Attachment A

Shovel Creek Wind Farm Development Plan

Shovel Creek Wind LLC, Alaska Renewables LLC
Submitted to Alaska Department of Natural Resources

Background

In June 2022, Golden Valley Electric Association, (GVEA) adopted a new Strategic Generation Plan that included the directive to develop and issue a Request for Proposal for the addition of a large-scale wind energy resource Power Purchase Agreement to their current generation mix. Alaska Renewables LLC (AKR) intends to propose and develop a wind energy project in the Shovel Creek area off of Murphy Dome Extension Road. The aim of our proposed project is to meet the needs and goals of GVEA and its member-owners, as well as the broader Alaska grid. This proposed project is designed to enable GVEA's transition to a lower-cost, more reliable, and more environmentally friendly energy mix.

Shovel Creek Wind LLC is a project owned and proposed by AKR. In putting this project together, AKR has consulted extensively with over a dozen major Alaska-based environmental, engineering, and construction firms to ensure the feasibility, low cost, and low impact of this proposed project. These are well-recognized, leading firms with a long history of working in the climate and communities of Alaska, including building prior wind projects. AKR has also initiated dialogue with key community leaders and looks forward to engaging with the full breadth of community members to answer questions and hear ideas to achieve the most positive outcomes for the community. Despite this preliminary due diligence, this project remains early on in its development, and significant work remains to fully evaluate its wind resource, benefits, impacts, design, sizing, and community acceptance, as well as any mitigation measures that may be necessary to minimize impacts and maximize the benefits for the community.

Project Summary

Site Description, Terrain, and Ground Cover

The proposed Shovel Creek Wind Farm would be located 18 to 25 miles WNW of Fairbanks, Alaska. The project would be sited along the crests of the minor ridge systems (elevations 1,900-2,800 feet above sea level) 2 to 13 miles to the west of Murphy Dome and the existing Murphy Dome Radar Station. The land is owned and managed by the State of Alaska and the Department of Natural Resources, and located within MTRS parcel IDs F001N004W05, F001N004W06, F001N004W07, F001N005W02, F001N005W03, F001N005W10, F001N005W11, F001N005W12, F001N005W14, F001N005W15, F001N005W16, F001N005W20, F001N005W21, F001N005W22, F001N005W23, F001N005W28,

F001N005W29, F001N005W31, F001N005W32, F001N005W33, F001S005W05, F001S005W06, F001S005W18, F001S006W01, F001S006W12, F001S006W13, F002N004W30, F002N004W31, F002N004W32, F002N005W12, F002N005W13, F002N005W24, F002N005W25, F002N005W35. The project would be partly within the Tanana Valley State Forest, which is designated for “multiple use management that provides for the production, utilization, and replenishment of timber resources while perpetuating personal, commercial, and other beneficial uses of resources.”

Much of the project is at higher elevations on gently sloped ridgelines characterized by low vegetation, rock outcrops, and sparse forest resources. Some of the further northern and southern ends of the project areas are forested along the top of the ridge (mainly black spruce but also some other deciduous species). Land would be cleared near the potential turbine sites and along the access roads. The proposed area would extend approximately 200 m on each side of the ridge apex to provide for access roads, turbine pads, and the necessary safety offsets from other potential structures to allow for flexibility in the project design and layout. Ultimately,

The project site was selected in large part because of its consistent and strong winds that can support cost-effective and reliable renewable energy generation. In fact, there are numerous existing residential wind turbines deployed in the off-grid communities to the SE of Murphy Dome, as well as an existing mid-scale turbine at the Murphy Dome Radar station near the summit. Although the exact path of the electrical interconnection remains preliminary, the utility (GVEA) has 17 miles of right of way that already contain some electrical distribution feeders that could be used to link the new wind farm directly to GVEA’s load center in Fairbanks, providing the opportunity to improve grid electrical stability for the region. Other transmission line alternatives exist as well including along the Old Murphy Dome Road firebreak to the existing Fort Knox Transmission Line, and south from the project to the Northern Intertie along the Parks Highway. The existing Murphy Dome Extension Road would bisect the project, offering site access with minimal cost and environmental impacts.

Figure 1. View of the existing Eva Creek Wind Farm (est. 2011) operated by Golden Valley Electric Association outside of Healy, AK. The proposed Shovel Creek Wind development would have many attributes in common with this existing project; however, electrical system modeling shows that this project could reliably provide >25% of GVEA's total annual energy needs with zero carbon emissions.

