

Riverbend Wind

September 29 – Fremont Township Planning Commission Meeting for
Proposed Ordinance Changes



Topics of Discussion

1. General Project Update
2. Buildable Area Demonstration
3. Wind Turbines and Health: Summary
4. Safety Concerns
5. Shadow Flicker
6. Sound



Project Update/Economic Benefits

- Project Update
 - 2 year avian and bat migration complete
 - Wetland surveys ongoing
 - SLUP Permit Submitted
 - Project proceeded through to final stage of MISO Interconnection Cycle
- Project targets Construction to Start Q2 of 2023, Commercial Operation by Q2 2025
- Benefits
 - Project expects to generate min of \$54M in tax revenue
 - Community Benefits Agreement ongoing, expects to generate \$2M over 40 years
 - Good Neighbor Agreements in the works for current non-participants to be part of the project
 - Project has donated more than \$30K locally over the last 2 months



Physical Setback Requirements

Setback	Existing Fremont WECS Ordinance	Fremont Planning Commission Proposed Change	Change Affords Greater Protection to Public Health and Safety?
Public Road Setbacks	1,320 ft from public road but not less than 150% (984 ft) of turbine height or 500 ft	Greater of 1,000 ft or 2x turbine height (1,312 ft)	Either the existing or change to ordinance afford protection against ice throw, blade failure and tower collapse. No greater setback is required.
Inhabited Structures on Participating Parcels	1,320 ft from an inhabited structure	Greater of 1,000 ft or 2x turbine height (1,312 ft)	Either the existing or change to ordinance afford protection against ice throw, blade failure and tower collapse. No greater setback is required.
Non-Participating Property Lines	150% (984 ft) of total height but not less than 500ft	Greater of 1,320 ft or 3 times turbine height (1,968 ft)	No. Typical setback to non-participating property lines is 1.1x height of turbine. The proposed change is excessive and does not afford any additional safety protection.

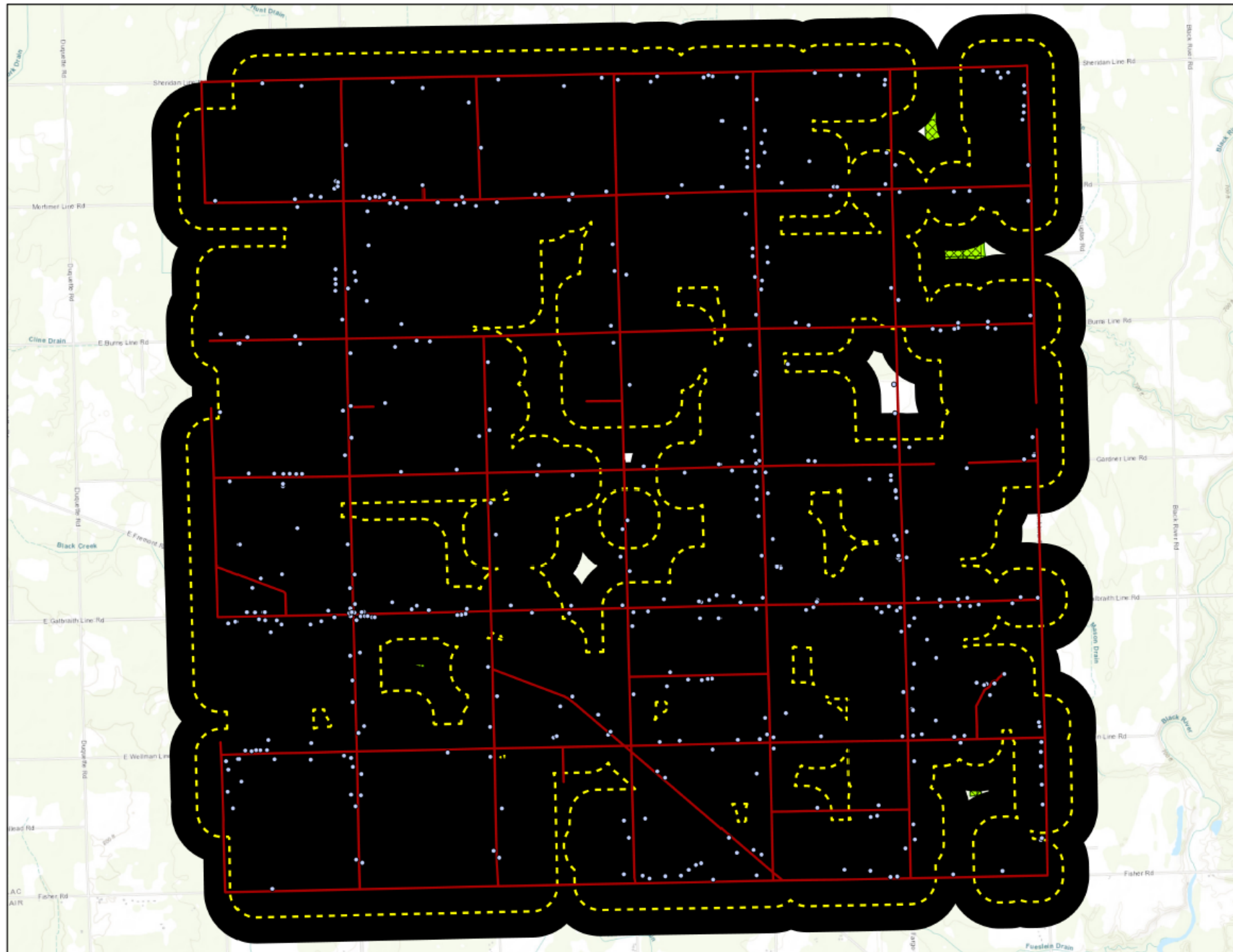
- The existing ordinance setback requirements of wind turbines to public roads, inhabited structures on participating properties and to non-participating property lines are reasonable, aligned with other Township, County and State standards and ensure the protection of public safety against the very rare events of ice throw, blade failure and tower collapse.
- The increase setback to non-participating property lines is excessive and does not afford greater protection. The existing ordinance distance of 150% of turbine height will ensure that in the unlikely event of a physical failure that it would be restricted to the participating parcel.



