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To: Dave Ward, Shelley Sussman, Aaron Engstrom, Donald Nielsen, and John Kessler (County of Ventura)

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Subject: Final County of Ventura Renewable Energy Project Siting Assessment

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

On September 15, 2020, the County of Ventura (County) Board of Supervisors adopted the 2040 General Plan and certified the project's Environmental Impact Report and related documents. The adopted 2040 General Plan became effective on October 15, 2020, and the County is currently in the implementation stage. In support of General Plan Program COS-O (Assessment of Land Near Electrical Transmission and Distribution Lines) and Policy EV-4.4 (Renewable Energy Facilities), Ascent is assisting the County in preparing a Renewable Energy Assessment that identifies undeveloped and underutilized sites within the County that have high potential for ground-mounted solar renewable energy, wind, and grid-scale battery storage projects. This project also provides information on California's Renewables Portfolio Standard (RPS), procurement goals of local utilities to achieve a carbon-free electric grid by 2045, and how many acres and megawatts[1] (MW) of wind, solar, and battery energy storage projects would be needed in the unincorporated County to meet the state's goals. This assessment is provided to the County to help inform the potential options to facilitate the siting and development of renewable energy projects.

[1] A watt is the standard unit of measurement for electric power. It measures the rate at which energy is produced (by an electric generator) or consumed (by customers such as homes or businesses, or "load"). Typically, energy use of houses and small business is expressed in kilowatts (thousands of watts, or kW), utility-scale electric generator output is expressed in megawatts (millions of watts, or MW), and larger quantities such as California's statewide electric demand is measured in gigawatts (billions of watts, or GW).

For example, a microwave oven uses approximately 1 to 1.5 kW. A single wind turbine can generate between 1 to 5 MW depending on its size, location, and year of construction; large gas-fired generators can generate up to approximately 1,000 MW or 1 GW. Assuming that a 1 MW wind turbine is producing at its full capacity, that turbine can meet the demand of one hundred homes or more (the exact number of homes depends heavily on location, square footage, what hours the home uses its electricity, and other factors; these figures are intended to be illustrative only). California peak electricity demand is approximately 50 gigawatts.

1.2 REGULATORY AND LAND USE SETTING

In response to the increase in anthropogenic greenhouse gas (GHG) emissions and the threat of global climate change, federal, state, and local governments have taken several steps to reduce GHG emissions and build resilience to climate change impacts. Decarbonizing the electric grid by shifting to renewable and zero-carbon resources is critical to achieving economywide carbon neutrality. A clean electricity grid provides the backbone for the decarbonization of other sectors, including the transportation and buildings sectors which account for the majority of the state's emissions. Effectively integrating renewable and zero-carbon electricity to achieve a carbon neutral electric grid will require significant resource capacity and coordinated efforts amongst state agencies, local governments, and electric utilities. The following sections provide a legislative background and context for this project at the federal, state, and local levels.

While an increase in renewable energy resources is essential to transitioning to a clean electricity grid, it is important to also consider that these resources can have a large footprint and require a significant amount of land. Natural and working lands (i.e., rangeland, farmland, and cropland) are critical components of the state's climate action strategy because these lands sequester carbon, and thus renewable energy development must be balanced with conservation of natural and working lands.

The Geographic Information System (GIS) based Renewable Energy Siting Assessment (Assessment) summarized in this study is intended to identify the most appropriate sites for renewable energy development in the unincorporated areas of Ventura County. The criteria evaluated as part of the Assessment are described in Section 2 below. This assessment is the first step to inform policy decisions. If zoning amendments are conducted, Ventura County will need to consider how to prioritize development of a clean electricity grid, with natural and working lands, and secondarily how a resilient energy system can help to "diversify the economic base of Ventura County through the development and expansion of environmental, creative, and technology industries," as intended by Economic Vitality Element Goal EV-4 and Policy EV-4.2 – Green Economy.

1.2.1 Federal

In January 2021, the Biden administration created the first-ever National Climate Task Force to reduce GHG emissions to 50-52 percent below 2005 levels by 2030 and achieve a net-zero emissions economy by 2050. The administration has also committed to achieving a carbon pollution-free power sector by 2035. The following federal legislation is working to support these goals:

THE INFRASTRUCTURE INVESTMENT AND JOBS ACT

The Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Act, was passed by Congress in November 2021. IIJA is the largest long-term investment to rebuild roads, bridges, and railways, expand access to high-speed internet, tackle the climate crisis, advance environmental justice, and invest in underrepresented communities. It also provides funding for energy efficiency measures and renewable energy projects.

INFLATION REDUCTION ACT

The Inflation Reduction Act (IRA) was signed into law by President Biden in August 2022. The IRA addresses climate pollution by investing in GHG reduction strategies. It incentivizes investment in domestic energy production and manufacturing, with the goal of reducing carbon emissions by roughly 40 percent below 2005 levels by 2030. It builds on the opportunities passed into law in IIJA by supporting projects including electric vehicle charging, power infrastructure and climate resilience. The IRA invests nearly $400 billion in energy security and climate change programs

over the next ten years. This includes rebates and tax credits for energy efficiency, renewable energy, and clean vehicle purchases, as well as funding for clean power infrastructure and climate resiliency.

EPA'S REPOWERING AMERICA'S LAND INITIATIVE

The U.S. Environmental Protection Agency's (EPA) RE-Powering America's Land Initiative encourages renewable energy projects to be built on current and formerly contaminated lands, landfills, and mine sites. Cleanup redevelopment of contaminated sites can transform liabilities into assets and encourages new markets for underutilized land. Land that falls within the jurisdiction of a Certified Unified Program Agency (CUPA) can be preferential for renewable energy development projects to be sited.

1.2.2 State

California has established itself as a global leader for its actions to reduce GHG emissions and increase resiliency to climate change risks. Table 1 highlights the key climate legislation the state has passed.

Table 1 California Climate Legislation

Year	Legislation	Description
2005	Executive Order S-3-05	Established a target to reduce statewide GHG emissions to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050
2006	Assembly Bill 32	Established regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and set a target to reduce statewide emissions to 1990 levels by 2020
2016	Senate Bill 32	Established a target to reduce statewide GHG emissions to 40 percent below 1990 levels by 2030
2022	Assembly Bill 1279	Established a target to reduce anthropogenic emissions to 85 percent below 1990 levels by 2045 and achieve net zero GHG emissions by 2045

Source: CARB's 2022 Scoping Plan. Table compiled by Ascent in 2023.

