Post Implementation Analysis

Standard Instrument Departures (SIDS) Implemented July 2024

Standard Terminal Arrival Procedures (STARS) & Instrument Approach Procedures (IAP) Implemented September 2024

DC Metroplex BWI Community Roundtable
June 24, 2025

Table of Contents:

Presentation Goals

- History of Implementation of Performance Based Navigation (PBN) Procedures at BWI Marshall
- Quick refresher on how BWI Marshall operates
- Understand what FAA changed and why
- Understand whether FAA and Technical Committee proposals met our shared goals
- Understand the increases and decreases in aircraft noise exposure resulting from the new procedures

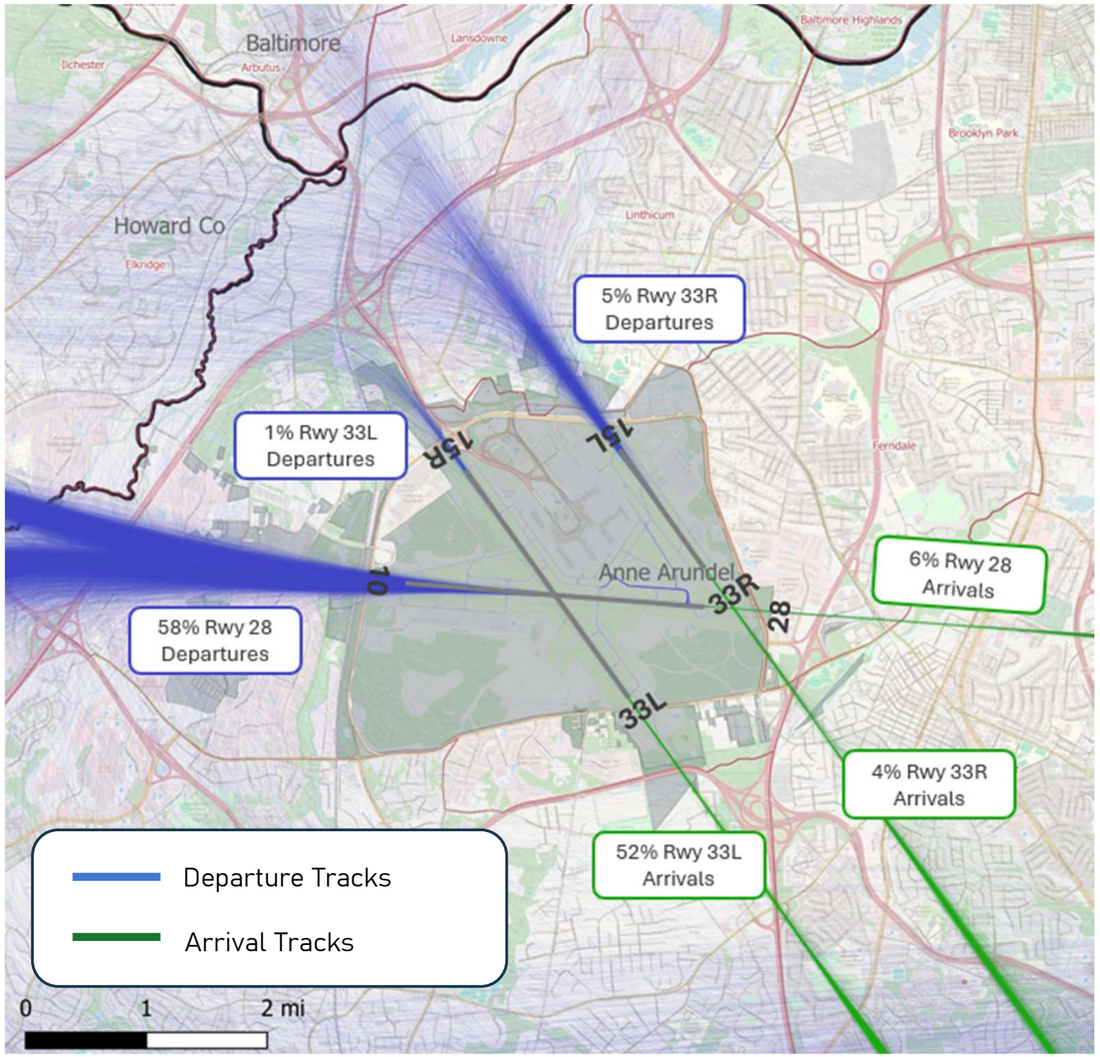
Section 1

Introduction

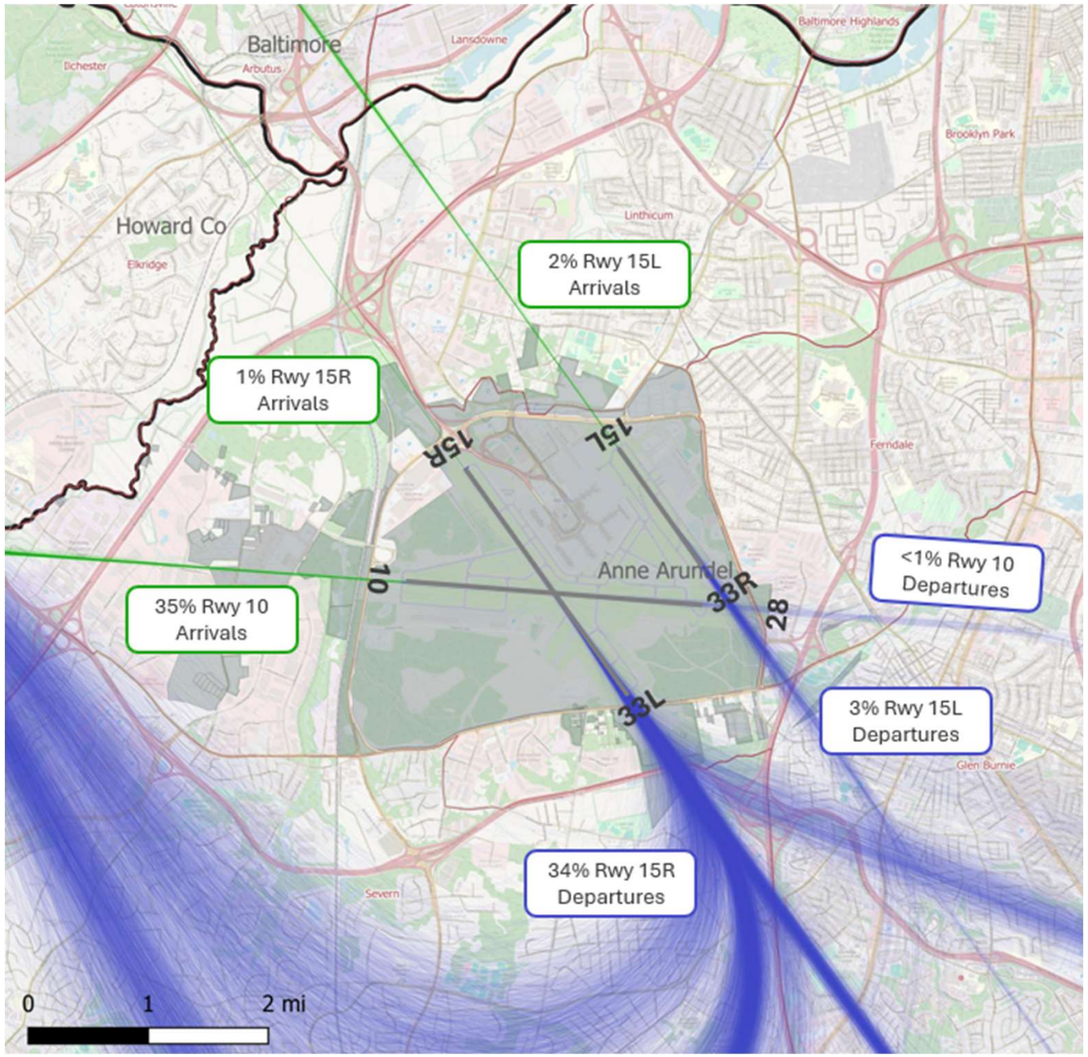
History (Simplified)

- 2013: DC OAPM – FAA Environmental Review of new PBN Procedures for BWI Marshall, DCA, IAD and other regional airports
- 2014-2016: Implementation of new procedures
- 2017: DC Metroplex BWI Community Roundtable Formed
- 2018: FAA presents potential revised procedures
- 2019: Technical Committee develops and proposes additional procedures
- 2020-2024: FAA consultation & FAA PBN Working Group
- 2024: Implementation of new Departure Procedures (July 11, 2024) and new Arrival and Instrument Approach Procedures (September 5, 2024)
- 2025: MAA Post-Implementation Review

BWI Marshall Airport Layout & Operational Flow

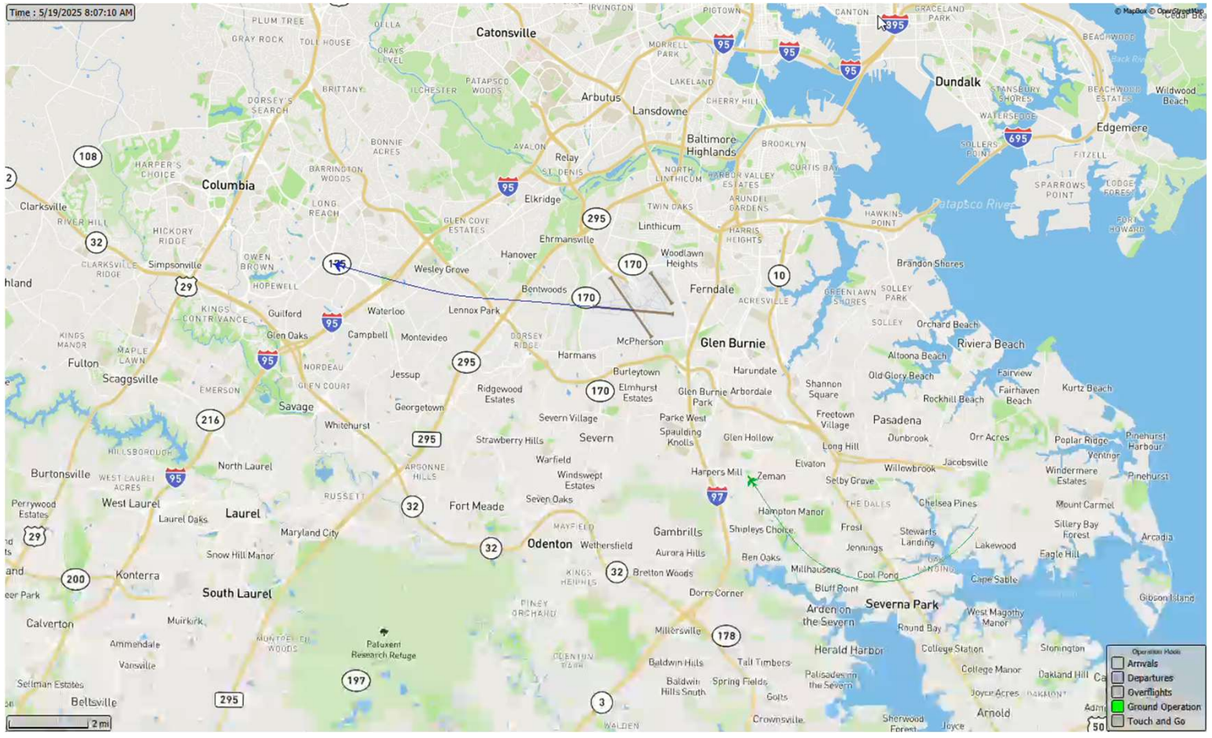


West Flow

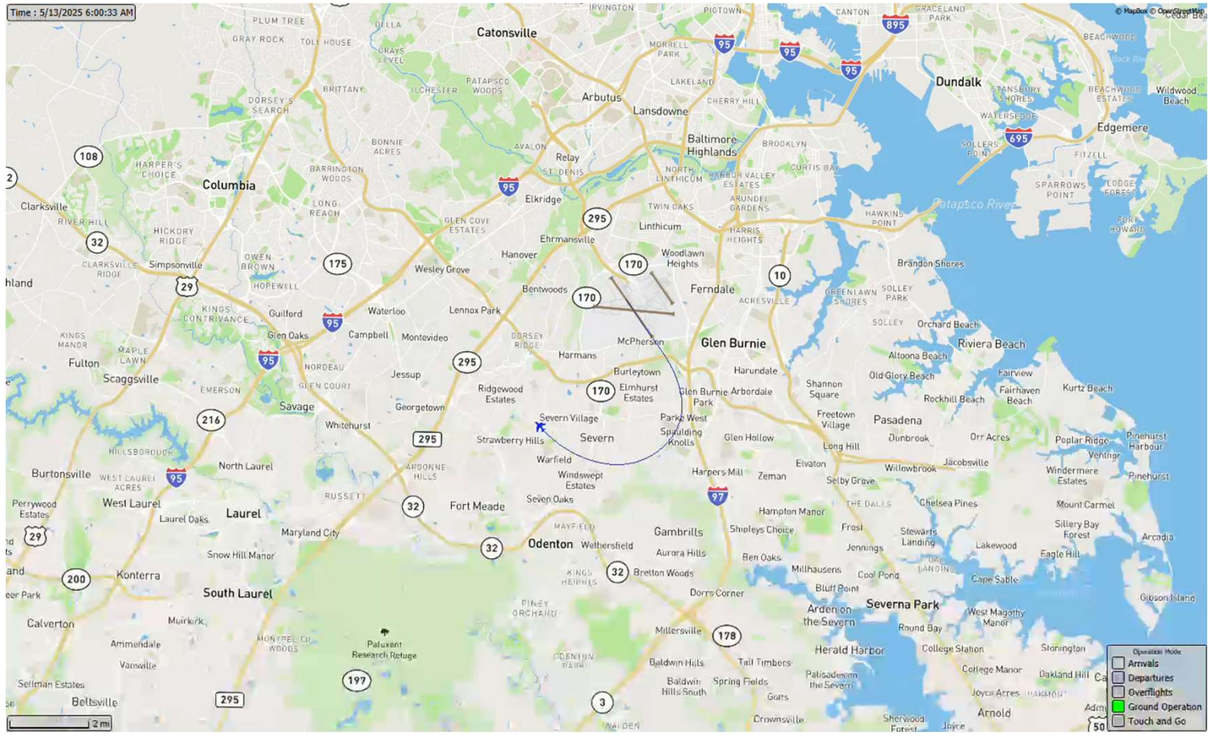


East Flow

BWI Marshall Operational Flow Animations



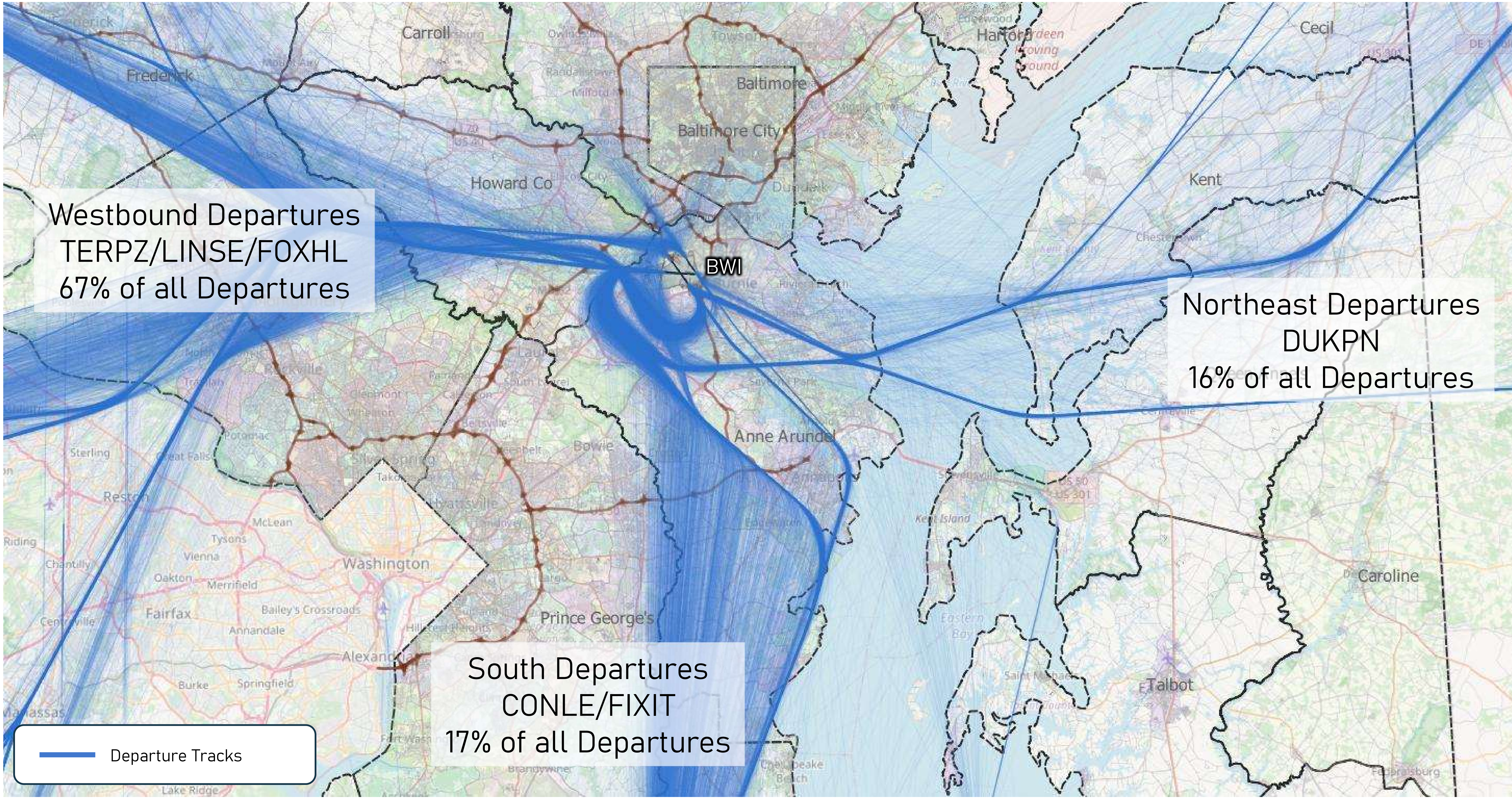
West Flow



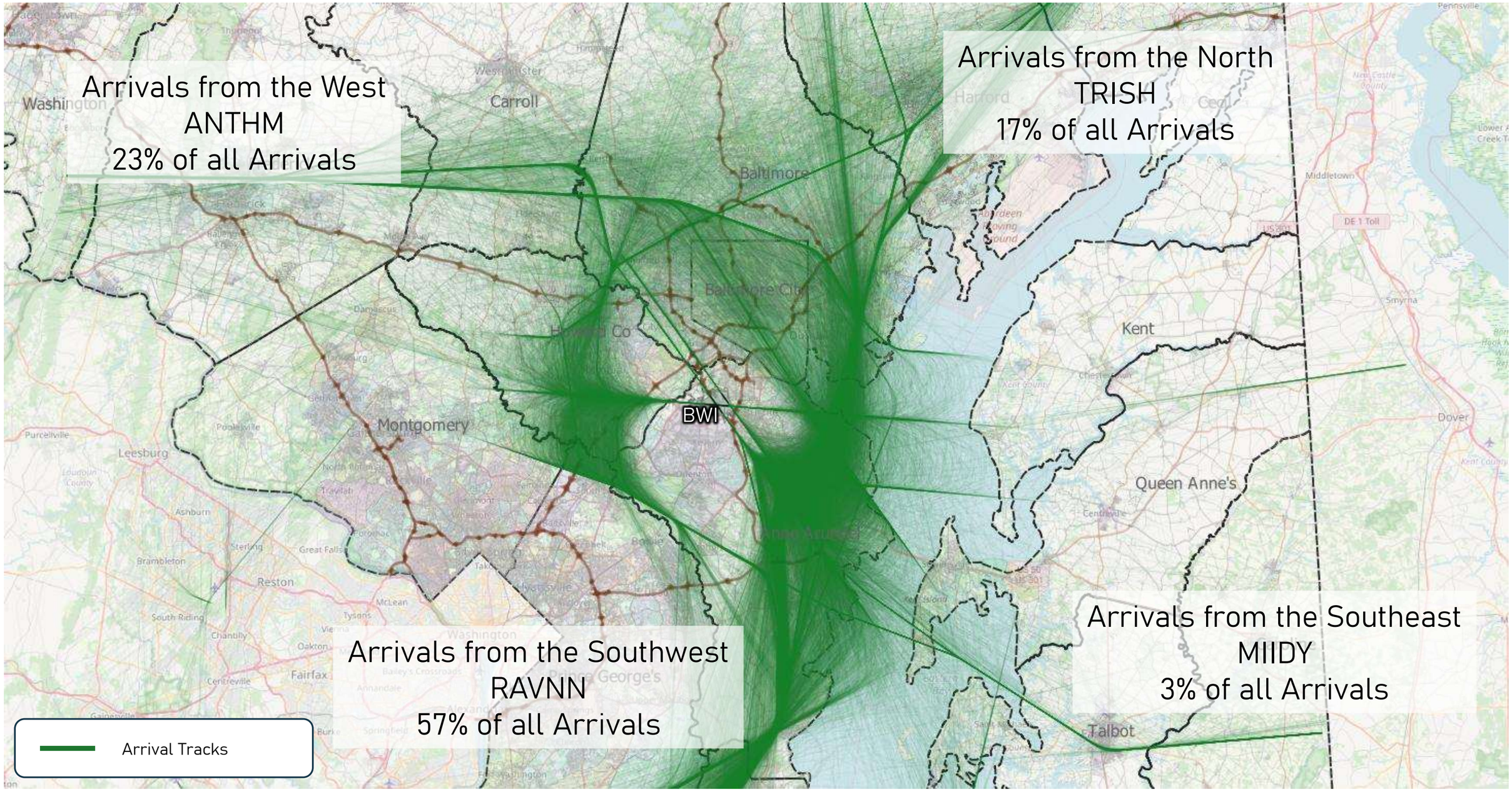
East Flow

Source: https://webtrak.emsbk.com/bwi3

Departures


Westbound Departures
TERPZ/LINSE/FOXHL
67% of all Departures
Northeast Departures
DUKPN
16% of all Departures
South Departures
CONLE/FIXIT
17% of all Departures
BWI
Departure Tracks
Carroll
Frederick
Baltimore
Baltimore City
Howard Co
Harford
Cecil
Kent
Anne Arundel
Washington
Prince George's
Caroline
Talbot
Fairfax
Alexandria

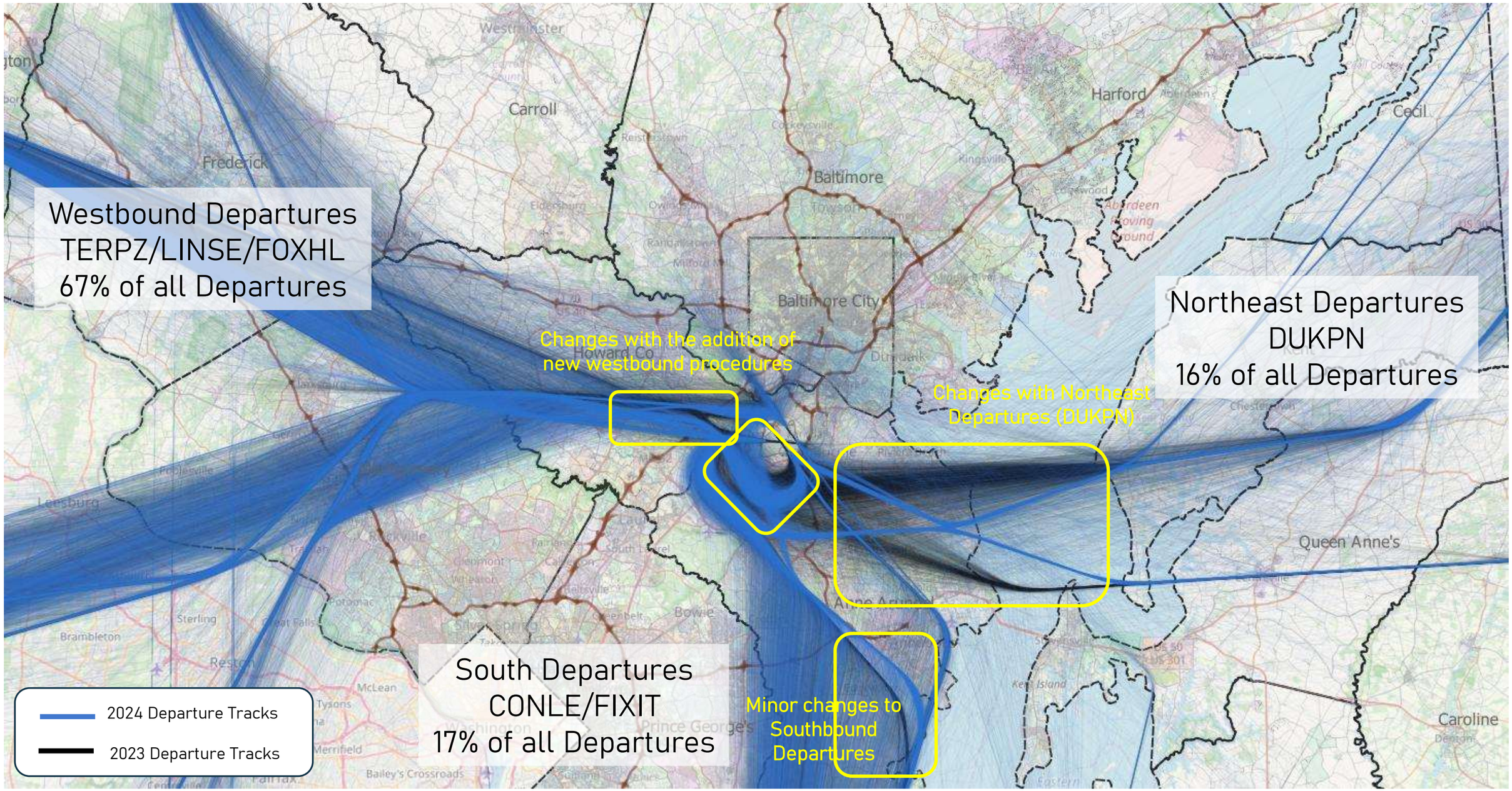
Arrivals


Arrivals from the West
ANTHM
23% of all Arrivals
Arrivals from the North
TRISH
17% of all Arrivals
Arrivals from the Southwest
RAVNN
57% of all Arrivals
Arrivals from the Southeast
MIIDY
3% of all Arrivals
BWI
Arrival Tracks
Baltimore
Baltimore City
Howard Co
Carroll
Montgomery
Kent
Queen Anne's
Talbot
Washington
Fairfax
Leesburg
Reston
Dover

