

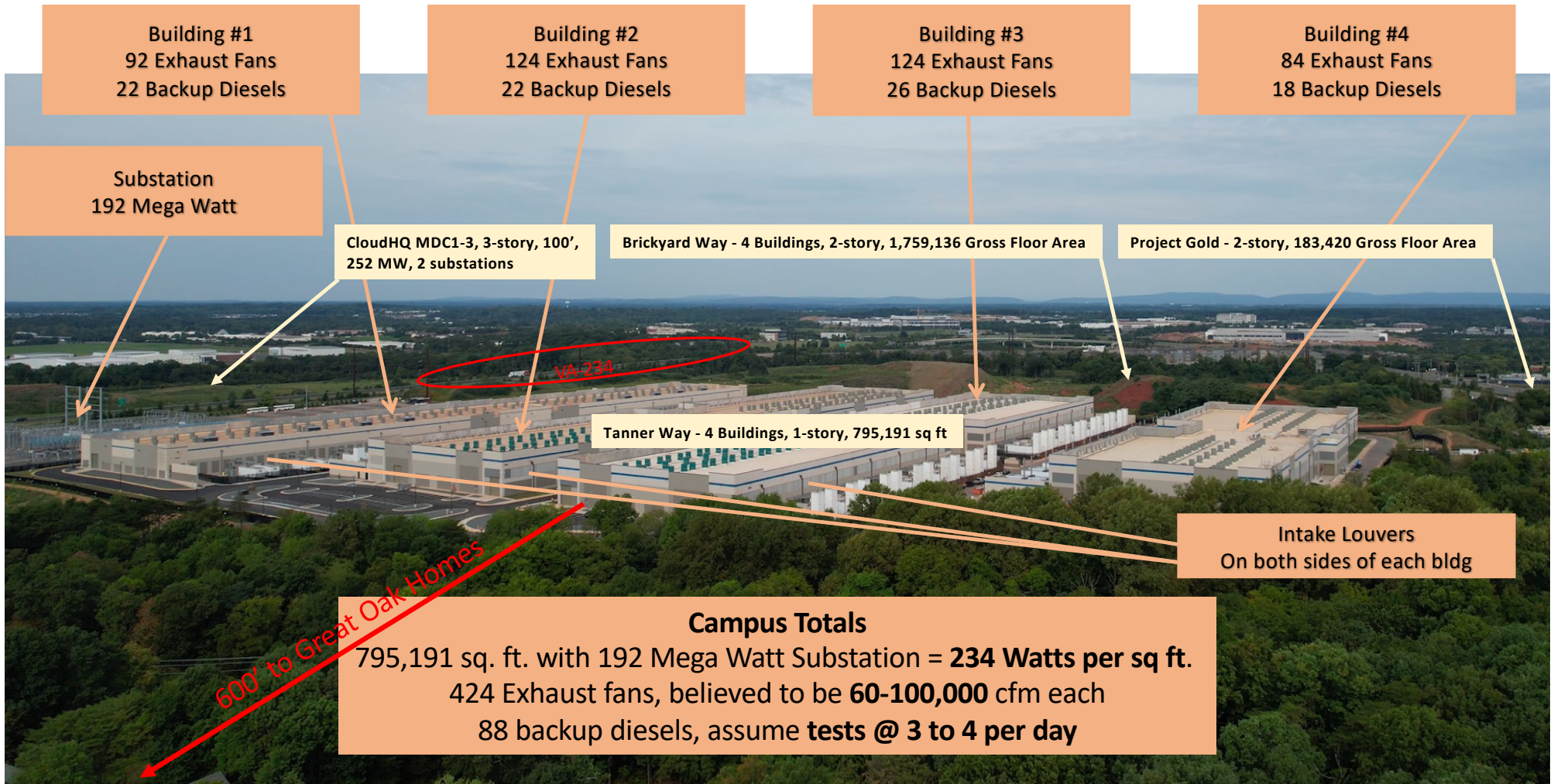
An aerial photograph showing a large, modern data center complex with multiple buildings and a flat roof covered in numerous air conditioning units. The facility is situated in a suburban area with a mix of residential houses and dense green trees. A road with several cars is visible in the foreground, and a small pond is located to the right of the main building. The sky is clear and blue.

