STATE OF NEW HAMPSHIRE

BEFORE THE SITE EVALUATION COMMITTEE

Docket No. SEC 2015-02

APPLICATION OF ANTRIM WIND ENERGY, LLC
FOR A CERTIFICATE OF SITE AND FACILITY

PREFILED DIRECT TESTIMONY OF DANIEL T. BUTLER AND PATRICK M. MARTIN ON BEHALF OF ANTRIM WIND ENERGY, LLC

September 10, 2015

<u>Qualifications of Daniel T. Butler</u>

Q. Please state your name, title and business address.

A: My name is Daniel T. Butler. I hold the position of Manager, Civil and Transmission Engineering Department with TRC Companies, Inc. (TRC"). My business address is 249 Western Ave., Augusta, Maine 04330.

Q. Please describe the services provided by TRC.

A: TRC is a national engineering, consulting and construction management firm that provides integrated services to energy, environmental and infrastructure projects. TRC serves a broad range of clients in government and industry, implementing complex projects from initial concept to operations.

Q. What are your responsibilities at TRC?

A: I supervise, coordinate, review and stamp engineering and design work of TRC's Civil and Transmission Engineering Department.

Q. Briefly summarize your educational background and work experience.

A: I hold a Bachelor of Science degree in Civil Engineering from the University of Maine. I have almost 30 years of broad-based civil / structural engineering experience. Examples of projects on which I have worked include structural and foundation design of electrical equipment supports and civil site design for electrical and transmission substations and wind projects; stormwater quantity and quality calculations for substations, transmission lines, and wind projects; preparation of SPCC plans and designs; and land-use permit application preparation.

Additional detail regarding my education, background and experience is contained in my curriculum vitae which is attached hereto as Attachment DTB-1.

Q. Have you ever testified before the New Hampshire Site Evaluation Committee ("SEC")?

A. Yes. I presented testimony regarding the design and construction of the Antrim Wind Project, as well as its potential effect on water quality and proposed mitigation measures, in connection with Antrim Wind Energy, LLC's ("AWE") application for a certificate of site and facility in Docket 2012-01. I have also provided testimony in the State of Vermont regarding the siting of the Glebe Mountain Meteorological Tower.

__Qualifications of Patrick M. Martin__

Q. Please state your name, title and business address.

A: My name is Patrick M. Martin. I am a Civil Engineer with TRC Companies, Inc. ("TRC"). My business address is 6 Ashley Drive, Scarborough, Maine 04047.

Q. What are your responsibilities at TRC?

A: My primary responsibility is to provide civil engineering support to a variety of projects. This generally includes grading and drainage design, storm water management design, hydrologic and hydraulic modeling, erosion and sediment control design, and technical report writing. I also undertake some supervisory and project coordination responsibilities.

Q. Briefly summarize your educational background and work experience.

A: I hold a Bachelor of Science degree in Environmental Engineering from Oregon State University. I have nearly fifteen years of civil engineering experience, with a background in water resources, transportation and site-civil engineering. My project experience includes work in both the public and private sectors. My responsibilities have included roadway design, site layout, grading and drainage design, utility design and coordination, hydrologic and hydraulic modeling, preparation of construction plans and permitting.

Additional detail regarding my education, background and experience is contained in my curriculum vitae which is attached hereto as Attachment PMM-1.

Q. Have you ever testified before the New Hampshire Site Evaluation Committee ("SEC")?

A. Yes. I presented testimony regarding the design and construction of the Antrim Wind Project, as well as its potential effect on water quality and proposed mitigation measures, in connection with Antrim Wind Energy, LLC's ("AWE") application for a certificate of site and facility in Docket 2012-01.

<u>Purpose of Testimony and Overview of Project</u>

Q. What is the purpose of your testimony?

A. The purpose of our testimony is to describe the design and construction of the reconfigured Antrim Wind Project. We will also discuss the Project's effect on water quality and the proposed mitigation of any such effects. Furthermore, we will explain why the construction of the Project will not have an unreasonable adverse effect upon public health and safety.

