ENERGY DEVELOPMENT AROUND TEXAS MILITARY INSTALLATIONS: TOOLS FOR PLANNERS: TECHNICAL MEMO

JOINING FORCES
NORTH TEXAS

ENERGY DEVELOPMENT AROUND TEXAS MILITARY INSTALLATIONS: TOOLS FOR PLANNERS

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SUMMARY

The nature of military operations, wind energy development, and airway safety in Texas necessitates purpose-built studies and solutions to attain maximal outcomes. The Texas Early Notification Tool (TENT) is an application that provides early notification capability to wind energy developers, facilitates communications between developers and regulating authorities at all levels, and speeds the deconfliction process. This tool presents significant savings in time, energy, and resources. In a similar vein, the Texas Airspace Planning and Forecasting Tool (TAPFT) was designed primarily to provide military operational planners awareness of current and future land development concerns that may impact military operations and airspace. Military professionals can leverage TAPFT to conduct community outreach and early mitigation to prevent conflicts between military planning and land developers. TENT and TAPFT also represent practical applications in a developing suite that seeks to further streamline and deconflict land and airspace planning and use in Texas. These tools are available to the public and widely applicable to stakeholder needs both in Texas and across the nation.

INTRODUCTION

Texas is one of the largest operational areas for the Department of Defense (DoD) with 15 military installations, over 200,000 service members, and over 1.5 million acres of property.[1] The state is also a world leader in the production of renewable energy and wind power. Texas produced over 20,000 megawatts of wind energy in 2016, and over 30,000 megawatts in 2020. This growth represented 15-20% of electrical energy produced in Texas and is projected to grow geometrically over the next several years with over 7,000 megawatts of added capacity already under construction as of 2022.[2] The trendlines of expanding military operational requirements and wind power generation intersect with conflicting priorities for land use and future development.

1 Texas A&M Natural Resources Institute, "Military Land Use compatibility in Texas: 2021 Protecting Military Readiness in Texas: Phase II," (2021)

2 Texas A&M Natural Resources Institute, "Coordination of Wind Energy and Military Operations in Texas," (2019)

JOINING FORCES
NORTH TEXAS

DEPARTMENT OF DEFENSE IN TEXAS

- 15 Military Installations
- 200,000+ Service Members
- 1.5 Million+ Acres of Property

TEXAS WIND ENERGY PRODUCTION

- 20,000+ megawatts in 2016
- 30,000+ megawatts in 2020

While the largest current concerns revolve around wind energy developments, other types of land use and development portend significant impacts on military planning and operations. Areas of concern include residential development due to population growth, the exposure of sensitive populations to aircraft noise, vertical obstructions associated with solar energy collection and power transmission, light pollution and glare, and radio frequency (RF) impedance/interference.[3] In light of this, public and private stakeholders have been working on a collection of tools, best practices, and operationalized expert input to deconflict development from military readiness and ensure win-win solutions for military units, the private sector, and the general public.

The conflict between military operational readiness, physical space and energy production projects is multifaceted:

- Aviation: Military aviators have strict policy requirements for flight hours, maneuvers, and exercises that must be routinely performed to maintain mission qualified certifications. These requirements are met by utilizing established aerial training areas and corridors around Texas. This category also includes the operation of Unmanned Aerial Systems (UAS), drones, and other types of non-traditional aircraft.
- Radar: Extensive radar, LiDAR, and other spectrum-based visualization system networks (hereafter radar) are maintained by the DoD, National Oceanic and Atmospheric Administration (NOAA), and Public/Private Airports. These systems maintain airway navigability, provide for air traffic control, and protect pilots, the flying public, and communities.

WIND ENERGY PRODUCTION

The size and scale of modern wind generation turbine fields enables sustainable use of renewable energy sources. The average height of a modern turbine, including the radius of the blades, exceeds 400 ft. in vertical rise. Further, the most productive wind ranges in Texas predominantly coincide with air traffic corridors and generally travel north to south through the Panhandle, West Texas, and North Texas regions. See Figure 1 on next page. Said air traffic corridors necessarily tend to mirror radar station wave propagation fields.[4] The radar station at NAS JRB Fort Worth is located in a mid- to high-speed wind corridor that averages winds of 16-18 mph at turbine generation altitudes.