AWS Data Center (Tanner Way)
Impacts on Great Oak

DCOAG Meeting – Presented to Nelson Acoustics

23 Oct 2024

Great Oak Subdivision
Dale Browne



Building #1
92 Exhaust Fans
22 Backup Diesels

Building #2
124 Exhaust Fans
22 Backup Diesels

Building #3
124 Exhaust Fans
26 Backup Diesels

Building #4
84 Exhaust Fans
18 Backup Diesels

Substation
192 Mega Watt

CloudHQ MDC1-3, 3-story, 100',
252 MW, 2 substations

Brickyard Way - 4 Buildings, 2-story, 1,759,136 Gross Floor Area

Project Gold - 2-story, 183,420 Gross Floor Area

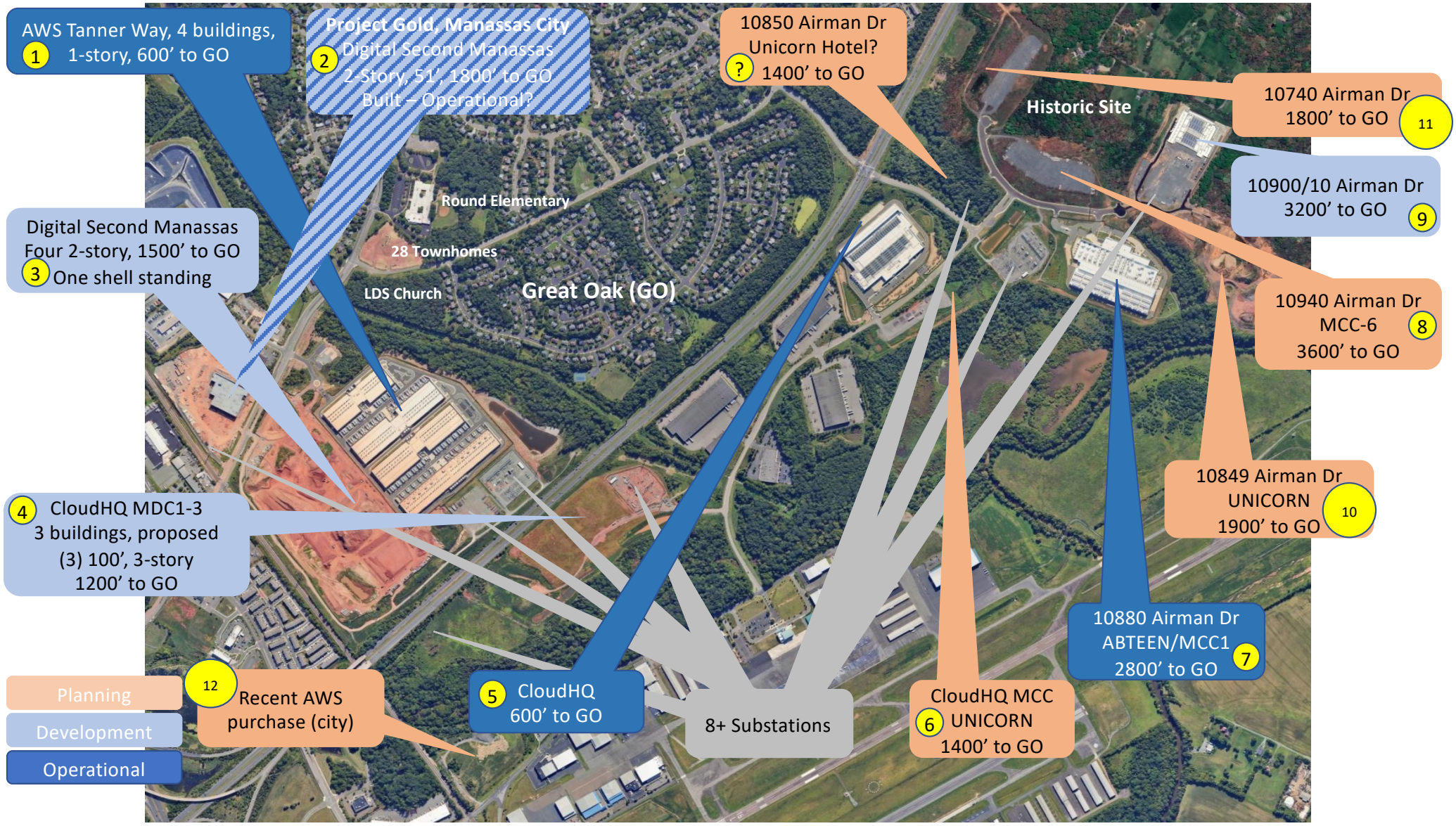
VA-234

Tanner Way - 4 Buildings, 1-story, 795,191 sq ft

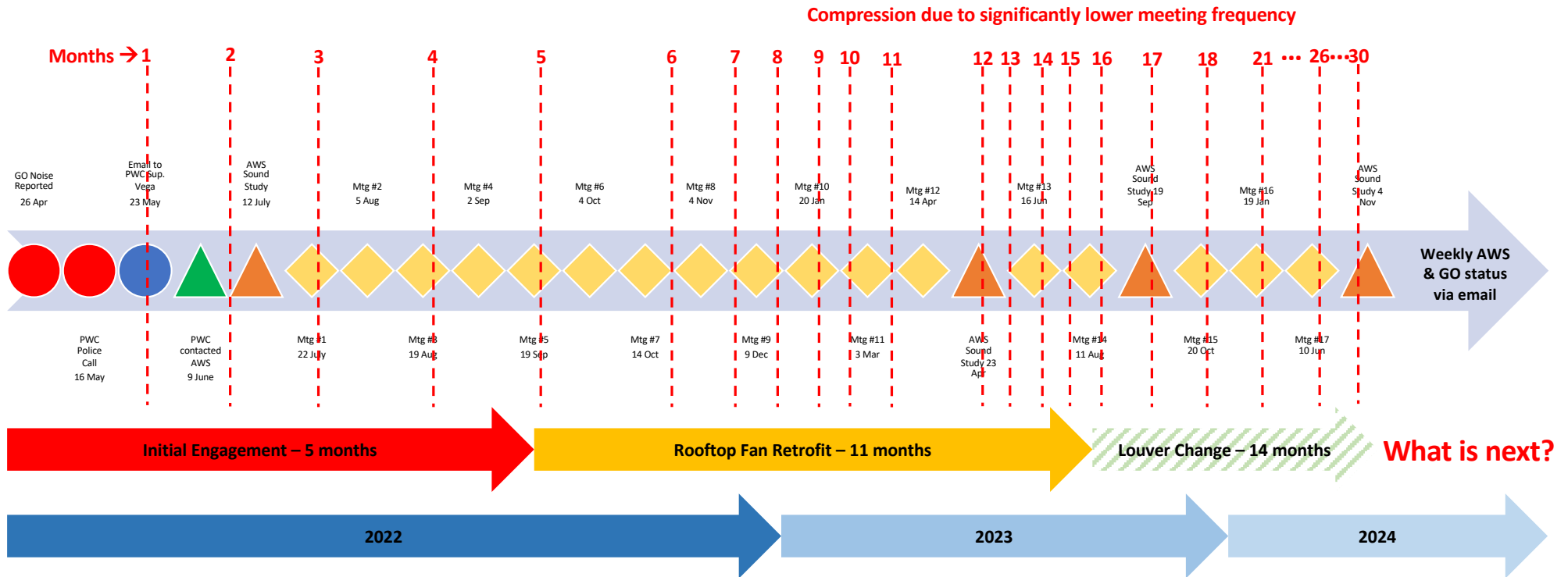
Intake Louvers
On both sides of each bldg

600' to Great Oak Homes

Campus Totals
795,191 sq. ft. with 192 Mega Watt Substation = **234 Watts per sq ft.**
424 Exhaust fans, believed to be **60-100,000** cfm each
88 backup diesels, assume **tests @ 3 to 4 per day**



AWS, PWC and Great Oak Interactions



After 2.5 years the AWS data center noise in Great Oak is better
but not resolved

Initial Engagement

26 Apr – 19 Sep 2022
(5 months)

-
- Complaints, police reports and initial dialog
 - Great Oak reported noise and blasting damage issues to AWS & PWC
 - AWS response during this time lacked detail due to “proprietary concerns”
 - AWS acknowledged rooftop AC noise source and began deploying shrouds
 - Shrouds were doubled and of little benefit (~1 dBA)



Fan Retrofit

19 Sep 22 – 18 Aug 2023
(11 months)

-
- AWS VP Operations for North America engaged
 - Initiated fan blade and motor change
 - added wind bands
 - modified control software
 - Noise reduced by about 10 dBA (58-65 dBA to 48-55 dBA range)
 - AWS announced louver change



Louver Baffle Change

18 Aug 23 – Oct 2024
(14 months, 4 months late)

- Add dampening material behind the louvers inside 3 buildings
 - Building #1 excluded, furthest from Great Oak
- Ducts behind each louver varies resulting in design and material variations
- Planned – January – March 2024
 - Slipped to June 2024
 - Slipped to October 2024
- No dBA reduction committed, will change “nature” of the noise, expect it to eliminate the “screech”
- **March 2024 – VP of Operations left AWS with no replacement committed**



Community Wellbeing

Replacing windows in one home did not help (>\$20K)