California's 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan) lays out a path to achieve targets for carbon neutrality and reduce anthropogenic GHG emissions by 85 percent below 1990 levels no later than 2045, as directed by Assembly Bill 1279. Components of the 2022 Scoping Plan focused on decarbonizing the electricity sector are most relevant to this project. To meet the targets set by AB 1279, the state must accelerate a shift away from fossil fuels and increase renewable and clean energy resources—including solar, wind and battery storage.

The following state policies address GHG emissions associated with electricity generation and work to accelerate the transition to a clean grid.

CALIFORNIA'S RENEWABLES PORTFOLIO STANDARD

California's RPS has been a primary driver to reduce GHG emissions in the electricity sector. RPS was established in 2002 by SB 1078 to accelerate the development and use of renewable energy resources for electricity use, requiring retail electricity suppliers to procure a minimum percentage of electricity from renewable energy sources. SB 1078 set an initial requirement that 20 percent of electricity retail sales must come from renewable resources by 2017. These targets were most recently updated in 2018 by SB 100, which requires that California's load-serving entities procure 60 percent of their retail electricity sales from eligible renewable sources by 2030 and 100 percent of their retail electricity sales from eligible renewable or zero-carbon resources by 2045. SB 100, as well as SB 1020 which was passed in 2022, also set interim RPS targets, as shown in Table 2.

Table 2 Senate Bill 100 and Senate Bill 1020 Targets

Year	Percent Retail Sales Renewable or Zero Carbon	Legislation
2020	33	SB 100
2024	44	SB 100
2027	52	SB 100
2030	60	SB 100
2035	90	SB 1020
2040	95	SB 1020
2045	100	SB 100

Source: Senate Bill 100 and Senate Bill 1020. Table compiled by Ascent in 2023.

California exceeded its 2020 target of 33 percent, with 36 percent of retail sales being supplied by eligible renewable energy resources that year. While the state was ahead of schedule in 2020, significant additional renewable energy capacity will need to be built to meet the state's targets. Energy resource capacity models developed by the California Energy Commission (CEC), the California Public Utilities Commission (CPUC), and the California Air Resources Board (CARB), presented in the 2021 SB 100 Joint Agency Report, show that California will need to produce 69.4 GW of utility-scale solar energy and 12.6 GW of onshore wind energy (both in and out-of-state) by 2045 to meet the targets set in SB 100. Based on current technology, annual build rates for solar and wind energy will need to nearly triple from what they are today to meet this capacity (CEC 2021).

While battery energy storage does not produce energy, it will be critical in ensuring grid reliability when solar and wind energy are not readily available. Currently, natural gas power plants provide about 75 percent of the flexible capacity of the grid, as they can quickly ramp-up energy production to meet supply and demand. To decrease reliance on natural gas, large-scale battery energy storage will be needed to maintain reliability as an increasing portion of the electricity grid is powered by renewables that are variable by nature. The 2021 SB 100 Joint Agency Reports shows that 48.7 GW of battery storage will be required by 2045 to meet the SB 100 targets. Based on current technology, battery storage build rates will need to increase by almost eightfold in order to meet capacity (CEC 2021).

CAP-AND-TRADE PROGRAM

California's market-based Cap-and-Trade Program, launched in 2012, is a critical component of the state's GHG reduction strategy. It places a declining cap on the amount of emissions that can be produced by large power plants, importers of electricity, industrial plants, and natural and transportation fuel suppliers each year (i.e., regulated entities). Regulated entities are required to obtain permits for emissions produced. To meet the emissions cap, regulated entities have the option to reduce on-site emissions or to purchase additional emissions allowances from auctions or other regulated entities that have reduced their emissions and are able to sell their additional emissions allowances. Cap-and-Trade covers approximately 80 percent of the state's GHG emissions (CARB 2023). Because the annual emissions cap is reduced each year, regulated entities are incentivized to shift towards renewable and clean energy.

INTEGRATED RESOURCE PLANNING

Integrated Resource Planning (IRP) began in 2015 as a requirement of SB 350 and is key to decarbonizing the electricity sector as it provides an implementation mechanism for integrating renewable energy sources to the electric grid to achieve the targets set by SB 100. To implement this, the CPUC requires California energy utilities to submit resource plans that show how they will reduce their carbon emissions below their share of 38 million metric tons (MMT) of total

statewide electric sector emissions by 2030 and even further to 30 MMT by 2035 (CPUC 2022b).[2] The Clean System Power tool is the official CPUC regulatory compliance mechanism that utilities must meet to show that their carbon emissions will meet targets.

ASSEMBLY BILL 2625

Assembly Bill 2625, passed in August 2022, exempts energy storage projects from the state's Subdivision Map Act, which gives local legislative bodies authority to approve, disapprove, or set conditions for the subdivision of parcels. Energy storage projects may be allowed on larger parcels without the need to subdivide. This bill allows energy storage projects to be built more quickly since the subdivision approval process often adds a significant amount of time to project timelines. Solar and wind generation projects were already exempt from the state's Subdivision Map Act.

ASSEMBLY BILL 205

Assembly Bill 205, passed in June 2022, expands the CEC's siting authority to include solar photovoltaic or terrestrial wind electrical generating powerplants with a generating capacity of 50 megawatts or more, energy storage systems that can store 200 megawatt hours or more, renewable energy manufacturing facilities valued at $250 million or greater, and electric transmission lines that carry power from these eligible facilities to a point of junction with any interconnected electrical transmission system. Eligible facilities must also have an overall net positive economic benefit to the local jurisdiction, and the applicant is required to enter into a binding and enforceable agreement with a community-based organization. It also established a new certification process for eligible facilities that allows them to be developed without needing approval from local zoning authorities and requires the CEC to complete environmental review pursuant to the California Environmental Quality Act. The bill also provides funding for eligible renewable generation and energy storage projects. The changes enacted by this bill support an increase in renewable energy in the state's electric mix. As this report was prepared, Ascent is not aware of any projects that have been approved through this new state process in the unincorporated area.

1.2.3 Local (Unincorporated Area of Ventura County)

LOCAL CLIMATE LEGISLATION AND POLICY

Local governments also play a key role in achieving California's statewide climate goals. One increasingly common strategy to reduce GHG emissions is for local governments is to adopt ordinances that impose requirements more stringent than the CEC's Building Energy Efficiency Standards (Title 24, Part 6, or California Energy Code),[3] California Green Building Standards Code (CALGreen) (Title 24, Part 11),[4] or nonbuilding code sections of the jurisdictions' municipal code[5] (e.g., public health and safety chapters). Local ordinances are an effective mechanism that governments can use to achieve GHG reductions contained in adopted sustainability, resiliency, climate action, and general plans.