Section 2

Departures

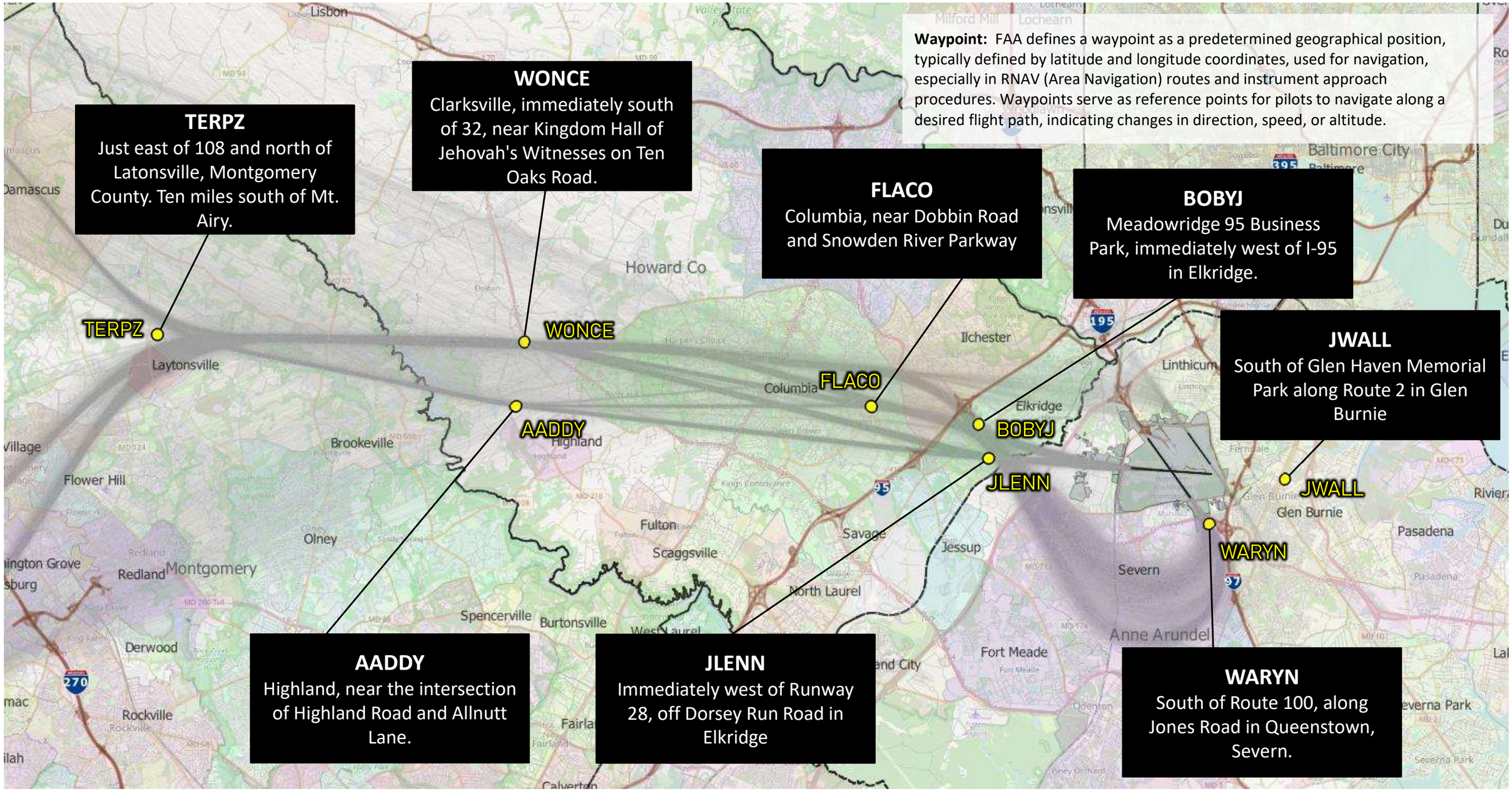
Departures Summary



Departures

Departures to the West

Orientation Map – Departures to the West



Waypoint: FAA defines a waypoint as a predetermined geographical position, typically defined by latitude and longitude coordinates, used for navigation, especially in RNAV (Area Navigation) routes and instrument approach procedures. Waypoints serve as reference points for pilots to navigate along a desired flight path, indicating changes in direction, speed, or altitude.

TERPZ
Just east of 108 and north of Latonsville, Montgomery County. Ten miles south of Mt. Airy.

WONCE
Clarksville, immediately south of 32, near Kingdom Hall of Jehovah's Witnesses on Ten Oaks Road.

FLACO
Columbia, near Dobbin Road and Snowden River Parkway

BOBYJ
Meadowridge 95 Business Park, immediately west of I-95 in Elkridge.

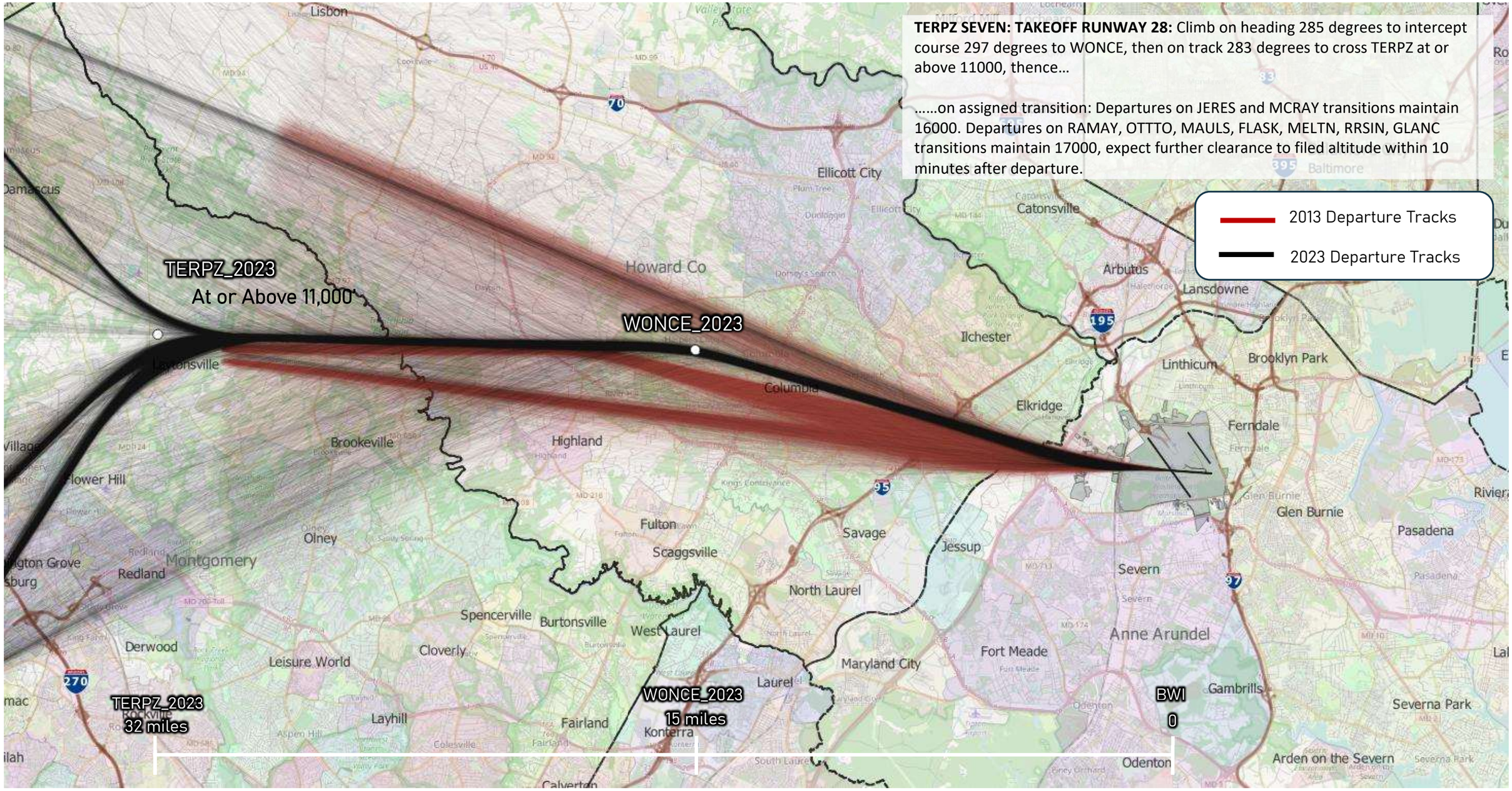
JWALL
South of Glen Haven Memorial Park along Route 2 in Glen Burnie

AADDY
Highland, near the intersection of Highland Road and Allnutt Lane.

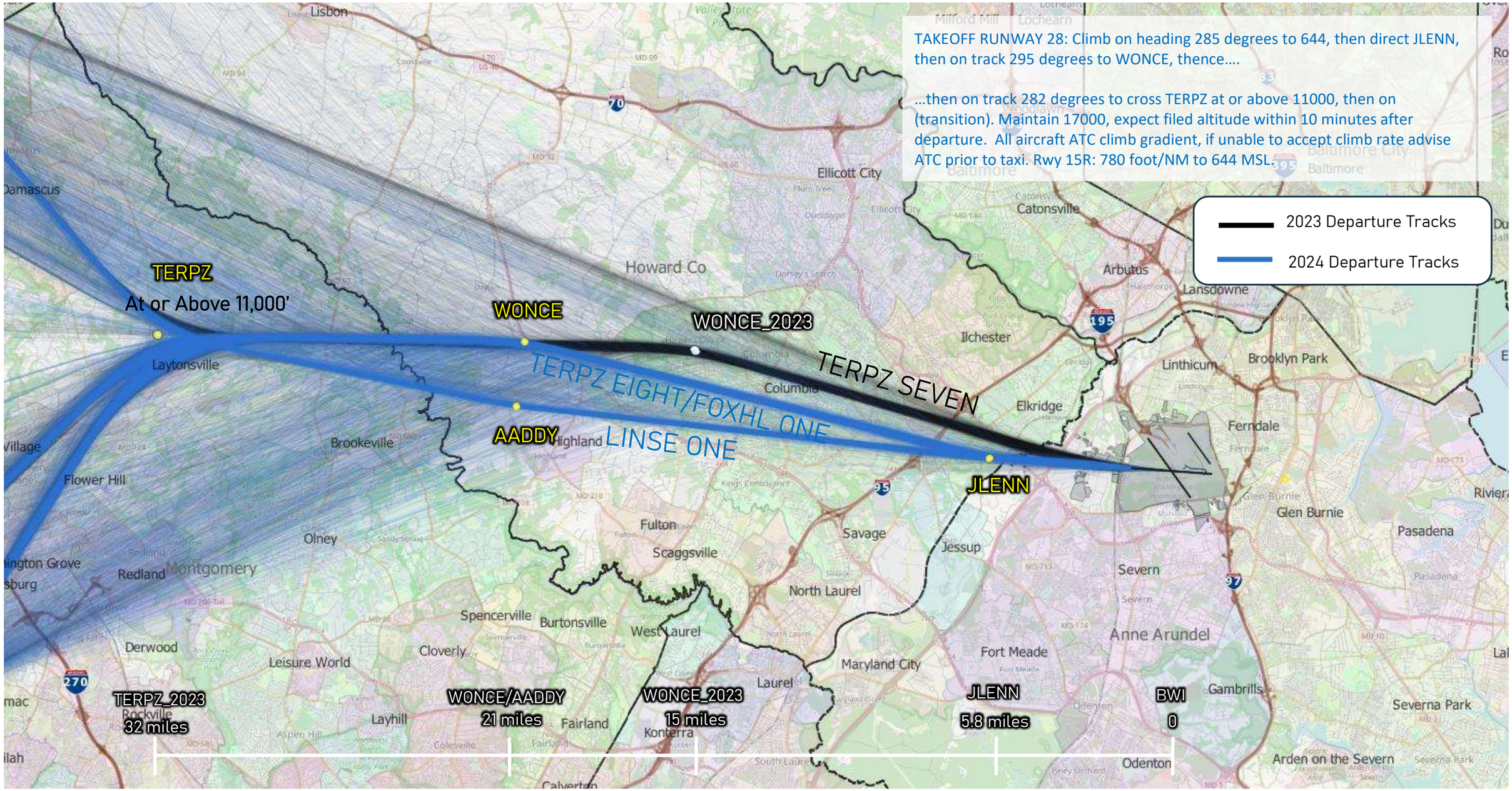
JLENN
Immediately west of Runway 28, off Dorsey Run Road in Elkridge

WARYN
South of Route 100, along Jones Road in Queenstown, Severn.

Runway 28 Departures to the West – 2013 vs 2023



Runway 28 Departures to the West – 2023 vs 2024



Runway 28 Departures to the West – 2013 vs 2024

TAKEOFF RUNWAY 28: Climb on heading 285 degrees to 644, then direct JLENN, then on track 295 degrees to WONCE, thence….

…then on track 282 degrees to cross TERPZ at or above 11000, then on (transition). Maintain 17000, expect filed altitude within 10 minutes after departure. All aircraft ATC climb gradient, if unable to accept climb rate advise ATC prior to taxi. Rwy 15R: 780 foot/NM to 644 MSL.

2013 Departure Tracks

2024 Departure Tracks

TERPZ

At or Above 11,000’

WONCE

AADDY

JLENN

TERPZ THREE

TERPZ EIGHT/FOXHL ONE

LINSE ONE

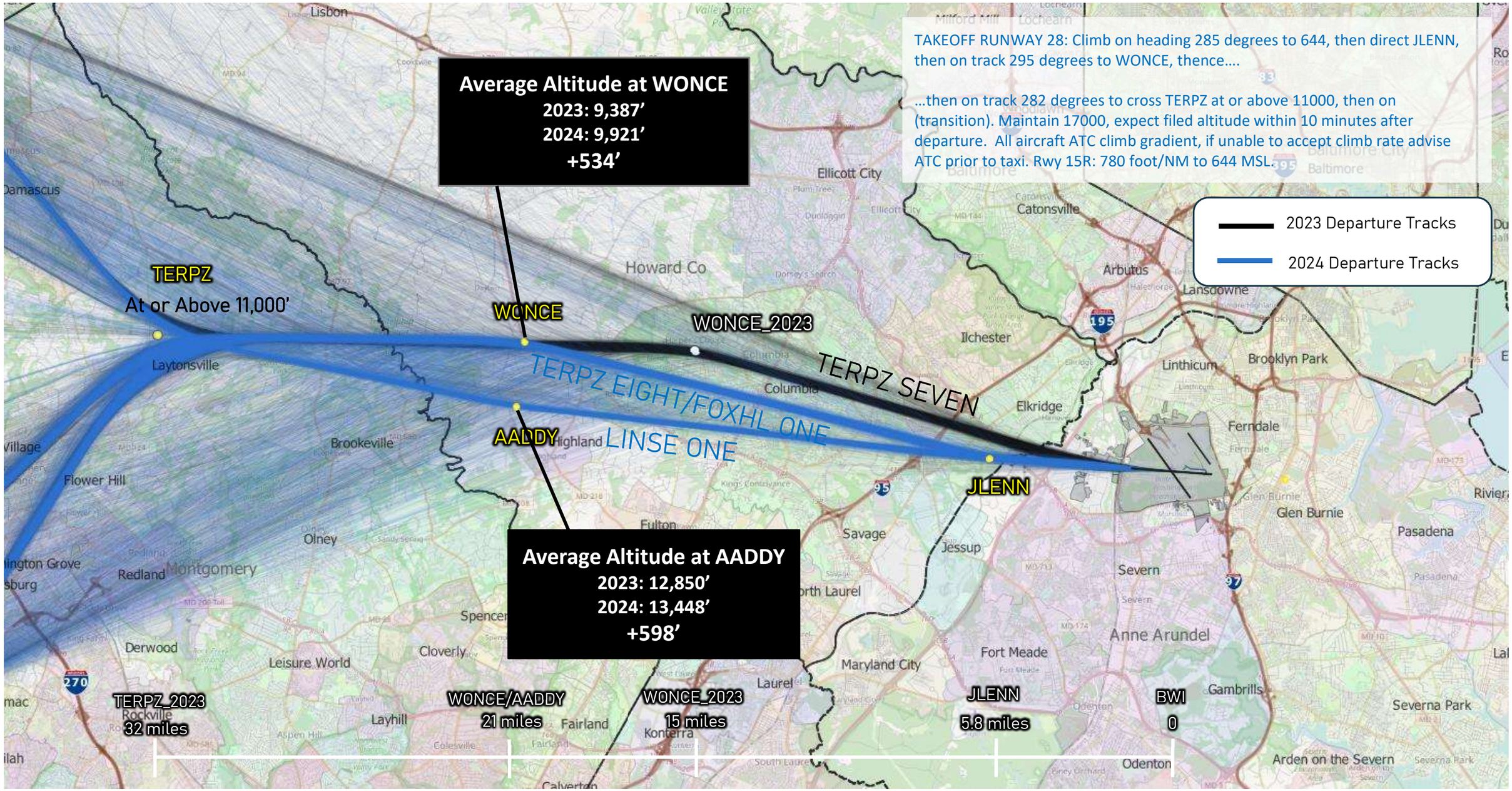
TERPZ
32 miles

WONCE/AADDY
21 miles

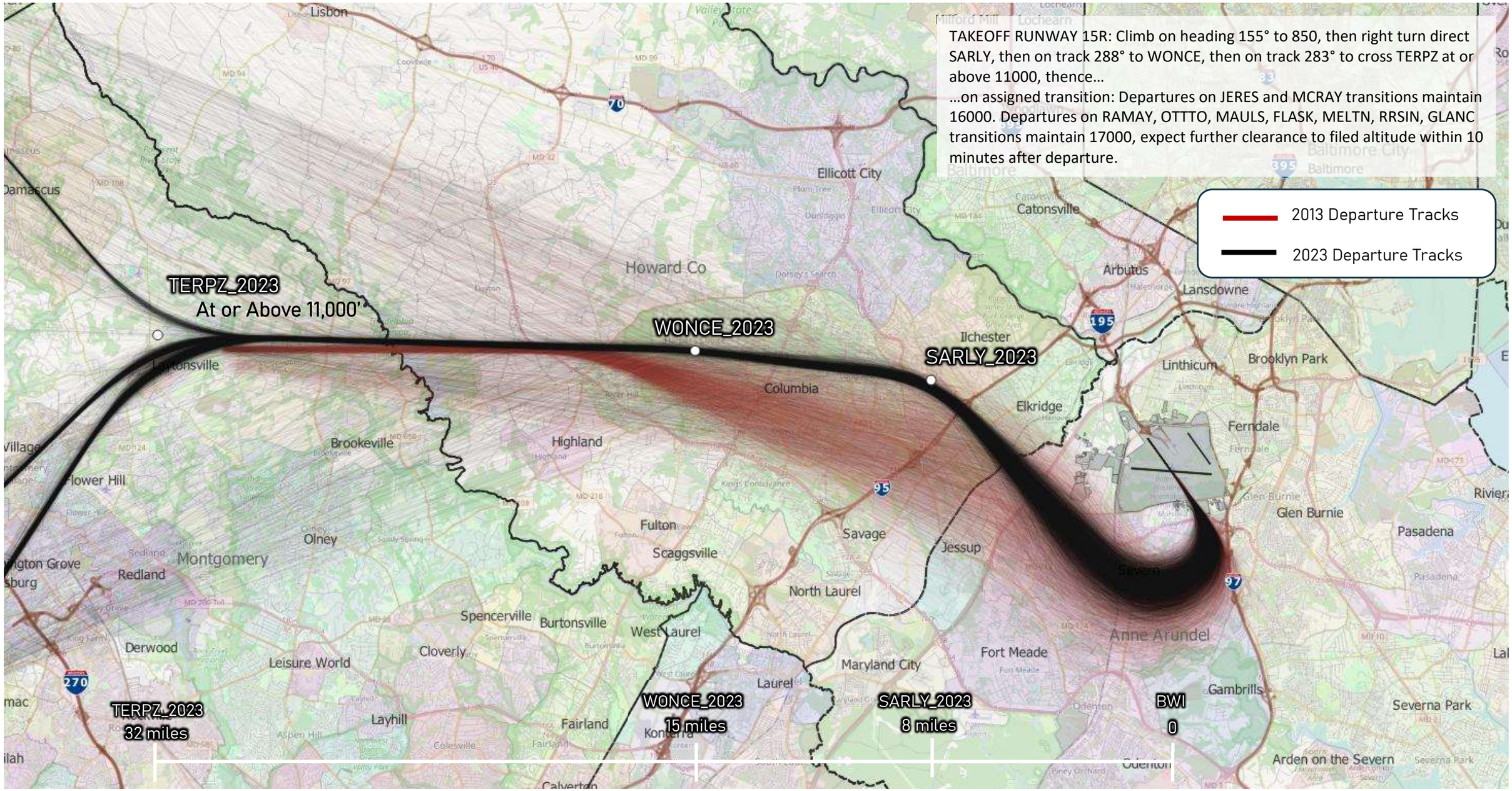
JLENN
5.8 miles

BWI
0

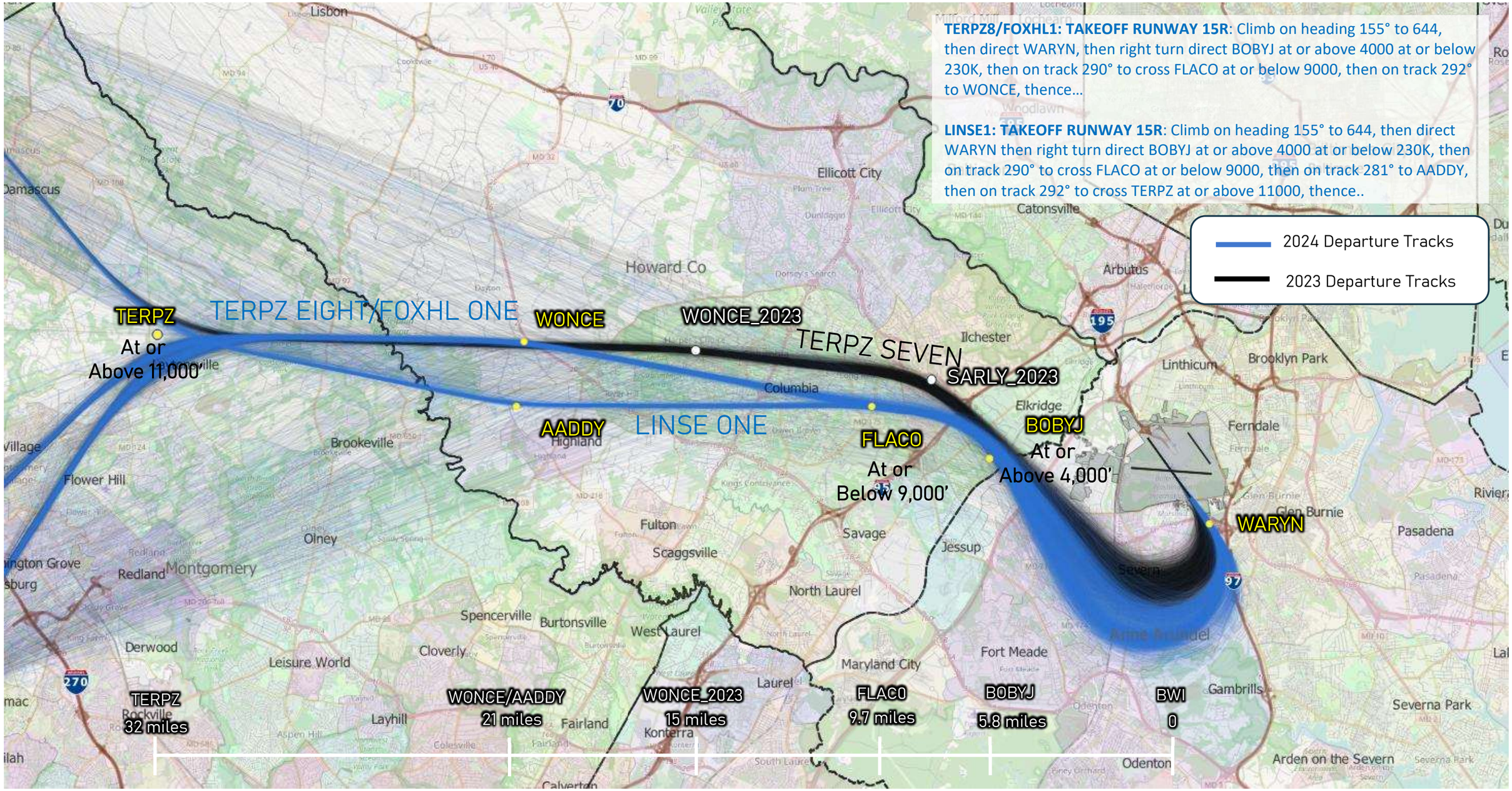
Altitude Comparison – Runway 28 Departures