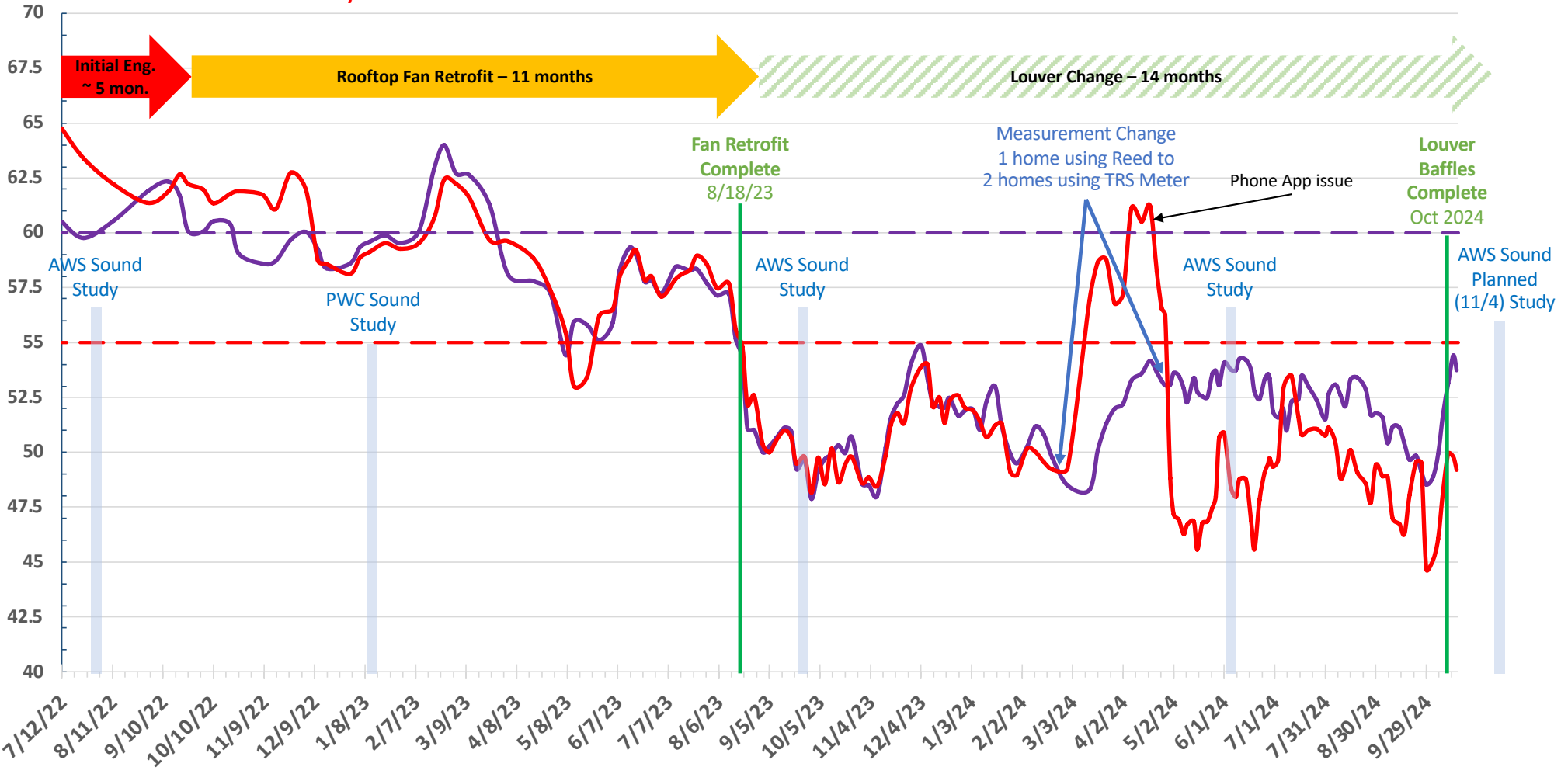
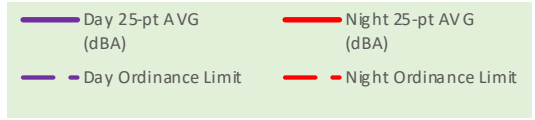
- Health Issues from the noise
 - Disturbed sleep
 - Increased stress and anxiety
 - Exacerbated migraines
 - Aggravated autoimmune disorder due to stress
 - Diesel impact on air quality
- Enjoying our homes and community
 - Deck/Patio/Backyard use is intolerable
 - Impacts to pets, reports of backyard avoidance
- Nearby worries
 - Tot lot 800', Tennis/Pickleball court 900'
 - Latter Day Saints Church parcel 500 ft
 - Round Elementary (playground) at 1400 ft

