
VNM50	1300	43	443	15	109	4

Noise Exposure: Number-of-Events-Above

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

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM51	1233	41	400	13	66	2
VNM52	966	32	429	14	77	3
VNM53	2244	75	1283	43	119	4
VNM54	2297	77	519	17	230	8
VNM55	4346	145	831	28	191	6
VNM56	2738	91	994	33	238	8
VNM57	1837	61	771	26	282	9
VNM58	1292	43	486	16	137	5
VNM59	669	22	270	9	16	1
VNM60	1675	56	440	15	27	1
VNM61	942	31	379	13	74	2
VNM62	1837	61	558	19	183	6
VNM63	1265	42	519	17	272	9
VNM64	4102	137	1109	37	287	10
VNM65	1791	60	643	21	245	8
VNM66	1061	35	449	15	132	4
VNM67	1203	40	298	10	34	1
VNM68	1753	58	403	13	84	3
VNM69	1537	51	458	15	154	5
VNM70	2315	77	712	24	194	6
VNM71	1639	55	497	17	144	5
VNM72	1065	36	373	12	78	3
VNM73	618	21	217	7	4	0
VNM74	1080	36	258	9	26	1
VNM75	1517	51	358	12	63	2

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Noise Exposure: Number-of-Events-Above

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

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
VNM76	2147	72	404	13	78	3
VNM77	998	33	356	12	56	2
VNM78	759	25	276	9	20	1
VNM79	836	28	236	8	21	1
VNM80	613	20	130	4	2	0
VNM81	821	27	169	6	5	0
VNM82	670	22	180	6	4	0
VNM83	551	18	173	6	7	0
VNM84	520	17	138	5	2	0
VNM85	421	14	85	3	1	0
VNM86	449	15	97	3	2	0
VNM87	469	16	106	4	2	0
VNM88	454	15	100	3	1	0
VNM89	490	16	126	4	1	0

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Noise Exposure: Number-of-Events-Above
(Anne Arundel County Landmark VNMs)

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
AAR_VNM1	242	8	16	1	0	0
AAR_VNM2	466	16	105	4	2	0
AAR_VNM3	4894	163	3396	113	425	14
AAR_VNM4	1500	50	268	9	19	1
AAR_VNM5	940	31	318	11	41	1
AAR_VNM6	1422	47	469	16	117	4
AAR_VNM7	131	4	10	0	0	0
AAR_VNM8	872	29	314	10	38	1
AAR_VNM9	978	33	346	12	52	2
AAR_VNM10	6394	213	5145	172	476	16
AAR_VNM11	844	28	293	10	29	1
AAR_VNM12	1383	46	437	15	115	4
AAR_VNM13	1701	57	499	17	269	9
AAR_VNM14	2137	71	720	24	238	8
ARR_VNM15	317	11	70	2	4	0
AAR_VNM16	2306	77	621	21	161	5
ARR_VNM17	1227	41	375	13	68	2
ARR_VNM18	1547	52	510	17	274	9

Noise Exposure: Number-of-Events-Above
(Howard County Landmark VNMs)

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	Total Events	Daily Average	Total Events	Daily Average	Total Events	Daily Average
HOCO_VNM1	8606	287	1410	47	151	5
HOCO_VNM2	4874	162	470	16	84	3
HOCO_VNM3	4530	151	329	11	103	3
HOCO_VNM4	5560	185	2341	78	116	4
HOCO_VNM5	5748	192	3077	103	127	4
HOCO_VNM6	5889	196	3297	110	130	4
HOCO_VNM7	5924	197	3603	120	135	5
HOCO_VNM8	7365	246	4880	163	821	27
HOCO_VNM9	7499	250	3858	129	253	8
HOCO_VNM10	5677	189	608	20	128	4
HOCO_VNM11	631	21	110	4	7	0
HOCO_VNM12	5053	168	934	31	184	6
HOCO_VNM13	6709	224	1887	63	229	8
HOCO_VNM14	6028	201	4310	144	692	23
HOCO_VNM15	710	24	251	8	55	2
HOCO_VNM16	6907	230	2245	75	248	8
HOCO_VNM17	9757	325	6961	232	3398	113
HOCO_VNM18	3971	132	375	13	49	2

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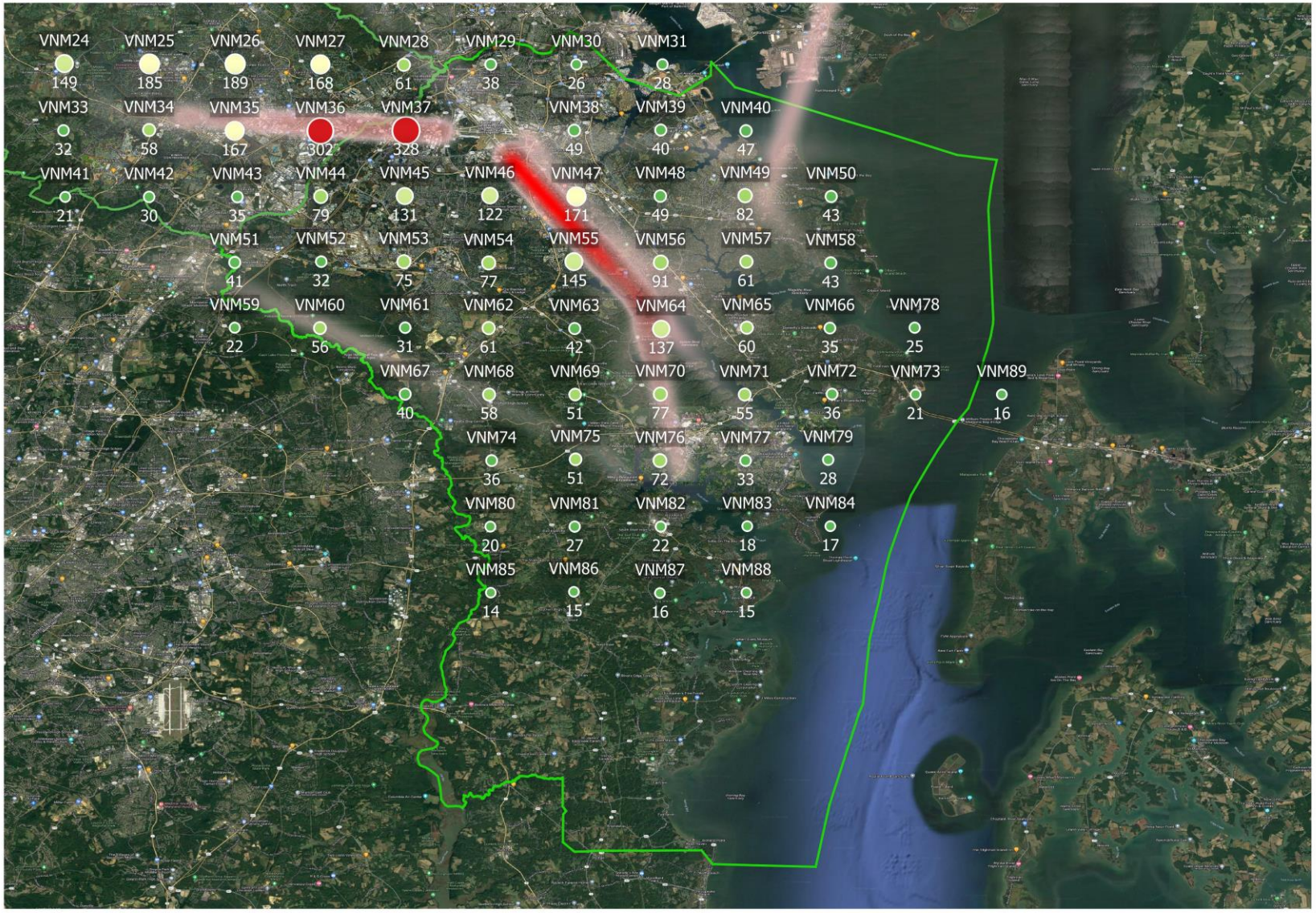
Noise Exposure: Number-of-Events-Above 55 dBA *(Daily Average)*

Anne Arundel County – Arrivals Heat Map



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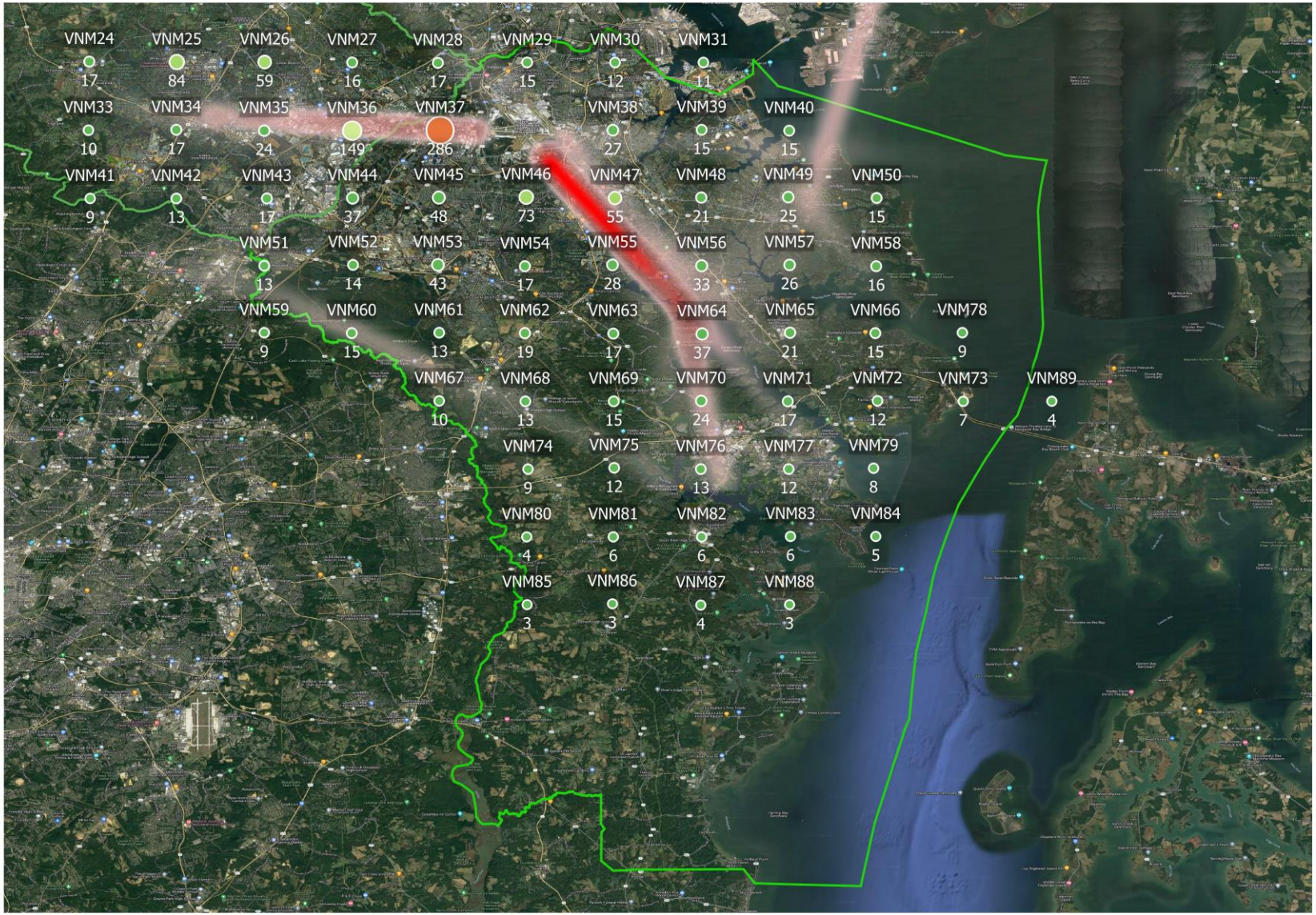
Noise Exposure: Number-of-Events-Above 65 dBA *(Daily Average)*