Q. Are you familiar with the Project proposed by AWE in this matter?

A. Yes, we are. AWE first retained TRC to assist in the construction design of the Project as it was proposed in Docket 2012-01, and TRC has again assisted in the design of the reconfigured Project proposed in this Docket. As in Docket 2012-01, TRC has also been tasked with assessing the potential effect of the proposed Project upon water quality, as well as the potential effect, if any, of the Project's construction upon public health and safety. As senior civil engineers, we have also been involved in the site planning and have conducted a field review of the Project site.

Q. Please describe the Project that TRC reviewed for design and construction purposes.

A. Though the design of the Project has been revised to address aesthetic concerns expressed in Docket 2012-01, the proposed Project site has not significantly changed. The proposed Project site runs approximately north to south along the ridge top of Tuttle Hill and Willard Mountain and spans several individually owned parcels. It will be accessed from State Route 9. The Project area touches upon three watersheds in the town: the North Branch River, Gregg Lake, and an unnamed stream which continues to its confluence with North Branch River at Steels Pond.[1] The North Branch River, which was placed in the NH Rivers Management and Protection Program in June 1991, runs along the north side of Route 9, in the valley to the north of the Project area, and is a major tributary to the Contoocook River. Gregg Lake, which is approximately 195 acres, is located in the valley to the southeast of Tuttle Hill and supports a moderate warm water fishery. Streams in the Project area include unnamed perennial and intermittent streams which drain either to the north toward Route 9, or to the southeast into Gregg Lake. There are very few perennial streams. The Project site is predominantly unimproved and heavily wooded. There is clear evidence of past logging activities in some areas. Slopes in the Project area range from approximately two (2) percent at the ridge top and saddles, to approximately 50 percent along the steeper natural slopes. Elevations range from approximately 1,042 feet to 1,752 feet above mean sea level. Soil types on or adjacent to the Project site include stony loam and complex stony loam, as well as rock outcrop and rock outcrop complex.

[1] The Project site, as initially proposed in Docket 2012-01, also touched upon the Willard Pond watershed. However, with the removal of the 10th turbine, the Project site no longer touches upon the Willard Pond watershed.

Q. Please describe the Project that TRC reviewed for design and construction purposes.

A. The Project involves the construction of nine (9) wind turbines, nine (9) graveled wind turbine generator construction areas, a 1.64 acre gravel/crushed stone yard area for a Public Services of New Hampshire (PSNH) interconnection substation, a collector station, an Operation and Maintenance building and parking area, approximately 3.55 miles of crushed stone access roads (including two spur roads), a 34.5 kV collector system, and a stormwater management system. Within the Project area, approximately 55.3 acres will be disturbed during construction; approximately 44.05 of those acres will be restored and revegetated upon completion of construction. The interconnection and collector substation yards, which will feature an open-graded crushed stone surface and two (2) control houses, are located adjacent to an existing PSNH transmission corridor to minimize the amount of clearing required for the new lines. The entire yard area will be enclosed within a security fence. The first 900 feet of the access road will be paved, if required by PSNH, and the remainder will be constructed of crushed stone or gravel. From the entrance at Route 9 to turbine #1, the road will be constructed with a width of 16 feet. The roadway beyond the turbine #1 will have a construction width of 34 feet to accommodate the turbine-erection crane. The road will have a maximum slope of 12%, with the exception of two short lengths where it reaches 13%. Upon completion of construction, the road width will be reduced to 16 feet along its entire length by revegetating a 9-foot shoulder on both sides. The side slopes will also be stabilized and revegetated. A gravel wind turbine construction area will be built at each turbine location. These areas will be approximately 0.9 acres each, and will provide room for a 6,000 square foot crane pad, a 20-foot diameter concrete tower foundation, and a turbine assembly area. These areas will also be used as staging and laydown areas during construction. After construction, all areas not required to be kept clear for maintenance purposes will be revegetated.

A temporary staging area to serve as on-site construction headquarters (i.e. the site of construction trailers, parking, receiving, and storage) will be located in a two (2) acre upland area between Route 9 and the Project substation. This area will be cleared and graded, and topsoil will be stripped and stockpiled for use during restoration. Geotextile fabric will be installed and topped with a layer of clean, well-draining gravel. An additional laydown area will be located off Route 9, west of the proposed Project entrance, and will occupy approximately 2.9 acres of previously disturbed area which was a gravel borrow pit and log landing. Temporary erosion control measures will be implemented to minimize erosion and sedimentation. After construction is completed, any debris, unused material, the gravel and geotextile will be removed, and the stockpiled topsoil will be replaced. The area will then be stabilized and seeded using approved native New Hampshire seed mixes, and allowed to revegetate with native plant species.