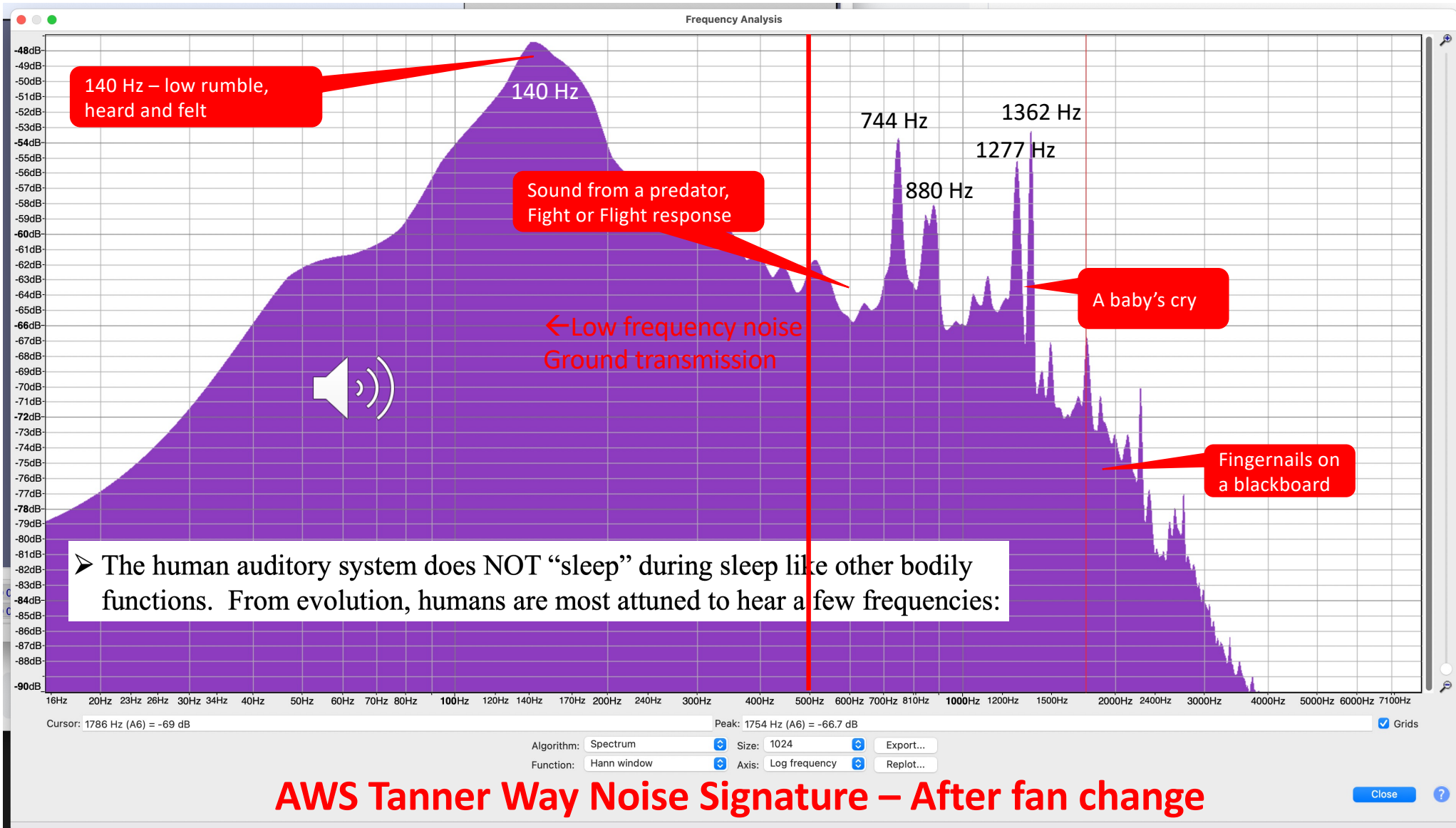


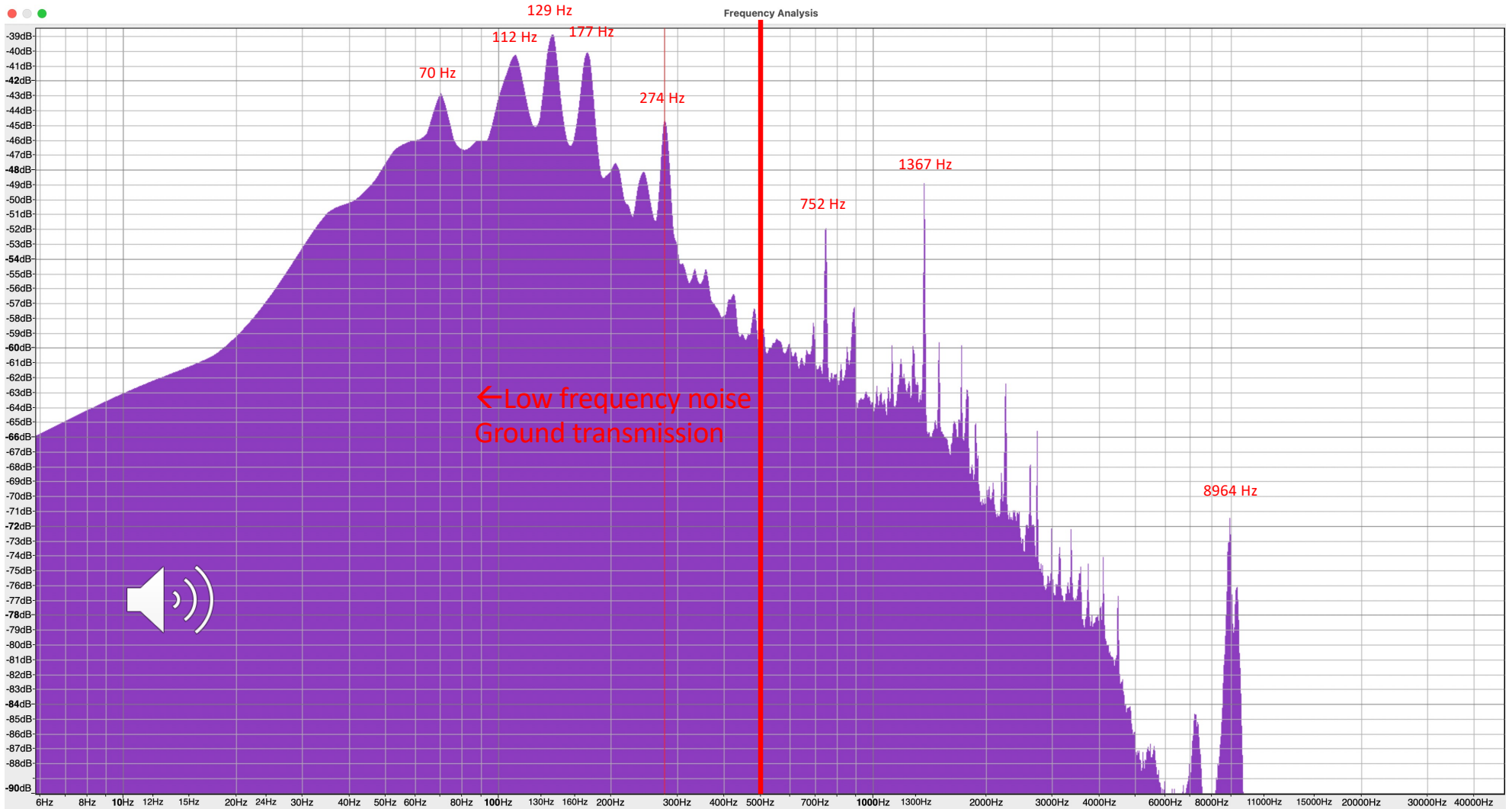
Great Oak Noise 25 Measurement Rolling Average

AWS Tanner Way
22 July 2022 - 18 Oct 2024

Over 1600 measurements as of 18 Oct 2024







AWS Tanner Way Noise Signature – After louver changes (10/20/24)

"Weekly readings stayed on the higher side even with the cooler weather. Noise coming through the house has gotten worse having to resort to white noise machines again. Besides the windows, I can hear it through the walls.

I've recorded more dbC readings as I feel that the louvers had made things worse as far as what's coming through the house. It's exhausting to resort to the old ways to escape the non-stop noise. I am starting to believe that maybe the louvers are producing more noise.

On 10/16 I took a second reading on the 3rd floor and maybe due to wind direction the levels were higher. When I closed the windows, I could clearly hear it through the walls. Even during the summer, it wasn't like this with higher decibels. It seems those louvers, being lower, are bombarding my side and maybe the other neighbors."

[Carlos Yanes, 18 Oct 2024](#)

"With my window open around 4-4:15 am I was hearing a sustained drone, not really sure when it started but got the meter out. Definitely not a plane and not as southwest oriented as I'd expect from the airport - more WSW or due west from us.

54.2 A and 67.0 C (!) - dbA peaked over 56 and C was over 70 at points.

Update 4:23am had a significant and noticeable drop back down to 47-49 dbA. That's a time to ask about. General insight, in the previous droning I couldn't hear Prince William Pkwy traffic over the droning. Now after 4:23am it's easy to tell when traffic is going by."

