

**Environmental Assessment,  
404(b) (1) Evaluation, and Finding of No Significant Impact  
Granite Reliable Power Permit Application #NAE 2008-410**

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## **1. Executive Summary**

### **1.1 Introduction**

*Please refer to the illustration entitled “Geographic Features Near the Granite Reliable Power Windpark.” In this document, we will refer to this plan as Exhibit 1 or the General Plan. Also please refer to another useful illustration, Exhibit 2, which depicts the project features superimposed on the U.S. Geological Survey topographic maps. This illustration is entitled “OVERALL SITE LAYOUT EXHIBIT.” For more detail on wetland impacts, please refer to, Exhibit 3, a series of 136 separate sheets, showing nearly 600 separate wetland impact areas, which we will refer to as the Permit Application Plans.*

Granite Reliable Power, LLC (“GRP”), a subsidiary of Noble Environmental Power, has applied for a permit from the Department of the Army, Corps of Engineers (“Corps”) for authorization to discharge dredged or fill materials into jurisdictional waters of the United States in connection with the proposed construction of a wind-driven electrical power generating facility in Coös County, New Hampshire. GRP has also applied for a loan guarantee from the U. S. Department of Energy’s (“DOE’s”) Loan Guarantee Program under Title XVII of the Energy Policy Act of 2005 (“EPAct 05”) for construction and startup of this facility. The facility would be known as Granite Reliable Power Wind Park (“GRP WP”). The facility would consist of 33 wind turbines built on the top of several mountain ridges. The wind turbines would be connected by wires to a transformer and then into the local electric power distribution grid known as the Coös Loop. To build the facility several access roads would have to be improved or built to bring the component parts of the facility on to the site. These access roads would involve a number of crossings of waterways and wetlands which would involve discharges into waters of the United States. As part of its decision making process, the Corps is obligated to consider the environmental impacts of a decision to allow these discharges and to determine that any such permit would be consistent with the requirements of Section 404 of the Federal Clean Water Act (“CWA”). DOE requested cooperating agency status in the development of this document pursuant to it’s jurisdiction under EPAct05 to issue a loan guarantee to GRP to assist with the financing of the GRP WP. Issuance of a loan guarantee is subject to review under the National Environmental Policy Act (“NEPA”). DOE will use this EA to assist its decision-making regarding whether to issue a loan guarantee to GRP.

The GRP WP would be a long, linear project, consisting of an access road with two branches off it. At the top of the main stem and at the end of the two lower branches would be three strings of level circular pads spaced out along the ridgeline next to the access road. These pads appear on drawings like grapes on a vine. They depict construction pads, on which of a series of wind turbines would be built.

Each wind turbine looks like a giant electric fan or pinwheel. Wind turbines consist of a large sheet metal shed called a nacelle built like the fuselage of a plane, held aloft by a tall tapered single steel tower. The nacelle contains the generator, with a huge propeller in the front of it. The propeller is turned by the wind and in turn drives the generator to produce power. Sensors and mechanical equipment housed in the nacelle with the generator allow it to be turned to face the direction of the wind and the propeller to be feathered to adjust to the strength of the wind. Buried within and built alongside the roads are other ancillary facilities to collect, transform, and transmit the electric power. It is the

effect that the construction of the access roads will have on the ecology of the forest and the potential for the towers and propellers to kill birds and bats that are the main environmental concerns with this proposed project. The Corps' primary concern as the agency with regulatory responsibility for permitting under Section 404 of the Clean Water Act is with impacts to aquatic resources. The access roads needed for the GRP WP regularly cross waters and wetlands as they traverse the mostly forested landscape. Approximately 13½ acres of primarily forested wetlands would be impacted by the roads and pads constructed for the project. In addition, nearly 300 acres of upland forest would be cleared to build the roads and the overhead power lines that are part of the project.

While the Corps permit review process is primarily focused on maintaining the integrity of the aquatic environment, there were also concerns expressed that the project, if permitted, would have an adverse affect on important terrestrial and avian wildlife such as the pine marten and the Bicknell's thrush. Other species of birds and bats may also be adversely affected. Adverse effects on tourism and the depreciation of real estate values were predicted by some who have commented on this application. In addition to these concerns expressed by agencies and members of the public, there are other public interest factors which the Corps must consider as part of its review.

This document evaluates the issues covered by the Corps' public interest review factors relevant to the GRP proposal and the issues raised by a number of individuals, environmental groups and government agencies who commented on this application. This document is an Environmental Assessment ("EA") pursuant to NEPA, as well as the written evaluation pursuant to 404(b)(1) of the Clean Water Act, and a Statement of Findings ("SOF") to document the Corps public interest review.

Many of the issues involved in our public interest review and the necessary 404(b) (1) Guidelines evaluation were also considered by the New Hampshire Site Evaluation Committee ("NH SEC") in the process of deciding upon a parallel application for the necessary state permits. On July 15, 2008, prior to formally submitting the Corps permit application, GRP applied to the NH SEC for a Certificate of Site and Facility ("Certificate"). The NH SEC Certificate is an "all-in-one" permit required by the State of New Hampshire for power generation and transmission facilities over 30 megawatts in size. The NH SEC process is a quasi-judicial process in which the appointed commissioners qualify interveners, hold hearings, take testimony under oath, deliberate in public, and make decisions based on an extensive administrative record. The NH SEC Certificate incorporates a New Hampshire Department of Environmental Services ("NH DES") wetlands permit, a NH DES Site Specific permit, aimed at controlling erosion and sedimentation from storm water runoff, and a state Water Quality Certificate ("WQC") aimed at preserving the quality and biological integrity of the receiving streams.

Consistent with the Council on Environmental Quality ("CEQ") NEPA regulations, 40 C.F.R. § 1506.2, to avoid duplication with the NH SEC process the Corps Regulatory Project Manager ("PM") for the Corps permit application participated in extensive pre-application conferencing with both state and federal regulators and natural resource agency staffers to ensure that the application would adequately address various state and federal regulations and criteria, thus ensuring a more efficient application and review process. In addition, the Corps Regulatory PM participated in the NH SEC public involvement process, attending the initial public informational meeting and subsequent public hearings, technical sessions and final arguments and deliberations so as to have full public input to the Corps permit decision. This effort to meld the Corps NEPA and Regulatory Public Interest Review

process is discussed in more detail in Appendix 2, Public Involvement and Public Comment. During the pre-application process and continuing into the early part of the state and federal review process, substantial changes were made to the proposed project to address concerns raised by state and federal agencies and by interested members of the public.

