

Appendix C

**SMUD Response to SMW NOP
Comments and Westslope Consulting
and Capitol Airspace Comment Letters**

April 26, 2019

VIA E-MAIL AND U.S. MAIL

Mr. Robert "Perl" Perlmutter
Shute Mihaly & Weinberger LLP
396 Hayes Street
San Francisco, California 94102

Re: Solano County ALUC Comments on SMUD Notice of Preparation for Solano 4 Wind Project

Dear Mr. Perlmutter:

We represent the Sacramento Municipal Utility District ("SMUD") and I am writing in response to your letter dated February 8, 2019, submitted on behalf of the Solano County Airport Land Use Commission ("ALUC") with comments regarding the January 9, 2019 Notice of Preparation ("NOP") for the Solano Wind Phase 4 Project ("Project"). While not required to do so under the California Environmental Quality Act ("CEQA"), SMUD is providing this response to the ALUC out of professional courtesy and in the interests of working cooperatively with the County on this important Project. As described in more detail below, the NOP's statement that the Solano Wind Project does not require ALUC approval is accurate. First, electrical generation/production facilities are exempt from a county's building and zoning ordinances under Government Code Section 53091, subdivisions (d) and (e). Second, the Federal Aviation Administration ("FAA") finding of no significant hazard for the Project preempts the ALUC regulations under the Travis Air Force Base ("AFB") Land Use Compatibility Plan ("LUCP") regarding air safety, including radar interference. Third, even if the ALUC regulations applied to the Project, SMUD, as a local agency, has the authority to overrule the ALUC determination under the State Aeronautics Act ("SAA")¹ provisions. Notwithstanding the lack of formal approval process, SMUD looks forward to reviewing and responding to comments from the Solano County ALUC on the Project's Environmental Impact Report to help ensure that concerns surrounding air safety are appropriately addressed.

¹ Pub. Util. Code, §§ 21001, et seq.

I. The Project is Exempt from the ALUC Review Because an Energy Generating/Production Facility is Exempt from a County's Zoning and Building Ordinances under the Government Code Section 53091.

SMUD's wind turbine facilities are exempted from the ALUC provisions because under subdivisions (d) and (e) of Section 53091 of the Government Code, the zoning and building ordinances of a county or city *shall not* apply to the location or construction of facilities for the generation of electrical energy. SMUD, as a municipal utility district, is a local agency for purposes of Section 53091. (See *City of Lafayette v. East Bay Municipal Utilities District* (1993) 16 Cal.App.4th 1005, 1012; 78 Cal.Atty.Gen.Ops. 31 (1995); see also *Center for Biological Diversity v. County of San Bernardino* (2016) 247 Cal.App.4th 326, 344 fn.4 [county did not have authority to apply building and zoning regulations to water project proposed by local water agency pursuant to Sections 53091 and 53096].) As a wind turbine facility is an electrical generation facility, the Project qualifies for the exemptions under subdivisions (d) and (e) of Section 53091.

In your February 8, 2019 Letter, the ALUC insists that Section 53091 exemptions do not apply because the ALUC is an independent governmental entity and not a "city or a county," and therefore the LUCP is not a "city or county" ordinance. (2/8/2019 Letter, at pp. 2-3.) As discussed below, the ALUC's powers exercised pursuant to the LUCP are tantamount to those powers exercised by a "county or city" in enacting a zoning ordinance. Indeed, the ALUC and its LUCP were formed pursuant to the County's police powers for the enactment of zoning and land use regulations. Consequently, to divorce the LUCP from the County's zoning powers would ignore the ALUC's and LUCP's foundational underpinnings. Further, the Section 53091 energy facility exemptions are more specific than the SAA provisions, and thus control.

A. The ALUC's Powers in Approving an LUCP is Tantamount to that Exercised by Solano County in Enacting a Zoning Ordinance, since it is an Exercise of the Same Zoning Power.

The ALUC's exercise of authority in drafting the LUCP is an exercise of the same zoning authority conferred by the Legislature upon cities and counties. Cities and counties draw their zoning authority from the state's general police powers. (See Cal. Const. art. XI, § 7 ["A county or city may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws"].) The Attorney General has made clear that the ALUC exercises its authority specifically by using zoning power, which derives from the general police powers possessed by cities and counties. (See 63 Cal.Atty.Gen.Ops. 641, at pp. 3-4 (1980) ["Attorney General Opinion No. 80-416"].) "Even though generally thought of in terms of city or county regulation, zoning is one exercise of the state's police power, and there is no impediment to the legislature granting that power to other agencies in the statewide interests." (*Id.* at p. 4.) This is precisely what the legislature has done in this case in creating the ALUC under the SAA.

The ALUC was established by Solano County on December 7, 1971 by Ordinance 781 to provide for orderly development of public airports in Solano County, as well as area surrounding airports to prevent new noise and safety problems.² The act creating the ALUC—a sub-agency of the County—and the powers delegated to the ALUC are derived from Solano County’s inherent police powers.³ Thus, the ALUC’s powers in drafting and approving the LUCP are an extension of Solano County’s police powers, and not separate powers of an independent agency.

Nevertheless, your February 8, 2019 Letter asserts that the ALUC’s authority is something more than or separate from that of a city or county, as the ALUC is an independent government body. But the Attorney General Opinion No. 80-416 demonstrates that the authority exercised by the ALUC is a type of “zoning authority” shared by counties and cities. In fact, the question in that case was whether an ALUC is able to zone land in the vicinity of an airport. The Attorney General found that an ALUC is, in fact, able to zone a land parcel, and that “ALUC’s [sic] have been granted zoning authority.” (Attorney General Opinion No. 80-416, at p. 5.) Contrary to the assertion in your February 8, 2019 Letter, the Attorney General in no way implied that the zoning authority possessed by an ALUC derives from a different or independent source than that possessed by a city or county.

Furthermore, under the SAA provisions, cities and counties have the authority to overrule the action of the ALUC. For example, a county may expressly overrule an ALUC’s disapproval of an action, regulation or permit by a two-thirds vote of its governing body, along with making certain findings. (Pub. Util. Code, § 21675.1(d).) A county also has the power to decide whether to submit all subsequent actions to the ALUC pursuant to Public Utilities Code Section 21676.5(a). Solano County’s ALUC Review Procedures recognize this overruling authority possessed by a county over the ALUC. (Solano County ALUC Review Procedures, § 1.5.2(b).) This authority demonstrates that the ALUC’s powers are shared with, not separate from or in addition to, those of Solano County.

