BWI Baseline Assessment & Quarterly Reporting

March 2022

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Project Overview

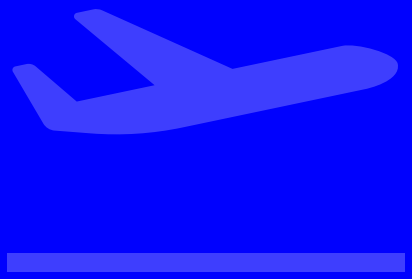
The growth in operations at BWI brings number social and economic impacts to communities surrounding the airport, however, this also results in significant noise impacts, especially for residents of Anne Arundel and Howard counties.

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

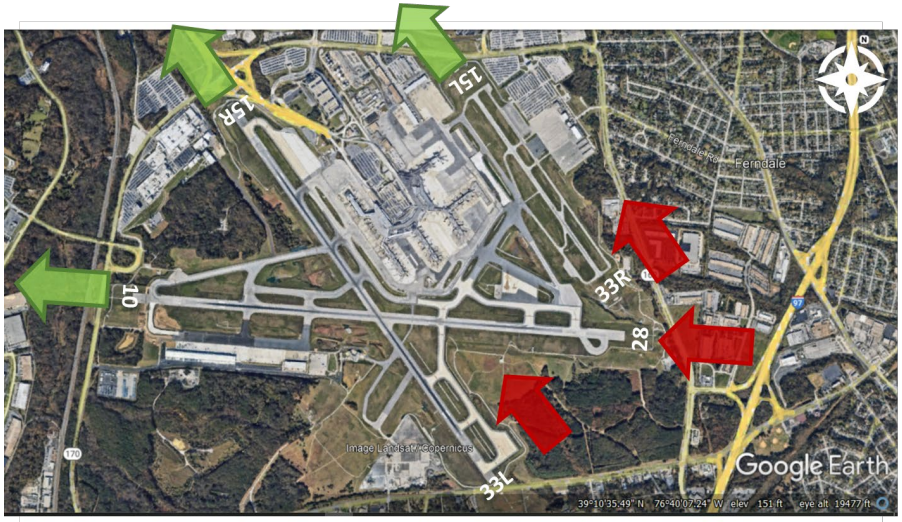
Aircraft operations (arrivals and departures) are the source for aircraft noise exposure for communities around BWI. While aircraft noise is the primary concern for most residents, it is important to understand aircraft operations in addition to analyzing aircraft noise. Changes in airport operations (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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Runway Use - Arrivals

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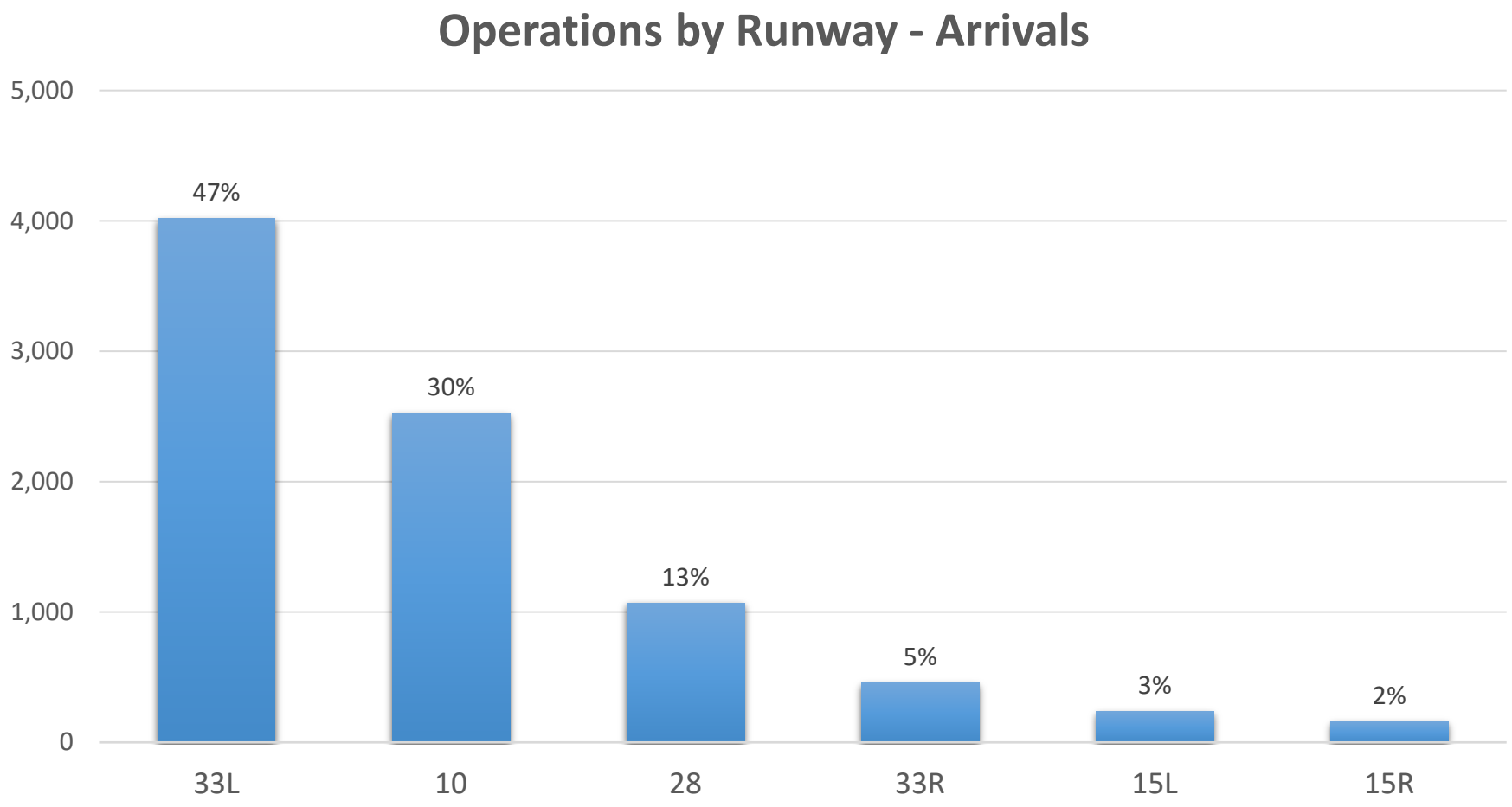
Runway Use - Arrivals



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Runway Use - Departures

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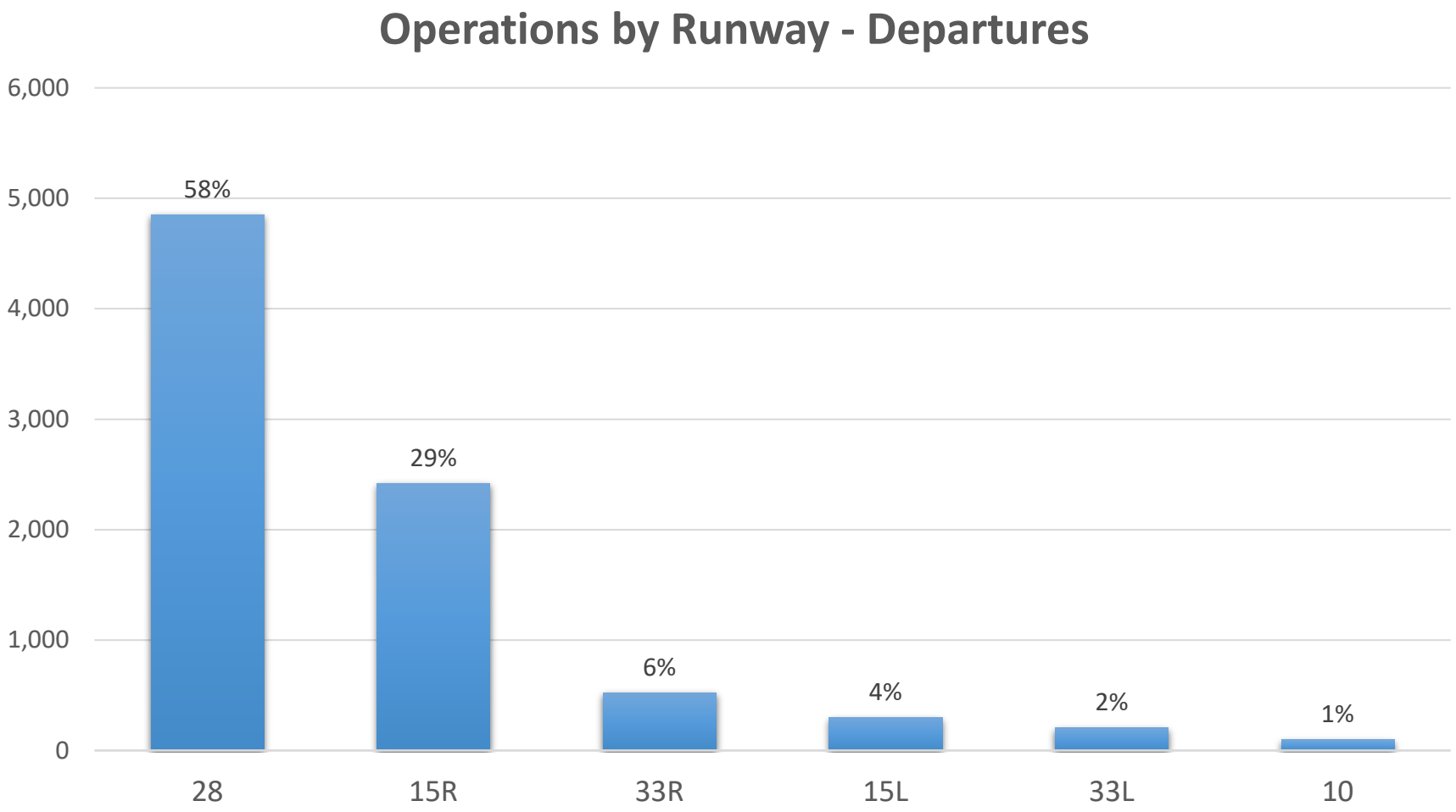
Runway Use - Departures



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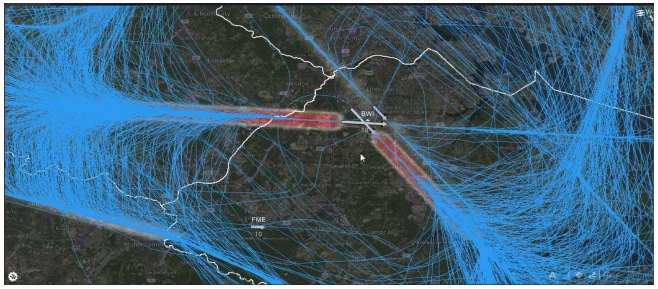
Density Analyses

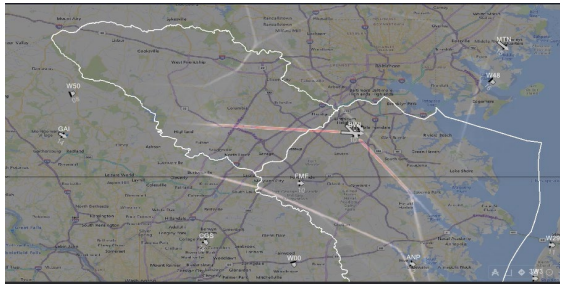
Flight paths to and from the airport will vary based on a number of factors, including weather conditions, runway, flight procedure, aircraft type, and air traffic conditions.

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.

All Flight Tracks



Converting Tracks to Density



Density Analysis

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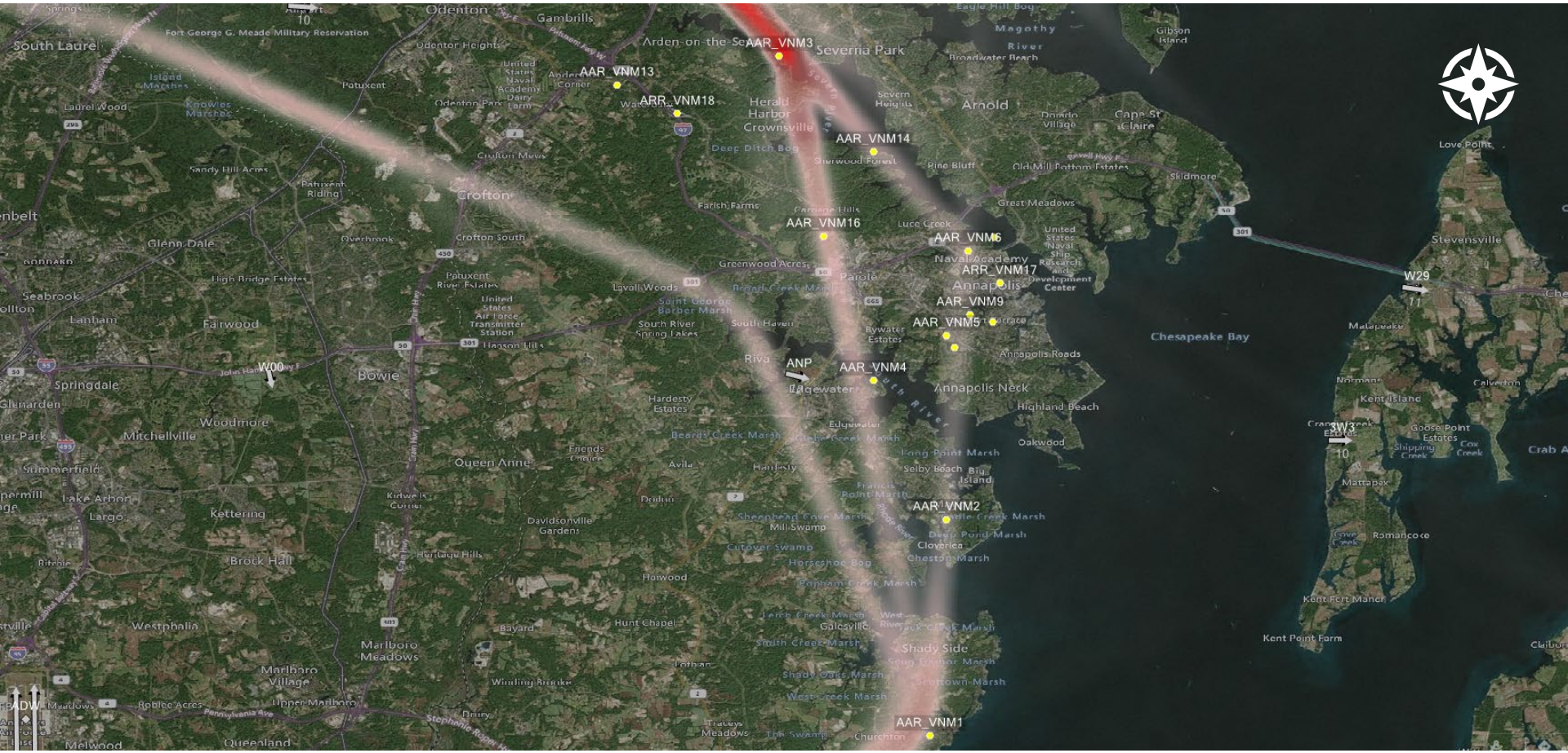
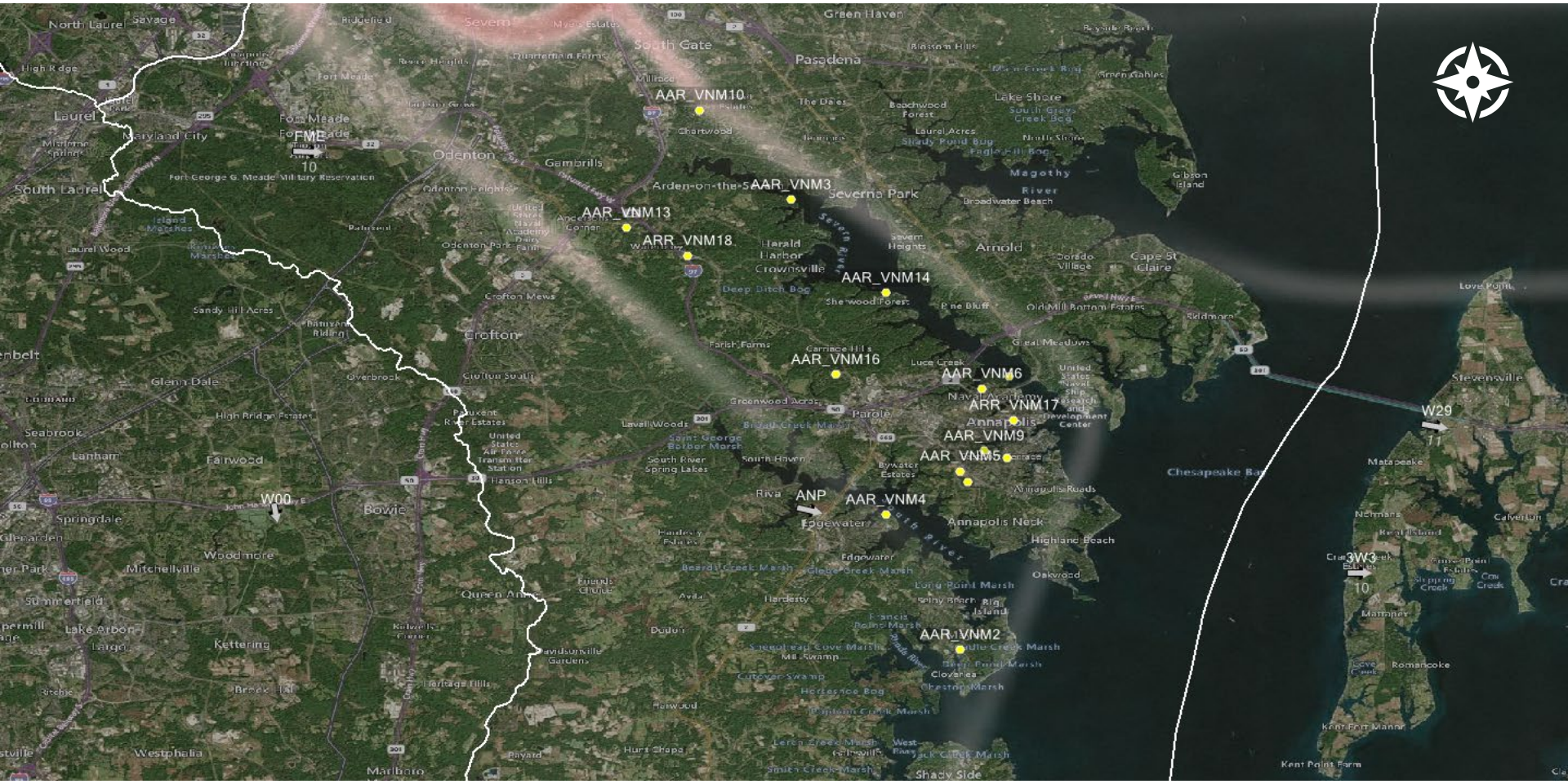
Density Analysis - Arrivals