The NH SEC record and decision contain analysis of the existing conditions, the scope of alternatives studied, the associated impacts of those alternatives, particularly of the preferred alternative, and the mitigation proposed to address adverse impacts. In the course of its review, the Corps has relied on documents produced for the NH SEC application, the transcripts of the hearings held, and the technical sessions as sources of information on the potential impacts of the project. The Corps also received a number of analyses prepared by GRP in the course of seeking both the NH SEC Certificate and the Corps' Section 404 permit. One report of particular importance to demonstrating compliance with the 404 (b) (1) Guidelines was the Needs and Alternatives Analysis, provided as Exhibit 4 to this document. This report was provided to the Corps on September 30, 2009. The Corps analysis of alternatives and compliance with the 404(b) Guidelines are discussed later in this document. Other reports on Bird and Bat surveys were also received by the Corps and are considered in this EA.

## **1.2 Overview of Proposed Action and Alternatives**

### **Overview of Proposed Action:**

GRP has proposed to construct a linear system consisting of 33 steel towers, each supporting a 3 megawatt nameplate-capacity wind-driven electric power generator with associated collection, transformer, and transmission facilities. The generator locations would be accessed by a system of existing unpaved logging roads, which run up the valley, supplemented with several upgraded or new roads, also constructed of crushed stone and gravel, ascending to the top of three mountain ridges (Dixville Peak, Kelsey/Owlhead Mountain, and Fishbrook Ridge) and then branching out along the ridgelines. On circular pads spread out alongside the ridgeline roads, 33 wind-driven generators would be built. The electric power generated by the wind turbines would be collected, fed into the local electrical grid and conducted to wherever there is demand on the grid.

Approximately 31 miles of upgraded existing or new unpaved roads would be needed for the project. Approximately six miles of the new roads would be built up on the ridge lines on top of several mountains. The project would impact 13.5 acres of wetlands and clear approximately 300 acres of forest to create the network of roads, tower pads, wind turbines and ancillary facilities that would comprise the system.

Exhibit 1, the General Plan, gives an overview of the breadth of the proposed system. Exhibit 3, the Permit Application Plans, 143 sheets in all, shows nearly 600 separate places where particular waters and wetlands would be impacted across the 31 mile length of the project.

Once constructed, the GRP WP would be operated by a computer controlled system and a small operations and maintenance staff of approximately 6 employees.

**Alternatives Considered:** *The alternatives considered by GRP are documented in the Needs and Alternatives Analysis report by Horizons Engineering dated, September 30, 2009, Exhibit 4. The*

*alternatives analysis is summarized here and later in Chapter 3 of this document under the heading “3.2 Overview of Alternatives Considered”.*

A dozen alternative site locations and two different arrays of wind turbines within the selected site were considered for this facility. The applicant only pursued the most promising site location to the permit application stage. That site initially consisted of two parcels of land which shared a common border on the top of the ridges where the proposed wind turbines would be built. The two timberland parcels involved are called the Philips Brook Tract and the Bayroot Parcel. A small but key piece of land on Dixville Peak, owned by the Tillotson Corporation, was added to the proposal as it developed. The Tillotson Corporation owns the Balsams Grand Resort Hotel in Dixville Notch. The resort operates both the Panorama Golf Club and the Balsam’s Ski Area, which are located immediately north of the proposed windpark.

Having selected the most promising location to develop a wind park, two generator arrays were considered by GRP: one using 67 generators, of 1½ MW nameplate-capacity, spread out over the two properties, the other using 33 generators, of 3 MW nameplate-capacity, concentrated on the eastern ridgeline. After some preliminary analysis, including some field work and environmental assessment, along with a continuing analysis of the wind resource available within various parts of the parcels, the applicant developed an initial plan and began pre-application coordination with various resource agencies. In response to comments on the initial plan by the state and federal regulators, especially the NH DES Wetlands Bureau staff, the GRP modified its initial proposal. They made some minor changes in the alignment of the access roads and layout of the tower pads. Later and more importantly, in response to objections by staffers of the New Hampshire Fish and Game Department (“NH F&G”) and other environmental groups about wildlife impacts, the applicants added very substantially to the mitigation package.

The alignment shifts reduced the direct wetland impacts by ½ acre, reducing the direct wetland impact from 14 acres to 13½ acres. Other minor changes were made to the design of some crossings of wetlands to avoid draining wetlands adjacent to the proposed road or to avoid concentrating flows in confined channels and causing erosion of these drainage features.

The main change in the plan from the original proposal was the development and inclusion of a plan to ameliorate or compensate for damages to wildlife resources, especially those that use the higher elevations on the property. The wildlife habitat at the higher elevations ( $\geq 2,700$  ft. elevation) are more rare, less disturbed and considered more valuable than those at the lower elevations ( $\leq 2,700$  ft. elevation). The so-called High Elevation Mitigation Agreement (“HEMA”) came together as a plan to conserve several large and important high elevation areas in the vicinity of the project. These areas, a substantial tract on Mount Kelsey and some other pieces on the western side of the site, would be preserved from logging or development that would otherwise detract from their value to wildlife. In addition to conserving several tracts of land, GRP would provide NH F&G with money, \$750,000, to buy and preserve other additional lands that would be valuable to wildlife in the area, and \$200,000 to study the effects of the project on wildlife.

The theory behind the mitigation strategy is that damage done by the construction of the windpark would be compensated for by preventing damage to wildlife habitat that would otherwise be done by loggers who would continue to log in the mitigation area. If GRP were allowed to cut new corridors up

to and along the mountain ridges and to erect their wind turbines, cutting by loggers in a substantial patch of high elevation forest on Mt. Kelsey and on several other high elevation places would be prevented. The conservation of one area would make up for the utilization of another. The mitigation proposal is discussed in more detail in Chapter 3, under the heading “3.3.4 The Modified or Mitigated Proposal at the Preferred Site” and Section 6.5 “Compensatory Mitigation for Unavoidable Losses”.

None of the build alternatives considered would avoid impacts to jurisdictional wetlands entirely. Considering the commercial or utility scale and consequent geographic extent of the proposed facility, it would be impossible to construct the necessary access roads to the numerous generator pads that would be needed without crossing many of the numerous waterways and wetlands that exist as a lacework of tributaries on the glaciated landscape in this mountainous region. Building or widening roads in this region simply requires some filling. A single wind turbine, or a short string of them, might be constructed without filling any wetlands, but such limited facilities would inevitably fail to meet the applicant’s overall project purpose of creating a commercially viable wind energy facility.

