MEMORANDUM

TO: Distribution below

FROM: Chris B. Caperton, Chief
Facilities Planning Branch, Planning Division, DPZ

SUBJECT: 2232 Review Application

RE: Application Number: 2232-V13-18 Tax Map: 113-1 ((1)) pt. 5, 7, 8; 113-3 ((1)) 1, 2, 4

Attached for your review and comment is a 2232 Review application

RECEIVED FROM: Furnace Associates, Inc.

PROPOSED USE: Green energy wind turbine and solar panel electric generating facilities and quasi-public use

LOCATION OF USE: 10001, 10201, 10209, 10215, 10219 and 10229 Furnace Road, Lorton, 22079

ADDITIONAL COMMENTS:

DEADLINE: Please send your comments to Debbie Pemberton by: November 21, 2013

Phone: 703-324-1407
Email: debbie.pemberton@fairfaxcounty.gov

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- Board of Supervisors – Supervisor Hyland

Department of Planning and Zoning
Planning Division
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Fairfax, Virginia 22035-5507
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**COUNTY OF FAIRFAX, VIRGINIA**

**APPLICATION FOR DETERMINATION**

**PURSUANT TO VIRGINIA CODE SECTION 15.2–2232**

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**APPLICATION NUMBER** 2232-V13-18

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**PART I: APPLICATION SUMMARY**

**LOCATION OF PROPOSED USE**

- **Address**: 10001, 10201, 10209, 10215, 10219, 10229 Furnace Road
- **City/Town**: Lorton, VA
- **Place Name**: Lorton Green Energy Park
- **Tax Map I.D. Number(s)**: 113-1-(1)-5(pt.), 7, 8; 113-3-(1)-1, 2, 4
- **Fairfax County Supervisor District**: Mt. Vernon

**APPLICANT(S)**

- **Name**: Furnace Associates, Inc.
- **Agent Name**: Francis A. McDermott
- **Agent’s Mailing Address**: Hunton & Williams LLP, 1751 Pinnacle Drive, Suite 1700
- **Secondary Contact**: Elaine O'Flaherty Cox

**BRIEF DESCRIPTION OF PROPOSED USE**

Green energy wind turbine and solar panel electric generating facilities and quasi-public use.
Total Area of Subject Parcel(s) ±249.82 acres

Zoning District R-1

Previous Zoning Approvals for all uses on site (proffered conditions, special permits, special exceptions, variances, development plans)
SE 80-L/V-061
SEA 80-L/V-061
SEA 80-L/V-061-2 (pending)

PROPERTY OWNER(s) OF RECORD
Owner Furnace Associates, Inc.
Street Address 11220 Assett Loop, Suite 201
City/Town Manassas State VA Zip Code 20109

Has property owner been contacted about this proposed use? ☑ YES ☐ NO

SIGNATURE

The undersigned acknowledges that additional Fairfax County land use review requirements may be identified during the review of this 2232 Review application and the fulfillment of such requirements is the responsibility of the applicant. The undersigned also acknowledges that all Fairfax County Zoning Ordinance requirements pertaining to this project shall be fulfilled.

In the event a new agent is assigned responsibility for this application, the applicant agrees to provide a letter to the Department of Planning and Zoning authorizing the transfer of responsibility for the application and providing all new contact information. In the event the applicant fails to notify County staff of a change in agent, the application may be subject to processing delays.

Signature of Applicant or Agent

Date 11/4/13

Submit completed application to:

Chris Caperton, Chief, Facilities Planning Branch
Fairfax County Department of Planning and Zoning
12055 Government Center Parkway, Suite 730
Fairfax, Virginia 22035-5507
(703) 324-1380
A. Description of the Proposed Wind and Solar Uses

