Wakulla Springs Alliance

"Protecting and restoring water quality, spring flow and ecological health of Wakulla Spring"

February 24, 2022

Mr. David Byrne
Assistant General Manager
City of Tallahassee Electric & Gas Utility
System Integrated Planning

Dear David:

We are writing to ask your help in persuading Origis Services (and/or KKR) to undertake a serious assessment of the pros and cons of deploying sheep grazing in lieu of large-scale herbicide treatment to manage vegetation at the two solar farms at the Tallahassee Airport. As detailed below, our efforts to promote this have been rebuffed. We believe that as lessor of the land upon which the solar farms sit and purchaser of the power generated, the City of Tallahassee has a responsibility for assuring that the operation will not cause ground water pollution that could impair private drinking water wells or the health of the Wakulla Spring and River ecosystem.

The environmental assessments prepared by the FAA for the two solar farms[1,2] did not address the potential for ground water contamination from herbicide use at the facilities. The reviews conducted by the city's Aquifer Protection Program only evaluated extant conditions on the sites, i.e. the presence of unused wells, geotechnical borings, and regulated substances/waste.[3,4] Furthermore, the language of the city's leases with FL Solar 1 LLC and FL Solar 4 LLC is ambiguous concerning whether or not herbicide treatment is an allowable use of hazardous materials on the properties.[5]

As detailed below, the facilities are situated over an area of the Floridan Aquifer that is designated as vulnerable to ground water contamination and evidence suggests that contaminants introduced at this location would flow south to Wakulla Spring. Several private residences that use ground water for drinking are situated down-gradient, just south of Solar Farm 1. Calculations of potential ground water loading of Oust, one of

the herbicides applied by Origis Services in 2021, indicate that it is plausible for concentrations of its active ingredient, sulfometuron methyl, to exceed EPA's phytotoxic threshold for aquatic vascular plants at Wakulla Spring. Herbicides also are a leading suspect for a sudden die off of nearly half an acre of emergent plants along the upper mile of the Wakulla River in late spring and early summer 2021.

As we explain below, sheep grazing is being successfully used as an alternative to herbicides for vegetation management at a number of solar farms in Florida and elsewhere in the U.S. Furthermore, sheep have been used to manage vegetation at O'Hare Airport in Chicago for over eight years, demonstrating that their use proximate to an airport is feasible.

We request, therefore, that the City of Tallahassee take the lead in urging Origis Services and/or KKR to undertake a thorough assessment of the costs and benefits of deploying sheep grazing in lieu of herbicide treatment to control weeds and woody plants at the two airport solar farms. Toward that end, we urge you to arrange a visit to the Tallahassee solar farms by J.C. Deriso with A+ Environmental Restoration, a sheep herder who provides grazing services to several solar farm installations in the southeast, including Tampa Electric.

Staff with the FDEP Division of Environmental Assessment and Restoration have indicated a willingness to test private wells south of Solar Farm 1 before and after any future applications of herbicides at the airport solar farms. We also urge the City to coordinate with Origis Services and FDEP if Origis elects to continue using herbicides this spring. Elaboration of these points follows.

- Our efforts to engage Origis Services

  Our efforts to promote considering sheep herding in lieu of herbicide use have been rebuffed by Origis Services Director of Field Operations, David Perrizo. As detailed in an email I sent to you and others on September 20, 2021, in a phone conversation with Perrizo, he said that while Origis has used sheep grazing at some of the other solar installations they manage, they have sunk costs in vegetation management equipment and labor at the Tallahassee facility that they would not be willing to forego. He said if the city wanted to pay for sheep grazing, they might entertain it. He also averred that the city has no leverage to compel them to make such a change.

- Vulnerability of private wells and Wakulla Spring to pollution

  Our concern with herbicide use at these facilities stems from the inherent vulnerability of the Floridan Aquifer to pollution at that location, the proximity of private wells to Solar Farm 1, and the occurrence of a substantial vegetation die-off on the upper Wakulla River this past spring.