### 1.3 **Affected Environment/Function and Value of Resources Impacted**

A functions and values assessment for the wetlands and waterways that would be impacted by the applicant’s preferred alternative is provided in detail in the attached , Exhibit 5, wetland delineation and functional analysis report entitled *”Compensatory Wetland Mitigation Plan Analysis”* dated revised 2/12/09. In addition, the attached Excel spread sheet, Exhibit 6, entitled “Table 1 Summary of Wetland Impacts” provides a description of the numerous individual wetland and waterway impacts for the preferred alternative. Finally, Volume 4, Appendix 2, Section 4 of the N.H. Wetlands Bureau Standard Dredge & Fill Application, Exhibit 7, contains a picture of each wetland impacted.

The GRP WP would be built back in the woods, up on the mountain ridges, within an 80,000 acre tract of timberland in the unincorporated places of Dixville, Earvings Location, Millsfield, Odell and the Town of Dummer. The properties involved are on the eastern side of a huge square shaped area of mostly undeveloped land bordered by Route 110 to the south, Route 16 to the east, Route 26 to the north and Route 3 to the west. Nash Stream State Forest borders most of the project site to immediately to the west.

The wind turbines would be built along a ridgeline which is the dividing line between two large timberland holdings. The Philips Brook tract and the Bayroot parcel. A small piece of a third property belonging to the Tillotson Corporation which operates the Balsams Grand Resort in Dixville Notch is also involved. The area is extremely rural and thinly populated. Four of the five named places involved, Dixville, Irvings Location, Millsfield and Odell are so small they are unincorporated and governed by the County Commissioners.

The project involves primarily three mountain ridges, small portions of the west facing slopes of these mountains, and the valley floor along the west side of Philips Brook. The distance from the northernmost tower to the southern terminus of the facility at the interconnection switching station is approximately 15 miles. From north to south the ridges are on: Dixville Mountain, Mount Kelsey/ Owlhead Mountain and Fishbrook Ridge. These ridges have come, during the application process, to be referred to as the eastern ridges, though they are located in the north central part of the parcels involved. The more westerly ridges are immediately adjacent to the Nash Stream State Forest.



The bulk of the work would occur in the Philips Brook watershed. Philips Brook drains south out of the valley between the westerly and easterly ridges, feeds into the Wild Ammonoosuc River and thence to the Connecticut River. At the very northern end of the project, part of Dixville Mountain drains to the southeast through the West Branch of Clear Stream to the Androscoggin River. At the southern end of the project, in Dummer, a substation, a transmission line, some improvements to Dummer Pond Road and the interconnection switching station would occur in the Dummer Ponds watershed that also flows south east to the Androscoggin River.

The land serves primarily two functions, it is used extensively for timber harvesting and it is valuable habitat for a variety of wildlife species. It is primarily terrestrial habitat but it contains a network of tributaries which drain the land. The project area comprises a substantial part of the Phillips Brook Watershed. Consequently what happens on this land has a considerable affect on what happens in the brook in terms of its temperature, dissolved oxygen, turbidity and biological productivity.

#### **1.4 Environmental Consequences/Public Interest Impacts**

The GRP WP road net is fairly long: 31 miles of roads, 12 of which would be new roads, with 6 miles of the new roads on top of the ridgelines. The GRP WP would introduce a new use on the land in this area, namely wind power generation, in addition to the current use of the area for commercial logging. The environmental consequences of the proposal stem mostly from adding to the network of logging roads in the area, but also from the operation of wind turbines. Approximately, 13½ acres of wetlands will be impacted and 300 acres of trees would be cleared for the project at various elevations. There would also be some adverse impacts to birds and bats that may collide with the 33 wind turbines that will project 400 feet above the forest floor.

When considered in context, and considering several ameliorating factors, such as the extensive mitigation proposed, the environmental consequences of constructing the proposed facility are considered to be moderate. While the roads are long they are relatively narrow, unpaved, and will be little used once they are built. The roads and pads on which the wind turbines will sit will utilize some valuable resources, several hundred acres of forest. However, as part of the mitigation strategy other valuable resources, several thousands of acres, will be preserved. The proposed activities would take place in an 80,000 acre tract of land that is corporately owned and actively managed for timber production. Roads and ditches are being graded regularly. Trees are being cut and stacked and trucked off the site regularly. Large areas of the high elevation forest are currently permitted for logging and are about to be cut. The introduction of 33 tall towers with rotating airfoils will likely cause the loss of some individual birds and bats. The populations of the wildlife that inhabit the area may be reduced slightly, but it is unlikely that the survival of any species now present will be threatened by the construction and operation of the proposed facility. Because the work will occur in the interior of a forest, the areas outside the forest will be little affected. The project is not expected to adversely affect the tourism or recreation industry in the area. The project is not going to detract visually from the area as a whole. One would have to look for places to see the towers from public roads or lands. It is not expected to adversely affect real estate values in the region.

In addition to the loss of habitat, the development would likely cause the direct loss of some wildlife, especially birds and bats due to collisions with the wind turbines. The development would also be expected to reduce--very slightly--the number of animals that currently use the forested habitat that will be cleared, and increase—very slightly--the number of animals that use edge habitat along the roads

carved out of the forest. This shift should diminish as time passes and the forest closes in over the construction area. Since the wind turbines will be situated on tall towers and have huge rotating airfoils, operating more or less continuously for a few decades, the operation would be expected to directly kill an unknown number of birds and bats through collisions with the rotating generator airfoils. If the losses at the recently completed Lempster, N.H. wind facility are any indication, the losses would be expected to be less than a few hundred birds killed per year for the GRP WP. The losses would not be expected to significantly affect the survival of populations of bird species in the area.

Of prime concern to the Corps is the effect the project would have on wetlands and waterways. The project would fill a total of 13.5 acres of wetlands, with a number of small impacts spread out across a very large area. The project is not expected to alter the hydrology of the affected waterways significantly. The new access roads that would be built would be constructed of crushed stone and will be permeable to the precipitation that falls on them. The wetland and waterway impacts are related to the crossings of streams and narrow bands of wetlands. Culverts and rock sandwiches will allow the tributary system to function pretty much as it presently does. The loss of wetlands would be compensated through mitigation. The ecological conditions of the receiving waters are not expected to be reduced as a result of the project. Water quality monitoring to detect and correct unacceptable impacts is a condition of the state permit and would also be a condition of any Corps permit. It is important to note that the state has issued the necessary water quality certificate for the project pursuant to Section 401 of the Clean Water Act.