3 Texas A&M Natural Resources Institute, "Texas Military Airspace & Land Use Projections: Protecting Military Readiness in Texas: Phase II," (2021)

4 Figure 1: U.S. Department of Energy. "Texas Land-Based Wind Speed at 100 Meters." Link.

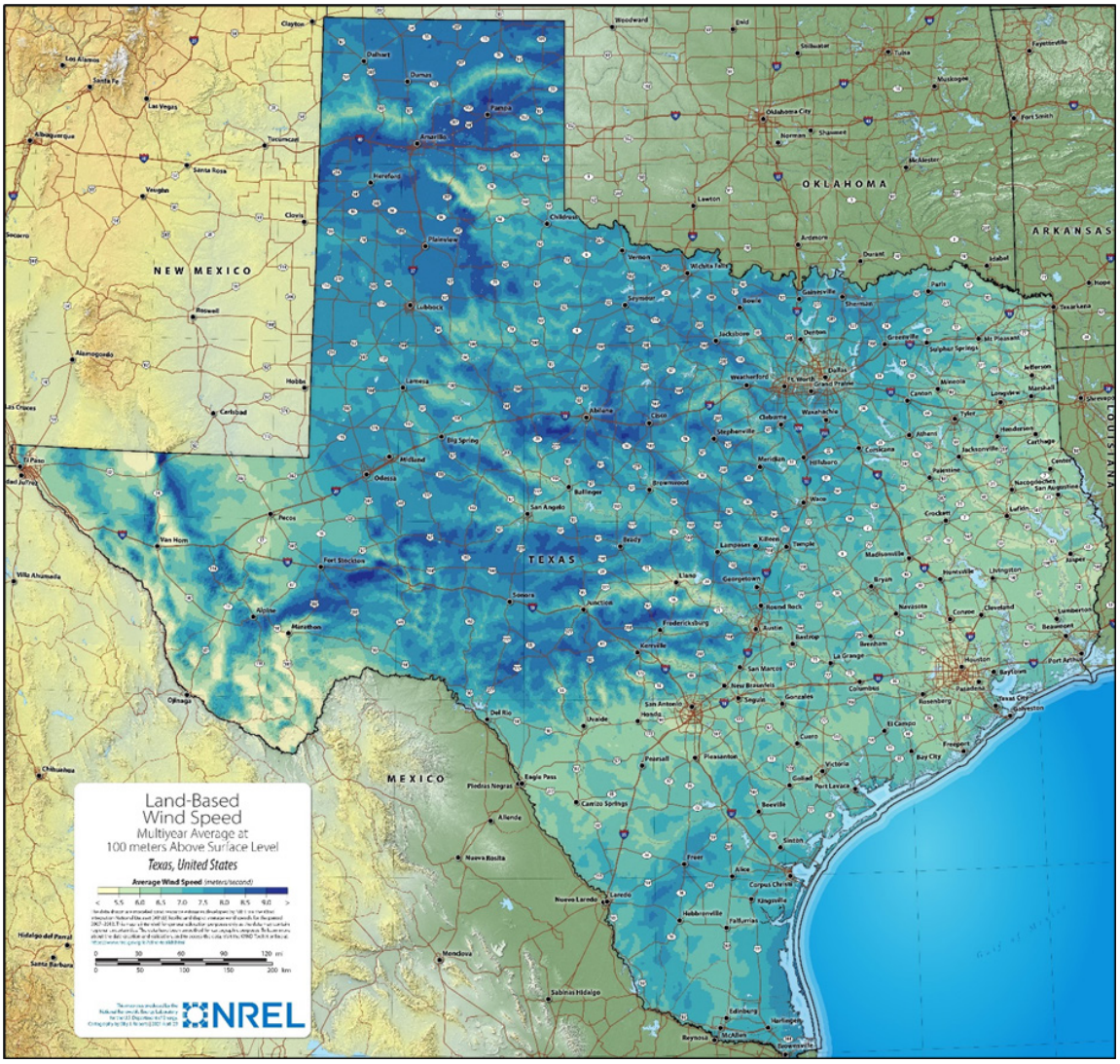

Figure 1 *multi-year average windspeed at 300 ft. in NAS JRB Fort Worth MOA 16-18 mph.*