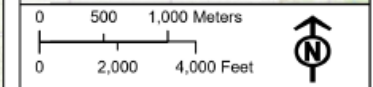
Buildable Area Demonstration (Current vs. Proposed Setbacks)

- Map on Page 6 – New Proposed Dwelling and Road Setback does not reduce current buildable area (shown in green)
- Map on Page 7 – New Proposed Non-Participating property line setback (shown in black) reduces current buildable area to green area with black hatching, making the setback exclusionary to wind development





- ### Legend
- Inhabited Structures
 - Roads
 - Buildable Area - Current Setbacks
 - Buildable Area - Proposed Setbacks
 - Current Property Line Setback - 985 ft
 - Proposed Property Line Setback - 1969 ft



RIVERBEND WIND

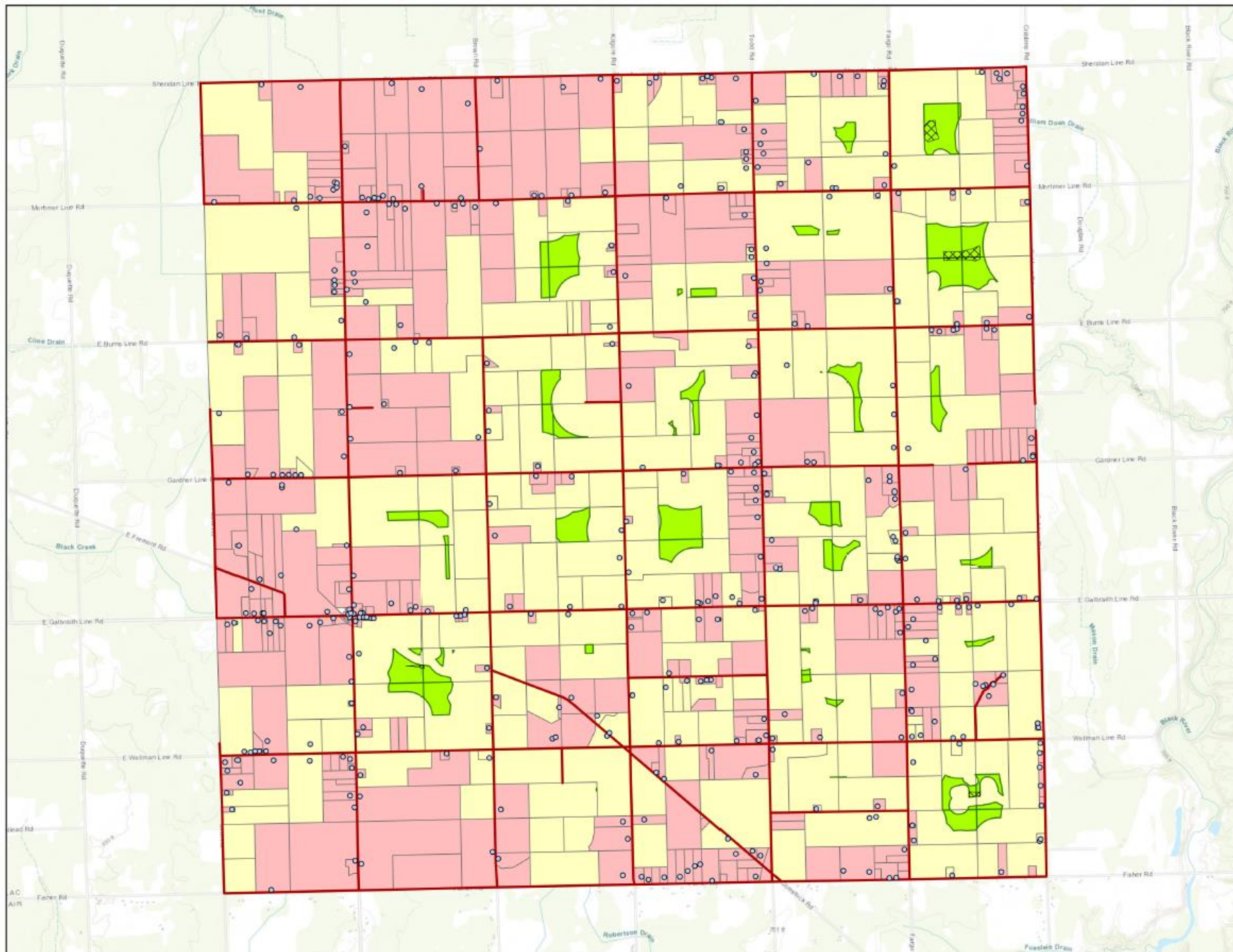
TITLE
Fremont Property Line Setback Comparison (V162 HH119)

