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Mr. Herbert R. Lemaster, PE
Tetra Tech
424 Lewis Hargett Circle, Ste 110
Lexington, KY 40503

RE: Cooperative Two Solar Project – Property Value Impact Study

Mr. Lemaster

The purpose of this letter is to address question from the Kentucky Siting Board related to the market impact analysis that I completed on this project on March 4, 2024 for Tetra Tech.

I was asked about my opinions on the following studies:

- i. “An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations”

I address this study in the original appraisal on Page 20. The short answer is this study concludes on no impact to a positive impact. The conclusion of the researchers is shown on Page 23 indicated that “Results from our survey of residential home assessors show that the majority of respondents believe that proximity to a solar installation has either no impact or a positive impact on home values.”

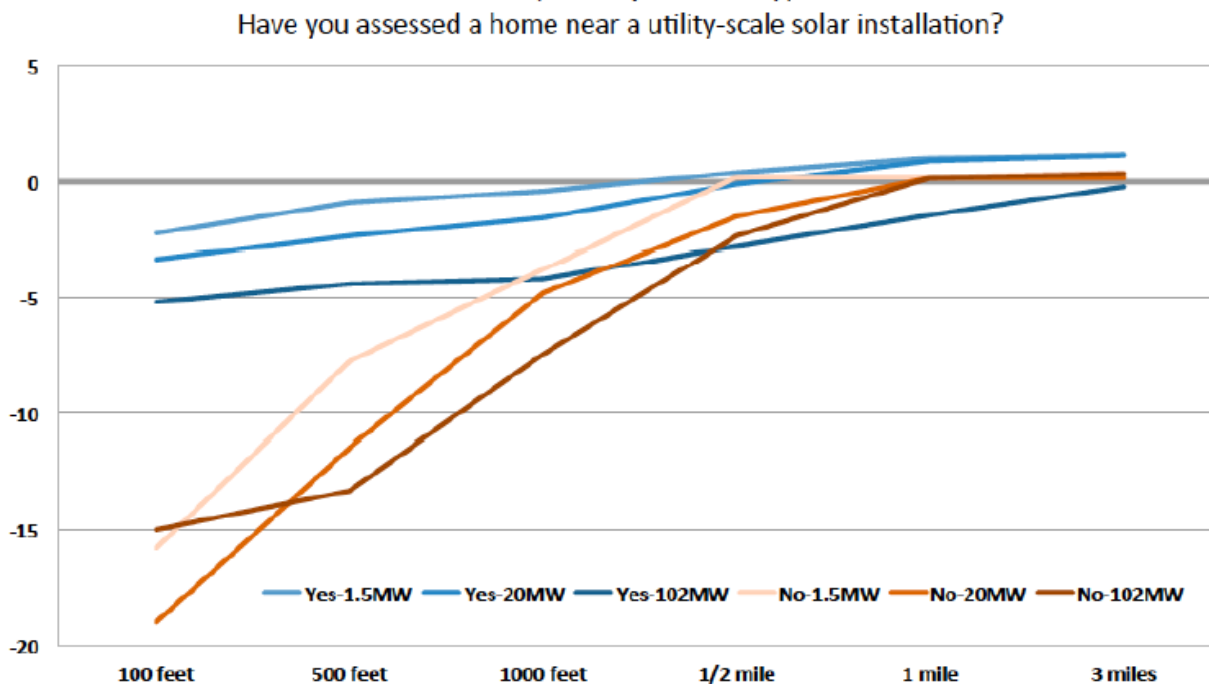
My response is copied from the original report below:

This study considers solar farms from two angles. First it looks at where solar farms are being located and concludes that they are being located primarily in low density residential areas where there are fewer homes than in urban or suburban areas.

The second part is more applicable in that they conducted a survey of appraisers/assessors on their opinions of the possible impacts of proximity to a solar farm. They consider the question in terms of size of the adjoining solar farm and how close the adjoining home is to the solar farm. I am very familiar with this part of the study as I was interviewed by the researchers multiple times as they were developing this. One very important question that they ask within the survey is very illustrative. They asked if the appraiser being surveyed had ever appraised a property next to a solar farm. There is a very noticeable divide in the answers provided by appraisers who have experience appraising property next to a solar farm versus appraisers who self-identify as having no experience or knowledge related to that use.