LAND DEVELOPMENT

Residential development in Texas is rapidly increasing due to population trends and economic growth, including near military installations, increasing the potential for exposing populations to increased noise thresholds, environmental pollutants, and other harmful byproducts of military operations. Solar field developments also have the potential to impact military operations. Specifically, concentrating solar-thermal power plants that utilize centrally located collection towers are risks for vertical encroachment into military airspace.[5] Solar collection equipment also contributes to increased ambient glare, a significant risk for military pilots conducting instrument flight, and impedes the operation of some flight electronic systems. Finally, all developments in this category contribute to RF impedance and interference. While RF planners are knowledgeable in spectrum use and band availability, there are still general overlaps between frequency bands used by the military for ground/air communications and

5 U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, "Solar Collectors," (2023).

commercial push-to-talk networks, emergency service bands, and UAS uplink/downlink nodes.

Taken together, these factors lead to a conflict of interests. Traditional air travel corridors and areas face vertical and horizontal encroachment from new energy developments. Radar station operation is degraded by the false readings, atmospheric disturbances, and physical obstructions of turbine fields, and desirable economic development may be impeded or precluded by existing systems and priorities.

TOOL 1: TEXAS EARLY NOTIFICATION TOOL (TENT)

TENT[6] is a solution developed to begin addressing this multifaceted problem from the ground up. TENT is an interactive web tool that interleaves multiple layers of Geographic Information Systems (GIS) data to provide guidance to deconfliction efforts between military and private stakeholders. Specifically, users can view layers delineating military installations and airspace, radar wave propagation zones, existing wind farm locations, and layers showing wind patterns and associated information across the state. These inputs are informed by GIS data provided by the DoD, the Electric Reliability Council of Texas (ERCOT), NOAA, and the United States Geological Survey (USGS).[7]

TENT was developed in 2019 by the Natural Resources Institute (NRI) of the Texas A&M AgriLife Extension and launched in 2020. NRI contributes research and expertise in the fields of land use trends, wildlife conservation, military land sustainability, and private land stewardship across the state.[8] Funding and stakeholder engagement for the tool's development was provided through a joint partnership of the Texas Governor's Military Preparedness Commission (TMPC) and the DoD Office of Local Defense Community Cooperation (OLDCC). Expert input was also provided by the American Wind Energy Association.[9]

TENT was primarily designed for wind energy developers to conduct early screening of potential projects for compatibility with existing land/air uses. The tool's visual interface allows for preliminary mapping and impact assessments during initial project stages. Additionally, the tool provides contact information for pertinent local, state, and federal jurisdictions to facilitate early notification and multi-lateral dialogue between developers and authorities. The early notification aspect of project planning and deconfliction is the key added value of TENT. It provides wind energy developers with clear guidelines for projects that will require, or benefit from, early notification; direct contacts to the managing authority based on geographic location; and the opportunity to engage with all actors who will participate in a successful planning process.

TOOL 2: TEXAS AIRSPACE PLANNING AND FORECASTING TOOL (TAPFT)

TAPFT[10] is a complementary application to TENT designed to aid military planners in addressing land use concerns before interest conflicts occur. It also leverages diverse inputs into a rendered GIS mapping application to inform understanding of current land use developments and potential future

6 Texas Early Notification Tool; Figure 2, Link.
7 NRI, "Coordination of Wind Energy," (2019).
8 Texas A&M Natural Resources Institute, "Our Work," (2024).
9 Texas A&M Natural Resources Institute, "NRI launches new screening tool for wind energy developers and military," (2020).
10 Texas Airspace Planning and Forecasting Tool; Figure 3, Link.