In November 2022, the County Board of Supervisors approved an all-electric reach code in order to implement General Plan Program HAZ-AA which required the County to amend the Ventura County Building Code to prohibit the use of natural gas in new residential and commercial buildings. This reach code also implemented Program COS-S which required the County to update the building code to include a mandatory reach code. The all-electric requirement

[2] In IRP, the CPUC also requires that utilities submit a second, lower-carbon resource plan to meet statewide carbon goals. This second plan uses targets of 30 and 25 MMT in 2030 and 2035, respectively.
[3] https://www.energy.ca.gov/publications/2008/2019-building-energy-efficiency-standards-residential-and-nonresidential.
[4] https://codes.iccsafe.org/content/CGBC2019P4.
[5] For Ventura County's municipal code, see https://library.municode.com/ca/ventura_county/codes/code_of_ordinances.

applies to all new buildings, as well as additions to existing structures that are greater than 50 percent of the size of the main building and remodels that are greater than 50 percent of the value of the main building. The County's all-electric ordinance became effective January 1, 2023.

To complement the County's building electrification policy and as part of the Climate Action Plan, the General Plan also identifies Policies and Programs to advance renewable energy generation and energy storage. General Plan Program COS-O requires the County to "conduct a study and prepare a publicly available assessment of suitable undeveloped lands near electrical transmission and distribution lines that serve as priority areas for the development of utility-scale solar energy generation and storage projects. If suitable locations are identified, the County shall establish a new zone, if necessary, called a Renewable Energy Priority Zone, for these sites in the County's Coastal and Non-Coastal Zoning Ordinances." Policy EV-4.4 also requires the County to "identify appropriate locations to allow for development of renewable energy generation and storage facilities and encourage the development of innovative approaches to renewable energy deployment, including solar power, wind power, wave energy, distributed power systems and micro-grids, and other appropriate renewable sources and storage and distribution systems." This Assessment works to support the transformation of the electric grid and directly implement COS-O and EV-4.4, as previously described.

In addition to directly supporting General Plan Program COS-0 and Policy EV-4.4, this assessment also supports policies and programs associated with emissions reduction and clean energy generation that are identified in the County's General Plan. These policies and programs are shown in Table 3.

Table 3 County of Ventura Policy and Programs

Policy or Program	Description
COS-8.1	*Reduce Reliance on Fossil Fuels* The County shall promote the development and use of renewable energy resources (e.g., solar, thermal, wind, tidal, bioenergy, hydroelectricity) to reduce dependency on petroleum-based energy sources.
COS-8.5	*Decarbonize Communitywide Electricity Supplies* The County shall work with utility providers to offer residents options to purchase and use renewable energy resources.
COS-8.6	*Zero Net Energy and Zero Net Carbon Buildings* The County shall support the transition to zero net energy and zero net carbon buildings, including electrification of new buildings.
COS-8.8	*Renewable Energy Features in Discretionary Development* The County shall encourage the integration of features that support the generation, transmission, efficient use, and storage of renewable energy sources in discretionary development.
COS-8.10	*Battery Energy Storage Systems* The County shall encourage battery energy storage systems as an option for optimizing the management of electricity generated by renewable resources.
COS-10.2	*Community Greenhouse Gas Emissions Reduction Target for 2030* The County shall work toward achieving a community-wide GHG emissions reduction target of 41 percent below 2015 levels by 2030.
COS-10.3	*Community Greenhouse Gas Emissions Reduction Goals for 2040 and 2050* The County shall work towards achieving longer-term, post-2030 community-wide GHG emissions reduction goals, as follows: 61 percent below 2015 levels by 2040, and 80 percent below 2015 levels by 2050.
COS-N	*Sustainable Building, Siting, and Landscaping Practice Guidelines* The County shall prepare sustainable building, siting, and landscaping practice guidelines that promote a whole systems approach to building designs and construction techniques that reduce consumption of nonrenewable resources such as oil, gas and water and promote renewable energy use.
COS-Q	*Incentives for Development of Renewable Energy Projects*

	To incentivize the development of the Renewable Energy projects, the County shall consider waiving permit fees for renewable energy generation or storage projects.
COS-R	*Performance-Based Building Code for Green Building* The County shall maintain and update as needed the Building Code to establish performance-based standards that incentivize green building techniques.
HAZ-11.7	*Green Building Design Features* The County shall encourage development to include new building designs or retrofits to improve building performance through strategic building design features, including insulation to reduce energy usage, solar-reflective white roofs, solar panels, green roofs (vegetation on roofs), and battery storage for energy.
PFS-7.7	*Community Microgrids* The County shall collaborate with renewable energy developers, community choice aggregation programs, and local serving entities to develop solar generation plus energy storage at critical facilities and community microgrids for resilience during power outages with a priority in designated disadvantaged communities.

Notes: COS = Conservation and Open Space; HAZ = Hazards and Safety; PFS = Public Facilities, Services, and Infrastructure

Source: County of Ventura General Plan 2040. Table compiled by Ascent in 2023.

While the policies described above support renewable energy development in the County, there are also other General Plan/Climate Action Plan contrasting policies and programs that may be limiting and challenging for this development, as shown in Table 4.

Table 4 County of Ventura Policy and Programs

Policy or Program	Description
Agricultural Lands Use Designation	The Agricultural designation is applied to lands which are suitable for the cultivation of crops and the raising of livestock. Because of the inherent importance of agriculture as a land use in and of itself, agriculture is not subsumed under the Open Space land use designation but has been assigned a separate land use designation. Under this designation, the County shall: ▪ Identify, preserve, and protect agricultural lands as a non-renewable resource within the county that are critical to the maintenance of the local agricultural economy and are important to the state and nation for the production of food, fiber, and ornamentals. ▪ Maintain agricultural lands in parcel sizes which will assure that viable farming units are retained. ▪ Establish policies and regulations which restrict agricultural land to farming and related uses rather than other development purposes. ▪ Restrict the introduction of conflicting uses into farming areas. Development Standards – Maximum Lot Coverage: 5 percent
AG-1.2	*Agricultural Land Use Designation* The County shall ensure that discretionary development located on land designated as Agricultural on the General Plan Land Use Diagram and identified as Prime Farmland or Farmland of Statewide Importance on the State's Important Farmland Inventory is planned and designed to remove as little land as possible from potential agricultural production and to minimize impacts on topsoil.
AG-1.8	*Avoid Development on Agricultural Land* The County shall ensure that discretionary development located on land identified as Important Farmland on the State's Important Farmland Inventory shall be conditioned to avoid direct loss of Important Farmland as much as feasibly possible.
LU-8.2	*Land Uses Appropriate for the Agricultural Land Use Designation* The County shall ensure that land designated as Agricultural is used for the production of food, fiber, and ornamental; animal husbandry and care; uses accessory to agriculture; and limited temporary or public uses which are consistent with agricultural or agriculturally related uses.