DATUM/PROJECTION: NAD83/UTM 17N	SCALE: 1:40,500
DRAWN BY: C TAM	DATE: SEPT 26, 2022
DRAWING No. RIV - 111	REVISION No. 4

Buildable Area Demonstration (Proposed Ordinance Layer Map)

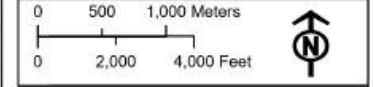
- Map on Page 9 – Shows the current buildable area (shown in green), participation status, and proposed buildable area if new setbacks implement (green area with black hatching)
- Map on Page 10 – First layer applied, setback for the new proposed road and dwelling setback (orange hatching). Current buildable remains intact.
- Map on Page 11 – Second layer applied, setback for new proposed non-participating setback requirement (shown in black). Dissolves current buildable area, only the new buildable area remains, project becomes exclusionary to Wind (i.e. no wind development possible – green area with black hatching).
- Map on Page 12 – overlays all setback layers for new physical proposed setbacks





Legend

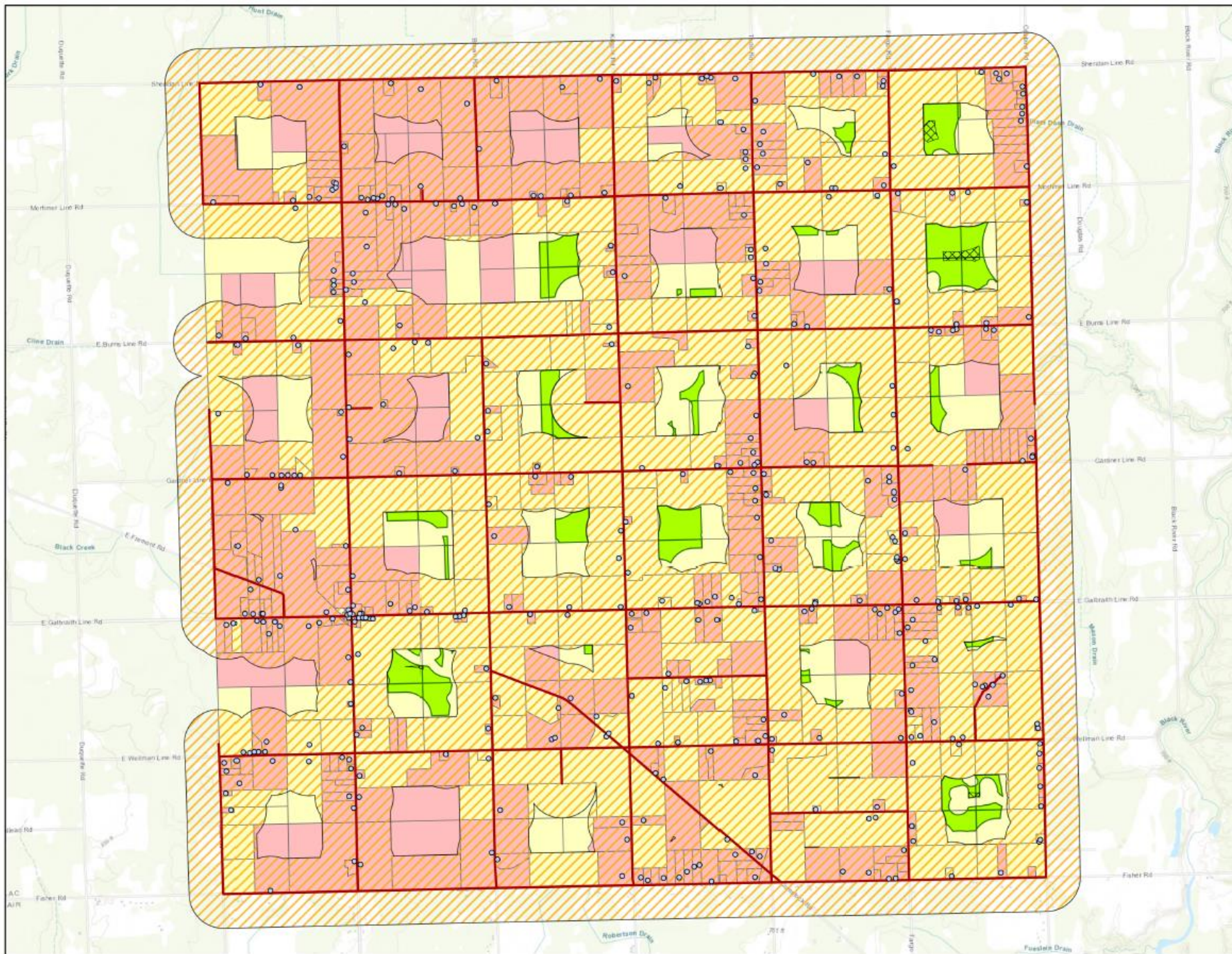
- Inhabited Structures
- Roads
- Buildable Area - Current Setbacks
- Buildable Area - Proposed Setbacks
- Participating Parcels
- Non-Participating Parcels



