Prince William County
Noise Ordinance Update

March 18, 2025

Board of County Supervisors Meeting

Photos borrowed from: https://historicprincewilliam.org/county-history/aerial-photo-survey/

Prince William County Noise Ordinance Update

AGENDA

- Background

- Peer Reviewed Communities
- Overview of Draft Updates
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  - Elements of sound
  - Technical
- Measurements Levels
  - A, C weighted & Octave Bands
  - Impulse, Intermittent & Continuous
  - Comparisons
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  - Actual measurements
- Additional Recommendations
  - Proposed Enforcement
  - Additional Processes
  - JLARC and County Staff Recommendations

Prince William County
Consultant Team

Ed Davidson, PG
Project Manager

Jenn Cinelli-Miller
Planner

David Nelson
Acoustical Engineer
Nelson Acoustics

JMT

Background

Why are we updating the County Noise Ordinance?

➢ The current decibel scale used in the County Noise Ordinance was created **over 30 years ago.**

➢ A-weighted scale doesn't effectively address the **low-frequency** noise generated by Data Centers and other large commercial facilities.

➢ Data Center development has grown exponentially over the past 10 years.

➢ **Noise is potentially produced 24 hours per day/7 days per week**.

➢ An example of noise created by cooling equipment:

    o Air pulled across fans which creates **low frequency noise and vibrations.**

    o Air is exhausted through fans on the top of the building which also generates noise.

➢ Tanner Way Data Center complex has significant rooftop equipment - 424 total exhaust fans.

Data Center noise is a 21st Century issue that is ever evolving due to high demand for technology.

Background, continued

Establishment of the Data Center Ordinance Advisory Group (DCOAG)

In 2023, Prince William County staff created the DCOAG:

➢ Comprised of citizen representatives and a member of the National Parks Conservation Association.

➢ Advises the County staff on regulatory changes proposed to address the impacts of data center development.

➢ Regulatory changes include the County Noise Ordinance (Chapter 14 of County Code), Zoning Ordinance and Design and Construction Standards Manual.

➢ The County brought in two consulting firms, JMT and Nelson Acoustics to assist with

- Recommending revisions to the County Ordinance,

- Provide recommendations for State level changes to address Legislative changes,

- Create a framework for noise testing and modeling.

Background, continued

JMT conducted extensive research of peer communities that have dealt with or are currently dealing with Data Center noise. This research included:

- Prince William County Noise Ordinance, Chapter 14 review
- State of Virginia Dillon Rule, State Code
- Online exploration of news articles, updated codes of peer communities,
- Court case reviews:
  1. VA Beach – Tanner v. Virginia Beach
  2. Warrenton, VA – Three court cases concerning the incoming Amazon Data Center filed by Citizens for Fauquier County,
  3. Williston, ND - Corey Seidel, et al. vs. Atlas Power Holdings (ND), LLC*
     *Could become a precedent setting case
- EPA Federal Noise Standards review,
- International communities.

JMT spoke with Planning Directors and planning staff in multiple locations to verify information and to receive updated documents. Most communities found updating their zoning ordinance over their noise ordinance had the most impact on mitigating noise from incoming data centers.

Peer Reviewed Communities, Ordinance & Zoning Changes

Chandler, AZ

➤ Maintain existing Ambient Levels

➤ Strong Zoning Requirements for incoming Data Centers

➤ Continued Monitoring of noise levels

Collier County, FL

➤ Divided noise ordinance into multiple sections

➤ Appropriate enforcement response to Noise – i.e. route Barking Dog to Animal control

➤ Updated Zoning Code
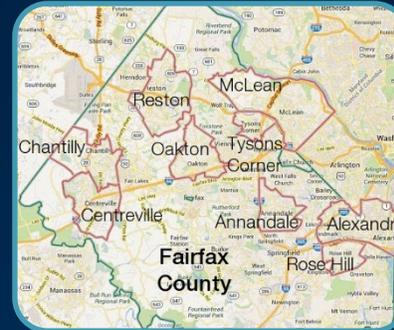
Fairfax County, VA

➤ Noise Ordinance applicability tables are very detailed and explain regulations

➤ Created a Department of Code Compliance

➤ Has exception list for emergencies, responding vehicles and alarms

Fauquier County, VA

➤ Developed a comprehensive Data Center Policy

➤ Addresses siting of incoming data centers

➤ Considers existing infrastructure and compatibility with the surrounding area

Peer Reviewed Communities, Ordinance Updates

City of Manassas, VA

A. Studies were conducted over two years to provide data for the Noise Ordinance update.

1. Measured maximum sound levels from the source.
2. Reduced the maximum sound levels for industrial districts.
3. Removed commercial and industrial cooling equipment from noise limit exemptions.