  The airport solar farms are located south of the Cody Scarp within both the Leon County Springs Protection Zone and the Wakulla Basin Management Action Plan Priority Focus Area 1. These areas were delineated in part on the basis of the Leon Aquifer Vulnerability Assessment. Wet and dry sinkholes are present on or immediately adjacent to the sites – a dry sink is situated within sub-array 1 of FL Solar 4.[6]

  Potentiometric surface mapping indicates that groundwater flow from this area moves towards Wakulla Spring (see Attachment A). Dye tests have shown direct flow to the spring from

Emerald Sink which lies 5 miles south of the airport from the airport along that groundwater flow gradient.

There are multiple private residences just south of Solar Farm 1 that rely on wells for drinking water. Herbicides that infiltrate into the ground water at that facility could pose a hazard to residents of those properties. FDEP's Division of Environmental Assessment and Restoration has expressed a willingness to test samples from wells in this area if Origis Services decides to continue to apply herbicides at this facility. For FDEP to do so, Origis would have to provide information on the herbicides they intend to use and the dates when they will be applied.

- Wakulla River vegetation die-off

  In May 2020, staff and volunteers at Wakulla Springs State Park observed die-offs of three species of emergent vegetation along the tour boat route on the Wakulla River and evidence of distress to those species along the entire three miles of the river within the park as well as downstream of the park boundary. We estimate that the river lost about 20,000 square feet (0.4 acre) of emergent marsh habitat along the upper mile where the boat tours are conducted. Inspection of other spring-fed waterbodies upgradient from Wakulla Spring, including the Sally Ward Run, revealed no similar conditions. Available data indicate that it is unlikely the plant loss was due to either a salinity spike or prolonged low river height. A toxic substance influx remains the leading hypothesis. In addition to examining herbicide use at the airport solar farms we have inquired about large-scale use for forestry management and/or utility rights-of-way maintenance within sections of Apalachicola National Forest and Wakulla State Forest upgradient of Wakulla Spring. We received no information of such uses coincident with the vegetation die-off.

  Insufficient data are available to test the toxic episode hypothesis. FDEP tests quarterly samples collected from the Boat Tram, approximately 0.5 mile downstream of the spring vent, for an array of toxic substances, including various insecticides and herbicides. One set of samples was collected on April 19, 2021, close to the time the emergent die-off may have begun. Roundup (glyphosate), which has been used by Origis in combination with Oust (sulfometuron methyl), was not detected in amounts above the method detection limit (MDL) between January 2019 and April 2021. FDEP does not, however, test for Oust. Velpar (hexazinone), which has been known to be used in forestry management in the area, was measured above the MDL on multiple occasions, but the largest concentration measured was almost 20 times less than FDEP's acute toxicity level for plants. Triclopyr, another herbicide known to have been used in forestry management, was not found above the MDL. Park staff sought a lab that could test plant tissues for Oust and Velpar. They eventually located a state agriculture lab in South Dakota. However, samples were not collected until August, well after the onset of the die off, and none of the results were above detection limits.

  We had requested information from Origis Services about the quantities of Roundup and Oust applied during their most recent annual treatment in March or April 2021. Mr. Perizzo declined to do so. In the absence of actual application data, I conducted a series of calculations based on the manufacturer's specimen product label for use of Roundup with Oust for "Release of Bermudagrass or Bahiagrass" to ascertain whether or not it is possible for such an herbicide treatment at the solar facilities to result in levels of sulfometuron methyl at Wakulla Spring that

exceed EPA's phytotoxic threshold for aquatic plants.[7] I asked FDEP's Water Quality Monitoring staff to review my calculations and they indicated that they are correct.

As shown in Attachment B, those calculations indicate that there are plausible scenarios where sulfometuron methyl levels at the spring could be toxic to aquatic vascular plants. The phytotoxicity threshold could be exceeded for both the high and low ends of the product label application rate of 0.25 to 1.0 oz/acre for both 360 acres and 120 acres of treated area at the minimum spring flow of 109 mgd.[8] At the median spring flow of 379 mgd, the phytotoxicity threshold could be exceeded at both ends of the application rate range for 360 acres of treated area and at the 1 oz/ac application rate for 120 acres.