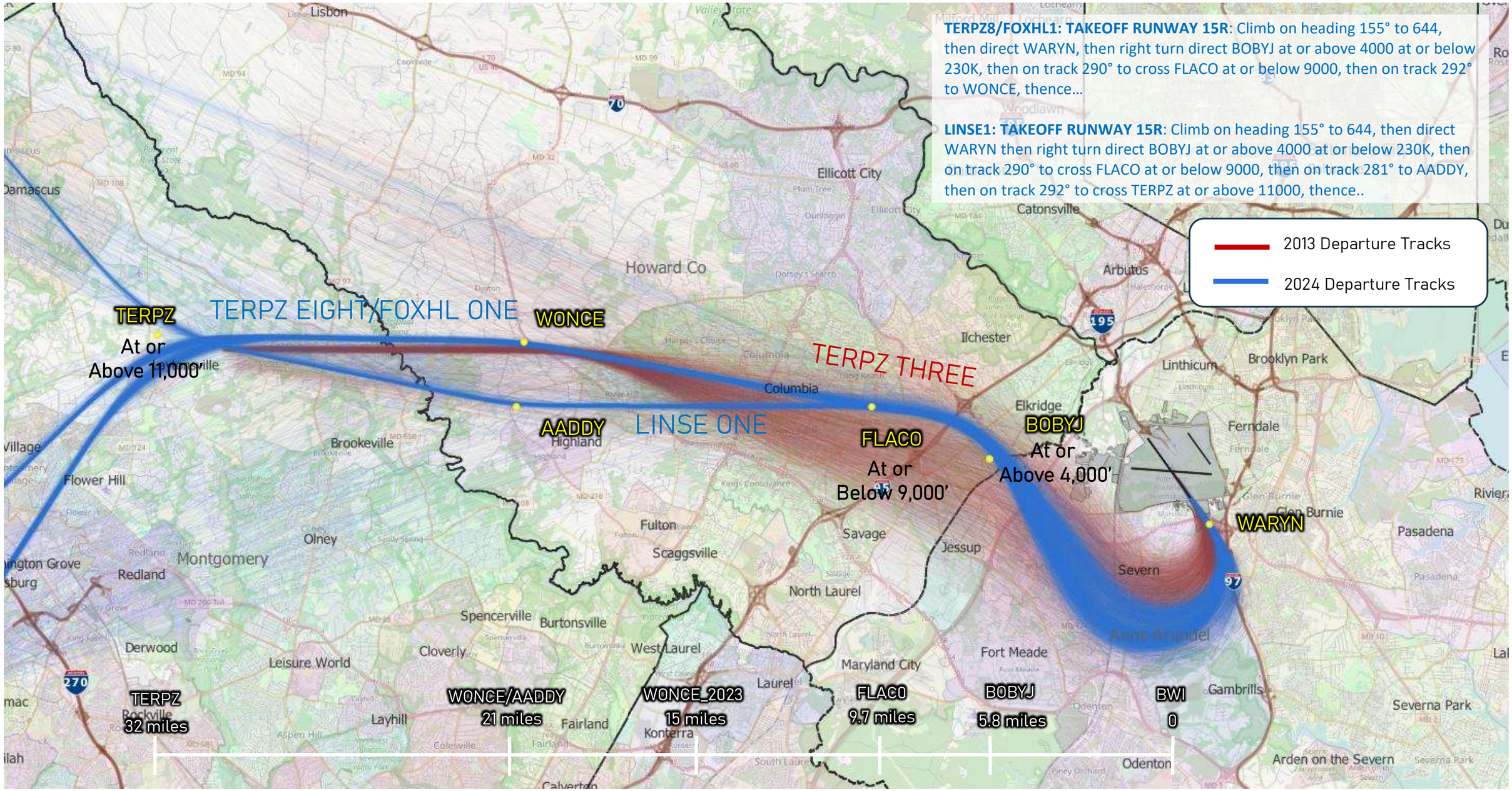
Runway 15R Departures to the West – 2013 vs 2023



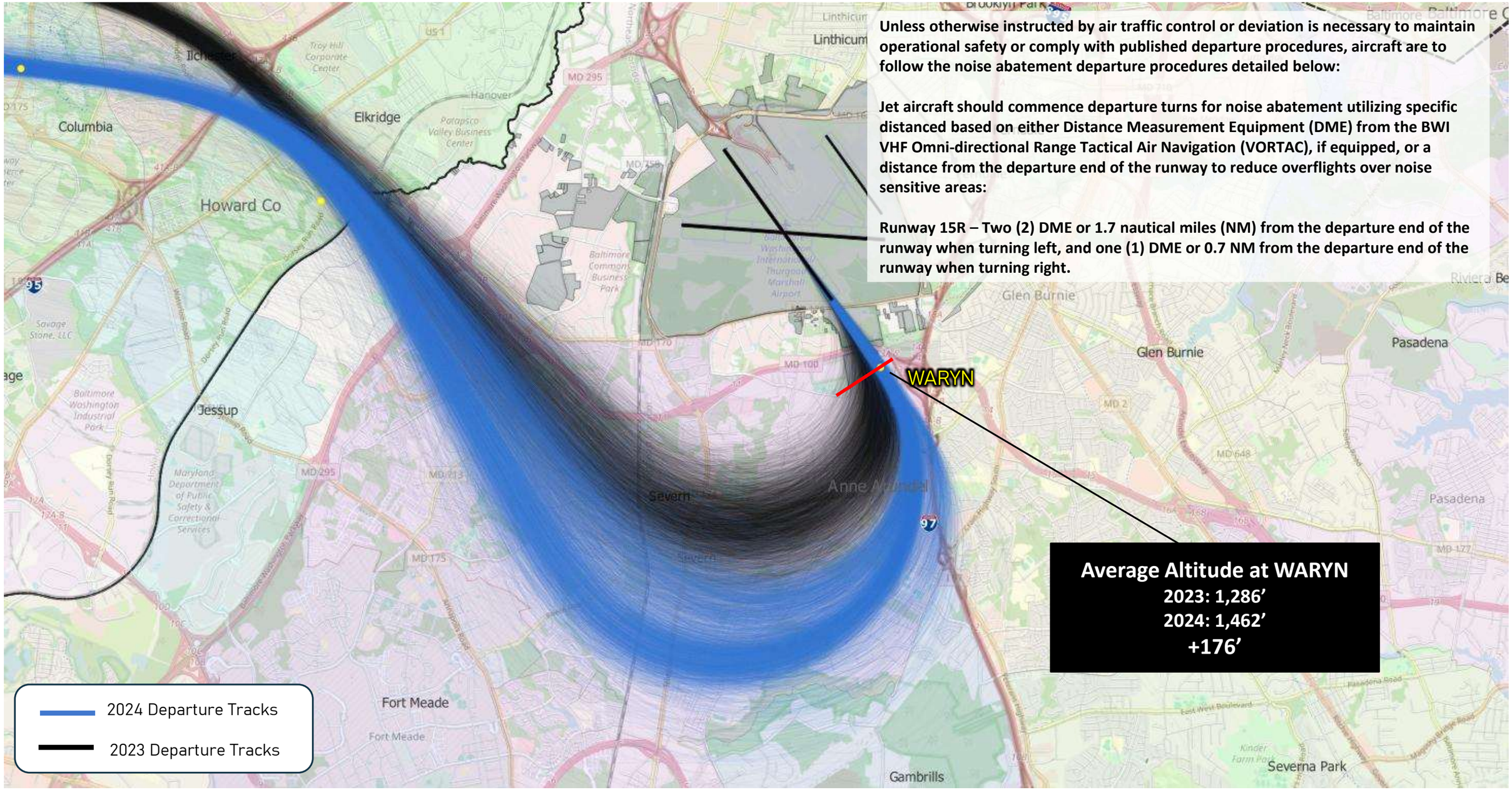
Runway 15R Departures to the West – 2023 vs 2024



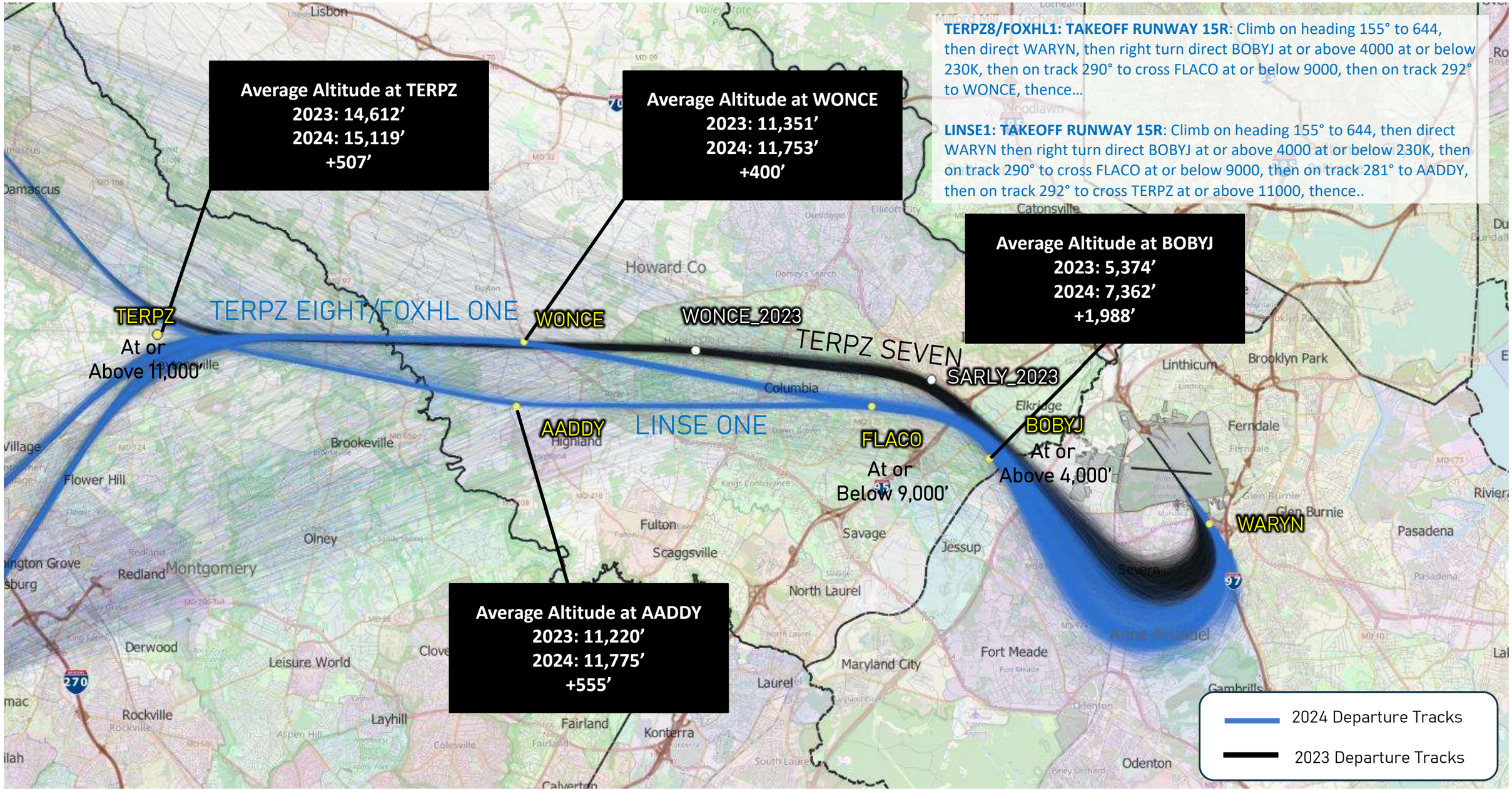
Runway 15R Departures to the West – 2013 vs 2024



Adherence to Historic Noise Abatement Procedures – Runway 15R - WARYN



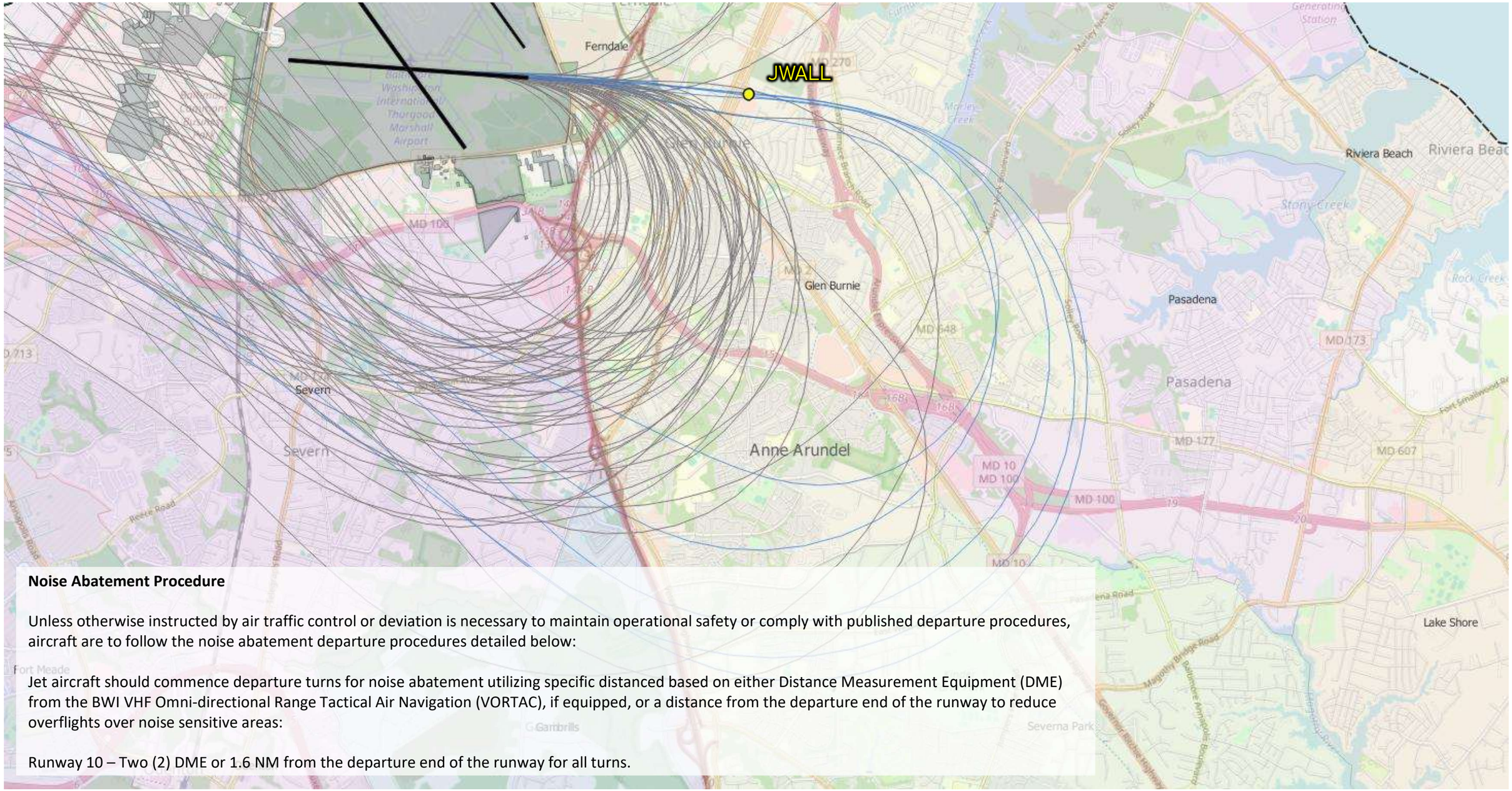
Altitude Comparison – Runway 15R Departures



TERPZ8/FOXHL1: TAKEOFF RUNWAY 15R: Climb on heading 155° to 644, then direct WARYN, then right turn direct BOBYJ at or above 4000 at or below 230K, then on track 290° to cross FLACO at or below 9000, then on track 292° to WONCE, thence…

LINSE1: TAKEOFF RUNWAY 15R: Climb on heading 155° to 644, then direct WARYN then right turn direct BOBYJ at or above 4000 at or below 230K, then on track 290° to cross FLACO at or below 9000, then on track 281° to AADDY, then on track 292° to cross TERPZ at or above 11000, thence..

Adherence to Historic Noise Abatement Procedures – Runway 10



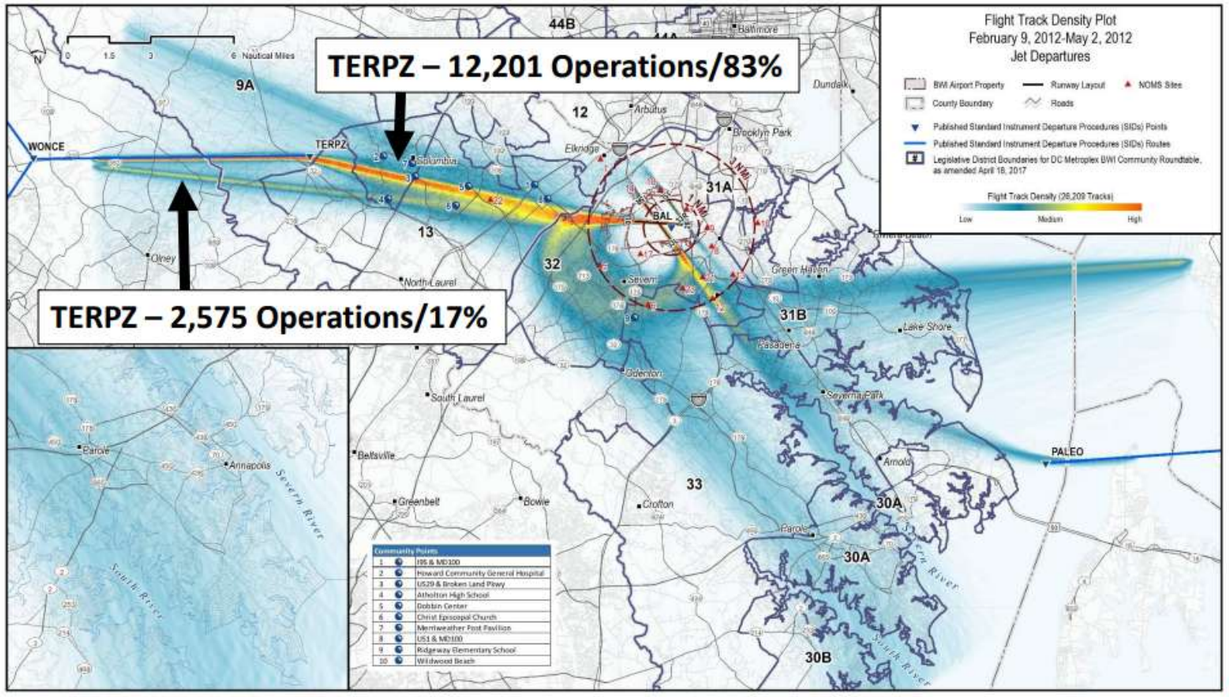
Noise Abatement Procedure

Unless otherwise instructed by air traffic control or deviation is necessary to maintain operational safety or comply with published departure procedures, aircraft are to follow the noise abatement departure procedures detailed below:

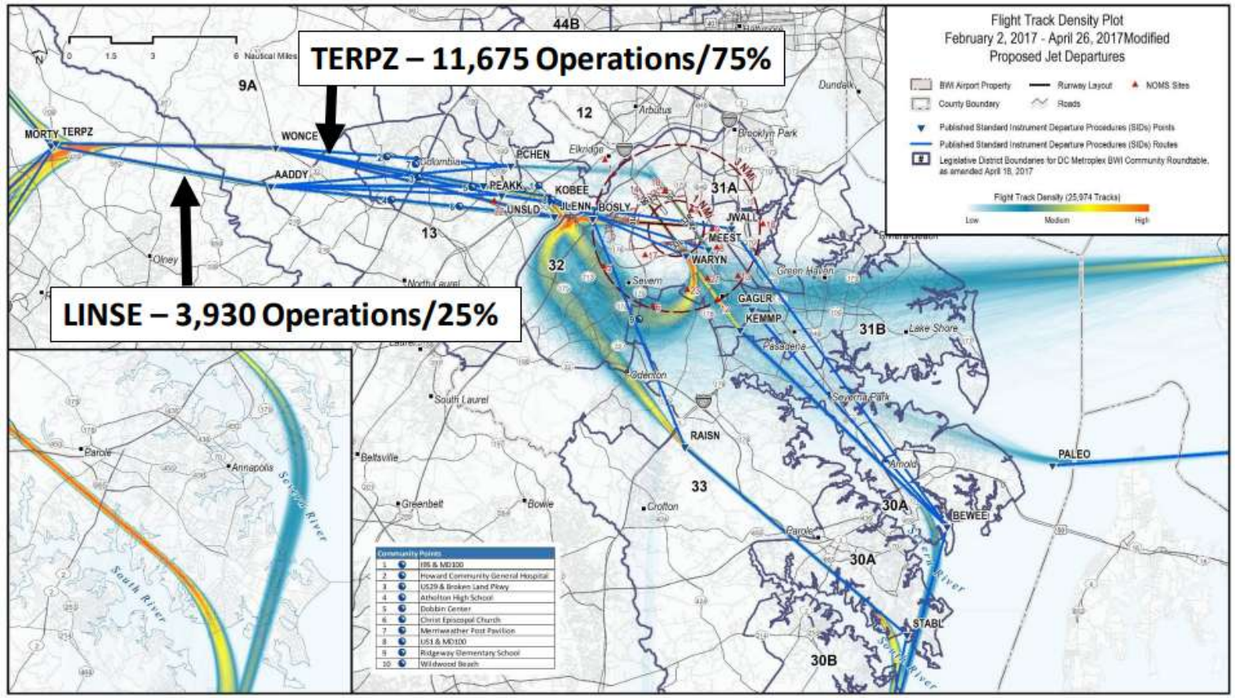
Jet aircraft should commence departure turns for noise abatement utilizing specific distanced based on either Distance Measurement Equipment (DME) from the BWI VHF Omni-directional Range Tactical Air Navigation (VORTAC), if equipped, or a distance from the departure end of the runway to reduce overflights over noise sensitive areas:

Runway 10 – Two (2) DME or 1.6 NM from the departure end of the runway for all turns.