A 34.5 kV collector system will be constructed from the turbines to the sub-station, with certain portions being underground, under the roadway, and other portions running overhead, roughly parallel with the road, depending on the topography and other factors.

Potential Effect of Project Upon Water Quality

Q. Has TRC assessed the potential effect of the Project upon water quality?

A. Yes. There will be no water withdrawal or discharge associated with the Project. The Project is designed to meet all state and federal water quality standards, and all potential effects upon water quality, including erosion and sedimentation during the construction phase and changes in storm water runoff have been addressed. AWE has designed a storm water management system that minimizes potential effect to existing natural drainage ways. Overall drainage patterns and directions of flow will remain generally the same. The Project will result in only a relatively small amount of new impervious areas distributed between three expansive and largely undeveloped watersheds, and as such the Project is unlikely to result in a significant increase in runoff. There will be a permeable road base at appropriate locations to maintain sheet flow conditions and provide hydrologic / hydraulic connectivity between wetlands. Where steep roadway / ditch slopes will impede the effectiveness of the permeable road base, culverts have been spaced every 100 feet to minimize channelization of runoff. The roadway will cross two identified streams. At one stream crossing, the road is in approximately 10 feet of cut to meet the maximum slope requirement of 12% for construction and delivery vehicles. As a result, impacts to the stream cannot be avoided. At the second crossing a three-sided concrete box culvert has been designed to comply with NHDES stream crossing guidelines.

A stormwater runoff model has been prepared for each of the three (3) watersheds affected by the Project. These models demonstrate that, on a watershed scale, the project will not result in a significant increase in stormwater peak rates of runoff for the 2-year, 10-year, or 100-year design storms in any of the three watersheds.

Q. What steps will AWE take to address effects of the Project upon water quality?

A. AWE will take a number of steps to reduce and mitigate the effect of the Project on water quality, including complying with design requirements for runoff quality control included in Chapters 2 and 4 of the New Hampshire Storm Water Manual. AWE's storm water management system incorporates a combination of roadway buffers, ditch turnout buffers, treatment swales and bioretention basins. TRC has prepared a grading and drainage plan detailing approved construction measures and best management practices for controlling storm water runoff and drainage for the site. A permeable road base constructed of coarse rock that allows runoff to pass freely under the road is proposed for reasonably flat lengths of roadway where bypass is less likely and the road is in a fill condition, to minimize channelization runoff, and in areas where the roadway crosses wetlands and maintaining hydraulic / hydrologic connectivity is desirable. Culverts will be installed per the design plans to maintain or improve the drainage of the area without increasing erosion of topsoil. During construction of the Project, AWE will install and maintain temporary sediment and storm water control devices, including silt fences, mulch berms, straw bale barriers, stone check dams, slope drains, rock stabilization of channels, hay bales, wood chips, swales, erosion control matting, and temporary sediment traps and / or water bars. After erection of the turbines, AWE will reseed with native mix and restore non-roadway areas to ensure that soils are not subject to erosion. A copy of the complete Stormwater Management Plan is included in Appendix 2B to AWE's Application.

Q. What was the Site Evaluation Committee's finding with respect the effect of the Project, as proposed in Docket 2012-01, upon water quality?

A. The Committee found that any potential concerns regarding water quality were adequately addressed by three recommended permits issued by the Department of Environmental Services (the Alteration of Terrain Permit and §401 Water Quality Certification, the Wetlands Permit, and the Subsurface Systems Permit) and that compliance with the conditions of said permits would support a finding that the Facility would not have an unreasonable adverse effect on water quality.

Q. In your opinion, will the Project have an unreasonable adverse effect on water quality?

A. No. AWE's proposed water quality treatment measures adequately address runoff from the Project site and protect nearby natural resources. It is therefore our opinion that the Project will not have an unreasonable adverse effect on water quality.