Anne Arundel County – Arrivals Heat Map



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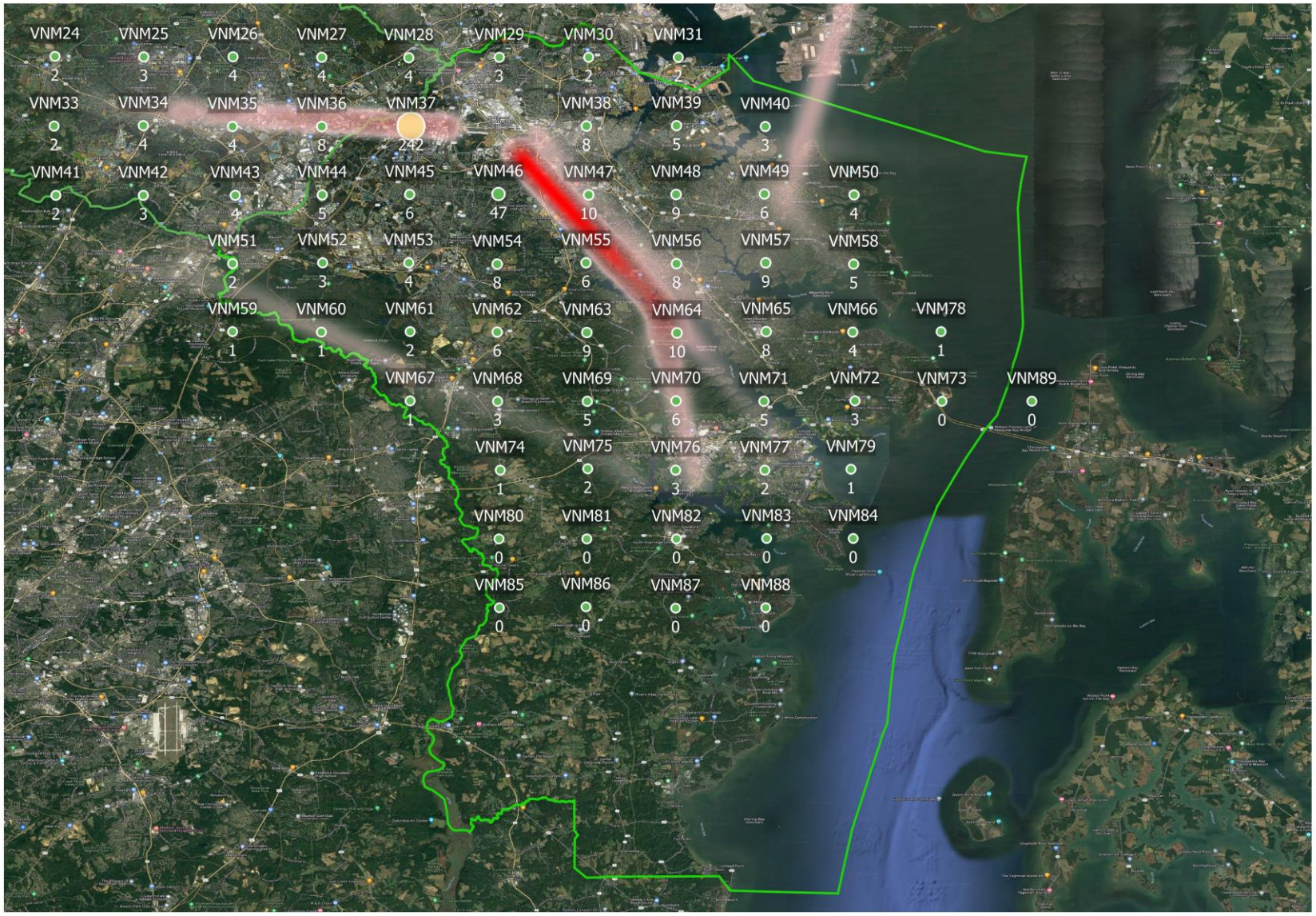
Noise Exposure: Number-of-Events-Above 75 dBA *(Daily Average)*

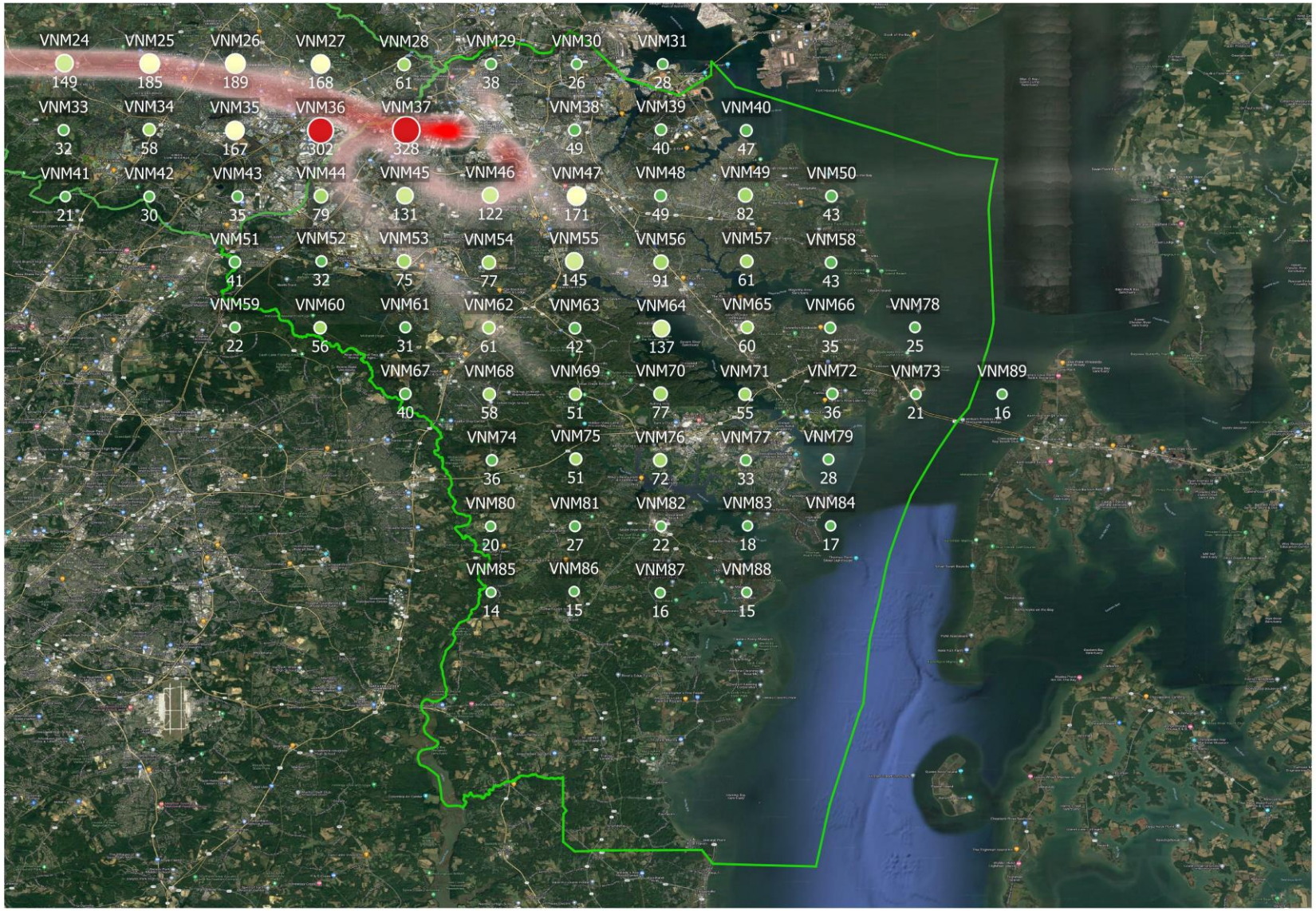
Anne Arundel County – Arrivals Heat Map



vianair

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

Anne Arundel County – Departures Heat Map



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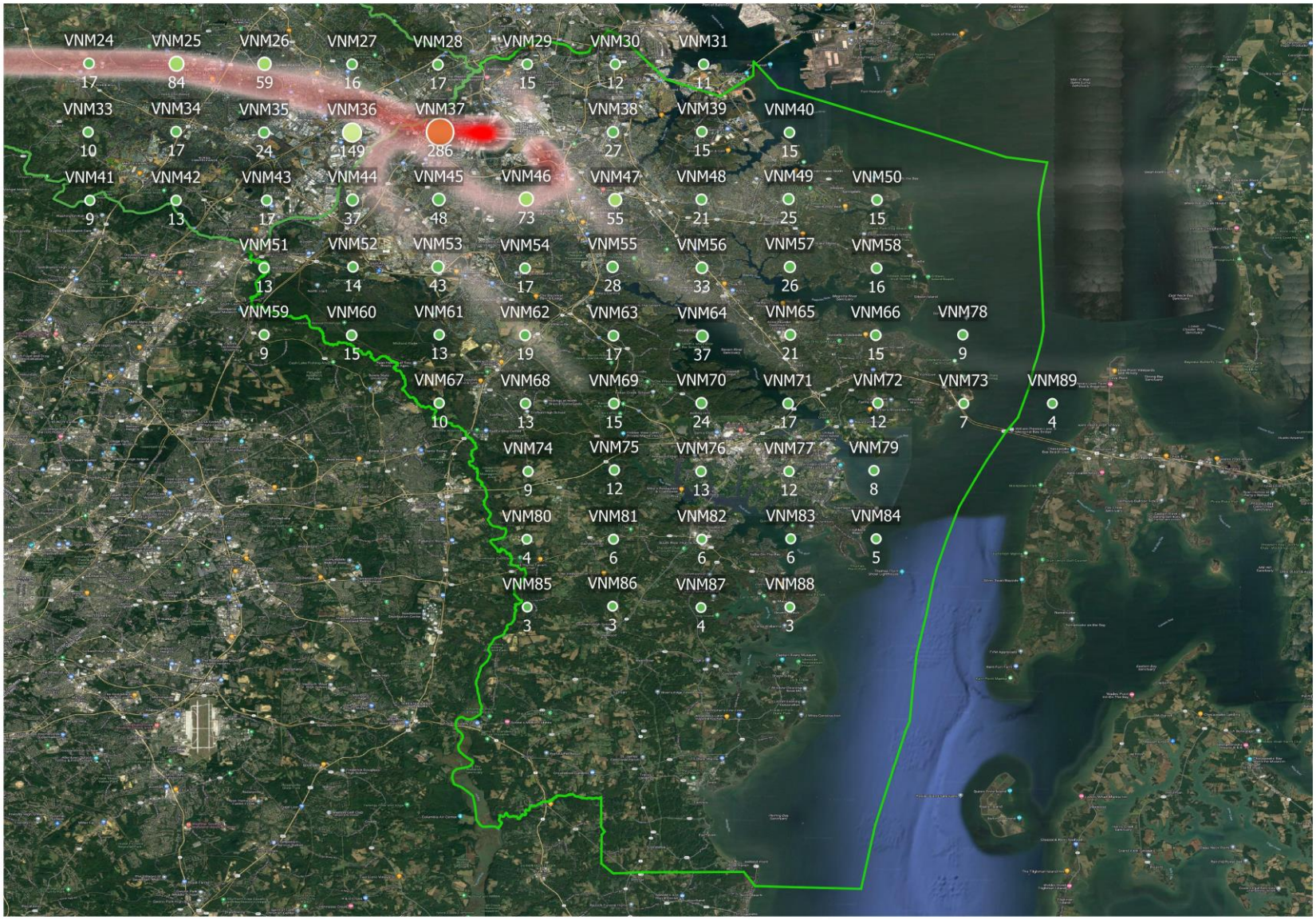
Noise Exposure: Number-of-Events-Above 65 dBA *(Daily Average)*