B. Maximum Sound Levels were reduced by 5 decibels based on the type of district for both day and night.

King George County, VA

A. Noise Ordinance update was completed in 2023.
➢ Clarified continuous versus impulse noise.
➢ Added dBC as a form of measurement for violations.

Peer Reviewed Communities Ordinance Updates, cont.

Loudon County

➤ Updated Data Center standards and locations and incorporated into their Comprehensive Plan and Zoning Ordinance.

Town of Warrenton, VA

➤ 2022 – Required Amazon Data Center to reduce their Octave Band-levels to reduce the lower frequency sound.

➤ Added a request to conduct a sound test a month after the facility came online.

The Town is currently updating their Zoning Ordinance:

https://www.warrentonzoningordinanceupdate.com/

➤ Summer of 2024 a survey and initial public outreach were conducted

➤ This two-year process will allow resident, business owners and staff to assess the current zoning regulations and update based on the needs of the community.

Proposed Administrative Updates

Proposed changes:

- Added State and Federal citations

- Added Definitions that align with updates.
  - Provides clarification for measurements.

- Divide the Noise Ordinance to reflect the different types of noise in the County:
  - **Excessive Sound in Residential Areas**
    - Nuisance noise such as barking dogs and loud music.
  - **Industrial, Construction and Commercial Noise**
    - Revised sound tables to capture lower frequency sound and pressure levels.

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Elements of Sound

Three elements to consider

Acoustics

o The process by which sound gets generated and travels from source to listener
o 100% physics
o Sound measurement

Hearing

o The process by which sound gets converted into nerve impulses in the inner ear
o The source of some phenomena like auditory threshold, frequency selectivity, sound masking
o   Some sound analysis

Listening

o The process by which nerve impulses get converted into subjective experience and assigned a meaning and/or value
o The source of focused attention, perceived loudness, annoyance
o Particular to listeners, no simple measurement can simulate this

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Proposed Technical Updates

Proposed major changes:

- Revised Permissible Limits to address:
  - Impulse noise
  - Intermittent noise
  - Constant or Continuous Noise
- Created more concise measurement levels
  - Add dBC
  - Provide Octave band sound levels

Photo borrowed from:
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Measurement Levels – Being updated