Public Health and Safety During Construction

Q. Please summarize the construction phase of the Project.

A. AWE has retained an experienced general contractor, Reed & Reed**,** who will have overall responsibility for the construction of the Project in accordance with the plans and technical specifications, as well as all applicable codes, standards and permit conditions. Reed & Reed will manage initial field work, including surveying and site flagging to establish clearing areas, buffer zones and non-disturbance areas. A qualified logging company will clear and remove trees where necessary. Access road construction will begin as soon as sufficient areas have been cleared to enable drilling and excavation. A construction staging area will be cleared in the vicinity of the operations building and substation area. For transport roadways, clearing is typically done to establish an approximately 30-foot corridor centered on the road alignment. Where the collection system is overhead and adjacent to the transport roadways, an approximately 40-foot wide corridor will be cleared; for crane roads the width of the corridor will be approximately 50 feet. Any blasting that is necessary will be done by an experienced licensed contractor who will operate in strict compliance with a project blasting plan, which will be provided to the Town of Antrim and reviewed and approved by the New Hampshire Department of Safety. Blasting plans will include advance notification procedures, as well as documented safety and control measures and warning signs and sounds. At the end of construction, all areas that are not developed into the final, operational components of the Project will be restored to their preconstruction condition.

Q. In your opinion will this project have an unreasonable adverse effect on public health and safety during the construction phase?

A. No. In view of the above-described steps that AWE will take during construction, we do not believe that this Project will have an unreasonable adverse effect on public safety during the construction phase.

Q. Does this conclude your pre-filed testimony?

A. Yes.

Results you can rely on

DANIEL T. BUTLER, PE

EDUCATION
B.S., Civil Engineering, University of Maine, 1986
Civil Engineering Graduate Courses, University of Maine, 1995

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS
Registered Professional Engineer, Alabama (#32832-E), 2012
Registered Professional Engineer, Arizona (#45969), 2007
Registered Professional Engineer, Connecticut (#23045), 2002
Registered Professional Engineer, Florida (#53332), 1998
Registered Professional Engineer, Georgia (#PE037171), 2012
Registered Professional Engineer, Maine (#6796), 1990
Registered Professional Engineer, Massachusetts (#47517), 2008
Registered Professional Engineer, Mississippi (#20709), 2012
Registered Professional Engineer, Nevada (21881), 2012
Registered Professional Engineer, New Brunswick, Canada (#L3291), 1998
Registered Professional Engineer, New Hampshire (#8105), 1991
Registered Professional Engineer, New Jersey (#24GE04574600), 2005
Registered Professional Engineer, New Mexico (#17752), 2006
Registered Professional Engineer, New York (#079800), 2002
Registered Professional Engineer, North Carolina (#38931), 2012
Registered Professional Engineer, Pennsylvania (#PE077437), 2010
Registered Professional Engineer, Prince Edward Island, Canada (#1141), 2007
Registered Professional Engineer, Rhode Island (#9164) 2009
Registered Professional Engineer, South Carolina (#29946), 2012
Registered Professional Engineer, Texas (#106460), 2010
Registered Professional Engineer, Vermont (#46232), 2009
Registered Professional Engineer, Virginia (Pending Board Approvals)
Registered Professional Engineer, West Virginia (#18069), 2009

AREAS OF EXPERTISE
- Engineering Management
- Civil and Structural Design
- Project Management
- EPC Project Management
- Preliminary and Conceptual Design
- Condition Assessment
- Engineering Studies
- Equipment Specifications
- Detailed Engineering Design
- Project Scheduling and Estimating
- Spill Prevention, Control and Countermeasure Plans (SPCC)
- Site Layout and Grading

- Foundation Design
- Foundation Design
- Licensing and Permitting
- Stormwater and Water Management Licensing and Permitting

REPRESENTATIVE EXPERIENCE

Mr. Butler has approximately 26 years of broad-based civil/structural engineering experience with over 10 years in the power delivery sector with specific expertise in substation site grading and development; foundation and concrete design; roadway design; sanitary sewer and water system designs; stormwater and erosion control management; environmental permitting; and extensive experience with engineering, procurement, and construction (EPC) contracts. Mr. Butler is also experienced with SPCC Plan and secondary containment design and has prepared and/or modified SPCC plans for commercial, government, and utility facilities across the country.