Furnace Associates, Inc. ("Furnace"), the Applicant in pending Special Exception Amendment Application SEA 80-L/V-061-2 ("SEA-2"), seeks to amend prior approvals for the Lorton Construction Demolition Debris Landfill (the "Landfill") and proposes, as interim uses, state-of-the-art renewable energy electric generating, quasi-public facilities. This request, filed pursuant to Section 15.2-2232 of the Code of Virginia, is limited solely to wind turbine and solar renewable energy generating, quasi-public, uses as proposed in SEA-2 on the Landfill located at 10001, 10201, 10209, 10215, 10219 and 10229 Furnace Road and identified as Fairfax County Tax Map Parcels 113-1-((1))-5(pt.), 7, 8; 113-3-((1))-1, 2 and 4 (collectively, the "Property"). The Property consists of approximately 249.82 acres and is zoned to the R-1 (Residential) District.

The SEA-2 Plat dated March 22, 2013, as revised through November 1, 2013 consists of 45 sheets showing proposed facilities and the anticipated phased installation of the facilities. The Plat has been prepared by BC Consultants with input from Geosyntec Consultants ("Geosyntec"), the Applicant's green energy and landfill consultant. Numerous detailed Geosyntec documents have been submitted in conjunction with pending SEA-2 and discussed by Geosyntec with all referral agencies for more than two hours on July 25, 2013 and, including a study by Geosyntec evaluating the feasibility of renewable energy technologies on the Property later filed with the Department of Planning and Zoning ("ZED") on August 15, 2013. The technical information in this Statement reflects reports prepared by Geosyntec.

As a pilot project, Furnace has proposed to phase potential implementation of four renewable energy technologies which will have the combined capacity of 15.5 megawatt peak (MWp) of electricity, including solar panels (7.5MWp), wind turbines (3MWp), methane gas to energy (4MWp), and geothermal heat exchange (1MWp). Establishment of these four technologies in one place would be unique in the United States, create a transformational use in the Lorton area and reduce the carbon footprint of the area by reducing or offsetting the use of fossil fuels. Based on a County Attorney opinion, two (wind turbines and solar panels) of the four renewable energy infrastructures need Section 2232 determination. Note that Furnace is committing to install a separate solar panel farm on its adjacent property on the west side of Furnace Road which is the subject of pending Proffered Condition Amendment Application PCA 2000-MV-034 and a separate Section 2232 Application.

Three wind turbines would be installed and begin operation during Phase 1 in the south-central operations area, as depicted on SEA-2 Plat Sheet 6. Furnace proposes to install mid-sized 250
kilowatt (kW) capacity turbines, rather than large-scale turbines, up to 180 feet in height for the tower and rotor (see SEA-2 Plat Sheet 14). The electricity generated by the turbines would be distributed to the power grid through one of four viable paths yet to be selected. The SEA-2 Plat requires Furnace to create in Phase 5 a 40-acre platform for the potential of up to 12 wind turbines and/or a solar panel farm to be provided by the Applicant or others, as depicted on SEA-2 Plat Sheets 10 -13. This new, Phase 5 top deck area can take advantage of unusually favorable prevailing wind conditions given the 412-foot elevation plus the turbine height, and proximity to a major water body.

Each of these initial three wind turbines will have the capacity of one-quarter megawatt peak of electricity on that section of the platform. The first turbine will be installed no later than 18 months after all necessary County, Virginia, and Federal approvals for the Landfill and turbines have been obtained. The second and third turbines will be installed within 36 months after having received all such approvals. Fifty percent of any revenue, in excess of 2.5 cents per Kilowatt-hour, Furnace receives from the sale of the electricity produced by the wind infrastructure will be given to the County.

Wind energy is a clean, safe, non-polluting source of energy. Unlike conventional power plants, wind power plants emit no air pollutants or greenhouse gases. At the scale planned for the Lorton Landfill, rotor swept-area radii are on the order of 60 feet, with tower heights varying from 85 to 120 feet. Due to their aerodynamic design, the width of a turbine blade varies from about three feet at the tip to ten feet near the center of the tower. Blades are typically manufactured from fiberglass reinforced polyester while towers are assembled from conical steel sections. Additional technical information regarding wind energy systems is available at the American Wind Energy Association website at:


The wind power industry rates a turbine in terms of its "name plate" power generation capacity, which assumes that the wind conditions prevailing at a site are available to achieve maximum efficiency from a wind turbine for 24 hours a day, 365 days per year. Reference to a 1MW wind power system is thus in reality reference to a 1MW name plate (1MWp) system. The difference between the name plate capacity and actual output is called the "capacity factor," which is typically about 20% because of daily variations in wind speed and direction, turbulence effects from the ground, and other factors.