Distribution of Westbound Departures – All Runways

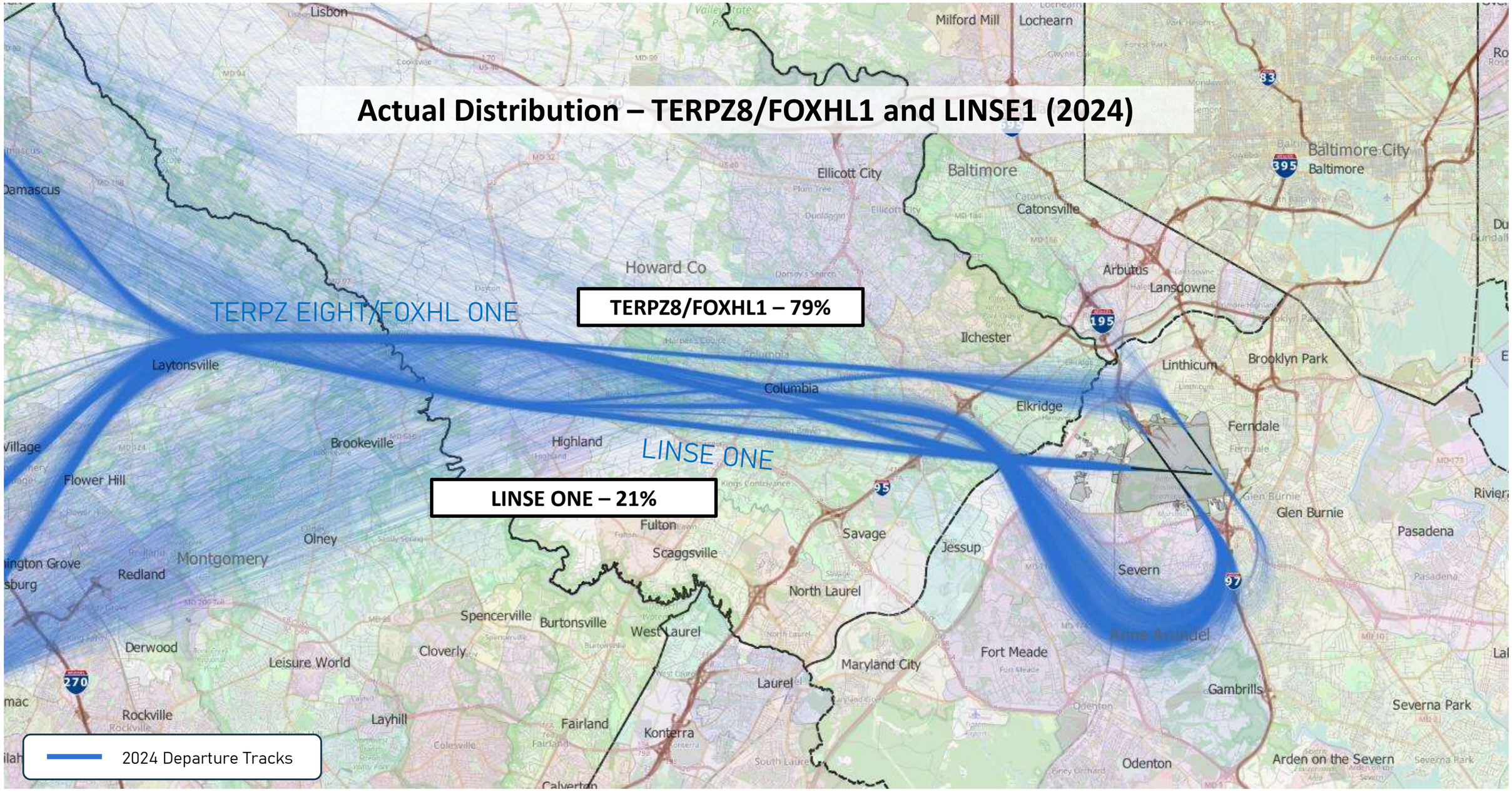


Historic Pre-Metroplex Distribution of TERPZ departures (2012)



Simulated Based on FAA Proposal (2017)

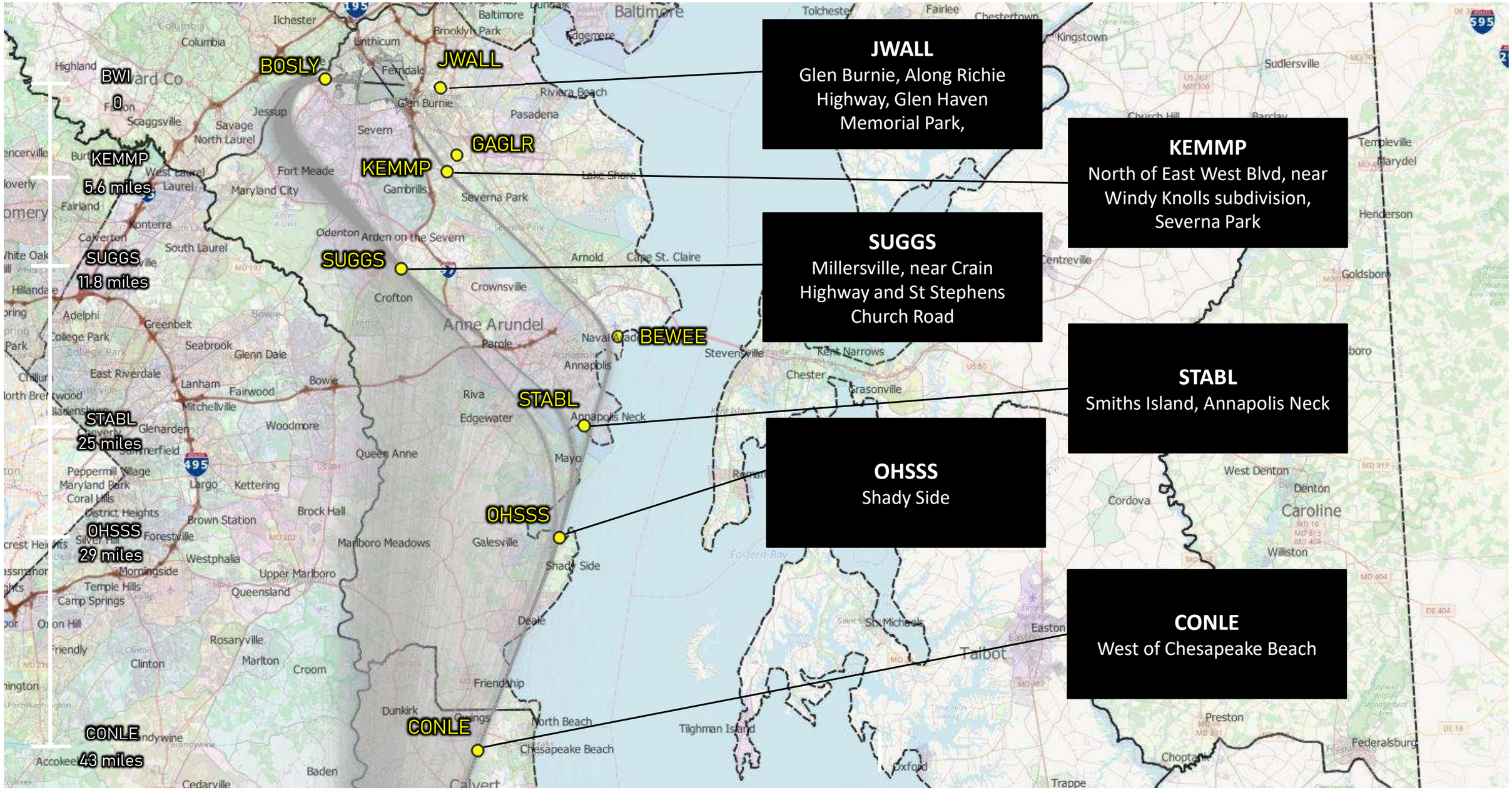
Distribution of Westbound Departures – All Runways



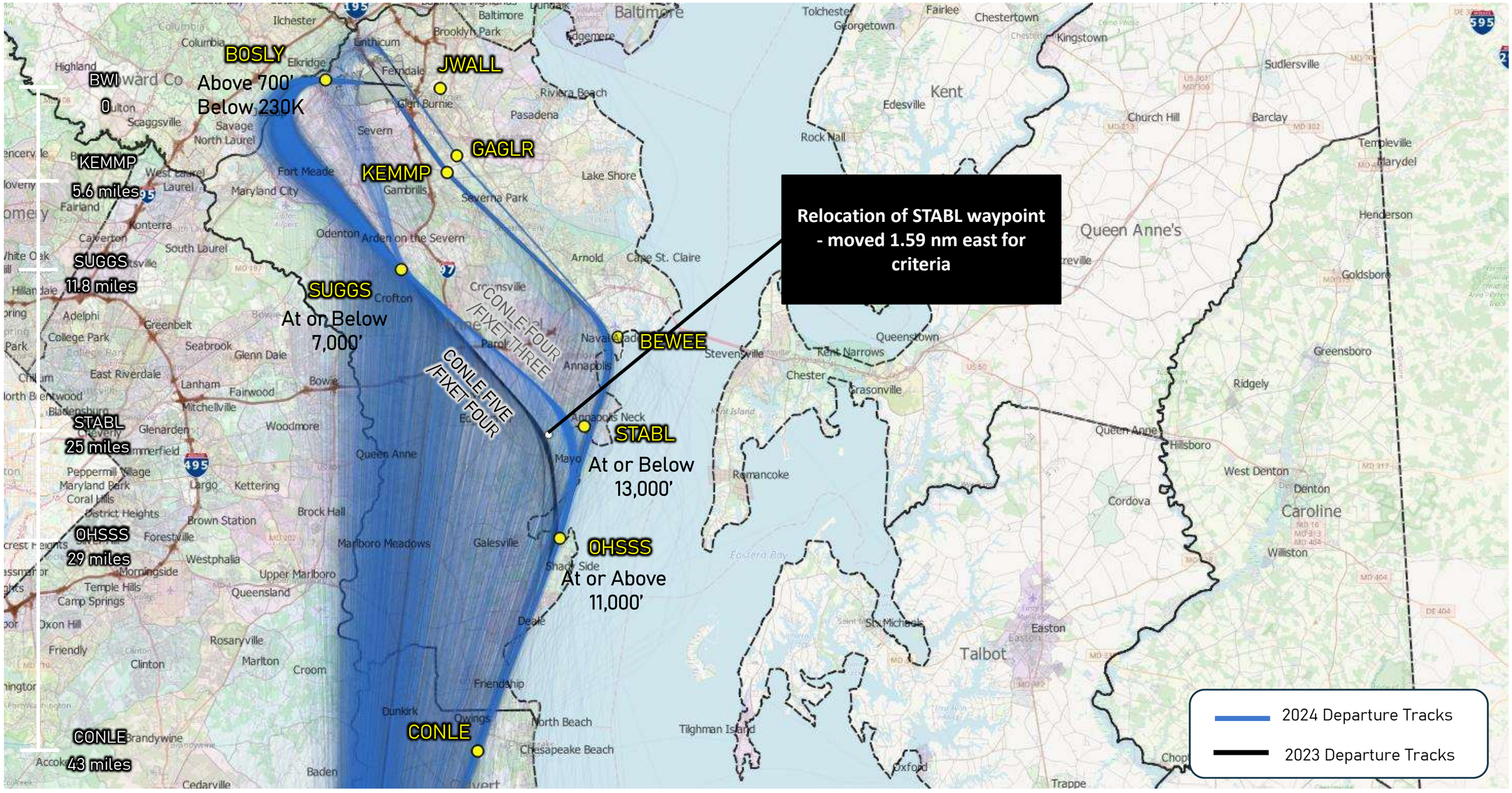
Departures

Departures to the South

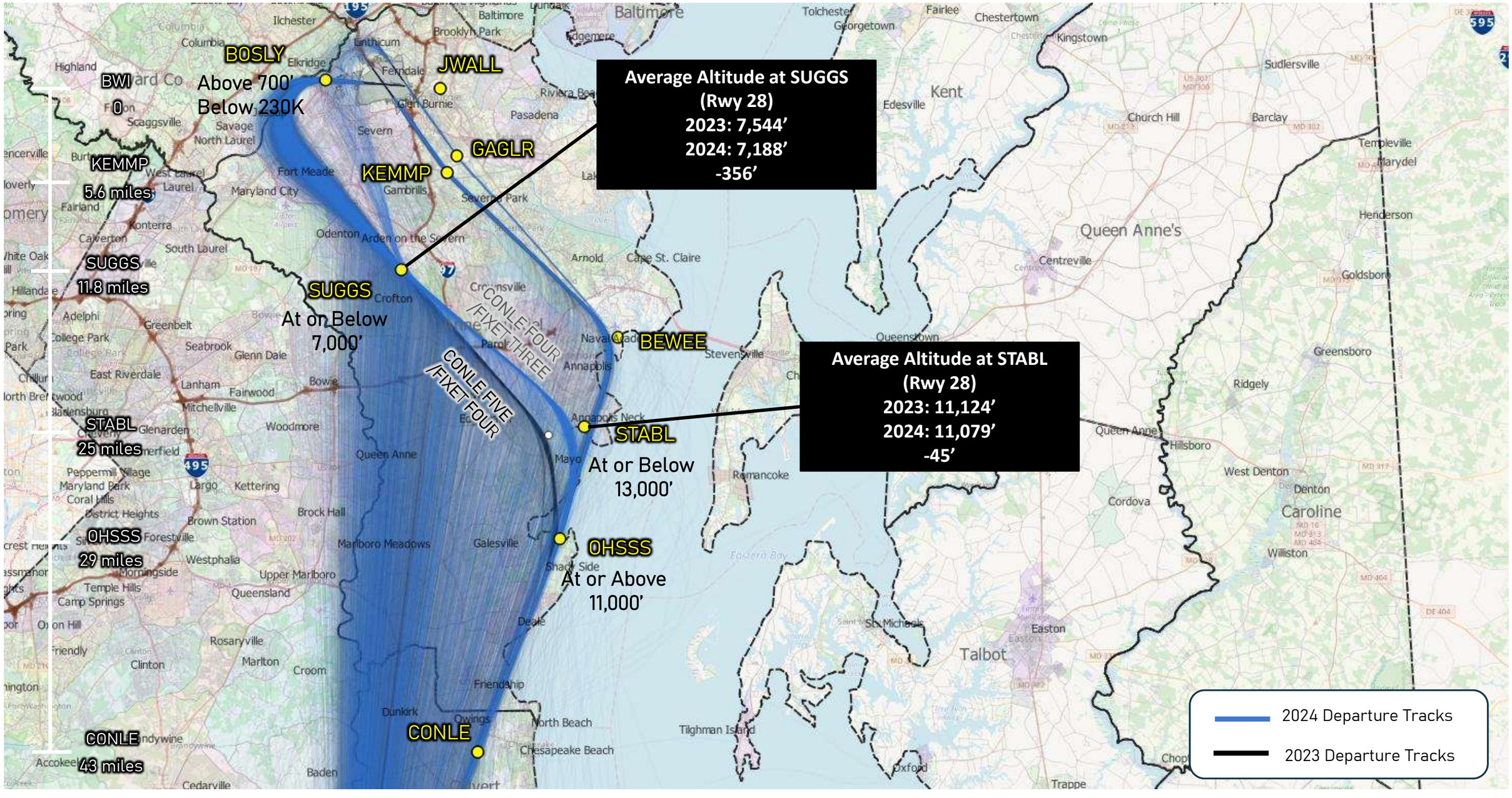
Orientation Map – Departures to the South



Southbound Departures – All Runways



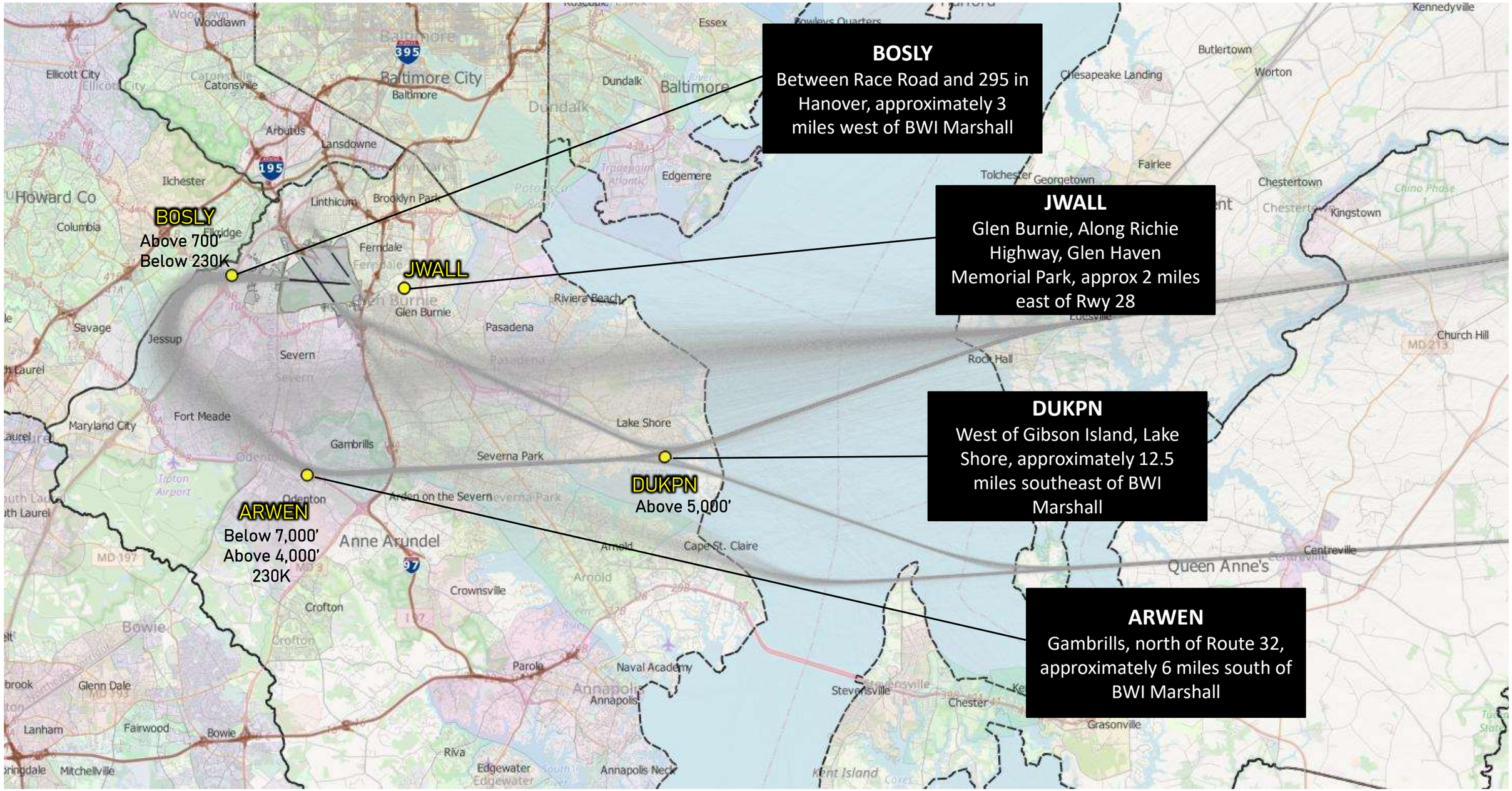
Southbound Departures – All Runways



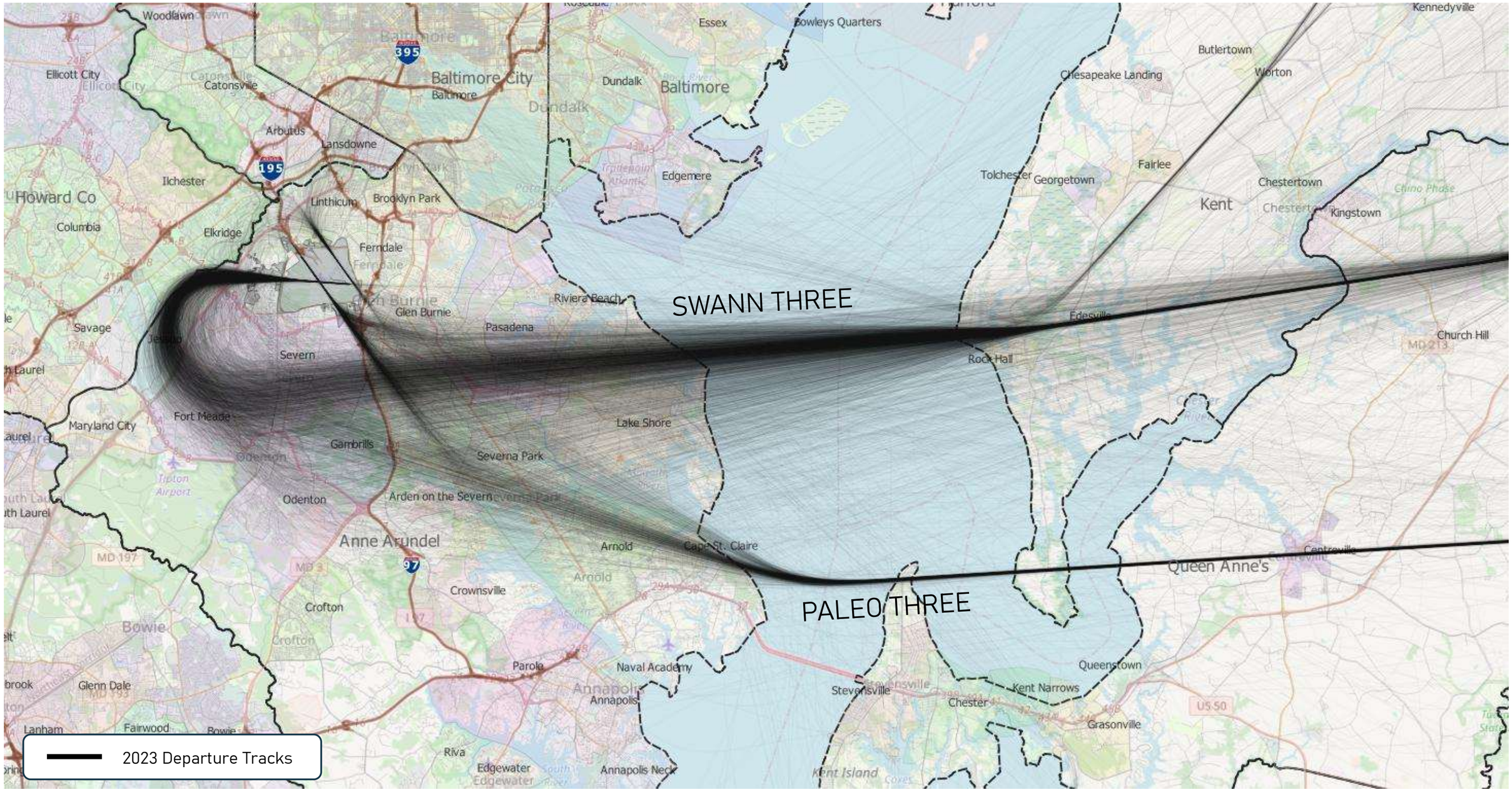
Departures

Departures to the Northeast

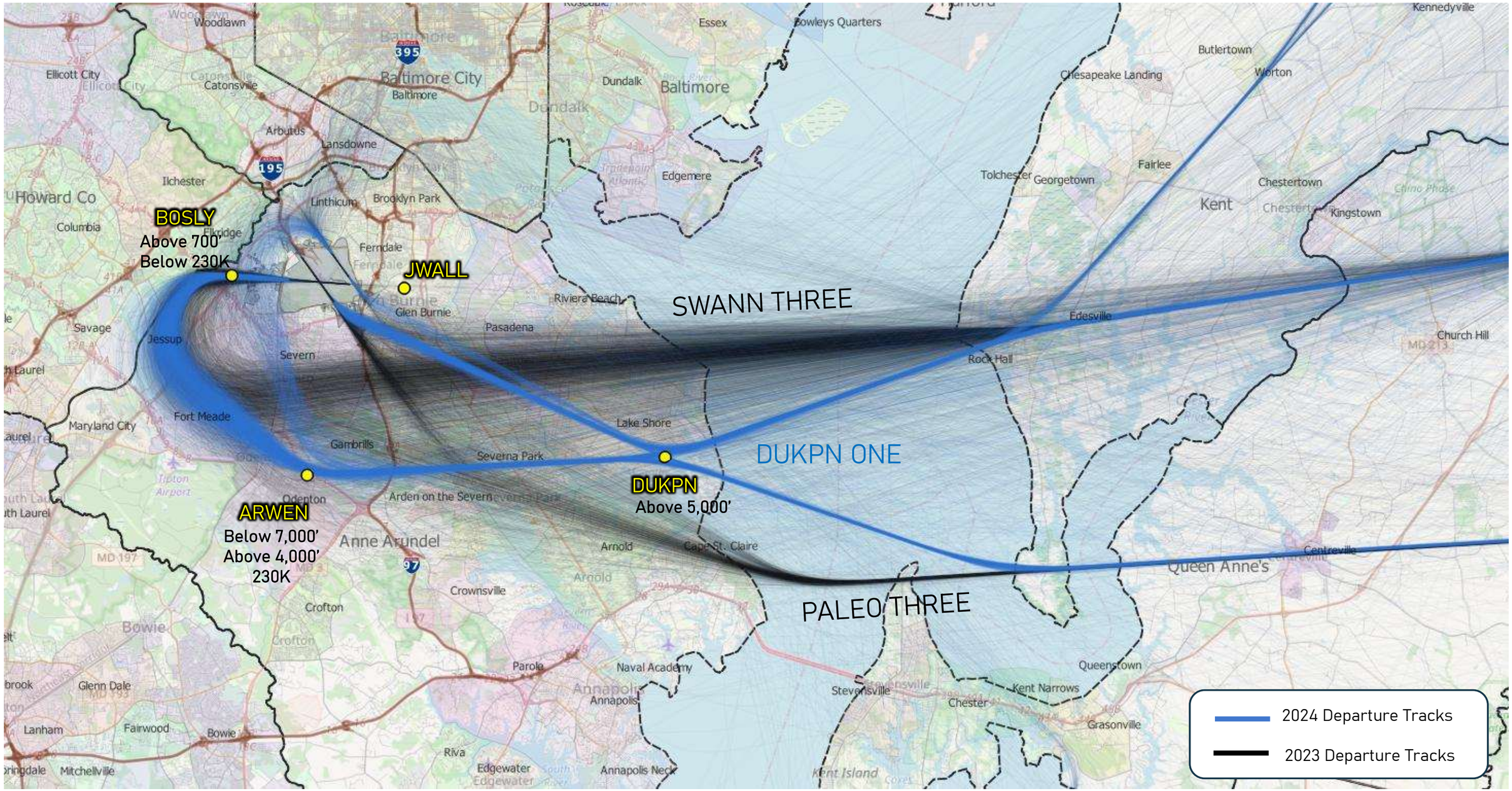
Orientation Map – Departures to the Northeast