As Manager of the Civil and Transmission Engineering Department, Mr. Butler's primary duties are as an Engineer of Record. As an Engineer of Record, Mr. Butler is responsible for the preparation, reviewing, coordinating, signing, dating, sealing, and issuing of any engineering document prepared by himself or by others working under his direction.

PSNH, Thornton 115/34kV Greenfield Substation Project – Merrimack, NH

Lead civil engineer and engineer of record for this EPC project to design and construct a 115/34.5kV greenfield substation. This project had its challenges including highly liquefiable soils. Led the effort to design an efficient pile-support foundation system that resulted in substantial savings allowing the project to come in on budget.

First Wind, Oakfield II 106MW (46Turbines) Wind Farm – Oakfield, ME

TRC's scope of work included design of the ridge-top turbine sites; about 20 miles of crane and access roads; over 30 miles of 34.5kV collector system, including 2 miles of underground collector; a 34.5 to 115kV substation; 60 miles of 115kV transmission system; and site design for the Operation and Maintenance facility. TRC's work also included coordination with the Owner's environmental engineer to identify and minimize impact on significant natural resources.

TransCanada, Kibby Wind Project – Kibby Township, ME

The Kibby Wind Project consisted of two distinct project developments—one on Kibby Mountain and the other on nearby Sisk Mountain. For the Kibby project, TRC designed the 30 mile 115kV transmission line and served as the Owner's Engineer for the design of the substation. For the Sisk project, TRC provided all permitting and engineering design services, including the preparation of the stormwater and erosion control management plans and the design of the access and ridge top roads, 34.5kV collector system, and the 115/34.5kV substation.

When completed, the overall wind development will consist of over 50 3.0MW, v90 Vestas wind turbines spread along the two mountain ranges, making this wind project the largest in New England.

National Grid, Wakefield Junction Substation – MA
As the prime consultant/contractor on the Wakefield Junction Substation project, TRC is providing engineering, procurement, and construction services for a new 345/115kV GIS substation under the terms of an EPC contract. The project includes engineering, designing, procuring, constructing, and testing equipment to provide the owner with complete operational facilities. These facilities include an indoor 115kV twelve breaker gas insulated substation, an indoor 345kV twelve breaker gas insulated substation, and four 345/115kV autotransformers situated within concrete containments and protected via removable, pre-cast firewalls. Each containment was constructed with a steel platform system to support a layer of crushed stone designed to squelch flames. Completion of this project is a critical part of various improvements to the transmission system associated with the North Shore Area Upgrades.

Northeast Utilities, Barbour Hill Substation – South Windsor, CT
TRC provided engineering, procurement, and construction services to Connecticut Light & Power for the Barbour Hill Substation Modification Project. This project included the removal and disposal of 3,000 cubic yards of contaminated soils, the construction of a new 115kV substation, the cut-over of six 115kV overhead lines from an existing 115kV substation to the new 115kV substation, the demolition and removal of the existing 115kV substation, the construction of a new 345kV substation, and the cut-over of an existing 345kV overhead line. Use of pre-cast foundations for the smaller substation equipment cut the construction effort significantly; the 345kV structures were founded on 6' diameter x 35' long caisson foundations to save cost and to resist significant uplift. Containment for the 345/115kV transformers consisted of geomembrane-lined, stone-filled pits. Cast-in-place firewalls provided the necessary fire protection per applicable NFPA codes.

Central Maine Power, Maguire Road Project – Southern Maine
TRC, as a joint venture, provided engineering, licensing, procurement, and construction services to Central Maine Power. This project was designed to improve the reliability of the transmission system in Southern Maine and included the construction of a new 115kV substation, a major expansion of a 345kV substation, upgrades at multiple remote end substations, and transmission line rebuilds and re-conductors.