Distinction between A/C Weighted Scale

A

Low   High

C

Octave-band sound levels, continuous

31.5   63   125   250   500   1000   2000   4000   8000
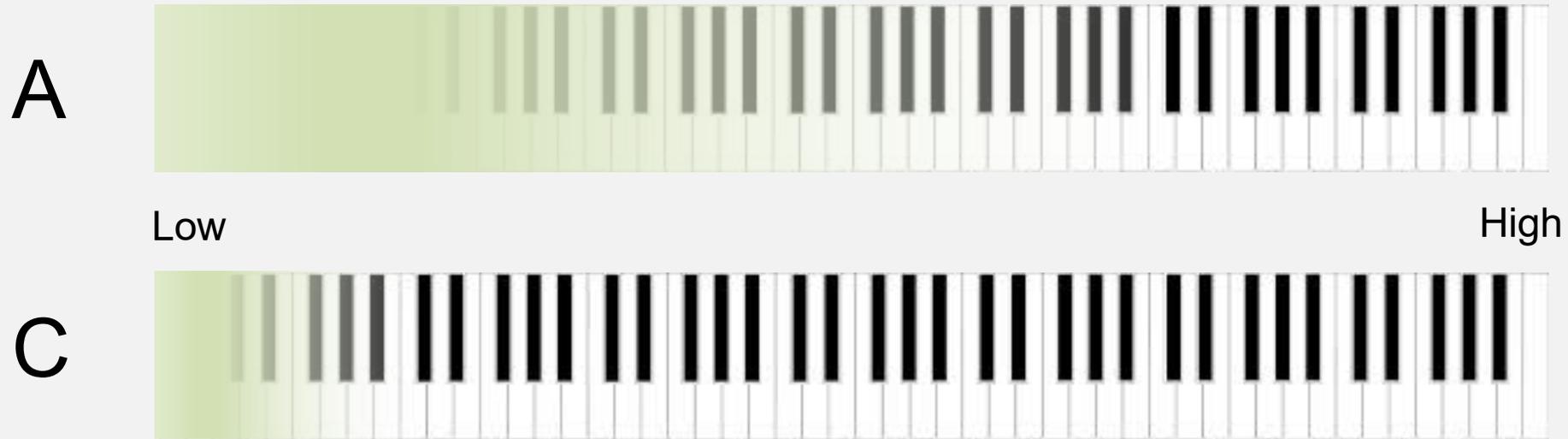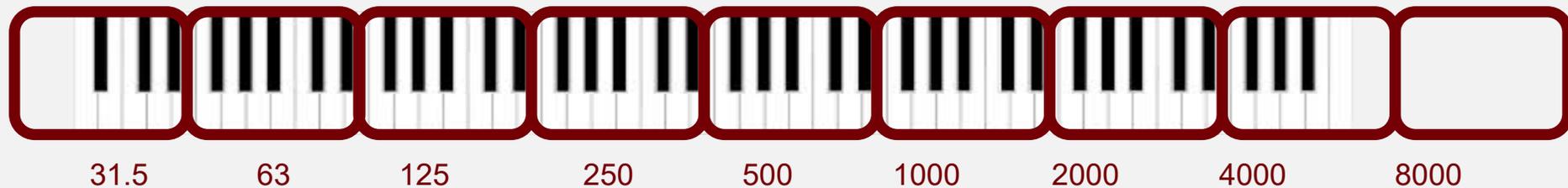
Draft Impulse Levels

Maximum Permissible Impulse Levels (Lmax)

Zoning District Classification	Maximum dBA Daytime	Maximum dBA Nighttime	Maximum dBC Daytime	Maximum dBC Nighttime
Residential	77	62	90	75

Draft Intermittent Levels

Maximum Permissible Equivalent Sound Pressure Levels (LEQ)

Zoning District Classification	Maximum dBA Daytime	Maximum dBA Nighttime	Maximum dBC Daytime	Maximum dBC Nighttime
Residential	52	47	65	60
Mixed Use District	62	57	70	65
Commercial	65	60	75	75
Industrial	79	72	80	80

Draft Continuous Measurement Levels

Octave-band sound levels, continuous
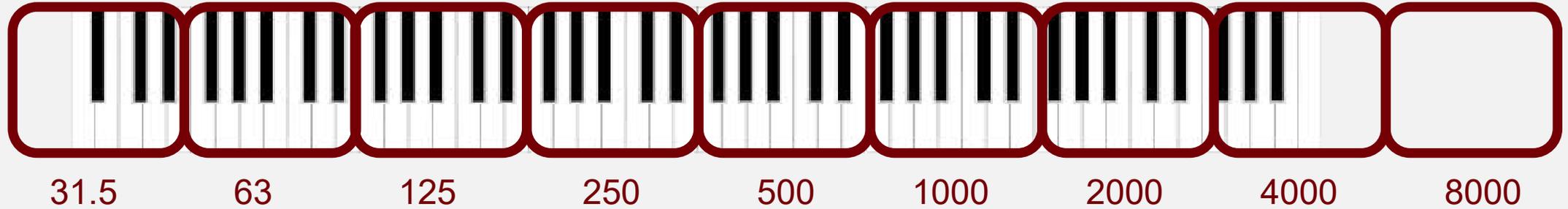
	31.5	63	125	250	500	1000	2000	4000	8000
Daytime:	65	60	55	50	45	41	38	36	35
Nighttime:	60	55	50	45	40	36	33	31	30