A visual assessment study was done and submitted with the NH SEC application. The study looked at how the proposed wind turbines would look from a number of vantage points from which the proposed wind turbines could be seen. Because the facility would be built in the interior of a large tract of undeveloped land, most of the vantage points are many miles away from the proposed wind turbine locations. Consequently the project is not expected to have a significant visual impact. For example, several of the towers on Dixville Peak will be able to be seen from the Panorama Golf Club, which is part of the Balsam's Grand Resort. However, the towers for the lift lines of the Balsam's Ski Area can also be seen from the club. While some who visit the golf club may not welcome the introduction of such visual elements along the ridgeline, the owner of the resort is willing to lease some of the land on which a few of the towers will be built. In addition, since the golf club is listed on the National Register of Historic Places, the State Historic Preservation Officer ("SHPO") has been consulted in accordance with Section 106 of the National Historic Preservation Act ("NHPA") about the visual effect the view of the towers from the club would have on the setting of the club. After visiting the viewpoint and reviewing simulations of how the wind turbines would appear, the Corps and the SHPO have agreed that there would be no adverse effect to the club, or any other properties eligible for listing on the National Register of Historic Places.

Some noise is made by the generators. Again, because the project is located in the interior of a large tract of forest, far from many receptors, no noise will be heard by people except by a few who work on the land or use the area for recreation. The animals that live in the project area will be exposed to the noise under some conditions. However, when the wind blows at strengths needed to drive the generators, the generator noise should be masked, and in higher winds drowned out, by the sound of wind in the trees.

The project is not likely to have a perceptible effect on recreational opportunities, tourism or real estate values in Coös County. The project would occupy a small portion of the timberland involved and

the facility operation will be compatible with recreational uses—hunting, fishing, hiking--currently pursued on these lands.

The project is anticipated to add a modest amount of clean power generation capacity and source diversity benefits to the state and the nation. This would be consistent with state and federal energy policy.

## **2. Purpose and Need for Action**

### **2.1 Purpose and Need**

There are both public and private purposes and needs for this project. The public needs more diversified electric power generation with less attendant pollution and less reliance upon imported fuel. To supply this need, both the state and federal government are encouraging the private entrepreneurial development of not one, but many, renewable energy facilities spread around the state and the country. In New Hampshire, these goals are expressed in the 2002 New Hampshire Energy Plan and the New Hampshire Renewable Portfolio Standard Law, RSA 362-F, and the federal government has expressed similar goals nationally in EAct05. GRP applied for a DOE loan guarantee under Title XVII of EAct05, as amended by Section 406 of the American Recovery and Reinvestment Act of 2009. Title XVII authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued.” The two purposes of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The applicant’s private purpose is to create an economically viable commercial-scale wind energy facility in New Hampshire. Corps regulations, 33 C.F.R § 325 App. B(4), direct that the Corps should consider both the applicant’s purpose for a project as well as a broader, public interest perspective. Here, the Corps considers the purpose and need for the applicant’s proposal to be the development of an economically viable commercial-scale wind energy facility in New Hampshire to address state and federal goals of renewable energy generation.

### **2.2 Decision to be Made**

The Corps has two fundamental decisions to make which will be based on this EA. The first is whether and under what circumstances the Corps should grant a permit to the applicant, GRP, pursuant to Section 404 of the CWA. The second is whether, in compliance with the NEPA, an Environmental Impact Statement must be prepared before permitting the proposed project, or based on this EA, a finding of no significant impact (“FONSI”) can be reached. Corps regulations guiding such decisions are found at 33 CFR Part 230 and Parts 330 through 335. DOE will also use this EA to guide its decision on whether to issue a loan guarantee to GRP to finance the construction and startup of the proposed project. DOE’s regulations guiding its decision are at 10 CFR Part 1021, NEPA Implementing Procedures.

**Authority:** The Corps permit action is being taken under authority delegated to the District Engineer from the Secretary of the Army and the Chief of Engineers by Title 33, Code of Federal Regulations,

Part 325.8, pursuant to Section 404 of the Clean Water Act. The proposed DOE loan guarantee is being considered pursuant to DOE authority under Section 1705, Title XVII of EPCA05.

### **3. Description of Proposed Action and Alternatives**

#### **3.1 Description of Proposed Action (Applicant's Modified Proposal)**

*Please refer to Exhibits 1 and 2 entitled "Geographic Features Near the Granite Reliable Power Windpark" and "OVERALL SITE LAYOUT EXHIBIT" for a general depiction of the layout of the proposed facility, and the project's wetland permit application plans, Exhibit 3, which show the details of the footprint of various parts of the facility where the project would directly impact waters and wetlands.*

The GRP WP layout is essentially a linear project with wind turbines to be installed along several miles of north-south oriented ridges. The very top of the ridges are the boundary between the two parcels of land on which the project would be built. The northern extent of the project site is located in the upper ridges of Dixville Peak (elevation 3,482 feet). Extending south from Dixville Peak, the wind turbines would be located on the ridgelines of Mount Kelsey (elevation 3,468 feet), Owlhead Mountain (elevation 2,867 feet), and an unnamed ridge referred to in the application as Fishbrook Ridge (elevation 2,582 feet). In its longest dimension, the project components will span approximately 14.5 miles from the northernmost wind turbine to the existing transmission line at the south end of the project area near the intersection of Dummer Pond Road and Route 16 in Dummer.

The Project includes the construction of approximately 12 miles of new access road and upgrading of about 19 miles of existing private logging roads. In all about 31 miles of access roads are involved in the project. Two of the ridgeline roads parallel the main north south access road and are connected to it by two ascending roads leading from the valley floor to the parallel ridges. Thus the total length of roads involved exceeds the straight line distance between the termini of the project.

A 34.5 kV electrical collection line buried in the access roads will gather the power from the wind turbines on Dixville, Kelsey and Owlhead Mountains and deliver it to a new substation just south of where the Dummer town line crosses Dummer Pond Road. An underground collector line would also be buried in the ridgeline road on Fishbrook Ridge. However, the power collected from this string of generators would be collected through an overhead line on poles extending from the southern terminus of the Fishbrook string to the substation 1.5 miles south. A maintenance building and lay down yard would be constructed in the vicinity of the substation to accommodate construction and operation of the project.

An 115kV electrical interconnection line will be constructed to deliver the power from the substation to the interconnection switching station located adjacent to an existing 115kV electric transmission line owned by Public Service of New Hampshire (PSNH). This electrical transmission line will span approximately 5.8 miles along the existing Dummer Pond Road from the substation to interconnection switching station.

The electrical power to be produced by the proposed project would be generated by 33 wind driven generators or turbines with a name plate capacity of 3.0 megawatts (MW) each, for a total installed

capacity of 99 MW. The wind turbines proposed to be used are the “V90” series manufactured by Vestas Wind Systems A/S.