On Page 16 of that study they have a chart showing the responses from appraisers related to proximity to a facility and size of the facility, but they separate the answers as shown below with appraisers with experience in appraising properties next to a solar farm shown in blue and those inexperienced shown in brown. Even within 100 feet of a 102 MW facility the response from experienced appraisers were -5% at most on impact. While inexperienced appraisers came up with significantly higher impacts. This chart clearly shows that an uninformed response widely diverges from the sales data available on this subject.

Chart B.2 - Estimates of Property Value Impacts (%) by Size of Facility, Distance, & Respondent Type



Furthermore, the question cited above does not consider any mitigating factors such as landscaping buffers or screens which would presumably reduce the minor impacts noted by experienced appraisers on this subject.

The conclusion of the researchers is shown on Page 23 indicated that “Results from our survey of residential home assessors show that the majority of respondents believe that proximity to a solar installation has either no impact or a positive impact on home values.”

This analysis supports the conclusion of this report that the data supports no impact on adjoining property values. The only impact suggested by this study is -5% if a home was within 100 feet of a 100 MW solar farm with little to no landscaping screening. The proposed project has a landscaping screening, is much further setback than 100 feet from adjoining homes, and is less than 100 MW.

ii. “Essays on Economic and Health Effects of Land Use Externalities”

This is an unpublished document as part of the PhD process. I spoke with Laura Taylor with Georgia Institute of Technology who was chair of the dissertation committee who indicated that in 2019 the residential analysis was incomplete and that the data and methodology was still being refined. This was a rough draft that was still being refined and that the analytical approach uses, data selection was still being changed at that time. She anticipated that it would be 2020 before they would have anything ready for a peer review presentation of the data.

They still have not published anything on residential homes based on this research and last I spoke with them it was still in flux. Nino Abashidze did publish her analysis on agricultural land values in proximity to solar farms in NC, which found a mild positive impact on ag land that adjoined the same powerline that the solar farm was on. See “Utility-

Scale Solar Farms and Agricultural Land Values” by Nino Abashidze dated October 29, 2020.

This study was completed by Nino Abashidze as Post-Doctoral Research Associate of Health Economics and Analytics Lab (HEAL), School of Economics, Georgia Institute of Technology. This research was started at North Carolina State University and analyzes properties near 451 utility-scale ground-mount solar installations in NC that generate at least 1 MW of electric power. A total of 1,676 land sales within 5-miles of solar farms were considered in the analysis.

This analysis concludes on Page 21 of the study “Although there are no direct effects of solar farms on nearby agricultural land values, we do find evidence that suggests construction of a solar farm may create a small, positive, option -value for land owners that is capitalized into land prices. Specifically, after construction of a nearby solar farm, we find that agricultural land that is also located near transmission infrastructure may increase modestly in value.”

This study supports a finding of no impact on adjoining agricultural property values and in some cases could support a modest increase in value.

iii. “Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island”

I address this study in the original appraisal on Page 21. The short answer is this study concludes on an impact in suburban/urban areas and no impact in rural areas. My response from the original report is included below.

The University of Rhode Island published a study entitled **Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island** on September 29, 2020 with lead researchers being Vasundhara Gaur and Corey Lang. I have read that study and interviewed Mr. Corey Lang related to that study. This study is often cited by opponents of solar farms but the findings of that study have some very specific caveats according to the report itself as well as Mr. Lang from the interview.

While that study does state in the Abstract that they found depreciation of homes within 1-mile of a solar farm, that impact is limited to non-rural locations. On Pages 16-18 of that study under Section 5.3 Heterogeneity in treatment effect they indicate that the impact that they found was limited to non-rural locations with the impact in rural locations effectively being zero. For the study they defined “rural” as a municipality/township with less than 850 population per square mile.

They further tested the robustness of that finding and even in areas up to 2,000 population per square mile they found no statistically significant data to suggest a negative impact. They have not specifically defined a point at which they found negative impacts to begin, as the sensitivity study stopped checking at the 2,000-population per square mile.

Where they did find negative impacts was in high population density areas that was largely a factor of running the study in Massachusetts and Rhode Island which the study specifically cites as being the 2nd and 3rd most population dense states in the USA. Mr. Lang in conversation as well as in recorded presentations has indicated that the impact in these heavily populated areas may reflect a loss in value due to the scarce greenery in those areas and not specifically related to the solar farm itself. In other words, any development of that site might have a similar impact on property value.