Anne Arundel County



Density Analysis - Departures

Anne Arundel County



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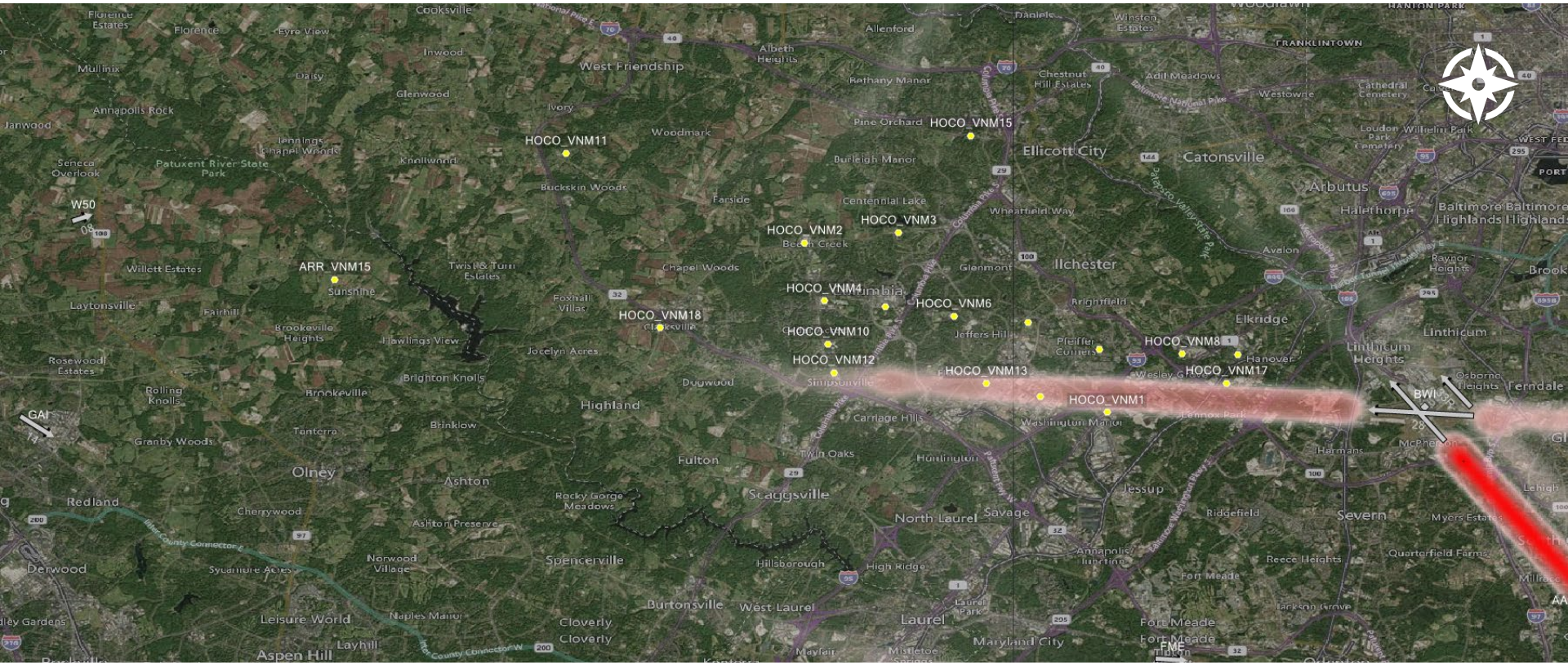
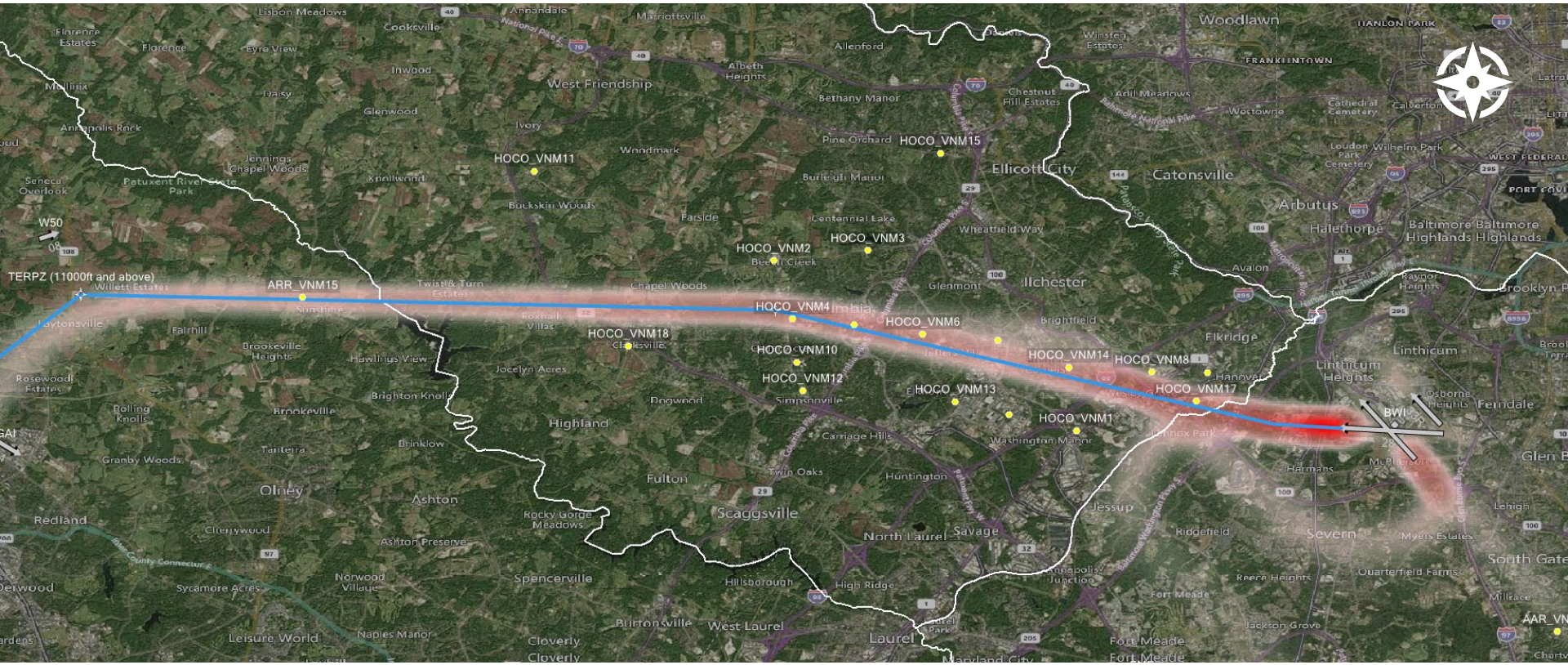
Density Analysis - Arrivals
Howard County



Density Analysis - Departures

Howard County



Note - *The blue line in the middle of the heatmap is the TERPZ SID.*

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NOISE EXPOSURE

Virtual Noise Analysis

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.

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).

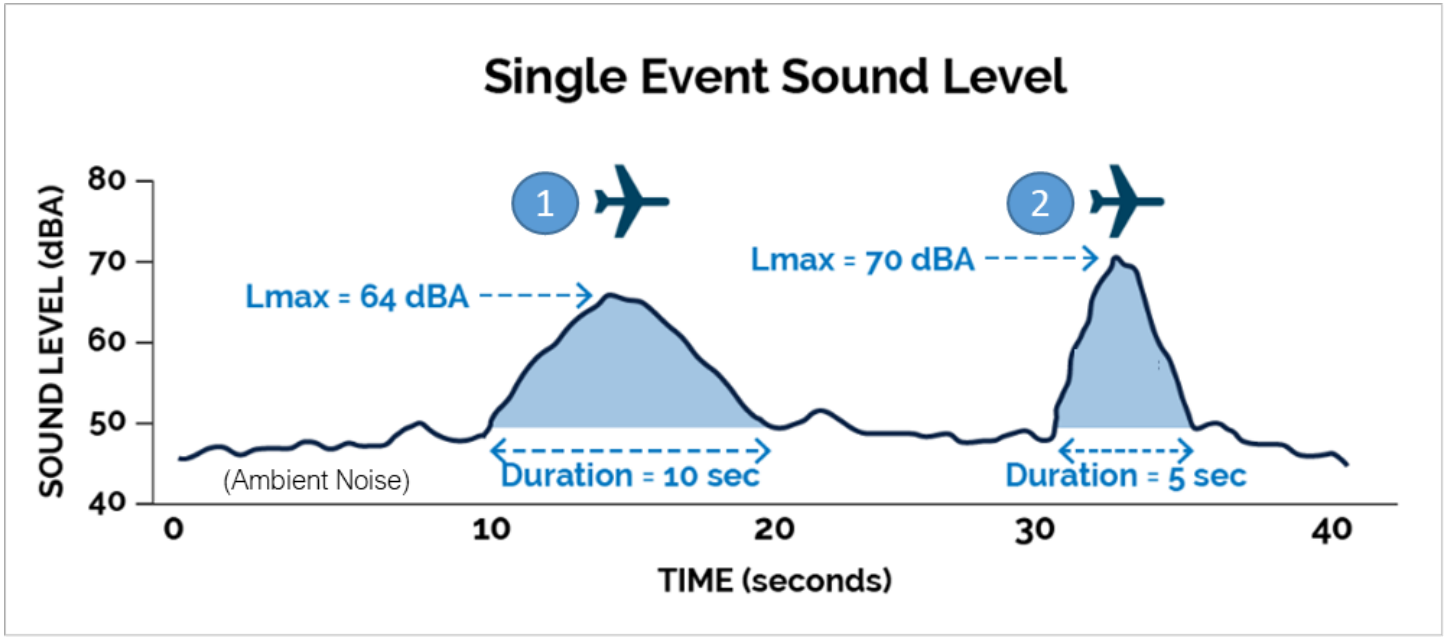
DNL is the standard metric used by the Federal Aviation Administration as required by federal regulation. The problem with DNL is it is difficult to understand and doesn’t seem to reflect what residents experience on a daily basis.

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

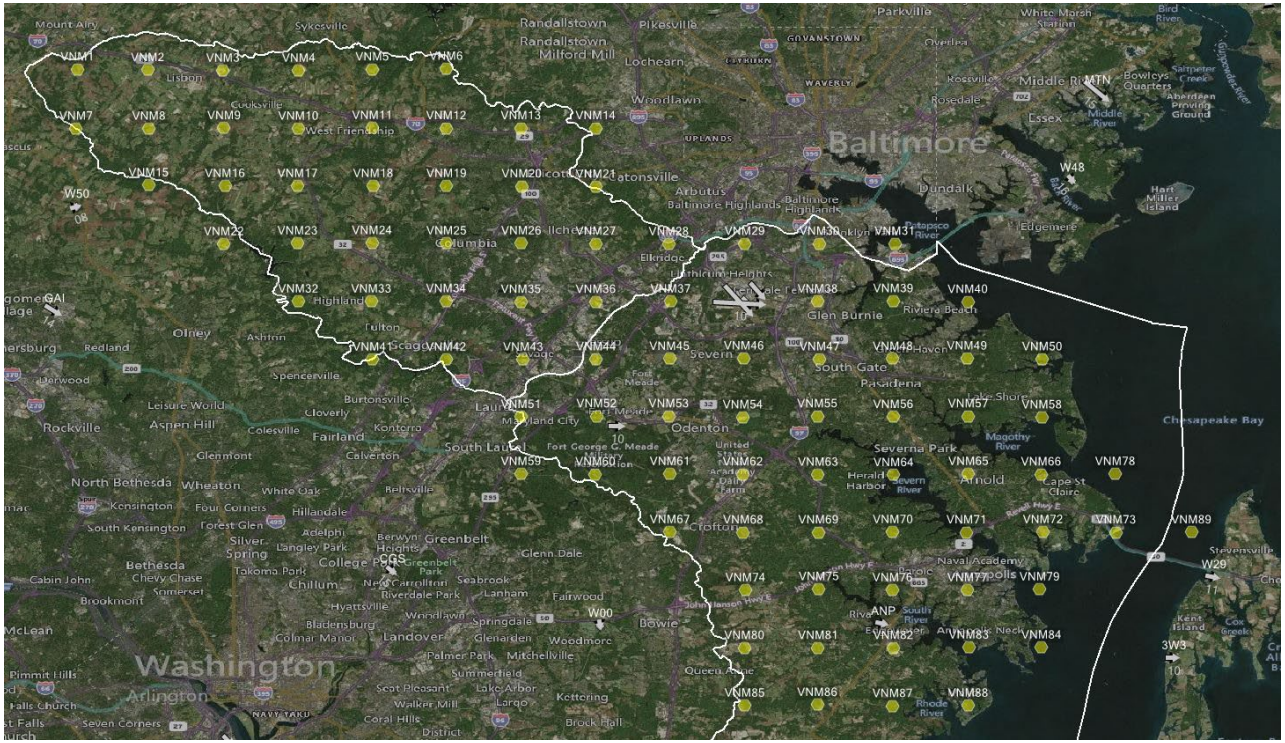
The scale below is intended to provide a basic understand of noise levels which are expressed in decibels (dB or dBA). As indicated, the typical sound level for people speaking (3 ft apart) is 64-65 decibels. Other common noise sources are also listed.

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

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 Monitor Locations

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

ID	Latitude	Longitude	Elevation
VNM1	39.342462	-77.149704	879
VNM2	39.342017	-77.098984	784
VNM3	39.341572	-77.044704	680
VNM4	39.341572	-76.98998	583
VNM5	39.342462	-76.937035	629
VNM6	39.342907	-76.883645	652
VNM7	39.29975	-77.150594	759
VNM8	39.29975	-77.098094	520
VNM9	39.300127	-77.04389	680
VNM10	39.29975	-76.990272	583
VNM11	39.300315	-76.937031	629
VNM12	39.300051	-76.883621	629
VNM13	39.300051	-76.829825	408
VNM14	39.300051	-76.775888	538
VNM15	39.258958	-77.098251	520
VNM16	39.258421	-77.043211	500
VNM17	39.258421	-76.990856	564
VNM18	39.258421	-76.936353	443
VNM19	39.258421	-76.883461	448
VNM20	39.258152	-76.829227	415

ID	Latitude	Longitude	Elevation
VNM21	39.257884	-76.775798	309
VNM22	39.216537	-77.044017	500
VNM23	39.217074	-76.990856	596
VNM24	39.217342	-76.937159	596
VNM25	39.217074	-76.883461	399
VNM26	39.217074	-76.829495	515
VNM27	39.216805	-76.775798	458
VNM28	39.216537	-76.723174	177
VNM29	39.216805	-76.668403	32
VNM30	39.216805	-76.614437	142
VNM31	39.216805	-76.560203	28
VNM32	39.17519	-76.990319	527
VNM33	39.17519	-76.937696	400
VNM34	39.175458	-76.88373	369
VNM35	39.174921	-76.829764	320
VNM36	39.174921	-76.775798	220
VNM37	39.17519	-76.721832	144
VNM38	39.17519	-76.61578	26
VNM39	39.175458	-76.561277	68
VNM40	39.174921	-76.507579	13

ID	Latitude	Longitude	Elevation
VNM41	39.133306	-76.936622	442
VNM42	39.133306	-76.88373	303
VNM43	39.133306	-76.828153	247
VNM44	39.133574	-76.775529	237
VNM45	39.133843	-76.722637	166
VNM46	39.134111	-76.66894	137
VNM47	39.133574	-76.614437	60
VNM48	39.133843	-76.561545	45
VNM49	39.134111	-76.508116	120
VNM50	39.133574	-76.453882	24
VNM51	39.091959	-76.829764	113
VNM52	39.092496	-76.775261	117
VNM53	39.092496	-76.723174	181
VNM54	39.09169	-76.669745	193
VNM55	39.092496	-76.616048	101
VNM56	39.091959	-76.561277	37
VNM57	39.092496	-76.507311	70
VNM58	39.09169	-76.45415	24
VNM59	39.05088	-76.829764	118
VNM60	39.050612	-76.776066	152

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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 – Landmark Locations

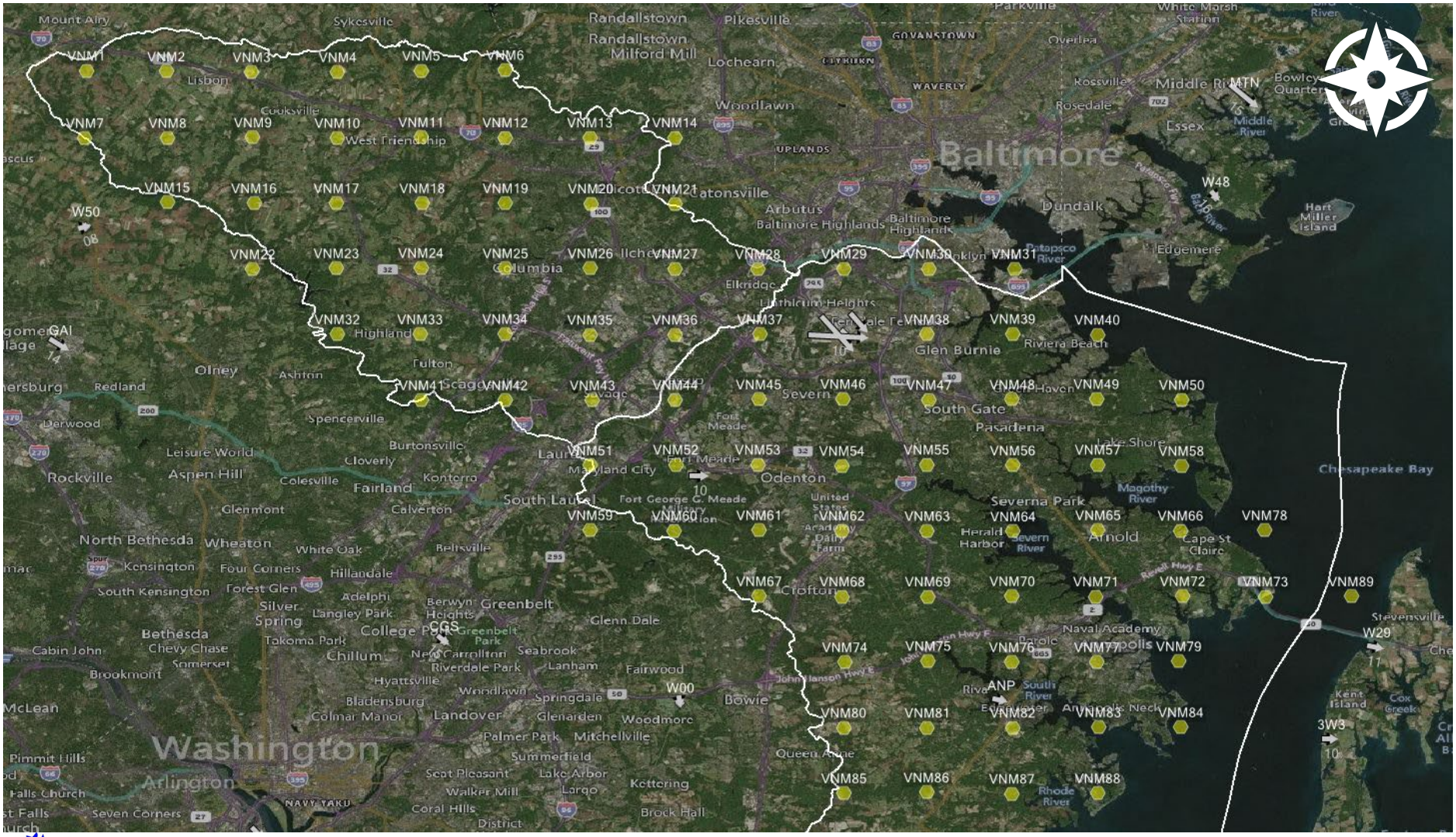
Howard County

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



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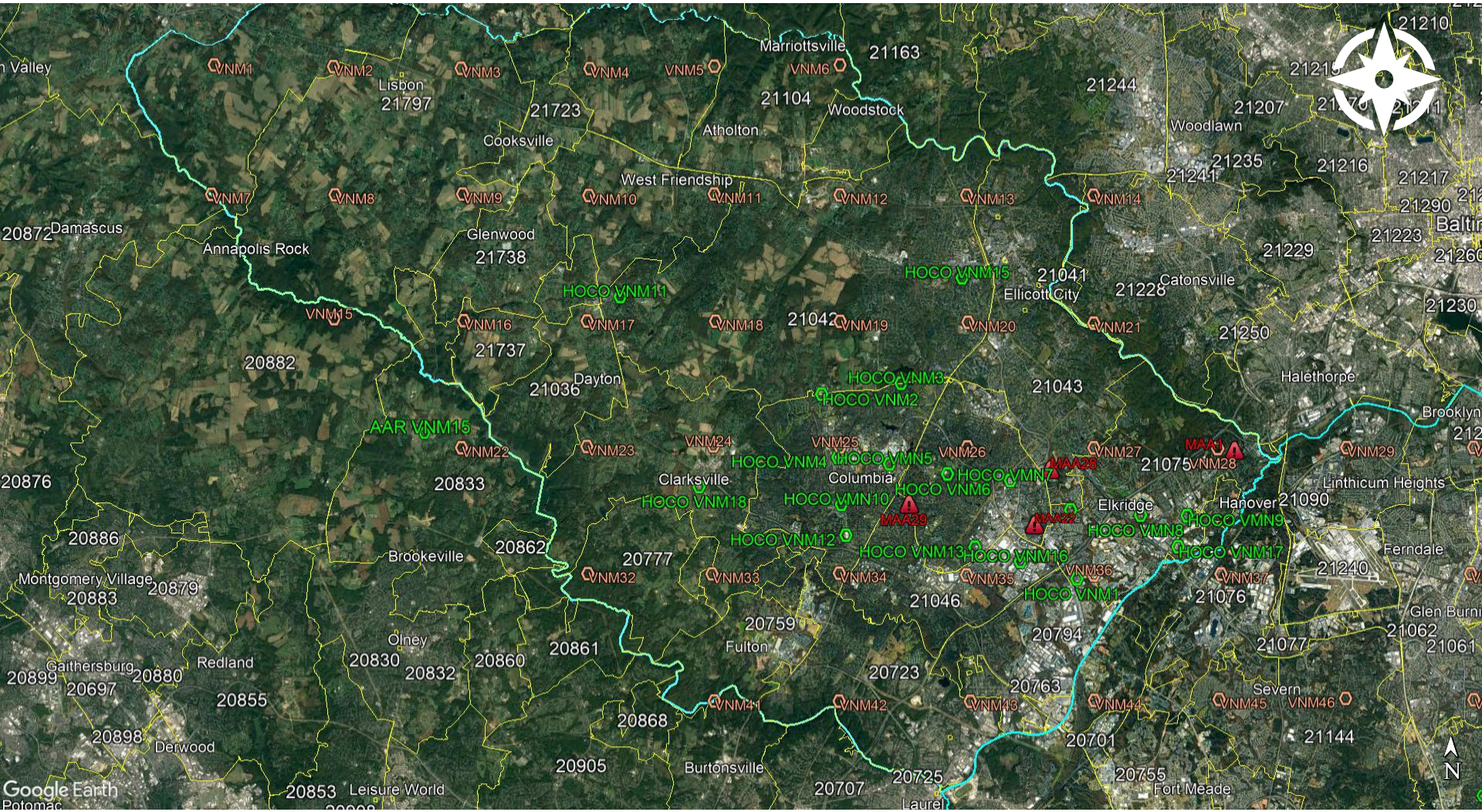
Virtual Noise Monitor Locations – Howard County