While Attorney General Opinion No. 80-416 acknowledges the lack of clarity in state law regarding the precise interplay between city and county zoning and the authority held by an ALUC, the Attorney General clearly lays out the mechanism for reconciling the land use planning and zoning regulations of an ALUC with those of the county or city in which the ALUC is located:

The first level is that of measuring the local regulation against those of the ALUC, and if the ALUC determines that the local regulation is inconsistent with the ALUC plan, and after a hearing, that the implementation of the local regulation

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https://www.solanocounty.com/depts/rm/boardscommissions/solano_county_airport_land_use_commission/default.asp.

³ Even the SAA recognizes the police powers of a county and require counties to establish an ALUC for orderly development of the public airports in a county and the areas around the airports. (Pub. Util. Code, § 21670(b).)

would be harmful and not in the best interests of the airport and the adjacent area, then, at that point, the ALUC plan would prevail On the second level, however, the local agency, after a hearing, may overrule the determination of the ALUC if the city council or board of supervisors so votes with the requisite majority. The existence of such an override, however, does not detract from our conclusion that airport land use commissions have been granted zoning authority.

(Attorney General Opinion No. 80-416, at pp. 4-5.) These procedures clearly demonstrate that the ALUC's authority is not superior to, or unconnected with, that of a city or county, but rather derives from the same source and is carefully balanced with the zoning authority of a county or city under the SAA.

Thus, the ALUC's zoning authority in drafting the LUCP is indeed an exercise of the same zoning authority conferred by the Legislature upon cities and counties, and the Section 53091 exemptions apply with equal force to the ALUC's zoning provisions.

B. Principles of Statutory Construction Indicate Government Code Section 53091 Exempts SMUD from the LUCP as Section 53091 is a more Specific Provision than the SAA.

Even if one considers that there is a potential conflict between Public Utilities Code Section 21670(f) and Government Code Section 53091, the Section 53091 exemptions prevail because they expressly exempt facilities "for the production or generation of electrical energy." For example, while Section 21670(f) of the Public Utilities Code provides generally that "special districts, school districts, and community college districts are included among the local agencies that are subject to airport land use laws," Section 53091(d) of the Government Code provides specifically that:

Building ordinances of a county or city *shall not apply* to the location or construction of facilities for the production, generation, storage, treatment, or transmission of . . . electrical energy by a local agency.

Section 53091(e) further provides that:

Zoning ordinances of a county or city *shall not apply* to the location or construction of facilities . . . for the production or generation of electrical energy.

The ALUC's February 8, 2019 Letter argues that Section 21670(f) expressly subjects special districts such as SMUD to the ALUC's land use requirements. But the plain reading of the statutes above supports SMUD's interpretation that zoning actions by the ALUC *are not binding* on SMUD (a local agency) with regard to the location and construction of wind turbines for electric generation under Section 53091 of the Government Code.

As a well-settled principal of statutory interpretation, a specific statute relating to a particular subject controls over a more general statute covering the same subject. (See, e.g., *Rea Enterprises v. California Coastal Zone Conservation Commission* (1975) 52 Cal.App.3d 596.)

Here, the provisions relating to Section 21670(f) of the Public Utilities Code are more general, as they essentially state that many different types of “local agencies” are subject to “airport land use laws.” Subdivisions (d) and (e) of Section 53091 of the Government Code, however, provide a specific exemption from local zoning ordinances for facilities “for the production or generation of electrical energy.” Given that subdivisions (d) and (e) grant narrow and specific exemptions for certain facilities, while Section 21670(f) makes airport land use laws broadly applicable to all local agencies, the exemptions available under the subdivisions (d) and (e) of Section 53091 are the narrower and more specific of the two sets of provisions. To interpret otherwise would allow the energy facilities exemption to be swallowed by the more general airport land use laws. The specific exemption for electrical generating facilities makes sense; otherwise agencies and public utilities developing energy facilities would be completely beholden to local politics within cities and counties, and thus unable to provide necessary services to customers throughout a region or to adjacent cities or counties.

Overall, the ALUC’s authority in drafting the LUCP provisions are derived from Solano County’s police powers and zoning authorities. And because the exemptions within Section 53091 are narrower and more specific than those announced in the SAA provisions, the Section 53091 exemptions control. Thus, SMUD’s wind turbine facilities are exempt from the LUCP provisions.

II. The ALUC Review of the Project is Preempted by Federal Law.

The ALUC in its LUCP has attempted to impose broad land use controls based on general safety and noise concerns, but in limiting the height of wind turbines has relied solely on the narrow and technical issue of alleged radar interference. As to the narrow and technical issue of radar interference, FAA and its regulations concerning air safety and aviation navigation occupy the field and preempt the ALUC’s land use regulations regarding radar system interference.

The federal government has “exclusive sovereignty of airspace of the United States.” (49 U.S.C. § 40103.) Congress has also given the Administrator of the FAA authority to regulate “the use of airspace necessary to ensure the safety of aircraft” and to “prescribe air traffic regulations” for, among other things, “navigating, protecting, and identifying aircraft.” (49 U.S.C. § 40103[b].) In addition, the California legislature “recognizes the authority of the federal government to regulate the operation of aircraft and to control the use of the airways” (Pub. Util. Code, § 21240.) California further acknowledges the preemptive nature of federal regulation in this area: “nothing in [the State Aeronautics Act] shall be construed to give the department [of transportation] the power to so regulate and control safety factors in the operation of aircraft or to control use of the airways.” (*Id.*)

A Ninth Circuit Court of Appeals decision affirms that Congress intended the Federal Aviation Act of 1958 to preempt state regulation of air safety. (*Montalvo v. Spirit Airlines* (9th Cir. 2007) 508 F.3d 464, 470-72.) The *Montalvo* court summarized,

the regulations enacted by the Federal Aviation Administration, read in conjunction with the [Federal Aviation Act] itself, *sufficiently demonstrate an intent to occupy exclusively the entire field of aviation safety* and carry out Congress’ intent to preempt all state law in this field.