RIVERBEND WIND

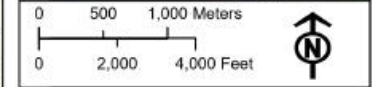
TITLE
**Fremont Proposed Setbacks
 Buildable Area
 (V162 HH119)**

DATUM/PROJECTION: NAD83/UTM 17N	SCALE: 1:40,500
DRAWN BY: C TAM	DATE: SEPT 26, 2022
DRAWING No. RIV - 111	REVISION No. 5



Legend

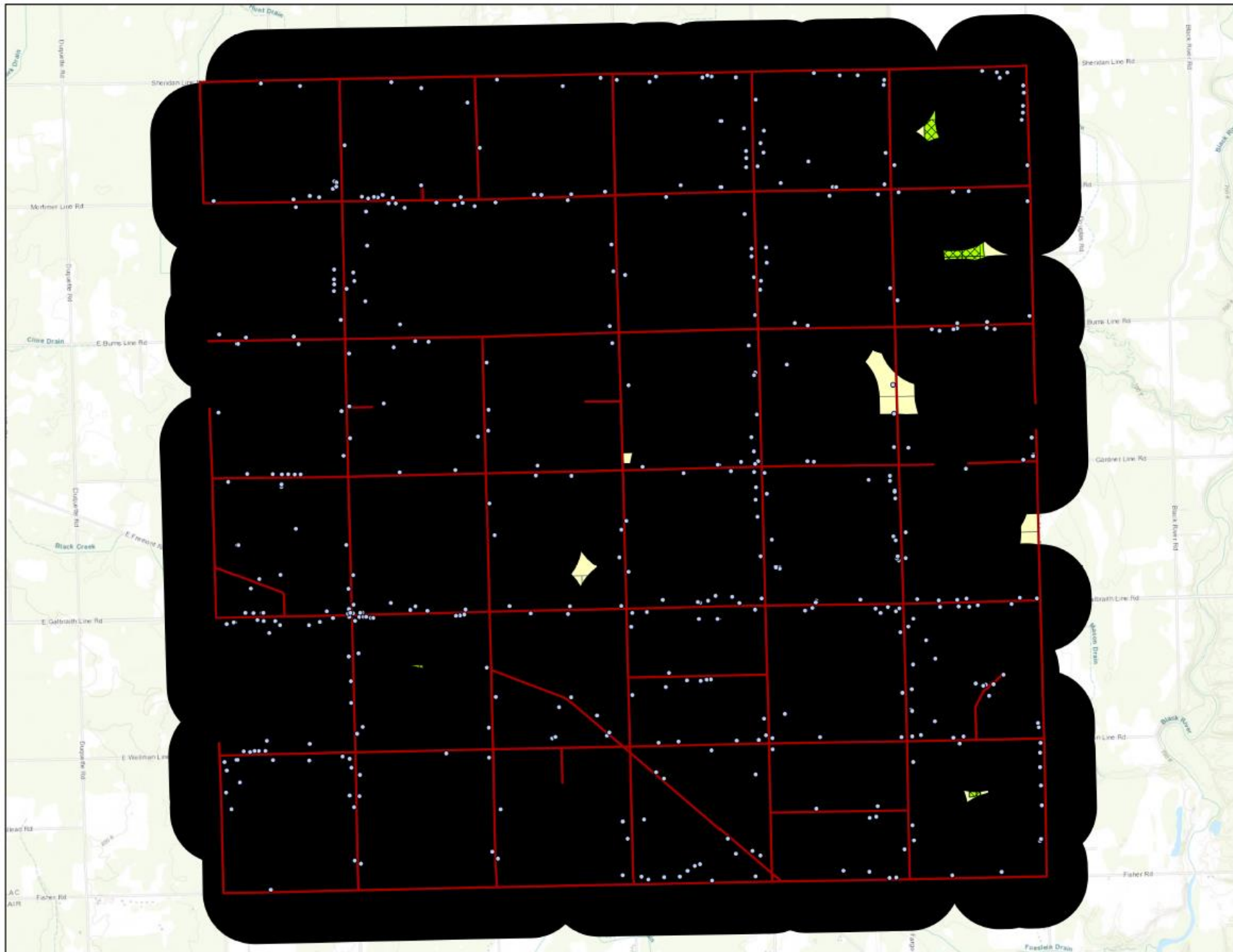
- c Inhabited Structures
- Roads
- Buildable Area - Current Setbacks
- ▨ Buildable Area - Proposed Setbacks
- ▧ Proposed Dwelling + Road Setback - 1312 ft
- Participating Parcels
- Non-Participating Parcels