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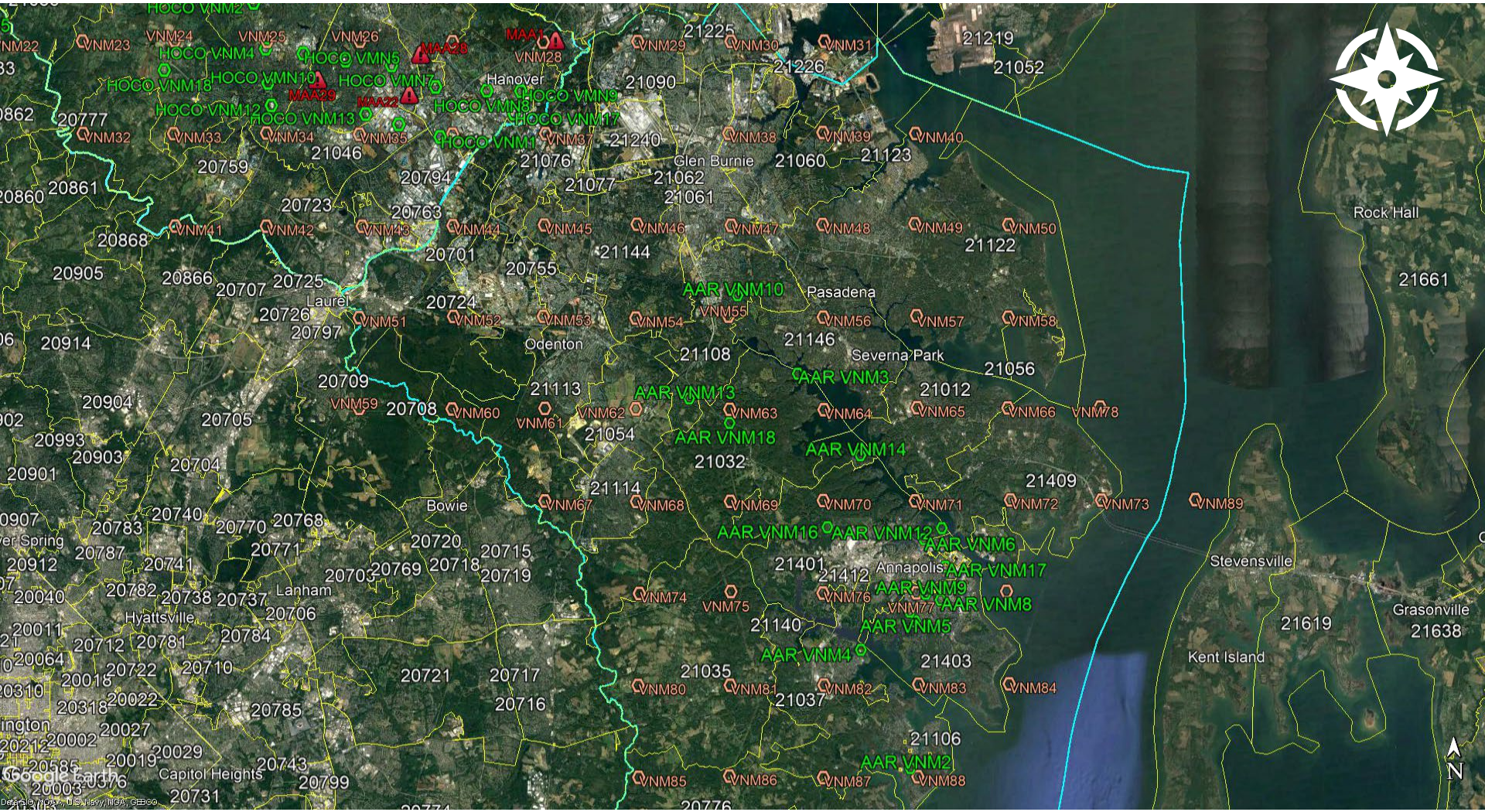
Virtual Noise Monitor Locations – Anne Arundel County



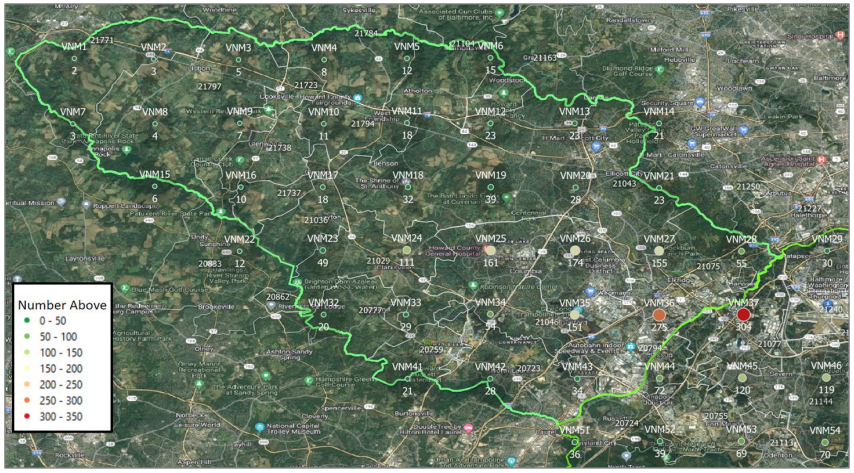
Noise Event Data
Number-of-Events-Above

The following slides include the noise event data for the selected locations.

The tables list data for each of the 125 locations including both the number of events exceeding 55 decibels, 65 decibels, and 75 decibels. This includes both a total count for the reporting period (month) as well as the daily average for the month.

In addition to providing this data in tabular form, it is also represented in a graphic (map-based) format.

	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

	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

Noise Exposure: Number-of-Events-Above

	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	5,379	174	1,244	40	78	3
VNM27	4,804	155	399	13	53	2
VNM28	1,701	55	233	8	19	1
VNM29	940	30	129	4	13	0
VNM30	771	25	123	4	8	0
VNM31	899	29	207	7	37	1
VNM32	605	20	164	5	17	1
VNM33	896	29	295	10	55	2
VNM34	1,687	54	504	16	94	3
VNM35	4,690	151	607	20	94	3
VNM36	8,530	275	3,807	123	156	5
VNM37	9,435	304	8,036	259	6,422	207
VNM38	2,016	65	1,205	39	93	3
VNM39	1,830	59	445	14	62	2
VNM40	1,638	53	489	16	74	2
VNM41	653	21	264	9	30	1
VNM42	883	28	406	13	66	2
VNM43	1,062	34	446	14	88	3
VNM44	2,230	72	940	30	47	2
VNM45	3,709	120	1,122	36	35	1
VNM46	3,696	119	1,925	62	1,147	37
VNM47	4,792	155	1,348	43	185	6
VNM48	1,653	53	672	22	159	5
VNM49	2,110	68	709	23	89	3
VNM50	1,442	47	522	17	96	3

vianair

Noise Exposure: Number-of-Events-Above

	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	1,127	36	324	10	22	1
VNM52	1,224	39	306	10	14	0
VNM53	2,152	69	724	23	14	0
VNM54	2,175	70	325	10	54	2
VNM55	3,884	125	827	27	108	3
VNM56	2,495	80	899	29	140	5
VNM57	1,882	61	759	24	166	5
VNM58	1,527	49	554	18	62	2
VNM59	720	23	169	5	8	0
VNM60	1,777	57	238	8	13	0
VNM61	1,165	38	261	8	12	0
VNM62	1,902	61	437	14	24	1
VNM63	1,564	50	508	16	127	4
VNM64	3,815	123	920	30	139	4
VNM65	2,035	66	739	24	133	4
VNM66	1,428	46	477	15	28	1
VNM67	1,141	37	216	7	10	0
VNM68	2,150	69	349	11	13	0
VNM69	1,734	56	550	18	59	2
VNM70	2,379	77	677	22	81	3
VNM71	2,129	69	594	19	80	3
VNM72	1,426	46	336	11	14	0
VNM73	793	26	94	3	6	0
VNM74	1,247	40	204	7	3	0
VNM75	1,418	46	354	11	12	0

vianair

Noise Exposure: Number-of-Events-Above

	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	2,102	68	381	12	22	1
VNM77	1,503	48	349	11	21	1
VNM78	966	31	174	6	12	0
VNM79	1,090	35	191	6	6	0
VNM80	649	21	34	1	1	0
VNM81	916	30	137	4	2	0
VNM82	874	28	155	5	3	0
VNM83	785	25	126	4	0	0
VNM84	603	19	38	1	0	0
VNM85	311	10	9	0	0	0
VNM86	425	14	15	0	0	0
VNM87	478	15	16	1	0	0
VNM88	435	14	14	0	0	0
VNM89	497	16	40	1	2	0

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	42	2	0	0	0	0
AAR_VNM2	183	6	1	0	0	0
AAR_VNM3	3,994	129	2,418	78	181	6
AAR_VNM4	1,161	38	66	2	1	0
AAR_VNM5	908	30	92	3	1	0
AAR_VNM6	1,449	47	191	6	12	0
AAR_VNM7	31	1	0	0	0	0
AAR_VNM8	740	24	83	3	1	0
AAR_VNM9	956	31	109	4	3	0
AAR_VNM10	5,295	171	4,091	132	271	9
AAR_VNM11	721	24	80	3	2	0
AAR_VNM12	1,263	41	170	5	13	0
AAR_VNM13	1,196	39	288	9	97	3
AAR_VNM14	1,766	57	429	14	58	2
ARR_VNM15	150	5	9	0	1	0
AAR_VNM16	1,806	59	323	10	20	1
ARR_VNM17	1,070	35	123	4	7	0
ARR_VNM18	1,066	35	308	10	98	3

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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	7,999	259	1,544	50	91	3
HOCO_VNM2	3,833	124	334	11	13	0
HOCO_VNM3	3,981	129	239	8	24	1
HOCO_VNM4	4,652	151	1,076	35	29	1
HOCO_VNM5	4,979	161	2,051	66	46	1
HOCO_VNM6	5,260	170	2,558	83	74	2
HOCO_VNM7	5,347	173	2,967	96	90	3
HOCO_VNM8	6,645	215	4,232	137	418	13
HOCO_VNM9	6,678	216	3,332	107	175	6
HOCO_VNM10	4,565	148	464	15	50	2
HOCO_VNM11	358	12	37	1	0	0
HOCO_VNM12	4,351	141	838	27	71	2
HOCO_VNM13	6,224	201	1,845	60	170	5
HOCO_VNM14	5,576	180	3,748	121	294	9
HOCO_VNM15	506	17	140	5	5	0
HOCO_VNM16	6,527	211	2,191	71	185	6
HOCO_VNM17	9,237	298	6,319	204	2,705	87
HOCO_VNM18	2,628	85	227	7	8	0

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Noise Exposure: DNL *(Daily Average)*

Name	Noise Level	Noise Metric
VNM1	21.05	DNL
VNM2	23.06	DNL
VNM3	25.69	DNL
VNM4	33.63	DNL
VNM5	37.54	DNL
VNM6	41.02	DNL
VNM7	21.98	DNL
VNM8	28.34	DNL
VNM9	31.5	DNL
VNM10	36.12	DNL
VNM11	40.98	DNL
VNM12	44.9	DNL
VNM13	43.77	DNL
VNM14	45.23	DNL
VNM15	29.69	DNL
VNM16	35.58	DNL
VNM17	39.43	DNL
VNM18	46.23	DNL
VNM19	50.36	DNL
VNM20	47.87	DNL
VNM21	44.12	DNL
VNM22	36.72	DNL
VNM23	43.4	DNL
VNM24	51.86	DNL
VNM25	55.33	DNL

Name	Noise Level	Noise Metric
VNM26	59.02	DNL
VNM27	53.97	DNL
VNM28	50.45	DNL
VNM29	44.59	DNL
VNM30	44.43	DNL
VNM31	44.32	DNL
VNM32	42	DNL
VNM33	48.57	DNL
VNM34	54.41	DNL
VNM35	56.36	DNL
VNM36	60.68	DNL
VNM37	72	DNL
VNM38	56.5	DNL
VNM39	50.77	DNL
VNM40	73.71	DNL
VNM41	47.96	DNL
VNM42	49.15	DNL
VNM43	53.79	DNL
VNM44	53.27	DNL
VNM45	55.79	DNL
VNM46	63.63	DNL
VNM47	57.17	DNL
VNM48	50.98	DNL
VNM49	50.81	DNL
VNM50	51.39	DNL

Name	Noise Level	Noise Metric
VNM51	48.88	DNL
VNM52	47.61	DNL
VNM53	50.74	DNL
VNM54	48.91	DNL
VNM55	53.49	DNL
VNM56	55.86	DNL
VNM57	52.03	DNL
VNM58	54.1	DNL
VNM59	44.33	DNL
VNM60	49.48	DNL
VNM61	45.08	DNL
VNM62	52.03	DNL
VNM63	49.33	DNL
VNM64	57.65	DNL
VNM65	51.27	DNL
VNM66	46.82	DNL
VNM67	45.44	DNL
VNM68	47.75	DNL
VNM69	47.39	DNL
VNM70	51.39	DNL
VNM71	49.56	DNL
VNM72	45.81	DNL
VNM73	42.64	DNL
VNM74	43.64	DNL
VNM75	45.01	DNL

Name	Noise Level	Noise Metric
VNM76	47.46	DNL
VNM77	45.19	DNL
VNM78	47.48	DNL
VNM79	39.51	DNL
VNM80	37.16	DNL
VNM81	37.35	DNL
VNM82	36.5	DNL
VNM83	35.54	DNL
VNM84	32.94	DNL
VNM85	29.95	DNL
VNM86	30.3	DNL
VNM87	30.83	DNL
VNM88	30.58	DNL
VNM89	37.29	DNL

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Noise Exposure: DNL

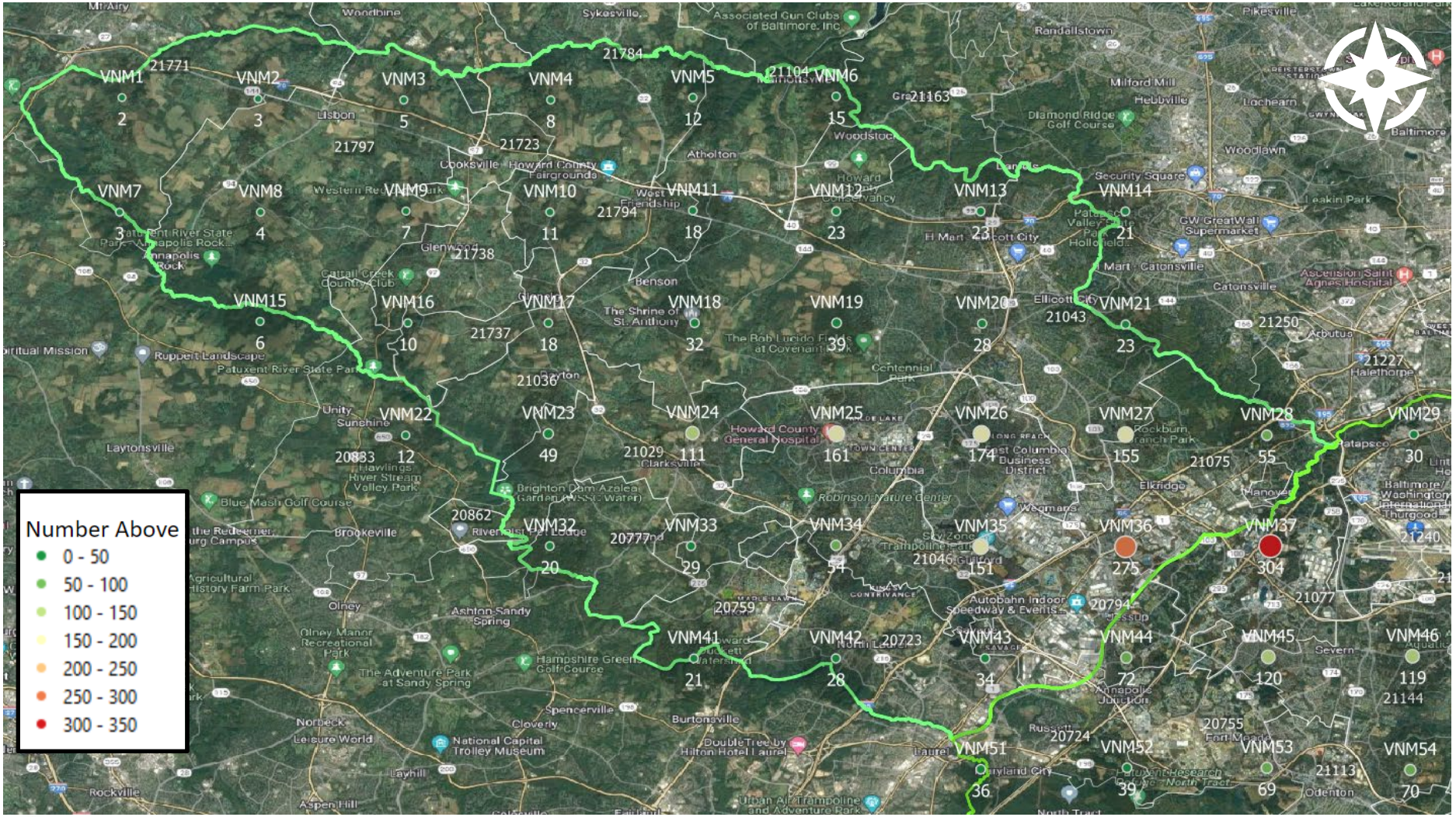
Landmark VNMs

Name	Noise Level
AAR_VNM1	22.19
AAR_VNM2	26.15
AAR_VNM3	58.75
AAR_VNM4	40.32
AAR_VNM5	40.77
AAR_VNM6	47.28
AAR_VNM7	25.46
AAR_VNM8	41.41
AAR_VNM9	43.28
AAR_VNM10	65.47
AAR_VNM11	38.88
AAR_VNM12	46.39
AAR_VNM13	51.07
AAR_VNM14	51.3
ARR_VNM15	41.04
AAR_VNM16	50.04
ARR_VNM17	46.96
ARR_VNM18	49.72