[Rob Pixley, 23 Oct 2024, 4:29 AM](#)

Great Oak Expectations

Proposed requirement for sustained noise, **combined** from **all nearby data center and substation sources**, as measured at the impacted property boundary

| Noise Level | Human Impact |
|-------------|--|
| <40 dB(A) | Quiet neighborhood, transient noises may exist w/o irritation |
| 40-45 dB(A) | Barely audible outside |
| 45-50 dB(A) | Audible outside, mildly intrusive to some people |
| 50-55 dB(A) | Moderately intrusive outside, may be audible inside (rooms facing noise source) |
| 55-60 dB(A) | Disturbing outside, audible in most rooms of the house (moderately intrusive) |
| 60-65 dB(A) | Uncomfortable outside, inside noise levels impact sleep, concentration, conversations (disturbing) |
| 65-70 dB(A) | Unbearable outside, home is untenable |

PWC NO Night

PWC NO Day

Current Levels
~51 dBA avg with
46-58 dB(A) range

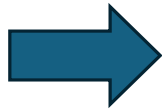




Noise Emitted [dB(A)]

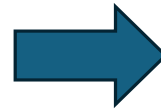


Convert to intensity
[watts/area]



Computing Holistic Noise

Attenuation
[distance ratio]



Calculate **NET**
intensity
[watts/area]

Noise Emitter #2

Noise Emitter #3

and so on

Noise Emitter #n



Noise Heard [dB(A)]



By John W. Lyver, IV, Ph.D.

5/20/2024

Prince William County & Manassas City
 Operating DC: **32 sites / 45 bldgs**
 Potential DC (est): **over 150 more bldgs**
 Potential DC: up to **55** planned new DC sites
 Public K-12 schools < 1 mile from DC: **13 & 8 more**
 Private K-12 schools < 1 mile from DC: **6 & 2 more**
 Police/Fire < 1 mile from DC: **3 & 3 more**
(Oper & Planned)

- Legend:**
- Operational DC Site (<275K sq ft, <500K sq ft of DC)
 - DC Site Under Development (<50, <100, <200 acres)
 - Newly Proposed DC
 - PWC/Manassas City Fire & Police Stations
 - PWC/Manassas City Public Schools
 - Private Schools
 - Manassas City Boundary (Approximate)
 - Dominion Power Transmission lines

Note: The following pages are expanded views of this map. The numbers/abbreviations are references to data center sites & facilities on the following pages.

J.Lyver's DC Mapping Report

Base map from

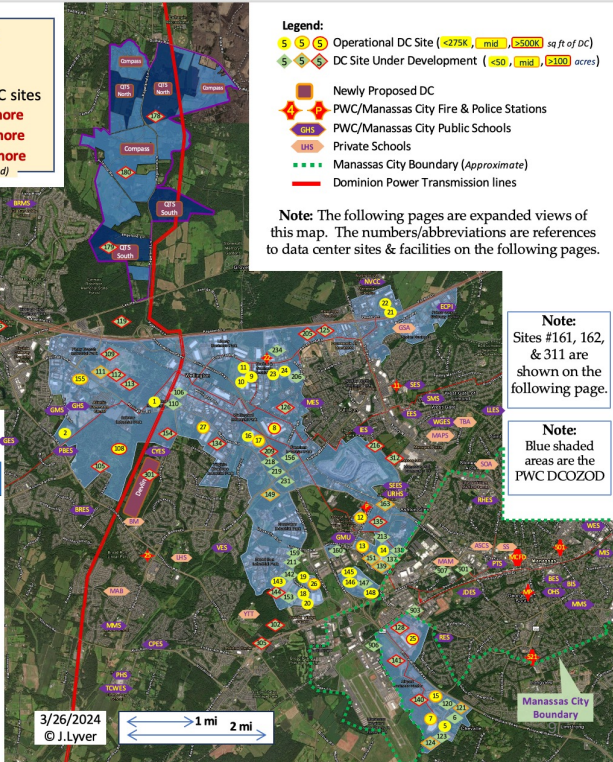
PW Digital Gateway Expanded Study Area
 An Interactive Informational Map provided by the Planning Office

Data compiled from
PWC Finance & Planning Offices
 (dated 1/24/2024 – with updates thru 3/10/2024)

Includes: Public Schools, Private Schools,
 Fire & Police Stations, and
 Colleges & Universities