As shown on the SEA-2 Plat, in Phase 1 installation of three 250kWp wind turbines, for a combined estimated generation of .75MWp, is proposed. At Landfill closure, the initial three turbines will have been removed and the Landfill configuration completed to allow installation of twelve 250kWp turbines for an estimated combined output of 3MWp. The expected annual power output from each 250kWp turbine at 20% capacity factor is (250x24x365x0.2) = 438,000kWh. The average U.S. home consumes about 1,200 kWh monthly; therefore, each turbine would be expected to offset annual electricity demand from 438,000/(1,200x12) = 30 homes. Based on this, three turbines would provide enough power for about 90 homes. 12 turbines would provide enough power for about 360 homes.

Foundation design information and a diagram prepared by Geosyntec were filed with ZED on June 24, 2013. The Phase 1 turbines are located in an area of the Landfill that will be inactive
for a significant period while other Landfill areas are filled. The entire Landfill will be filled to final height and fully capped before any potential installation of the 12 turbines. Due to potential issues with differential settlement, proper foundation design is critical for any large structure installed on a landfill. The foundation design for wind turbines on top of a landfill will require either deep foundations (drilled shaft or piles, which penetrate the final cover) or shallow foundations (concrete rafts, which do not penetrate the cover). Design selection will be based on the settlement characteristics and bearing capacity of underlying cover, waste, and soil/rock properties, and regulatory conditions governing cover penetrations. Note that to avoid excessive movement of the wind turbines and transmission of high dynamic forces to the tower and foundation during high winds, automatic braking and cut-off systems are built into the turbines' control systems which stop operation if wind speeds exceed a given range.

During Phase 4, as shown on SEA-2 Plat Sheet 9, Furnace proposes to create a 10 acre elevated platform at the southern end of the Landfill operations area for establishment of a potential solar panel farm by the Applicant and/or others. The potential for additional solar renewable energy facilities would also exist by the end of Phase 5 on the 40 acre platform. The combined potential solar energy from those two solar panel platforms equates to approximately 7.5 MWp. Energy would be produced in the form of electricity from solar power using photovoltaic ("PV") cells. The PV cells are made of silicon, a semi-conductor material, which when exposed to the direct sunlight leads to the movement of electrons, thereby generating direct current ("DC") electricity. The electric current produced will likely be connected to power grid at the LES (formerly "Michigan Cogeneration") facility which is 500 feet east of the Landfill. The PV cells are designed to absorb sunlight to produce energy; the more sunlight they absorb the more energy they produce. Current PV cells absorb about 2/3rds of the total incident sunlight and reflect 1/3rd of the sunlight reaching their surface. Most solar panels are now designed with at least one anti-reflective layer and may have multiple layers, thereby further reducing reflectivity.

B. Requirement for Proposed Wind and Solar Uses

Numerous Board of Supervisors (the "Board") policies, reports, task forces and motions call for sustainability and use of renewable energy, including creation of a pilot, green energy program in Lorton. The wind and solar facilities proposed on the Property will implement the vision of the County's Energy Alliance Task Force (the "Task Force") and the broader, long-term sustainable energy goals established by the Board. One recommended goal of the Task Force specifically was to establish a "Green Energy Triangle" as a transformational use in Lorton.

The proposed wind and solar facilities would implement (i) County Energy Policy, which includes the objective of the "use of alternative and sustainable energy options" based on the Board's Environmental Agenda to "support alternative energy sources"; (ii) the "Cool Counties Climate Stabilization Declaration" to which the County is signatory and states that this policy is the cornerstone of renewable energy and commits to reducing greenhouse gases; and (iii) the County's 2014 Environmental Improvement Program ("EIP") which calls for development of a "Renewable Energy Demonstration Park".