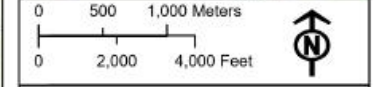
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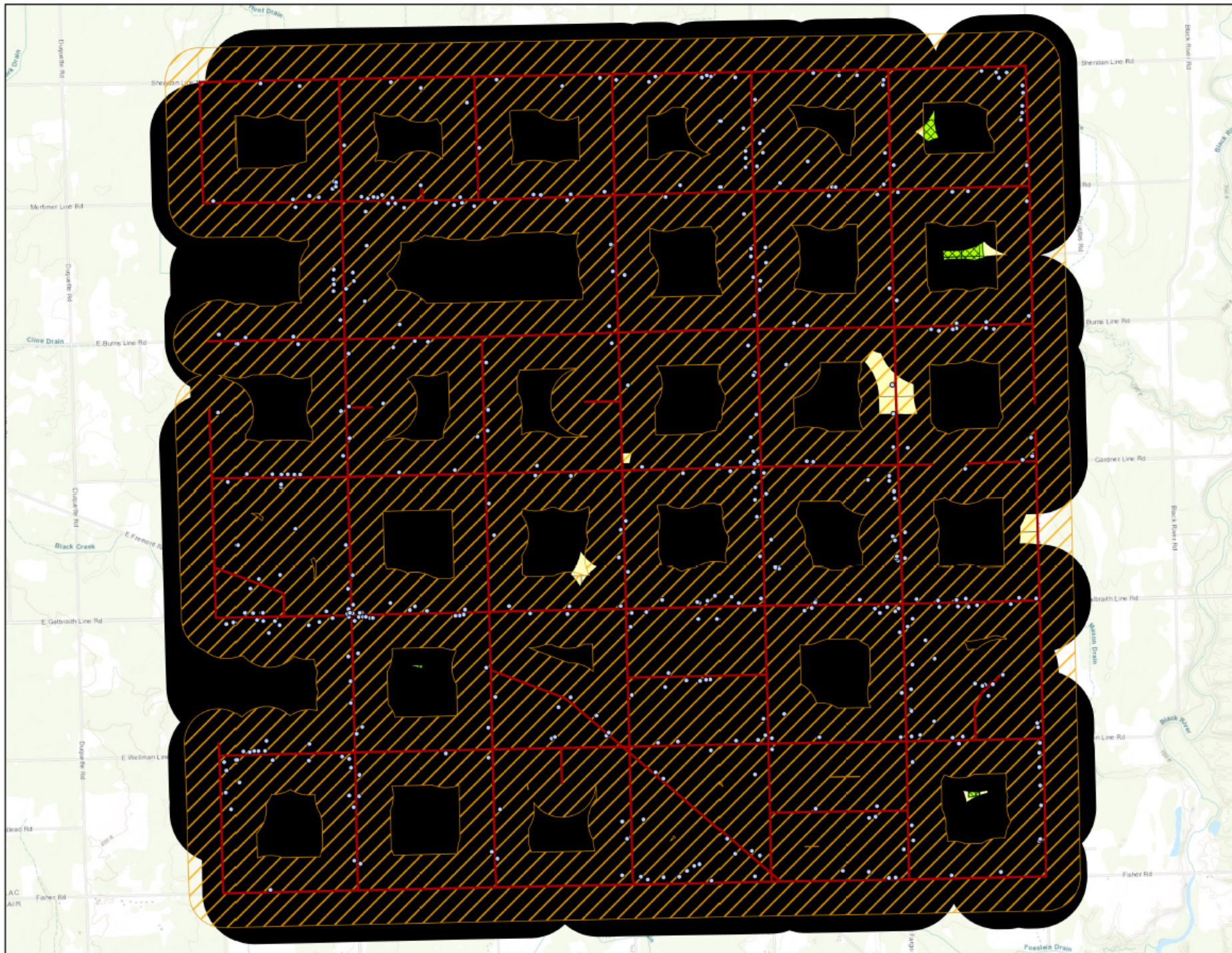
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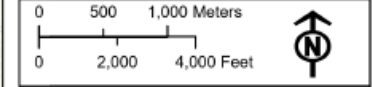
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Sound and Shadow Flicker Requirements