(*Id.* at 471, emphasis added.) California Courts of Appeal have further concluded that the FAA has authority over navigation aids such as air control towers, radio navigation systems, runway markers, and directional beams. (*Bethman v. City of Ukiah* (1989) 216 Cal.App.3d 1395, 1403, 1408; *City of Burbank v. Burbank-Glendale-Pasadena Airport Authority* (1999) 72 Cal.App.4th 366, 379.) Likewise, a federal district court in South Dakota has opined that a state agency may not veto a FAA No Hazard Determination, particularly where the basis for the agency’s veto, in that case, potential harm to visual flight rules (“VFR”) routes, had been specifically considered by the FAA. (*Big Stone Broadcasting, Inc. v. Lindbloom* (D.S.D. 2001) 161 F.Supp.2d 1009, 1019.) The court in that case enjoined the state agency from prohibiting construction of radio towers where the FAA had determined that the towers would result in no hazard to air traffic and safety. (*Id.* at 1021.)

In this case, the FAA has already evaluated the Project’s “impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures.” (FAA Determination of No Hazard to Air Navigation, dated February 1, 2019 (“FAA Determination”), at p. 4.) The FAA Determination states that the Project’s “aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities.” (*Id.* at p. 1)

We also note the process for obtaining the Determination of No Hazard included review by the Department of Defense Clearinghouse, which engaged Travis Airforce Base (Travis). If Travis had filed objections related to radar, we understand the FAA would have suspended processing of SMUD’s application and directed formation of a Mitigation Monitoring Team to resolve concerns. These processes did not happen.

The ALUC submitted comments to the FAA, stating the ALUC belief that the wind turbines would “have electromagnetic effects on radar [of Travis AFB].” (*Id.* at p. 5.) But the ALUC never submitted any information in support of these statements and instead requested that FAA confirm that the Project did not exceed obstruction standards. (*Ibid.*) FAA did analyze the Project’s impacts, including exceedances of various obstructions standards, and concluded that just because a wind turbine is within the line of sight of a radar sensor *does not imply* that the

turbine will result in unacceptable adverse impacts on Air Traffic Control ("ATC") operations. (*Id.* at pp. 5-6.) While the Project turbines would be within the line of sight of the Travis AFB radar facilities, "[s]tudy for possible VFR effect disclosed that the proposals would have no effect on existing or proposed VFR arrival or departure operations." (*Id.* at p. 6.) The FAA thus concluded that while the Project turbines "would extend upwards into altitudes commonly used for en route VFR flight," there is no information that the turbines would be "located along a regularly used VFR route or that they would pose a problem for pilots operating en route" or otherwise result in unacceptable adverse impact on ATC operations. (*Id.* at p. 6.) The FAA's determination is conclusive.

Further, the ALUC neglected to file a petition for review of the FAA Determination by the review deadline, and the FAA Determination became final on March 13, 2019. The ALUC has thus waived any challenge to the FAA's No Hazard Determination, and the LUCP provisions that rely on unsupported and inaccurate radar interference issues are preempted under the federal law. Therefore, there is no basis for the ALUC review of the Project for radar interference or under the visual flight rules.

III. Even if the LUCP Applied to the Project, SMUD can Overrule the ALUC's Determination.

Even if the updated Travis AFB LUCP provisions regarding radar interference apply, SMUD, as a local agency, can overrule the ALUC by holding a hearing, making findings that the action is consistent with the purposes of the SAA, and obtaining a two-thirds vote of its governing body. (*See* Pub. Util. Code, § 21674.7(b) ["This subdivision does not limit the authority of local agencies to overrule [the ALUC] actions or recommendations pursuant to Sections 21676, 21676.5, or 21677."].)

While your February 8, 2019 Letter argues that only cities and counties can utilize the overruling authorities under the SAA, the language and legislative intent of the SAA does not support this interpretation. As stated above, and without expressly limiting the provisions to cities or counties, the SAA does not limit "the authority of *local agencies*" to overrule an ALUC's actions or recommendations, and certainly does not limit that discretion to only local agencies with land use authority. (*See* Pub. Util. Code, § 21674.7(b).) Further, by using the term "local agency" in Sections 21676 and 21676.5 of the Public Utilities Code, and conversely and expressly using the term "city or county" in Section 21675.1(d) with respect to parallel provisions regarding overruling an ALUC's determination, the legislature clearly intended that "local agencies" such as SMUD similarly have discretion to overrule the ALUC under Sections 21676 and 21676.5. (*See* Pub. Utilities Code, §§ 21674.7(b), 21675.1(d), 21676, 21676.5, and 21677 [allowing local agencies in Marin County to overrule an ALUC determination by a simple majority].) In fact, Solano County staff already conceded that "SMUD is a regulated entity by the ALUC and is similarly situated as any city or the County." (Solano County ALUC Agenda Submittal for ALUC-17-10: SMUD Plan Amendment Request [File No. AC 17-035], October

12, 2017; see also *Suisun Alliance v. Suisun City* (2010) Solano Co. Sup. Ct. Case No. A125042, 2010 WL 3280273, at 4-5.) The Legislature clarified its intent that a local agency such as a special district has the ability to overrule the ALUC determination, as long as the local agency follows the proper procedure set forth in the SAA. (See Assembly Bill Analysis for AB 332 [May 2003], at p. 3.)

Broadly stated, the intent of the SAA is to minimize the risk to public health, safety, and welfare from exposure to excessive noise and safety hazards (i.e., aircraft accidents) and to ensure the orderly development and expansion of airports and surrounding areas. (Pub. Util. Code, § 21670(a); see also *Suisun Alliance*, 2010 WL 3280273 at 4-5.) Therefore, even if the ALUC provisions apply to the Project, SMUD has the authority under Sections 21676 and 21676.5 to overrule the ALUC’s consistency determination upon making the requisite findings, similar to any city or county.