Based on this study I have checked the population for the Lexington-Fayette Northeast Division of Fayette County, which has a population of 59,630 population for 2023 based on HomeTownLocator using Census Data and a total area of 78.05 square miles. This indicates a population density of 764 people per square mile which puts this well below the threshold indicated by the Rhode Island Study.

I therefore conclude that the Rhode Island Study supports the indication of no impact on adjoining properties for the proposed solar farm project.

Lexington-Fayette Northeast Division Data & Demographics (As of July 1, 2023)

POPULATION		HOUSING	
Total Population	59,630 (100%)	Total HU (Housing Units)	26,822 (100%)
Population in Households	59,326 (99.5%)	Owner Occupied HU	15,110 (56.3%)
Population in Families	44,606 (74.8%)	Renter Occupied HU	9,541 (35.6%)
Population in Group Quarters ¹	304 (0.5%)	Vacant Housing Units	2,171 (8.1%)
Population Density	764	Median Home Value	\$302,914
Diversity Index ²	61	Average Home Value	\$334,720
		Housing Affordability Index ³	99

INCOME		HOUSEHOLDS	
Median Household Income	\$74,496	Total Households	24,651
Average Household Income	\$107,592	Average Household Size	2.4100000000
% of Income for Mortgage ⁴	24%	Family Households	14,459
Per Capita Income	\$44,488	Average Family Size	3
Wealth Index ⁵	100		

iv. “Wind turbines, solar farms and house prices”

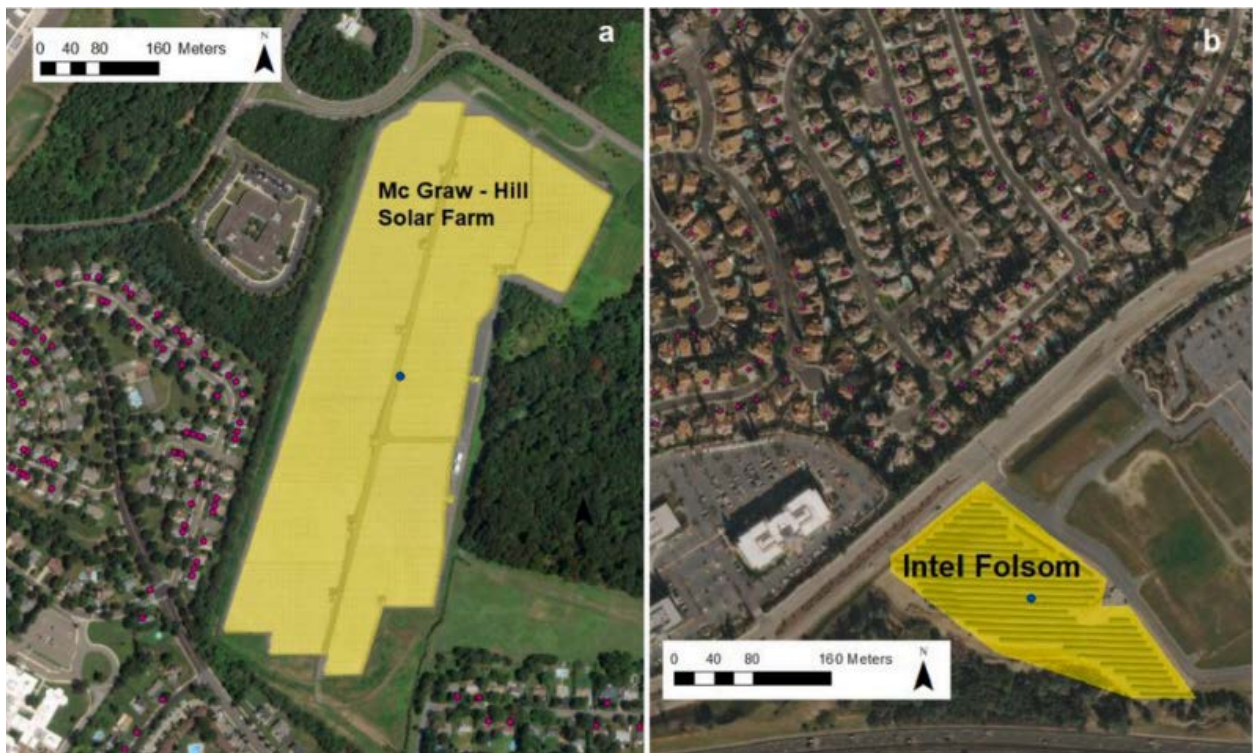
I have seen this study referenced before but since it is based on data in the Netherlands I have not given this any consideration.

v. “Shedding light on large-scale solar impacts:...”