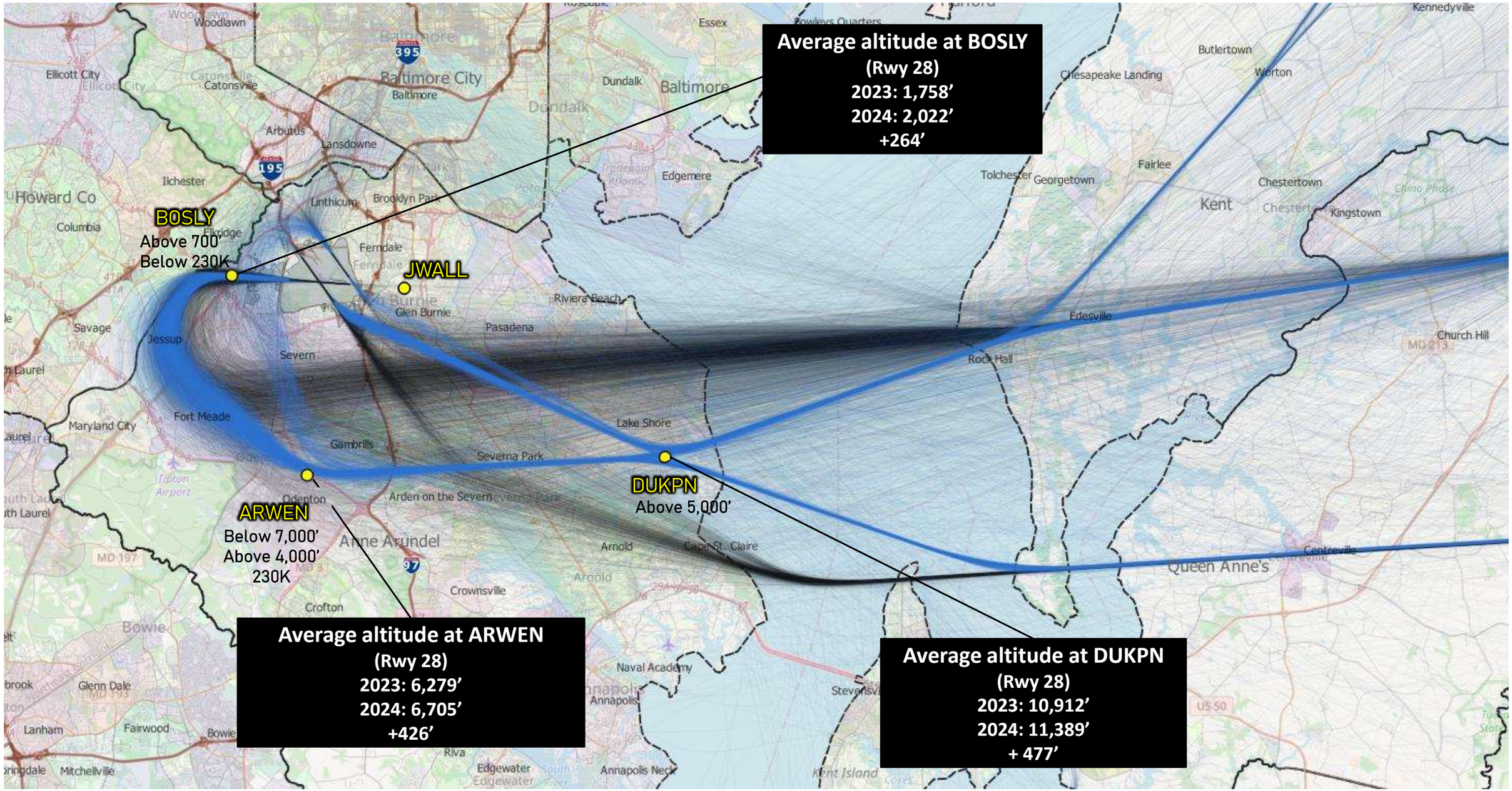
2023 Northeast Departures



2023 versus 2024 Northeast Departures – All Runways



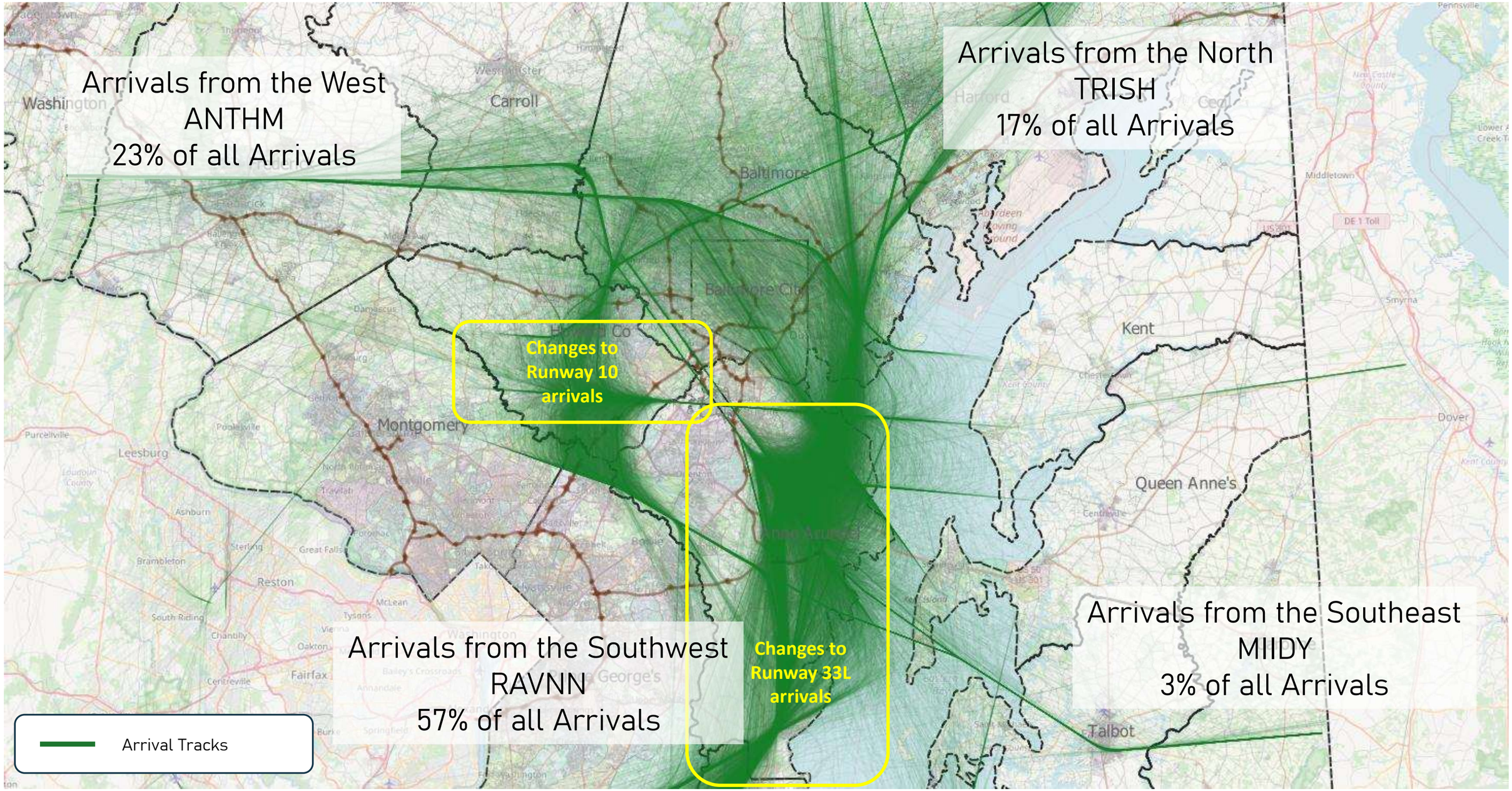
2023 versus 2024 Northeast Departures – All Runways - Altitudes



Section 3

Arrivals and Ap

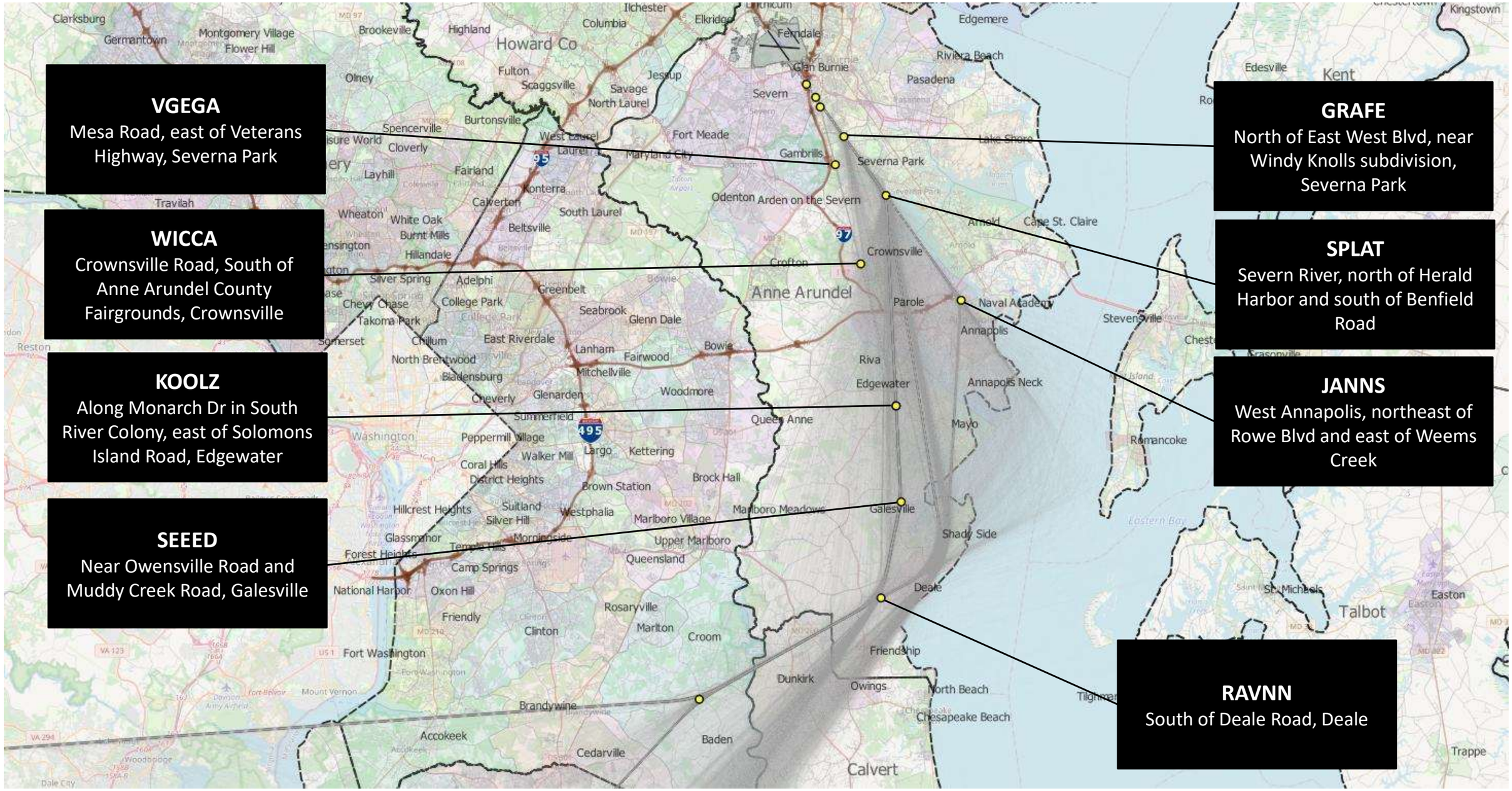
Arrivals Summary



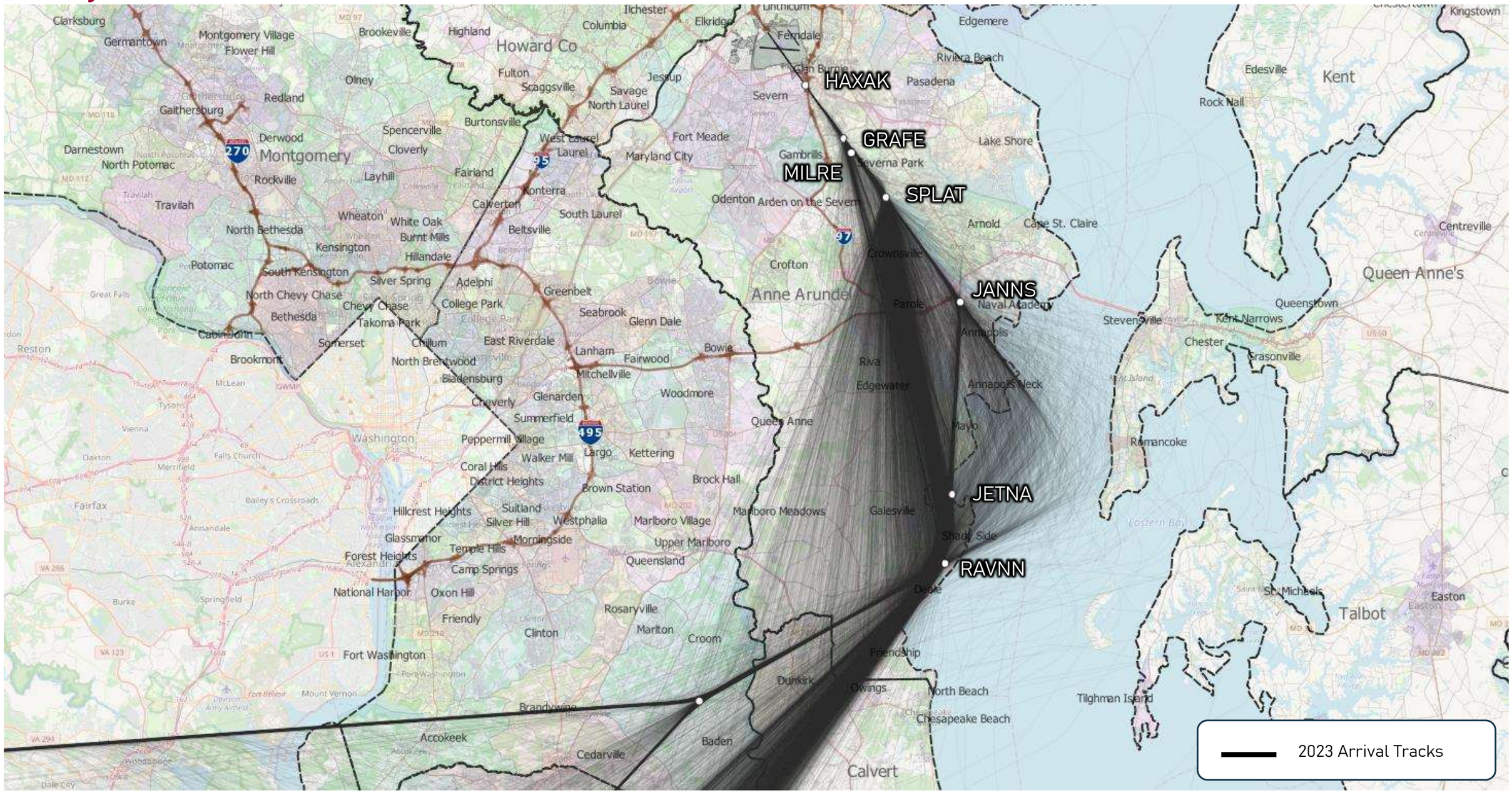
Arrivals

Rwy 33L Arrivals and Approaches (RAVNN)

Orientation Map – Arrivals to Runway 33L (RAVNN)



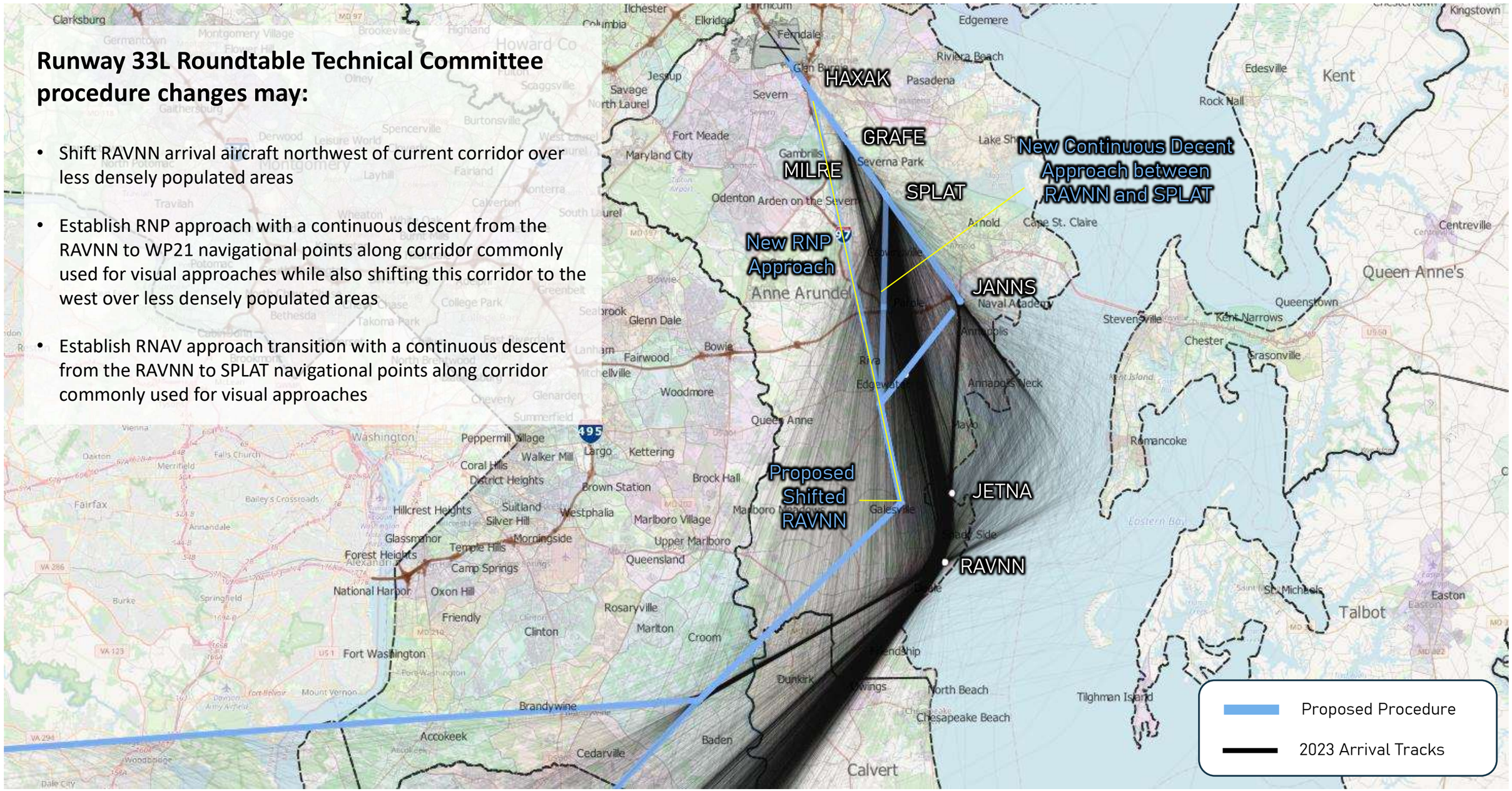
Runway 33L Arrivals (RAVNN) - 2023



Runway 33L Arrivals (RAVNN) – Technical Committee Proposed Procedures

Runway 33L Roundtable Technical Committee procedure changes may:

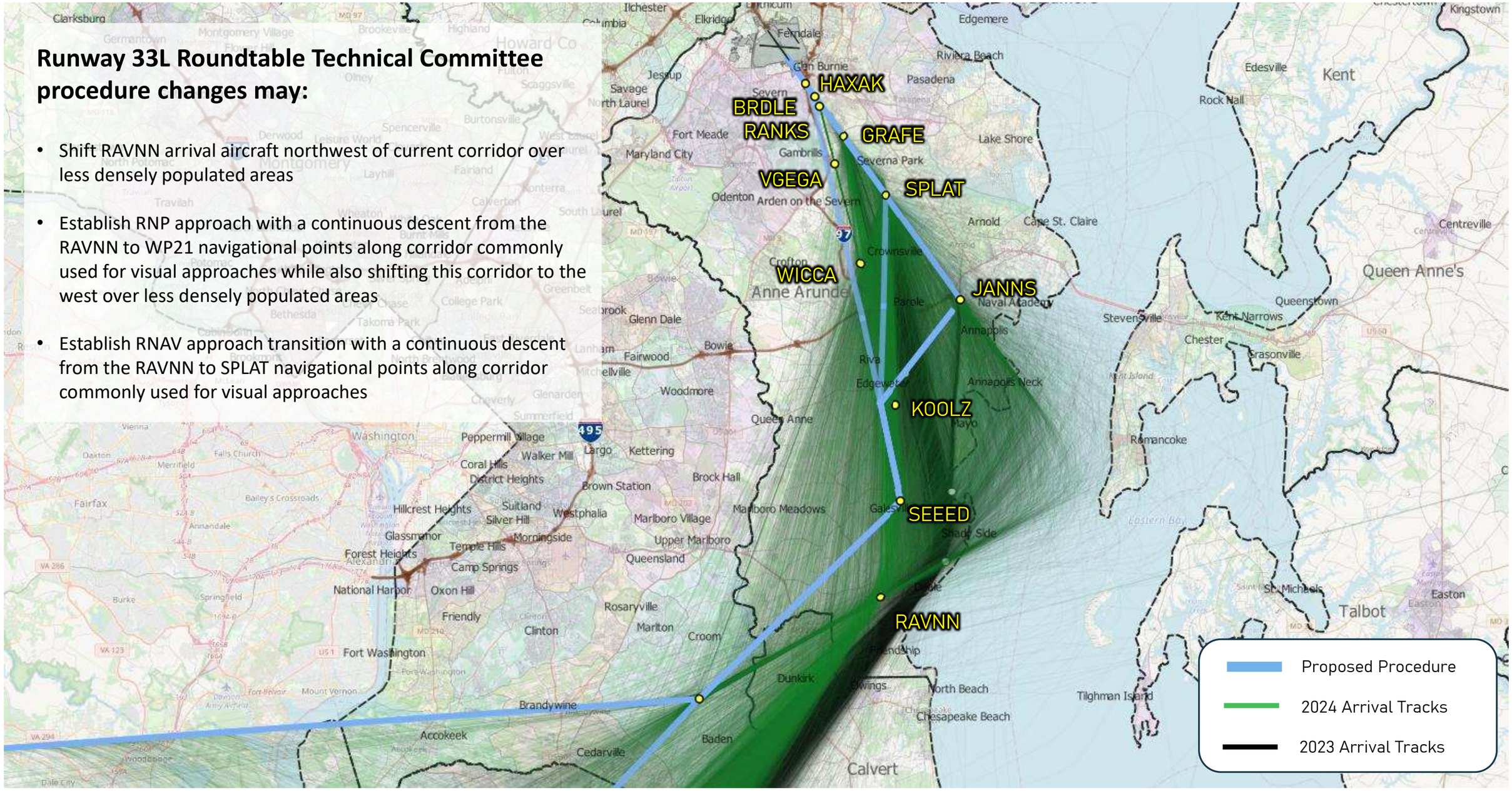
- Shift RAVNN arrival aircraft northwest of current corridor over less densely populated areas
- Establish RNP approach with a continuous descent from the RAVNN to WP21 navigational points along corridor commonly used for visual approaches while also shifting this corridor to the west over less densely populated areas
- Establish RNAV approach transition with a continuous descent from the RAVNN to SPLAT navigational points along corridor commonly used for visual approaches



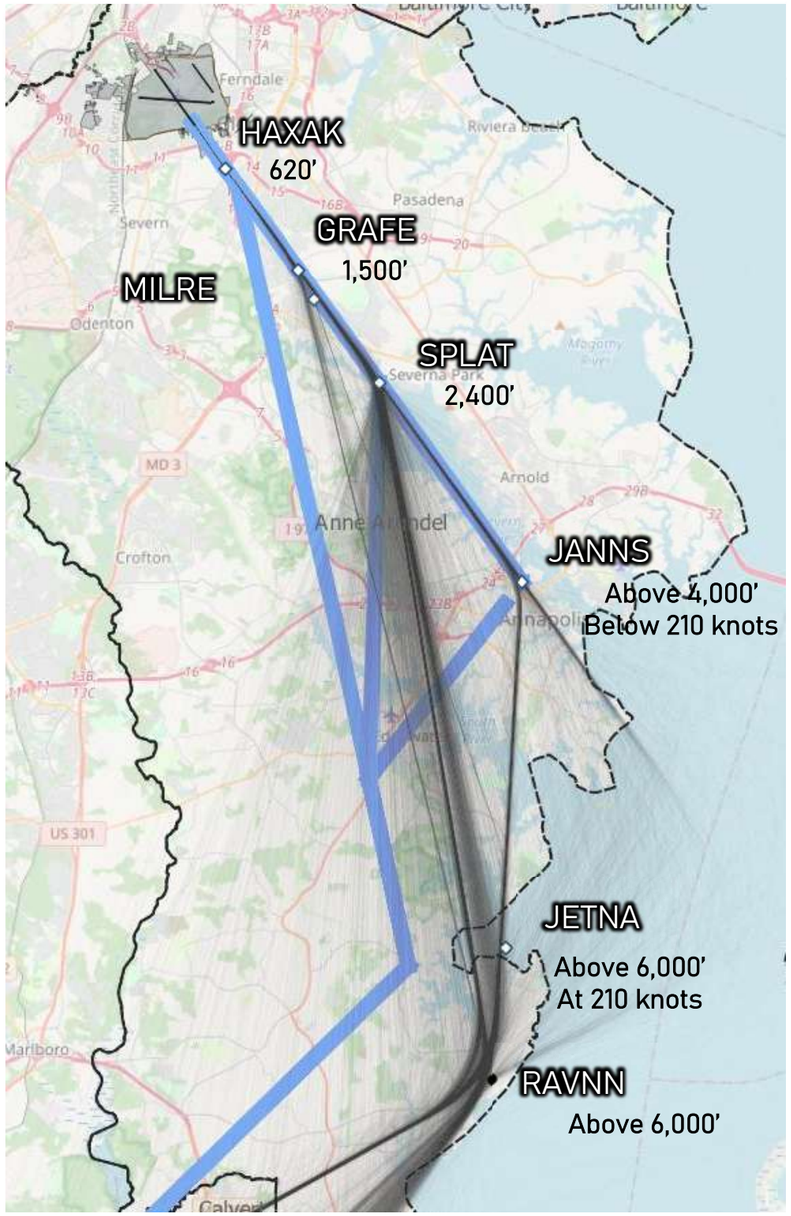
Runway 33L Arrivals (RAVNN) – 2024

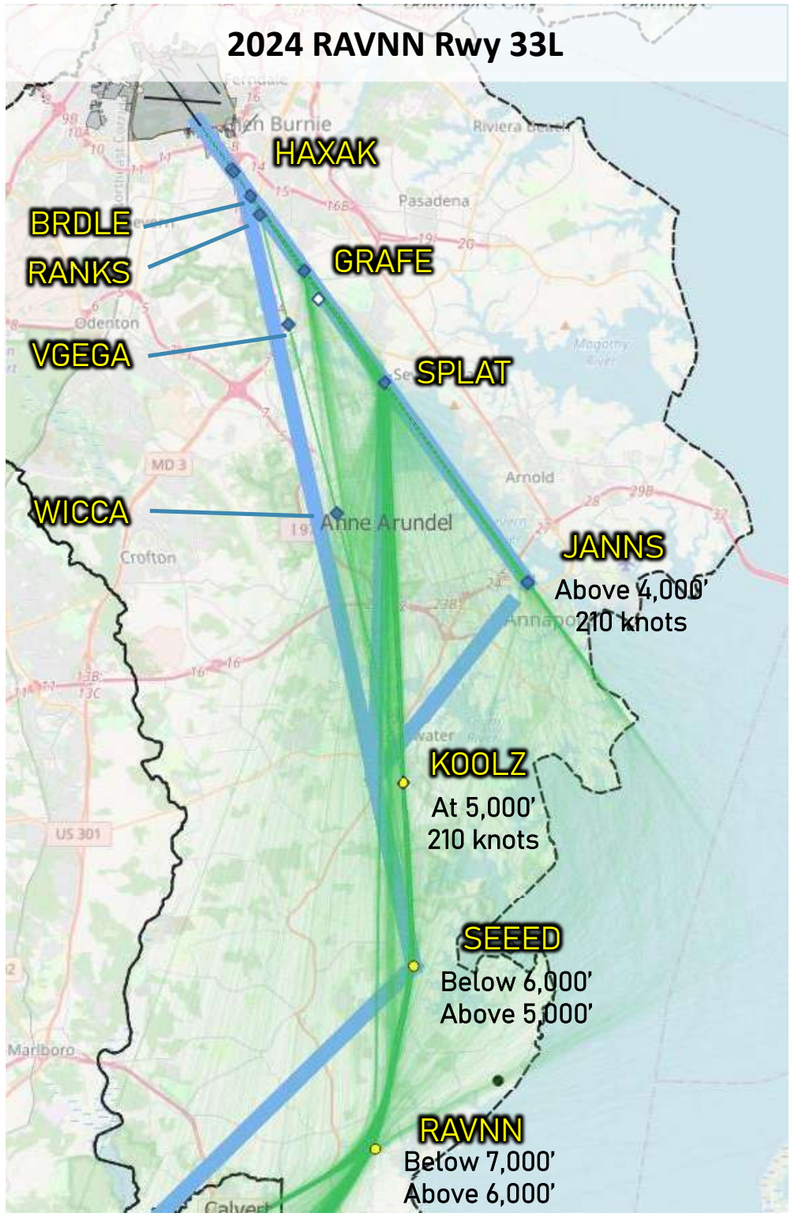
Runway 33L Roundtable Technical Committee procedure changes may:

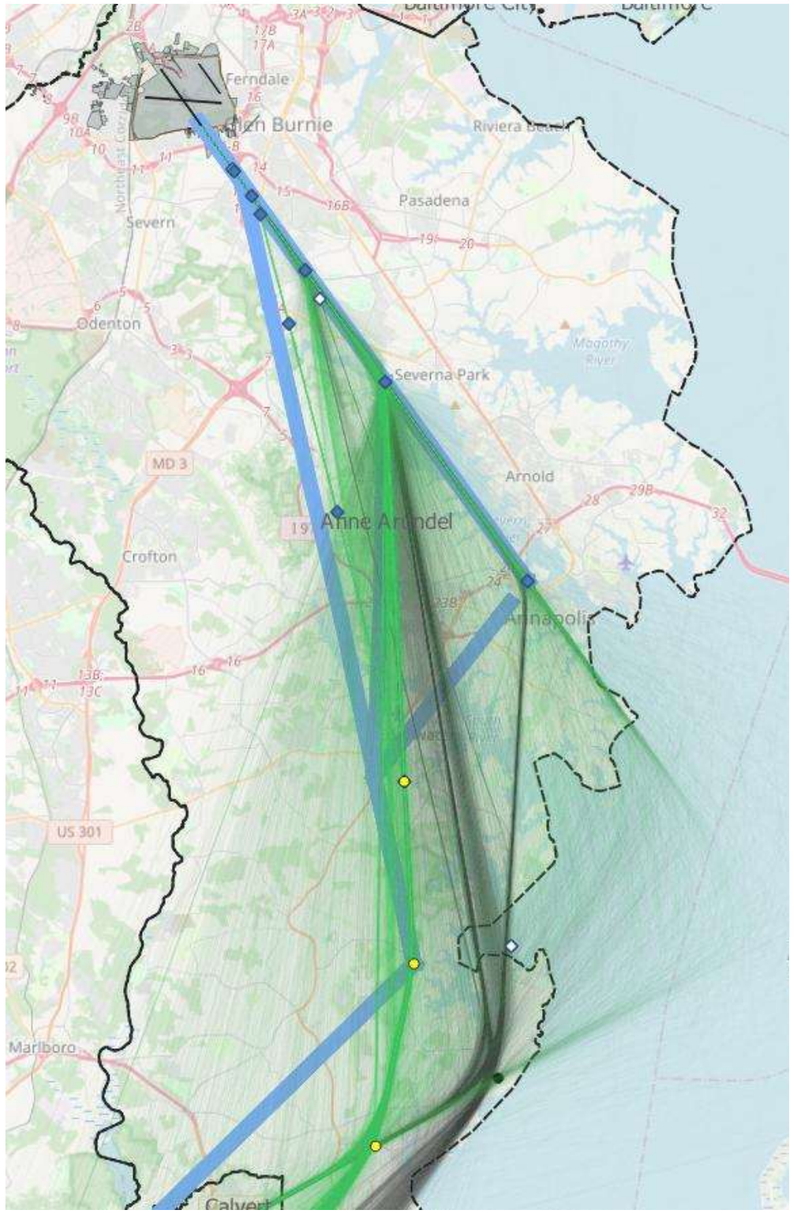
- Shift RAVNN arrival aircraft northwest of current corridor over less densely populated areas
- Establish RNP approach with a continuous descent from the RAVNN to WP21 navigational points along corridor commonly used for visual approaches while also shifting this corridor to the west over less densely populated areas
- Establish RNAV approach transition with a continuous descent from the RAVNN to SPLAT navigational points along corridor commonly used for visual approaches



RAVNN Runway 33L Arrivals and Runway 33L Approaches





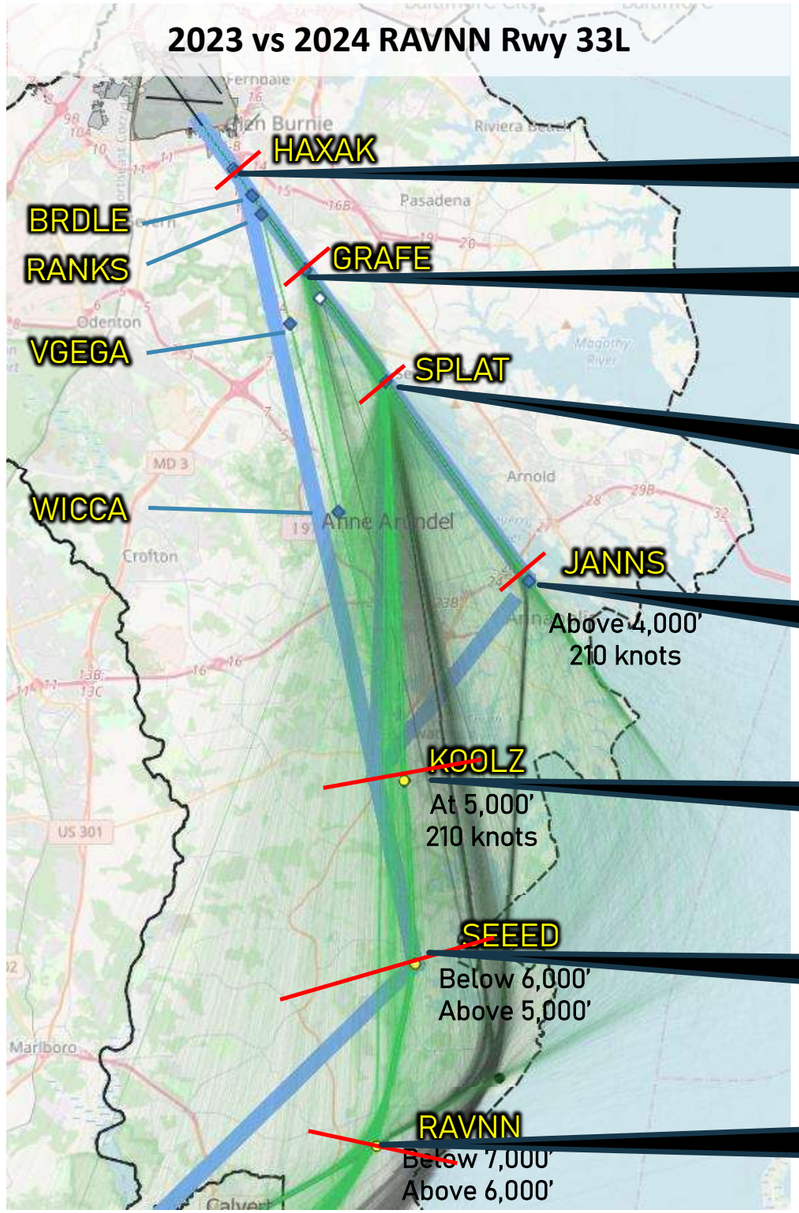


Proposed Procedure

2023 Arrival Tracks

2024 Arrival Tracks

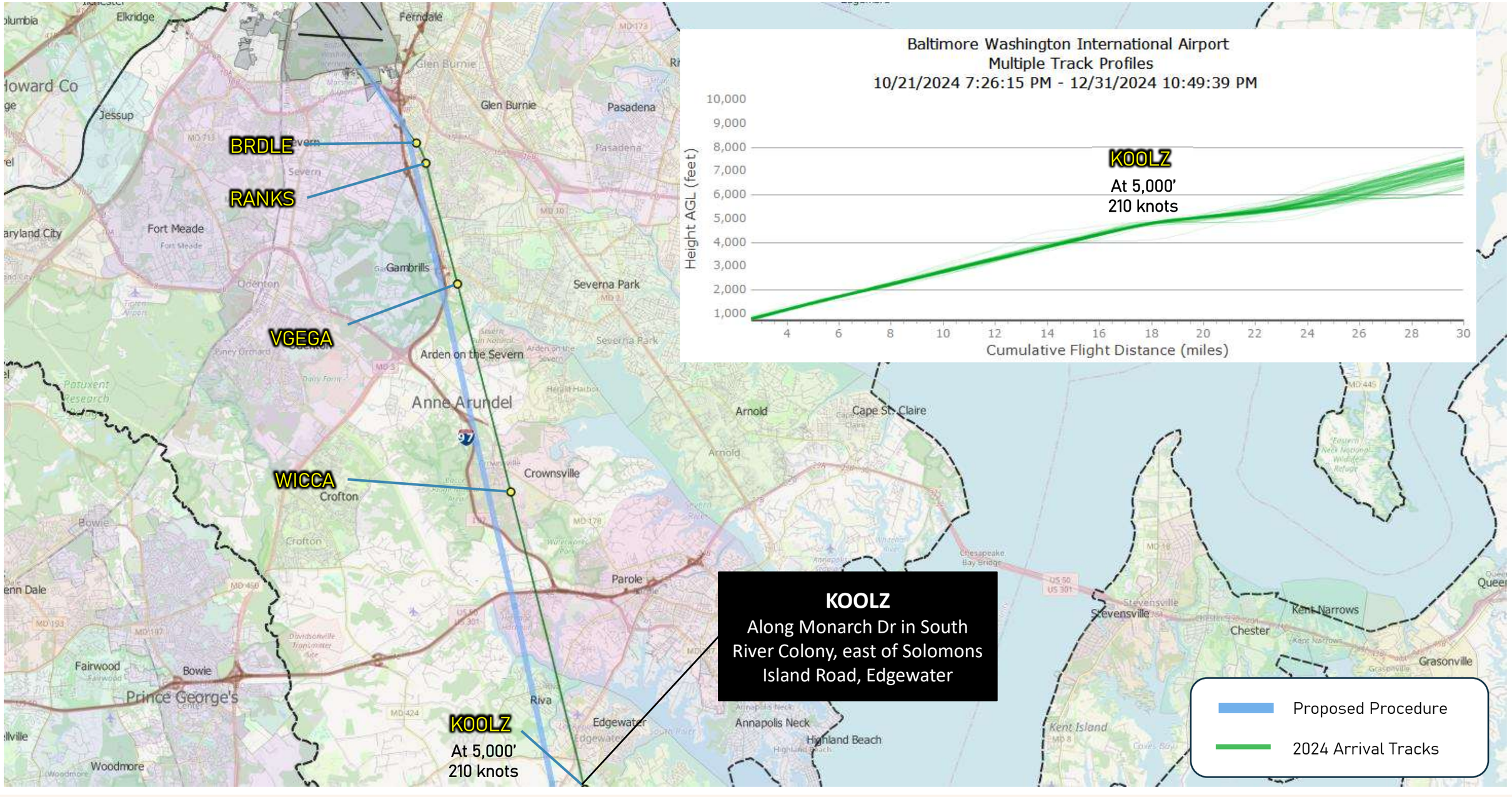
RAVNN Runway 33L Arrivals and Runway 33L Approaches – Altitudes



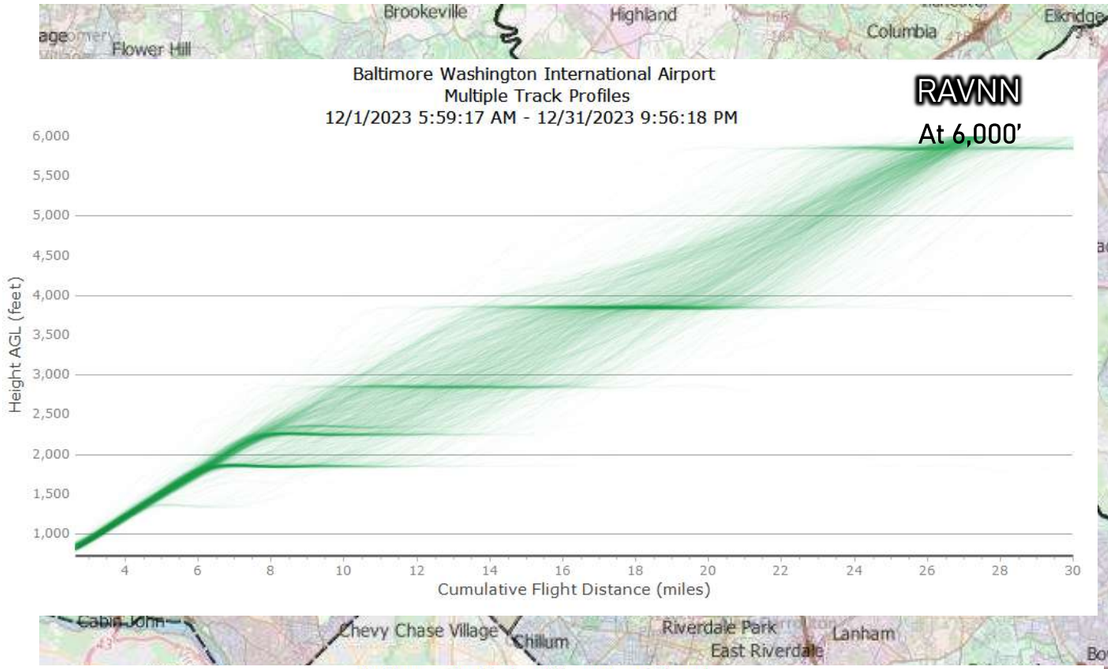
HAXAK	2023 Average Altitude: 488' 2024 Average Altitude: 631'	+143'
GRAFE	2023 Average Altitude: 1,408' 2024 Average Altitude: 1,531'	+123'
SPLAT	2023 Average Altitude: 2,204' 2024 Average Altitude: 2,384'	+180'
JANNS	2023 Average Altitude: 3,460' 2024 Average Altitude: 3,666'	+206'
KOOLZ	2023 Average Altitude: 3,995' 2024 Average Altitude: 4,652'	+657'
SEEED	2023 Average Altitude:5,127' 2024 Average Altitude: 5,465'	+338'
RAVNN	2023 Average Altitude:6,560' 2024 Average Altitude: 6,605'	+45'

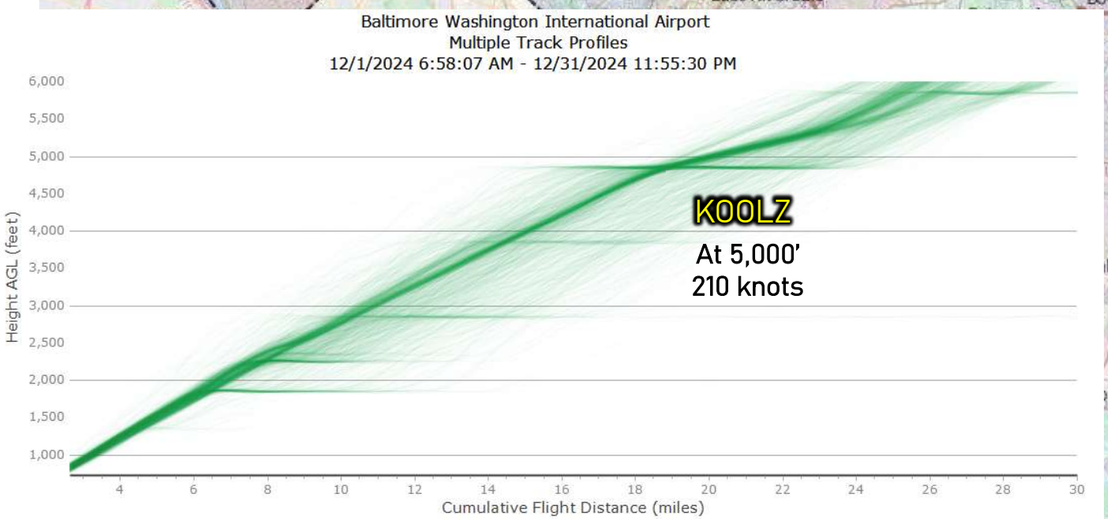
- Proposed Procedure
- 2024 Arrival Tracks
- 2023 Arrival Tracks

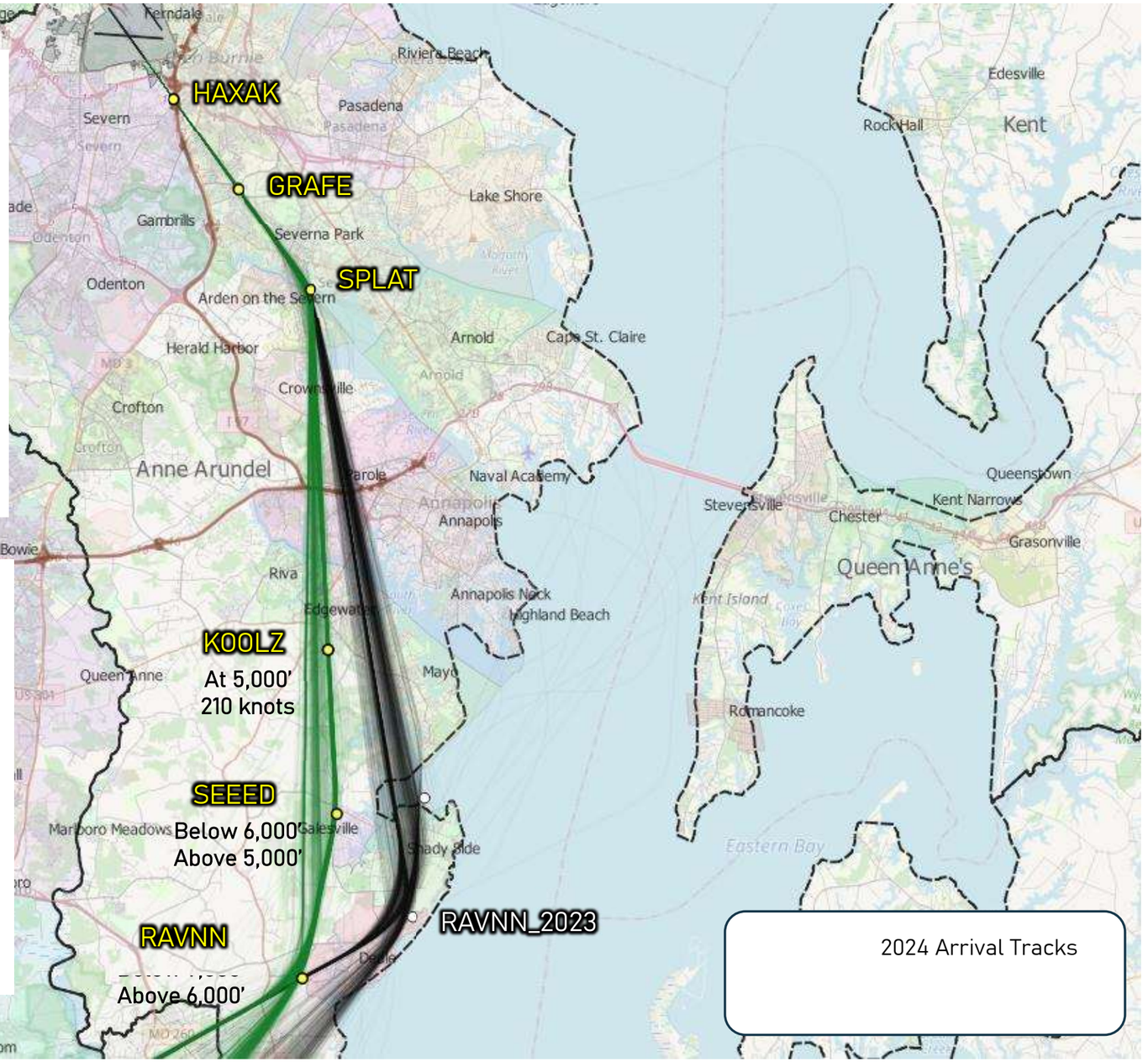
RAVNN Runway 33L Arrivals and Runway 33L Approaches – RNAV (RNP) X