Open Space Land Use Designation	The Open Space designation encompasses land, as defined under Section 65560 of the Government Code, as any parcel or area of land or water which is essentially unimproved and devoted to an open-space use as defined in this section and which is designated on a local, regional or State open space plan as any of the following: ▪ Open space for the preservation of natural resources including, but not limited to, areas required for the preservation of plant and animal life, including habitat for fish and wildlife species; areas required for ecologic and other scientific study purposes; rivers, streams, bays and estuaries; and coastal beaches, lakeshores, banks of rivers and streams, and watershed lands. ▪ Open space used for the managed production of resources, including but not limited to, forest lands, rangeland, agricultural lands not designated agricultural; areas required for recharge of groundwater basins; bays, estuaries, marshes, rivers and streams which are important for the management of commercial fisheries; and areas containing major mineral deposits, including those in short supply. ▪ Open space for outdoor recreation, including but not limited to, areas of outstanding scenic, historic and cultural value; areas particularly suited for park and recreation purposes, including access to lakeshores, beaches, and rivers and streams; and areas which serve as links between major recreation and open space reservations, including utility easements, banks of rivers and streams, trails, and scenic highway corridors. ▪ Open space for public health and safety, including, but not limited to, areas which require special management or regulation because of hazardous or special conditions such as earthquake fault zones, unstable soil areas, flood plains, watersheds, areas presenting high fire risks, areas required for the protection of water quality and water reservoirs and areas required for the protection and enhancement of air quality. ▪ Open space to promote the formation and continuation of cohesive communities by defining the boundaries and by helping to prevent urban sprawl. ▪ Open space to promote efficient municipal services and facilities by confining urban development to defined development areas. Development Standards – Maximum Lot Coverage: 5 percent

LOCAL PROCUREMENT GOALS

Clean Power Alliance (CPA) is the community choice aggregator that has provided electricity to the County and other regions in Southern California. The County Board of Supervisors voted to join CPA in December 2017, and CPA has been serving electric customers in the County since 2019 (Clean Power Alliance 2019). CPA currently serves 96 percent of the customers in its territory (CalCCA 2023). As mandated by SB 350, the CPUC requires all energy utilities to submit an Integrated Resource Plan (IRP) that shows how the utility will meet the carbon-free electricity targets set by SB 100 and SB 1020 while also ensuring a safe, reliable, and cost-effective electrical supply. CPA's IRP shows the utility will provide 81 percent GHG-free power by 2024, 87 percent by 2026, 92 percent by 2030, and 96 percent by 2035 (CPA 2022). These targets are more ambitious than the procurement requirements set by SB 100 and SB 1020.

SCE also provides electricity to a small portion of the County and other regions in Southern California. SCE's IRP shows the utility will provide 45 percent GHG-free power by 2024, 54 percent by 2026, 67 percent by 2030, and 77 percent by 2035 (SCE 2022).

The state's current target for battery energy storage is 14,000 MW of new build by 2030 (CPUC 2022a: 87); of this amount, CPA plans to build approximately 1,440 MW in its territory (CPA 2022). If these amounts were prorated to reflect unincorporated Ventura County's load, about 79 MW of new storage would be sited in the unincorporated County.[6]

[6] These numbers are intended to be illustrative ranges and would vary based on whether the County adheres to the state targets or CPA targets. Ventura County had a population of 839,784 as of 2021, and of this approximately 94,003, or 11%, is located in the unincorporated county. This 11%

2 DATA AND METHODS

2.1 METHODOLOGY

This renewable energy assessment identifies undeveloped and underutilized sites within the County that have high potential for ground-mounted solar renewable energy, wind, and grid-scale battery storage projects. Using Geographical Information Systems (GIS) mapping software, data sets for multiple criteria were overlaid to assess the level of desirability of sites within the County.

To conduct the analysis, a set of criteria related to the feasibility of siting renewable energy was developed. If a given area was deemed unacceptable for construction of new energy resources (e.g., the area is state or federally owned land or it is zoned for high-density urban residential uses, meaning that neither the zoning law nor the available space would permit the construction of a new energy project), that area was deemed unacceptable and removed from consideration. For the remaining areas, each was given a score between 1 and -1, with 1 representing a preferred area, 0 representing an acceptable area, and -1 representing an acceptable but discouraged area. This analysis was performed separately for each type of renewable energy being assessed—solar, wind, and battery energy storage. Refer to Appendix A for a detailed list of criteria, scores, and rationale for inclusion in the analysis, as well as areas deemed unacceptable and removed from consideration. The criteria were then overlaid using GIS mapping software and a summary score was calculated to determine the overall level of desirability for each type of energy resource. The results are presented by energy source type in Section 3.

Since distance to high-voltage energy transmission lines is an important factor for siting renewable energy projects, the ranges for preferred, acceptable, and acceptable but discouraged distances of potential energy project sites to their point of interconnection (POI) with the SCE grid was determined. The distance between each generation site and its POI at a substation was measured using latitude and longitude coordinates. An average distance from generator to POI was calculated, weighted by project MW (e.g., when calculating the average, a 400 MW project received twice the weight in the average that a 200 MW project received). It was found that, on average, solar projects were approximately 9 miles from their POI, wind projects were approximately 7 miles from their POI, and energy storage projects were approximately 8 miles from their POI. Based on these averages, it was qualitatively determined that the following distance categories would be most appropriate for this project: 0 to 6 miles is preferred, greater than 6 but less than or equal to 12 miles is acceptable, and greater than 12 miles is acceptable but discouraged. Given the wide network of transmission lines across the County (see map in Appendix B), this analysis indicates renewable energy projects can be connected to the SCE grid from virtually anywhere in the southern areas of the County.

2.2 STAKEHOLDER FEEDBACK

Planning Division staff had discussions with key stakeholders to ensure a robust set of criteria was included in the Assessment. Stakeholders included SCE, private renewable energy facility developers and operators, as well as the County's Development Review Committee, including staff from the Public Works Agency, the Fire Department, Department of Airports, Agricultural Commissioner, and the Local Area Formation Commission (LAFCo). Key criteria identified during these discussions included distance from transmission lines and substations, zoning status, slope,

share was used to estimate the energy usage of the unincorporated county. The County as a whole used 5,242 Gigawatt hours (GWh) in 2021, and 11% of that equates to 577 GWh. This 577 GWh was then used to estimate the County's electrical load percent of the Clean Power Alliance's total load in year 2021 of 10,727 GWH, which equates to approximately 5.5 percent of the total (587 GWh for unincorporated county / 10,727 GWh in 2021 for Clean Power Alliance service territory = approximately 5 percent).
According to its latest Integrated Resource Plan (filed at the California Public Utilities Commission in November 2022), CPA plans to build 1,440 MW of new energy storage capacity by 2035. If that 5.5 percent were allocated to unincorporated Ventura County, it would approximate 79 MW of new storage build for the unincorporated county.

airport safety zones, areas with a high risk of flooding or fires, earthquake zones, national and state park designated areas, wildlife habitats, wetlands, and whether the site is located within a water purveyor or Certified Unified Program Agency facility (i.e. sites handling or storing hazardous materials) boundary.