- Feasibility of deploying sheep grazing at this site

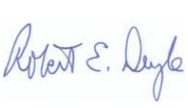
  As noted above, Origis Services acknowledges that they have used sheep grazing in lieu of herbicides to manage vegetation at other solar farms they manage. Several utilities are doing so in Florida, including Tampa Electric, Duke Energy, and Florida Power and Light.

  Mr. Deriso, the sheep herder with whom Jim Stevenson has been conferring, indicated that sheep would not be bothered by noise from the nearby runways. It also appears that FAA regulations are unlikely to be a barrier to deploying sheep at the Tallahassee solar farms. The Chicago Department of Aviation has been using grazing by sheep, goats, and at one point llamas, to maintain 200 acres of vegetation adjoining the runways O'Hare airport since 2013. It is the longest-running grazing herd at an airport.[9]

Given our demonstration of the potential for herbicides used at the solar farm to reach Wakulla Spring at concentrations high enough to be toxic to aquatic plants, and the proximity of private wells to Solar Farm 1, we think the City of Tallahassee, as lessor of the solar farm property, ought to (a) determine if herbicide use is consistent with the terms of the leases and (b) take the lead in persuading Origis Services and/or KKR to assess the feasibility of deploying sheep grazing in lieu of broad-scale herbicide treatment to control weeds and woody plants.

Early on we had asked Origis Services for a tour of the solar farm. David Perrizo initially said he could provide such a tour when he was next in Tallahassee, sometime in September. However, after we began asking for more detailed information about herbicide application rates, he said that in order to participate in such a tour we would have to secure written permission from both KKR and the City. At this point, the principal value of conducting such a tour would be to include Mr. Deriso. He could offer an initial assessment of what might be feasible. We urge the City of Tallahassee to arrange such a visit.

Sincerely,



Robert E. Deyle, Chair
Wakulla Springs Alliance

cc: Reese Goad
Michael Ohlsen

[1] Department of Transportation Federal Aviation Administration Orlando Airports District Office. 2016. Finding of No Significant Impact. Construction and Operation of FL Solar 1 LLC and City of Tallahassee Electric Utility's 20 megawatts AC Solar Farm Tallahassee International Airport, Tallahassee, Florida.

[2] Department of Transportation Federal Aviation Administration Orlando Airports District Office. 2019. Finding of No Significant Impact and Record of Decision. Environmental Assessment for the Construction and Operation of Solar Farm Project Phase 2 at the Tallahassee International Airport, Tallahassee, Florida.

[3] Seay, Cory. 2016. Aquifer Protection Site Review Clearance Form. COT Solar Facilities Springhill Road. November 16.

[4] Seay, Cory. 2018. Aquifer Protection Site Review Clearance Form. TIA Solar Farm #2 - Submittal. November 7.

[5] Section 5.5 of the City of Tallahassee's Land Leases and Solar Easements with FL Solar 1 LLC and FL Solar 4 LLC, stipulates that "Neither Party will use, store, dispose of or release on the Premises or cause or permit to exist or be used, stored, disposed of or released on the Premises as a result, any substance which is defined as a "hazardous substance", "hazardous material", or "solid waste" in any Legal Requirement, except in such quantities as may be required in the operations that Party is permitted to conduct on the Premises." While Exhibit D, Site Rules, section f, permits the Project Company to "bum, remove and clear wood, plants and brush on the Premises," it does not specifically authorize herbicide use.

[6] U.S. Department of Transportation (2018), p. 78.

[7] U.S. Environmental Protection Agency. 2008. Reregistration Eligibility Decision for Sulfometuron Methyl. https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_PC-122001_18-Sep-08.pdf.

[8] Northwest Florida Water Management District. 2021. Recommended Minimum Flows for Wakulla and Sally Ward Springs Wakulla County, Florida. Final.

[9] https://www.flychicago.com/community/environment/herd/pages/default.aspx; https://chicago.curbed.com/2019/5/3/18525723/airport-animals-environment-ohare-sustainability.