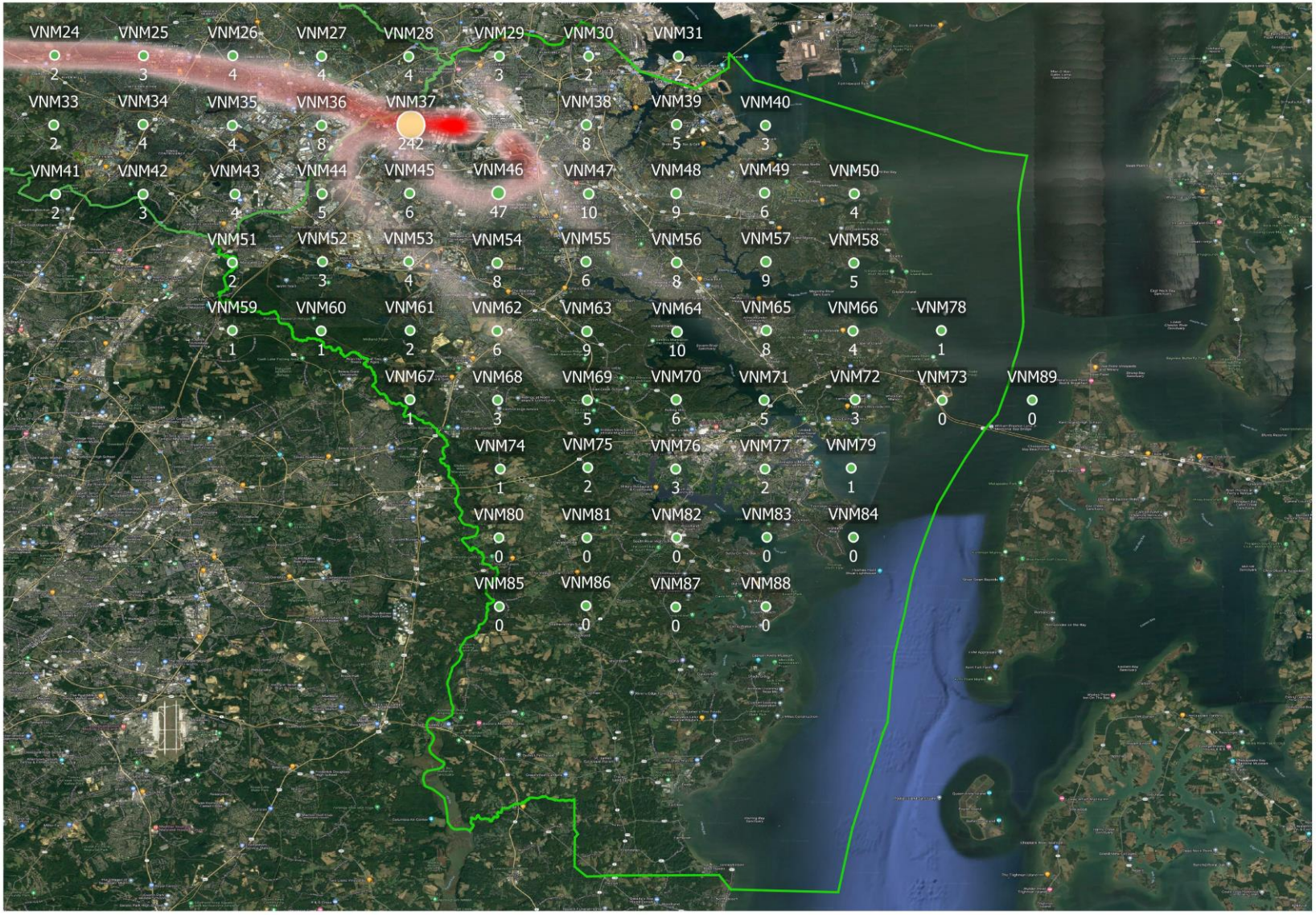
Anne Arundel County – Departures Heat Map



vianair

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

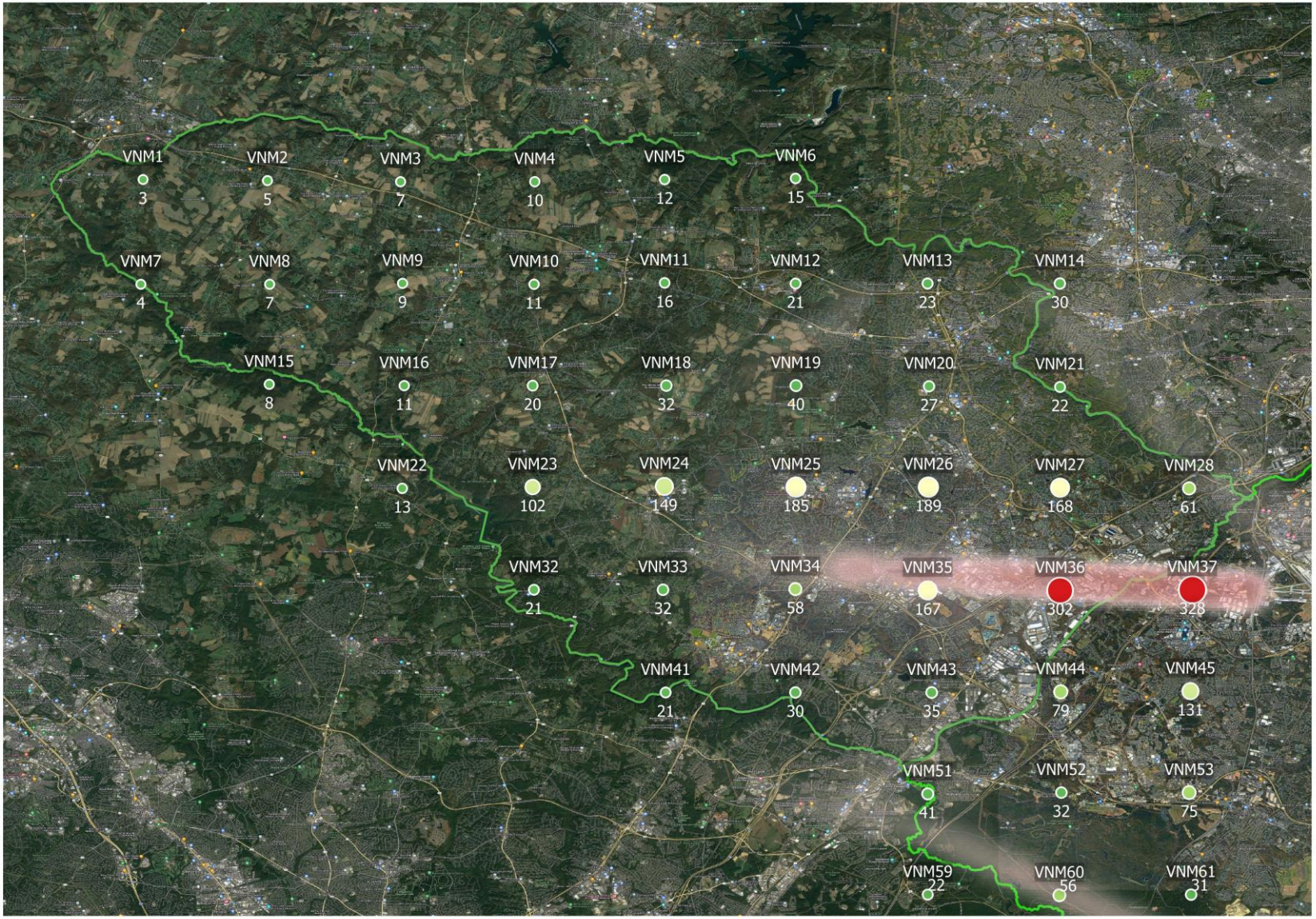
Anne Arundel County – Departures Heat Map