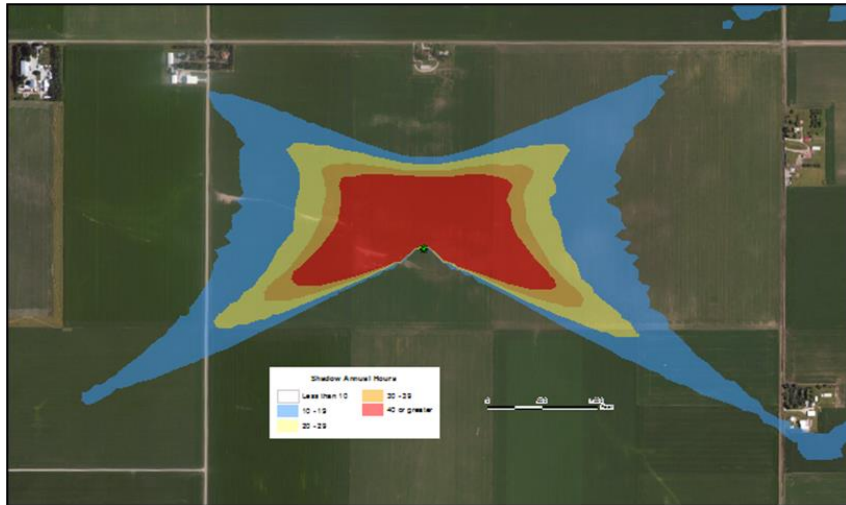
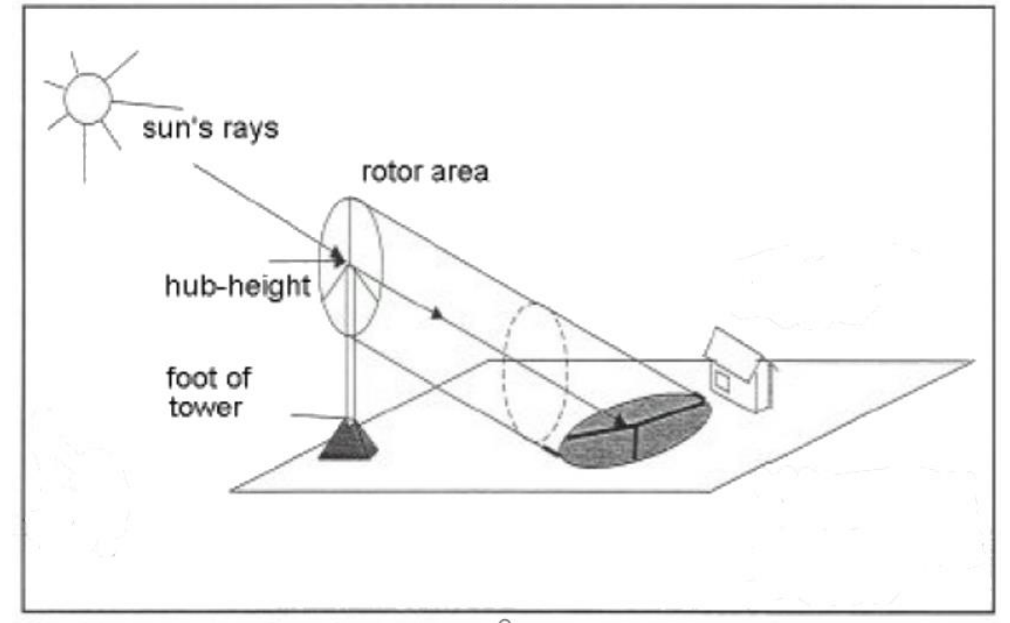
Setback	Existing Fremont WECS Ordinance	Fremont Planning Commission Proposed Change	Change Affords Greater Protection to Public Health and Safety?
Sound	forty-five (45) decibels on the DBA scale as measured at the nearest property line of a non-Participating Property or road.	forty-five (45) decibels <u>L_{max}</u> on the DBA scale as measured at the nearest property line of a non-Participating Property or road.	No. The use of L _{max} is not representative of the sound experience of humans and is not used in the health studies or other jurisdictions to set sound limits. Leq is the appropriate metric to ensure protection of health.
	No requirement	Post-Construction Sound Survey. The Applicant shall complete a post-construction sound survey within six (6) months of the commencement of the operation of the project.	Yes. This requirement is common in the United States to ensure that the Applicant demonstrates compliance with sound requirements during the operation of the project.
Shadow Flicker	Shadow flicker on a habitable structure on Non-Participating Property shall not exceed thirty (30) hours per year.	Under no circumstances shall a WECS or Testing Facility produce any shadow flicker beyond the property boundaries of the participating property where the WECS or Testing Facility is located.	No. There is no health impact from exposure to shadow flicker. The 30 hour limit at a home is consistent with numerous other state level requirements.