The type of pilot green energy project being proposed by Furnace has been contemplated specifically by the Board in Lorton for several years. In its October 16, 2012 Motion the Board enthusiastically and unanimously endorsed the Board Chairman's "Private Sector Green Energy Task Force" recommendations with the purpose of "stimulating a transformational energy
"project" and creating "with the private sector, pilot projects to demonstrate the use of local alternative energy sources for small and large scale development. These projects should: a) Not require legislative changes, nor changes to county policy; b) Be revenue neutral for the county or have the potential for revenue generation and c) Could be initiated within 24 months. The Lorton Green Energy Triangle is a potential example."

SEA-2 proposes to implement a key component of the February 5, 2013 DPWES Staff Report to the Board Environmental Committee recommending development of the Green Energy Triangle in Lorton. A key objective in this Staff Report is to rebrand the Lorton area. The Applicant's proposal further manifests the County Executive's FY 2014 report to the Board, which specifically cites the Green Energy Triangle as "leading to a re-branding of the Lorton area, changing its identity from being a site of the County's waste and debris disposal facilities to becoming a tangible expression of the County's renewable commitment". The SEA-2 green energy package is a direct result of the work of the Green Energy Task Force and the Board's Environmental Committee.

This site is uniquely situated for all four renewable energy technologies being shown in SEA-2, and would be the first such co-location site in the Country. Few, if any, parcels in Fairfax County can create the elevated platform with sufficient height to generate wind speeds, establish large solar arrays and have methane and geothermal properties to create a feasible green energy pilot project with adjacency to (i) single-ownership (County) land and uses, and (ii) options for immediate access to the grid. Wind turbines need moderate but steady winds for producing energy, begin producing as wind speeds reach 5-7 m/s (11-16 mph). The efficiency of wind turbines depends on the amount of energy extracted by the blades (swept area of the rotor) and installation height of rotor. Greater height provides better access to steadier, higher-speed winds. Wind energy is a clean, non-polluting source of energy. Unlike conventional power plants, wind power plants emit no air pollutants or greenhouse gases. It is estimated that a 1MWp wind system would prevent the release of nearly 2 million pounds of carbon dioxide every year for the life of the system (California Energy Commission). This location and proposal create the potential for 3MWp wind energy and 7.5MWp solar energy.

C. Anticipated Impacts/Mitigation

Although wind power plants have little impact on the environment as compared to fossil fuel plants, several concerns need to be addressed when designing a wind facility. Wind power presents three environmental impact consideration: noise, visual, and risk of bird collisions.

Two kinds of noises are associated with wind turbines: (1) aerodynamic noise from the spinning blades, and (2) mechanical noise from the rotating machinery. Modern wind turbines produce negligible noise above the ambient backdrop of residential communities. The turbine blades produce a sound as they encounter turbulence in the air (similar to the sound made by wind passing through trees), but this noise is masked by the background noise associated with blowing wind. From a distance of over 500 feet, a modern mid-sized turbine is no noisier than a kitchen refrigerator running normally. Geosyntec already performed a preliminary noise impact analysis as part of the initial feasibility study. The results are illustrated in the chart below:
Expected wind turbine noise levels at Lorton Energy Park

At a distance of 1,600 feet from the turbines, the noise (at less than 40dBA) would be only 1/16th that of nearby traffic on I-95 (at about 80dBA) and less than half that of a normal conversation (at about 50dBA). The turbines would not add any noise above the ambient level of suburban residential areas at night.