Name	Noise Level
HOCO_VNM1	60.7
HOCO_VNM2	51.67
HOCO_VNM3	51.1
HOCO_VNM4	54.89
HOCO_VNM5	56.54
HOCO_VNM6	58.21
HOCO_VNM7	59.25
HOCO_VNM8	62.04
HOCO_VNM9	60.64
HOCO_VNM10	53.74
HOCO_VNM11	38.05
HOCO_VNM12	54.86
HOCO_VNM13	60.87
HOCO_VNM14	61.89
HOCO_VNM15	44.93
HOCO_VNM16	61.63
HOCO_VNM17	67.55
HOCO_VNM18	48.53

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

Howard County



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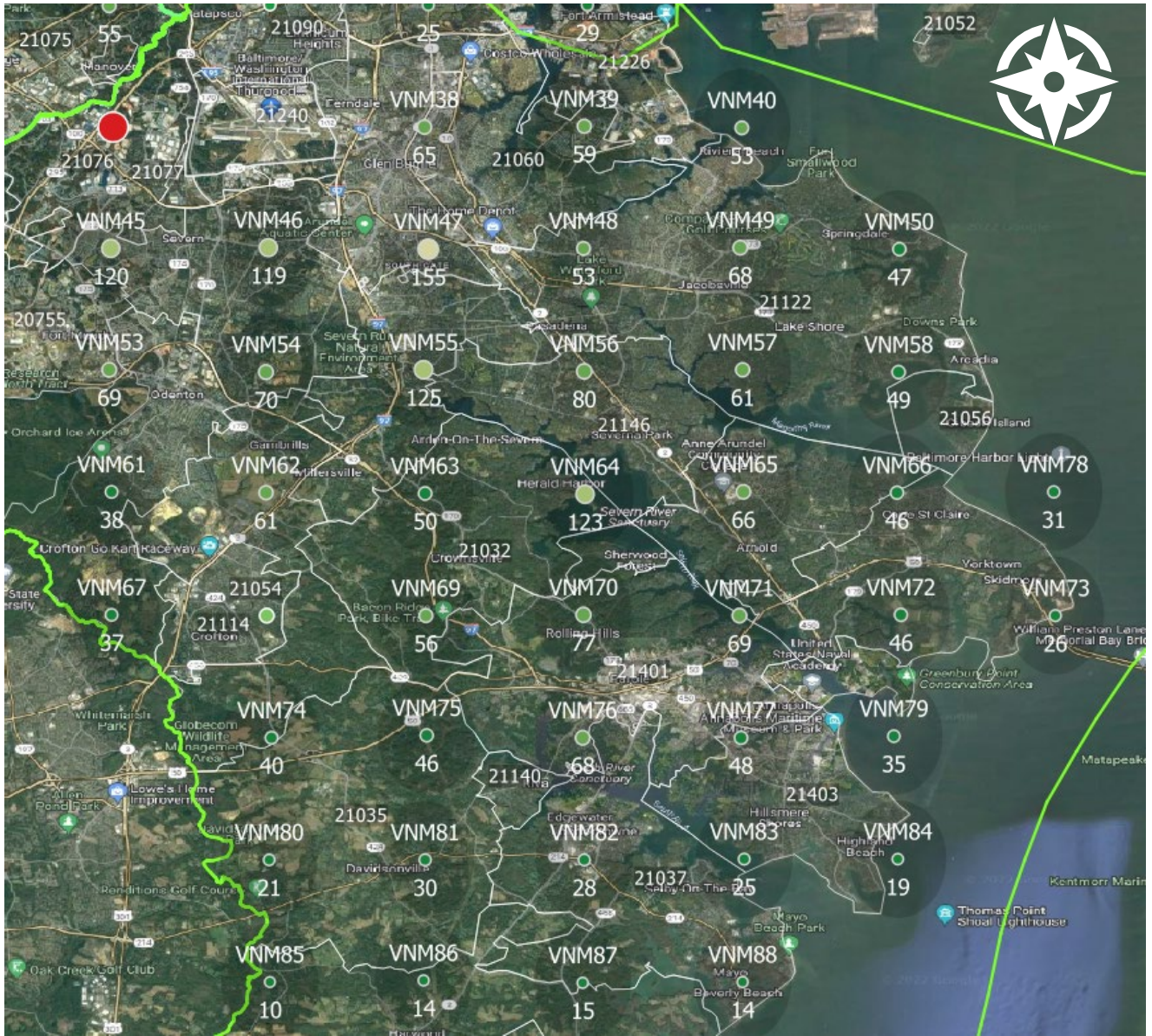
Noise Exposure: Number-of-Events-Above 55 dBA *(Daily Average)*

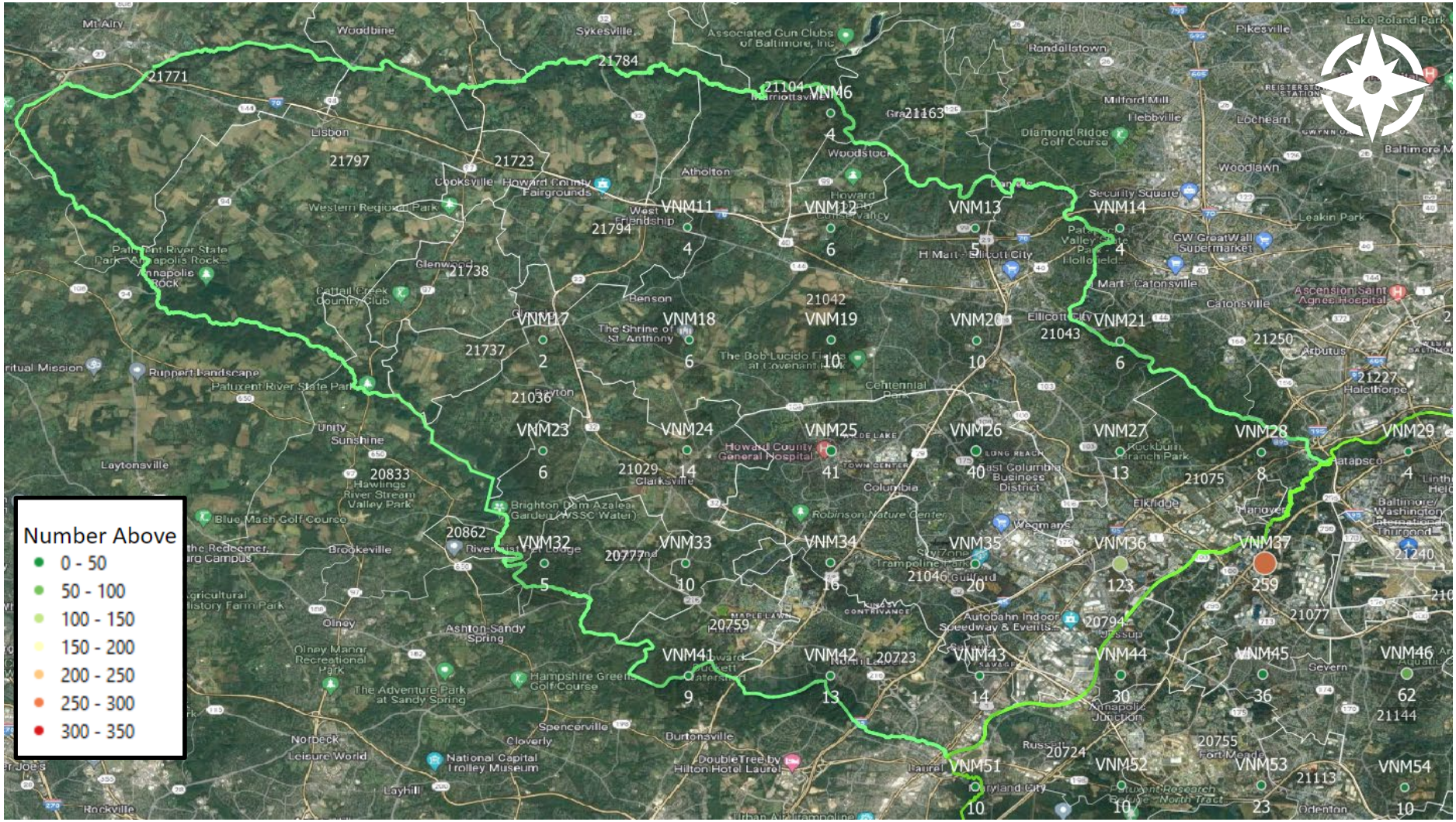
Anne Arundel County



vianair

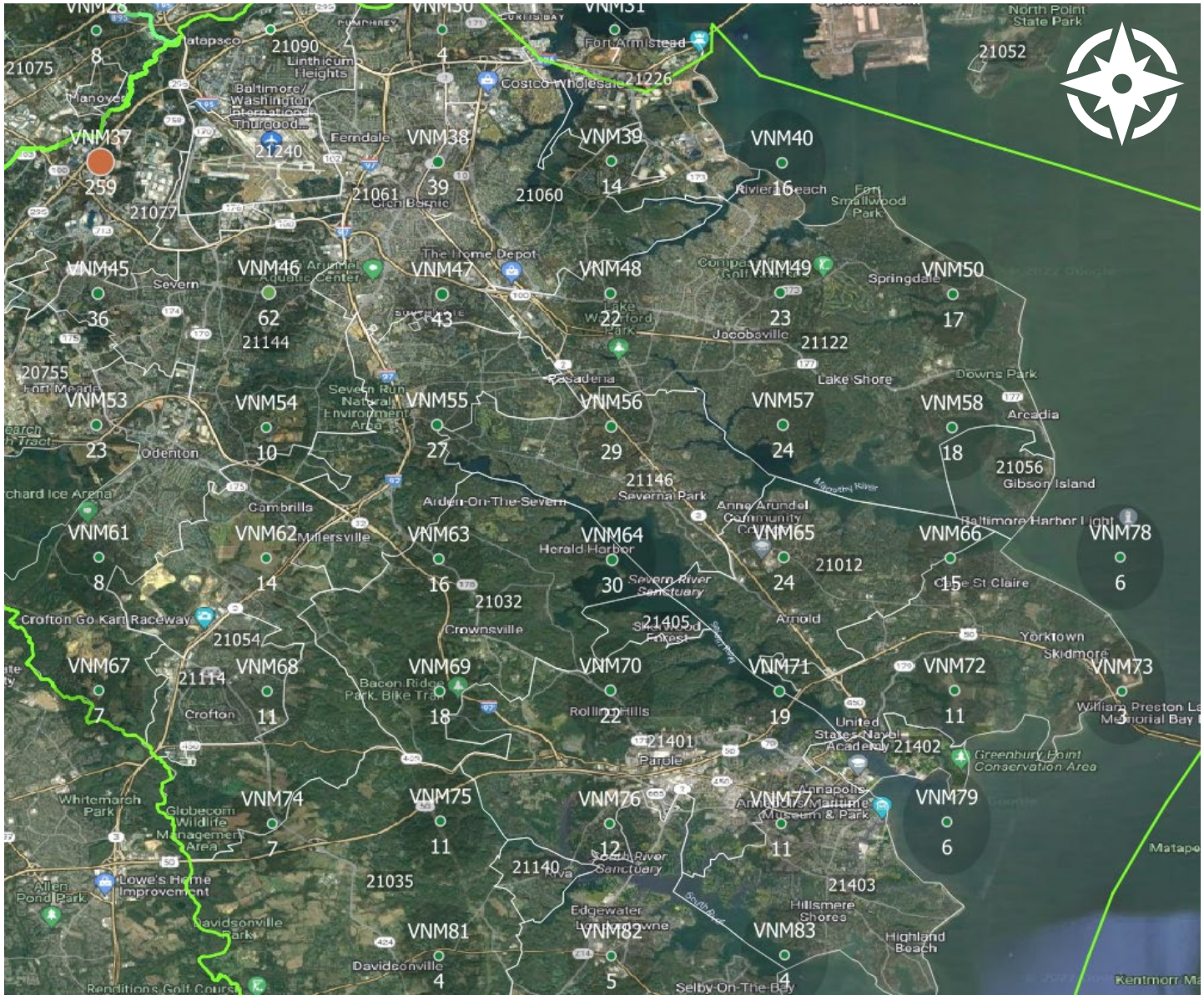
Noise Exposure: Number-of-Events-Above 65 dBA *(Daily Average)*

Howard County



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

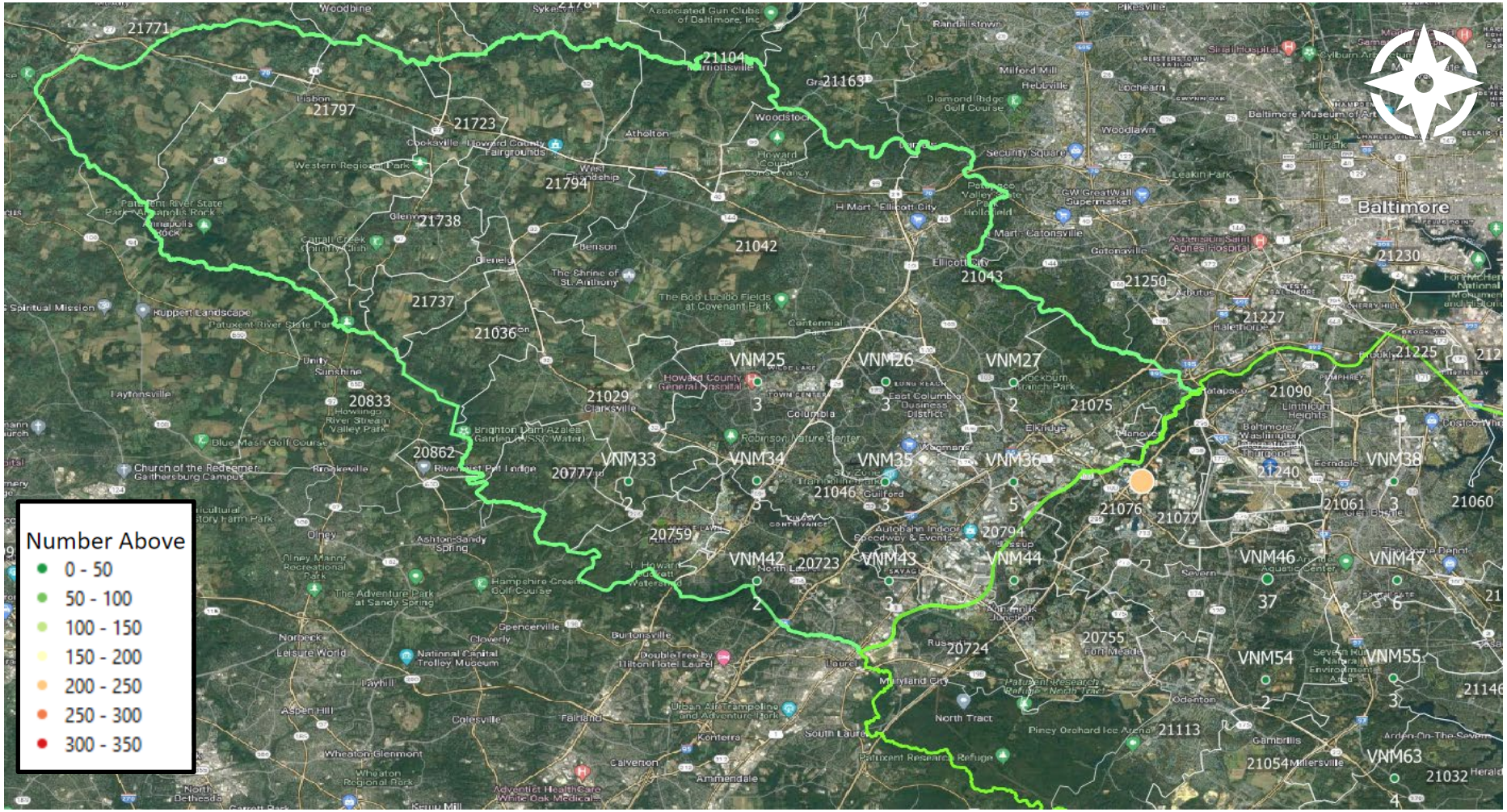
Anne Arundel County



vianair

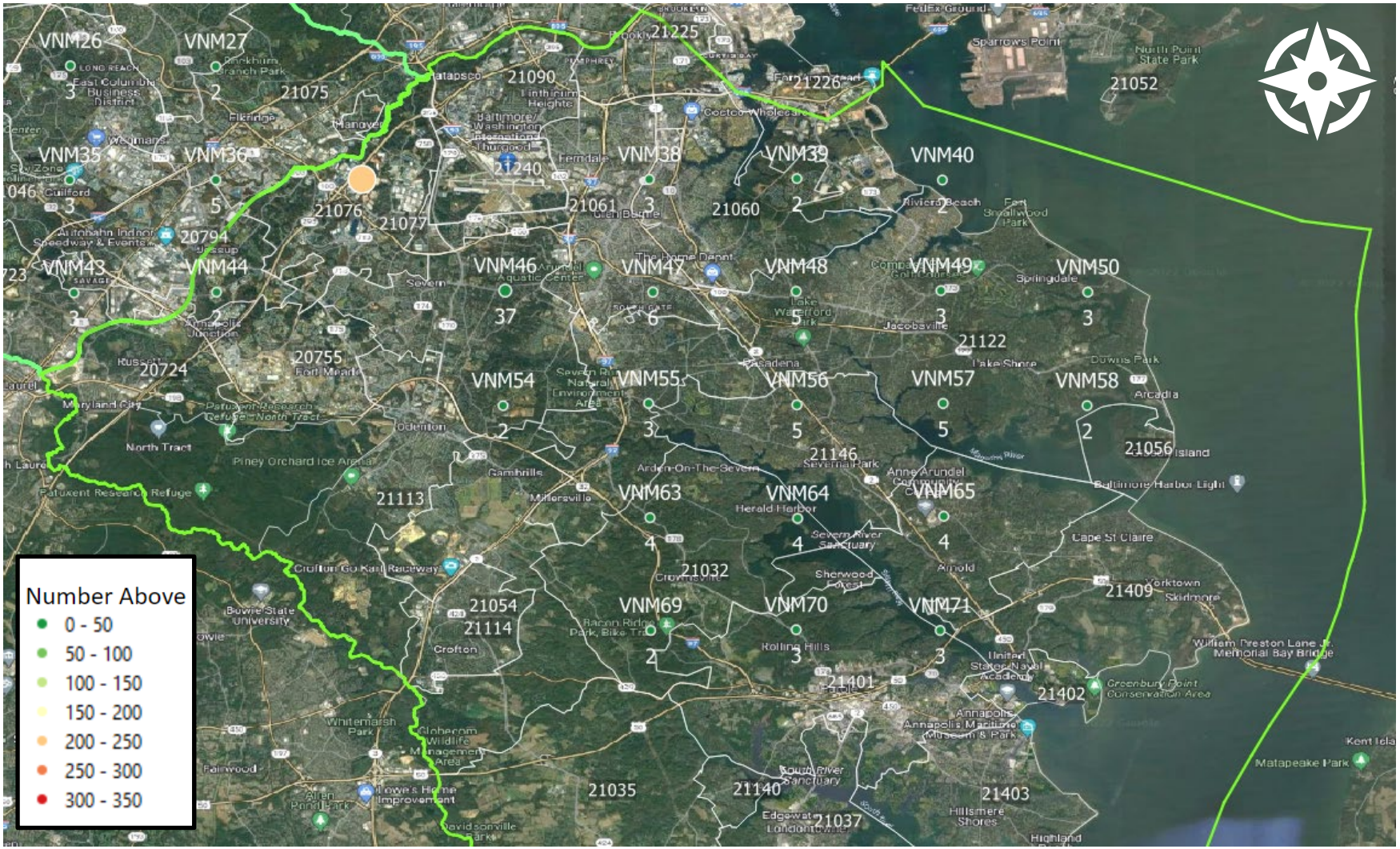
Noise Exposure: Number-of-Events-Above 75 dBA *(Daily Average)*