Project Scope

The exact extent and scale of the proposed project would depend on the energy offtake agreement(s) that might ultimately be reached between AKR and GVEA or other potential offtakers. The proposed Shovel Creek Wind project would consist of up to 63 wind turbines, corresponding to a total electrical output of up to 264 MW in wind power capacity. GVEA's Request for Proposals targeted renewable energy projects between 40-150MW, but we have sized the development plan to allow for a larger project or future expansion that takes advantage of the economy of scale in order to further reduce the cost of wind energy and the carbon dioxide emissions of the broader grid. The expanded footprint also allows for additional flexibility in the site design, layout, and engineering stages of the project as the project moves through the different phases of study, design, and permitting.

Meteorological Towers

Between 2003 and 2005, GVEA installed two temporary meteorological towers on the ridges to the west of Murphy Dome, structures that have since been removed. Additional temporary meteorological observations lasting approximately 1-4 years are required in order to determine the feasibility, economics, and financeability of the proposed project. Golden Valley Electric Association installed three 60m tall meteorological towers in 2022 and AKR installed one additional 50m tower in 2023. These are authorized under separate Land Use Permits through DNR. Ground-based LIDAR systems will also be used to monitor the wind and other meteorological variables.

Once wind turbine generators are installed, the temporary meteorological towers will be removed and replaced by up to 5 permanent meteorological towers up to the turbine hub height throughout the project in order to monitor turbine performance. Each permanent meteorological tower would require a parcel of approximately 1-4 acres, depending on its height and whether it is a self-supported or guyed lattice tower.

Turbines, Turbine Pads, and Foundations

Each turbine pad would be approximately 3.5 to 5 acres, with sufficient space for a crane to enable the delivery, staging, and installation of all turbine and tower components. Within that pad area, a foundation would be built for the turbine towers according to the manufacturer's requirements. Turbines would be spaced approximately 1,300-2,000 feet (400-600 m) apart along the apex of the generally N-S oriented ridgelines, an orientation that would result in low turbine wake losses given the prevailing winds from the east. The potential turbine locations are only preliminary, as layout will be optimized based on further wind resource characterization, topography, geotechnical and environmental considerations, as well as community input.

The specification and supplier of the turbines themselves are subject to change; however preliminary planning involves 4 megawatt class turbines with hub heights between 100 and 120m and a rotor diameter of 150-163 m. The turbines would be outfitted with cold weather modifications to ensure reliable performance in Interior Alaska's climate.

Table 1. Preliminary locations of the proposed Shovel Creek Wind turbine sites for the maximum, full project layout. The actual number of turbines would depend on the ultimate size and capacity of the project desired by the utility or utilities that will purchase the power production from the facility. These locations are also subject to change within the proposed Lease Area as the project progresses towards final design. The turbine sites listed here are the maximum potential project footprint.

Latitude	Longitude
65.006945	-148.466982
65.003106	-148.467441
64.999329	-148.468805
64.995686	-148.471781
64.990808	-148.475487
64.986962	-148.471231
64.98297	-148.469923
64.97896	-148.469082
64.975275	-148.46253

64.971234	-148.462357
64.968354	-148.448647
64.963449	-148.442942
64.959108	-148.440711
64.954725	-148.437905
64.949633	-148.419133
64.947303	-148.434354
64.943824	-148.440171
64.939966	-148.442958
64.935909	-148.444475
64.93154	-148.44605
64.927093	-148.44693
64.95231	-148.505755
64.947625	-148.507216
64.944363	-148.513913
64.940367	-148.517947
64.93599	-148.520899
64.930782	-148.520092
64.925784	-148.520845
64.920151	-148.525415
64.916301	-148.52461
64.912502	-148.523632
64.908784	-148.521169
64.920294	-148.548976
64.916654	-148.551919
64.913011	-148.55508
64.90928	-148.557723

64.905697	-148.561247
64.900262	-148.571855
64.89683	-148.577605
64.893622	-148.584977
64.890781	-148.595077
64.887636	-148.602833
64.883832	-148.604484
64.879994	-148.603018
64.876082	-148.597734
64.872322	-148.608433
64.868529	-148.609015
64.864388	-148.60561
64.860959	-148.601825
64.855805	-148.608993
64.851349	-148.61053
64.868475	-148.632718
64.865084	-148.640024
64.86158	-148.646124
64.858402	-148.655666
64.855307	-148.665906
64.851702	-148.670764
64.847958	-148.673901
64.844295	-148.677535
64.840468	-148.677082
64.836375	-148.666652
64.832487	-148.661012
64.828585	-148.651467

Laydown Yard(s)

A laydown yard (flat gravel pad) would be constructed within the project area. The yard would serve as the site for the laydown of turbine components during construction or maintenance periods. It would be an area of up to 800 feet by 1400 feet, or about 25 acres. While the yard would likely be situated somewhere near the center of the project as built or split up into smaller yards placed throughout the project, the exact siting is only preliminary and would be dependent on further engineering, design, and land use considerations. Much of the Laydown Yard would remain vacant after construction, though a portion of it may be used as a site for component, equipment, or vehicle storage.