© J.Lyver

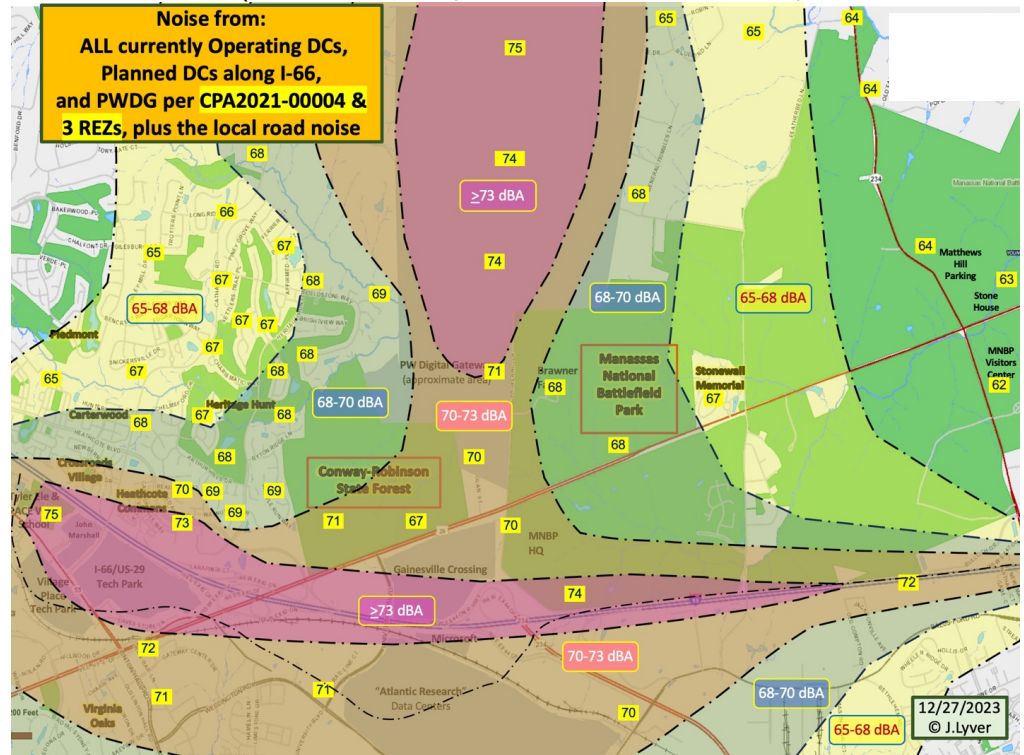
3/26/2024
 © J.Lyver



Note:
 Sites #161, 162,
 & 311 are
 shown on the
 following page.

Note:
 Blue shaded areas
 are the
 PWC DCOZOD

Choropleth of Noise prediction for Future DCs in Gainesville Area
(Interpretation and graphic done in MS PowerPoint)



By John W. Lyver, IV, Ph.D.

*Thank
you*



Media Commentary

SOURCE: Prince William Times, Peter Cary, Feb 27.2023, *Some cities suffering from data center noise turn to tough limits*

"Data center noise is unique in that it is not so much its loudness that is an irritant as its constancy."

Les Blomberg, director of the Noise Pollution Clearinghouse *"Blomberg noted that typical noise limits are focused on transient noise and not on the 24/7 drone that invades your house."* People say noise of 55 to 65 decibels (the range of Prince William's noise ordinance limit) is no louder than human conversation, he said, *"but it's like having a conversation with someone you don't want to have, all the time. That's the thing; there's no escaping it."*

"One solution could be to write an ordinance that penalizes the duration of noise. Alameda, California, regulates noise based not only on decibel level, but also its time length. The longer the noise continues, the quieter it must be. But Blomberg said such an ordinance requires a police officer to stay in place as long as an hour to measure noise duration. It makes sense, but it's not enforceable" he said."

The better solution, he [Blomberg] said – as in Chandler and Niagara Falls – is to require emitters of nonstop noise to be especially quiet. "It's not unreasonable to choose a night level of 45 decibels," Blomberg said, "and a daytime limit of 50".

"Writing ordinances to deal with data center noise is relatively new", said Blomberg. But he and Eric Zwerling, who runs the Rutgers University Noise Technical Assistance Center, said "it can be done"



Blasting damage

(example from 1 of several homes)

- Impact to foundations, patios, interior walls, and windows function
- Exterior dust required professional cleaning on many homes
- Met with EE Reed (site developer) and PWC Fire Marshall
- Homeowners instructed to file insurance claims and let both insurers work it out
- Could not prove when damage occurred, so I believe all were dismissed

Great Oak Noise Scatter & 25-Point AVG After Fan Retrofit - AWS Tanner Way

1 Aug 2023 - 7 Apr 2024