Howard County



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

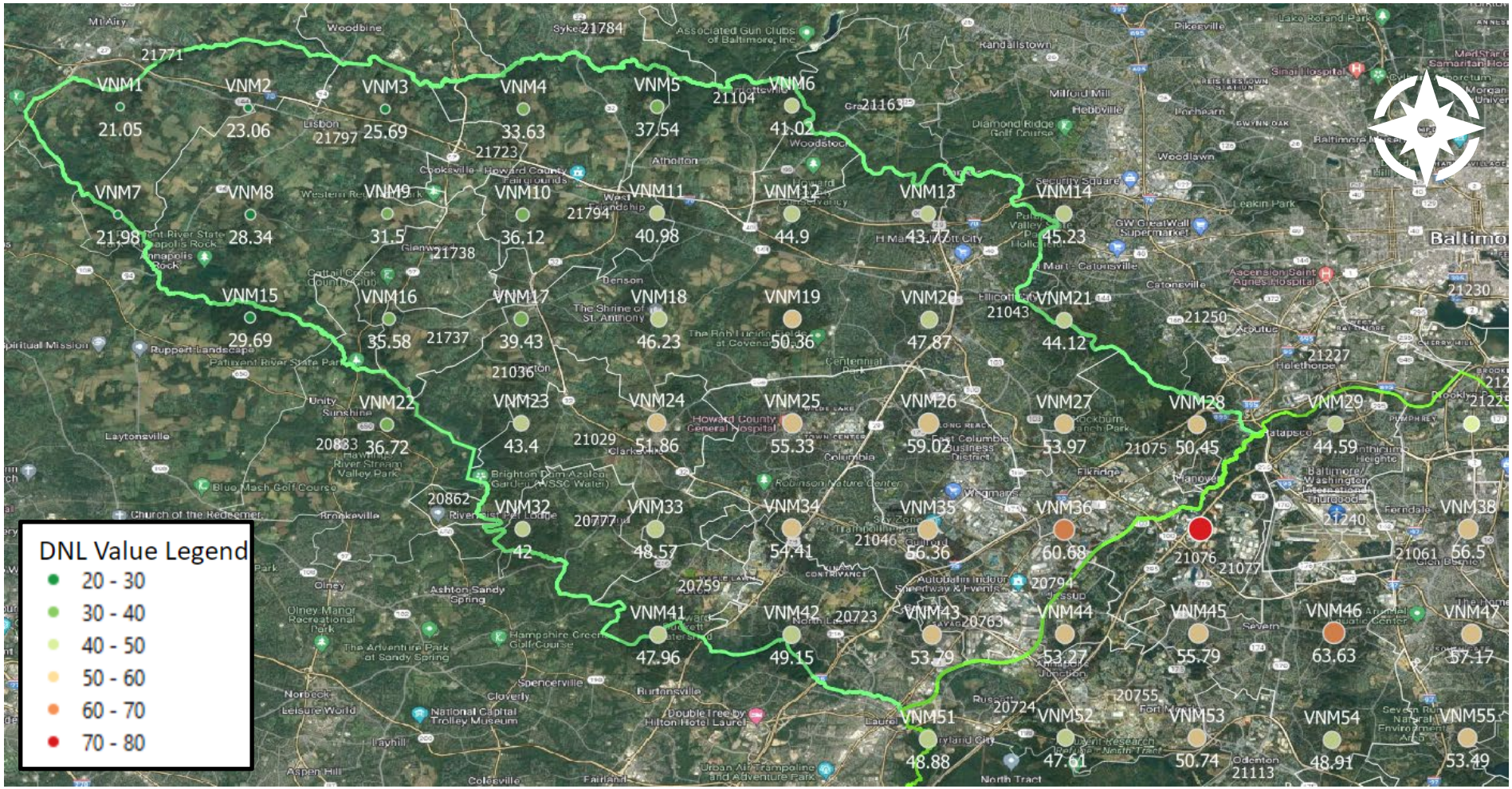
Anne Arundel County



vianair

Noise Exposure: DNL *(Daily Average)*

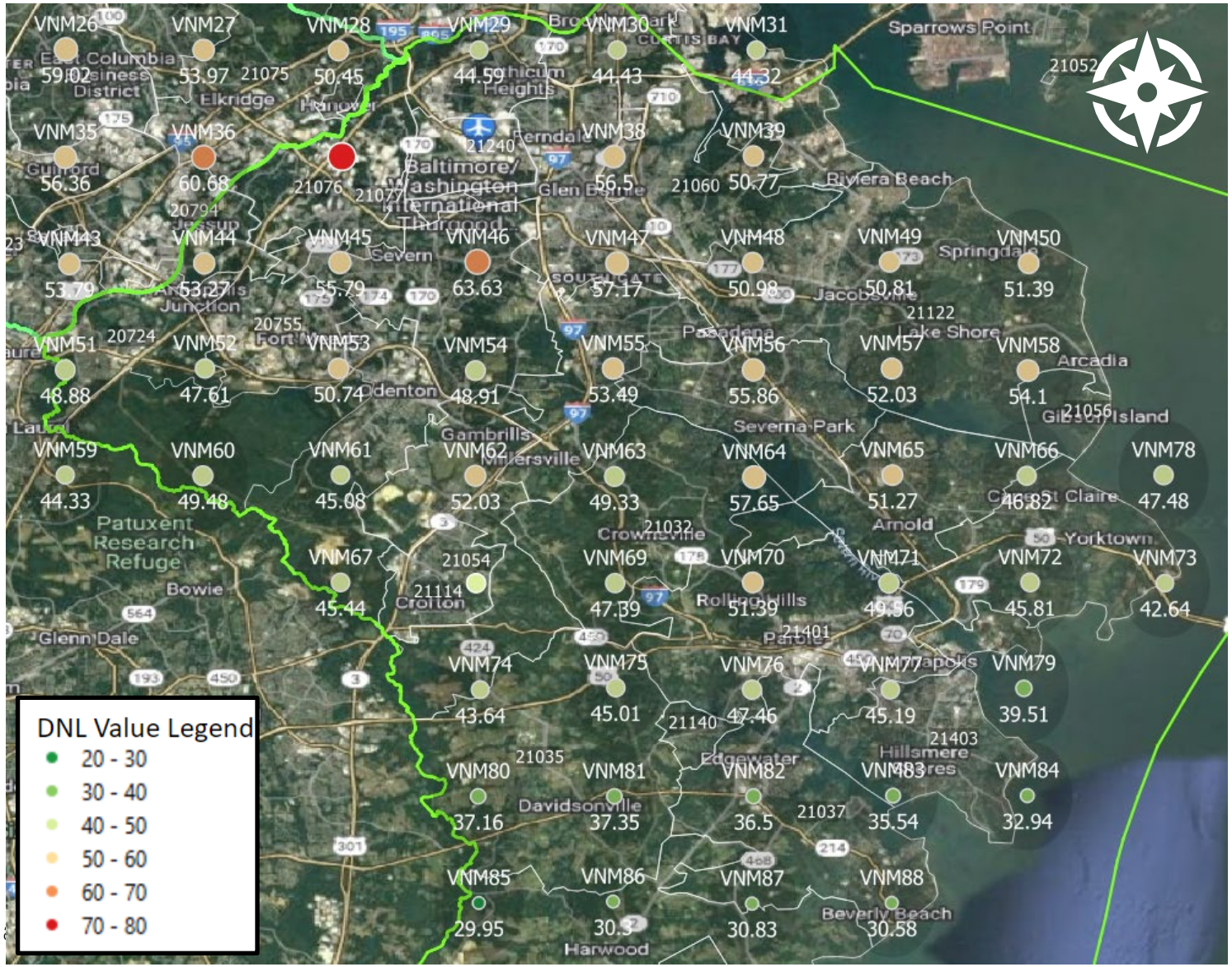
Howard County



vianair

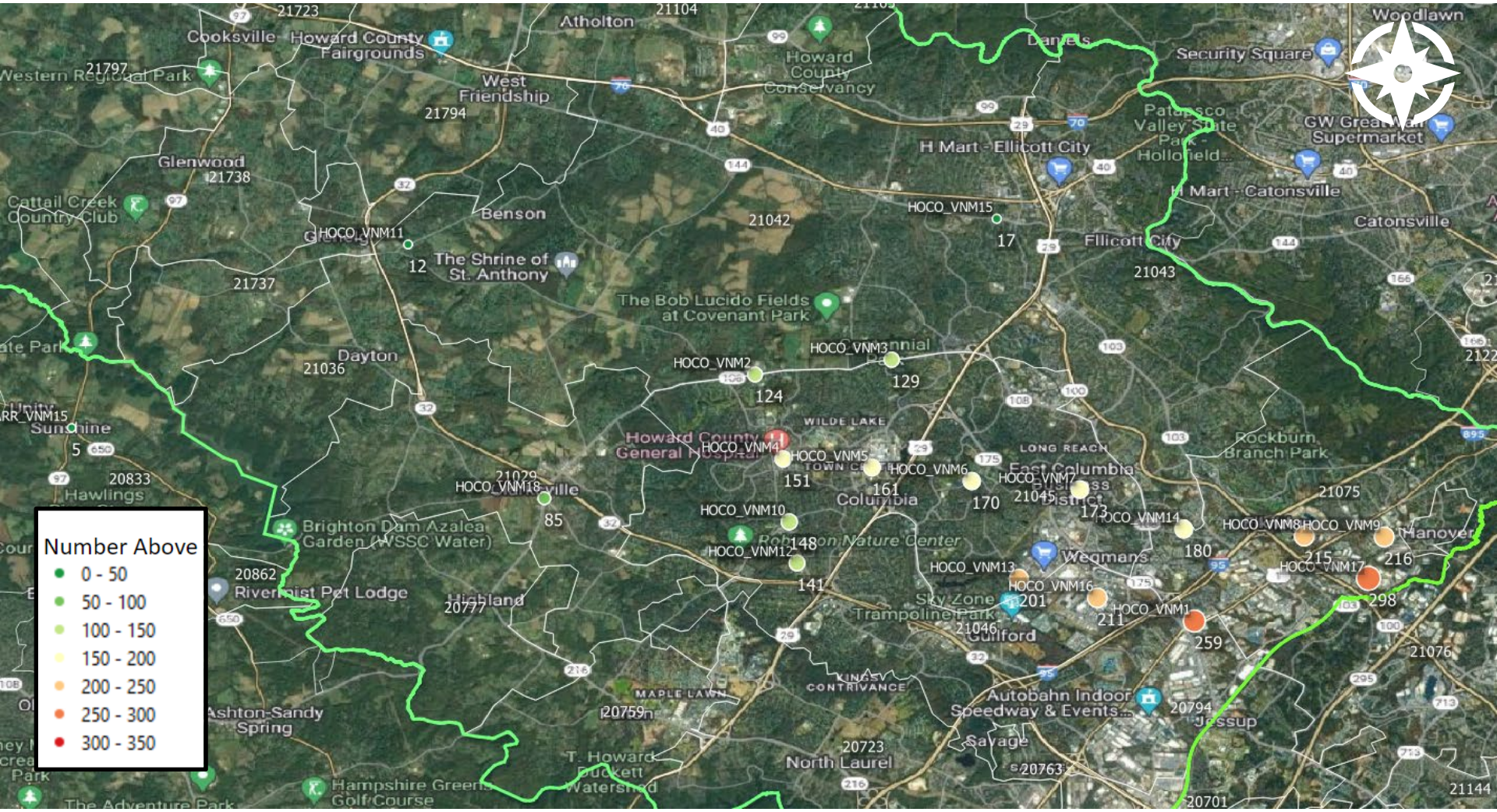
Noise Exposure: DNL (Daily Average)

Anne Arundel County



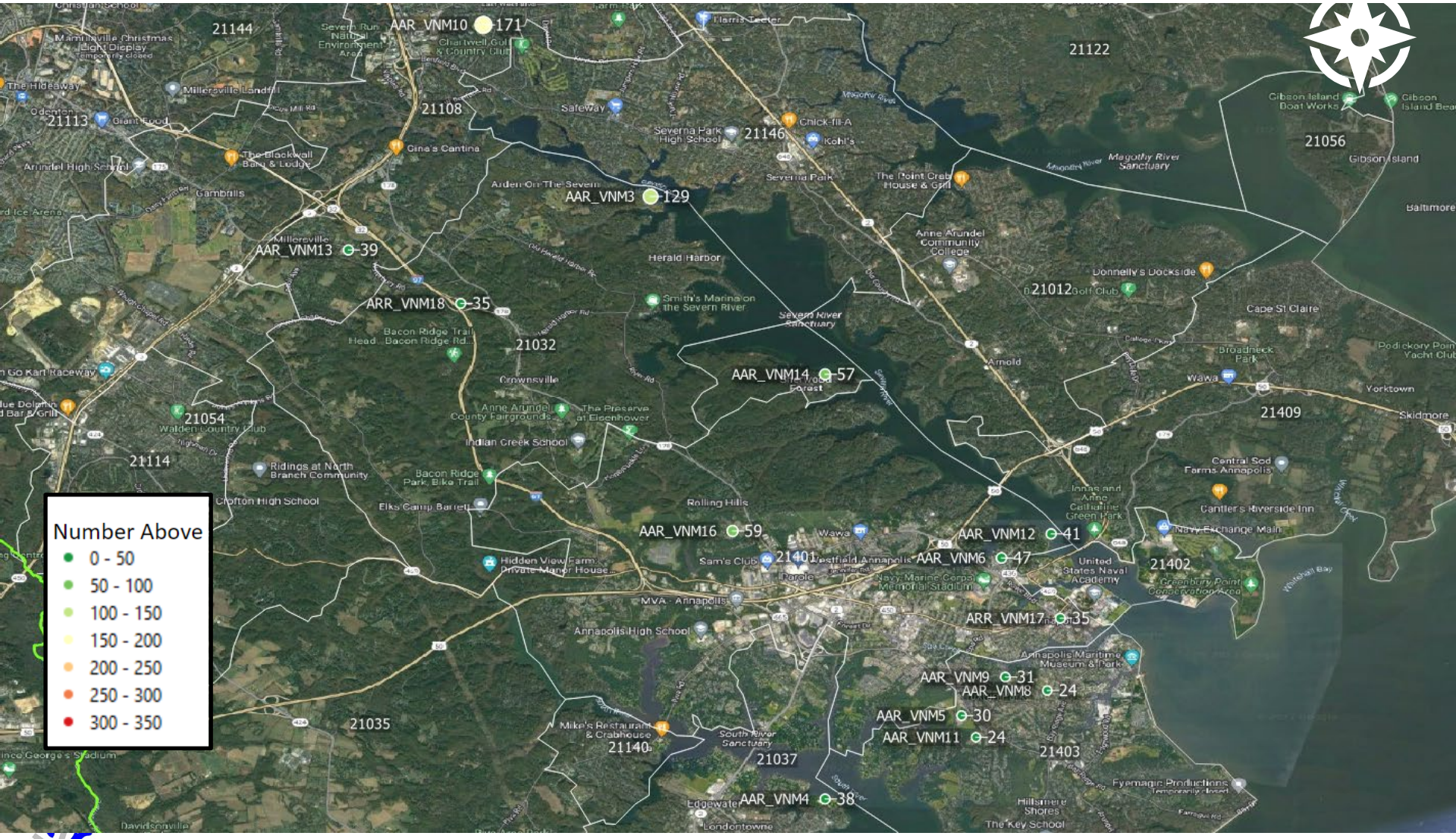
Noise Exposure: Number-of-Events-Above 55 dBA *(Daily Average)*

Howard County – Landmark Locations



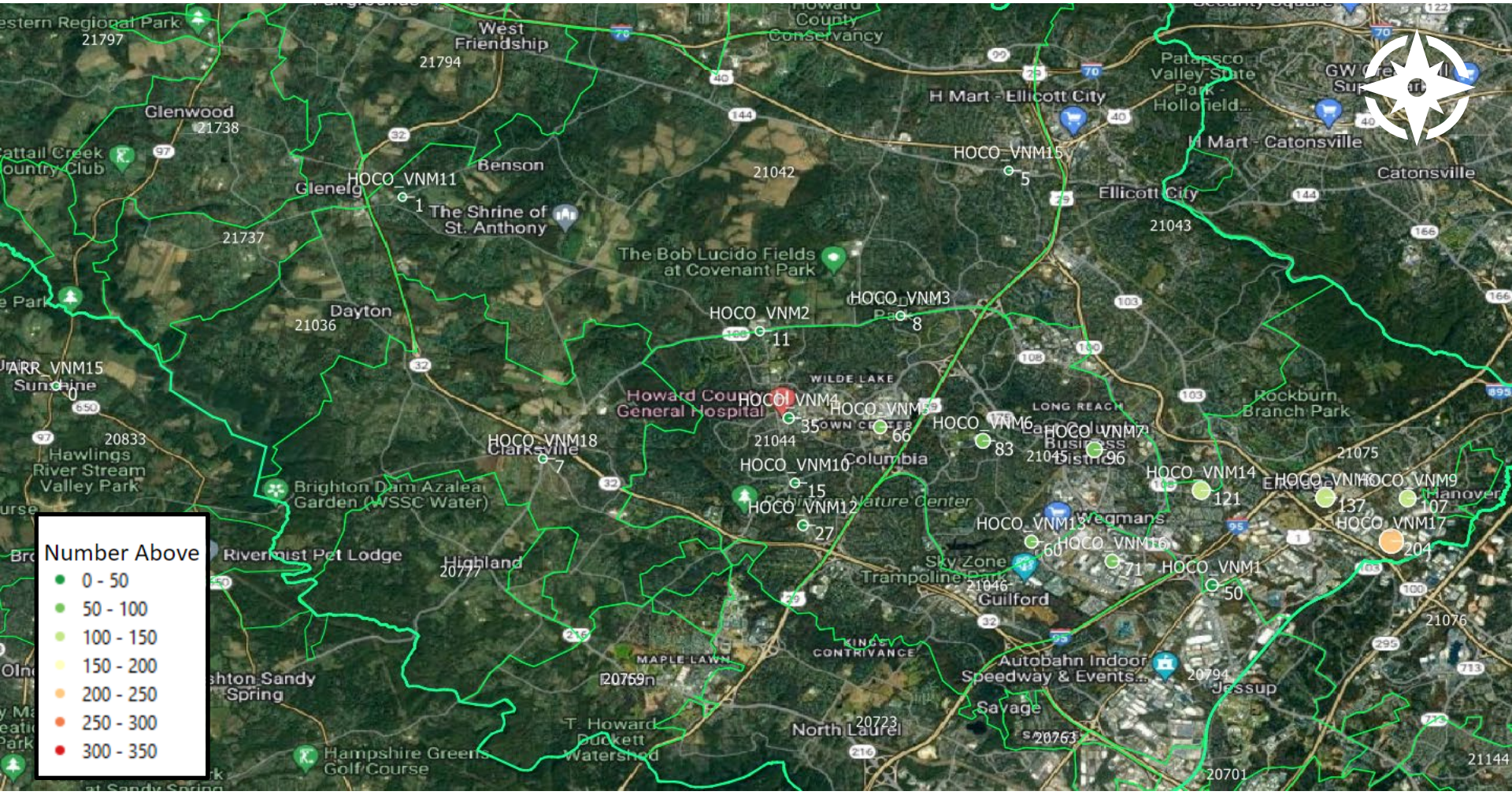
Noise Exposure: Number-of-Events-Above 55 dBA *(Daily Average)*