Maintenance buildings

One or several permanent enclosed buildings would be required within the project site to serve as a mechanical and electrical shop, maintenance crew quarters, control room equipment, maintenance equipment storage and garage, telecommunications facilities, as well as outdoor vehicle parking and storage. The maintenance building infrastructure would be sited on a parcel of up to 5 acres.

Substation

Up to 3 acres will be required for an electrical substation to convert power from the wind turbine generators' collector systems to the higher voltage of the transmission lines that connect the project to the GVEA electrical grid.

Battery Energy Storage System

Up to 20 acres would be utilized for a battery energy storage system (BESS). This facility would be located adjacent to the Substation in a building or enclosures.

Collector System

An electrical collection system will connect each of the wind turbine generators to the main project substation. Most of this cabling will be underground, but some portions may be located above ground to avoid impacts on the gas line easements or to minimize costs and environmental impacts of burying cable in areas with poorly suited geotechnical characteristics.

Access

The Murphy Dome Extension Rd portion of the site access is 6 miles long, mostly hillside and broad ridgeline, and requires some improvement (slight widening, some profile improvements, drainage and culvert improvements, and some embankment improvements to facilitate

mobilization of the tower components). Between approximately MP 2 and MP 8 of Murphy Dome Extension Rd, several new intersections and new branching access roads would be required to provide access to the strings of turbines within the proposed lease areas. The precise location of these intersections would be driven by engineering and environmental considerations, and determined in consultation with DOT. Public access and use of Murphy Dome Extension Road would be maintained and improved with this development. The new access roads have the potential to enhance access to the surrounding State Forest lands and the diverse resources they hold.

The final turbine access road surfaces would be up to 52 feet wide to accommodate the erection crane traveling between turbine pads, with widening anticipated on the curves. The goal is to find a route with design grades and a horizontal alignment that can safely accommodate access and maintenance for wind farm construction and operation. All but about ¼ mile is between 2% and 6% profile grade. The new road infrastructure would be situated within a 100' road easement that would also contain collector cables, junction boxes, and communications cables. These would primarily be buried, but some portions may be above ground.

Temporary parking will be provided for workers; long-term limited parking will be established for the small maintenance staff at key locations along the ridges.

The total lease area of interest encompasses approximately 3,786 acres. The proposed installed infrastructure and leased area footprint would take place on a small subset of that land, up to approximately 450 acres (for the largest possible project size, less for smaller projects with fewer wind turbines). Once the project layout is finalized, the surveyed lease area could be limited to the as-built areas associated with the installed infrastructure, analogous to the leasing structure of the Eva Creek Wind farm.

Electrical Interconnection

The project would be connected to the existing GVEA grid with new high voltage transmission lines. Several transmission routes are being considered. One potential transmission route would follow along the existing power lines and wide fire break along Old Murphy Dome Road and interconnect with the Fort Knox Transmission line route to deliver power to the load center in Fairbanks. Another alternative is to create a new line from the project to the Nenana Line of the Northern Intertie. It is possible that a combination of multiple interconnection points would provide the best overall interconnection to the broader grid. Multiple independent sets of lines may be required.

Special Site Considerations

AKR has reviewed this proposed project closely with the Alaska Department of Natural Resources and over a dozen major Alaska-based environmental, engineering, and construction firms. Through this process, AKR has designed and refined the project in a manner that attempts to maximize the project benefits while minimizing potential impacts. Further, AKR is sensitive to the diverse public values and potential mitigations required to ensure the project results in the greatest good for the community's health, economy, recreation, subsistence, and sustainability. Several key site considerations that were identified in our preliminary review of the site are listed below, as well as possible mitigations and approaches. This is not an exhaustive list, and we expect to learn more about other uses and site considerations through the ongoing public engagement phase, and design in ways to address the identified issues. AKR intends to make any reasonable and cost-effective adjustments as necessary to respond to these considerations and improve the overall project outcomes.