Daytime = 48 dBa/Nighttime = 43 dBa
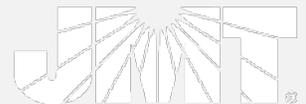
Measurement Level Comparisons

Comparison of Criteria

Day

Band	Proposed	Warrenton	Oregon
31.5	65	---	68
63	60	64	65
125	55	60	61
250	50	54	55
500	45	48	52
1000	41	42	49
2000	38	38	46
4000	36	34	43
8000	35	30	40
A_{max}	48	51	55
C_{max}	65	67	69

Night

Band	Proposed	Warrenton	Oregon
31.5	60	---	65
63	55	59	62
125	50	55	56
250	45	49	50
500	40	43	46
1000	36	37	43
2000	34	33	40
4000	32	29	37
8000	30	25	34
A_{max}	43	46	49
C_{max}	59	64	65

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Additive Noise Example
+3 Model with Resampling

Sample
Neighborhood

Ambient measurement is 40 dBA

Modeling reflects the rise in decibel
levels <u>by 9</u> with only three applications.

Data Center Bld 1
Emits 40 dBA
Adds 3 dBA

New Ambient = 43 dBA

Data Center Bld 2
Emits 43 dBA
Adds 3 dBA

New Ambient = 46 dBA

Data Center Bld 3
Emits 46 dBA
Adds 3 dBA

New Ambient = 49 dBA

General Observations

Background Levels

Residential

1. Great Oak – Tanner Way Data Center noise
   - ➢ Data Center strongly masked by traffic noise during visit
   - ➢ Most distinct at *greater* distance in the neighborhood
     - o Likely because of shielding due to roof parapets
     - o Low-frequency tones are present (90 Hz in particular)
     - o Most likely audible indoors

2. Hornbaker
   - ➢ Lots of traffic noise, kept pausing to remove aircraft
   - ➢ HF tone may be more noticeable on ground in line with louver openings
   - ➢ Possibly less impactful at neighboring apartments

3. Cloud HQ
   - ➢ Very difficult to pick out due to:
     - o Traffic, traveling roadways near and far
     - o Aircraft operations at Manassas Airport

Sound Measurements – Locations with No Data Centers

Red shading = non-compliance

Date	Time	Class	Location	LpA'eq		Lp,50 OBSPL								
				LpAeq	LpC,eq	31.5	63	125	250	500	1000	2000	4000	8000
10/9/24	Day	Residential	Kingsbrooke	52	65	66	54	50	44	41	38	33	27	19
11/5/24	Day	Residential	Montclair Subdivision	44	57	49	49	45	39	33	36	34	32	28
11/5/24	Day	Residential	Cloverdale	39	54	51	50	47	40	32	35	35	32	31
11/5/24	Day	Residential	Rollingwood	47	62	55	57	55	47	37	36	32	31	26
11/27/24	Day	Residential	Nokesville	37	53	52	50	40	35	33	31	21	14	13
1/30/25	Day	Residential	Heritage Hunt Community	40	55	54	50	43	39	36	33	27	22	21
1/30/25	Day	Residential	Amberleigh Station	36	59	59	54	46	34	30	27	23	21	17
10/9/24	Day	Education	Yung Elementary	46	63	61	56	54	46	42	40	33	26	23
11/5/24	Day	Education	Beville MS	48	64	57	55	47	38	30	35	34	26	16
11/5/24	Day	Education	Montclair Library	43	59	56	55	49	45	39	36	33	24	17
10/9/24	Day	Park	Rollins Ford	47	62	56	56	56	49	39	38	31	23	14
11/5/24	Day	Park	Locust Shade	52	63	60	58	54	49	49	48	42	36	30
1/30/25	Day	Park	Manassas Battlefield/Brawner Farms	43	62	60	56	49	41	39	37	25	21	18
1/30/25	Day	Park	Long Park	51	62	57	58	52	46	49	47	38	21	16
			Day Criterion	52	65	65	60	55	50	45	41	38	36	35

Residential "Background" Day

Effective 48 dBA day

Vehicle traffic and school bus noise contributed to the "false positives"