- **Sound:** Scientific study shows that the existing ordinance of 45 dBA at the property line is very conservative and will ensure the protection of residents health, sleep and quality of life. However, it should be measured as Leq, which is standard practice for sound measurements of wind turbine noise and appropriate for measuring the human experience.
- **Shadow Flicker:** No more than 30 hr shadow flicker at homes is almost an universal standard across the United States. There are no potential health impacts from exposure to Shadow Flicker. It occurs only in buildings and outdoors it is a shadow event on the ground and should not be restricted at the property line to protect health.



Shadow Flicker Occurrence

- Shadow flicker only occurs:
 - During daytime when skies are not cloudy or overcast
 - Wind is of sufficient speed for operation
 - Sun is aligned with the turbine blades and the “receptor” (i.e., home or residence).

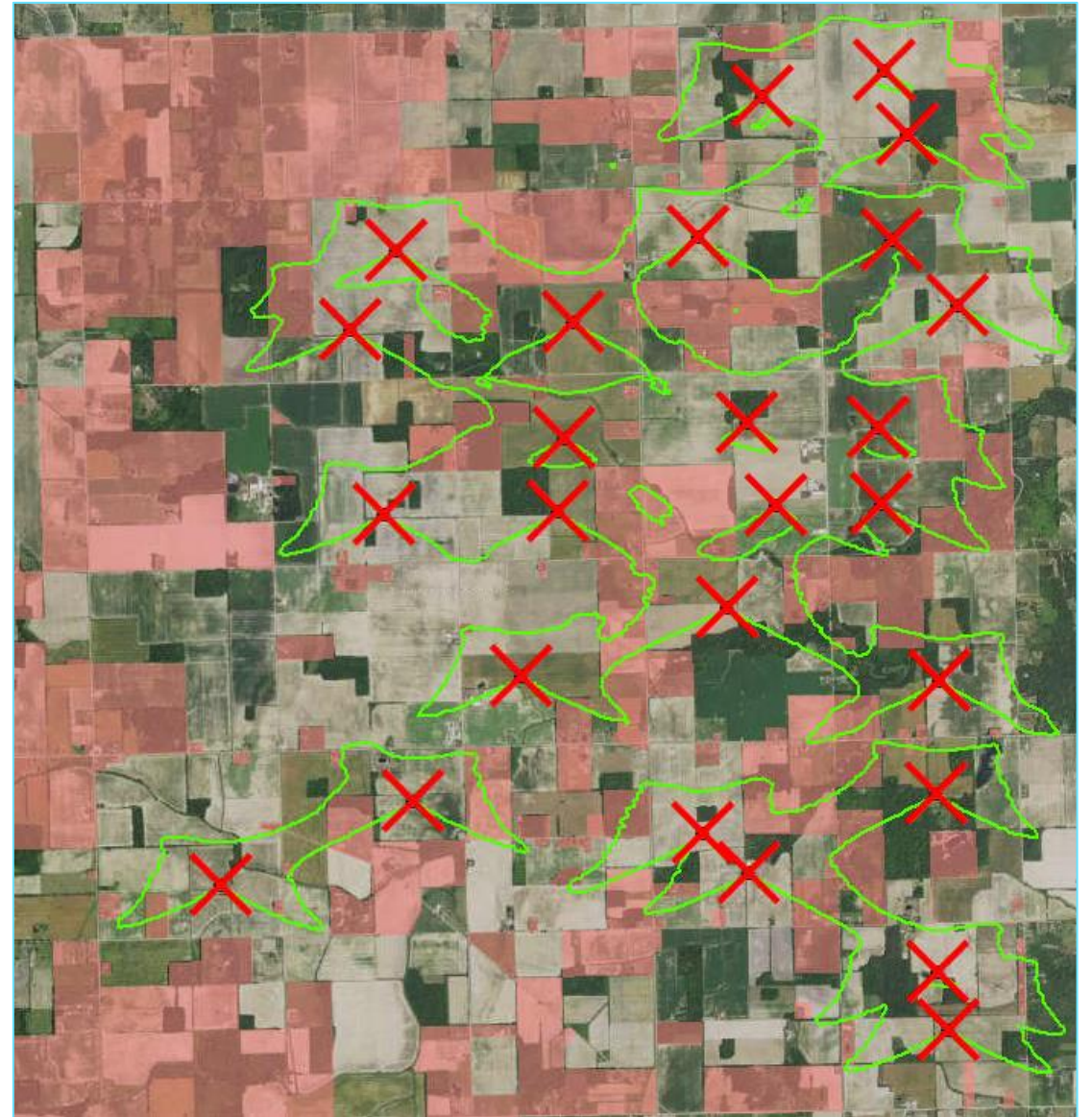


- Diminished by distance and may be blocked by vegetation and other buildings
- Duration will be shorter when blades are not perpendicular to receptor.
- Generally limited to early morning and late afternoons/evenings when the sun is low in the sky