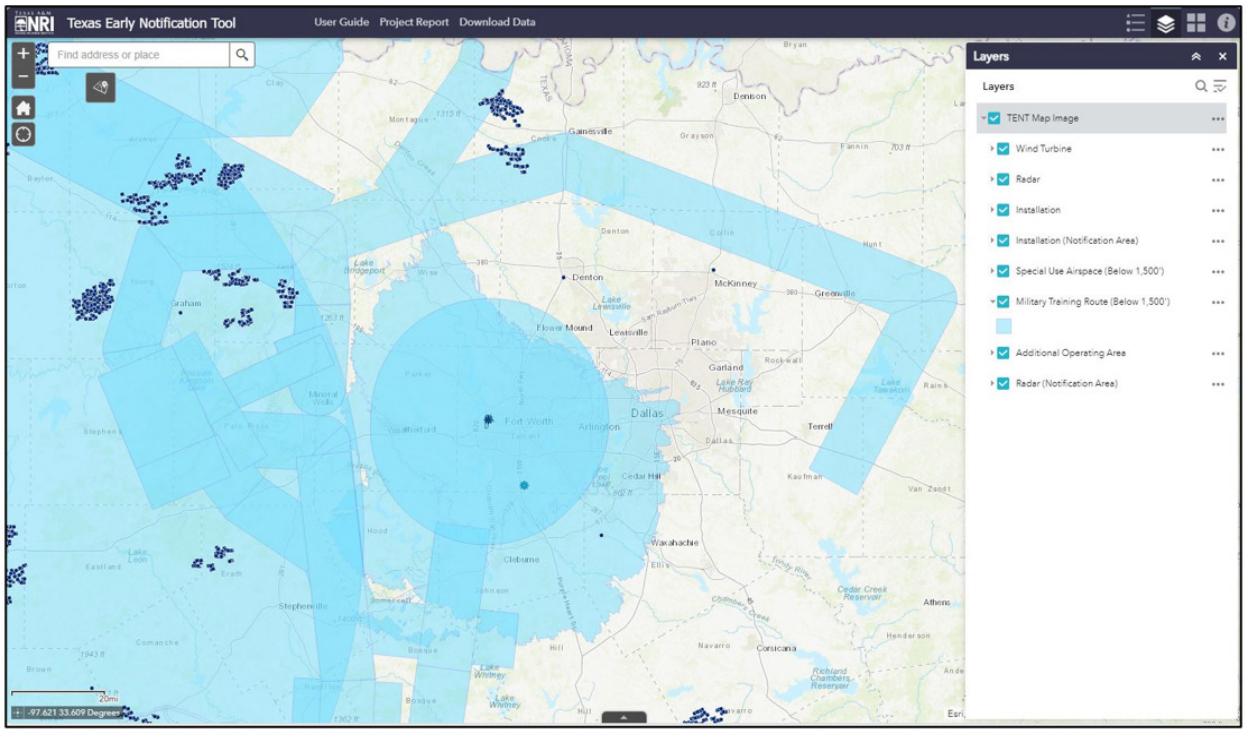

Figure 2 *TENT View of NAS JRB Fort Worth MOA and radar zones.*

developments. For military users, it provides increased fidelity over TENT by incorporating airspace layers that show special use corridors, military training routes, drop/parachute zones, and ground military operating areas. For all users, it uses new layers that expand the tall structures definition to include vertical obstructions (e.g.: radio/cell towers, power transmission towers, power lines) taller than 150 ft. in addition to wind turbines. Additionally, new layers map land use associated with impervious surfaces, urban, suburban, and residential data feeds. GIS data for TAPFT is provided by the DoD, Federal Aviation Administration (FAA), U.S. Fish and Wildlife Service (FWS), USGS, Texas Parks and Wildlife Department (TPWD), and the Environmental Protection Agency (EPA).[11]

TAPFT was developed in 2020 by the NRI and launched in 2021. This effort was in conjunction with the Phase II programming and report prepared for the TMPC. In addition to developing and launching TAPFT, Phase II included facilitating an annual military/wind energy stakeholder meeting, maintenance and updates for TENT, and issue reports on current land use compatibility, land use change projections, and candidate species reviews. Phase II was funded by an additional grant by the DoD OLDCC.[12]