vianair

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

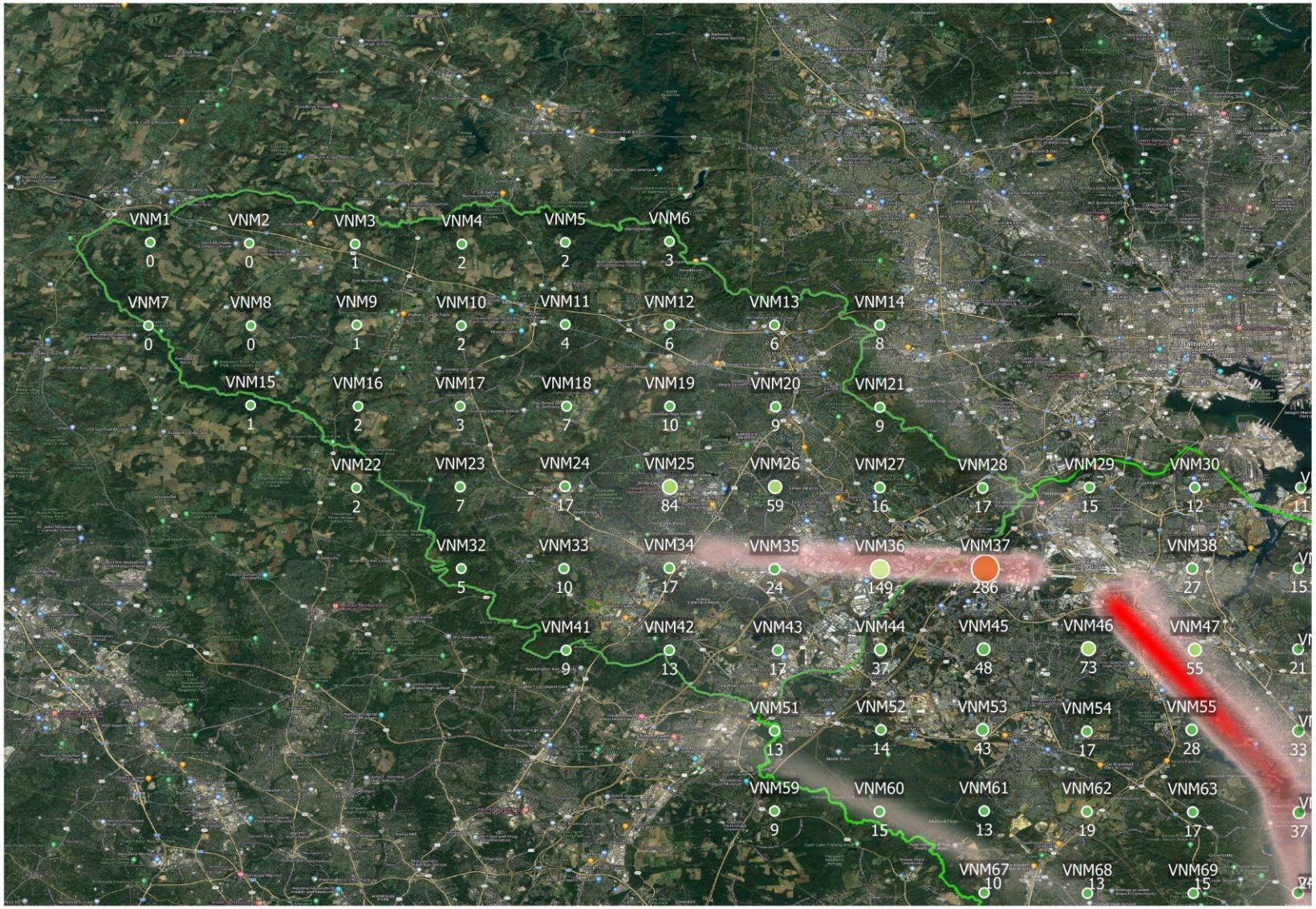
Howard County – Arrivals Heat Map



vianair

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

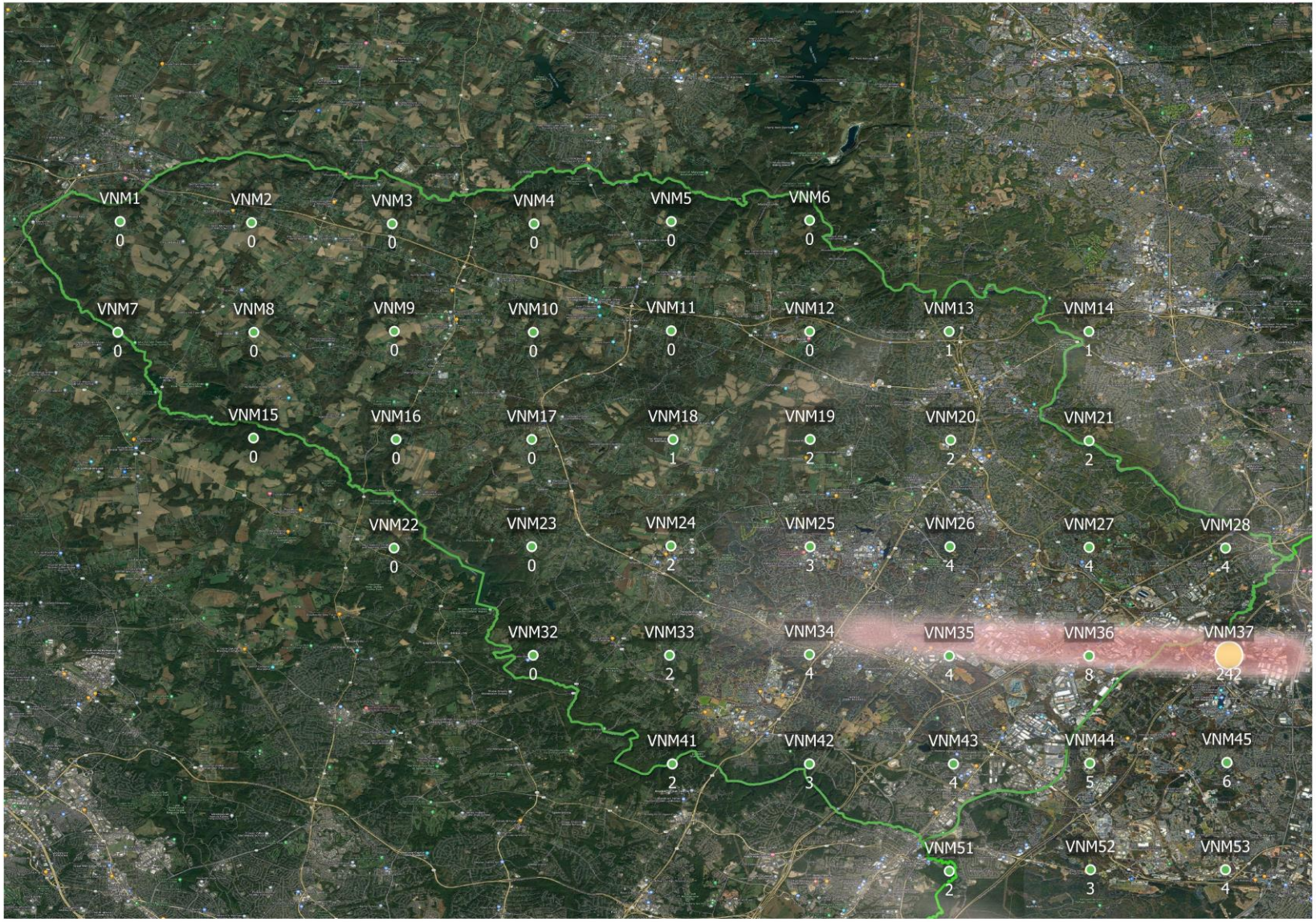
Howard County – Arrivals Heat Map



vianair

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

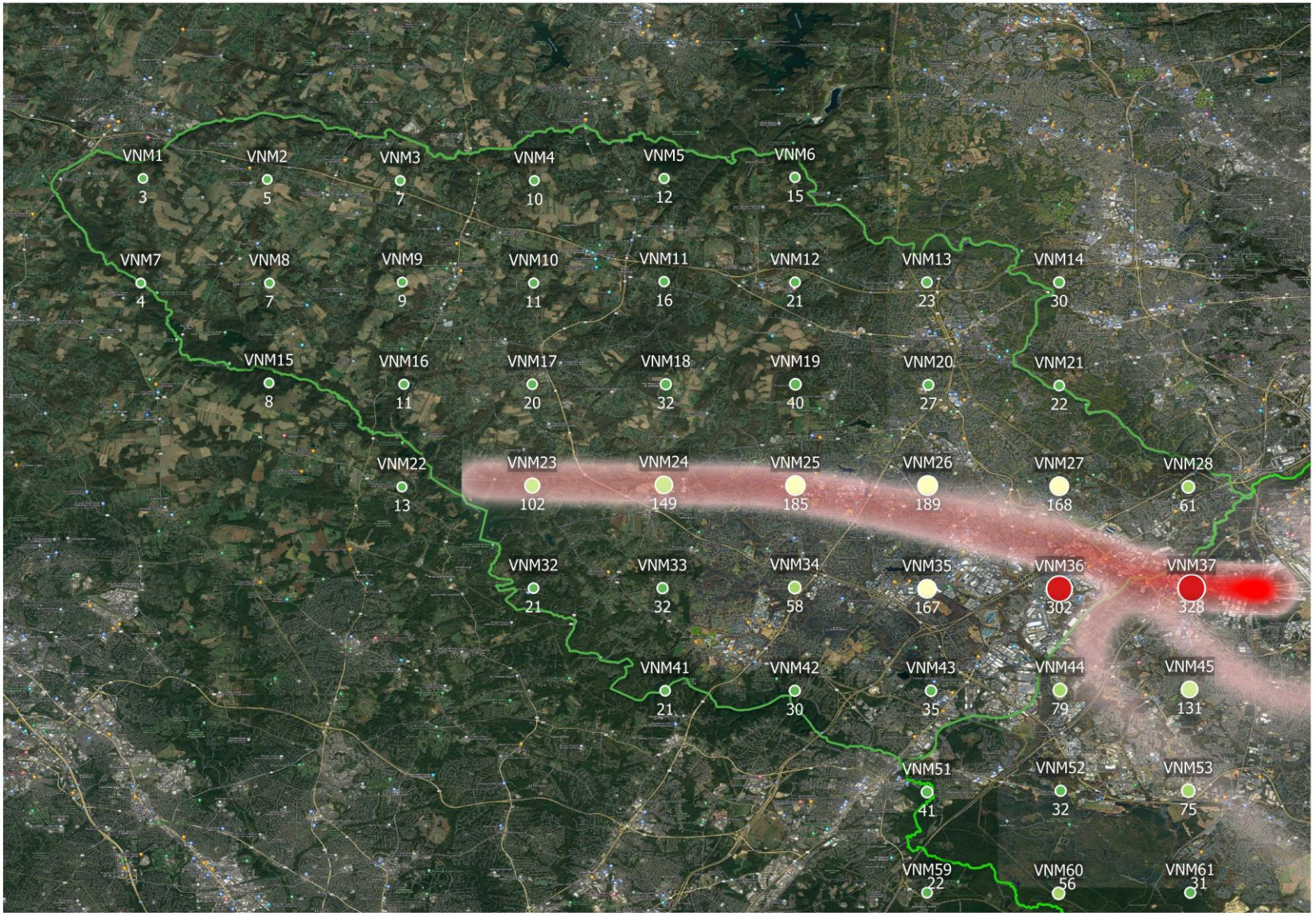
Howard County – Arrivals Heat Map



vianair

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

Howard County – Departures Heat Map



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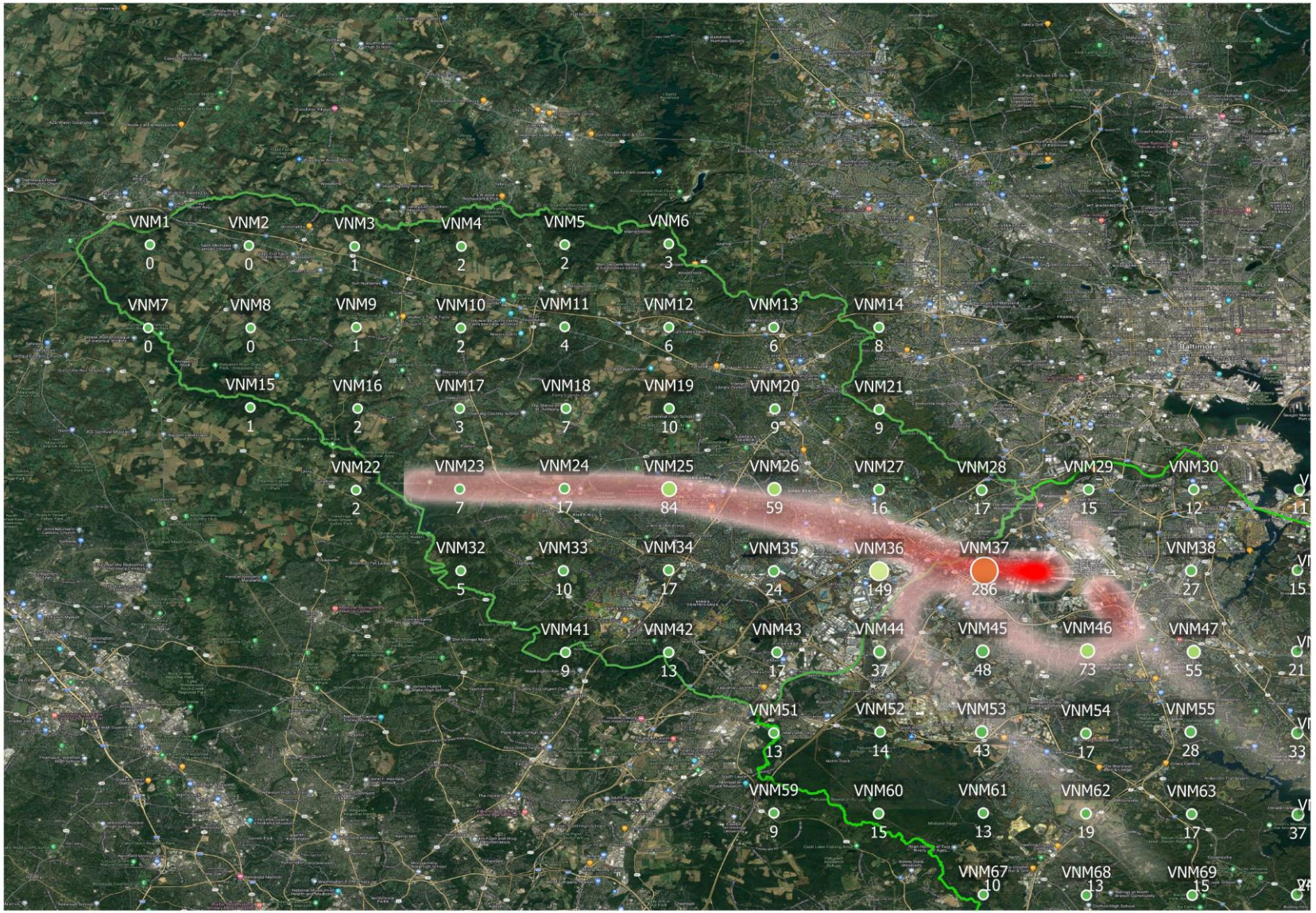
Noise Exposure: Number-of-Events-Above 65 dBA *(Daily Average)*