Bangor Hydro Electric Company, NRI Orrington 345kV Substation Expansion Project
TRC provided engineering, procurement, and construction services to BHE for an expansion at the existing 345/115kV Orrington Substation Facility as part of the Northeast Reliability Interconnect 345kV Transmission Line Project. Changes

included the relocation of the existing Orrington-Maxcy's tie-line, the addition of a series compensation of the Orrington-Maxcy's 345kV Line, termination of an additional second tie-line to New Brunswick Power, expansion of the existing control house to accommodate new and future protection and control equipment, cable trench, and conduit additions to comply with NPCC separation requirements.

Rochester Gas & Electric, Rochester Transmission Project – Rochester, NY
TRC, working in partnership with two other firms, completed final design, procurement, and construction of the Rochester Transmission Project EPC project. At the time of award this project was the largest one of its kind in the country. The scope of work included engineering, procurement, project management, civil and electrical construction, testing, and commissioning of all facilities in this project. The facilities in this project included approximately 38 miles of new or rebuilt 115kV transmission lines, two new 115kV substations, and expansion and equipment upgrades at nine existing substations, including a 345/115kV yard. The steel-pole transmission towers were founded on reinforced concrete caissons in sizes up to 10' in diameter and up to 30' deep. Containment for the new 345/115kV transformer consisted of a geomembrane-lined, stone-filled pits. Existing 115/34.5kV transformers at several of the expanded yards received retro-fitted containments that included stone-lined, geomembrane pits, or remote oil/water separators.

Ventus Energy, West Cape and Norway Wind Projects – Prince Edward Island, Canada
TRC's scope of work included the design, procurement, project management, construction oversight, and commissioning of 138/69kV interconnection facilities and 34.5kV collector systems for two wind-powered generating facilities located along the north western coastline of Prince Edward Island, Canada.

National Grid, Clay 345kV Rebuild – Clay, NY
This project consisted of reconfiguring seven existing 345kV transmission lines in conjunction with rebuilding a 40-year–old substation. The project included the addition of an eighth bay to an existing seven-bay 345kV yard to allow most of the work to be done in a de-energized bay. The substation upgrade included a new 345kV control house and station service. The transmission reconfiguration included replacement of existing lattice steel structures of several different designs with tubular steel pole structures.

Public Service of New Hampshire, Saco Valley Substation Upgrade – NH
TRC supported this project to improve the reliability of electricity in northern New England by providing design, construction oversight, and commissioning services for the Saco Valley Substation upgrade project that included the installation and protection of a 290MVA Phase Shifting Transformer (PST). To accommodate the PST, TRC modified the existing substation structures to include a 115kV bus extension, protection and control systems, and a new control house. Containment for the 600-ton PST was provided by a geomembrane-lined, stone-filled pit. An oil-

minder pump system was incorporated to automatically pump stormwater from the pit without the danger of discharging oil.

Barksdale AFB, Jet Fuel Off-Load Facility – LA
Design manager and lead civil engineer for a 5-acre JP-8 petroleum logistics facility to support jet fuel receipt requirements at Barksdale Air Force Base (AFB), Louisiana. The design provides the capability to receive 100% of the Base's daily jet fuel requirement by tank truck, operating storage for receipt/issue of JP-8, aircraft refueler fillstands, and connection into the existing petroleum logistics infrastructure. Ancillary facilities include a system pumphouse, operations facility, reinforced concrete secondary containment systems, and a 2,000 gpm oil/water separator capable of treating contained stormwater during the site's "first flush.

DFSP Tampa, Repair Petroleum, Oil, and Lubricant Facilities – Tampa, FL
Design manager and lead civil engineer for a containment lining, drainage system, and an oil/water separator repair project for the 7-acre fuel facility. The project includes the design of a 750,000-square–foot geomembrane liner system, a 2,000-foot drainage system, and twin 1,250 gpm precast concrete aboveground oil/water separators. Environmental permitting and plans included an SP3 Plan, a Florida DEP Air Emissions Permit, a Florida DEP Wastewater Discharge Permit, and an EPA NPDES Discharge Permit.

Rochester Gas & Electric, Substation SPCC Updates
Lead civil engineer on project to update or prepare new SPCC plans for eleven substations in and around Rochester, New York, in accordance with revised 40CFR112 regulations. Work effort ranged from minor text revisions to developing transformer inspection program in lieu of secondary containment.