I address this study in the original appraisal on Pages 24-29. The short answer is this study found no impact in some states and some impact in some states. They blend this to 1.5% impact within 0.5 miles and has a sliding scale as you get closer. This study did not consider landscaping screening or proximity to other potential negative uses in the area. Those statistical impacts indicate a mild correlation of data but not causation. More importantly, real estate prices have typical market imperfection and a 1.5% impact is not something that an appraiser could differentiate in the market as typical appraisals show values within +/-5%. For example, if a home sold for \$300,000 it would not be uncommon for an appraisal to show comps that have been adjusted to \$285,000 to \$315,000 – especially in rural areas where data is more sparse.

See the comments in my full response copied below.

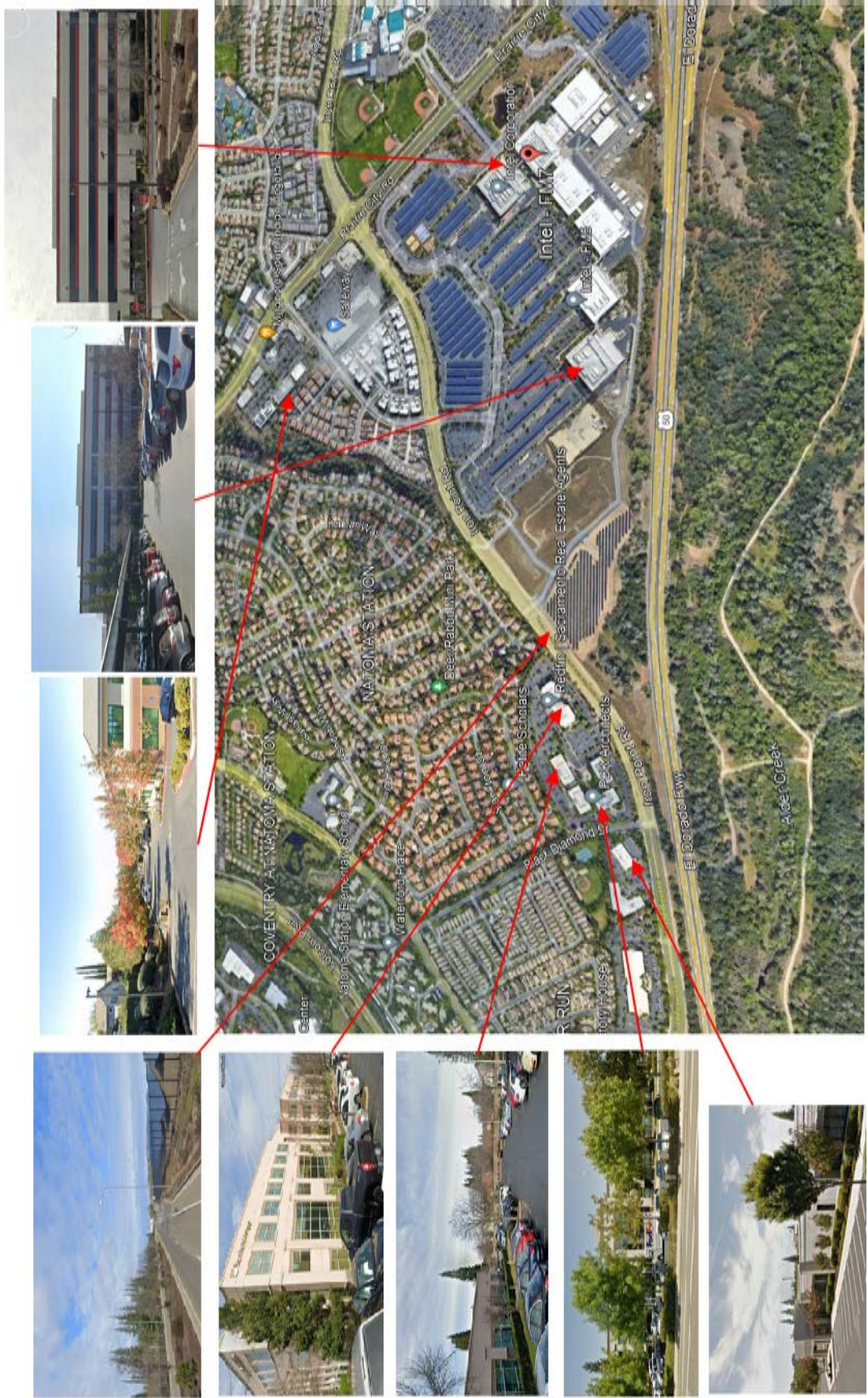
This study was completed by researchers including Salma Elmallah, Ben Hoen, K. Sydney Fujita, Dana Robson, and Eric Brunner. This analysis considers home sales before and after solar farms were installed within a 1-mile radius and compared them to home sales before and after the solar farms at a 2-4-mile radius. The conclusion found a 1.5% impact within 0.5 mile of a solar farm as compared to homes 2-4 miles from solar farms. This is the largest study of this kind on solar and addresses a number of issues, but also does not address a number of items that could potentially skew these results. First of all, the study found no impact in the three states with the most solar farm activity and only found impacts in smaller sets of data. The data does not in any way discuss actual visibility of solar farms or address existing vegetation screens. This lack of addressing this is highlighted by the fact that they suggest in the abstract that vegetative shading may be needed to address possible impacts. Another notable issue is the fact that they do not address other possible impacts within the radii being considered. This lack of consideration is well illustrated within the study on Figure A.1 where they show satellite images of McGraw Hill Solar Farm in NJ and Intel Folsom in CA. The Folsom image clearly shows large highways separating the solar farm from nearby housing, but with tower office buildings located closer to the housing being considered. In no place do they address the presence of these towers that essentially block those homes from the solar farm in some places. An excerpt of Fig. A.1. is shown below.



