Report on the Economic Viability of Agricultural Production on 1611 Green Island Road, American Canyon, CA

Prepared for GIV, LLC.

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I. QUALIFICATIONS AND ASSIGNMENT

1. My name is Wenbiao Cai. I am a Director at Vega Economics, a full-service economic consulting firm located in Berkeley, California. I hold a Ph.D. in Economics from the University of Iowa and a bachelor's degree in Finance from the University of Alberta. Prior to joining Vega, I was an associate professor of economics at the University of Winnipeg.

2. I am a specialist in agricultural economics. My doctoral dissertation was on agriculture and income differences across countries. My research on agricultural economics has been published in leading economics journals including *Economic Inquiry*, *Journal of Economic Dynamics and Control,* and *International Economic Review* and has received research funding from government agencies including the Social Science and Humanities Research Council of Canada.

3. I have been asked to provide my independent professional opinion on the economic feasibility of agricultural production on the real property located on 1611 Green Island Road, City of American Canyon, California (the "Subject Property").

4. It is my understanding that the owner of the Subject Property commissioned a report by Dr. Paul R. Anamosa (the "Anamosa Report"), who opined that the soil on the Subject Property is "not suitable for wine grapes as a result of excessive accumulation of salts in the rootzones of the vines."[1] In an addendum to his report, Dr. Anamosa further opined that the property is "unsuitable for not only wine grapes but also for fruit trees and nut trees."[2]

5. I relied on the Anamosa Report for the scientific assessment of soil salinity on the Subject Property. Because Dr. Anamosa has provided his professional opinion that it is not sustainable to grow wine grapes, fruit trees, or nut trees on the Subject Property, I did not evaluate the economic feasibility of growing these agricultural commodities on the Subject Property.

6. Instead, I evaluated whether the Subject Property soil can support growing other crops commonly planted in the Napa County region and, if so, whether such an operation would be economically viable. I also evaluated whether the Subject Property could support an economically viable ranching operation with cows.

[1] Anamosa, Paul R. Site Visit Report, Green Island Vineyard Project 21-178 (September 21, 2021) at 1.

[2] Anamosa, Paul R. Addendum Assessing Fruit and Nut Trees, Soils and Vineyard Report, Green Island Vineyard Project 21-178 (October 12, 2021) at 3.

7. Based on my review of Dr. Anamosa's soil report and my independent analysis of the costs and revenues of growing barley and running a beef cattle operation on the Subject Property, it is my professional opinion that agricultural production is not economically viable on the Subject Property.

II. AGRICULTURAL PRODUCTION IS NOT ECONOMICALLY VIABLE ON THE SUBJECT PROPERTY.

8. The Subject Property is comprised of 157 gross acres, although I understand from the property owner that excluding ditches and roads, only 135 net acres are suitable for agriculture. The Subject Property has been used as vineyard since it was purchased but has experienced unstainable toxic salinity. As a result, the property owner removed 65 acres of vineyard from production with no plans to replant the acreage.[3] I further understand from the property owner that another 35 acres are currently being taken out of production, with the remaining 35 acres to be taken out next year.

9. The Subject Property is within the boundaries of Napa County. Wine grapes are the dominant agricultural commodity in Napa County, accounting for more than 99 percent of the total value of agricultural commodities produced in 2019. Outside of wine grapes, agricultural commodities produced in the county include animal products (cattle and calves, sheep and lambs), nut and fruit trees, range pasture, vegetables, and hay.[4]

A. The Subject Property Soil Is Not Sustainable for Growing Vegetables.

10. Napa County produced a total $171,500 in vegetables in 2019 and $198,700 in 2020.[5] Growing vegetables on the Subject Property, however, is not sustainable due to the high level of soil salinity. **Table 1**: *Salinity Tolerance of Vegetables Commonly Grown in California* below, which is based on information contained in a crop salinity tolerance and yield function table published by the University of California at Davis,[6] summarizes the threshold salinity level for a variety of selected vegetables. For comparison, values for grapes, fruit trees, and nut trees are also included.