- First and foremost, we acknowledge that the project would be located on the traditional lands of the Dene people of the Lower Tanana Valley. Alaska's indigenous peoples have stewarded these lands since time immemorial and maintain deep cultural and substantive connections with their lands. In deference to this history and stewardship, AKR is committed to taking a transparent, collaborative, and consultative approach by engaging with Native communities and organizations to ensure the project benefits indigenous communities and is consistent with indigenous values and land use practices. We embrace the practice of Free, Prior and Informed Consent (FPIC) and aim to implement this practice throughout the development of this project.

- Several small privately owned parcels exist adjacent to Murphy Dome Extension Road, but none are known to contain structures. We will engage with local landowners to understand and respond to their interests and concerns.

- General recreation and tourism uses are common in the area. These activities are concentrated primarily near the Murphy Dome summit, several miles to the east of the proposed wind farm, but also extend out along Murphy Dome Extension Road and down to the Chatanika River corridor and Minto Flats. Activities include but are not limited to hiking, biking, scenic viewing, off-road vehicle use, and shooting. Several social, multi-use trails are found throughout the area. Moreover, seasonal subsistence uses such as hunting and berry picking are common in the broader area. Given the existing uses of the project area, the vast majority of the project area would remain accessible to the public. In many cases, access opportunities would be improved for the benefit of the public and the State Forest. Access to the space immediately beneath and adjacent to the wind turbines and associated electrical equipment will be restricted and/or signed to minimize risk to the public.

- A majority of the project will be located within the Tanana Valley State Forest, so the development will need to be compatible with the legislatively designated purpose and established management priorities of the Forest, namely ensuring the sustained yield of multiple resources. Most of the proposed leasing area is along the exposed ridgelines with limited few trees, so there is unlikely to be any significant direct impacts on harvestable forestry resources. Moreover, new and improved roads would facilitate improved access to the forestry resources that do exist at lower elevations below the ridgelines.
- There are no significant mining interests in this area.
- This proposed site is located within a few miles, and at least a few hundred feet in elevation below the long range radar station at the top of Murphy Dome. No conflict of use was identified in pre-permitting due diligence with the U.S. Department of Defense.
- Once constructed, portions of the project may be visible on the western horizon at a distance of approximately 5 to 12 miles from the residential communities to the SE of Murphy Dome. Given its location on the tops of ridges, the project would also be visible from other high points in the region. A preliminary visual impacts report was provided in support of this Development Plan.
- The Alaska Gasline Development Corporation holds some leases for a proposed gas line along Murphy Dome Extension Road. AKR would site its project in a way that is compatible and complementary to those leases and prospective infrastructure.

Other Environmental Considerations

Wind farms generate negligible waste (e.g. used lubricating oil, which is changed periodically and will be disposed of properly), produce no hazardous substances, and use no water.

Wind Project Development Stages

The following is a discussion of the critical stages in the grid-scale wind project development process. Each project, site, and community are unique, so there is no “one size fits all” template or blueprint for successful development.

The following segments represent the critical steps to develop a successful, grid-scale wind project.

Site Identification and Wind Resource Assessment

Successful development of a grid-scale wind power project is founded on identifying a site suitable for hosting a wind project, often called a wind farm. Key characteristics of an attractive wind site include:

- Above average but consistent wind resource, minimizing gusts and shear
- Access roads that can be graded to 8% grade or less
- Access to electricity grid infrastructure (transmission lines and/or substations)
- No impingement on protected, sensitive or conservation areas
- Minimal to no wetland or floodplain impacts
- Minimal to no impact on protected ecosystems and organisms
- Minimal to no impact on cultural or archaeological resources
- Ability to secure land access and long-term rights from the landowner
- A location where wind development provides net gains to the local community and grid

In consultation with leading environmental, engineering, construction, and legal firms, AKR has investigated each key characteristic identified above and made a preliminary determination that this site meets all requirements for a successful wind farm. Further study and stakeholder engagement is still required to verify this preliminary determination and implement all reasonable and cost-effective measures for mitigating impacts and maximizing the net benefits of the project.