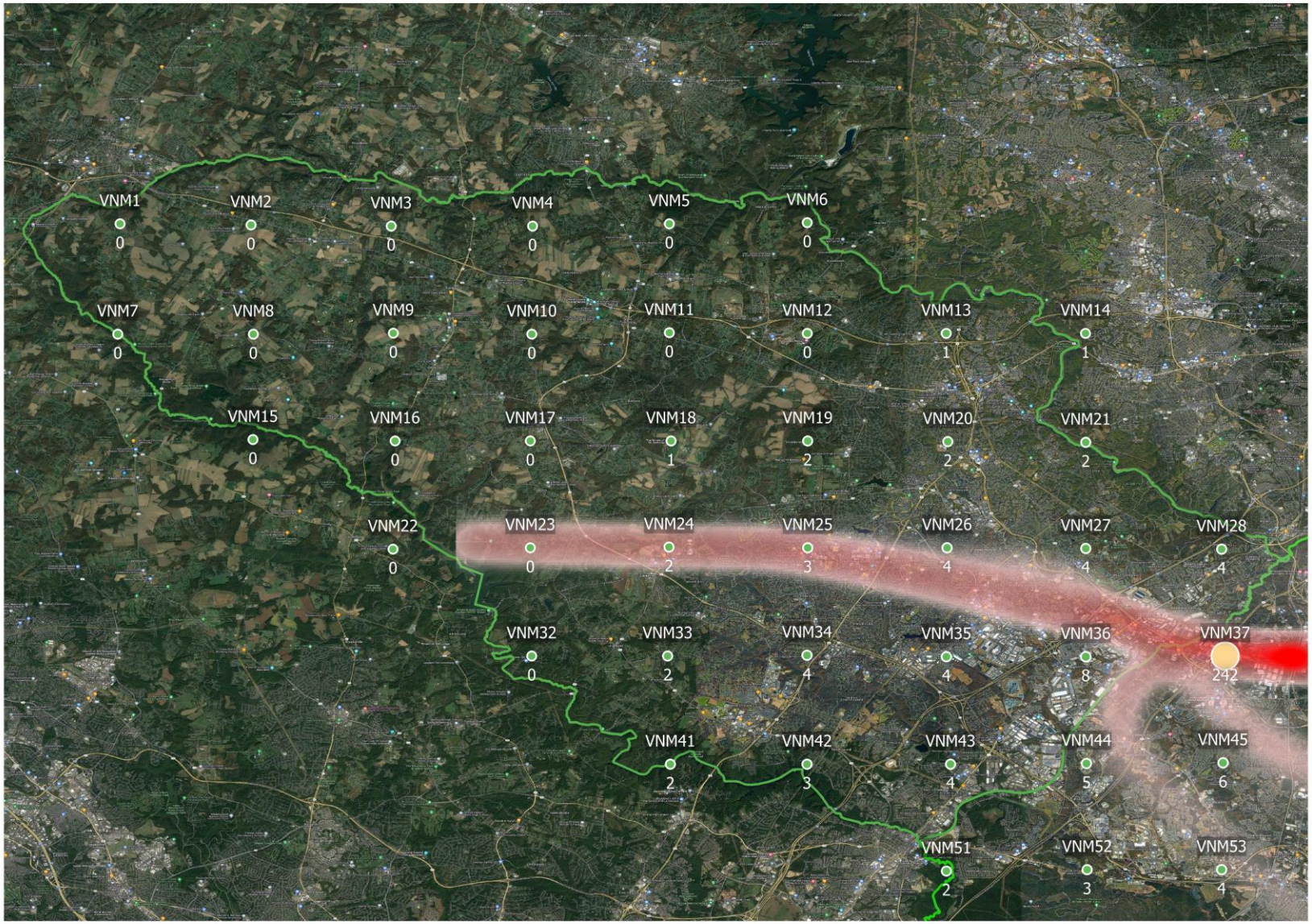
Howard County – Departures Heat Map



vianair

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

Howard County – Departures Heat Map



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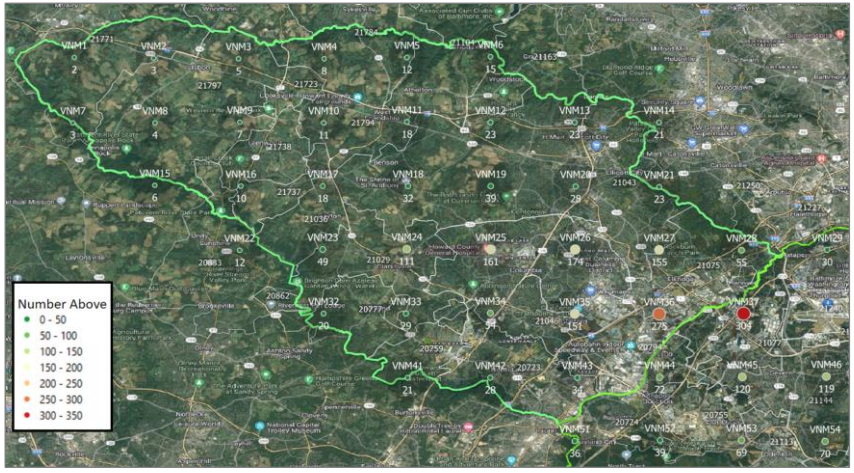
Noise Event Data
DNL

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.

	Number-of-Events-Above 55 dBA		Number-of-Events-Above 65 dBA		Number-of-Events-Above 75 dBA	
Name	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



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Noise Exposure: DNL *(Daily Average)*

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

Name	DNL
VNM1	21.1
VNM2	22.1
VNM3	27.4
VNM4	30.5
VNM5	35.2
VNM6	38.8
VNM7	21.8
VNM8	25.7
VNM9	28.3
VNM10	33.7
VNM11	39.4
VNM12	44.2
VNM13	44.7
VNM14	47.4
VNM15	28.1
VNM16	32.8
VNM17	40.5
VNM18	46.8
VNM19	48.7
VNM20	47.2
VNM21	46.6
VNM22	33.7
VNM23	45.8
VNM24	53.4
VNM25	56.6

Name	DNL
VNM26	56.9
VNM27	53.5
VNM28	52.4
VNM29	48.1
VNM30	44.7
VNM31	42.6
VNM32	41.8
VNM33	49.4
VNM34	57.4
VNM35	57.2
VNM36	60.5
VNM37	73.1
VNM38	53.4
VNM39	46.9
VNM40	48.7
VNM41	44.4
VNM42	48.2
VNM43	51.7
VNM44	52.9
VNM45	55.9
VNM46	64.9
VNM47	58.2
VNM48	54.5
VNM49	53.6
VNM50	48.6

Name	DNL
VNM51	49.4
VNM52	45.6
VNM53	51.1
VNM54	49.3
VNM55	55.8
VNM56	60.3
VNM57	52.8
VNM58	50.4
VNM59	44.1
VNM60	50.3
VNM61	46.3
VNM62	49.6
VNM63	50.9
VNM64	63.0
VNM65	55.1
VNM66	48.9
VNM67	46.1
VNM68	47.2
VNM69	47.1
VNM70	52.1
VNM71	50.6
VNM72	45.8
VNM73	38.0
VNM74	44.5
VNM75	45.8

Name	DNL
VNM76	47.1
VNM77	43.5
VNM78	41.1
VNM79	38.8
VNM80	36.6
VNM81	39.4
VNM82	37.8
VNM83	35.5
VNM84	33.2
VNM85	31.1
VNM86	31.9
VNM87	30.2
VNM88	29.5
VNM89	32.1

Noise Exposure: DNL *(Daily Average)*

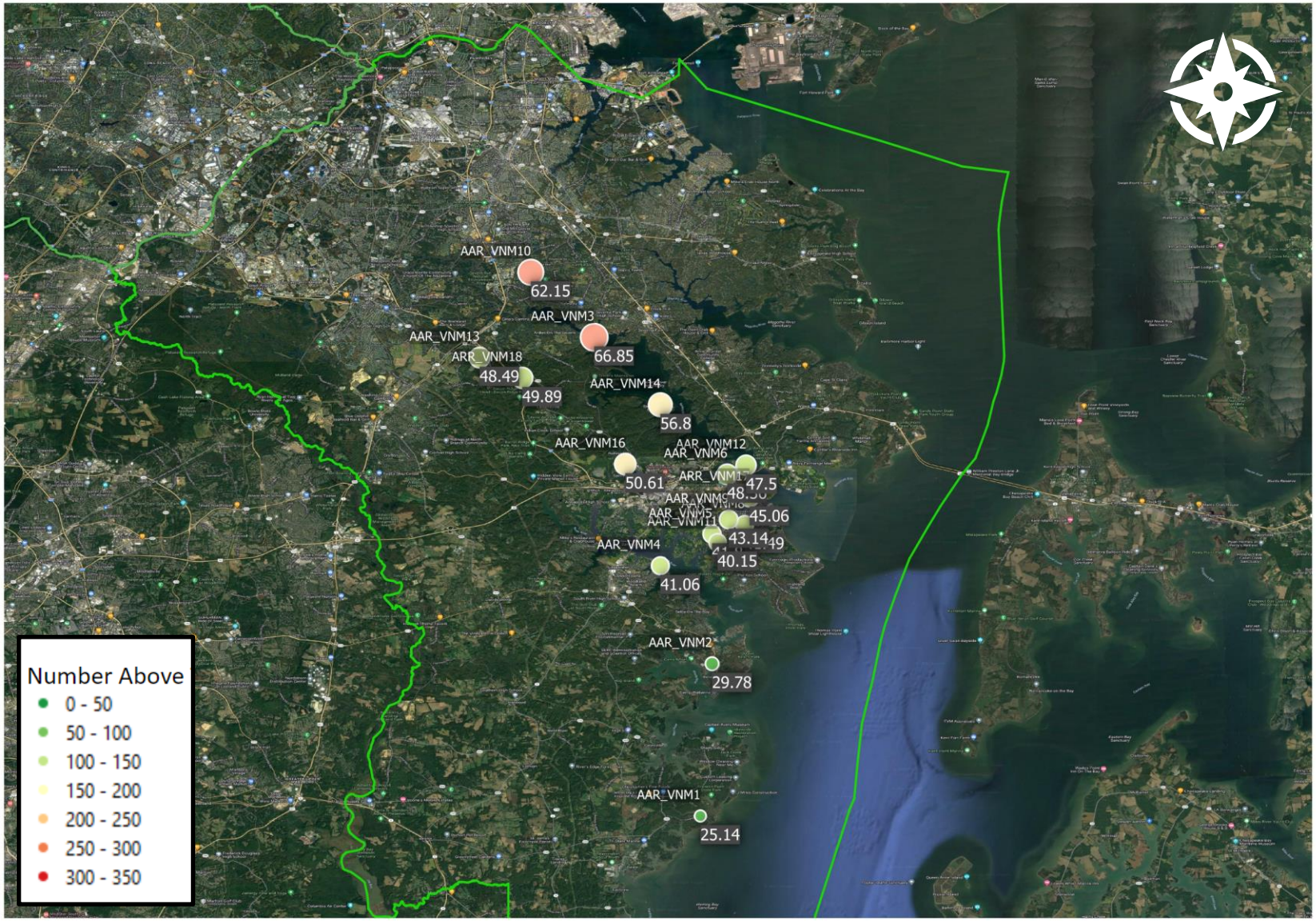
Landmark VNMs

Name	DNL
AAR_VNM1	25.1
AAR_VNM2	29.8
AAR_VNM3	66.9
AAR_VNM4	41.1
AAR_VNM5	41.8
AAR_VNM6	48.4
AAR_VNM7	18.5
AAR_VNM8	41.5
AAR_VNM9	43.1
AAR_VNM10	62.2
AAR_VNM11	40.2
AAR_VNM12	47.5
AAR_VNM13	48.5
AAR_VNM14	56.8
ARR_VNM15	32.9
AAR_VNM16	50.6
ARR_VNM17	45.1
ARR_VNM18	49.9

Name	DNL
HOCO_VNM1	58.8
HOCO_VNM2	52.7
HOCO_VNM3	51.6
HOCO_VNM4	56.6
HOCO_VNM5	57.7
HOCO_VNM6	58.8
HOCO_VNM7	59.3
HOCO_VNM8	62.1
HOCO_VNM9	60.6
HOCO_VNM10	55.9
HOCO_VNM11	40.9
HOCO_VNM12	60.7
HOCO_VNM13	63.1
HOCO_VNM14	62.1
HOCO_VNM15	46.0
HOCO_VNM16	62.3
HOCO_VNM17	68.5
HOCO_VNM18	51.5

Noise Exposure: DNL (Daily Average)

Anne Arundel County – Landmark Locations



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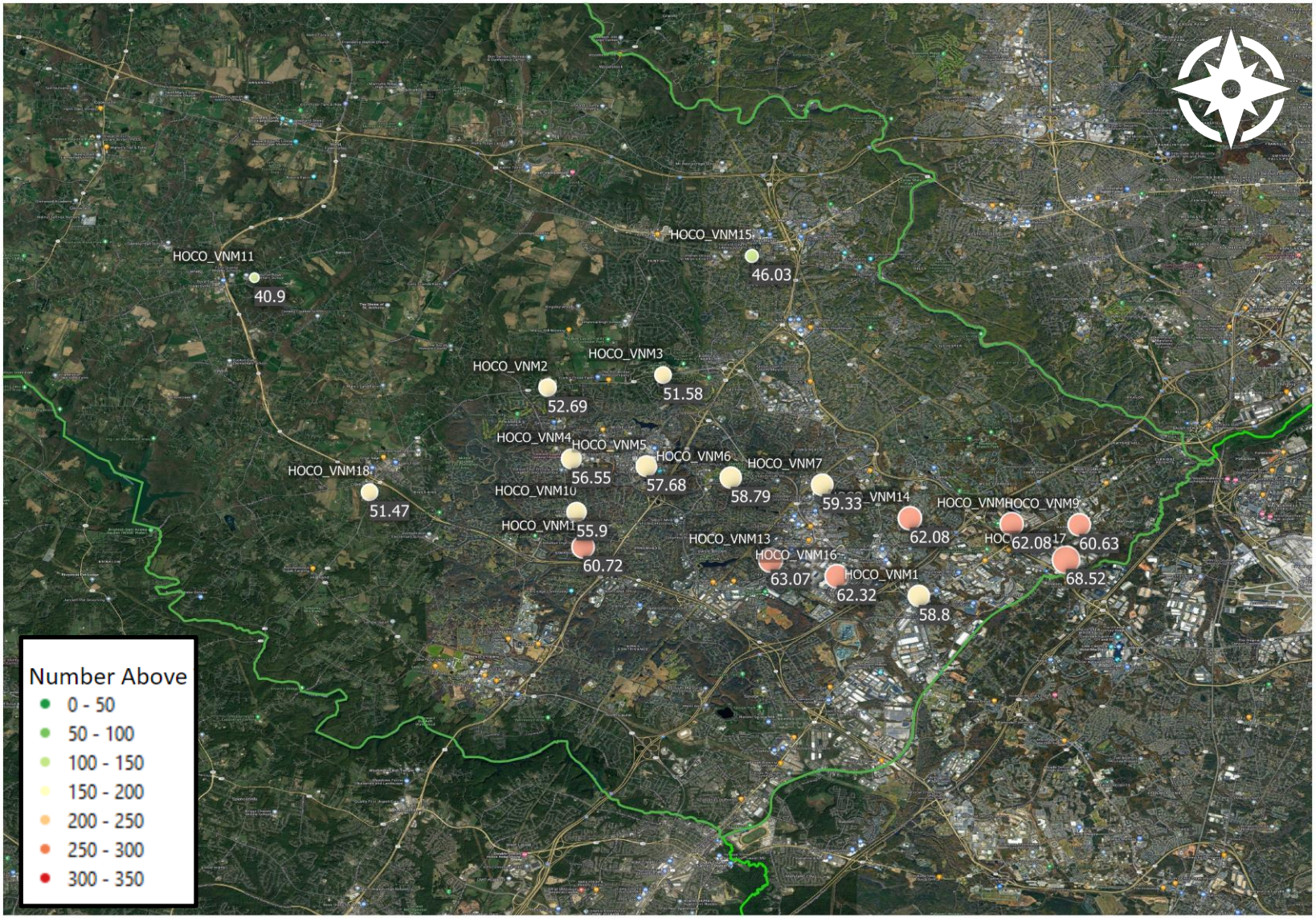
Noise Exposure: DNL (Daily Average)