Visual and aesthetic concerns are the most commonly expressed concerns for the development of wind energy projects. Furnace has redesigned and added to the currently approved landscape plan to provide a more natural screening effect on the north and east slopes of the Landfill. Other proposed landfill design changes would result in the Landfill top elevation increasing from four acres to forty acres to create a platform for the potential of twelve wind turbines and an approximately forty-acre solar farm. The three wind turbines proposed to be installed during Phase 1 will be at the southern end of the operations area and will not be visible to the residents of Lorton Valley, the community closest to the Landfill. The only homes that will be able to view any of these three turbines or the possible future 12 turbines are located at a significant distance from the Landfill, across I-95 on certain high points of land within Lorton Station. On July 25, 2013, illustrative photographs taken from 10 locations surrounding the Landfill, showing existing and projected conditions in 2013, 2019, 2033, 2040 and 2050 (prepared by BC Consultants) were hand-delivered to DPZ, including an aerial index, narrative descriptions and line of sight drawings demonstrating the very minimal, off-site visual impact of the three wind turbines proposed to be installed in Phase 1 and the solar panels and wind turbines potentially to be installed, respectively, in Phase 4 and at the end of Phase 5.

Lights are required for aviation safety on any structure which is higher than 200 feet above the surrounding terrain, and have to follow recommendations from the Federal Aviation Administration (FAA) Advisory Circular AC 70/7460 (2007) for Obstruction Marking and Lighting. The number of lights required depends on the number and layout of the wind turbines
Not all the wind turbines will need to be lighted, however, because the periphery of the installation will be lighted properly and the lights will be not spaced more than a half mile apart. A dual lighting system which consists of red lights for nighttime and high or medium intensity flashing white lights for daytime and twilight is generally required. The red colored flashing lights need to comply with FAA L-864 requirements and have 20-40 flashes per minute (FPM); white lights need to comply with FAA L-864/L-865 requirements, with 40 FPM.

**Birds** can fly into wind turbines, as they can with other tall structures. Assuming that care is taken to site turbines outside of the main cross-continent migration corridors, the collision rate of birds with turbines is reportedly very low, similar to that for electricity transmission lines. In fact, wind energy's overall impact on birds is extremely low compared to other human-related causes of death. Buildings (particularly with glass facades), communications towers, traffic, and house cats are responsible for far greater numbers of bird deaths per year than wind turbines.

Increasing the top deck area available at the highest elevation of the Landfill will facilitate installation of wind turbines with rotor heights above the surrounding land surface where wind speeds are higher, more constant, and reliable throughout the year, without the need to construct excessively tall turbine towers. A larger top deck will allow installation of a larger number of medium-scale turbines (only 12 are proposed), increasing the total power generation capacity and enabling greater efficiency in the use of interconnection infrastructure. Wind energy is a clean, non-polluting source of energy. Unlike conventional power plants, wind power plants emit no air pollutants or greenhouse gases. It is estimated that a 3MWp wind system such as that proposed at the Landfill would prevent/substitute for the release of nearly 6 million pounds of carbon dioxide every year for the life of the system. That's equivalent to the average annual carbon dioxide emissions from over 1,500 cars.

Energy will be produced in the form of electricity from solar power using PV cells at the Green Energy Park. As stated earlier, Furnace is providing a solar farm on its adjacent, companion site which is the subject of a separate Section 2232 Application, and is creating the potential for solar on this Property with a ten-acre platform in Phase 4 and a forty-acre platform in Phase 5, as depicted on SEA-2 Plat Sheets 9 and 10, respectively. PV systems consist of multiple cells which convert sunlight directly into DC electricity using the photoelectric effect, which in simple terms is the movement (excitement) of electrons caused by interaction between sunlight energy and semiconductor materials. The electrons are collected to form DC electricity. The primary impact of PV cells is reflectivity. As stated above, the current PV cells absorb about 2/3rd of the total incident sunlight and reflect 1/3rd of the sunlight reaching their surface. Most solar panels now are designed with at least one anti-reflective layer and may have multiple layers thereby further reducing reflectivity. The glare from summertime sun at high noon would have the highest potential for impact to the surrounding area. Based on the sun path (east to west and southeast to southwest), topographic elevations, locations, and the southern inclination of the solar arrays, however, the potential for glare on surrounding residents was found to be minimal in Geosyntec's analysis because of its reflecting primarily away from those residents.