Local Outreach

One of the most challenging aspects of the grid-scale wind development process is securing the required approvals. Additionally, being a good neighbor is essential to developing a quality wind project and requires working closely with nearby residents, businesses and industries, indigenous communities, government authorities, and the community at large to ensure all questions and concerns are addressed. The success of a grid-scale wind project often hinges on a developer's ability to build strong relationships with all stakeholders throughout the development process and the project's lifetime. At this early stage in the project development process, AKR has initiated some of these relationships and looks forward to expanding the engagement over the coming years before the project is finalized. A key factor in this project is that it is being developed in response to the community's and GVEA's requests and needs for new renewable, reliable, and cost effective power generation. The expansion of renewable energy resources has been identified as a priority by Indigenous leaders, area residents, the Fairbanks North Star Borough, GVEA and all of the Railbelt Utilities, as well as the State of Alaska and Federal Government.

Site Environmental Review and Cultural Assessment

Even with the extensive environmental review already performed, grid-scale wind projects require additional highly-detailed studies to ensure the project has limited to no negative impacts on existing ecosystems, threatened or endangered species, or cultural and archaeological resources. Soil conditions and topography (“geotechnical conditions”) are also evaluated to ensure the project can be constructed efficiently.

While no rezoning is required and there are no endangered species identified, there is extensive environmental assessment and permitting required. This process, which can take around 2 to 4 years, involves significant investment of time and resources from the developer. During this period, professional teams will be on site for the required field studies and observations.

Grid Access and Interconnection Management

The next step in the wind project development process involves securing rights for a connection to the electric grid through either high voltage or medium voltage. Proper connection with the electric grid is crucial to a successful wind project, especially given the unique dynamics of power flow and load balancing for GVEA. AKR has examined the load flows for GVEA’s system with multiple electrical engineering firms familiar with the system. AKR’s team of interconnection engineers will work with GVEA to assess connection prospects at the project site, assemble the Interconnect Application and other necessary applications, and complete the appropriate studies. Fortunately, thanks to the advances in reliability and cost with wind turbine technology, energy storage (battery) technologies, and other modern software, this project can increase the reliability for GVEA’s system and reduce system cost over its 30 to 40 year operating lifetime.

Energy Sales/Offtake Agreement

Arranging in advance for the sale of electricity generated by a wind project is essential to a project's success. By securing a long-term contract in advance for the purchase of the energy from a wind facility, a project developer can guarantee the levelized cost of energy that reduces the cost of energy to consumers. AKR aims to negotiate a power purchase agreement (PPA) with GVEA or another qualified offtaker.

Project Financing

Grid-scale wind energy projects require significant upfront investment. This investment takes the form of both equity and project debt, supported by predictable revenues generated under a PPA or other energy offtake arrangement. The more predictable the project's revenue stream, the lower the risk and cost of capital required to build the facility. There is a robust global market for wind project equity and debt investments, which reduces the cost of ownership and capital, thereby reducing the cost of carbon-free, renewable electricity to consumers. This will bring low-cost capital into the region and moreover insure that GVEA Members only pay for the project if it delivers according to contract terms, as opposed to other financial structures where the debt is owed regardless of power plant performance.

Engineering, Design, and Procurement

Early in the project development process, preliminary engineering layout and design work is done to appropriately size and tailor the proposed project layout for the particular site and circumstances. This is now complete. As the project moves forward and the development team secures the energy offtake arrangement, the engineering efforts become more detailed to produce a viable plan that can be financed and built. A preliminary team has been assembled with offices in Fairbanks and Anchorage to do this detailed engineering work. Simultaneously, procurement efforts are undertaken to evaluate and negotiate equipment supply agreements (wind turbine generators, energy storage equipment, substation equipment, collector and transmission cabling) and construction agreements.

Construction

The development process is complete when:

- The site has been secured
- Permits have been granted
- Full permission to connect to the grid has been granted
- Final engineering and procurement plans are complete
- Offtake provisions for the power or the project have been negotiated

- Financing has been arranged

At this point, often called “Notice to Proceed” (NTP), the project is “shovel ready” and construction can begin. From design to final delivery of the completed and operational energy generation facility, a wind project developer must select and deploy a capable construction management crew to direct skilled tradespeople for safe, efficient, and precise plant construction. Depending on the size of the project, construction should be completed within 6 to 12 months. During this period, project construction generates a significant number of local jobs across many trades (civil works, electrical, mechanical, labor, etc.), at times employing over 100 workers.

Ongoing Operations & Maintenance

Once a grid-scale wind project is tested, approved, and accepted by GVEA, it is placed in service and begins delivering electricity to the grid. During its operational lifetime of up to 40 years, the project requires very little in terms of operations and maintenance (“O&M”) to efficiently deliver renewable energy to consumers through the grid. Dramatic technical advances have occurred in the reliability of these platforms over the past decade, especially for established major vendors like GE, Siemens, and Vestas. Moreover, remote monitoring and predictive maintenance software is now mainstream, significantly decreasing the uncertainty in O&M planning, cost, and burden.