Various FPL Facilities, SPCC Upgrades
Lead civil engineer on projects to survey all inside and outdoor, oil-containing systems, including tanks, equipment, piping, and on-site switchyards and substations for compliance to new SPCC regulations. Designed secondary containments, where needed and not already present. Work included secondary containments for outdoor aboveground oil piping, utilizing a membrane pipe-wrap system.

DFSP, Oil/Water Separator and Drainage System Design – Charleston, SC
Lead civil engineer on project to design new drainage system for a DOD fuel farm facility. The project included the design for a cast-in-place aboveground concrete 4,500 gpm oil/water separator and new drainage system to treat stored water from secondary containments. Environmental permitting and plans included a Stormwater Pollution Prevention Plan and a South Carolina DHEC Wastewater Discharge, South Carolina DHEC Air Emissions, and EPA NPDES Stormwater Discharge Permits.

Austin Energy, SPCC Upgrades – Austin, TX
Lead engineer on project to survey aboveground storage tanks to develop an integrity testing program consistent with new SPCC requirements.

Green Mountain Power, Generation Facility Inspections – VT
Lead civil engineer on project to inspect eight hydro-generation facilities throughout the State of Vermont. Responsibilities included the inspection and assessment of generation assets, transmission and distribution system structural elements, and limited SPCC compliance for bond holders.

PSNH, Rochester Substation Upgrade – NH
Lead civil engineer on the upgrade project that included site and spread footing and cast-in-place caisson foundation designs. Project also included the design of a remote transformer oil containment system and oil/water separator.

Rochester Gas & Electric, Russell Station Oil/Water Separator – NY
Served as design manager and senior civil engineer for project that provided complete design for two 1,250 gpm aboveground hopper-style oil/water separators. Separators were housed within a steel-framed building with accommodations for a future oil/water separator. Since three different oils with varying densities have the potential to be present in the cooling water, the oil/water separator design was optimized to insure maximum oil removal throughout a wide water temperature range.

PATRICK M. MARTIN P.E

EDUCATION
B.S., Environmental Engineering – Oregon State University, Corvallis, OR, 2000

PROFESSIONAL REGISTRATION/ CERTIFICATES
Professional Engineer, Maine, (#12007) 2009

AREAS OF EXPERTISE
Mr. Patrick M. Martin has technical experience in the following fields:

- Engineering Management
- Site/Civil Design (Site Civil Design, not structural)
- Preliminary & Conceptual Design
- Drafting Services
- Detailed Engineering Design
- Site Layout
- Licensing & Permitting
- Geographic Information Systems (GIS)

REPRESENTATIVE EXPERIENCE
Mr. Martin is a civil engineer with over nine years of professional experience. His experience includes engineering design in the fields of water resources, transportation, and site-civil/land development. This range of experience provides him with a well-balanced engineering background. Mr. Martin has experience with Hydraflow, HEC-HMS, HEC-RAS, and ArcView 9.2. Mr. Martin currently serves as Civil Engineer for the Civil and Transmission Division.

Oakfield II 110MW Wind Farm: Oakfield, Maine (Project Engineer)
Mr. Martin was involved in the Oakfield II project which included the development of a permit-level design for a 54 turbine, 110 MW wind farm located in the forested mountains and hills of Eastern Maine. TRC's scope of work included the civil design of the ridge-top turbine sites, about 20 miles of crane and access roads, 31 miles of 34.5 kV collector system including 2 miles of underground collector, a 34.5 to 115 kV substation, 60 miles of 115 kV transmission system, and site design for the Operation and Maintenance facility. Mr. Martin assisted with the access and ridge road design and the project stormwater and erosion control management plans.

The Resort at Goose Rocks: Kennebunkport, Maine (Project Engineer)
Mr. Martin was involved in the improvements to an existing seasonal resort including the demolition of an existing multi-unit structure and the construction of 30 cottage-style units. As the project engineer Mr. Martin was responsible for development of construction drawings, grading and drainage design, utility coordination, stormwater management design, preparation of the stormwater report, and local and environmental permitting.