3 ANALYSIS AND RESULTS

The analysis for solar, wind, and energy storage is presented below. The megawatt (MW) potentials shown are illustrative "upper bound" values and show only the maximum amount of MW that could be sited on the land, based solely on the acreage requirements detailed below. They are not intended as an estimate of commercially feasible amounts, nor do they reflect other factors that energy developers consider when siting resources such as engineering constraints, the cost of interconnection, or permission from the owner of the land.

The following colors on the map indicate that an area was prohibited for siting: light gray (within the boundary of a city), dark gray (on federal, state, or Naval Base Ventura County (NVBC) lands), and crosshatched (prohibited due to having at least one criterion being prohibited; for example, in a critical wildlife passage area). Colors on these maps show the sum of the scores using the methods described in Section 2.1 and Appendix A; yellow and orange generally indicate lower scores, whereas purple and blue indicate higher scores. These total scores range from -4 to 3 for solar, -3 to 3 for wind, and -5 to 4 for batteries. These scores represent qualitative rankings only (e.g., siting a resource on a "3" site is "better" than on a "2" site, but the amount that it is better is not quantifiable), and are not comparable across resource types: for example, a -4 for battery does not equate to a -4 for solar. The ranges of the scores differ because different sets of criteria apply to different resources—for example, wind resources receive a score -1 for being sited in a condor habitat, whereas this criterion is not relevant for solar and battery storage.

3.1 SOLAR

Based on the criteria described in Section 2 and detailed in Appendix A, a map showing solar potential in the County was created (Figure 1). Table 5 summarizes total acres by rating, for all acres that were not prohibited (324,752 acres) and estimates the number of solar MW that could be built in that area, based on an assumption of 7.9 acres per MW of installed capacity (NREL 2013: v).[7] Locations with the top two scores (in light blue and dark blue) are located in various places across the southern half of the County, with larger concentrations near Ojai, Moorpark, and Simi Valley.

[7] For this MW per acre value, it was assumed that the solar project was a photovoltaic array greater than 20 MW. This MW per acre value is similar to that of photovoltaic arrays smaller than 20 MW, which is approximately 8.3 acres per MW (NREL 2013: v).

An acre is approximately one football field of space. Solar PV units can range from less than 1 MW for some distributed systems, to over 500 MW for large projects (e.g., Topaz Solar Farm in San Luis Obispo, CA, which has a capacity of 550 MW).

Figure 1: Solar Potential Map for Ventura County

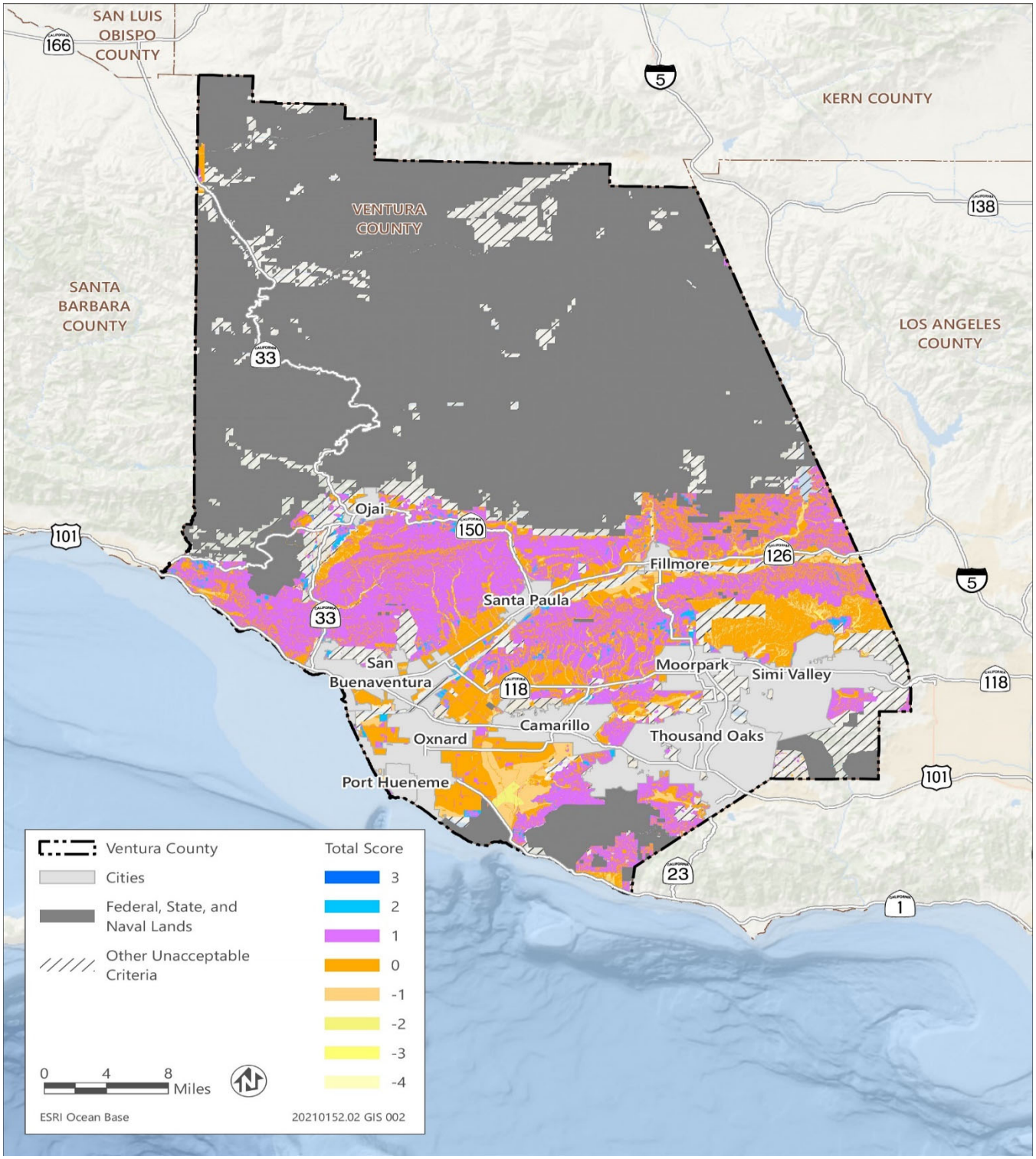

Table 5: Solar Potential Acreages and MW for Ventura County

Rating	Total Acres	Total Solar MW
-4	0	0
-3	77	10
-2	2,404	304
-1	23,839	3,018
0	127,755	16,171
1	164,591	20,834
2	6,080	770
3	8	1
Total	324,752	41,107

Notes: MW = megawatt. Values are rounded to the nearest whole number.