GRP’s modified proposal includes a number of design modifications that respond to environmental and other concerns raised through the public review process. The most significant changes in the proposal were made to mitigate impacts to wetlands and wildlife. An extensive wetland and wildlife mitigation plan has been added to ameliorate the potential for impacts to aquatic and wildlife impacts. The project has been reduced in its footprint by using fewer higher capacity generators to produce the 99 megawatt nameplate capacity desired. The alignment of the access roads and adjacent construction pads has been shifted to reduce the wetland impacts of the project. The erection of the generators will use a single blade lift technique that adds the blades to the generator shaft hub one at a time at the top of the tower. This reduces the size of the pad necessary to assemble and erect the wind turbines and in some instances reduces the amount of wetland fill necessary for the project.

The project has been designed to control runoff from the project and avoid sedimentation of the brooks below the project by using best management practices specified by the state. The effects on the receiving streams will be monitored. (See Mitigation Plan and Permit special conditions.)

### **3.2 Overview of Plan Formulation and the Alternatives Considered**

The design of the applicant’s plan evolved over time to become the modified plan that was ultimately permitted by the NH SEC and that is the subject of this application. The alternatives analysis began with a look at twelve potential sites in northern New Hampshire. Sites were compared based on criteria relating to wind power generation, availability of land, proximity to transmission lines, transmission line capacity, parcel sizes, visual, archaeological, and historic factors, wetland impacts, wildlife impacts, public support, access, construction logistics, connectivity to other wind parks to create viable operations, financial viability, and other factors. Based on this analysis, the applicant selected the most promising site for further analysis, and after selecting what they believed to be the most promising site, they began negotiating with the landowners and eventually came to agreements with several in the project area. After further study of various opportunities and constraints, the applicant settled on an initial plan and began pre-application consultations with state and federal regulators and resource agency personnel. In due course, the applicant decided upon the initial plan they wished to pursue and submitted their applications, first to the state and then to the Corps. There were strong objections to the initial plan primarily by the federal and state fish and wildlife agencies. The main concern was the loss of high altitude wildlife habitat. After further discussions and negotiations during the application process, the plan was modified to make it more acceptable to many. The modifications involved some shifts in the alignment of roads and construction pads to reduce wetland impacts and a major expansion of the proposed mitigation package to ameliorate impacts to wildlife, especially those that use high elevation habitats.

#### **3.2.1 Other Geographic Locations Considered:**

To meet the documentary requirements of the 404(b) (1) Guidelines, the applicant produced an alternatives analysis report in which they describe the process they went through to screen potential alternative locations for a wind park in New Hampshire. In this report, they produced a matrix comparing 12 potential locations in New Hampshire. The matrix estimated how well or poorly various

criteria thought necessary to a successful wind park development were met for each of the alternate locations. The report is entitled “NEEDS AND ALTERNATIVES ANALYSIS FOR THE GRANITE RELIABLE POWER WINDPARK FOR GRANITE RELIABLE POWER, LLC dated “September 30, 2009,” Exhibit 4. This report went through several iterations and was received by the Corps in “final” form on October 1, 2009. Some clarifications of the report were received in April 2010.

The report documented that the project planners had considered a reasonable range of alternative locations, had given sufficient weight to the value of wetlands and waters in their planning and had rational reasons for picking the proposed Bayroot-Philips Brook location as most the promising location to develop a windpark. While the analysis conducted at this scale did not include site-specific wetland and stream delineations, the sites were examined using coarser-scale methodologies, such as the U.S. Fish and Wildlife Service’s National Wetlands Inventory maps and U.S. Geological Survey maps. This analysis concluded that no site would result in substantially less/different impacts to waters of the United States than the proposed site in Coos County.

### **3.2.2 A more diffuse and numerous array of smaller wind turbines on the preferred site:**

*Please refer to an illustration which depicts this 67 tower layout, which we will refer to as, Exhibit 10, entitled, “Granite Reliable Power, LLC, Granite Reliable Power Windpark, Alternatives Analysis Exhibit, WEST RIDGE & EAST RIDGE TURBINE STRING,” Dated March 2010.*

Another alternative considered was an array of 67 smaller towers spread out over both the western and eastern ridges within the Bayroot and Philips Brook parcels. This alternative was dismissed as not likely to be less environmentally damaging because it would entail a longer network of roads, more stream crossings and more land disturbance to construct the larger number of towers. In addition, even though these turbines would not be as tall as the larger 3 MW wind turbines (thereby impacting less air space), with the larger number of wind turbines, more bird strikes would be expected. The western ridges were also perceived to be more environmentally sensitive than the eastern ridges because of their location immediately adjacent to the Nash Stream State Forest.

### **3.2.3 The Initial Proposal at the Preferred Site:**

Another alternative considered was the applicant’s initial proposal for 33 towers on the eastern ridges as described in the original applications. The initial proposed project alternative would have filled approximately 14 acres of wetland, ½ acre more than the modified proposal. The wetland compensation plan called for setting aside 620 acres in the headwaters area of Philips Brook for wetland mitigation. A corridor along a part of the project alignment amounting to 350 acres on Mt. Kelsey was offered initially for wildlife mitigation. The resource agencies felt strongly that this did not adequately address impacts to high altitude habitats.

This alternative would have a slightly greater net impact on wetlands compared with the preferred alternative because it would directly fill one half acre more of wetlands. More importantly, this alternative would have a much greater impact on wildlife because logging would continue on the upper parts of Mount Kelsey and the other areas that would be preserved under the high altitude mitigation agreement (“HEMA”). In view of the changes which have been negotiated during the review process, the initial proposal is more environmentally damaging than the applicant’s preferred alternative and therefore could not be considered the least damaging practicable alternative.

### **3.2.4 Modified or Mitigated Proposal at the Preferred Site:**

Another alternative considered was the applicant's modified or mitigated proposal for 33 towers on the eastern ridges which included slightly more avoidance and minimization of direct wetland impacts and substantially more compensatory mitigation than the initial proposal. This modified proposal changed the alignment of the road in a few places to avoid a small amount of wetland impact and more importantly included a much more robust mitigation proposal. The so called "High Elevation Mitigation Agreement" ("HEMA"), which was added to the initial proposal, calls for protecting about 1700 acres of high altitude forest in addition to the wetland mitigation. The HEMA would include much of Kelsey Mountain above 2,700 feet of elevation and several other pieces of land on the western ridges next to the Nash Stream State Forest. All the land to be preserved under the modified proposal is shown on the illustration entitled "Granite Reliable Power Windpark, Mitigation Plan Preservation Areas." The HEMA was negotiated primarily with the Appalachian Mountain Club and the staff of the New Hampshire Department of Fish and Game. It has been incorporated by GRP as part of their Corps permit application and required as a condition of the Certificate issued by the NH SEC. This modified proposal at the preferred site does much to ameliorate concerns about the overall impact of the project on wetland and wildlife resources. This is borne out by testimony of the parties to the agreement at NH SEC hearings on the subject. The "High Elevation Mitigation Agreement" prevents habitat damage that would otherwise occur as a result of continuing logging on substantial tracts of high elevation forest and thereby reduces the amount of habitat loss that would occur if both the proposed project and continued logging occurred. Thus, in the end, with the mitigation in place, the net impacts to wildlife habitat would be neutral or positive.