RAVNN Runway 33L Arrivals and Runway 33L Approaches – 2023 RNAV (GPS) Y





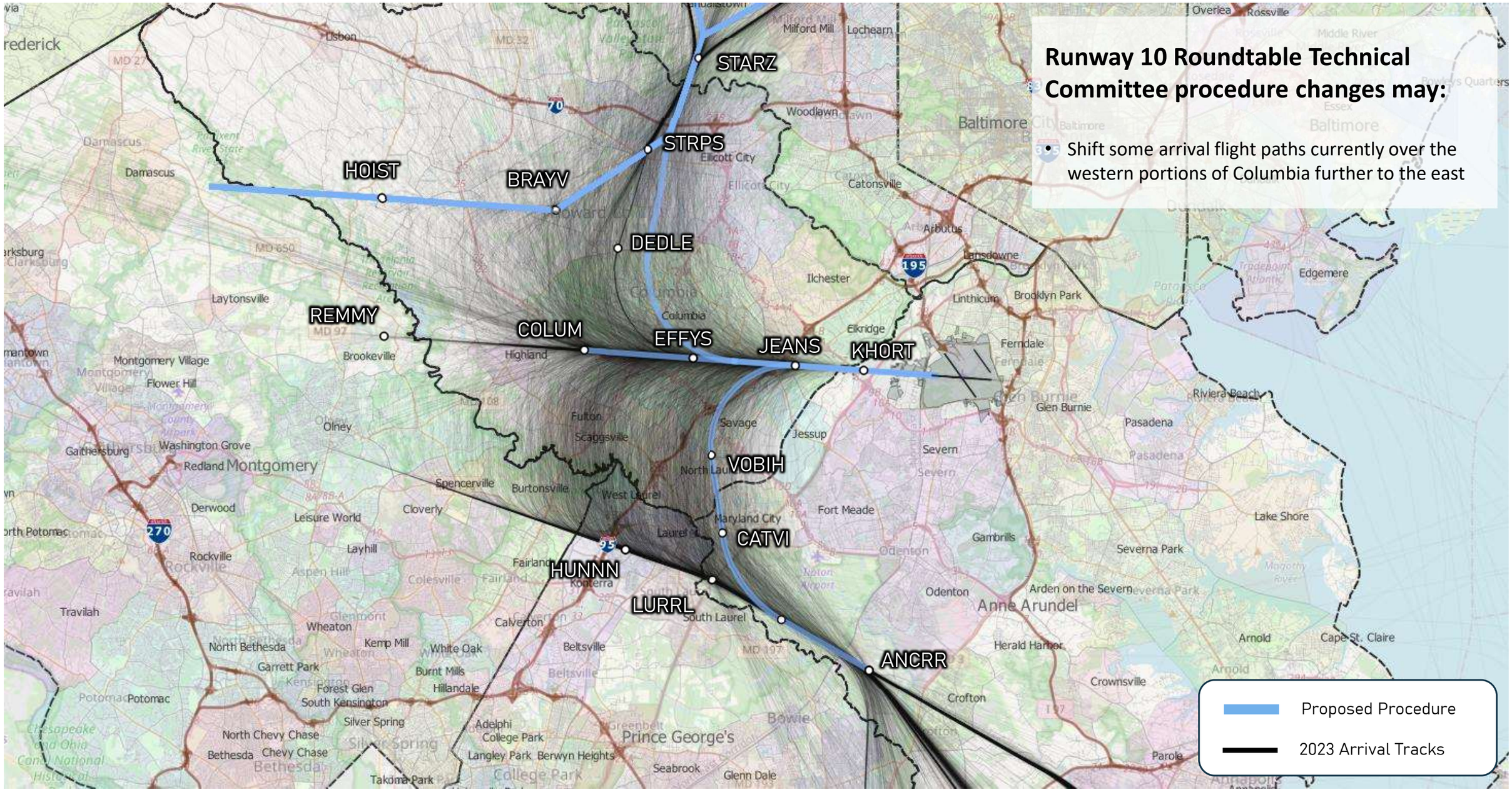


Arrivals

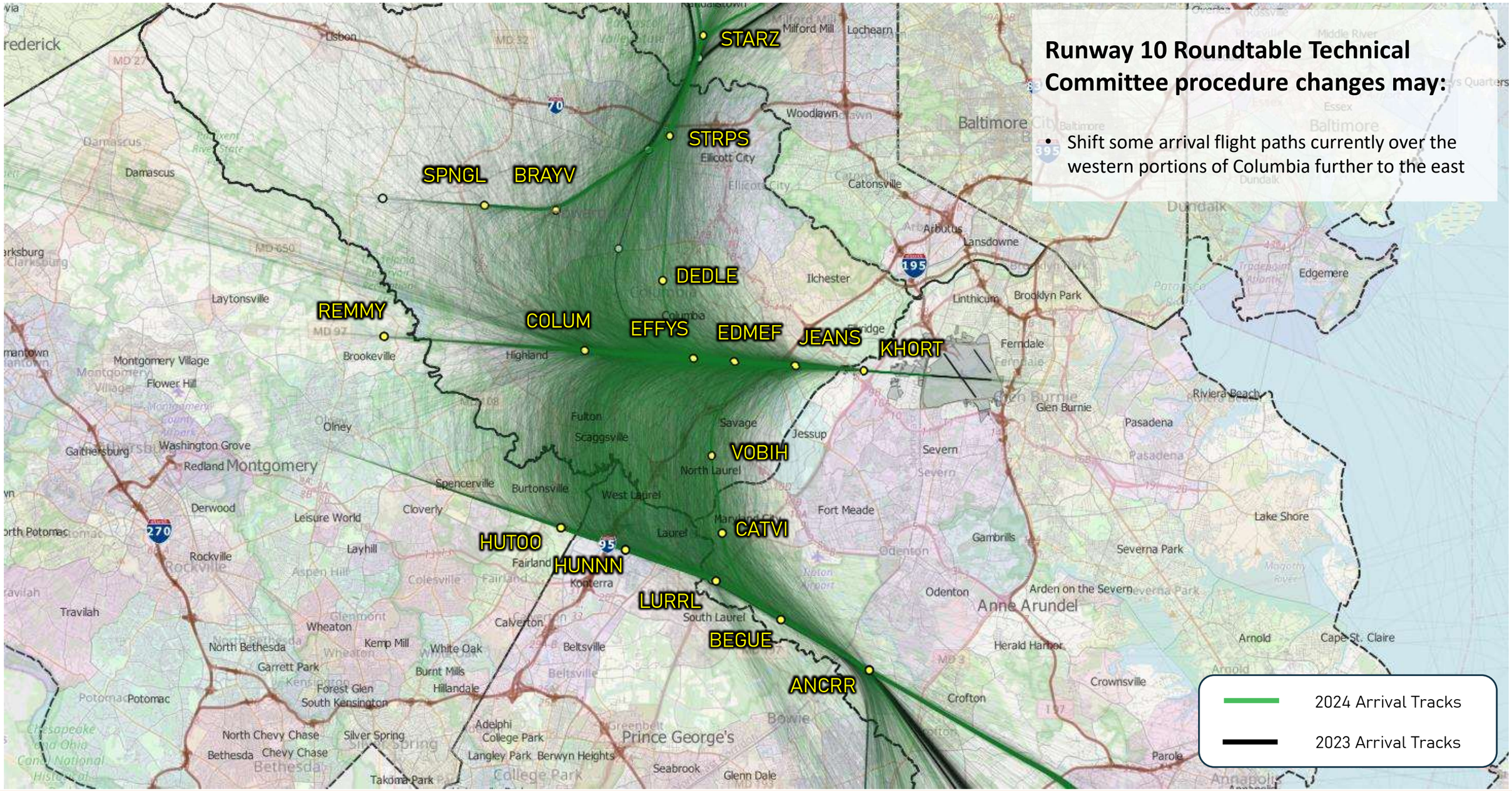
Rwy 10 Arrivals

Orientation Map – Arrivals to Runway 10

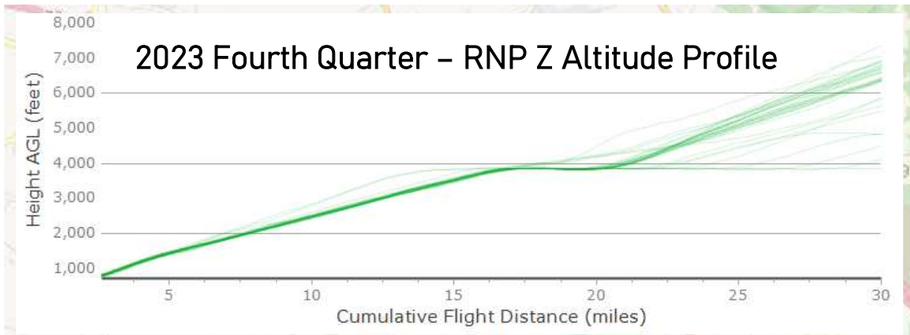
Runway 10 Arrivals – 2023 with 2019 Proposals

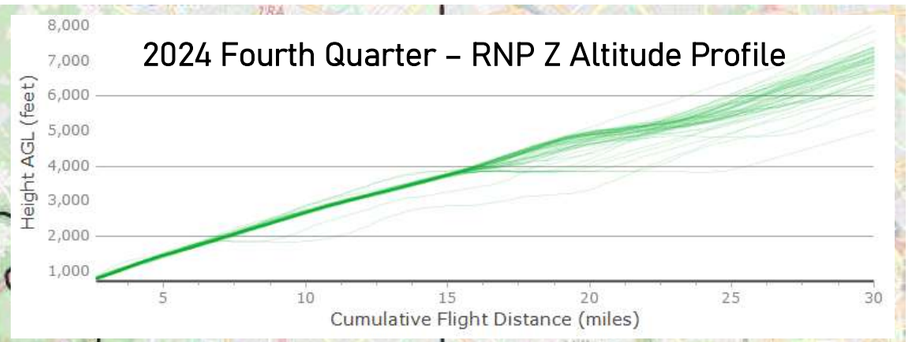


Runway 10 Arrivals – 2023 vs 2024



Runway 10 Jet Arrivals – RNP Approach





STARZ
At 4,000'

STARZ
(2023)

STRPS
At 4,000'

STRPS
At 4,000'

DEDLE
(2023)

DEDLE

COLUM

EDMEF
(2023)
(2024)
Relocated 1,100'

EFFYS
2,300'

JEANS
1,500'

KHORT
860'

Proposed Procedure

2024 Arrival Tracks

2023 Arrival Tracks

Operations – Key Observations & Conclusions

Key Conclusions:

- The departure procedures meet FAA's 2018 intent to mimic pre-Metroplex dispersion via implementation of TERPZ8/FOXHL1/LINSE1 for westbound departures. The distribution of operations is consistent with FAA predictions.
- The addition of waypoints to mimic BWI's historic voluntary noise abatement procedures has resulted in notable increases in altitude (WARYN/BOBYJ on Rwy 15R and JWALL on Rwy 10).
- FAA implemented changes consistent with the Technical Committee's proposals for RAVNN arrivals to Runway 33L.
- FAA successfully implemented the Technical Committee's Runway 10 proposal to relocate the RNP Z procedure.
- FAA successfully implemented the Technical Committee's Runway 15R proposal to increase altitude of arriving aircraft (not discussed in this presentation).

Section 4

Noise Analysis

Noise Analysis

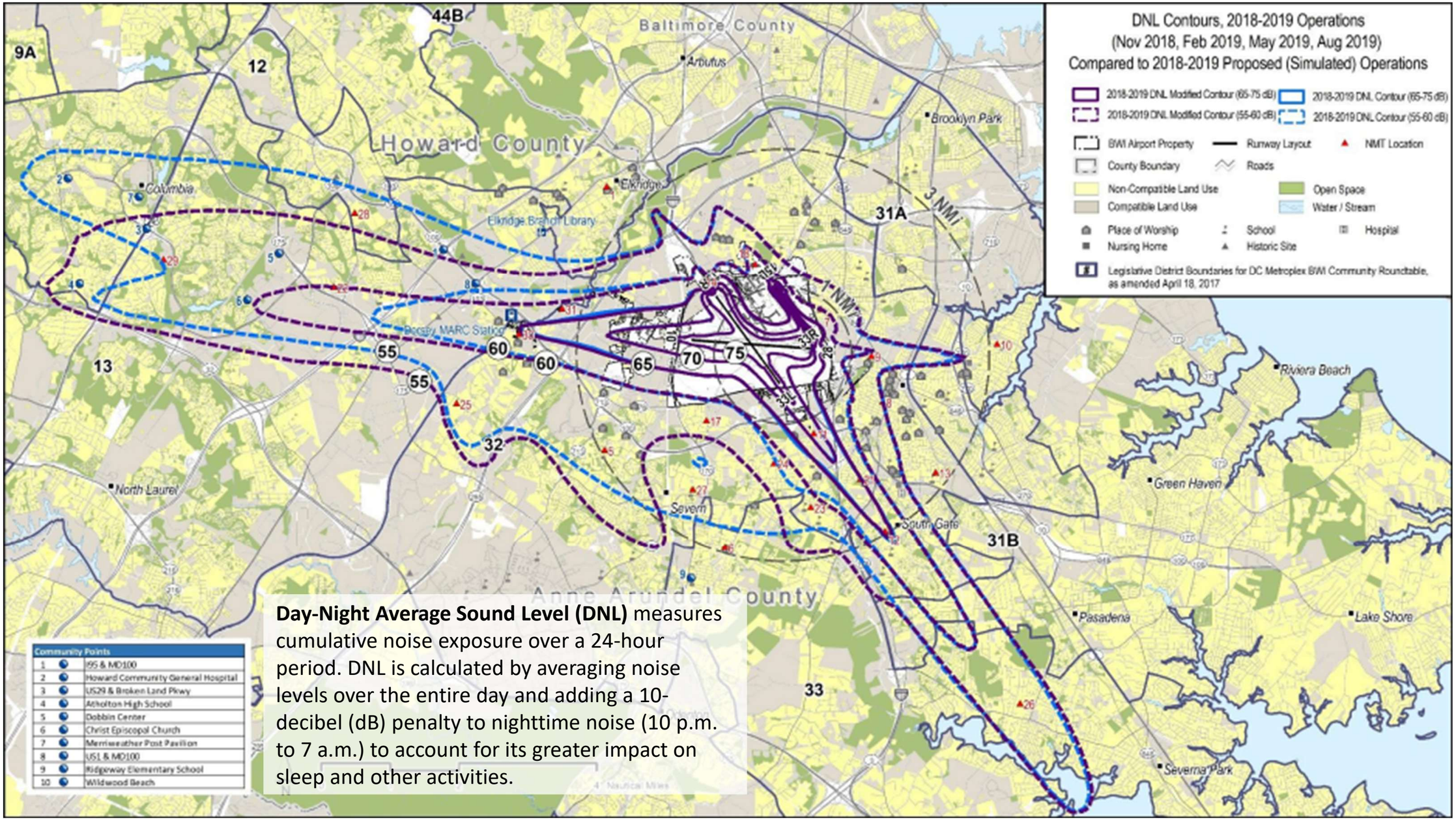
Proposed procedures were modeled in 2019

- Developed noise modeling inputs from radar flight track data samples used in flight track analysis for 2012, 2018-2019, and 2018-2019 proposed (simulated) operations flying the FAA and Roundtable Technical Committees proposed procedure changes
- Anticipated slight increases and decreases

Implemented procedures in the 4th Qtr 2024 were compared to procedures in place in the 4th Qtr of 2023. Noise exposure is presented in terms of:

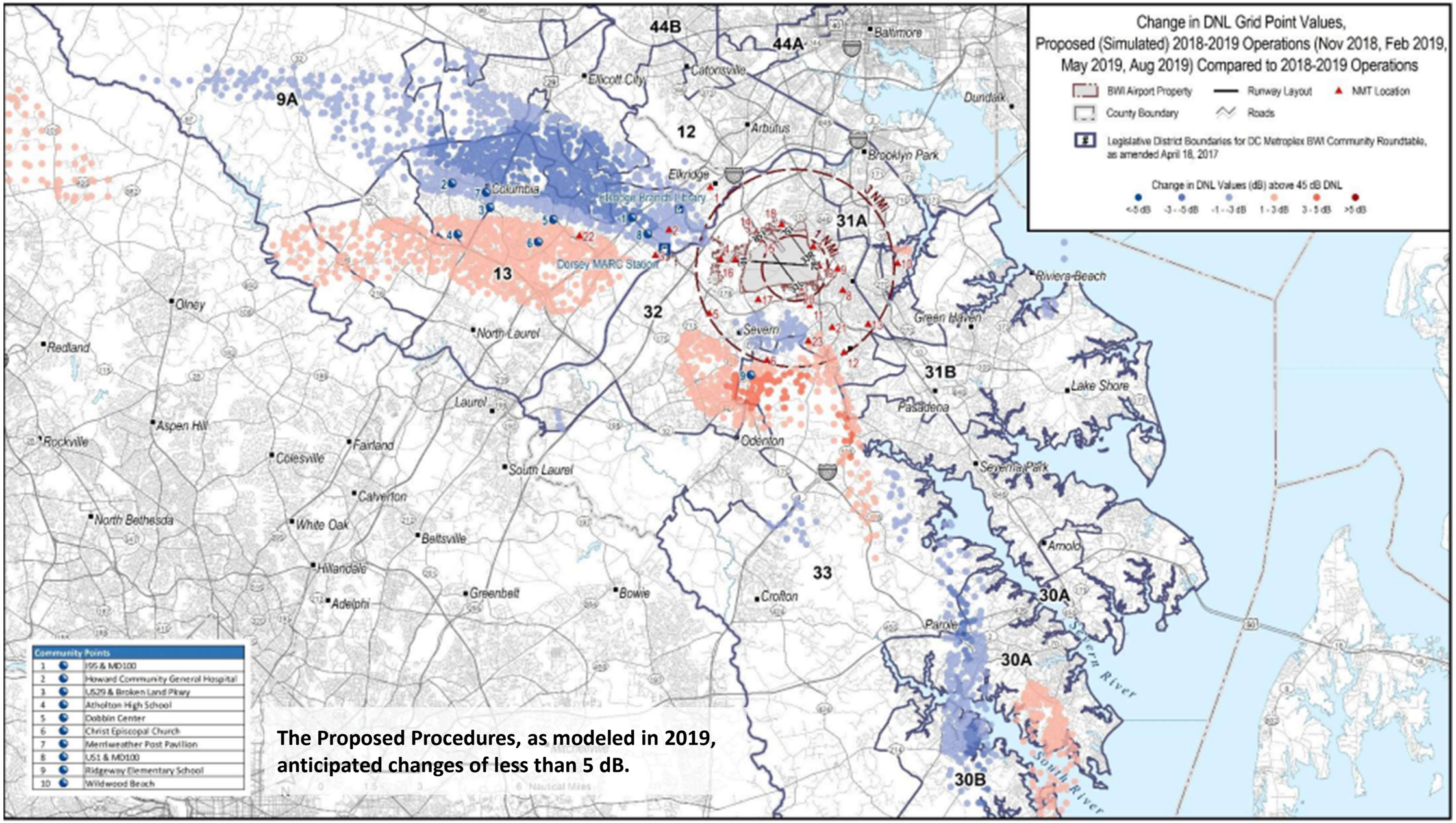
- DNL Noise Contours (55 DNL +)
- Change in DNL
- Number of Events Above (NA) – 55 dB and 65 dB (at US Census Block centroids)

2019 DNL Noise Analysis



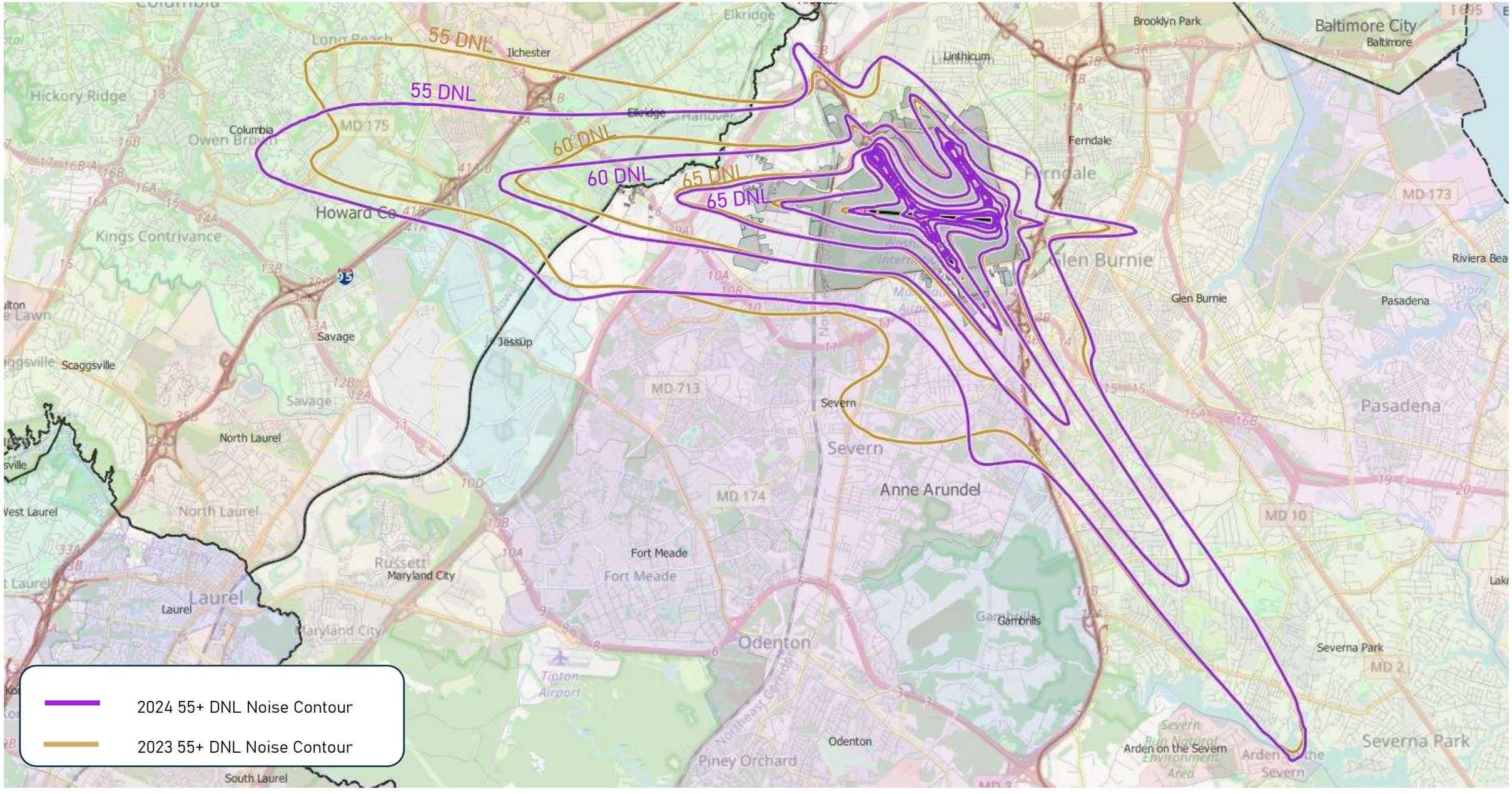
Day-Night Average Sound Level (DNL) measures cumulative noise exposure over a 24-hour period. DNL is calculated by averaging noise levels over the entire day and adding a 10-decibel (dB) penalty to nighttime noise (10 p.m. to 7 a.m.) to account for its greater impact on sleep and other activities.

2019 DNL Noise Analysis – Change in DNL at Census Block Centroids

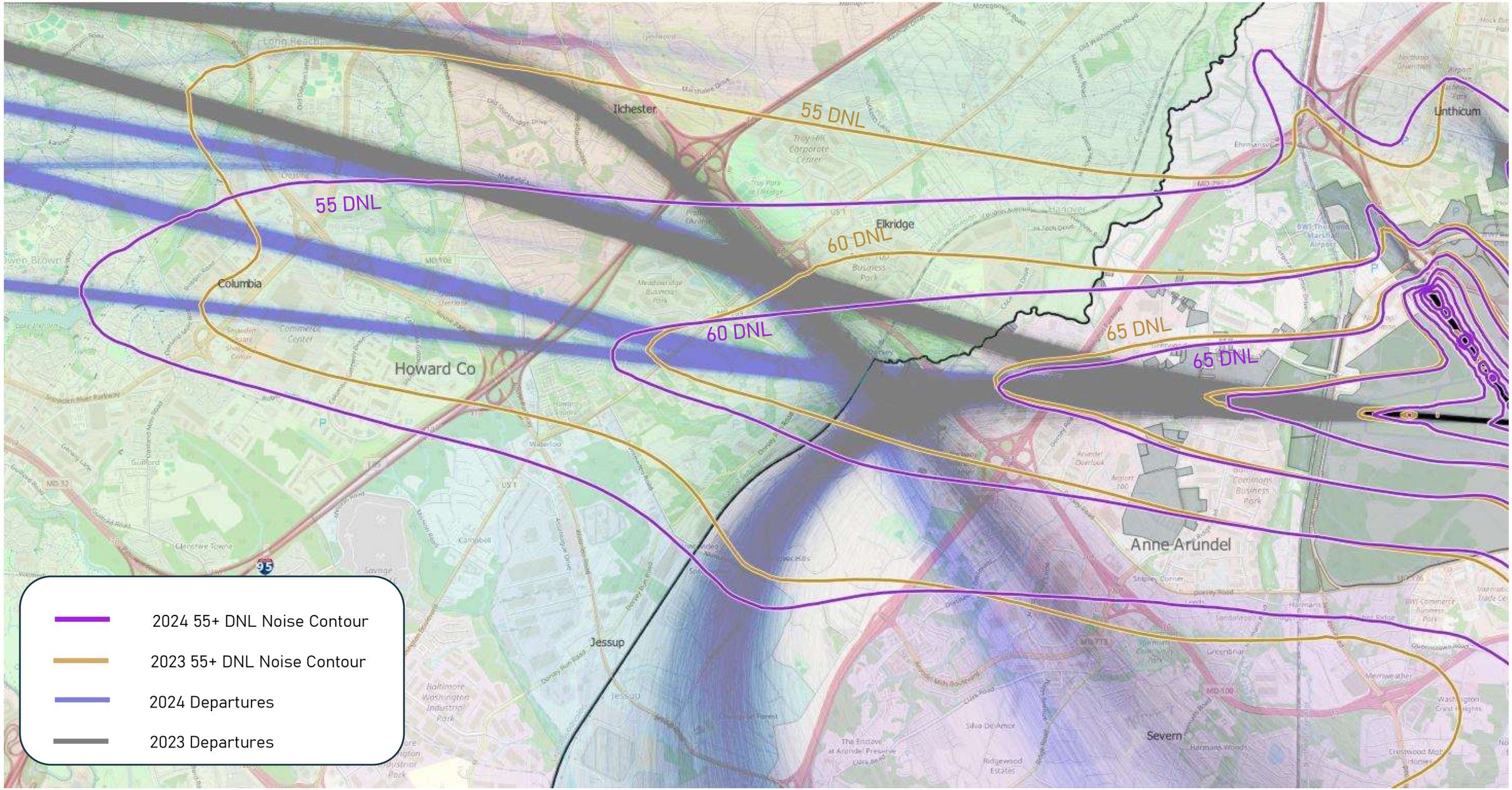


The Proposed Procedures, as modeled in 2019, anticipated changes of less than 5 dB.