Howard County – Landmark Locations



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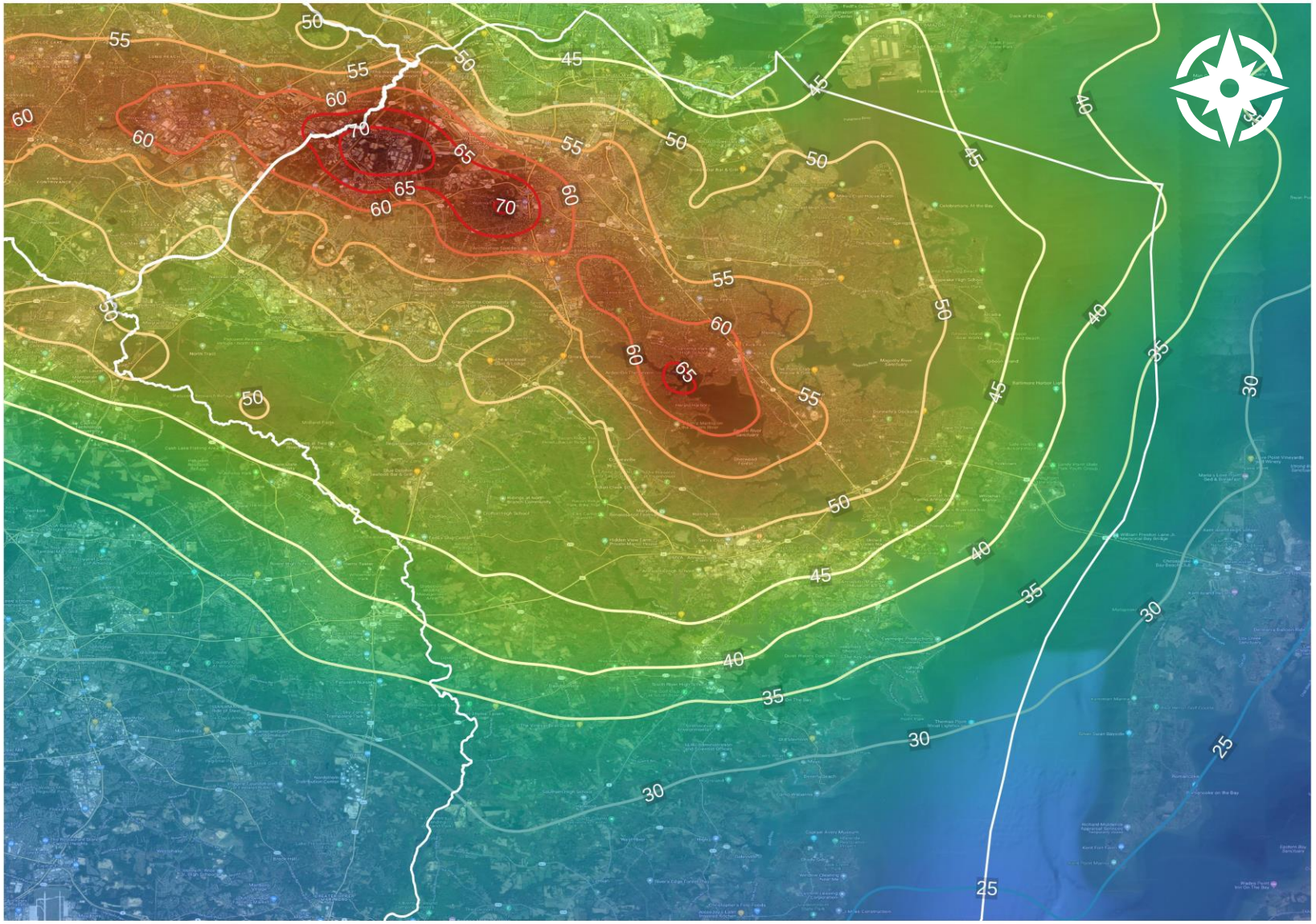
Noise Exposure: DNL Contours (Daily Average)

Anne Arundel County



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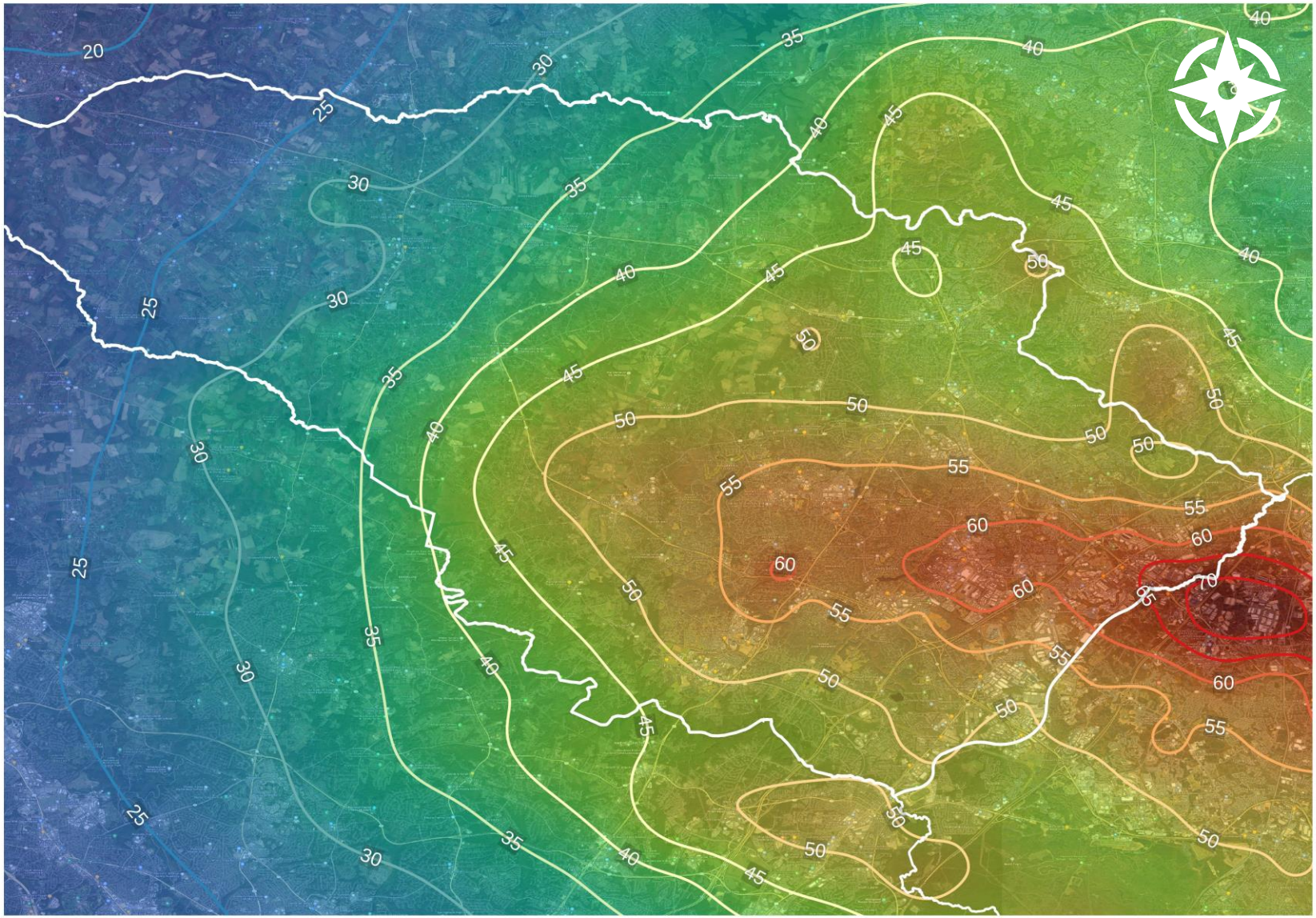
Noise Exposure: DNL Contours (Daily Average)

Howard County



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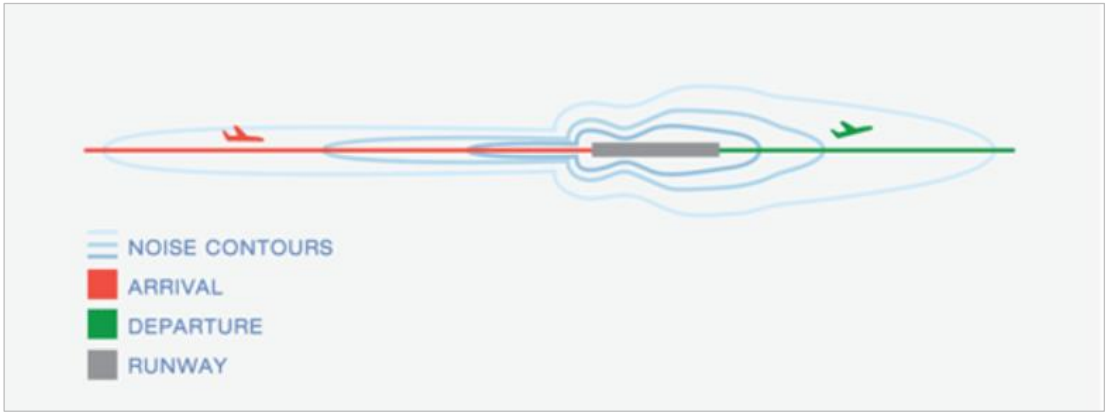
Noise Exposure – Single Event Noise Contours

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).