TAPFT was designed to provide military planners with visibility and capability to inform current and projected land use that impacts, or has the potential to impact, military operations. The tool provides accurate data on current land and airspace in use by military units in Texas. It couples this with current and projected land use inputs covering energy developments (wind, solar, transmission), residential use (urban, suburban, industrial), roads and highways, and state and federal park land. The tool's utility is maximized by the ability to incorporate or delineate between layers for current use and layers for

11 NRI, "Military Airspace & Land Use," (2021).
12 NRI, "Military Airspace & Land Use," (2021).

projected future use across all development categories. This capability ensures that military planners will have an accurate, up-to-date, and nuanced view of development. It also facilitates the proactive contact, input, and planning necessary to preserve safety, protect property, and solve problems before they arise.

APPLICATIONS

TENT and TAPFT were developed and implemented as components of an ongoing effort to study and strengthen the development of the Texas wind energy industry and land/airspace use while preserving the current standard of military readiness and aviation safety.[13] NRI has been the lead agency for these efforts and is currently working on upgrading the solution toolbox suite to include a diverse array of applications for use by developers, legislators, and the military.[14] It is also a response to recent state legislation that established new tax rules regarding wind energy developments near military installations in Texas. Specifically, SB 277, which went into effect in 2017, prohibited tax abatement for new wind energy developments within a 30-mile radius of military installations. This legislation was intended to protect and safeguard mission critical military capabilities while decreasing burdens on developers planning new wind energy projects.[15] Both TENT and TAPFT model this regulation in addition to other features. As such, the tool is especially applicable to the nation-wide wind energy regulatory environment where 46 of 50 states regulate wind energy siting through local control, or through hybrid local and state regulation as Texas does.[16] Further, TENT has been cited in several academic forums as a cutting-edge example of leveraging GIS systems to support decision making for developers and officials,[17] and used as a development baseline

"SB 277... PROHIBITED TAX ABATEMENT FOR NEW WIND ENERGY DEVELOPMENTS WITHIN A 30-MILE RADIUS OF MILITARY INSTALLATIONS."

13 Texas A&M Institute of Renewable Natural Resources (NRI), "Wind Energy and Military Airspace in Texas," (2010); NRI, "Coordination of Wind Energy," (2019); NRI, "Military Land Use compatibility in Texas: Phase II," (2021).

14 Alison Lund, and Brittany Wegner, "New military land use compatibility tools to shape the future of action plans across the nation," (Texas A&M: Natural Resources Institute, 2022).

15 Elizabeth A. Weis, "Wind Energy Legislation Strategies for the Lone Star State," *Inquiries Journal*, (Vol. 10 No. 5, 2018).

16 Jaclyn Kahn, and Laura Shields, "State Approaches to Wind Energy Siting," (National Conference of State Legistalures, 2020).

17 Daniel P. Richards, Jennifer L. Whytlaw, and Thomas R. Allen, et al., "User Experience Design as a Framework for Environmental and Political Negotiation in Decision-Making about Wind Energy," (Association for Computing Machinery: 39th ACM International Conference on Design of communication, 2021).

for similar tools in use around the country.[18]

NEXT STEPS

The North Central Texas Council of Governments (NCTCOG), in its role as the supporting agency for the NAS JRB Fort Worth Regional Coordination Committee (RCC), remains committed to supporting compatible development in the region and actively hosts links on its website to these tools and engages RCC members and local planners on their use. Also, NCTCOG staff have facilitated presentations by NRI on these tools at meetings of the Texas Compatible Use Forum, ensuring that military installations and municipalities across the state are aware of these tools.

18 Thomas R. Allen, Daniel P. Richards, and Jennifer Whytlaw, et al., "A Geospatial Hub to Support Wind Energy and Maritime Activity Spaces near Hampton Roads, Virginia, U.S.A.," (The Intitute of Electrical and Electronics Engineers: OCEANS 2022 Conference Hampton Roads, 2022).