In many cases, a separate O&M provider will be engaged who will hire local employees to perform ongoing maintenance, monitor and optimize production, and maintain the grounds. If the land is leased, the project will generate a recurring lease or royalty payment to the landowner. Compared to other generation sources, the total cost and time invested in a wind farm is very low, making the wind farm a good neighbor, quietly producing low-cost, carbon-free, renewable energy and delivering benefits to the landowner, local community, and the environment.

Closure/Removal Plan

Wind farms operate for a minimum of 20 years, but now have extension plans available for purchase from the manufacturer to extend life up to 40 years. Following that, projects are often “repowered” with new, higher efficiency equipment installed on the original tower, which can last indefinitely. As the long-term fuel cost for this project is free wind resource, it is expected the project would be extended multiple times.

The project will have cash reserves as part of the overall financing to fully remove all of the surface infrastructure and address unforeseen hazards such as contamination or site conditions. We wish to leave the roads, pads, and subsurface turbine foundations in place. The

roads and pads may be beneficial for future uses/users. The turbine foundations are inert and removal would cause substantial surface disturbance with little or no benefit. Turbines and unused above ground electrical infrastructure would be removed and recycled to the extent possible and practical.

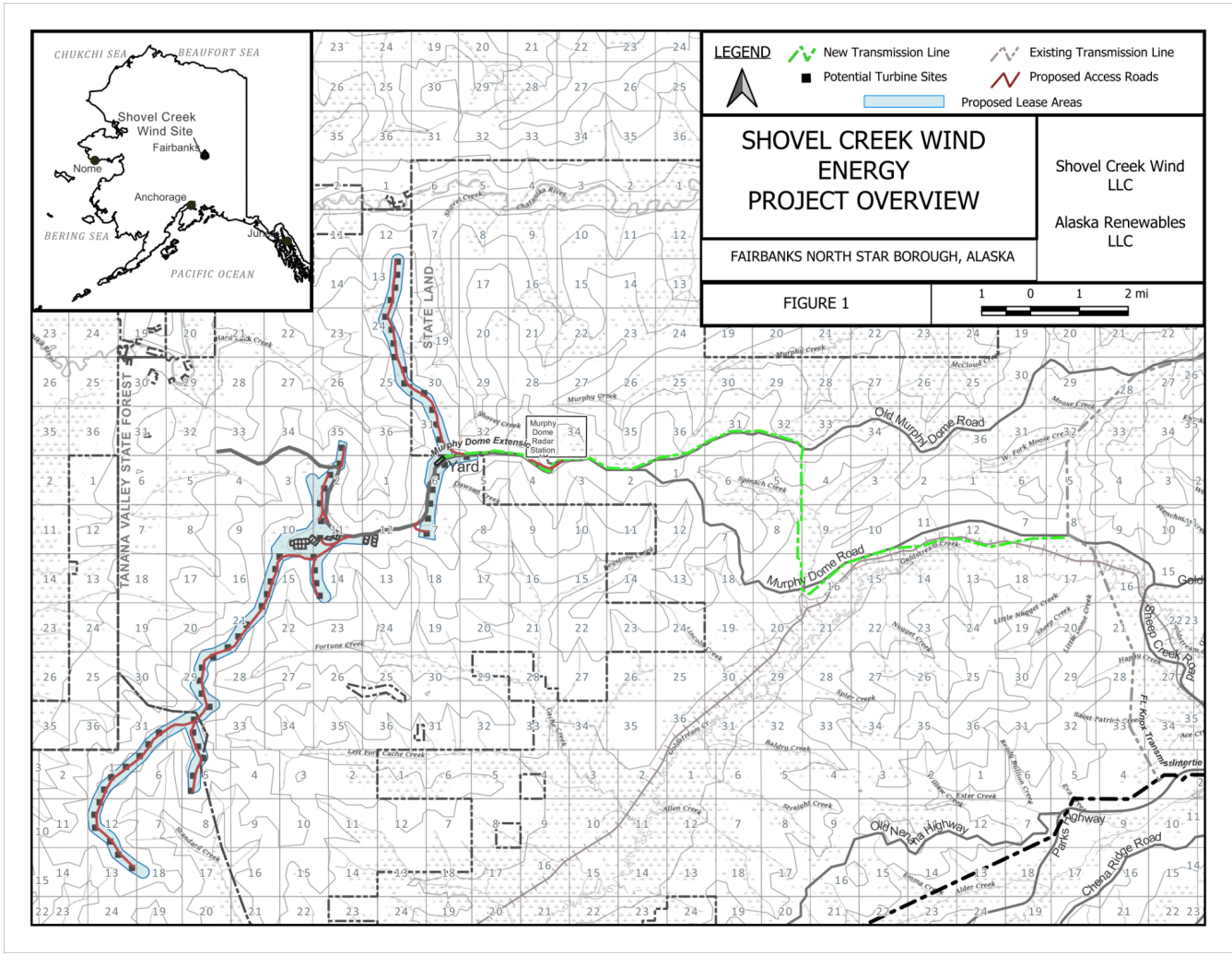

Figure 1. Overview map of the Shovel Creek Wind Project illustrating the maximum potential turbine layout within the proposed lease area. The locations of infrastructure within the project are subject to change as the project design progresses. Also shown is one representative transmission pathway.