### **3.2.5 The Partial Build Alternative:**

Yet another alternative considered, but dismissed as impracticable would be to build essentially the applicant's preferred alternative minus the string of 8 generators on Kelsey Mountain and minus the mitigation included in the HEMA. The partial build alternative would be a 75 MW facility rather than the proposed 99 MW facility. In concept, this partial build alternative would save some impacts to high altitude, mostly terrestrial, habitat and a moderate amount of direct wetland impact. Approximately 3 acres of wetland impact would be avoided if the generators on Mt. Kelsey were eliminated. It would also avoid the possible bird and bat collisions which may occur with the wind turbines on Kelsey, and therefore probably avoid some bird and bat mortality. The mitigation that was negotiated in the High Elevation Mitigation Agreement would also be eliminated, and logging would continue on the upper part of Mt. Kelsey with its concomitant adverse effects. This "partial build" alternative was dismissed as impractical because the eight Kelsey turbines are expected to be the more productive generating locations in the project, and therefore the overall efficiency of the project would be seriously diminished. The applicant has indicated that the cost of losing the most productive generators would make the payback period longer and undermine their ability to attract the financing that is critical to the project. In other words, the project might arguably be slightly less damaging to the project site's environment (but with the loss of mitigation on Mt. Kelsey—and the likelihood of logging that would result--it is not clear that the overall net effects would be less damaging), but the project could not be built by the applicants who are relying on project investors for financing. Thus, the partial build alternative might be less damaging but it would be impracticable for the applicant. The applicant argues that in the present market, marginal profitability means no financing which in turn means no project as

the applicant must rely on project financing to be able to build the project. The applicant maintains that the scope of the project cannot be reduced and succeed in its development and have requested a decision on the proposal as it was permitted by the NH SEC. Based on the substantial impact that eliminating the Mt. Kelsey turbines would have on the energy production from the facility and the consequences of this to the applicant's ability to construct the facility, combined with the loss of large amounts of mitigation lands, the Corps has concluded that this is not a practicable alternative.

### **3.2.6 The No Build or No Action Alternative:**

The No Build Alternative would consist of not building the proposed wind driven electrical power generating facility within the forest tract under consideration and letting commercial forestry continue on all of the property as it has in the past. Under the No Build scenario, it is reasonable to conclude that cutting permits for logging on high altitude parts of the property would continue to be issued by the County. From testimony given during the SEC process it was evident that while the Fish and Game Department is deft at negotiating with landowners, they are not able to completely prevent logging in sensitive areas. Thus, substantial areas of high altitude forest would likely be harvested. Harvesting in these areas has a more adverse effect on wildlife than the cutting roads because the harvesting takes place in large blocks rather than the narrow corridors and small patches for roads and pads needed for a windpark. These harvested areas would take long periods to regenerate. The erosion, sedimentation and fragmentation of the forest that are a concern with the project would continue without it. The visual impacts to the area from tall towers with long rotating airfoils would be avoided as would the adverse effects of collisions between birds, bats and the wind turbines. However, the habitat value of the areas where timber harvest occurs would be lost in large areas under the no build scenario.

The No Action alternative does not achieve GRP's overall project purpose to generate wind driven electrical power and make a profit, nor would it contribute to fulfilling the public need for the production of more clean energy.

As discussed below, in the section on compliance with the 404(b) (1) Guidelines we believe the modified proposal is the preferred and least environmentally damaging practicable alternative.

## **4. Affected Environment**

This is a more detailed description of the important resources which exist within the area in which the project would take place.

### **4.1 Natural Environment- Wetlands and Wildlife**

*Please refer to two illustrations of the project, The first illustration, Exhibit 2, which is superimposed on topographic quad sheets of the area is entitled "OVERALL SITE LAYOUT EXHIBIT," dated July 2008. This illustration shows the major project features of the project, contours of elevation and the more prominent waterways and wetlands in the area. The second illustration, Exhibit 8, which is superimposed on an aerial photograph of the area, is entitled "Progression of Windpark Design Minimization of Impact Map 4." This illustration also shows the major project features, and the forest cover in the area. One can also see signatures of the logging activity that has occurred in the area in the past.*



*A functions and values assessment for the wetlands and waterways that would be impacted by the applicant's preferred alternative is provided in detail in the attached wetland delineation and functional analysis report entitled "Compensatory Wetland Mitigation Plan Analysis" dated Revised 2/12/09, Exhibit 5. In addition, the attached Excel spread sheet entitled "Table 1 Summary of Wetland Impacts," Exhibit 6, provides a description of the numerous individual wetland and waterway impacts for the preferred alternative. Finally, Volume 4, Appendix 2, Section 4 of the N.H. Wetlands Bureau Standard Dredge & Fill application, Exhibit 7, contains a picture of each wetland impacted.*

The project setting is a working forest set back a few miles from the road. The region is known as the "Grand Bois du Nord" or Great North Woods. The area is rural and thinly populated. The project would be built in parts of the unincorporated places of Dixville, Earvings Location, Millsfield, Odell and the Town of Dummer. The land serves primarily two functions, it is used extensively for timber harvesting and it is valuable habitat for a variety of wildlife species. It is also a substantial part of the Phillips Brook Watershed. Consequently what happens on this land has a considerable affect on what happens in the brook in terms of its temperature, dissolved oxygen and turbidity. These parameters in turn affect the biological diversity and productivity of the waters.

The project involves primarily three mountain ridges plus portions of the west facing slopes of these mountains and the valley floor along the west side of Philips Brook. From north to south the ridges on which the wind turbines would be placed are: Dixville Mountain, Mount Kelsey/ Owlhead Mountain and Fishbrook Ridge. These ridges have come, during the application process, to be referred to as the eastern ridges, though they are located in the north central part of the parcels involved. The more westerly ridges on the western side of the Phillips Brook tract are immediately adjacent to the Nash Stream State Forest, which is now a large conservation area.