Source: Ascent Environmental 2023.

3.2 WIND

Based on the criteria described in Section 2 and detailed in Appendix A, a map showing wind potential in the County was created, with darker colors indicating higher potential (Figure 2). Only the southeast corner of the County (between Highway 126 and Simi Valley) was studied, as this was the only area with fast enough wind speeds (greater than 8 meters per second)[8] to make a wind project economical. Locations with the top two scores (in light blue and dark blue) are generally located south of Highway 126, in addition to land southeast of Simi Valley.

Table 6 summarizes total acres by rating for all acres that were not prohibited (52,634 acres) and estimates the number of wind MW that could be built in that area, based on an assumption of 2.47 acres per MW (DOE 2015: 214).

[8] For wind projects constructed in 2021, average wind speed was approximately 8 meters per second (DOE 2022: 24-26; speeds are measured at a hub height of 100 meters, which is most typical for new wind turbines). Based on Ventura County-specific wind speed data (DOE: 2023), the 134,874 acres studied are the only locations in the County with wind speeds that met or exceeded this value. Other areas have slower wind speeds and are thus unlikely to attract development of wind resources.

Figure 2: Wind Potential Map for Ventura County

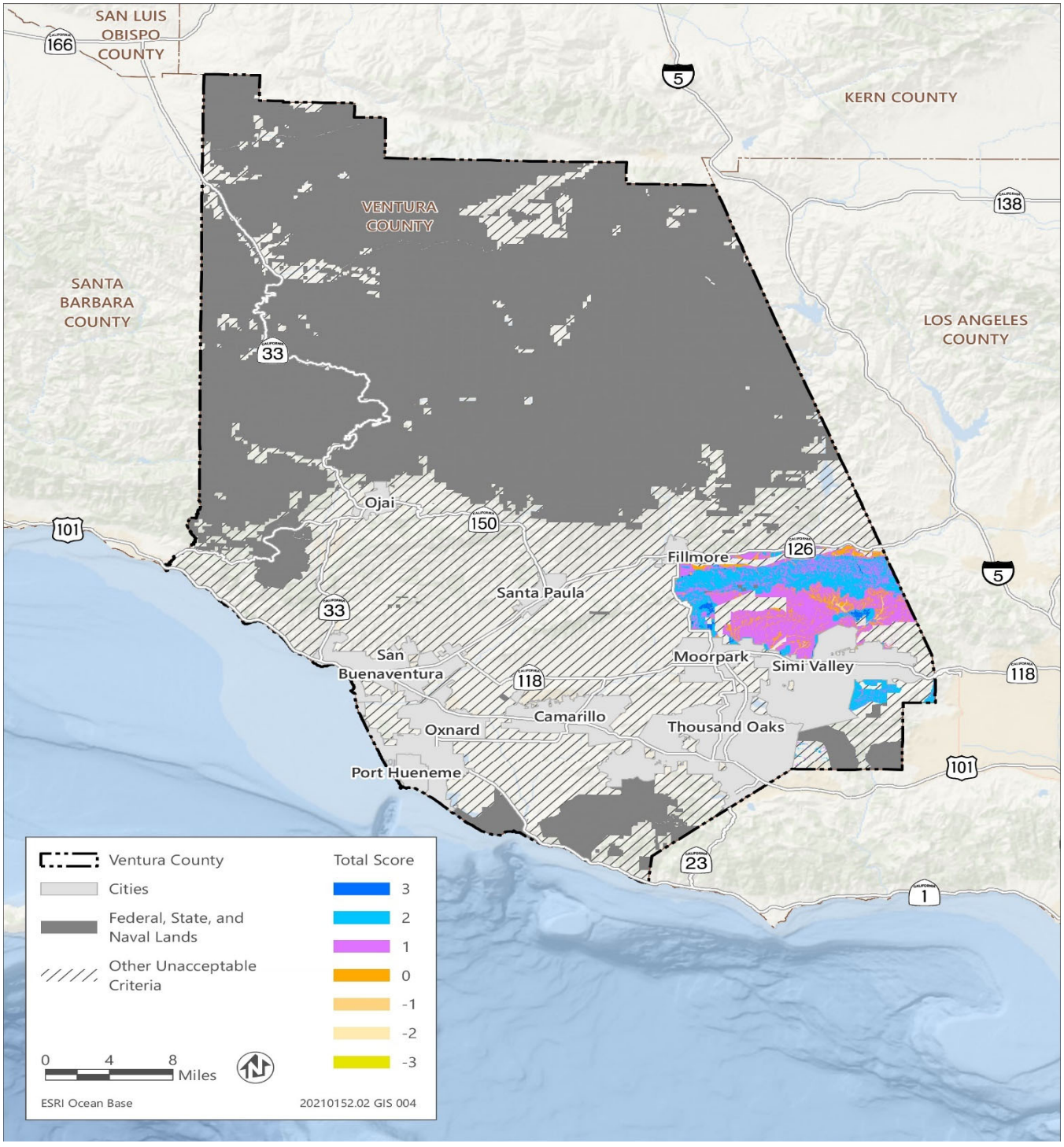

Table 6: Wind Potential Acreages and MW for Ventura County

Rating	Total Acres	Total Wind MW
-3	0	0
-2	31	13
-1	412	167
0	5,354	2,168
1	26,894	10,888
2	19,058	7,716
3	887	359
Total	52,635	21,310

Notes: MW = megawatt. Values are rounded to the nearest whole number.

Source: Ascent Environmental 2023.

3.3 ENERGY STORAGE

Based on the criteria described in Section 2 and detailed in Appendix A, a map showing energy storage potential in the County was created, with darker colors indicating higher potential (Figure 3). For the purposes of this analysis, lithium ion batteries were assumed to be the technology used,[9] as they are currently the most popular (S&P Global 2023). It was assumed that 1 MW of battery storage required 0.04 acres of land.[10] Table 7 summarizes total acres by rating, for all acres that were not prohibited (324,752 acres). Locations with the top two scores (in light blue and dark blue) are generally located near Moorpark, Camarillo, Ojai, and Simi Valley.

[9] Other energy storage technologies include redox-flow batteries, zinc-hybrid batteries, and flywheel energy storage.