PV systems provide one of the most sustainable methods of electricity generation without producing greenhouse gas emissions. Using the "Clean Energy Calculator" on the California Energy Commission "Go Solar California" website, a modest 2MWp solar system that generates about 2 million kWh per year prevents/substitutes for the emission of approximately 2.3 million
pounds of carbon dioxide, 2,500 pounds of sulfur dioxide, and 3,500 pounds of nitrous oxide every year. This is equivalent to an annual reduction in automobile driving of nearly 3 million miles or planting over 180 acres of trees. Operation and maintenance costs for PV systems are minimal due to the absence of moving parts and are estimated to be around 0.5% of the capital investment annually.

D. Conformance with the Comprehensive Plan and other Standards

Page 75 of the Area IV Plan for the "Lower Potomac Planning District" recommends for this Property: "Sub-unit B4 contains a private debris landfill. To help mitigate any visual impacts upon the surrounding area, buffers should be maintained around the landfill. When the landfill is built-out, it is recommended that the site ultimately be developed with active recreational uses such as a golf course."

Parsing the text immediately above, until release by DEQ, finalization of the cap and adjustments from settlement will not be complete. This is the absolute earliest possible point of "build-out". And, "ultimately", does not mean "immediately", but at a final point in the future.

Further, the Property has unique characteristics that allow each of the four renewable technologies to be established together in one place which, according to Geosyntec, is unprecedented in the United States. The 40 acres of wind and solar uses in this Section 2232 Application are proposed as "interim" uses to be located on the top elevation of a landfill that's been in existence for more than thirty years. This is one of the few, if only, locations in the County with sufficient height, vacant area and wind currents to sustain efficient wind energy generation. The proposed location adjacent to Interstate 95 offers a unique branding visibility. The proposed locations for wind and solar on this 250-acre Property (south-central portion of the operations area at a 350-foot elevation in Phase 1 and central top portion at 412-foot elevation in Phase 5) will have negligible, if any, visual impacts from nearby residential properties. A significant buffer will remain on the north, east and southern sides of the operations area throughout Phases 1 through 6. The character of these two types of wind and solar facilities is completely consistent with the principal use of a landfill. Finally, the extent of the proposal is limited both in scope and elevation high above adjacent land uses. The fact is that few sites in Fairfax County offer the ability to locate wind turbines. The solar panels would be low to the ground and fixed in location.

These renewable energy features proposed in SEA-2 support policies in the "Environment Element" of the County's Comprehensive Plan which encourage, in Objective 13, Policy a "...application of energy conservation . . . in the design and construction of new development and redevelopment projects" and "Use of renewable energy resources". This interim use mirrors the County's closed landfill initiative for a similar interim use (a solar farm) during its post-closure period, which is cited in the Solid Waste Management component of the Comprehensive Plan.

An increase in height is being requested to permit sufficient, energy efficient height for the turbines.
E. Alternative Sites Considered for These Uses

In addition to the above-described considerations, both the site and the requested wind and solar uses are unique. No parcels in Fairfax County can create the 40-acre elevated platform with sufficient height to receive adequate, consistent wind speeds, establish large solar arrays and have methane and geothermal properties to create a feasible green energy pilot project immediately adjacent to the County-owned former penitentiary property and its numerous existing and proposed potential users of the renewable energies generated by this Property. Furnace's proposal for green energy uses provides an immediate and an interim use for this site, after closure and during its State-regulated post-closure period, that is compatible with the limitations of the site until such time a final active recreation use can be implemented. The proposed locations on the Property's large Landfill operations area were selected due to their central locations away from the Property perimeter, their distance from residential views, and their ability to capture maximum wind and solar energies.

Conclusion

The wind and solar electric generating facilities proposed in this Application satisfy the location, character and extent considerations of a Section 2232 Application. This Application presents a unique opportunity for Fairfax County to realize its Green Energy Triangle.