[3] GIV, LLC. Sphere of Influence Amendment Attachment #3 (September 30, 2021).

[4] "Napa County Agricultural Crop Report 2020." *Napa County Department of Agriculture and Weights and Measures* (2020) at 5. <https://www.countyofnapa.org/DocumentCenter/View/21404/2020-Agricultural-Crop-Report-English?bidId=> (accessed Nov. 10, 2021).

[5] *Id.*

[6] "Crop Salinity Tolerance and Yield Function." *Salinity Management, University of California at Davis*. <https://ucanr.edu/sites/Salinity/Salinity_Management/Effect_of_soil_salinity_on_crop_growth> (accessed Nov. 9, 2021).

11. Soil salinity is measured by the electrical conductivity of saturated soil extracts (EC_e in dS/m). The threshold indicates the level of salinity above which yield starts to decrease. The slope indicates the percentage yield decrease when the salinity level increases by one unit above the threshold.

12. Many vegetables commonly planted in California have salinity tolerance that is similar to that of grapes. The Anamosa Report has concluded that the Subject Property soil is not sustainable for growing wine grapes, fruit trees, or nut trees. Based on this conclusion from the report, and my analysis of the salinity tolerance of vegetables, I conclude that the Subject Property soil is not sustainable for growing vegetables commonly planted in California.

Table 1: Salinity Tolerance of Vegetables Commonly Grown in California

Vegetable	**Threshold** (dS/m)	**Slope** (% per dS/m)
Asparagus	4.1	2
Bean	1.0	19
Broccoli	2.8	9.2
Brussel sprouts	1.8	9.7
Cabbage	1.0	14
Cauliflower	1.8	6.2
Celery	2.5	13
Cucumber	1.1	6.9
Kohlrabi	1.3	13
Lettuce	1.7	12
Okra	1.2	16
Pea	1.5	14
Pepper	1.7	12
Pumpkin	1.2	13
Radish	2.0	7.6
Spinach	3.2	16
Squash, zucchini	1.0	33
Strawberry	1.5	11
Sweet potato	2.5	9.9
Tomato	0.9	9
Grape	1.5	9.6
Almond	1.5	19
Apricot	1.6	24
Orange	1.7	16

B. Growing Barley on the Subject Property Is Not Economically Viable.

13. Some agricultural commodities are more saline-tolerant than others. Barley is one of the most saline-tolerant crops with a threshold salinity level of 8 dS/m. It is commonly grown in the Central Valley and surrounding foothills, but no significant production of barley has been reported for Napa County

during the 2019-2020 growing season.[7] Nevertheless, because the prospect of growing barley on the Subject Property is supported by the plant's salinity tolerance, I fully evaluated this possibility.

14. I estimated the economic returns to an investor who purchases the Subject Property to grow barley. Two models of cultivation were considered—irrigated and non-irrigated. The expected yield from irrigated production is 65 bushels per acre, based on historical yields for the state of California.[8] The expected yield from non-irrigated production is 32.5 bushels per acre, which was assumed to be half the expected yield from irrigated production. The total revenue from these yields was calculated, including both the sales of grains as the primary product as well as the sales of secondary products such as silage, straw, and grazing.

15. I relied on the October 2021 Costs and Returns report on barley production published by the United States Department of Agriculture ("USDA") for the following information: (1) per-acre value of secondary product; (2) per-acre operating costs except for hired labor; and (3) per-acre allocated overhead costs except for the cost of land and the opportunity cost of unpaid labor.[9]

16. I made the following adjustments to the USDA cost estimates to reflect market conditions specific to California and Napa County. First, I estimated the cost of hired labor based on a labor requirement of two hours per acre (one hour for tilling and one hour for harvesting) and a cost of $32 per acre. I estimated an opportunity cost of $32 per acre for unpaid labor supplied by the owner (or family members). Second, for non-irrigated production, the cost of irrigation and straw baling was reduced by 80 percent and the costs of fuel, lube, electricity, repairs, and hired labor were reduced by 20 percent, relative to irrigated production. Third, capital recovery of machinery and equipment is scaled by the ratio of the assumed planted acres on the Subject Property (135 acres) to the benchmark acres used in the USDA estimates (289 acres).