Sound Measurements Locations No Data Centers

Red shading = non-compliance

Date	Time	Class	Location	LpA'eq	LpC,eq	31.5	63	125	250	500	1000	2000	4000	8000
										Lp,50 OBSPL				
10/23/24	Night	Residential	Kingsbrooke	35	49	47	46	41	36	34	29	28	32	23
11/12/24	Night	Residential	Kingsbrooke	45	58	45	43	41	39	35	38	42	44	38
11/29/24	Night	Residential	Nokesville	32	48	45	44	40	33	27	26	15	12	12
10/23/24	Night	Education	Yung Elementary	40	55	51	50	47	39	39	34	29	28	17
10/23/24	Night	Park	Rollins Ford	39	60	58	54	49	43	36	31	27	25	18
			Night Criterion	47	60	60	55	50	45	40	36	33	31	30

Residential "Background" Night

Effective 43 dBA night

Insect noise contributed to the "false positives"

Data Centers Day

Date	Time	Class	Location	LpA'eq	LpC,eq	31.5	63	125	250	500	1000	2000	4000	8000
									Lp,50 OBSPL					
10/9/24	Day	Data Center	Tanner Way	54	66	64	61	56	51	51	51	42	31	24
10/9/24	Day	Data Center	Wellington Glen	59	73	64	65	59	53	51	53	49	41	30
10/9/24	Day	Data Center	Hornbaker 1	60	71	69	64	63	59	59	57	51	44	29
10/9/24	Day	Data Center	Hornbaker 2	62	75	66	64	64	56	56	54	50	43	29
1/30/25	Day	DC/Traffic	Hornbaker 1	56	68	65	62	59	52	52	51	48	37	22
1/30/25	Day	Traffic/DC	Cloud HQ	52	64	60	59	56	51	46	43	33	25	20
			Day Criterion	52	65	65	60	55	50	45	41	38	36	35

Red shading = non-compliance

Data Centers Night

Date	Time	Class	Location	LpA'eq	LpC,eq	Lp,50 OBSPL 31.5	63	125	250	500	1000	2000	4000	8000
10/23/24	03:23	Data Center	Tanner Way Powerline Easement	47	61	58	57	54	49	45	40	37	41	19
1/30/25	05:35	DC/Traffic	Tanner Way Powerline Easement	52	65	61	60	56	50	50	48	37	22	17
1/30/25	04:24	DC/Traffic	10200 Winged Elm	48	61	57	58	51	47	45	43	32	23	20
1/30/25	04:44	DC/Traffic	10224 Winged Elm	52	63	59	58	56	48	46	44	33	20	17
1/30/25	05:06	DC/Traffic	10087 Post Oak Terrace	49	60	54	56	50	46	45	45	35	20	17
10/23/24	04:47	Data Center	Wellington Glen	56	66	60	61	53	49	50	49	44	35	26
11/12/24	05:40	Data Center	Wellington Glen	54	70	59	60	55	49	42	44	43	34	22
1/30/25	06:13	Data Center	Wellington Glen A	60	72	72	67	60	54	54	56	52	39	26
1/30/25	06:21	Data Center	Wellington Glen B	62	73	70	66	61	58	55	57	53	42	30
10/23/24	05:06	Data Center	Hornbaker 1	55	70	66	64	63	56	54	51	48	44	40
10/23/24	05:09	Data Center	Hornbaker 2	52	67	65	63	61	54	50	48	46	43	38
			Night Criterion	47	60	60	55	50	45	40	36	33	31	30

Red shading = non-compliance

Using Ordinance Levels

Updating measurements will:

- Provide moderate protection against noise sources incompatible with residential living,

- Provide additional protection against continuous noise sources,

- Be more restrictive at night,

- Minimize "false positives."

Updating measurements won't:

- Achieve complete "silence." Sources may still be audible,

- Once sound is heard by human ear, it is more easily detected - even at lower levels.

JLARC Report/Recommendations

Land Use Regulations

➢ Classify data centers as industrial use,

➢ Revise zoning maps to prevent by-right data centers <u>next to residential</u>,

➢ Ensure minimum requirements for data center developments are sufficient (setbacks, building heights),

➢ Designate optimal locations for data center development (away from residential, close to transmission),

➢ Require pre-development sound modeling and revise ordinances to better prevent and address noise conflicts.