For each of these locations, I have panned out a little further on Google Earth to show the areas illustrated to more accurately reflect the general area. For the McGraw Hill Solar Farm you can see there is a large distribution warehouse to the west along with a large offices and other industrial uses. Further to the west is a large/older apartment complex (Princeton Arms). To the east there are more large industrial buildings. However, it is even more notable that 1.67 miles away to the west is Cranbury Golf Club. Given how this

analysis was set up, these homes around the industrial buildings are being compared to homes within this country club to help establish impacts from the solar farm. Even considering the idea that each set is compared to itself before and after the solar farm, it is not a reasonable supposition that homes in each area would appreciate at the same rates even if no solar farm was included. Furthermore the site where the solar farm is located and all of the surrounding uses not improved with residential housing to the south is zoned Research Office (RO) which allows for: manufacturing, preparation, processing or fabrication of products, with all activities and product storage taking place within a completely enclosed building, scientific or research laboratories, warehousing, computer centers, pharmaceutical operations, office buildings, industrial office parks among others. Homes adjoining such a district would likely have impacts and influences not seen in areas zoned and surrounded by zoning strictly for residential uses.





On the Intel Folsom map I have shown the images of two of the Intel Campus buildings, but there are roughly 8 such buildings on that site with additional solar panels installed in the parking lot as shown in that image. I included two photos that show the nearby housing having clear and close views of adjoining office parking lots. This illustrates that the homes in that 0.5-mile radius are significantly more impacted by the adjoining office buildings than a solar farm located distantly that are not within the viewshed of those homes. Also, this solar farm is located on land adjoining the Intel Campus on a tract that is zoned M-1 PD, which is a Light Industrial/Manufacturing zoning. Nearby homes. Furthermore, the street view at the solar farm shows not only the divided four-lane highway that separates the office buildings and homes from the solar farm, but also shows that there is no landscaping buffer at this location. All of these factors are ignored by this study. Below is another image of the Folsom Solar at the corner of Iron Point Road and Intel West Driveway which shows just how close and how unscreened this project is.