Here, as discussed above, SMUD prepared an individual line-of-sight study for the Project and has obtained the FAA Determination of no significant hazard (including a confirmation from the FAA that its determination addresses the VFR routes and radar issues). As stated above, the ALUC did not file a petition challenging the FAA’s determination. Thus, even if the ALUC provisions applied to the Project, SMUD can overrule the ALUC inconsistency determination based on its own findings and the substantial evidence—including the FAA Determination—supporting its findings to overrule the ALUC. (*California Aviation Council v. City of Ceres* (1992) 9 Cal.App.4th 1384, 1393 [a court’s review of a local agency’s findings in support of its decision to overrule the ALUC is for substantial evidence].)

Pursuant to the exemption provisions under Section 53091 of the Government Code, the FAA’s no significant hazard determination, and SMUD’s ability to overrule any inconsistency determination the ALUC might render, SMUD’s NOP is accurate. Nevertheless, SMUD will be evaluating air-related hazards in its CEQA process, and is happy to work with Solano County and its ALUC to ensure that any safety considerations are addressed in the EIR.

Mr. Robert "Perl" Perlmutter
April 26, 2019
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Please do not hesitate to contact me if you have any questions or concerns regarding this letter.

Very truly yours,

DOWNEY BRAND LLP



Christian L. Marsh

cc: Ammon Rice, Environmental Management, Sacramento Municipal Utility District
Thomas Randall, Chair, Solano County Airport Land Use Commission
Lee Axelrad, Deputy County Counsel, Solano County

March 30, 2021

Ammon Rice
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Re: Response to Dr. Jerry Johnson, Director of Engineering Regulus Group, LLC letter dated August 6, 2019

Mr. Rice,

This letter is in response to Dr. Jerry Johnson, Director of Engineering Regulus Group, LLC dated August 6, 2019. In this letter, we address each of the points raised by Dr. Johnson.

- 1. Dr. Johnson commented on air safety impacts as discussed in the draft environmental impact report (DEIR) and stated that it is well known that utility scale wind turbines impact primary surveillance radar systems when the turbines are located within the line of sight of the radar. Dr. Johnson stated that the existing turbines in the proposed project area have created turbine radar interference at Travis Air Force Base (AFB). To adjust, Dr. Johnson stated the AFB had to move/lose a circling approach and the AFB would like to reclaim the lost airspace.*

Utility scale wind turbines within line-of-sight of a primary surveillance radar, such as the Travis AFB digital airport surveillance radar (DASR), can have an adverse effect on radar performance. In fact, Travis AFB has served and continues to serve as an excellent source of information for the United States government and the wind industry in understanding the effects that multiple wind projects can have on a DASR and the display system used by the air traffic controllers, the Standard Terminal Automation System (STARS), at the Travis AFB Radar Approach Control (RAPCON) facility. Travis AFB and the wind projects in the Collinsville-Montezuma Hills Wind Resource Area (WRA) area also served as an excellent source of information in determining how to manage or lessen the effects of wind turbines for a DASR and STARS air traffic control systems configuration. Part of this work was conducted under Cooperative Research and Development Agreement (CRADA) No. 10-002 in collaboration with Travis AFB, Westslope Consulting, LLC (Westslope), and three wind project developers including the Sacramento Municipal Utility District (SMUD).^{1,2} It should also be noted that while there can be adverse effects on the DASR, the Monopulse Secondary Surveillance Radar (MSSR), which is the secondary surveillance radar co-located with the DASR and is the main radar used for air traffic control by the base, was shown to not be effected by wind turbines. The MSSR interrogates transponder equipment on board the vast majority of aircraft operating in and around the Travis AFB RAPCON's airspace.

¹ Air Mobility Command article at [Cooperative agreement forges solution for wind turbine projects at Travis AFB > Air Mobility Command > Article Display](#).

² United States Transportation Command Cooperative Research and Development Agreement, "Assessment of Wind Farm Construction on Radar Performance" Operations Working Group Research Conclusions and Recommendations Interim Report to Joint Technical Working Group dated January 20, 2010. Available at [blobdload.aspx \(solanocounty.com\)](#).

Secondary surveillance radar, such as the MSSR, are less susceptible to interference from wind turbines than primary surveillance radar. Unlike primary surveillance radar that depends on reflected energy to discern aircraft, secondary surveillance radar relies on, in general terms, two-way communication with aircraft via operating transponders. This process is cooperative whereby the secondary surveillance radar transmits a set of pulses at one frequency to interrogate transponders, then receives and processes replies from operating transponders at another frequency. Because of the use of different transmit and receive frequencies, secondary surveillance radar is not as susceptible to the effects of clutter that interfere with the performance of primary surveillance radar. Clutter is unwanted radar returns from the ground, rain or other precipitation, buildings, antenna towers, transmission lines, wind turbines, vehicular traffic, and birds. Some publicly available United States government research has considered the effects of wind turbines on secondary surveillance radar. A Department of Homeland Security (DHS) funded study conducted by JASON found that “[s]econdary (i.e., transponder, or “beacon”) tracks were rarely affected” by wind farms.³ JASON is a group of the nation’s top scientists that advise the United States government. In addition, the Department of Energy, Department of Defense (DoD), DHS, and the Federal Aviation Administration (FAA) sponsored flight trials conducted by Massachusetts Institute of Technology/Lincoln Laboratory (MIT/LL) and Sandia National Laboratories as part of an Interagency Field Test and Evaluation (IFT&E) program noted that “primary surveillance radars are severely impacted by wind turbines while the beacon transponder-based secondary surveillance radars was not affected by wind turbines.”⁴

The below excerpts are from the Solano 4 Wind Project (Solano 4) Determinations of No Hazard (DNHs) issued by the FAA originally on February 1, 2019, and after further DoD and FAA review, were recently extended on January 28, 2021.

“Simply being “seen” by the radar is not the real issue though. How that target (in this case, the wind turbine) is processed and displayed for ATC is the key. The users of the system (ATC) is the sole decider on whether the system is acceptable to be able to perform their duties. Although there may be others entities using these radar systems, the responsibility and authority of the FAA is the safe and efficient use of the navigable airspace, including the impact of the radar effects on air navigation.”

“The turbines would be within the line of sight of the Stockton, CA. (SCK) ASR-11, the Travis (SUU) DASR, the Mill Valley (QMV) ARSR-4, and the McClellan (MCC) ASR-9 facilities. The proposals will affect the quality and/or availability of radar signals. The effects would be unwanted primary returns (clutter) and primary target drops, all in the area of the turbines. Tracked primary targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines.”