Anne Arundel County – Landmark Locations



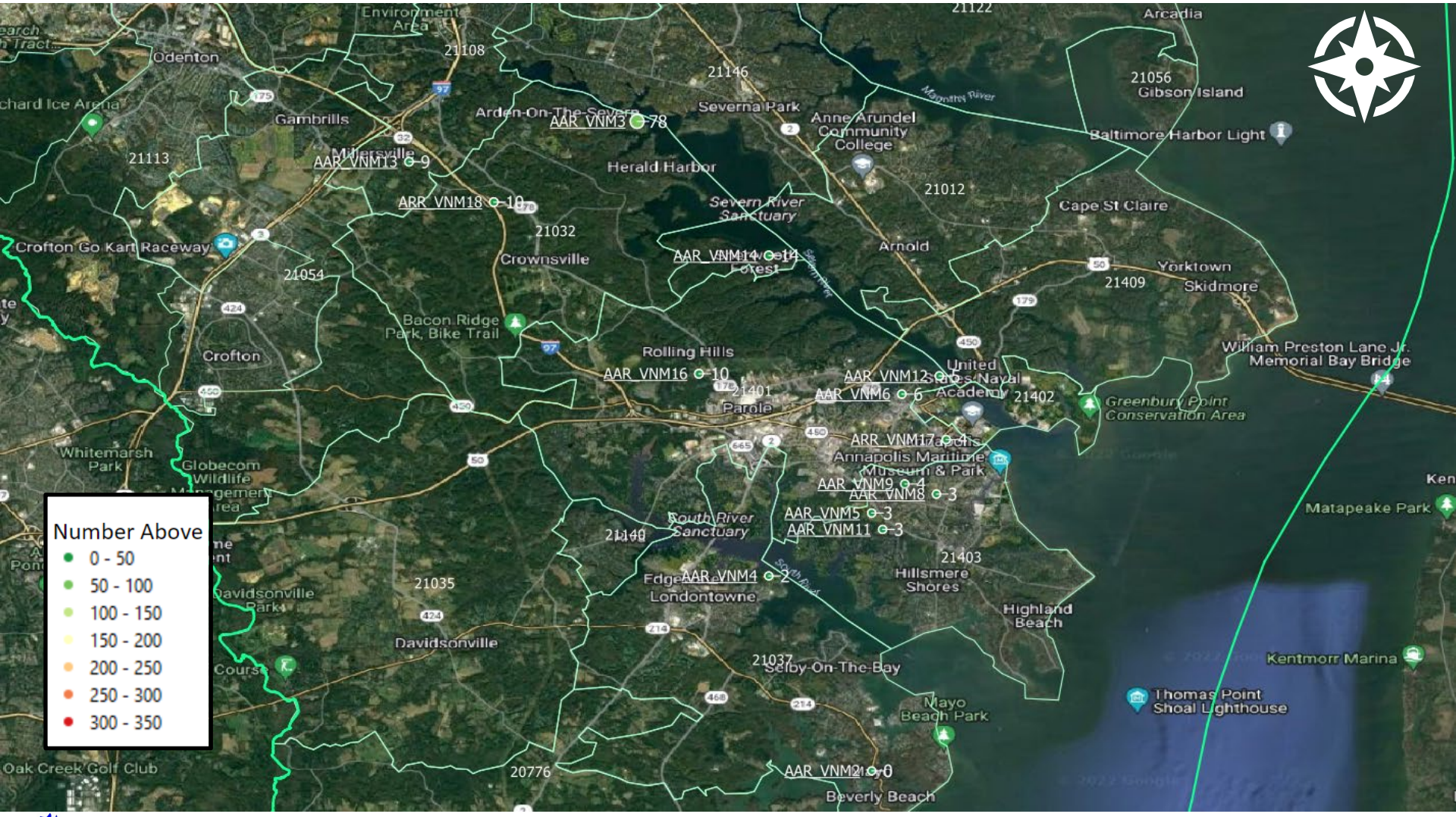
Noise Exposure: Number-of-Events-Above 65 dBA *(Daily Average)*

Howard County – Landmark Locations



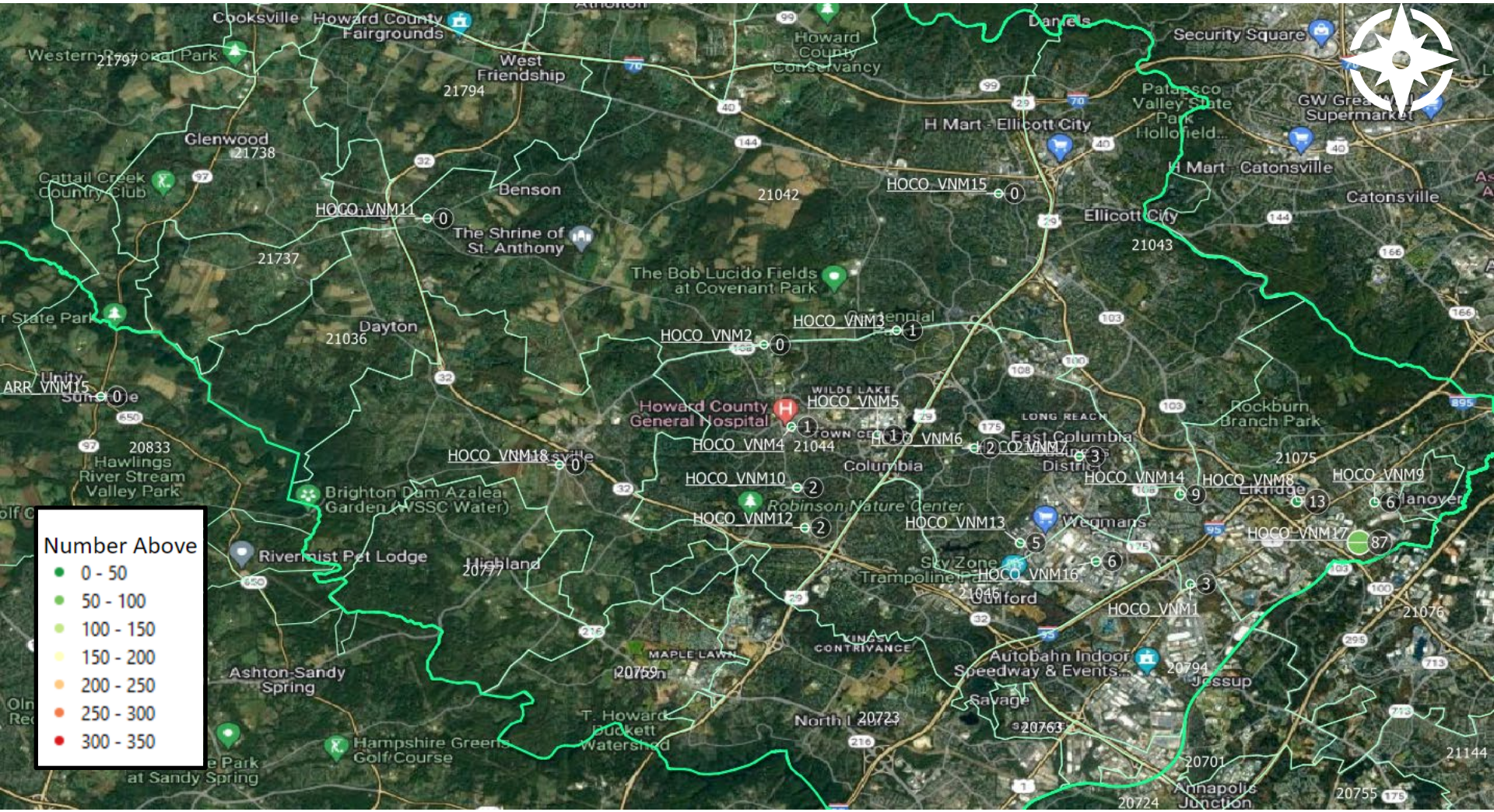
Noise Exposure: Number-of-Events-Above 65 dBA *(Daily Average)*

Anne Arundel County – Landmark Locations



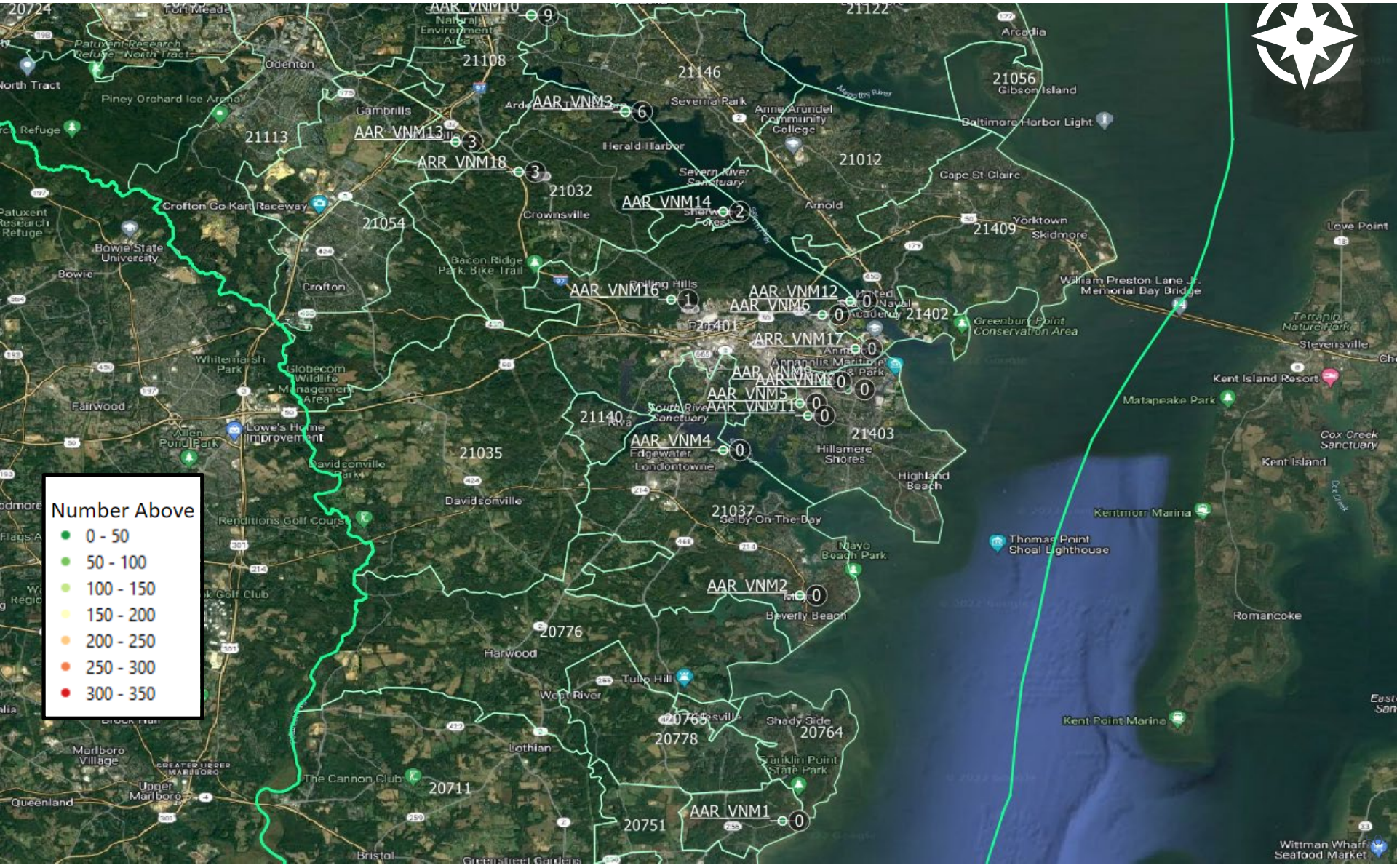
Noise Exposure: Number-of-Events-Above 75 dBA *(Daily Average)*

Howard County – Landmark Locations



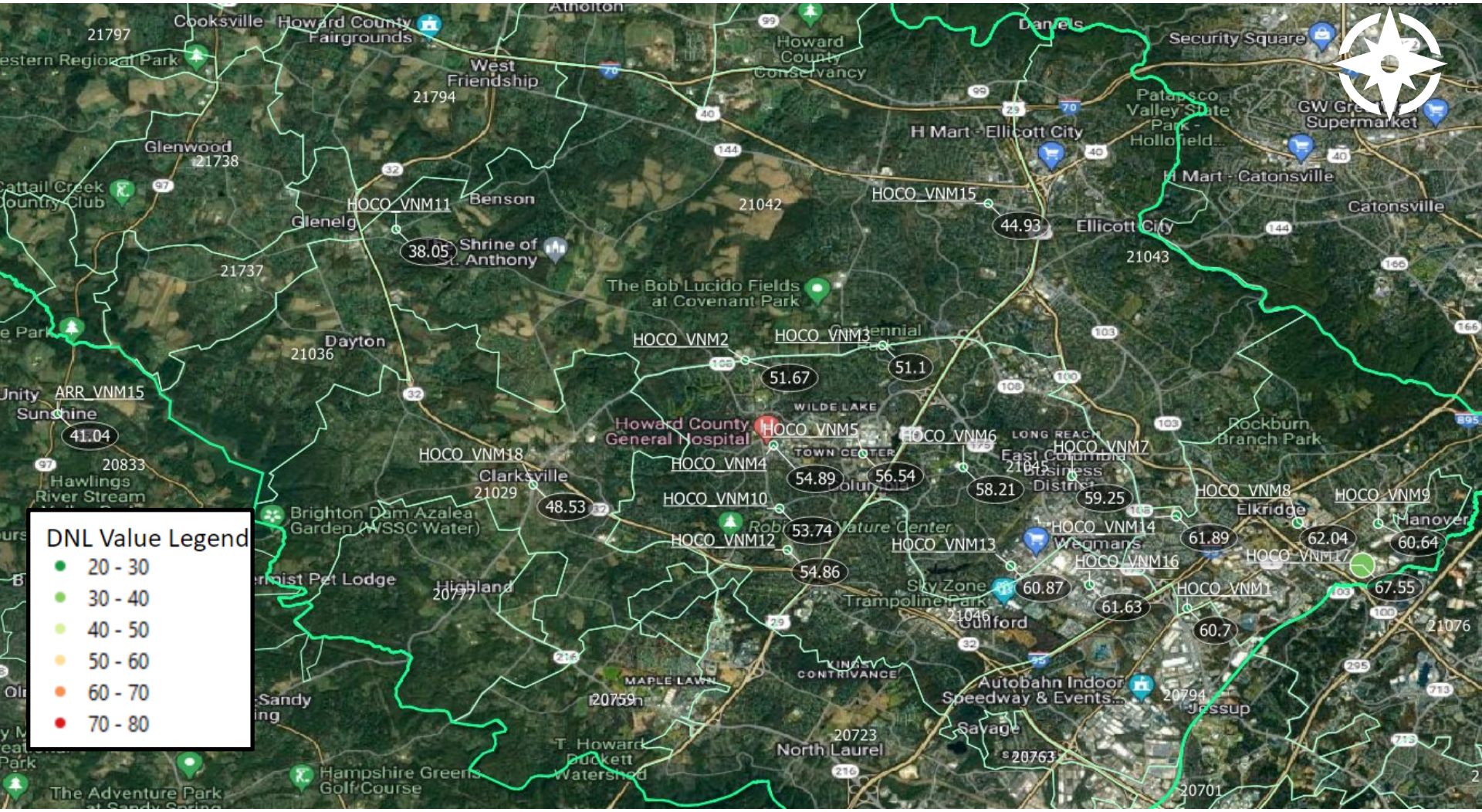
Noise Exposure: Number-of-Events-Above 75 dBA *(Daily Average)*

Anne Arundel County – Landmark Locations



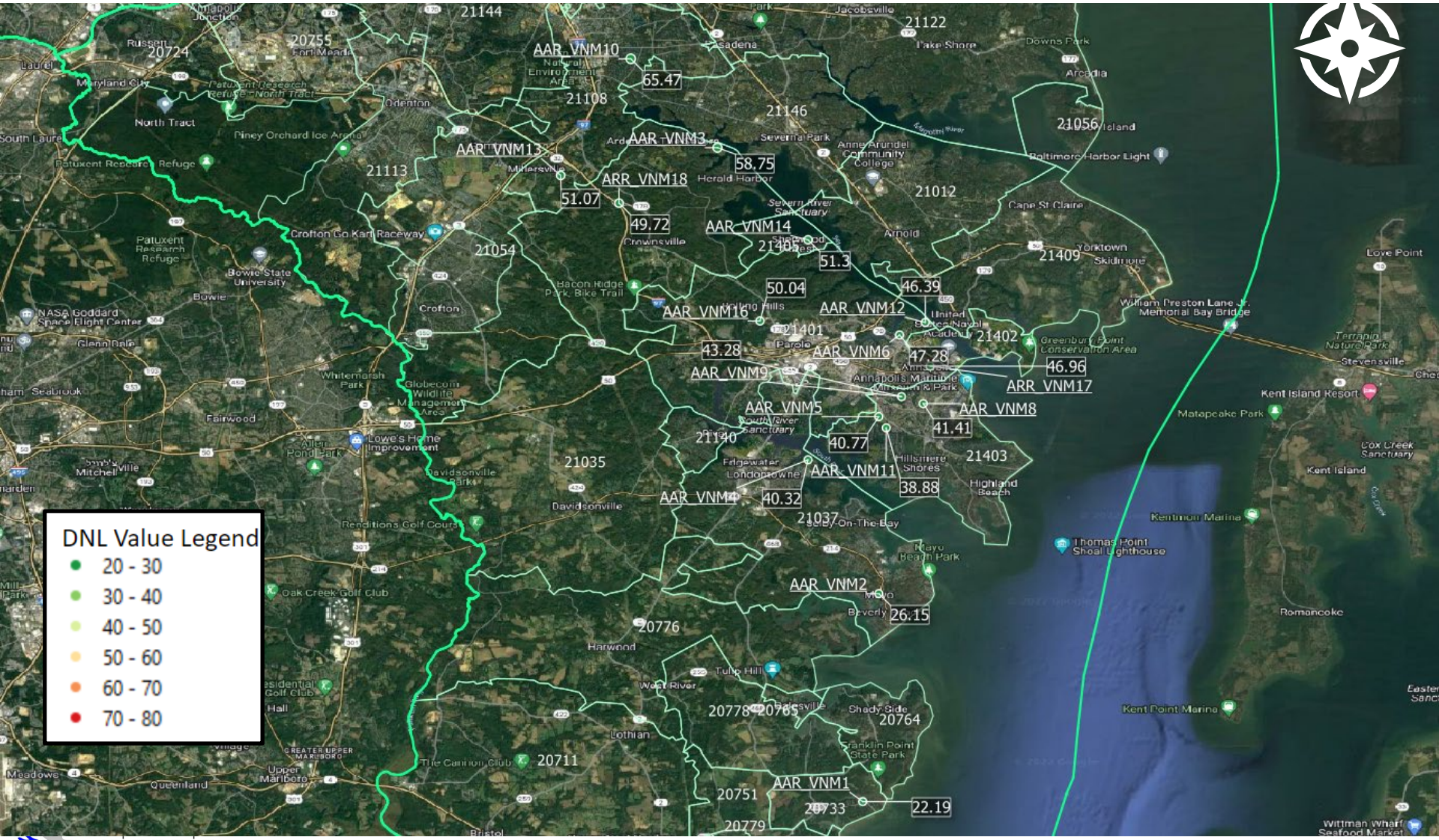
Noise Exposure: DNL (Daily Average)