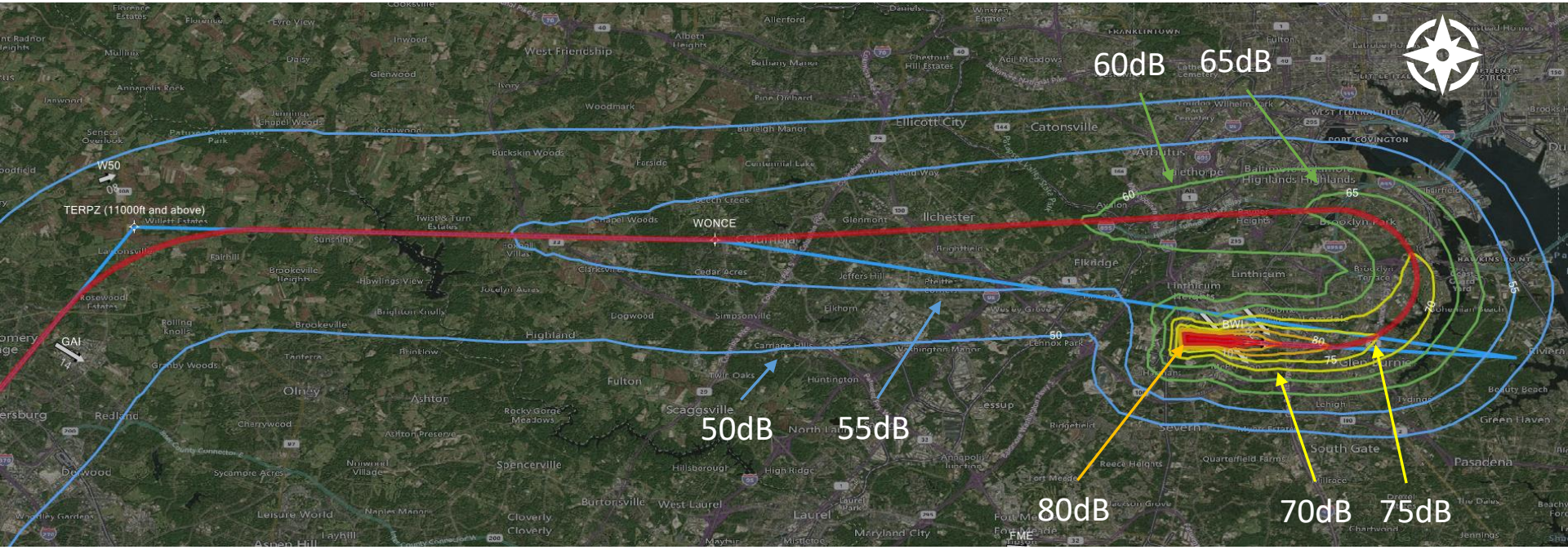


Source: Federal Aviation Administration (https://www.faa.gov/regulations_policies/policy_guidance/noise/basics)

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)

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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)

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For More Information…

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

transportation@howardcountymd.gov

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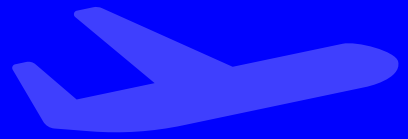
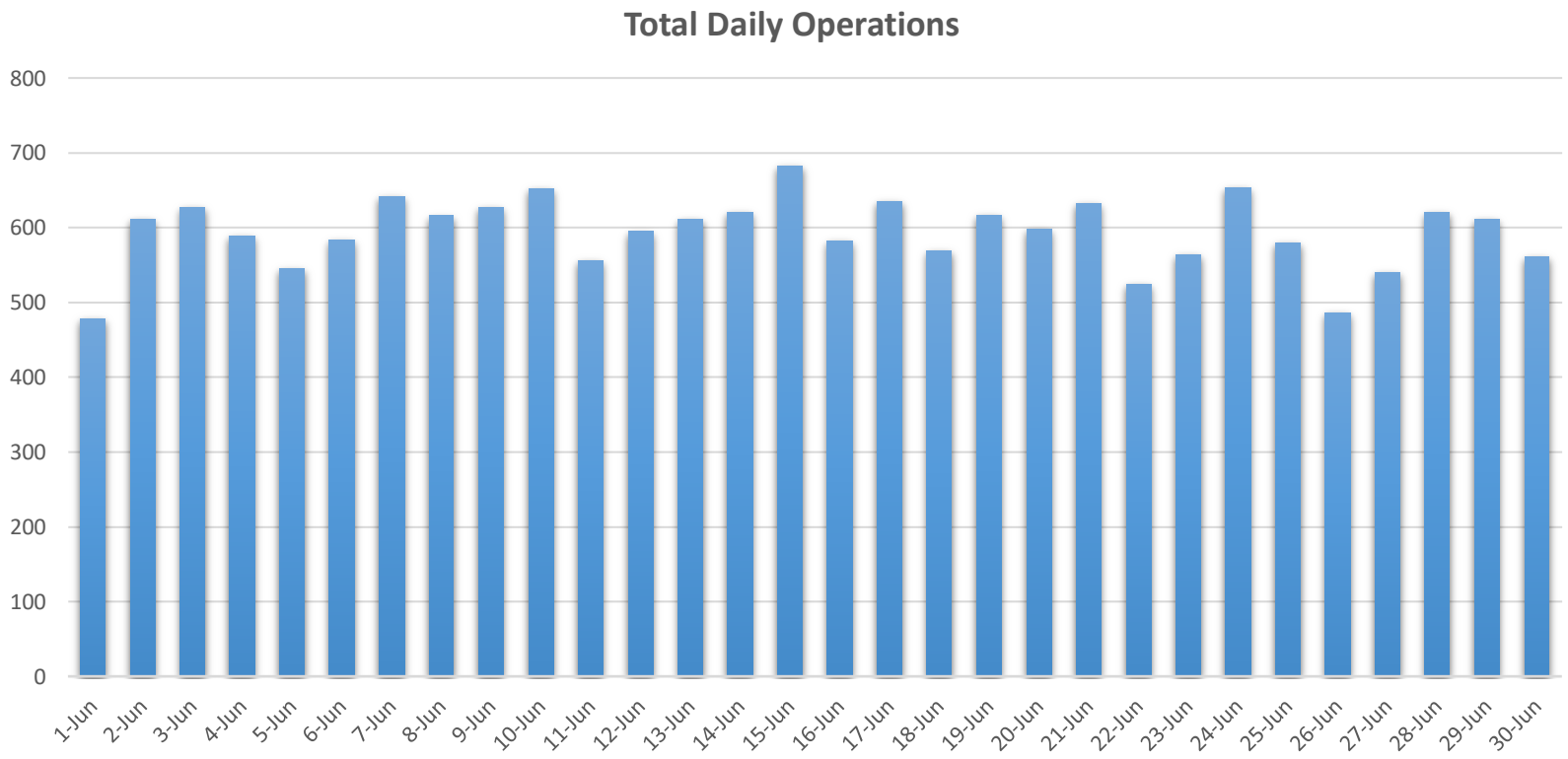
APPENDIX I:

SUPPLEMENTAL OPERATIONAL STATISTICS



Total Operations



Total Monthly Operations	17,812
Average Daily Operations	594

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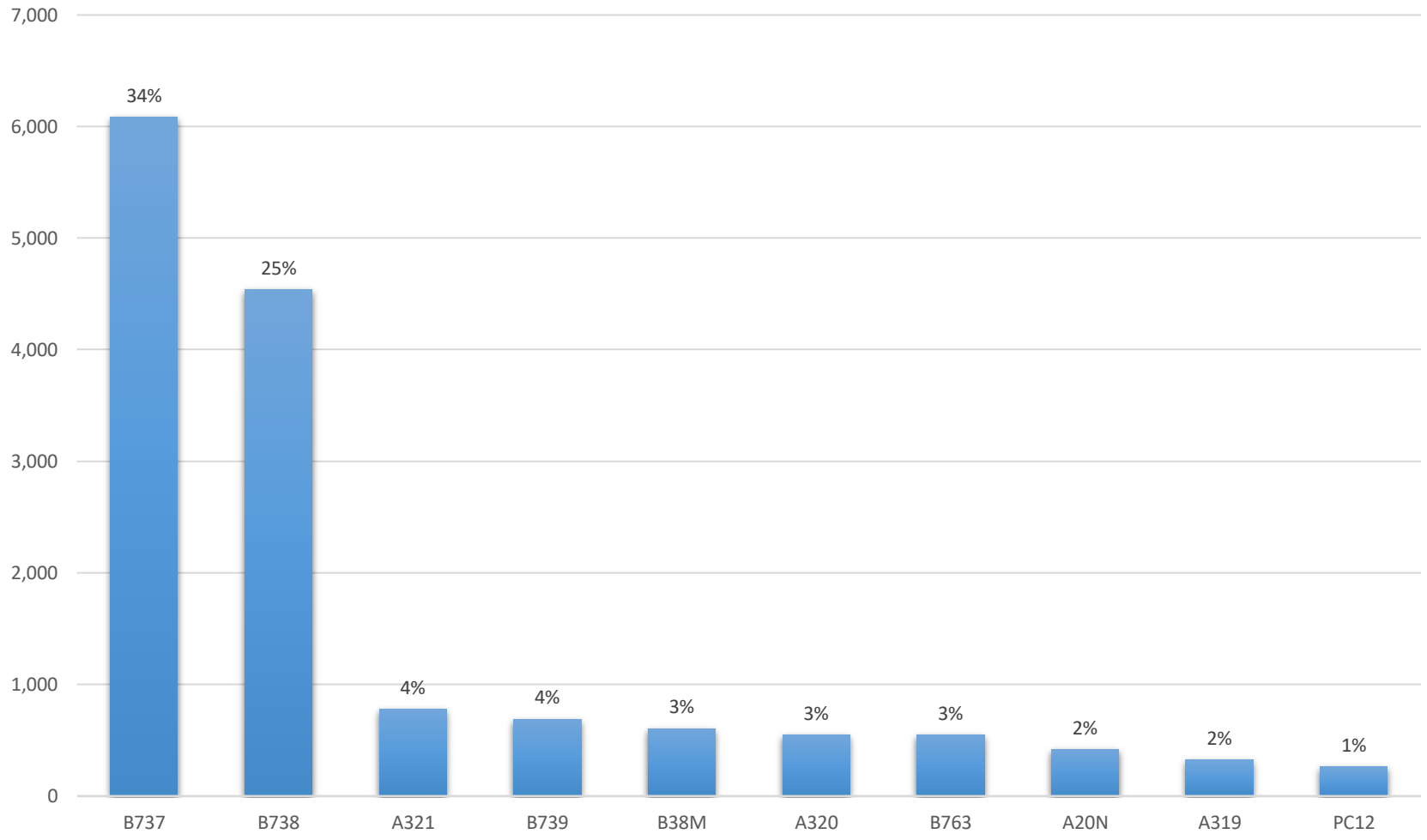
Fleet Mix: Operations by Aircraft Type (Top 10 Aircraft Types)



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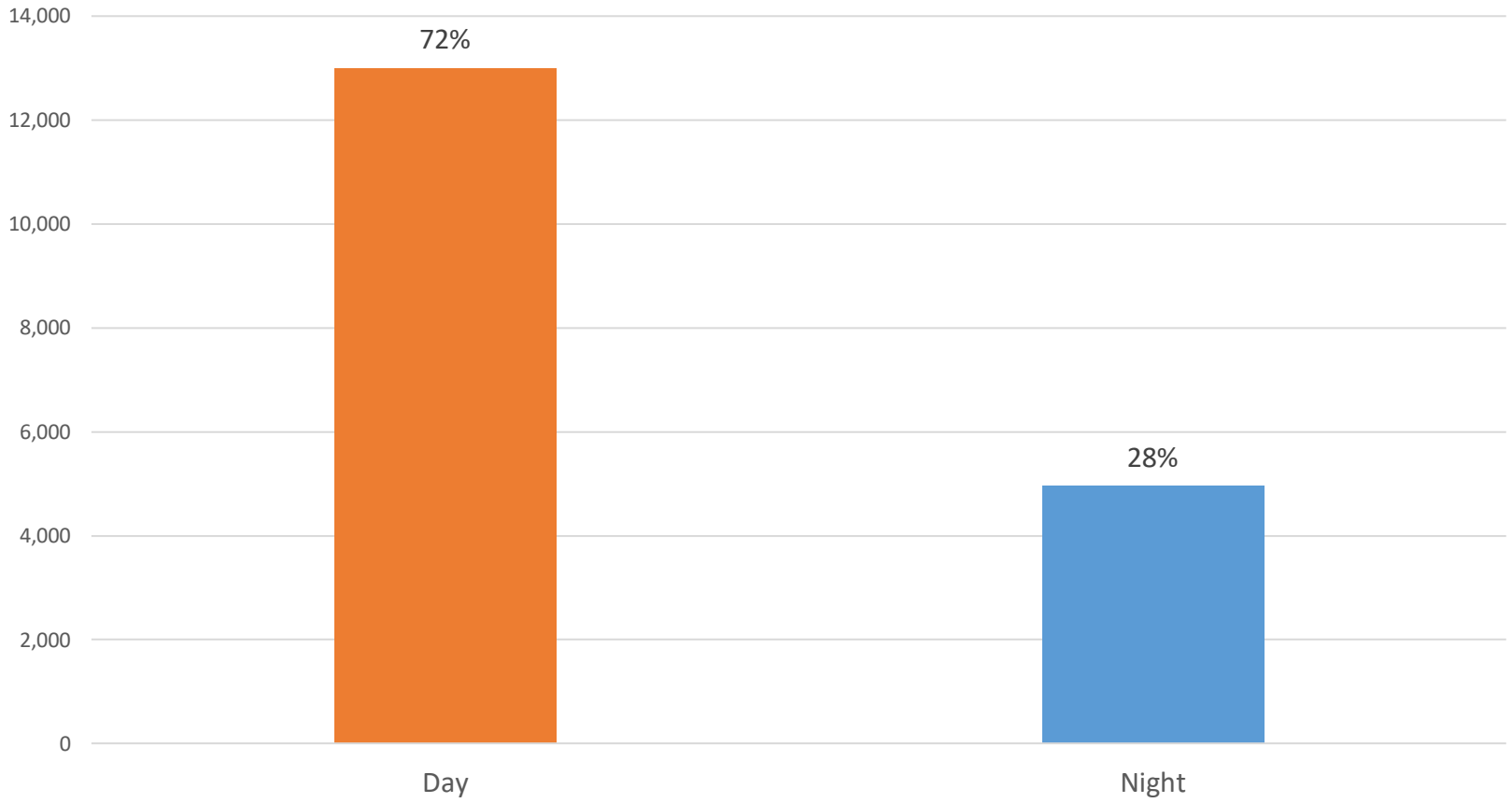
Total Operations: Daytime vs. Nighttime