These items will be referred to Mosley Architects for Future Board Consideration

# JLARC Report/Recommendations, cont.

Land Use Regulations

➢ Initiate changes to zoning ordinances that can address incoming data centers and other industrial uses for best practices.

➢ Review locations of zones currently allowing data centers by right, and re-assess the overlay district, while considering proximity to existing and proposed residential areas, parks, historical landmarks, etc. when siting data centers.

➢ Consider data center applications within the context of current and planned development in the same area to minimize aggregate effects.

➢ Ensure incoming industrial development includes necessary setbacks, building heights, and has access to necessary infrastructure.

➢ Require pre-development sound modeling to better prevent and address noise conflicts.

These items will be referred to Mosley Architects for Future Board Consideration

JMT

Enforcement Updates

1. **Excessive Sound in Residential Areas:** will continue to be enforced by Prince William County Police and prosecuted by the Commonwealth Attorney's Office

2. **Industrial, Construction and Commercial Noise:** proposed to be enforced by PWC Police in conjunction with PWC Public Works and a third-party noise consultant (prosecuted by the Commonwealth Attorney's Office

- Purchasing 10 new level one noise meters = $50K

- Staff training in the use of the meters = $2,000

- Rutgers Noise Technical Assistance Center (RNTAC) online Certification per registration =$1120 ($730/$390)

- Third-party noise consultant estimated at $3,000+/- per violation case.

- Cost to obtain ambient noise readings for a residential community by a consultant = $30,000

- Time to respond to noise violations needs to be addressed.

Additional Process Needed

1. Update Zoning Ordinance
   a. Develop a potential impact checklist for incoming Data Centers/Industrial complexes and add a noise emission model.
   b. Consider re-assessing the Data Center Overlay District.
   c. Change zoning and building codes to require updated design practices for data center/industrial use.
2. Modify citations, fees and how penalties are assessed – Legislation may be required.
3. Compute sound pressure levels at representative locations (e.g., perimeter above noise barriers or parapets) that correspond to compliant levels at noise-sensitive areas in the community
4. Require monitoring and enforce sound pressure levels at the monitor locations, including the use of perimeter monitoring.
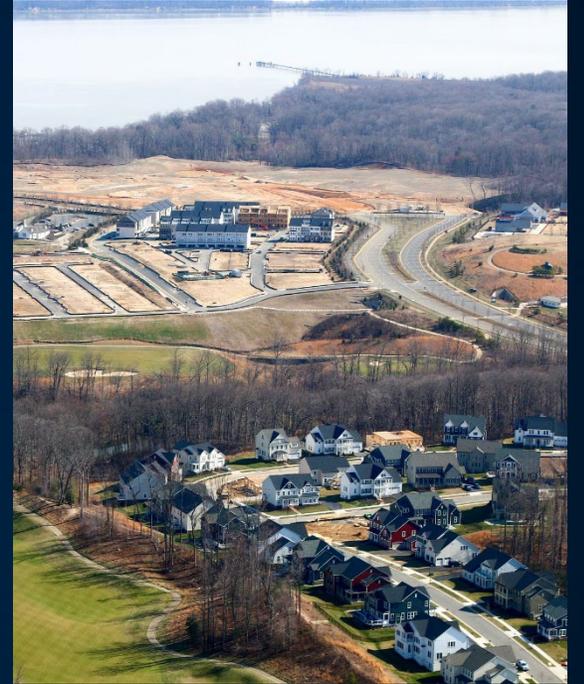
These items may require legal review, need Legislative or other types of State level action.

Prince William County Staff: Request for Board direction

1. Does the Board support the proposed re-write of the Noise Ordinance to include a change in the noise scale?

2. Does the Board support the establishment of the three categories for noise enforcement?
   - Impulse noise
   - Intermittent noise
   - Continuous noise

3. Does the Board support the requirement for projects meeting the low frequency noise emission criteria (TBD) to submit noise testing and noise modeling to ensure compliance with the Noise Ordinance as a condition to operate in the County?

4. Does the Board support staff developing a budget for the Board's consideration for the enforcement of the continuous noise standards?

Questions