“However, this would not cause an unacceptable adverse impact on ATC operations at this time.”

³ JASON, MITRE Corporation, “Wind Farms and Radar,” January 2008, pp. 7. Available at [Wind Farms and Radar \(fas.org\)](https://fas.org).

⁴ Sandia National Laboratories, MIT Lincoln Laboratory, “IFT&E Industry Report, Wind Turbine-Radar Interference Test Summary,” September 2014, pp. 32. Available at [SANDIA REPORT;SF 1075-SUR \(energy.gov\)](https://energy.gov).

“The cumulative impact of the proposed structures, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any significant adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposals affect the capacity of any known existing or planned public-use or military airport.”

“Therefore, it is determined that the proposed construction would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.”

The extension process resulted in the formation of a Mitigation Response Team (MRT) with Travis AFB as required by the DoD Military Aviation and Installation Assurance Siting Clearinghouse (the “DoD Siting Clearinghouse”) mission compatibility evaluation process as documented in Part 211 of Title 32 of the Code of Federal Regulations.⁵ The DoD Siting Clearinghouse was established under direction of the United States Congress per the National Defense Authorization Act for Fiscal Year 2011.⁶ The result of the MRT review was a conclusion by the 60th Air Mobility Wing of “[a]s proposed, Solano 4 should have minimal negative impact on Travis Operations” and a conclusion by the DoD Siting Clearinghouse that Solano 4 “will not present an adverse impact to military operations.”^{7,8}

When evaluating the effects of wind turbines on radar, it is important to distinguish between effects and operational impacts. Effects do not always translate into operational impacts (i.e., a substantial adverse effect). As a result of early consultation with Travis AFB and Solano County’s Windfarm Re-Power Group dating back to April 21, 2016, SMUD and Westslope undertook a substantial effort to identify a wind project configuration—considering different wind turbine layouts, numbers of wind turbines, and wind turbine models—for Solano 4 to ensure there would be no additional effects as a result of the project on the DASR and on the air traffic controllers’ displays in STARS. In the spirit of collaboration, the results of multiple radar cumulative impact studies were presented to Travis AFB prior to filing the Solano 4 wind turbines with the FAA.⁹

Westslope’s studies indicate that removing and replacing 23 existing wind turbines with up to 22 136-meter rotor diameter or up to 19 150-meter rotor diameter modern wind turbines will have no material difference to the DASR or on the air traffic controllers’ displays in STARS.

The Solano 4 wind turbines are located outside of Travis AFB circling approach areas and will have no effect on the base’s published visual flight rules (VFR) operations or on instrument flight rules (IFR) operations.¹⁰ Solano 4 will replace 23 existing Vestas V47 wind turbines, which currently interfere with the Travis AFB DASR, with up to 22 136-meter rotor diameter or up to 19 150-meter rotor diameter wind turbines. Because construction of Solano 4 will result in fewer overall wind

⁵ [Welcome to the Military Aviation and Installation Assurance Siting Clearinghouse \(osd.mil\)](https://www.osd.mil/).

⁶ [H.R.6523 - 111th Congress \(2009-2010\): Ike Skelton National Defense Authorization Act for Fiscal Year 2011 | Congress.gov | Library of Congress](https://www.congress.gov/111/legislation/2009/2010/111-6523).

⁷ Letter from the 60th Air Mobility Wing Commander dated January 11, 2021. On file.

⁸ Letter from the DoD Military Aviation and Installation Assurance Siting Clearinghouse dated February 9, 2021.

⁹ See SMUD Solano 4, Cumulative Impact Study and Mitigation Solution Results for Vestas V136 and V150 Wind Turbine Layouts dated September 6, 2018.

¹⁰ In accordance with FAA Order 8260.3D and FAA Order 8260.58A.

turbines and the proposed wind turbines will have no effect on the base's published VFR or IFR operations, Solano 4 will have no material difference on the performance of the DASR and STARS configuration compared to current conditions and will not impact current RAPCON air traffic operations. Further, the secondary surveillance radar co-located with the DASR, which is the main radar used for air traffic control, will not be affected. These conclusions regarding impacts are supported by the MRT process and FAA's DNHs that state that the Solano 4 wind turbines "would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation."

2. *Dr. Johnson stated that the DEIR does not include information needed to inform decision makers and the public about the scope of the project's impacts. Dr. Johnson notes that the DEIR refers to an FAA aeronautical study conclusion that navigable airspace is not affected by turbine operation, but the DEIR does not mention that the study also reports that quality and availability of radar signals would be affected. Dr. Johnson further commented that when wind turbine radar interference (i.e., clutter) is high, air traffic controller workloads can increase due to the creation of track duals (false tracks), which increase the need for more coordination between controllers and pilots and greater distances among aircraft, and may impact aircraft maneuvers.*

The DEIR focused on the conclusion of the aeronautical study process rather than FAA's initial findings. As pointed out by Dr. Johnson, the FAA's initial findings state that the "[t]he proposals will affect the quality and/or availability of radar signals. The effects would be unwanted primary returns (clutter) and primary target drops, all in the area of the turbines. Tracked primary targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines." This language is standard language used by the FAA for any wind turbine that is within line-of-sight of a primary surveillance radar and is used to inform the proponent of a wind project that further study is required to determine whether these effects could result in operational impacts.

After in-depth study, at the request of SMUD, the FAA determined that Solano 4 "would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation". Further, the DNHs state that the aeronautical studies "considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact" resulting from Solano 4 when combined with the impact of other existing structures.

Regarding "track duals", Dr. Johnson may be confusing this term with "false targets." Track duals and false targets are two different effects. It is also possible that Dr. Johnson may be confusing track duals with a phenomenon identified during testing of in-fill radar ongoing at Travis AFB at this time.

While false primary targets are possible, replacing the 23 existing wind turbines with up to 22 136-meter rotor diameter or up to 19 150-meter rotor diameter modern wind turbines will have no material difference in the number of false primary targets reported by the DASR or in the number of the false primary tracks on the air traffic controllers' displays in STARS. After construction, system optimization, including updating the range-azimuth gate map in the DASR, will address the

difference in the location and number of wind turbines. In other words, the conditions under the Solano 4 Wind Project would not be any different than the current condition.