[7] "California Agricultural Statistics Review 2019-2020." *California Department of Food and Agriculture* (2020). < https://www.cdfa.ca.gov/Statistics/PDFs/2020_Ag_Stats_Review.pdf> (accessed Nov. 10, 2021).

[8] Lazicki, Patricia, Daniel Geisseler, and William R. Horwath. "Barley Production in California." *University of California at Davis* (June 2016) at 2. <https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Barley_Production_CA.pdf> (accessed Nov. 10, 2021).

[9] "Commodity Costs and Returns." *United States Department of Agriculture.* <https://www.ers.usda.gov/data-products/commodity-costs-and-returns/> (accessed Nov. 9, 2021). Numbers cited in the table correspond to the "Fruitful Rim" region in the USDA report, which includes California.

17. Lastly, I calculated the cost of land by amortizing 80 percent of the purchase price over 30 years at an annual interest rate of 3.7 percent. The annual cost is $81,384, which implies a per-acre cost of $603 on a 135-acre production basis.[10]

18. **Table 2**: *Revenue and Cost Estimates of Hypothetical Barley Production* summarizes the estimated total revenue, operating costs, and overhead costs of the hypothetical barley production, for both the irrigated and non-irrigated scenarios.

Table 2: Revenue and Cost Estimates of Hypothetical Barley Production[11]

	Irrigated	Non-Irrigated
Gross value of production		
Yield (bushels per planted acre)	65.0	32.5
Price (dollars per bushel at harvest)	$4.8	$4.8
Primary product, grain	$313.3	$156.7
Secondary product, silage/straw/grazing	$20.1	$20.1
Total, gross value of production	$333.4	$176.7
Operating costs		
Seed	$29.4	$29.4
Fertilizer	$57.0	$57.0
Chemicals	$19.1	$19.1
Custom services	$28.3	$28.3
Fuel, lube, and electricity	$40.6	$32.5
Repairs	$45.0	$36.0
Irrigation and straw baling	$18.5	$3.7
Interest on operating inputs	$0.5	$0.5
Hired labor	$32.0	$25.6
Total, operating costs	$270.4	$232.1
Allocated overhead		
Cost of land	$603	$603
Opportunity cost of unpaid labor	$32.0	$32.0
Capital recovery of machinery and equipment	$63.4	$63.4
Taxes and insurance	$10.9	$10.9
Total, allocated overhead	$709.2	$709.2
Costs listed		
Total, costs listed	$979.6	$941.3
Net value		
Value of production less total costs listed (per-acre)	-$646.2	-$764.6
Value of production less total costs listed (annual)	-$87,241	-$103,219

[10] The 2021 assessed land value for the Subject Property is $1,841,670, as reported by the Napa County Assessor. <https://common1.mptsweb.com/mbap/napa/asr> (accessed Nov. 12, 2021).

[11] Unless otherwise noted, dollar values are expressed in units of dollars per acre.

19. Based on my calculations, irrigated barley production on the Subject Property would generate a total revenue of $333.4 per acre at a cost of $979.6 per acre, resulting in a loss of $646.2 per acre. On a 135-acre production basis, the annual total loss would be $87,241.

20. Based on my calculations, non-irrigated barley production on the Subject Property would generate a total revenue of $176.7 per acre at a cost of $941.3 per acre, resulting in a loss of $764.6 per acre. On a 135-acre production basis, the annual total loss would be $103,219.

21. My estimate of the net revenue from the hypothetical barley production is conservative. First, the implied wage of $16 per hour for hired labor is likely unattainable in the current market, given the severe labor shortage many sectors face at present. Higher labor cost reduces net revenue. Second, the Subject Property currently relies on salty recycled water supplied by the City of American Canyon for irrigation. Growing barley with salty recycled water reduces yield once soil salinity reaches the threshold. That would also reduce net revenue.