Attachment A:

Leon-Wakulla Potentiometric Map

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Tallahassee International Airport

Wakulla Springs

State of Florida, TLCGIS, Earthstar Geographics

Leon-Wakulla County Potentiometric Surface Map

N

W E

S

0 1.25 2.5 5 Miles

0 2 4 8 Kilometers

Potentiometric Surface Contour

Potentiometric surface lines are in 10 ft intervals. Contours were calculated from May 2019 Upper Floridan aquifer well data from the NWFWMD.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

GEOLOGICAL SURVEY

Attachment B

Estimates of Oust Loadings to Wakulla Spring from Tallahassee Solar Farm

Active ingredient = sulfometuron methyl (75% by weight per product label)

Assumptions:

- Application rate for "Release of Bermudagrass or Bahiagrass" when used with Roundup per product label (https://natseed.com/pdf/Roundup%20Pro%20Label.pdf): 0.25 to 1 oz per acre
- Area treated is between 360 and 120 acres depending on whether herbicides are applied throughout or only in areas where mowing equipment cannot be operated
- Plant uptake rate = 10% over 72 hours (USDA Forest Service, 1998, p. 2)
- Soil adsorption = 0% (USEPA, 2008, p. 15)
- Ground water transport rate to spring = 60-65 days (Florida Geological Survey, 2012)
- Persistence where half-life = 14-180 days (USEPA, 2008, p. 15): 5% for 14-day HL; 100% for HL ≥ 65 days
- Herbicide reaches spring vent as a single slug at one time (100%) or half that amount (50%) – A single slug could be generated if herbicides were applied during a prolonged dry spell after which a significant rain event flushed the accumulated heribicdes into the ground water
- Median discharge at spring vent = 379 mgd; range = 109-1348 mgd (NWFWMD, 2021)
- 1 ug/L = 8.3454×10^{-9} lbs/gal
- Phytotoxic threshold concentration for aquatic plants = 0.590 ug/L (USEPA, 2008)

Sample calculation: 1 oz/ac over 360 acres with 10% plant uptake, 100% persistence after 65 days, arriving as a single slug (100%) with median spring flow of 379 mgd

1 oz/ac x 360 acres = 360 oz = 22.5 lbs

Per the product label, Oust XP is 75% sulfometuron methyl by weight = 16.875 lbs

Concentration at spring vent at median discharge of 379 mgd

= (16.875 lbs * 0.90 * 1.0 * 1.0)/379,000,000 gal = 4.01×10^{-8} lbs/gal = 40.1×10^{-9} lbs/gal = 4.802 ug/L

where 1 ug/L = 8.3454×10^{-9} lbs/gal

Application Rate (oz/ac)	Area Treated (ac)	Total Load sulfometuron methyl to Soil (lbs)	Plant Uptake (%)	Soil Adsorption (%)	Persistence After 65 Days (%)	Percent Reaching Vent at One Time	Spring Vent Discharge (mgd)	Load to Spring Vent (lbs/gal)	Concentration at Spring Vent (ug/L)	Comparison to Toxic Threshold (0.590 ug/L)
*1	360	16.875	10%	0%	100%	100%	109	1.39E-07	16.696	28.30
1	360	16.875	10%	0%	100%	50%	109	6.97E-08	8.348	14.15
1	360	16.875	10%	0%	5%	100%	109	6.97E-09	0.835	1.41
1	360	16.875	10%	0%	5%	50%	109	3.48E-09	0.417	0.71
0.25	360	4.219	10%	0%	100%	100%	109	3.48E-08	4.174	7.07
0.25	360	4.219	10%	0%	100%	50%	109	1.74E-08	2.087	3.54
0.25	360	4.219	10%	0%	5%	100%	109	1.74E-09	0.209	0.35
0.25	360	4.219	10%	0%	5%	50%	109	8.71E-10	0.104	0.18
1	360	16.875	10%	0%	100%	100%	379	4.01E-08	4.802	8.14
1	360	16.875	10%	0%	100%	50%	379	2.00E-08	2.401	4.07
1	360	16.875	10%	0%	5%	100%	379	2.00E-09	0.240	0.41
1	360	16.875	10%	0%	5%	50%	379	1.00E-09	0.120	0.20
0.25	360	4.219	10%	0%	100%	100%	379	1.00E-08	1.200	2.03
0.25	360	4.219	10%	0%	100%	50%	379	5.01E-09	0.600	1.02
0.25	360	4.219	10%	0%	5%	100%	379	5.01E-10	0.060	0.10
0.25	360	4.219	10%	0%	5%	50%	379	2.50E-10	0.030	0.05
1	120	5.625	10%	0%	100%	100%	109	4.64E-08	5.565	9.43
1	120	5.625	10%	0%	100%	50%	109	2.32E-08	2.783	4.72
1	120	5.625	10%	0%	5%	100%	109	2.32E-09	0.278	0.47
1	120	5.625	10%	0%	5%	50%	109	1.16E-09	0.139	0.24
0.25	120	1.406	10%	0%	100%	100%	109	1.16E-08	1.391	2.36
0.25	120	1.406	10%	0%	100%	50%	109	5.81E-09	0.696	1.18
0.25	120	1.406	10%	0%	5%	100%	109	5.81E-10	0.070	0.12
0.25	120	1.406	10%	0%	5%	50%	109	2.90E-10	0.035	0.06