The bulk of the work would occur in the Philips Brook watershed. Philips Brook drains south out of the valley between the westerly and easterly ridges, feeds into the Wild Ammonoosuc River and thence to the Connecticut River. At the very northern end of the project, part of Dixville Mountain drains to the southeast through the West Branch of Clear Stream to the Androscoggin River. Another very small portion drains to the Mohawk River which enters the Connecticut River in Colebrook. At the southern end of the project, in Dummer, a substation, a transmission line, some improvements to Dummer Pond Road and a switching station would occur in the Dummer Ponds and Pond Brook watershed that also flows south east to the Androscoggin River.

*Please refer to Exhibit 2, the illustration entitled "OVERALL SITE LAYOUT EXHIBIT." This illustration is overlain on USGS Topographic maps of the area. It also depicts mile markers extending northward up Dummer Pond Road from its intersection with Route 16. Route 16 is the major highway connecting these forest tracts to the outside world, and reference to this highway is helpful in locating various aspects of the project. For example the transformer substation and staging area is located at mile marker 6 and the Fishbrook Spur Road would ascend from Dummer Pond Road, north of mile marker 9, to Fishbrook Ridge.*

The southern one third of the project area from mile 6 (location of the substation and staging area) south to the intersection of Route 16 and Dummer Pond Road, mile 0, is fairly flat. This area drains to the Pontook Reservoir and Androscoggin River through a series of impoundments including Dummer Pond. Dummer Pond has a number of camps or cottages on it. This portion of the project seems to be of less environmental concern because it is fairly flat and only involves relatively innocuous activities,

such as minor road widening, culvert improvements, clearing and placing poles for overhead transmission lines, and because the wildlife habitat affected is more common and abundant. The switching station and the transformer substation would be at miles 0 and 6 respectively. For example, if one looks at the permit plans sheet 4 of 138, the plan shows that 5,559 square feet of palustrine forested and emergent marsh would be filled for site preparation for the switching station. Plan sheet 5, impact area 4 would be 2,497 square feet of forested, shrub and emergent wetland, impacts occurring in a roadside ditch.

The northern twelve miles of the project from mile 6¼ to Mile 18¼, on the east side of the valley, are situated in the Philips Brook watershed. The water falling on this part of the project will drain to Philips Brook and its tributaries. This watershed area, especially in the steeper slopes that ascend to the mountain ridges and on the higher ridges, is of the most environmental concern from the aquatic resources and wildlife point of view. Here, the new roads ascending the mountain slopes, the ridgeline roads and the wind turbine erection pads would be built. As the elevation increases, the tree species that dominate the area shift from a mix of hardwood and softwood to mixed stands of spruce and fir. The amount of disturbance from logging also diminishes so the environment becomes more natural and valuable to wildlife less tolerant of man-made disturbance. The natural environment is fairly well described in the reports submitted with the state and federal applications.

In summary, the project is going to upgrade an existing road at lower elevations on the valley floor, improve or create three roads that ascend the mountain sides and create three ridge top roads next to which the wind turbines would be built on level construction pads made of crushed rock. In the lower part of the watershed, on the valley floor, the road will travel alongside (east of) Philips Brook. This road already exists as an active logging road. The proposed grading, drainage and culvert improvements will actually improve the connectivity between the brook and its tributaries. It will also reduce erosion and sedimentation into Philips Brook, which is now occurring from the logging road, and will thereby improve water quality. This should have a positive affect on the brooks ecology.

Many of the jurisdictional impacts are to areas which have already been disturbed by ongoing forestry activities such as ditching and grading the haul roads. Many impacts are to road side ditches and many more of the impacts are to the bottom of culverted streams carried under existing haul roads in pipes of various materials and dimensions. These impacts add up to a substantial part of the total impacts, five of the thirteen and a half acres. The existing limited functions served by these roadside ditches will be replaced by the new ditches. Many of the culverted streams will be bridged or placed in box culverts with the invert buried below the grade of the stream, so the substrate will be the natural substrate.

As the ascending roads branch off the valley road and climb to the tops of the mountains several progressively smaller tributary streams will be crossed. For example, on permit plan sheet 66/138, impact area number 66-4 would remove a large steel pipe from the West Branch of Clear Stream, near mile 16 of the project, where the Dixville Connector Road crosses over the West Branch of Clear Stream and becomes the beginning of the Dixville Road (See Exhibit 2 ). The existing culvert, which has been washed out, will be replaced with a 22 foot long bridge. In the Summary of Wetland Impacts this impact area is counted as impacting 2,036 square feet of area. This area is included in the total project impact area, and is part of the total 13½ acres of impact. It is however, going to be an improvement over the present culvert and could arguably be considered as mitigation, rather than impact. Another example of areas that have been previously impacted by forestry practices can be seen on permit plan

sheet 133/1143. Here the Kelsey staging area would be constructed. This area is half way up the ascending road that leads up to Owlhead and Kelsey Mountains. It is presently an old log yard. This area has been flattened and covered with wood debris; it is highly disturbed and does not provide very valuable aquatic habitat functions or values. According to the permit plans, a small brook will be culverted through the site. This accounts for 2,301 square feet of wetland impact. Some of the tributaries crossed by the roads are fairly well defined occurring in fairly narrow excised channels. In other areas there are broader less well defined seeps. In the case of well defined channels, they will be carried under the road in small culverts. In other areas where the drainage ways are more spread out, occurring as wetland seeps with no defined channel, they will be traversed by a rock sandwich or a combination of the two treatments. A rock sandwich is a porous road embankment fill that allows water to pass through the embankment without concentrating the flow as a culvert would. A detail of this design feature is shown on page 143 of the application plans. Provided the conditions of the site specific permit, which are incorporated in the NH SEC Certificate as conditions, are followed, and the precipitation landing on the road is handled so as not to concentrate it or add to the flashiness of the receiving stream, the impacts to aquatic resources will be minor.

On the whole, it appears that the drainage patterns would not be significantly altered by the discharges needed to build the access roads. Because the design provides for water moving down the watershed to be allowed to continue without substantial interruption or concentration, the ecology of the aquatic system should not be significantly affected.

In the upper elevations the wetlands are covered in vegetation much the same as the uplands, spruce and fir. In walking over the area, the only obvious difference between the wetlands and uplands is that the wetlands seem to have less tree cover or canopy and are more open. There were also signs of water at the surface of the ground in some places or the sound of water running beneath the surface. Because the vegetation is similar, the function served by both the uplands and wetlands are similar. These areas mostly provide wildlife habitat value (as opposed to aquatic habitat value). The highest elevations, those above 2700 feet, are of the highest habitat value due to the relative rareness of these high elevations in New Hampshire.