Shadow Flicker Requirement

- 30-hour annual hours is most accepted shadow flicker requirement in US regulations/ordinances
- Limiting shadow flicker to the hosting property would allow for no wind projects to be approved and constructed in Fremont Township (Red X shows all WEC's removed)



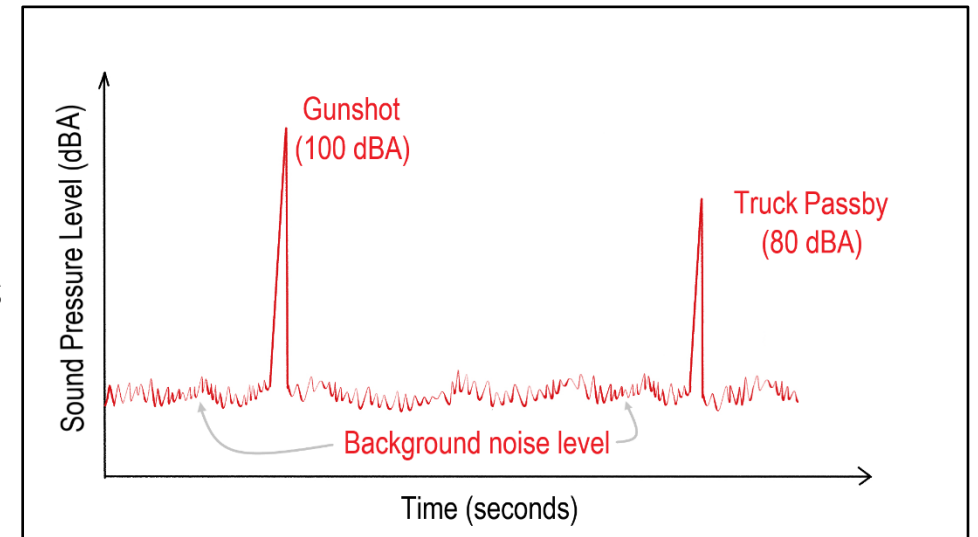
Sound Requirements

- 45 dBA is typically applied at a residence. The Township applies it at the property line which is more restrictive.
- The noise level metric that is OVERWHELMINGLY used by agencies that regulate noise in the U.S., including wind farms, is a metric called the equivalent level, noted as L_{eq} . This is typically applied over a 10-minute or one-hour interval.
- The L_{eq} is what the 45 dBA limit is based on and is the metric recommended by relevant acoustical standards.
- Using the L_{max} as proposed, will only serve to make the measurement of wind farm noise compliance a difficult if not impossible task.
- Post Construction sound survey by a third-party consultant reasonable expectation to ensure compliance



Sound Leq Appropriate Ordinance Standard

- L_{max} finds it's use when predicting or measuring noise from sources that have very large variation in their noise emissions, such as a gun shot.
- L_{max} is not used by any state or local governments in the U.S. where responsible wind farm development is ongoing or being considered.
- It has one purpose: to complicate or stymie responsible wind farm development.
- The L_{eq} is the appropriate metric and I urge the Township to adopt it on a 10-minute or one-hour average basis.



Wind Turbines and Health: Summary

- Measurements of low-frequency sound, infrasound, and amplitude-modulated sound show that infrasound is emitted by wind turbines. The levels of infrasound at customary distances to homes are typically well below audibility thresholds.
- Based on over 100 research studies reviewed, there is no clear or consistent association between wind turbine noise and any reported disease or other indicator of harm to human health.
- Components of wind turbine sound, including infrasound and low frequency sound, have not been shown to present unique health risks to people living near wind turbines.
- Annoyance associated with living near wind turbines is a complex phenomenon related to personal factors. Noise from turbines plays a minor role in comparison with other factors in leading people to report annoyance in the context of wind turbines.
- Shadow flicker is not a risk to health, including photo epileptic



Wind Turbines and Health: Summary

- The main health risk potentially associated with living near wind turbines is noise and its impact on sleep. At the sound levels required in the current ordinance, and based on a review of numerous studies, it is not expected that there would be any adverse effect on sleep.
- Based on my professional experience and a review of the current ordinance regarding the placement of wind turbines, no changes are necessary to the current ordinance to further protect public health.
- The Leq measurement is the most appropriate metric to assess sound levels from the turbines and is used universally in the study of potential health effect living near wind turbines.
- Sound and shadow flicker limits in the current ordinance are similar to other counties and states where wind turbines have been in operation for decades.
- Low frequency noise and infrasound from wind turbines are well below a level that would harm local residents.
- The current ordinance would ensure that a properly sited wind project would not adversely impact the health of local residents.



Thank you