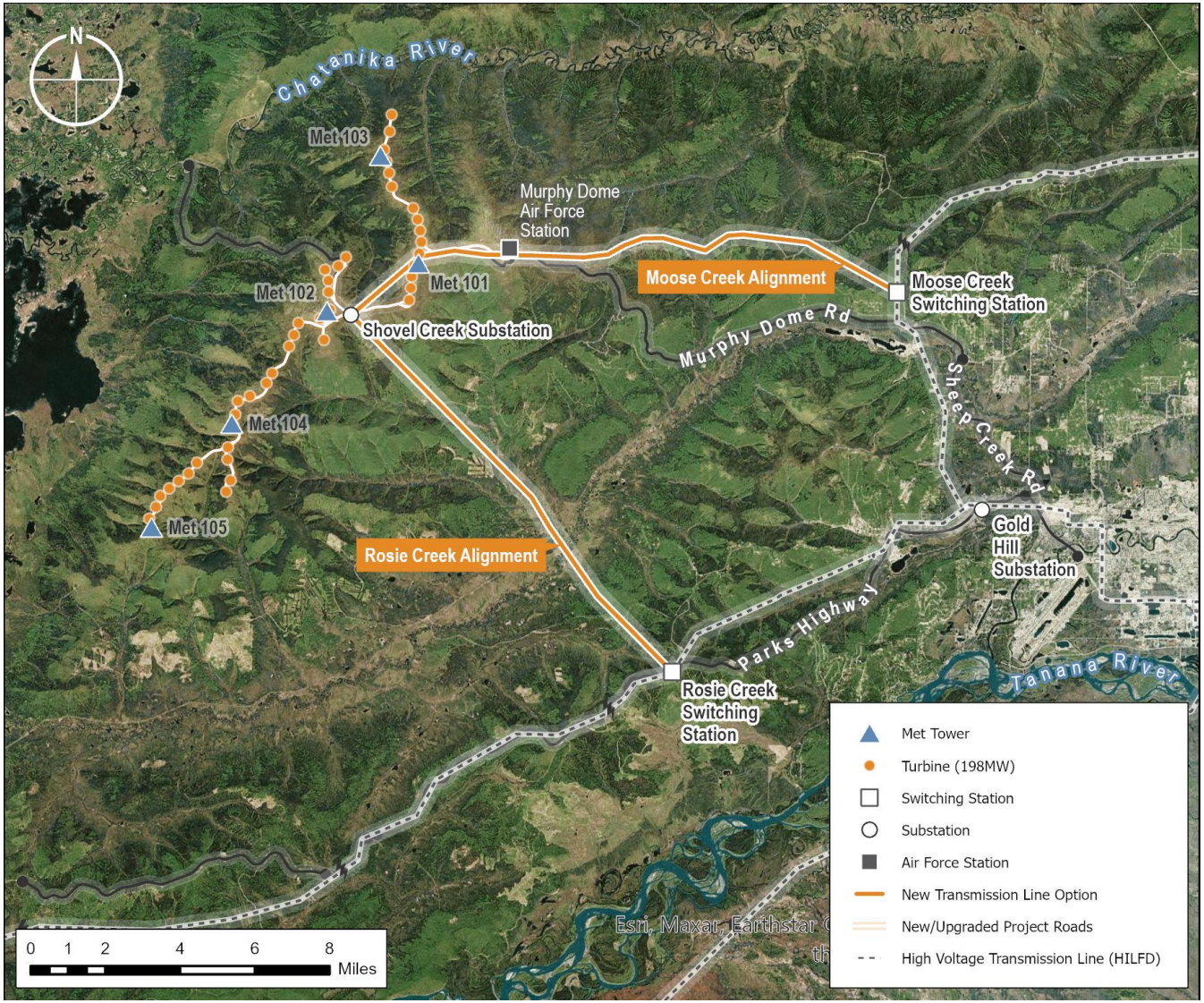

Figure 2. Project overview map alternative for a design configuration proposed in response to GVEA's Request for Proposals for Wind Energy Projects.

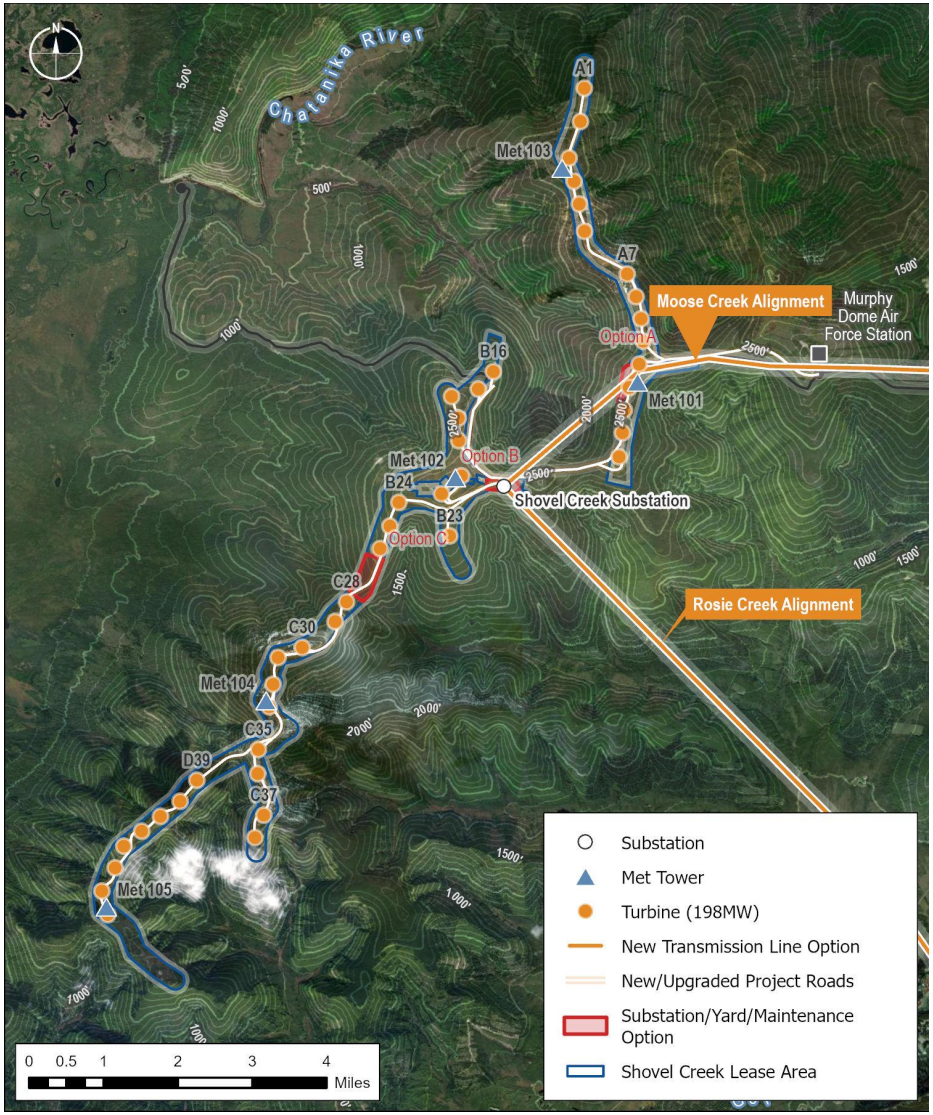

Figure 3. Detailed map of the project area indicating potential substation, yard, and maintenance building parcel locations as well as turbine layouts optimized based on recent meteorological data.

Figure 4. Visualization of the proposed Shovel Creek Wind site looking NW from near the summit of Murphy Dome, including the proposed wind turbines. The visualization shows a ten-turbine string along the northern portion of the proposed lease area.