3. *Dr. Johnson's comment that while the DEIR indicates that the wind turbines would not be a hazard to air navigation if the turbines are properly painted and lighted, these are measures for obstruction avoidance and would not mitigate the turbines' interference with radar or air traffic control.*

Per the FAA issued DNHs, Solano 4 "would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft" and "would not be a hazard to air navigation" provided the wind turbines are marked/lighted in accordance with FAA Advisory Circular 70/7460-1 L Change 2, Obstruction Marking and Lighting. This advisory circular provides the FAA's standard for marking and lighting to ensure the appropriate daytime and nighttime conspicuity so that pilots can visibly see and avoid wind turbines.

The FAA and SMUD, in Mitigation Measure 3.7-3, are not suggesting that marking and lighting is a radar mitigation.

4. *Dr. Johnson stated that the DEIR does not mention that Air Traffic Control (ATC) Minimum Vectoring Altitudes (MVAs) for the turbine area would need to be increased and that the FAA has identified this as an adverse effect.*

During the aeronautical study process, the FAA's prime objective is to ensure the safety of air navigation and the efficient utilization of navigable airspace.¹¹ As many as ten different government offices take part in each study, including: the FAA's Office of Airports, Instrument Flight Procedures Impact Team, Flight Standards, Technical Operations, and Frequency Management, and the United States Air Force, United States Navy, United States Army, DHS, and the DoD. The FAA utilizes the information provided by each office, as well as defined metrics, to determine whether or not the proposed wind turbines would be hazardous.¹²

During the review of Solano 4, the FAA identified that the proposed wind turbines would have an adverse effect on a minimum vectoring altitude (MVA) sector. A MVA defines the lowest altitude that air traffic controllers can normally issue radar vectors to aircraft and is based on obstacle clearance. Specifically, the FAA identified an effect on Sector MCC_B which is utilized by the air traffic controllers at Northern California Terminal (NCT) Radar Approach Control (TRACON). To address this effect, the FAA requires Form 7460-2, Part 1, Notice of Actual Construction or Alteration to be submitted at least 60 days before the start of construction so that appropriate action can be taken to amend the affected procedure(s) and/or altitude(s), if necessary. By SMUD e-filing FAA Form 7460-2, Part 1, Notice of Actual Construction or Alteration at least 60 days before the start of construction, the FAA would take appropriate action to amend the affected procedure(s) and/or altitude(s), if necessary." The FAA will modify Sector MCC_B by increasing the MVA from 1,700 to 1,800 feet above mean sea level (MSL). This increase ensures the appropriate obstacle clearance and, as a result, maintains safety.¹³ This amendment to modify the sector by increasing the MVA to 1,800 feet MSL removes the adverse effect on the MVA sector. Lastly, Northern

¹¹ FAA Order 7400.2M Paragraph 6-3-1(a) "Policy."

¹² FAA Order 7400.2M Paragraph 6-3-3(a) "Determining Adverse Effect" with reference to aeronautical study number 2018-WTW-13388-OE.

¹³ FAA Order 8260.3D Paragraph 11-3-3 "Obstacle Clearance."

California TRACON confirmed that this would not have an operational impact on providing radar vectoring services. For these reasons, the effect on a MVA sector will not result in the degradation of safety or efficiency.

5. *Dr. Johnson commented that while the DEIR acknowledges that the project could have potentially significant adverse impacts, it does not provide enough information about the impacts for readers to comprehend them. Dr. Johnson states that the DEIR should 1) discuss objective metrics regarding the effects on radar performance, 2) compare clutter tracks over the wind turbine area with the additional clutter that would be generated by the new turbines, 3) compare expected dual tracks with real targets and provide metrics such as length measured over a span of time, and 4) discuss increased operator workload (controllers and pilots) due to clutter and provide metrics regarding this.*

As stated above, SMUD undertook extensive efforts to identify a wind project configuration for Solano 4 to ensure there would be no additional effects as a result of the project on the DASR and on the air traffic controllers' displays in STARS. Results of an initial cumulative impact study conducted by Westslope, employing the same method verified under CRADA No. 10-002 and using primary probability of detection (Pd) as a metric, showed that the 22 136-meter rotor diameter wind turbines will result in a 0.1 percent overall decrease in the primary Pd over the Collinsville-Montezuma Hills WRA. A subsequent cumulative impact study for 19 150-meter rotor diameter wind turbines at the proposed locations showed no drop in the primary Pd. In other words, the conditions under Solano 4 will result in no material difference on the performance of the DASR and STARS configuration compared to existing conditions. These findings were presented to Travis AFB on September 6, 2018 and were used to support the current layouts proposed for the Solano 4 wind turbines.

As determined by the FAA and stated in the Solano 4 DNHs "the turbines would be within the line of sight of the Stockton, CA. (SCK) ASR-11, the Travis (SUU) DASR, the Mill Valley (QMV) ARSR-4, and the McClellan (MCC) ASR-9 facilities. The proposals will affect the quality and/or availability of radar signals. The effects would be unwanted primary returns (clutter) and primary target drops, all in the area of the turbines. Tracked primary targets could diverge from the aircraft path and follow wind turbines, when the aircraft is over or near the turbines." The DNHs conclude, "[h]owever, this would not cause an unacceptable adverse impact on ATC operations at this time."

The number of false primary targets reported by the DASR and the number of false primary tracks presented on the STARS' displays were also considered as a metric during these studies; however, based on Westslope's experience with the Travis AFB DASR and STARS, as well as other similar facilities, and the fact that Solano 4 will replace 23 existing wind turbines with 22 or 19 new wind turbines, Westslope expects no material difference in the number of false primary targets out of the DASR or the number of false primary tracks on the STARS' displays. As stated above, the result of the MRT review was a conclusion by 60th Air Mobility Wing Commander of "[a]s proposed, Solano 4 should have minimal negative impact on Travis Operations" and a conclusion by the DoD Siting Clearinghouse that Solano 4 "will not present an adverse impact to military operations." The FAA determined that the proposed Solano 4 wind turbines "would not cause an unacceptable adverse impact on ATC operations at this time" and "would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met." Further, SMUD received extensions for the 19 DNHs for Solano 4 on January 28, 2021, as requested.