Compare that image from the McGraw Hill Street view facing south from County Rte 571. There is a distant view and much of the project is hidden by a mix of berms and landscaping. The analysis makes no distinction between these projects.



The third issue with this study is that it identifies impacts following development in areas where they note that “more adverse home price impacts might be found where LSPVPS (large-scale photovoltaic project) displace green space (consistent with results that show higher property values near green space.” The problem with this statement is that it assumes that the greenspace is somehow guaranteed in these areas, when in fact, they could just as readily be developed as a residential subdivision and have the same impacts. They have made no effort to differentiate loss of greenspace through other development purposes such as schools, subdivisions, or other uses versus the impact of solar farms. In other words, they may have simply identified the impact of all forms of development on property value. This would in fact be consistent with the comments in the Rhode Island study where the researchers noted that the loss of greenspace in the highly urban areas was likely due to the loss of greenspace in particular and not due to the addition of solar panels.

Despite these three shortcomings in the analysis – the lack of differentiating landscape screening, the lack of consideration of other uses within the area that could be impacting property values, and the lack of consideration of alternative development impacts – the study still only found impacts between 0 and 5% with a conclusion of 1.5% within a 0.5-mile radius. As discussed later in this report, real estate is an imperfect market and real estate transactions typically sell for much wider variability than 5% even where there are no external factors operating on property value.

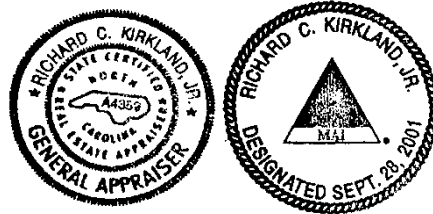
I therefore conclude that the minor impacts noted in this study support a finding of no impact on property value. Most appraisals show a variation between the highest and lowest comparable sale that is substantially greater than 1.5% and this measured impact for all its flaws would just be lost in the static of normal real estate transactions.

vi. “The disamenity impact of solar farms: a hedonic analysis”

I have seen this study referenced before but since it is based on data in England and Wales I have not given this any consideration.

If you have any further questions please call me any time.

Sincerely,

Richard C. Kirkland, Jr., MAI
Kirkland Appraisals, LLC

Surrounding Uses

#	MAP ID	Owner	GIS Data		Adjoin		Distance (ft)	Assessed
			Acres	Present Use	Acres	Parcels	Home/Panel	Value
1	10175	Simpson	0.09	Residential	0.01%	5.26%	N/A	N/A
2	6907	Ratliff	6.85	Residential	0.75%	5.26%	695	\$115,000
3	7282	Summers	23.64	Agri/Res	2.59%	5.26%	140	\$448,250
4	24	Caudill	153.95	Agricultural	16.88%	5.26%	N/A	\$929,000
5	3262	Baldwin	154.00	Agri/Res	16.88%	5.26%	165	\$1,049,500
6	8690	Hinton	189.00	Agri/Res	20.72%	5.26%	140	\$941,000
7	Unknown	Unknown	11.20	Residential	1.23%	5.26%	N/A	N/A
8	4874	Rediker	24.86	Agricultural	2.73%	5.26%	N/A	\$130,000
9	1582	Rediker	26.55	Agri/Res	2.91%	5.26%	1525	\$349,750
10	7171	Crafton	35.62	Agri/Res	3.91%	5.26%	1020	\$232,500
11	9971	Tyree	83.00	Agricultural	9.10%	5.26%	N/A	\$417,000
12	9003	Glenn	1.79	Residential	0.20%	5.26%	210	\$10,750
13	9359	Crafton	64.00	Agricultural	7.02%	5.26%	N/A	\$322,000
14	9076	Key LLC	95.79	Agricultural	10.50%	5.26%	N/A	\$1,623,500
15	7240	SAV LLC	24.03	Commercial	2.63%	5.26%	N/A	\$515,000
16	1284	Barnhill	5.00	Residential	0.55%	5.26%	360	\$104,000
17	6502	Johns	2.00	Residential	0.22%	5.26%	510	\$86,500
18	9197	Johns	0.76	Residential	0.08%	5.26%	400	\$80,000
19	8762	Webb	10.00	Residential	1.10%	5.26%	550	\$105,000
Total			912.128		100.00%	100.00%	520	

N/A means there is no adjoining home to which I can measure.