Howard County – Landmark Locations



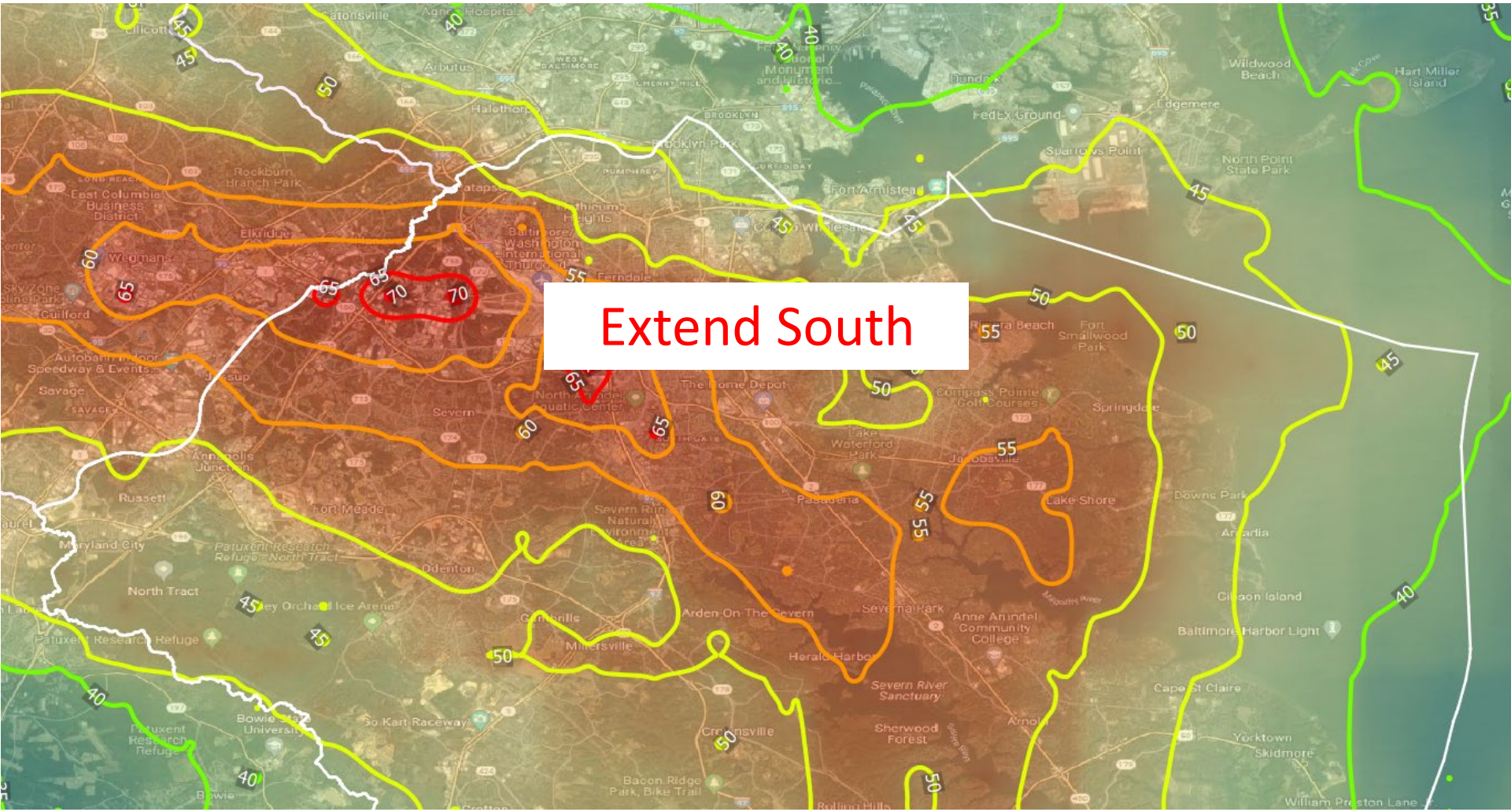
Noise Exposure: DNL (Daily Average)

Anne Arundel County – Landmark Locations



Noise Exposure: DNL Contours (Daily Average)

Anne Arundel County



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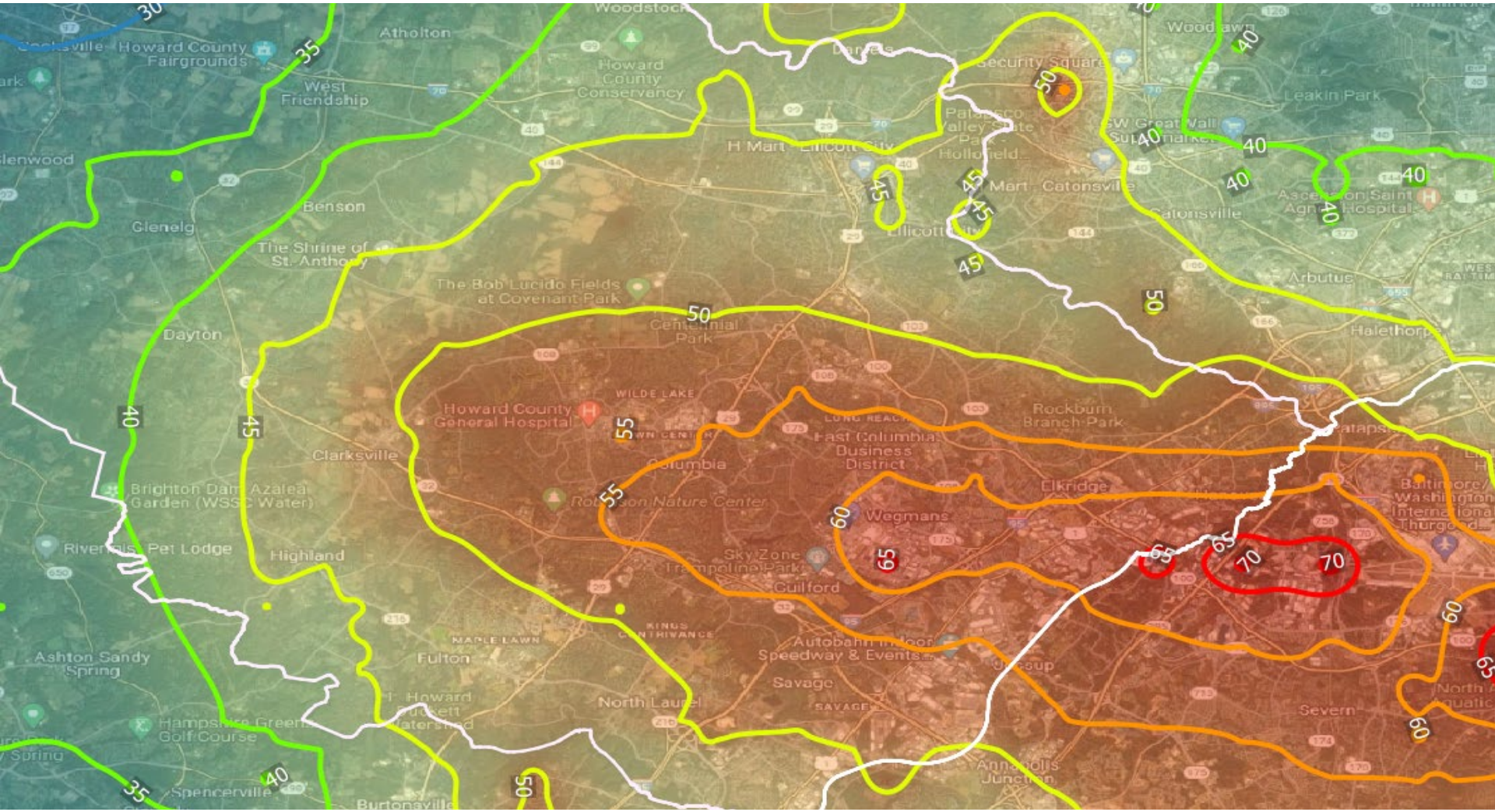
Noise Exposure: DNL Contours (Daily Average)

Howard County



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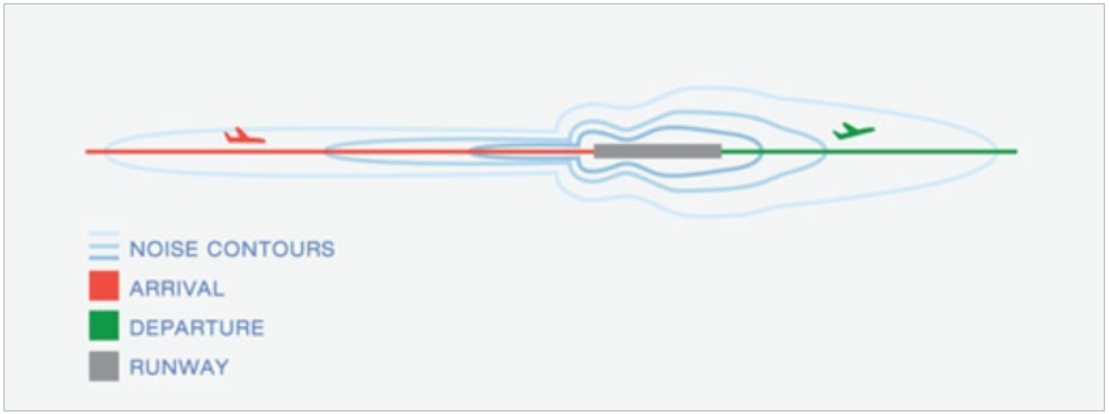
Noise Exposure – Single Event Noise Contours

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.

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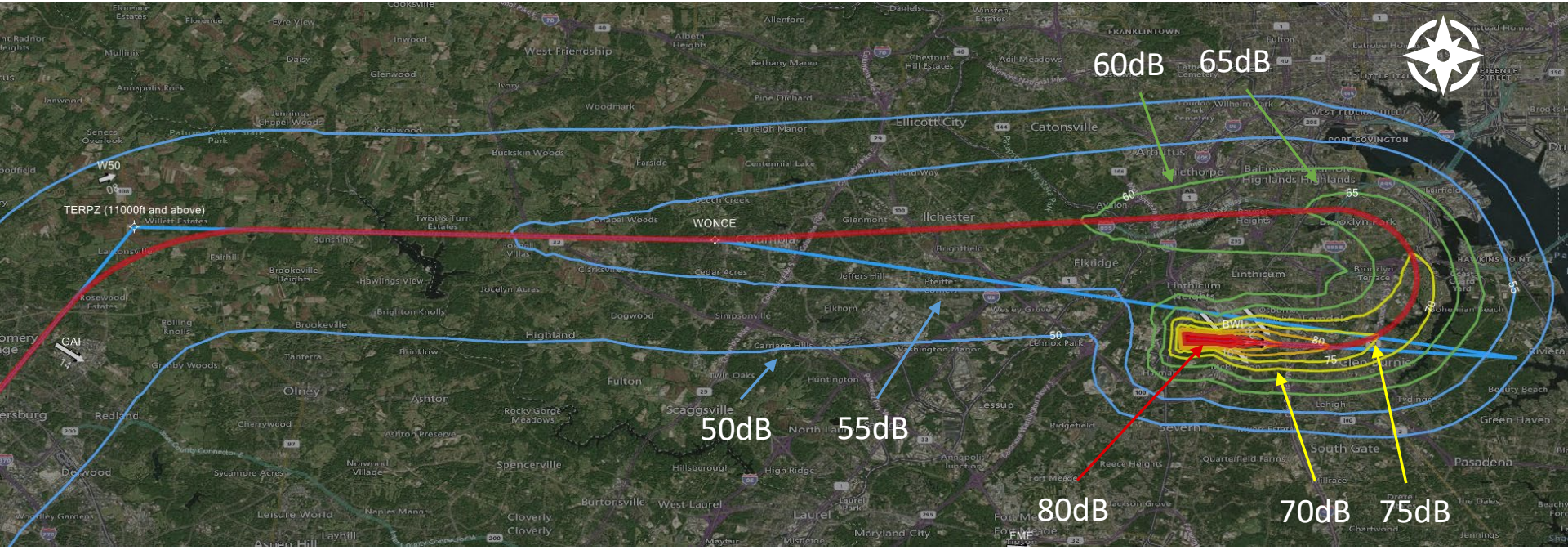
Single Event Noise Contours

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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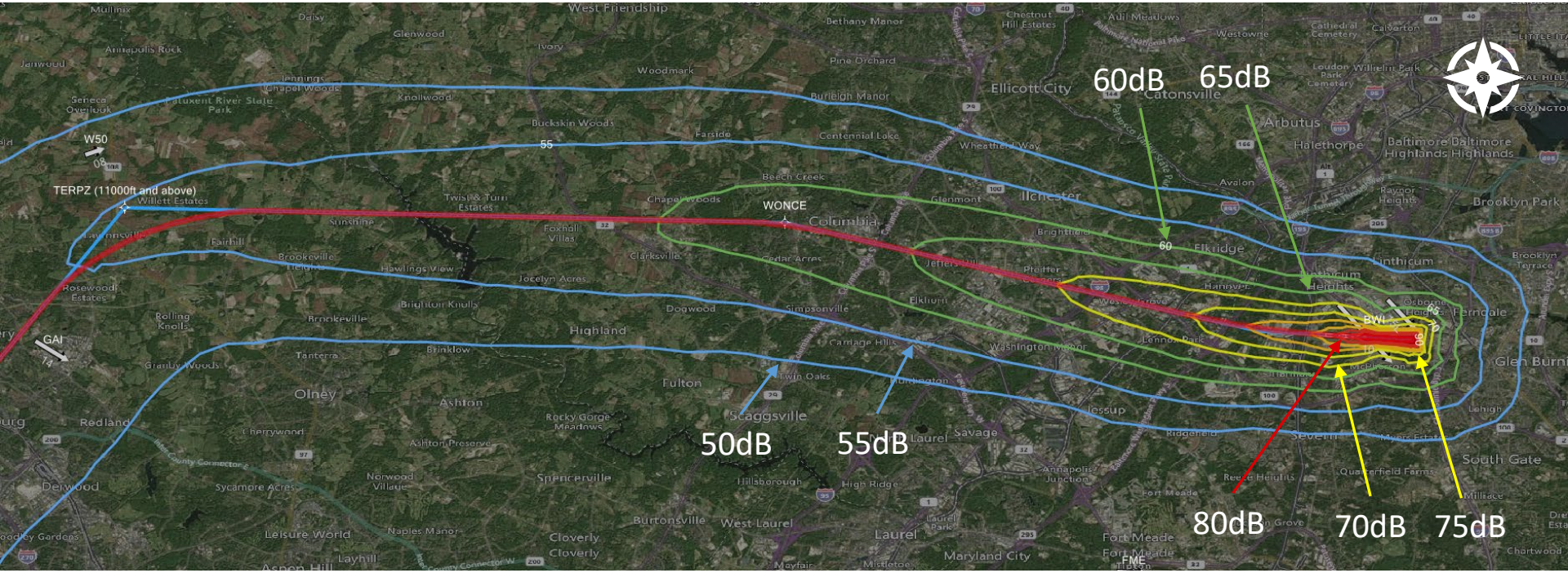
Single Event Noise Contours

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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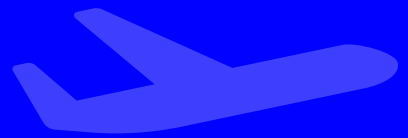
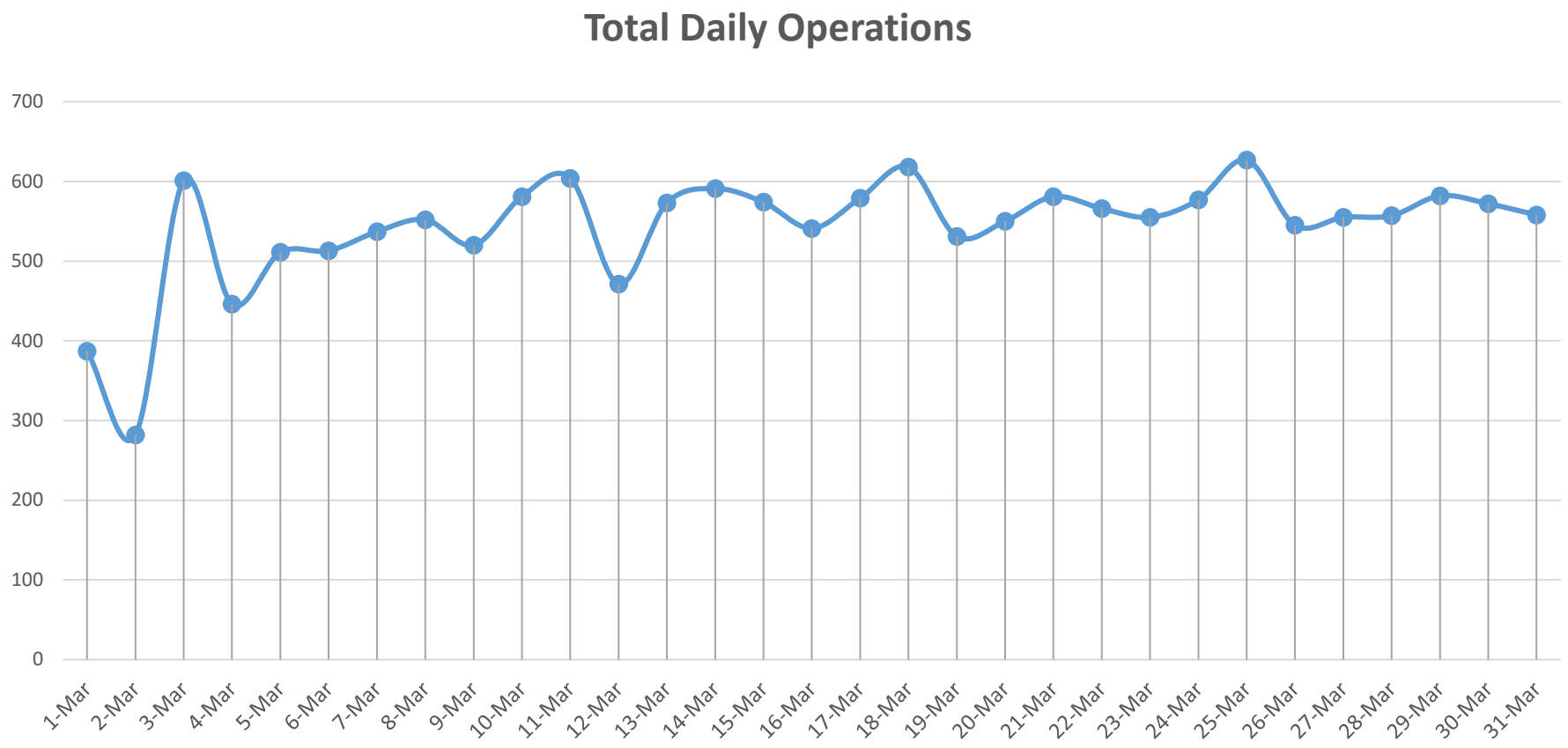
APPENDIX I:

SUPPLEMENTAL OPERATIONAL STATISTICS



Total Operations



Total Monthly Operations	16,837
Average Daily Operations	543

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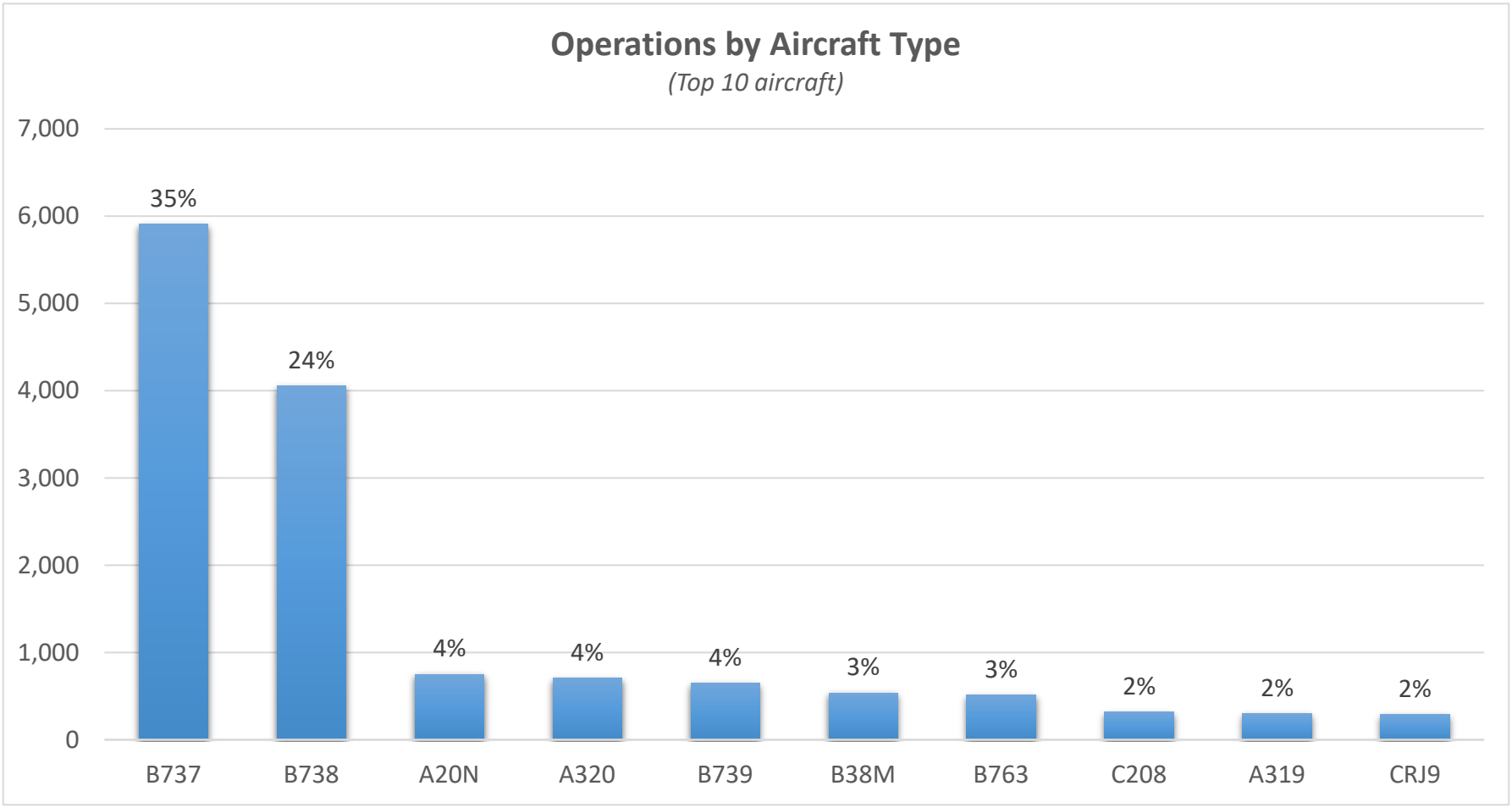
Fleet Mix: Aircraft Type