6. *Lastly, Dr. Johnson stated that the DEIR does not discuss other potentially feasible means to mitigate the project's adverse impacts, such as a Pilot Mitigation Program at Travis AFB that is studying how in-fill radar systems could mitigate turbine radar interference, or an effort that is underway to develop radar processing algorithms that could reduce clutter on air traffic control screens. Dr. Johnson notes that these are not yet proven or certified for use, and so the only way to limit turbine impacts on radar systems is to locate the turbines beyond the line-of-sight of the radar.*

As discussed above and in the cumulative impact studies conducted by Westslope, the Solano 4 wind turbines will result in no material difference on the performance of the DASR and STARS configuration compared to existing conditions, and will not impact current RAPCON air traffic operations. Further, the secondary surveillance radar co-located with the DASR, which is the main radar used for air traffic control, will not be affected. These conclusions are supported by the FAA's DNHs that states that the Solano 4 wind turbines "would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation".

Please direct any questions to Geoff Blackman of Westslope Consulting at gnblackman@westslopeconsulting.com or Joe Anderson of Capitol Airspace Group at joe.anderson@capitolairspace.com.

Respectfully,



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Owner/Principal
Westslope Consulting, LLC

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Director of Airspace Consulting
Capitol Airspace Group, LLC

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SUMMARY

Founded Westslope Consulting, LLC in 2008. Provides radar consulting and technical services to developers of wind energy projects, commercial real estate projects including high-rises, event venue and stadium projects, transmission line projects, and solar energy projects in the United States, Canada, and overseas.

Over 26 years of experience in the United States working with radar and associated tracking and display systems and is considered a subject matter expert on the potential effects of wind turbines on air traffic control radar, air defense radar, homeland security radar, weather radar, over-the-horizon drug interdiction radar, and test-range instrumentation radar.

Works with developers at all stages of project development. In the early stages of project planning to identify potential radar concerns as well as other potential aviation, military, and weather-related operational concerns. In the late stages of development as projects move through the approval process at local, state, and federal levels. This work includes conducting radar studies, identifying impacts, outlining mitigation techniques and strategies, modeling, simulation, data analysis, optimization, flight tests, and defining and testing software and/or hardware changes.

Engages with military bases, BOEM, DoD Siting Clearinghouse, DHS Long Range Program Office, FAA Obstruction Evaluation Group, NOAA, NORAD, NTIA, WSR-88D Radar Operations Center, and national laboratories on behalf of clients and the wind industry.

Supports hearings and meetings at various levels of government.

Technical expertise spans multiple navigation and surveillance systems including airport surveillance radar, long range radar, secondary surveillance radar, ADS-B and multilateration systems, in-fill wind farm mitigation radar, navigational aids, precision approach radar, coastal HF radar, Aircraft Detection Light Systems, bird and bat radar, over-the-horizon radar, weather radar, and associated tracking and display systems.

EDUCATION

University of Leeds – Leeds, England

September 1991 to July 1994

Bachelor of Engineering with Honors in Electronic Engineering with a concentration in Microwave Engineering.

PROFESSIONAL EXPERIENCE

Westslope Consulting, LLC – Norman, OK

Founder, Owner, and Principal

May 2008 to present

- Provides mitigation studies and negotiates mitigation agreements with various federal agencies and third parties.
- Develops data analysis and modeling tools to assess for radar effects and identify possible mitigation solutions.
- Serves as the wind industry technical representative to the DOE Wind Turbine Radar Interference Mitigation Working Group.
- Consults with American Clean Power Association regarding wind-radar policy, process, and technical issues.
- Served as a subject matter expert in over 20 FAA safety risk management panels involving radar-related hazards as a result of wind development.
- Worked hand-in hand with the DHS to identify and site in-fill radar mitigation and draft agreements to resolve border security concerns.
- On behalf of wind developer, supported first exercise modeling the impacts of wind turbines on Relocatable Over-the-Horizon Radar working with the United States Navy and MIT/LL.
- Provided expert witness testimony relating to impacts to United States and Canadian weather radar.
- Supported the DoD, DOE, DHS, and FAA Interagency Field Test and Evaluation.
- Served as Radar Working Group lead under the first Cooperative Research and Development Agreement with United States Transportation Command and three wind developers successfully improving DASR radar performance over approximately 600 wind turbines near Travis AFB. This work included implementing and validating a proprietary Westslope Consulting modeling method for predicting the impacts of wind energy projects, integrating two adjacent radar sites into STARS, several iterative optimization changes, third party evaluation of wind farm mitigation, and flight testing.
- Served as the wind industry representative for the DHS radar and wind turbines interaction modeling tool.
- Served as a technical advisor for wind developer in negotiations of first Memorandum of Agreement with the DoD and United States Navy.

Regulus Group, LLC – Woodstock, VA

Partner, Senior Engineer, and Consultant

September 2003 to May 2008

- On behalf of the FAA, supported DoD testing at King Mountain, Texas during the ARSR-4 long range radar wind turbine interference and mitigation study.

- At the request of Idaho National Laboratory, served as a technical advisor for the 2008 JASON Report JSR-08-125 Wind Farms and Radar.
- Supported Idaho National Laboratory at wind-radar intra-agency meetings to further understanding of radar impacts and existing and potential mitigation techniques.
- Led FAA working group to study potential impacts on the ASR-11 and co-located MSSR (referred to as the DASR by the United States Air Force) and VOR from a proposed wind energy project near Ted Stevens International Airport. Identified potential impacts, outlined mitigation strategies, simulated and modeled potential impacts and mitigation techniques, analyzed data, and defined and tested software changes.
- Managed field engineering activities including maintenance and troubleshooting, system optimization and commissioning flight inspection for the FAA ASR-11 Program Office.
- Developed ASR-11 Optimization Procedures and ASR-11 Optimization Training Course. Conducted training courses and on-the-job training for various government agencies and radar manufacturer.
- Led and participated in numerous detailed investigations into ASR-11 performance issues. Instrumental in defining, modeling, testing, analyzing, and implementing new algorithms and algorithm enhancements to the ASR-11 software to improve performance.
- Co-developed Radar Toolbox, a FAA software radar analysis tool.
- Supported the assessment of radar concerns for the FAA regarding real estate development projects and wind projects.