22. Based on these analyses, I conclude that barley production on the Subject Property is not economically viable.

C. A Sheep and Lamb Operation on the Subject Property Is Not Economically Viable.

23. To determine the economic prospect of a sheep and lamb operation on the Subject Property, I reviewed a cost of production analysis published by the American Sheep Industry Association. The report shows, based on most recent estimates, that a representative operation in the western U.S. would produce a loss of $15.67 per ewe.[12]

24. The report also indicates that hired labor and pasture are the two largest operating costs for a sheep and lamb operation. Considering that the Subject Property currently has no irrigated pasture and higher labor costs in California than in other western states, I conclude that a sheep and lamb operation on the Subject Property would not be economically viable either.

[12] "U.S. Baseline Lamb Cost of Production Analysis, 2018 Update." *American Sheep Industry Association* (November 27, 2019) at 15. <https://www.sheepusa.org/wp-content/uploads/2019/12/2018-ASI-Budget-Project.pdf> (accessed. Nov. 11, 2021).

D. A Beef Cattle Operation on the Subject Property Is Not Economically Viable.

25. In 2019, Napa County produced roughly $3 million of animal products, among which beef represents the largest value of production. I estimated the economic returns to an investor who purchases the Subject Property to run a beef cattle operation.

26. The hypothetical operation I considered involves purchasing twenty yearling heifers in the spring and feeding them on grass from April to October until they reach 1,100 pounds in weight. The animals would then be harvested, processed, and packaged at a USDA-inspected processing plant. Revenue is generated through sales of packaged beef products to consumers.

27. I relied on a 2017 cost study of a 20-head beef cattle operation in the Northern Sacramento Valley, published by the University of California at Davis, for the following information: (1) average hanging carcass weight for 1,100-pound cattle; (2) operating costs; and (3) overhead costs except for land cost, opportunity cost of unpaid labor, interest on working capital, and fencing cost.[13]

28. I made the following adjustments to those costs. First, unit variable costs and cash overhead costs were adjusted for inflation at an annual rate of three percent. Second, the purchase cost of heifers and the unit wholesale price of beef were updated to reflect current market rates. The purchase price of heifers was based on a February 2021 report from Shasta Livestock Auction Yard.[14] The wholesale price per pound is estimated using the average beef wholesale price reported by the USDA between 2015 and 2020.[15] Third, working capital is calculated as the sum of operating cost and the purchase price of heifers, of which 40 percent is assumed to be borrowed at an annual interest rate of six percent. Fourth, it is assumed that the property owner provides unpaid labor on a part-time basis, with an opportunity cost of $5,376.[16] Fifth, I estimated a land cost of $81,384, based on amortizing 80 percent of the purchase price over 30 years at an annual interest rate of 3.7 percent.

29. Lastly, an amortized fencing cost was added to the overhead cost. Fences provide protection for the cattle and are necessary for a ranching operation on the Subject Property that borders busy roads on three sides and the Napa River on the fourth. At present, the Subject Property is not fenced. I

[13] "Current Cost and Return Studies." *University of California at Davis* (June 11, 2020). <https://coststudies.ucdavis.edu/en/current/> (accessed Nov. 9, 2021).

[14] "Current Market Report." *Shasta Livestock Auction Yard* (February 12, 2021) <https://shastalivestock.com/current-market-report/> (accessed Nov. 9, 2021).

[15] "Meat Price Spreads." *Economic Research Service, United States Department of Agriculture* (November 10, 2021). <https://www.ers.usda.gov/data-products/meat-price-spreads/> (accessed Nov. 10, 2021).

[16] Calculated based on forgone wage rate of $32 per hour and 7 hours per week from April to October.

estimated the total cost of installing barbed wire fences around the Subject Property, based on an estimated cost of $2.72 per linear foot and an estimated perimeter length of 12,196 feet. The total cost is amortized over an assumed working life of ten years.[17]

30. **Table 3**: *Revenue and Cost Estimates of Hypothetical Beef Cattle Operation* summarizes the returns to the hypothetical beef cattle operation on the Subject Property. The operation would generate a total revenue of $22,031 at a cost of $115,033, resulting in an annual total loss of -$93,002.