[10] Energy storage resources have specifications for both their maximum power output and the total energy that they are able to store. Units of energy are specified in watt-hours, abbreviated as Wh. For example, if a 1.5 kilowatt microwave ran for 3 hours, it would use 1.5 * 3 = 4.5 kWh of energy. A typical grid-scale battery configuration might have a power rating of 100 MW and the ability to store a total of 400 MWh of energy.

To calculate this acreage requirement, storage footprint was assumed to be 0.01 acres per MWh of energy stored (Guidehouse 2020: 9). A typical grid-scale lithium ion battery has a duration of 4 hours (CAISO 2023: 8). Therefore, a 1 MW battery with a 4-hour duration can store 4 MWh of energy. This battery will occupy 0.01 acres per MWh * 4 MWh per MW = 0.04 acres per MW.

Figure 3: Storage Potential Map for Ventura County

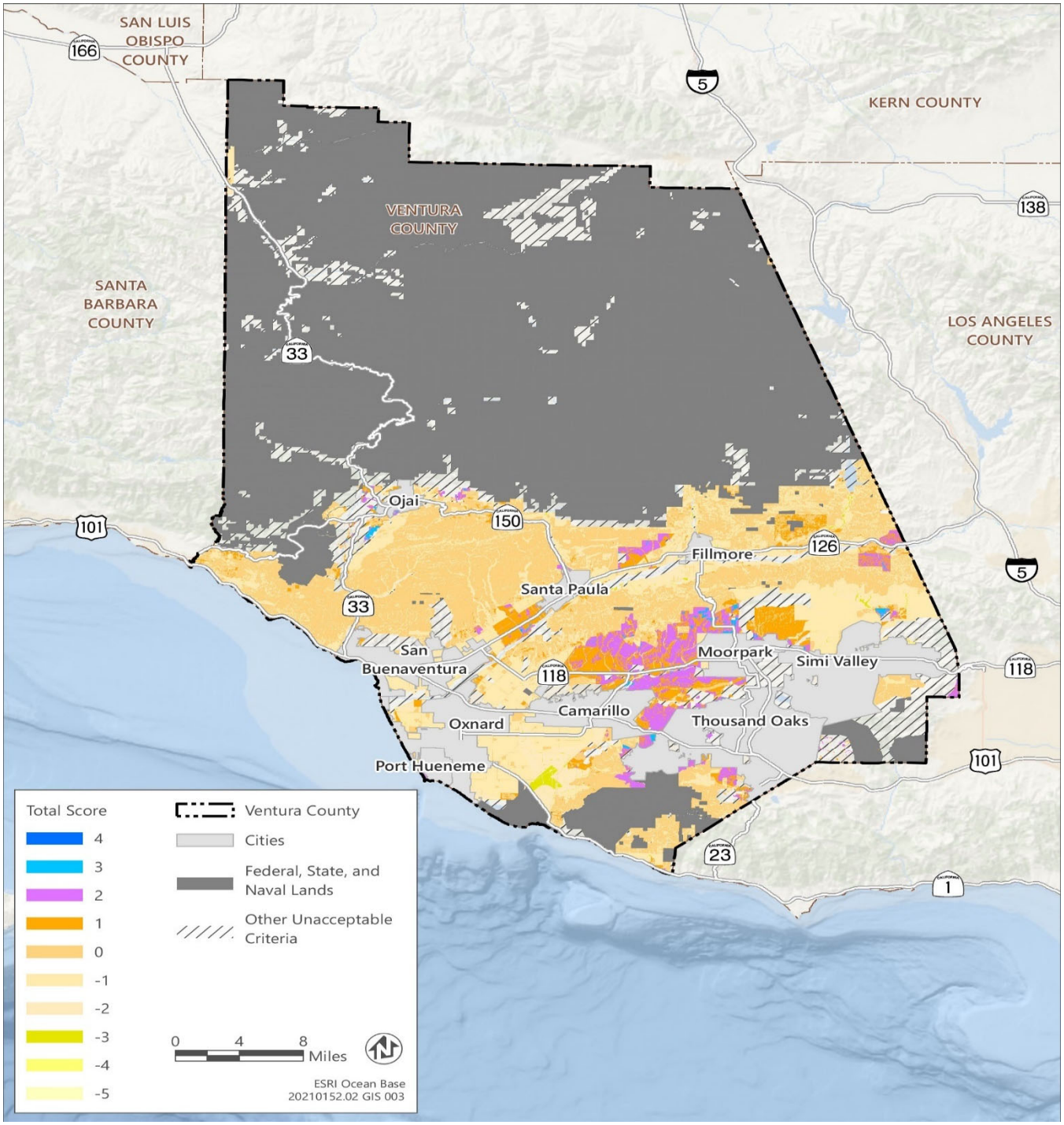

Table 7: Storage Potential Acreages and MW for Ventura County

Rating	Total Acres	Total Storage MW
-5	0	1
-4	51	1,272
-3	2003	50,083
-2	18678	466,944
-1	101826	2,545,658
0	146171	3,654,281
1	30990	774,755
2	23461	586,517
3	1572	39,300
4	0	1
Total	324,752	8,118,812

Notes: MW = megawatt. Values are rounded to the nearest whole number.

Source: Ascent Environmental 2023.

4 SUMMARY OF FINDINGS

As summarized in Table 8, the greatest number of acres in the County was found to be potentially compatible for battery storage projects due to the relatively small project footprint (0.04 acres per MW), compared to 7.9 acres for solar and 2.47 acres per wind. The table below also highlights the number of acres receiving the top two possible scores for each resource type (e.g., 3 and 4 for storage)—these are called "optimal" acres as a shorthand. The 39,301 MW of storage exceeds the upper bound estimate of the prorated share of county storage (250 MW) by 39,052 MW.

Table 8: Summary of Potential Acreages and MW for Ventura County

Technology	Total Potential Acres	Total Potential MW	Total Optimal Acres	Total Optimal MW	Acres per MW
Solar	324,752	41,107	6,087	771	7.90
Wind	52,635	21,310	19,944	8,075	2.47
Energy Storage	324,752	8,118,812	1,572	39,301	0.04

Notes: MW = megawatt. Acres and MW values are rounded to the nearest whole number.

Source: Ascent Environmental 2023.