Application Rate (oz/ac)	Area Treated (ac)	Total Load sulfometuron methyl to Soil (lbs)	Plant Uptake (%)	Soil Adsorption (%)	Persistence After 65 Days (%)	Percent Reaching Vent at One Time	Spring Vent Discharge (mgd)	Load to Spring Vent (lbs/gal)	Concentration at Spring Vent (ug/L)	Comparison to Toxic Threshold (0.590 ug/L)
1	120	5.625	10%	0%	100%	100%	379	1.34E-08	1.601	2.71
1	120	5.625	10%	0%	100%	50%	379	6.68E-09	0.800	1.36
1	120	5.625	10%	0%	5%	100%	379	6.68E-10	0.080	0.14
1	120	5.625	10%	0%	5%	50%	379	3.34E-10	0.040	0.07
0.25	120	1.406	10%	0%	100%	100%	379	3.34E-09	0.400	0.68
0.25	120	1.406	10%	0%	100%	50%	379	1.67E-09	0.200	0.34
0.25	120	1.406	10%	0%	5%	100%	379	1.67E-10	0.020	0.03
0.25	120	1.406	10%	0%	5%	50%	379	8.35E-11	0.010	0.02

* Highlighted scenarios yield concentrations at spring vent that exceed EPA toxic threshold for vascular aquatic plants.

Worst worst case = 28.30 X toxic threshold 1 oz/ac over 360 acres with 10% plant uptake, 0% soil adsorption, 100% persistence over 65 days, 100% arriving in one slug at median discharge of 109 mgd

Intermediate worst case = 14.45 X toxic threshold: 1 oz/ac over 360 acres with 10% plant uptake, 0% soil adsorption, 100% persistence over 65 days, 50% arriving in one slug at median discharge of 109 mgd

Best worst case = 0.05 X toxic threshold: 1 oz/ac over 360 acres with 10% plant uptake, 0% soil adsorption. 5% persistence over 65 days, 50% arriving in one slug at median discharge of 379 mgd

Worst best case = 0.68 x toxic threshold: 0.25 oz/ac over 120 acres with 10% plant uptake, 0% soil adsorption, 100% persistence over 65 days, 100% arriving in one slug at median discharge of 379 mgd

Intermediate worst case = 0.34 X toxic threshold: 0.25 oz/ac over 120 acres with 10% plant uptake, 0% soil adsorption, 100% persistence over 65 days, 50% arriving in one slug at median discharge of 379 mgd

Best best case = 0.02 X toxic threshold: 0.25 oz/ac over 120 acres with 10% plant uptake, 0% soil adsorption. 5% persistence over 65 days, 50% arriving in one slug at median discharge of 379 mgd

References Cited

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