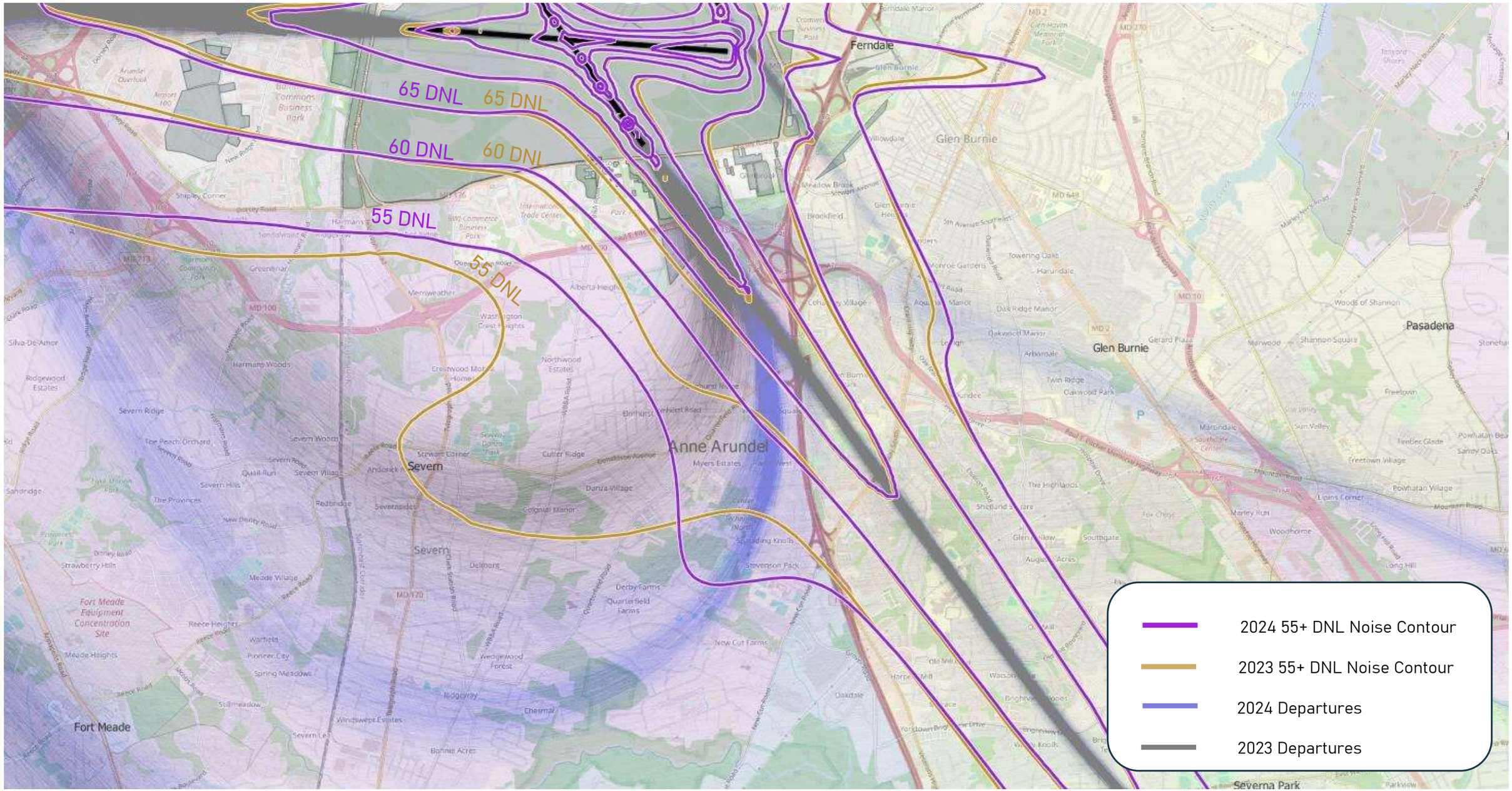
DNL Noise Analysis – 2023 versus 2024 DNL Contours



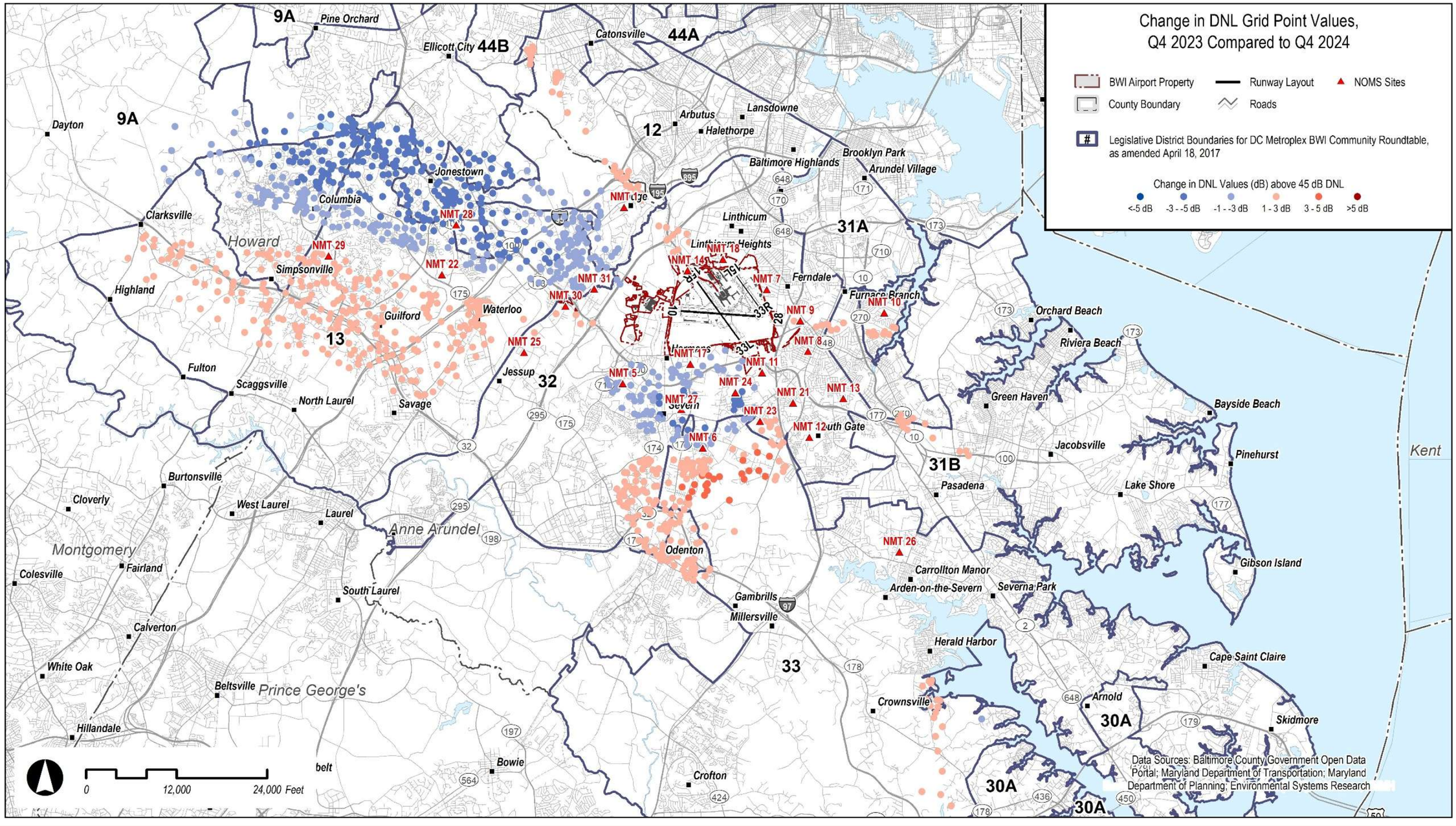
DNL Noise Analysis – 2023 versus 2024 – West Departures



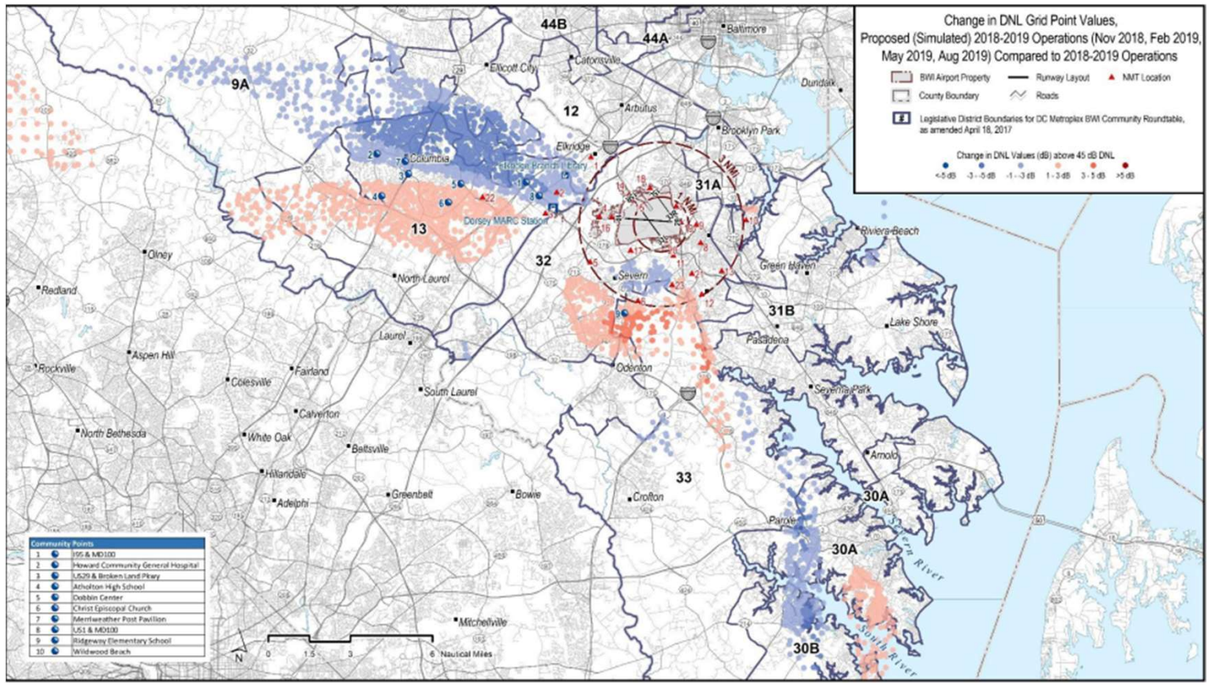
DNL Noise Analysis – 2023 versus 2024 – Runway 15R Departures



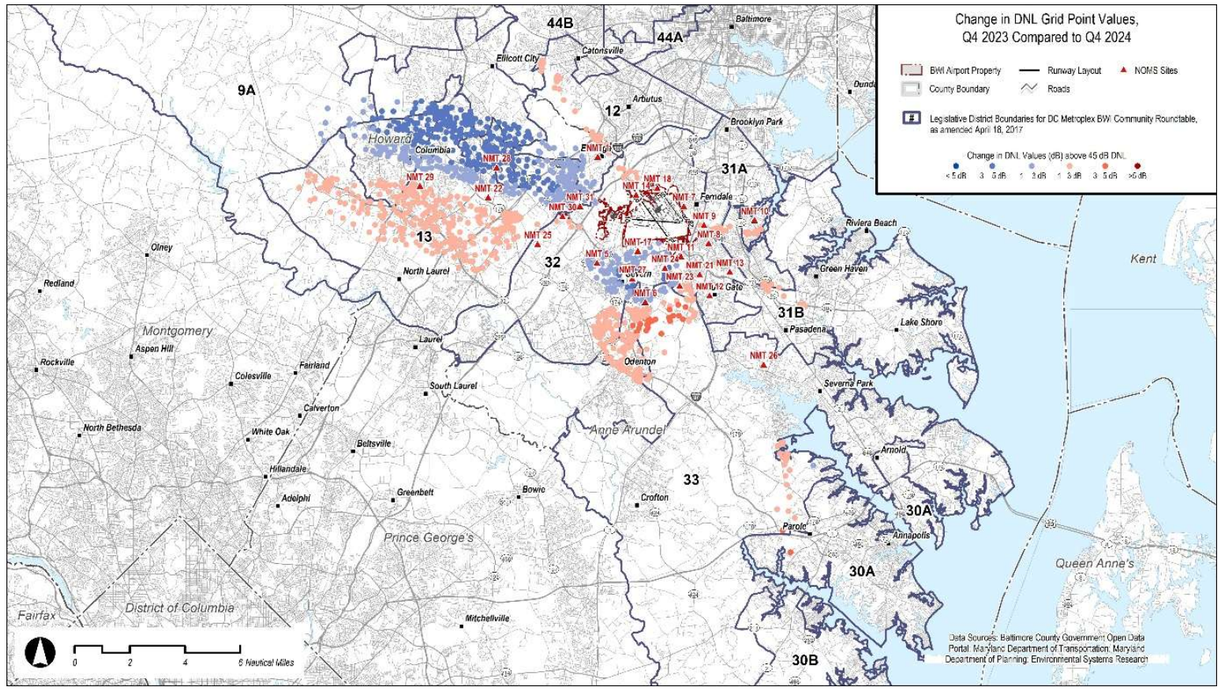
DNL Noise Analysis – Change in DNL at Census Block Centroids



DNL Noise Analysis – Comparison of 2019 Projected and 2023/2024

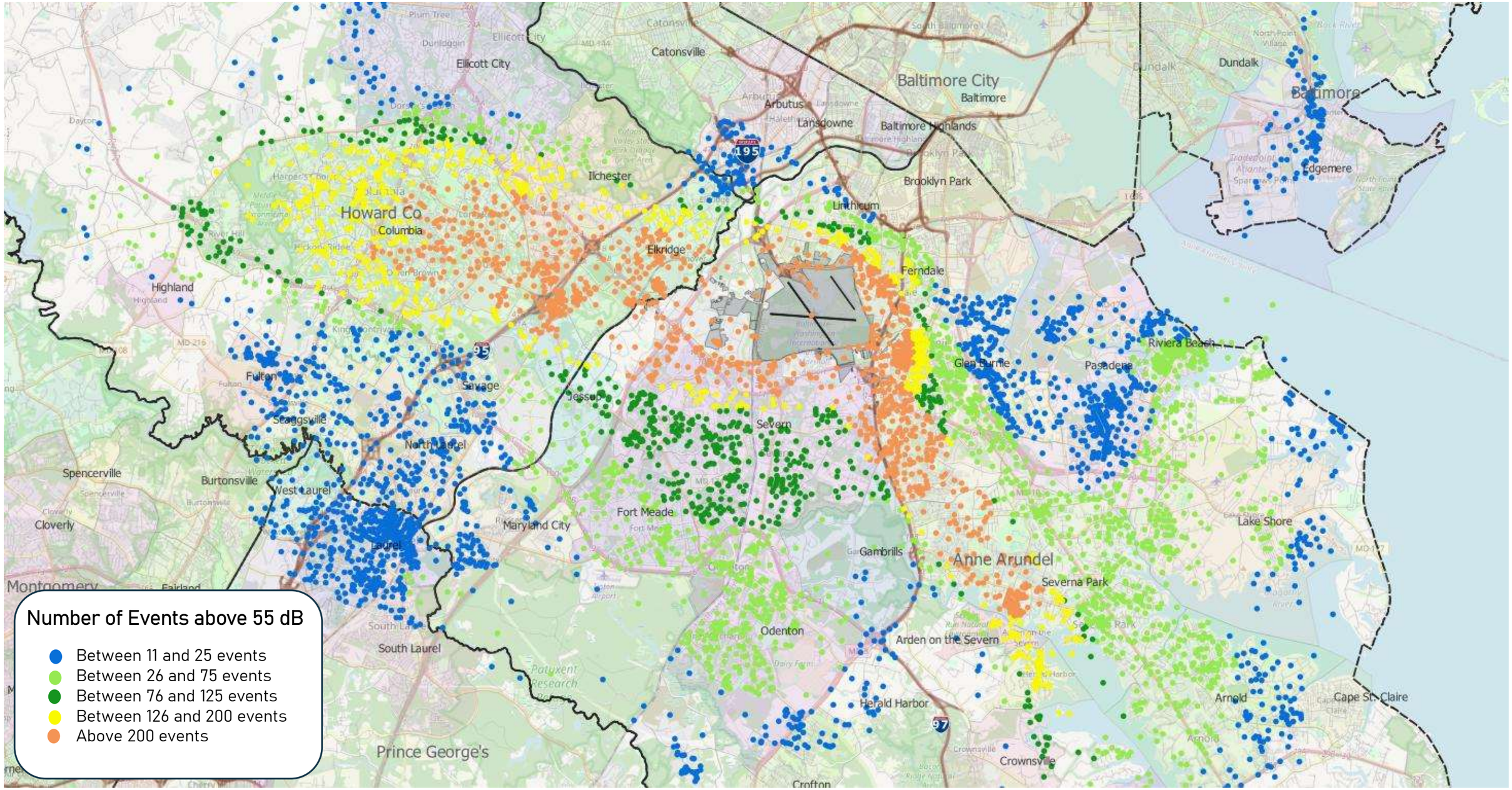


2019 Proposed
Change in DNL

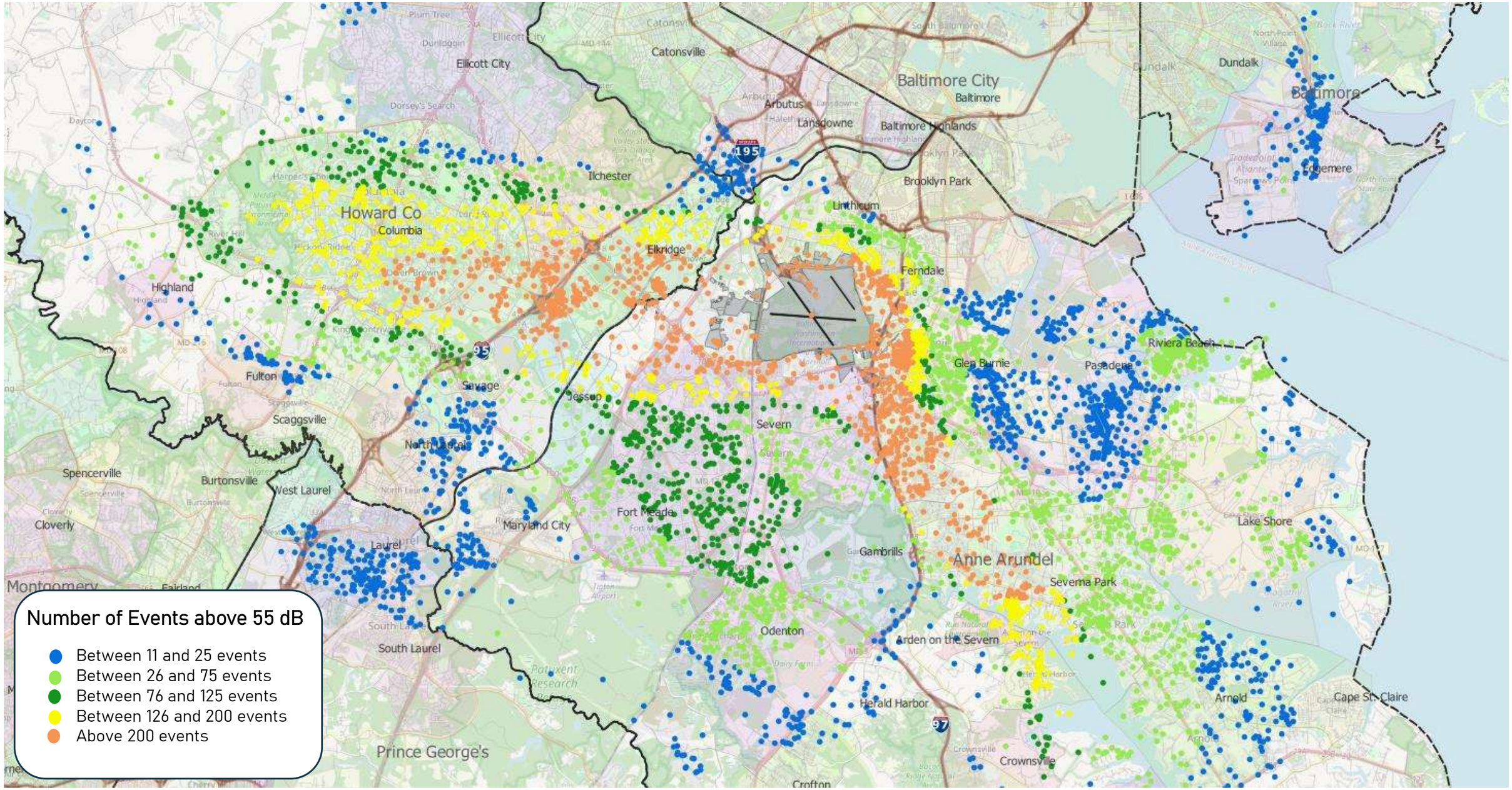


2023/2024
Change in DNL

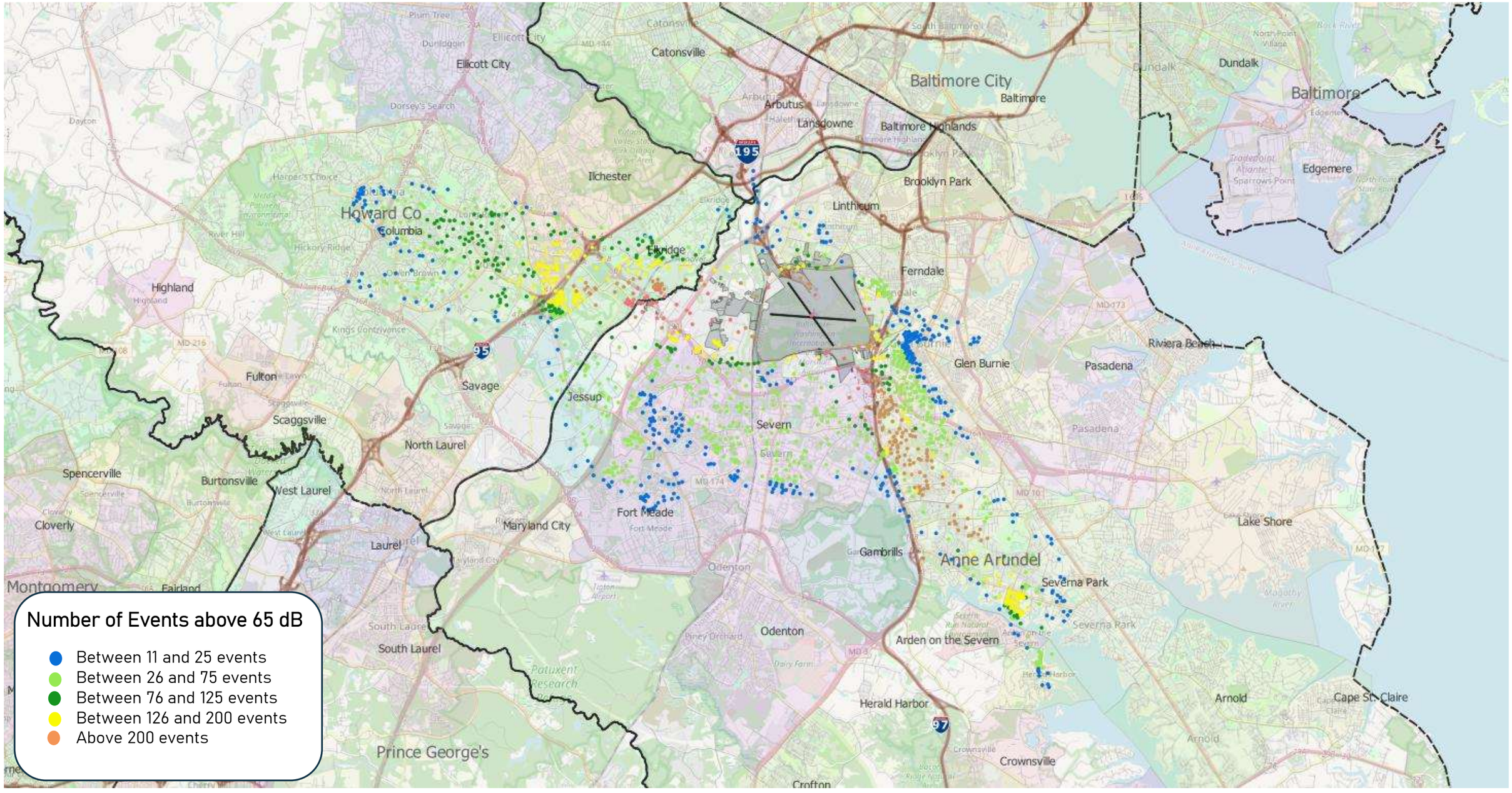
Number of Events Above Analysis – 2023 NA 55 dB



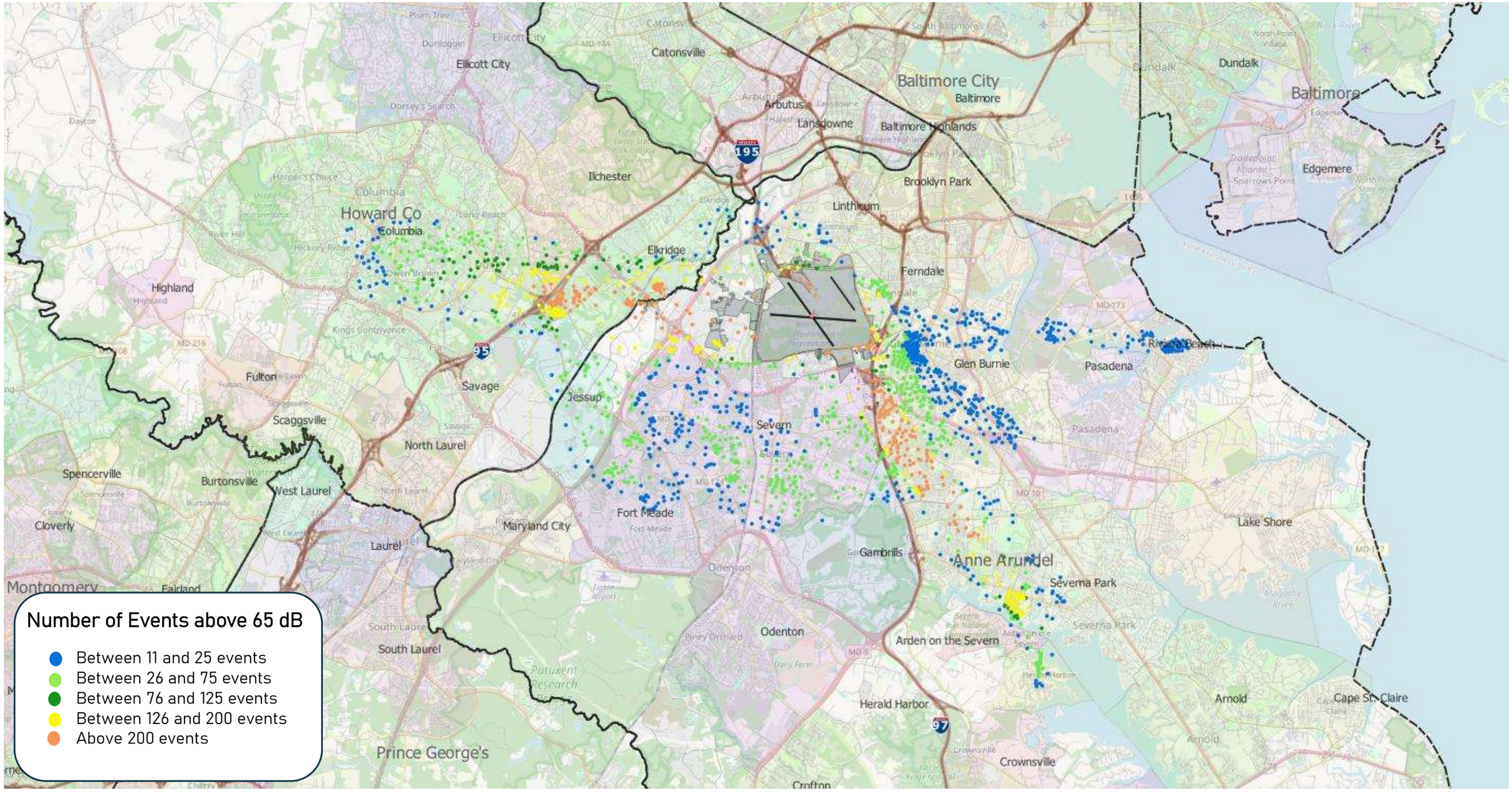
Number of Events Above Analysis – 2024 NA 55 dB



Number of Events Above Analysis – 2023 NA 65 dB



Number of Events Above Analysis – 2024 NA 65 dB



BALTIMORE/WASHINGTON INTERNATIONAL Thurgood Marshall AIRPORT

Thank You.

Baltimore/Washington International
Thurgood Marshall Airport

Connect With Us!