Table 3: Revenue and Cost Estimates of Hypothetical Beef Cattle Operation

		Animals	Weight	Dollar Value	Gross Value
Gross Value of Production[18]					
Carcasses sold		20	627	$3.4	$42,511
Calves purchased		20	800	$1.3	$20,480
Total, gross value of production					$22,031
Operating Cost	**Units**		**Animals**	**$/Unit**	**Total Costs**
Pasture lease	AUM	6.00	20	$33.8	$4,052
Salt/mineral supplements	Tons	0.50	20	$270.1	$135
Hay	Tons	1.00	20	$135.1	$135
Veterinary/Medical	Each		20	$4.4	$89
Death loss (1% of purchased price)				$204.8	$205
Brand inspection	Each		20	$1.4	$28
Marketing order promotion	Each		20	$1.1	$23
Harvest costs	Carcass		20	$112.6	$2,251
Cut and wrap	Pounds	627	20	$1.1	$14,114
Marketing advertisement costs	Each		20	$39.4	$788
1-Ton pickup truck	Miles	1,000		$0.6	$608
Stock trailer	Miles	400		$0.2	$90
ATV-4WD	Miles	1,000		$0.4	$394
Horse (shoes, vet, & feed)	Each		1	$225.1	$225
Total, operating costs					$23,136
Allocated Overhead					
Cost of land					$81,384
Opportunity cost of unpaid labor					$5,376
Amortized fencing cost					$3,311
Interest on working capital					$521
Insurance (Liability)					$1,021
Office expenses					$281
Total, allocated overhead					$91,897
Total Cost					
Total, costs listed					$115,033
Net Revenue					
Value of production less total costs listed (annual)					-$93,002

[17] "Estimated Costs for Livestock Fencing." *Ag Decision Maker, File B1-75. Iowa State University Extension and Outreach* (February 2012). < https://www.extension.iastate.edu/agdm/livestock/html/b1-75.html > (accessed. Nov. 10, 2021). The reported estimates are adjusted for inflation at an annual rate of five percent and an average labor cost of $32 per hour.

[18] The purchased heifer's weight is on the hoof whereas the carcass's sold weight is the hanging weight.

31. My calculation of net revenue is conservative because a 20-head operation may exceed the maximum number of animals the Subject Property can support. A general rule of thumb is that 15 to 18 acres of non-irrigated rangeland is needed for each animal,[19] which suggests that the 157-acre Subject Property can support, at most, 10 animals. Since a smaller number of animals reduces revenue proportionately—but not costs—the expected loss would be larger if the actual number of animals in the operation were lower.

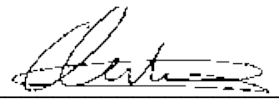
32. Based on these calculations, I conclude that a beef cattle operation on the Subject Property is not economically viable.

III. CONCLUSION

33. Based on my independent review of Dr. Anamosa's soil report, I conclude that the Subject Property soil is not sustainable for growing vegetables. Based on my review of cost studies published by the American Sheep Industry Association, I conclude that a sheep and lamb operation on the Subject Property would not be economically viable. Based on my analysis of costs and revenues, I further conclude that growing barley or running a beef cattle operation on the Subject Property would not be economically viable.

34. It is therefore my professional opinion that agricultural production is not economically viable on the Subject Property. Given the lack of economic profits, it is against the economic interest of a rational investor to purchase the Subject Property for the purpose of agricultural production.

Dated: November 12, 2021



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[19] Dan Macon and Hannah Meyer. "How Many Cows Can My Property Support? Basics of Carrying Capacity, Stocking Rate, and Pasture Irrigation." *University of California, Agriculture and Natural Resources, Cooperative Extension, publication number 31-1005* (June 2018). <https://projects.sare.org/wp-content/uploads/Pub-31-1005-Carrying-Capacity-and-Stocking-Rate.pdf> (accessed Nov. 10, 2021).