Fesler Technical Services – Oklahoma City, OK

Principal Engineer

July 2002 to September 2003

Senior Engineer

May 2000 to July 2002

- Managed engineering activities including maintenance and troubleshooting, system optimization, commissioning flight inspection, and test and evaluation support to FAA ASR-11 Program Office.
- Assigned to National Airways System Engineering Division to provide systems engineering support. Provided coordination between FAA ASR-11 Program Office and DoD DASR Program Office.
- FAA point of contact for test and evaluation of ASR-11 weather channel. Worked with MIT/LL to complete Developmental Test and Evaluation.
- Participated in FAA's Pre-Operational Test and Evaluation and Operational Test and Evaluation at Stockton, California. Assessed radar performance to ensure operational suitability. Modeled algorithms to investigate potential software changes. Developed enhancements to improve system performance. Coauthored several data processing algorithm enhancements required by the FAA.

PUBLISHED WORKS/PRESENTATIONS

- *Radar Mitigation in the U.S.*, presented at the Canadian Wind Energy Association 2012 Conference and Exhibition, October 15, 2012.

- *Wind and Radar Introduction and Mitigation Overview*, presented at the International Wind and Radar Forum, Canadian Wind Energy Association, June 29, 2011.
- *Military, Radar, and Aviation Issues: Growing Concerns and Ways to Navigate Potential Problems*, presented at WINDPOWER 2010 Conference and Exhibition, American Wind Energy Association, May 24, 2010
- *Introduction to the Issues*, presented at the State of the Art in Wind Siting Seminar, National Wind Coordinating Collaborative, October 21, 2009.
- *Candidate Solutions*, presented at the State of the Art in Wind Siting Seminar, National Wind Coordinating Collaborative, October 21, 2009.
- *Overview of Mitigation Efforts at Wind Projects in the UK and US*, presented at the WINDPOWER 2009 Conference and Exhibition, American Wind Energy Association, May 7, 2009.
- *Long Range Radar Technical Discussion*, Competition for the Sky, FAA, September 29-October 2, 2008.
- *Issues, Wind Turbine Clutter, I/Q Data, Detection and Track Eligibility, and Modeling Tools*, Competition for the Sky, FAA, September 29-October 2, 2008.
- *Radar Issues: A Developer's Perspective*, presented at the WINDPOWER 2008 Conference and Exhibition, American Wind Energy Association, June 1-4, 2008.
- *Technology Update and Mitigation Options*, presented at the Wind Energy Project Siting Workshop, American Wind Energy Association, February 14-15, 2008.
- *Fire Island Wind/Radar*, presented at the WINDPOWER 2007 Conference and Exhibition, American Wind Energy Association, June 3-6, 2007.
- *Fire Island Wind Turbine Project*, 51st Annual Conference Proceedings, Air Traffic Control Association, October 2006.

HONORS/AWARDS

- *Thank you letter*, Brigadier General Steven J. Lepper, February 2010.
- *Thank you letter*, Congressman John Garamendi, CA-10, February 2010.
- *Award for Exemplary Performance*, FAA ASR-11 Program Office, August 2009.
- *Letter of Appreciation*, FAA ASR-11 Program Office, May 2008.
- *Letter of Appreciation*, FAA ASR-11 Program Office, June 2007.
- *ASR-11 Team Award*, FAA ASR-11 Program Office, November 2005.

PROFESSIONAL AFFILIATIONS

- IEEE, Member
- IET, Member

CITIZENSHIP

- United States

Joe (Alton) Anderson

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Experience

Capitol Airspace Group

Alexandria, Virginia

Director of Airspace Consulting, January 2020 to present

- Supporting 250+ projects throughout the United States, including consulting on the development of event stadiums, high-rise buildings, utility-scale wind projects, and moored aerostats.
- Developing unique strategies that strike a balance between the needs of economic development and the need to protect the National Airspace System.
- Providing expertise in instrument procedure design, optimization, and impact mitigation.
- Mitigating interference with military training routes and special use airspace.
- Assisting in development of Project Manager training program.

Senior Project Manager, July 2016 to December 2019

- Cultivated and grew portfolio to include 100+ development projects.
- Coordinated project details, including development constraints, to determine technical support that would lead to resolving identified airspace impacts.
- Assisted in business development, including redesigning company website, updating relevant social media platforms, and creation of educational "aeronautical study" video.

Senior Airspace & GIS Specialist, September 2015 to July 2016

- Developed analytical processes and Python-based automation to assess historical air traffic operations and climatological data in order to evaluate risks to proposed development.
- Developed Python-based GIS automation to:
 - o improve efficiency of obstruction evaluation and airspace analyses, and
 - o analyze frequency of nighttime flight operations in proximity to proposed wind turbines; findings utilized by wind developers to determine cost efficacy for lighting control systems.
- Designed new instrument approach procedures, in a challenging obstacle environment, that allowed for an airport operator to maintain procedure minimums while allowing for proposed development.
- Participated in FAA's Aeronautical Charting Meeting Instrument Procedures Group (IPG)
- Assisted in recruitment and training of Airspace Specialists

Airspace Specialist, June 2014 to September 2015

- Prepared written reports, with supporting methodology and easy-to-interpret graphics, that described the potential impact of development on the National Airspace System, including the evaluation of instrument flight rules (IFR) and visual flight rules (VFR) air traffic operations; conducted in accordance with FAA Orders 8260.3 and 8260.58.
- Provided verbal briefings regarding findings of analytical studies, including descriptions of airspace, usage, and impacts.
- Analyzed "notice requirements" for proposed development in accordance with 14 CFR 77.9.
- Implemented procedures for consistent graphics and report writing

Embry-Riddle Aeronautical University

Daytona Beach, Florida

Graduate Teaching Assistant, January 2013 to June 2014

- Mentored Air Traffic Control (ATC) students and created teaching scenarios for three high-fidelity simulation classes
- Assisted with learning analytics, Aviation Accreditation Board International (AABI) processes, and managing of department's web presence.

Education

Embry-Riddle Aeronautical University

Daytona Beach, Florida

Master of Science in Aeronautics, 2014

- Treasurer, Student Government Association

Bachelor of Science in Air Traffic Management, 2012

- Founder of Air Traffic Honor Society