"Nighttime Hours" are from 10PM - 7AM

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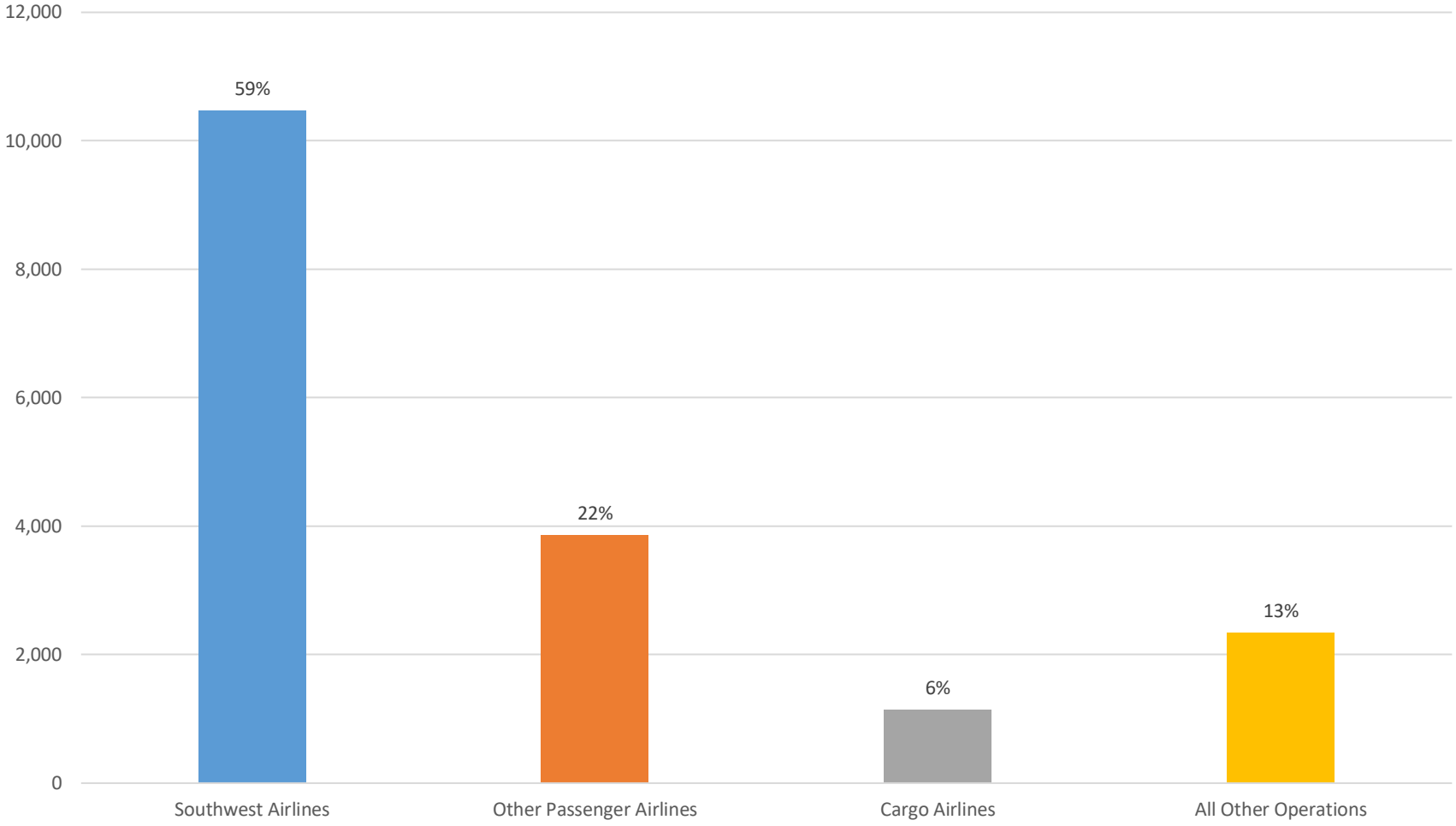
Total Operations: Southwest Airlines vs. Other



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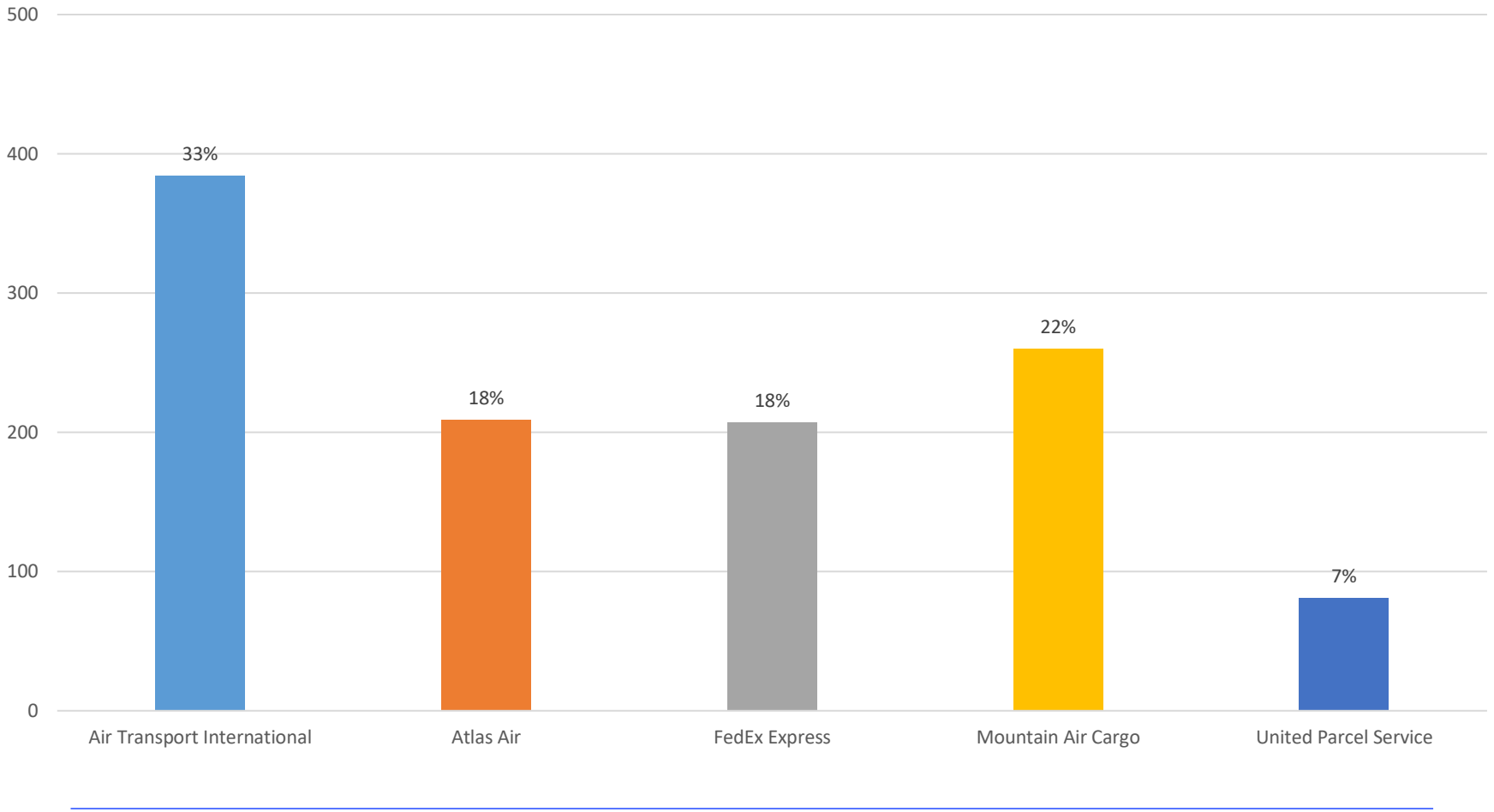
Cargo Operations



This analysis includes the primary cargo operators at BWI.

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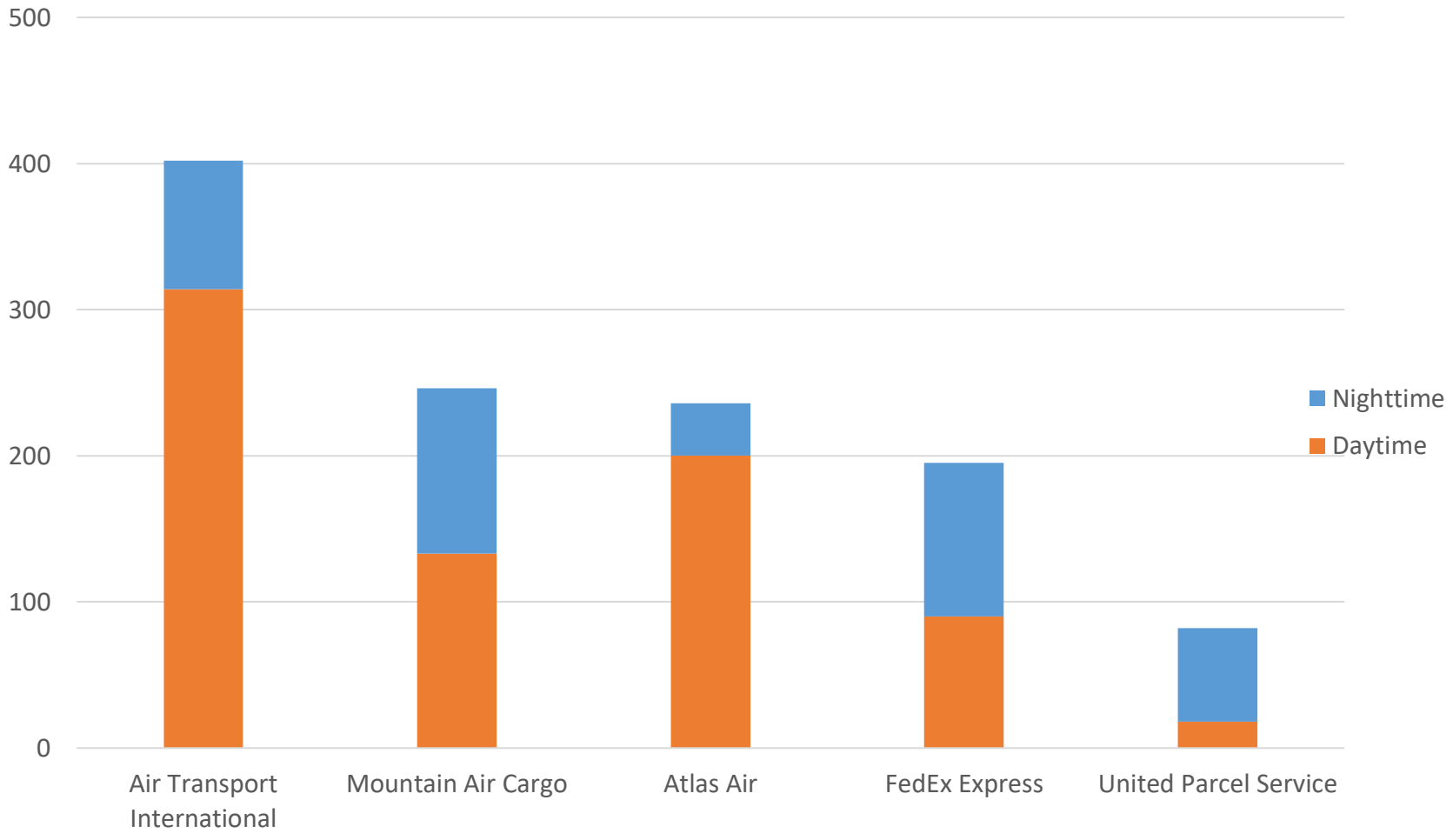
Cargo Operations: Daytime versus Nighttime



Nighttime hours are from 10PM-7AM.

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