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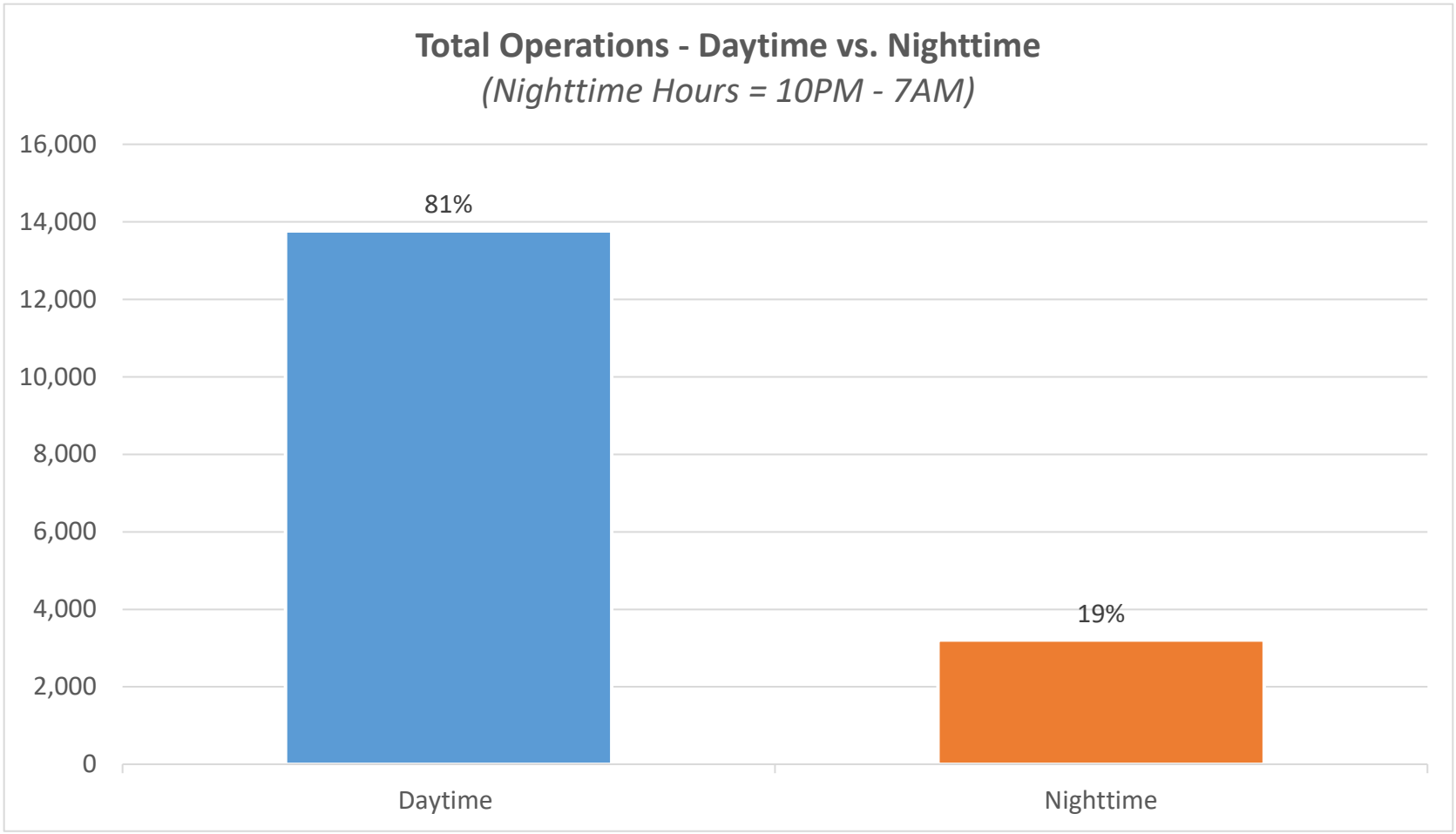
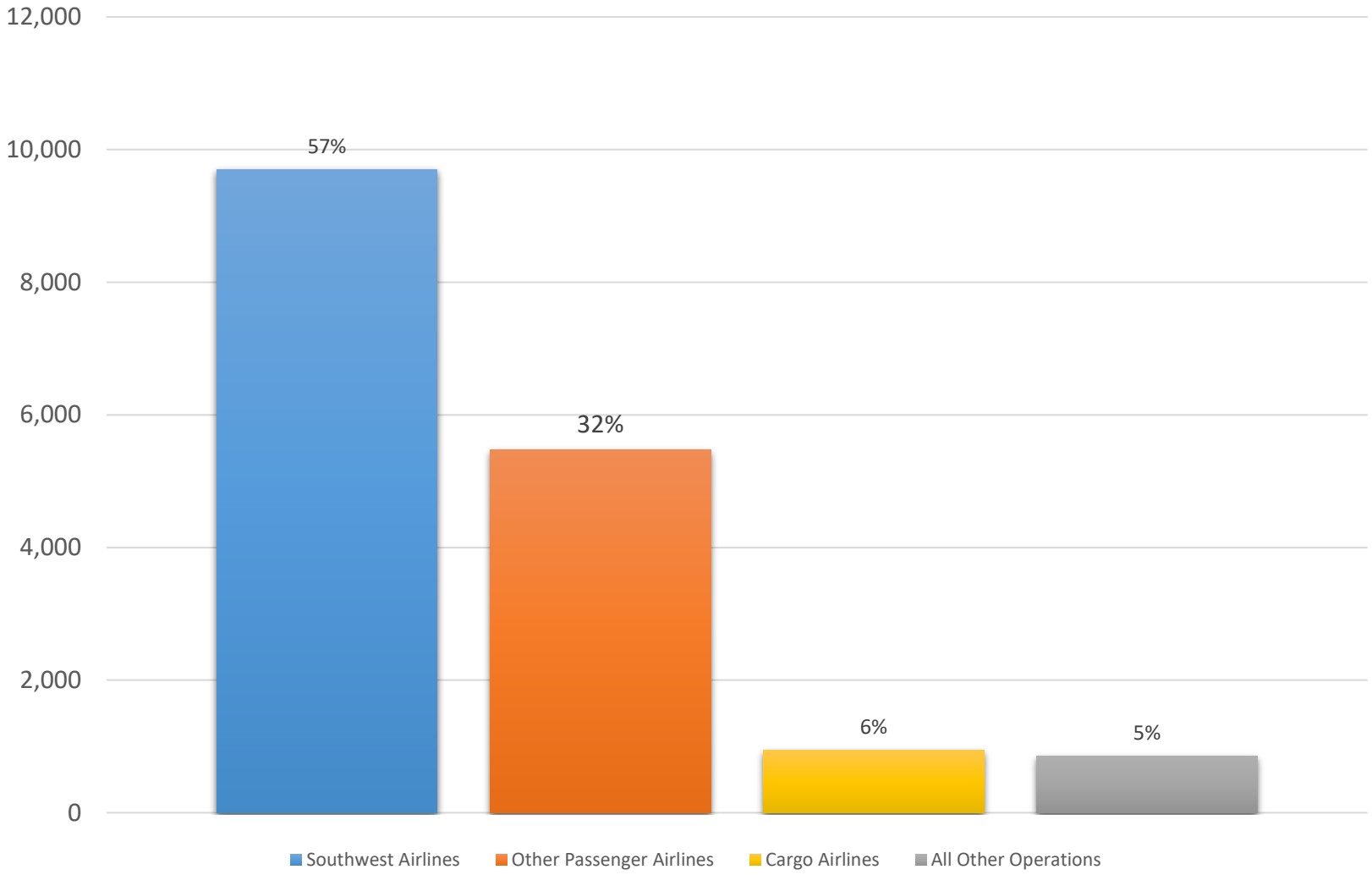
Total Operations: Daytime vs. Nighttime



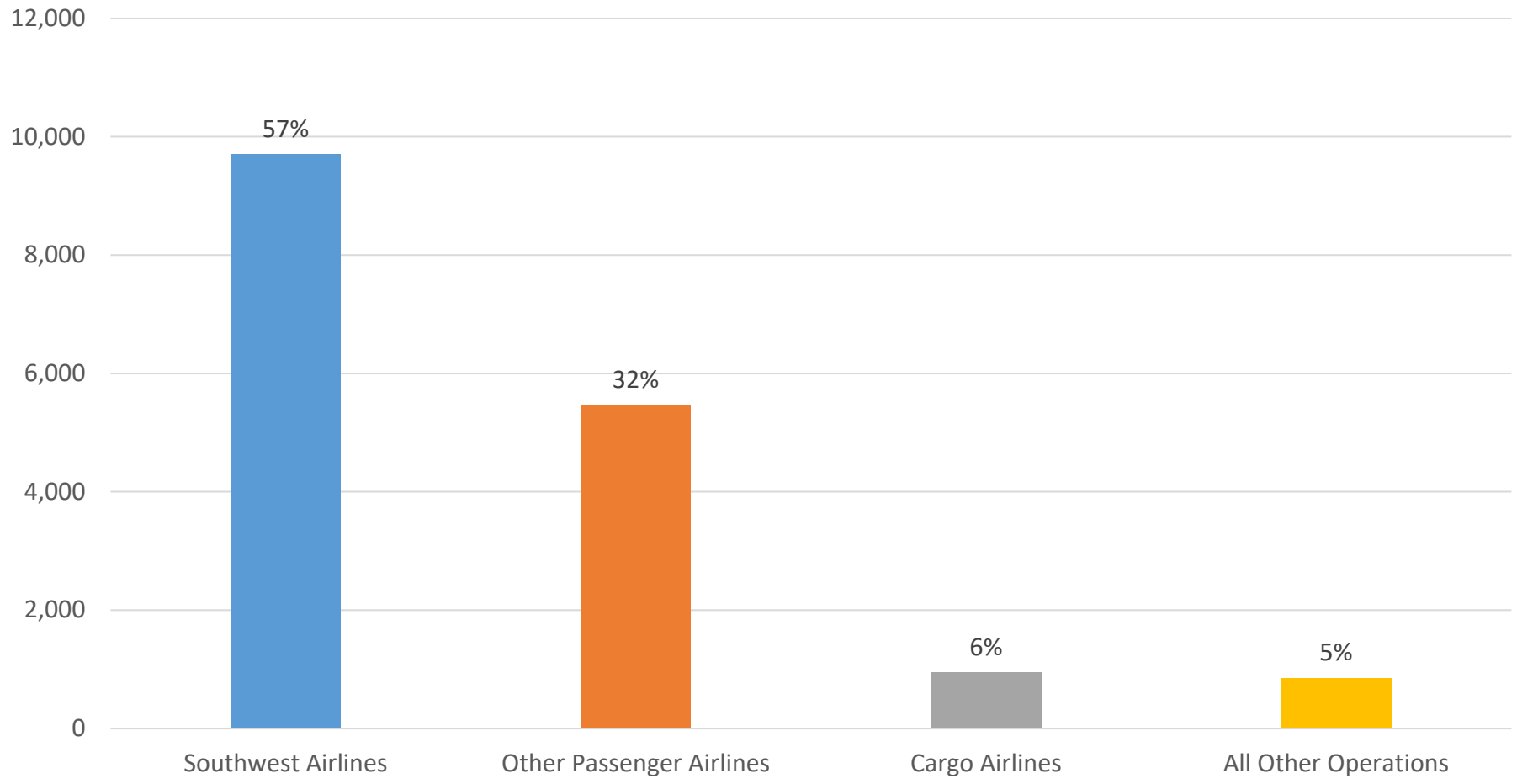
vianair

Total Operations: Southwest Airlines vs. Other



vianair

Total Operations: Southwest Airlines vs. Other



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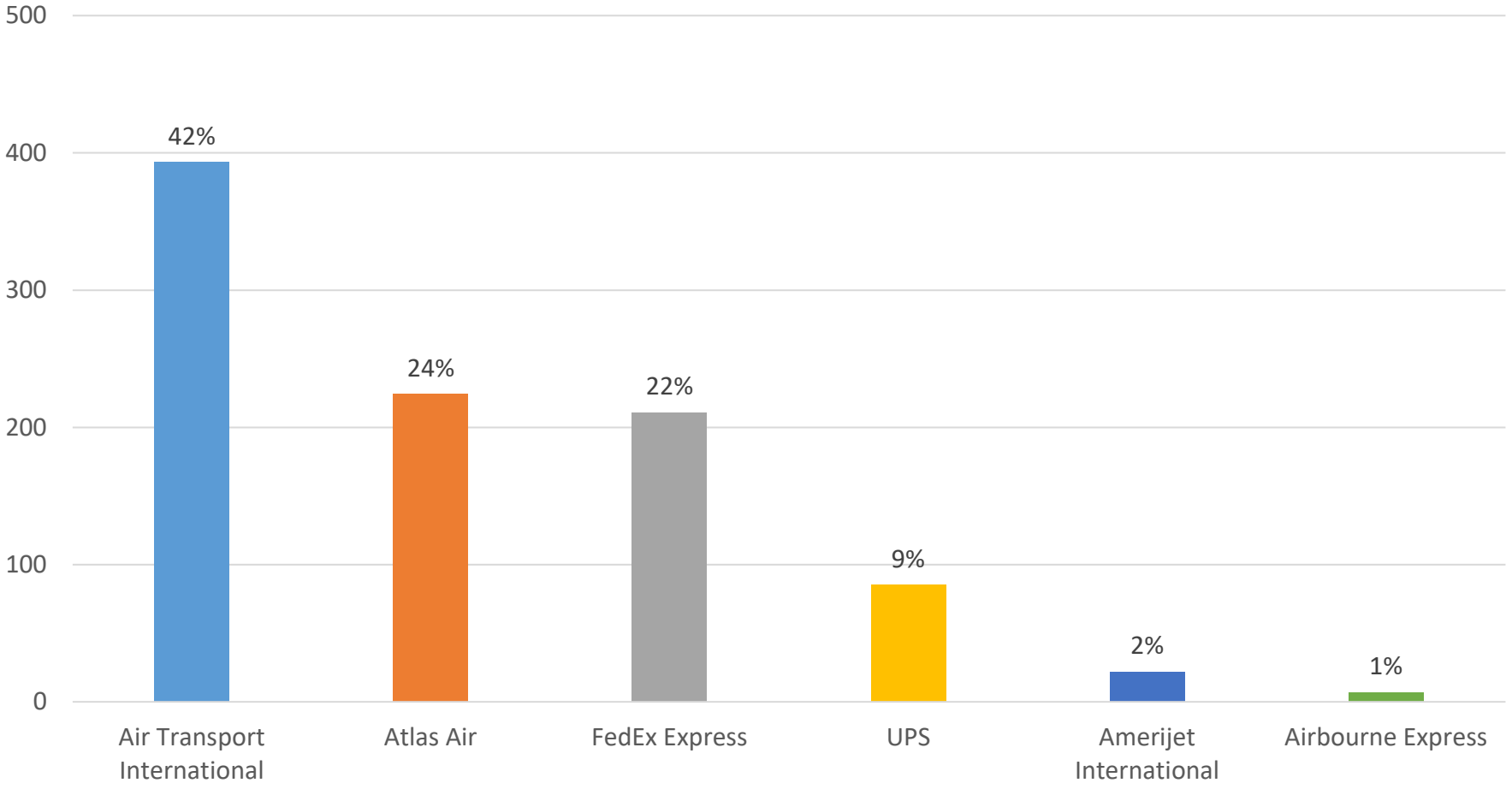
Total Operations: Cargo Operators



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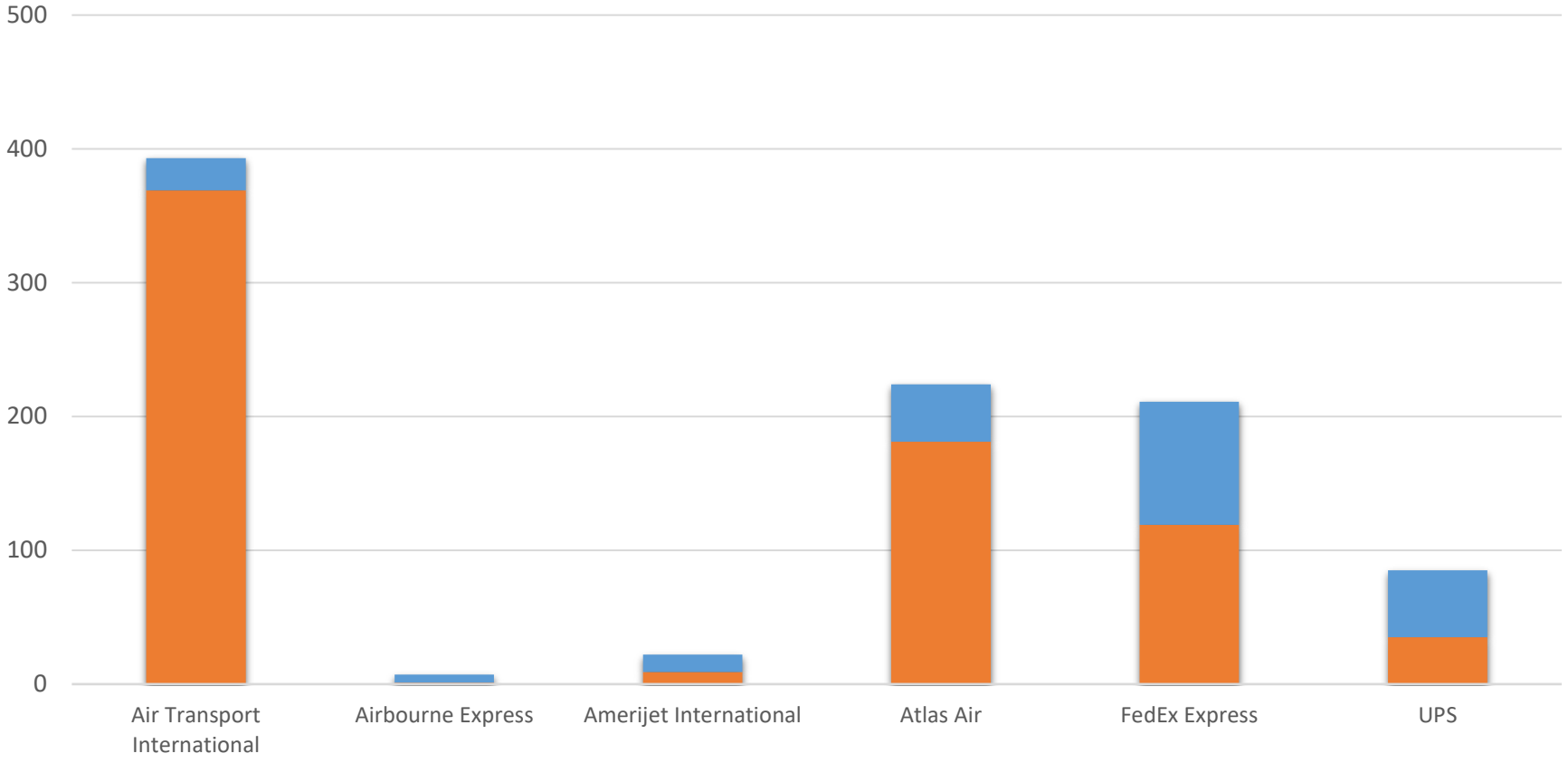
Cargo Operations: Daytime vs. Nighttime



"Nighttime Hours" for this analysis was based on the period from 10PM - 7AM

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