USPS Processing and Distribution Center: North Reading, Massachusetts (Project Engineer)

Mr. Martin was involved in the construction of a 130,000 s.f. expansion of an existing United States Postal Service Processing and Distribution Center. The project lead was the construction management firm. The site-civil engineers coordinated the work with the client, architect, and mechanical engineer. Throughout the project they incorporated federal (USPS), state, and local design requirements. Mr. Martin was responsible for access road, loading dock, and parking lot design, grading and drainage design, utility design coordination, and preparation of construction documents. He oversaw the staff engineer working on the stormwater management design and report, and the CAD technician assisting with the construction drawings. Mr. Martin also assisted the project manager with the local and environmental permitting.

Artificial Turf Field, New England College: Henniker, New Hampshire

Mr. Martin was involved in the design of a multi-purpose NCAA athletic field for field hockey/soccer multi-purpose field, a baseball field, and reconstruction of the football field. Mr. Martin responsibilities also included development of construction drawings, coordination with artificial turf manufacturer, athletic field layout, grading and drainage design, utility coordination, and stormwater management design, report preparation and local and environmental permitting.

Bouffard Property FEMA LOMR Flood Study: Falmouth, Maine

Mr. Martin was involved the completion of a riverine flood study for the purpose of filing a Letter of Map Revision application with FEMA. To respond to the FEMA reviewer's comments, he reviewed the original HEC-HMS and HEC-RAS models, flood study and application working with the FEMA reviewer to address concerns. This involved making minor revisions to the HEC-RAS model, and revising and resubmitting the workplan and annotated FIRM.

Kennebunk Coastal Flood Study: Kennebunk, Maine

Mr. Martin was involved in a peer review of FEMA's provisional flood maps and coastal BFEs. He Used current bathymetric and topographic (LIDAR) data, he propagated FEMA's deep water wave (based on significant wave height and peak period) to each of the transect locations using the 2-D wave model STWAVE, run from the SMS 10.2 platform. This allowed him to account for any wave refraction, shoaling, and/or restricted fetch conditions, as applicable. As design engineer, Mr. Martin reviewed FEMA's data for assumptions and errors digitized the land/sea boundary for the STWAVE model. He evaluated the wave setup, wave height, and run up elevation using the Direct Integration Method, TAW, and Casco Bay Method, and the wave modeling software WHAFIS 4, RUNUP 2, and/or ACES. Mr. Martin created figures (using ArcGIS) illustrating our findings at each transect. He also wrote and compiled the final report. A similar service was also provided to the municipalities of Portland, South Portland, Cape Elizabeth, Kennebunkport, Falmouth, and Harpswell.

Exit 3, I-295 Reconstruction: South Portland, Maine (Design Engineer)
Mr. Martin was involved in the reconfiguration and reconstruction of the intersection of Broadway and Westbrook Street, including a new on-ramp at the I-295 interchange. As an engineer on the design team, he was responsible for assisting with the design of the on-ramp and intersection improvements, grading and drainage design, signage and striping layout, construction staging plan, and development of construction drawings.

Route 1/Route 88 Intersection Improvements: Falmouth, Maine (Design Engineer)
Mr. Martin was involved in the improvements to an existing intersection with an unusual traffic pattern and poorly defined lanes. As the design engineer, his responsibilities included intersection design, grading and drainage design, signage and striping layout, construction staging plan, and development of construction drawings.

Snohomish County Drainage Needs Report (DNR); Snohomish County, Washington
Mr. Martin delineated drainage sub-basins, collected drainage inventory data, developed f-tables for HSPF models, prepared HEC-RAS and SWMM hydraulic models, managed a GIS database, created numerous drainage maps in GIS, and wrote sections of the report.

Upper Thornton Creek-Ronald Bog Flood Reduction Study and Improvements; Shoreline, Washington (Design Engineer)
Mr. Martin was involved in converting approximately 1,400 feet of closed conduit and ditch conveyance to a more natural stream channel. As design engineer, he assisted with the preliminary design to daylight Thornton Creek in Corliss Avenue, just downstream of Ronald Bog. This included plans preparation and development of a HEC-RAS hydraulic model.

SPECIALIZED TRAINING
- AutoCAD/LDD 2006
- Auto-Turn
- HydroCAD
- Hydraflow
- HEC-HMS
- HEC-RAS
- ArcView 9.2
- CHAMP