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6 APPENDIX A: DESCRIPTION OF GIS LAYERS

Table 9 GIS Layers

Criterion	Data Source	Solar	Wind	Battery	Rationale
Greater than 12 miles away from transmission line or substation	California Electric Transmission Lines (CEC 2023a) Electric Substations (CEC 2023b)	-1	-1	-1	High interconnection costs; less attractive to developers
6-12 miles away from transmission line or substation	California Electric Transmission Lines (CEC 2023a) Electric Substations (CEC 2023b)	0	0	0	Medium interconnection costs; more attractive to developers
0-6 miles from transmission line or substation	California Electric Transmission Lines (CEC 2023a) Electric Substations (CEC 2023b)	1	1	1	Low interconnection costs; most attractive to developers
In Los Padres National Forest, National Park Service-owned parcels in Santa Monica National Recreation Area, or California State Parks	USFS Administrative Forest Boundaries (USFS 2021)	Unacceptable	Unacceptable	Unacceptable	Mountainous terrain increases project costs, sparse transmission, not in County jurisdiction
In a regulatory or special floodway	National Flood Hazard Layer Viewer (FEMA 2021a) Flood Hazard and Risk Data Viewer (FEMA 2021b) Flood Map Service Center (FEMA 2023)	Unacceptable	Unacceptable	Unacceptable	Safety and equipment damage hazards

In a 100-year flood hazard (1 percent chance annual flood hazard) area	National Flood Hazard Layer Viewer (FEMA 2021a) Flood Hazard and Risk Data Viewer (FEMA 2021b) Flood Map Service Center (FEMA 2023)	-1	-1	-1	Safety and equipment damage hazards
In an area with slope grades greater than 20 percent	Digital Elevation Monitoring (DEM) data provided by Ventura	-1	-1	-1	Steep slopes substantially increase project costs
In an earthquake fault hazard zone	CGS Seismic Hazards Program: Alquist-Priolo Fault Hazard Zones (DOC 2022)	-1	-1	-1	Safety and equipment damage hazards
In Water Purveyor's boundary	County of Ventura Water Purveyors (County of Ventura 2023)	Not relevant	Not relevant	See footnote[11]	Batteries require water for fire suppression
In condor Critical Habitat	California Natural Diversity Database (CDFW 2023)	Not relevant	Unacceptable	Not relevant	Wildlife endangerment
In condor habitat range	California Natural Diversity Database (CDFW 2023)	Not relevant	-1	Not relevant	Wildlife endangerment
In southeast corner of the County with sufficient wind resource	WindExchange - California Land-Based Wind Speed at	Not relevant	1	Not relevant	Minimum wind speed required to make project economical

[11] For water purveyors, a score of -1 was assigned if a battery storage unit was not in a water purveyor's boundary. A score of 0 was assigned if the unit was in the boundary of a water purveyor, but that purveyor currently had no additional capacity (although that capacity could be expanded in future). A score of 1 was assigned if that water district currently had additional capacity.

	100 Meters (DOE 2023)				
Parcel is vacant/underutilized commercial/industrial site	Vacant lot data provided by Ventura	1	1	1	Lower cost of development
In Critical Habitat (all species)	Critical Habitat for Threatened & Endangered Species (USFWS 2023a)	-1	-1	-1	Wildlife endangerment
In Wetlands	National Wetlands Inventory (USFWS 2023b)	-1	-1	-1	Wildlife endangerment
In Critical Wildlife Passage Areas	Habitat Connectivity and Wildlife Corridor (County of Ventura 2019)	Unacceptable	Unacceptable	Unacceptable	Wildlife endangerment
In any of these zones: (RE, RO, R1, R2, RPD, RHD, and TRU). This list comprises all Urban Residential and Rural Residential Zones except RA.	Zoning Designation Data Provided by Ventura	Unacceptable	Unacceptable	Unacceptable	Current zoning laws
In RA Zones on parcel less than 4 acres	Zoning Designation Data Provided by Ventura	Unacceptable	Unacceptable	Unacceptable	Not enough space to build
In RA Zones on parcel 4 acres or larger	Zoning Designation Data Provided by Ventura	0	Unacceptable	0	Current zoning laws; noise issues for wind
In Ag GP Designation, and has Important Farmland Inventory Classification: Prime/Statewide Importance	Farmland Mapping & Monitoring Program (DOC 2023)	-1	-1	-1	Possible disturbance to soil and crops for highest importance land (Prime/Statewide)
In Ag GP Designation, and has Important Farmland Inventory Classification: Unique/Local Importance	Farmland Mapping & Monitoring Program (DOC 2023)	0	0	0	Possible disturbance to soil and crops
In OS GP Designation, and has Important Farmland Inventory Classification:	Farmland Mapping & Monitoring	0	0	0	Possible disturbance to soil and crops

Prime/Statewide/Unique/Local Importance	Program (DOC 2023)				
In OS GP Designation and has No Important Farmland Inventory Classification	Farmland Mapping & Monitoring Program (DOC 2023)	1	1	1	Development possible without disturbance to soil and crops
In High or Very High Fire Hazard areas	California Fire Hazard Severity Zones (CAL FIRE 2022)	-1	-1	-1	Safety and equipment damage hazards
In Moderate Fire Hazard areas	California Fire Hazard Severity Zones (CAL FIRE 2022)	0	0	0	Safety and equipment damage hazards
In zone with coastal and residential zoning	Coastal Zone Boundary (CCC 2014)	Unacceptable	Unacceptable	Unacceptable	Current zoning laws
In zone with coastal and agricultural zoning	Coastal Zone Boundary (CCC 2014)	Unacceptable	Unacceptable	Unacceptable	Current zoning laws
In Naval Base Ventura County Airfield Accident Potential Zone - Clear Zone*	Military Areas Data Provided by Ventura	Unacceptable	Unacceptable	Unacceptable	Safety and national security issues
In Naval Base Ventura County Airfield Accident Potential Zone - Accident Potential Zone I (Apz I) Or Accident Potential Zone II (Apz II)[12]	Military Areas Data Provided by Ventura	-1	-1	-1	Safety and national security issues
Not In County Jurisdiction	City, State, and Federal Lands Data Provided by Ventura	Unacceptable	Unacceptable	Unacceptable	City, state, and federal lands not in County jurisdiction
In Land Conservation Area Boundary	Land Conservation Area Boundary Provided by Ventura	Unacceptable	Unacceptable	Unacceptable	Conserved lands are protected from development
County of Ventura-owned land	Boundary provided by Ventura	Unacceptable	Unacceptable	Unacceptable	Land use already set aside for County

Source: Compiled by Ascent in 2023.

[12] Imaginary surface zones data were not available and thus excluded from this analysis.

7 APPENDIX B: VENTURA COUNTY ELECTRIC TRANSMISSION MAP

Figure 4: Ventura County Electric Transmission Lines Map

Note: Blue lines on this map indicate transmission lines; the dotted gray line to the east indicates the borders of the County. Only the southern half of the County is shown in this figure because there are no transmission lines in the County north of Meiners Oaks.

Source: CEC 2023a.