Many of the waterways and wetlands traversed by the project are very small. They serve to drain the little sub watersheds that contribute to them and transport water and nutrients to the larger streams below them. They are important as part of the stream ecology. Some of the wetlands also collect and slowly release water that comes to them and thus ameliorate the flashiness of the system. The function of the waters and wetlands depends on where they occur. Each wetland is different and there are so many of them that it would take more space than is available in this document to describe them all. However, as mentioned earlier, there is a report, Exhibit 5, which enumerates the waters that are affected, and a table, Exhibit 6 that lists the size of each wetland, the type of wetland and the amount of impact.

#### **4.2 Natural Environment - Birds and Bats**

GRP hired competent consultants with expertise in ornithology to study birds and bats found in the area where they intended to build the proposed windpark. Radar surveys were performed in the fall of 2006, spring 2007 and fall 2007 to study migrating perching birds. In addition Stantec, the consultant, used data from a nearby site collected in fall 2006 and spring 2007 for comparison. Breeding bird surveys were conducted by Audubon in the spring of 2007 and replicated by Stantec in the spring of 2009. Visual surveys were conducted in fall 2007, fall 2009 and spring 2010 during the day to look for

migrating raptors flying over the area. Acoustic surveys were performed to detect the presence of bats in the area during April through October 2007. According to these studies and testimony given at the NH SEC technical sessions, there are few bats present in the area where the towers would be built. There are some but not many hawks migrating past the area and relatively few living up near the towers. Migrating passerines fly past the area during annual migrations, and some fly at heights that create a risk of collision with wind turbines, but the survey results suggest that the project area is not a concentrated flyway for these birds. There are a variety of perching birds that seasonally reside and breed in the area. A few of the species are somewhat rare and of concern to ornithologists because they specialize in high elevation spruce/fir habitats that are limited in New Hampshire and that are disappearing due to logging activities and other developments.

During the NH SEC and the Corps' review process it became apparent that if the project were to move forward, some of the bird studies should be repeated before construction and after construction to be able to gauge the effects of the project on birds. After consulting with the NH Fish and Game Department, the Corps and the U.S. Fish and Wildlife Service, GRP undertook to repeat some of the bird studies. The studies will continue after the project is built to determine what the effects of the project are and answer such questions as whether birds will continue to nest near the facility and whether and how many birds are killed by collisions. These studies may provide information for future decision making and opportunities for adaptive management of the proposed facility.

#### **4.3 Cultural Environment, Historic and Archaeological Resources**

##### **Section 106 Consultation Process to minimize impact on historic resources**

Section 106 of the National Historic Preservation Act of 1966 requires that (1) every federal agency take into account the potential impact of its undertakings on historic properties, (2) consult with State Historic Preservation Officer ("SHPO") on potential impacts of federal undertakings on properties eligible for listing on the National Register of Historic Places, and (3) afford the Advisory Council on Historic Preservation ("ACHP") an opportunity to comment on federal undertakings which would have an adverse effect on properties that are included in or are eligible to be included in the National Register of Historic Places. The GRP Windpark project is an "undertaking" of the federal government that triggers the Section 106 process because the project requires a federal Clean Water Act Permit from the U.S. Army Corps of Engineers, and may receive a loan guarantee from the DOE Loan Guarantee Program.

Area of Potential Effect. An "Area of Potential Effect" (APE) was defined where historic resources could be potentially affected by the project. In this case it was assumed to be the area within several miles of the towers from which the wind turbines would be visible. This is a large area. However, because the project area is so undeveloped there would likely be only a few inhabited places from which the towers could be seen, and fewer still that would be eligible for listing on the National Register of Historic Places. There are a few camps within and many houses outside the forest tracts from which the towers will be able to be seen. Those outside the Philips Brook tract and Bayroot Parcel are far away from the proposed wind turbines. Because the wind turbines will be so far from the houses there will be little visual impact from the facility.

Identification of Historic Resources. A survey of historic resources that might be potentially affected by the project was conducted and eight properties potentially eligible for inclusion on the National Register were identified. The eight places were determined eligible by agreement between the Corps of Engineers and the New Hampshire Division of Cultural Resources, SHPO. Among the eligible resources was a cottage or camp on Phillips Pond within the Philips Brook Tract, and the Panorama Golf Club, which is part of the Balsams Grand Resort a few miles north of the towers proposed for Dixville Peak.

Determination of Effect. The Corps and the SHPO agreed that there would be no adverse affect to properties eligible for listing on the National Register. This finding concludes the Section 106 process. This is discussed briefly below under the heading “Environmental Consequences for Cultural Resources.”

## **5. Environmental Consequences / Comparative Environmental Impacts**

To aid in understanding the environmental consequences of the proposed project, it may help to divide the project into geographic areas, and to divide the impacts into separate categories e.g. those to wetlands and wildlife and those to birds and bats. The project can be divided into three separate geographic areas based on whether they occur at the base, the side or the top of the mountains. The three areas are: 1) The valley floor where the existing logging road would be improved and where the switching station and transformer substation would be constructed; 2) The ascending roads that would lead up the side of the mountains to the ridges, and 3) The ridge roads that run along the ridge tops and provide immediate access to the pads where the generator towers would be erected.

Most of this discussion will focus on the applicant’s modified proposal, as this is what the applicant now seeks authorization to do. While there is only a small difference between the applicant’s initial proposal and the modified proposal insofar as wetland impacts are concerned (14 acres vs. 13.5 acres), there is a great deal of difference in the proposed mitigation.

### **5.1 Environmental Consequences, Applicant’s Modified Alternative**

#### **5.1.1 Environmental Consequences, Wetland and Wildlife Impacts**

While the total wetland impacts for the entire project are 13½ acres, there are over 500 separate impact areas across the entire project area spanning 14.5 miles from north to south over a road network of 31 miles across the valley floor, up the side of the mountains and across the mountain ridges. Most of the impact areas would be very small, in the one thousandths to one hundredth of an acre range. Very few of the impacts exceed a tenth of an acre.

The small fills and crossings for the lower access road, down on the valley floor, are of minor concern. The slopes are fairly flat, the elevations relatively low and the forest cover a mix of deciduous and coniferous trees. The habitat in the lower part of the valley is quite common and abundant in the region. Many of the impacts are to previously disturbed areas such as roadside ditches and previously culverted stream crossings. The wetlands and waters involved provide primarily wildlife habitat and groundwater interchange and some aquatic habitat where there are more permanent waters. The impacts

to these waters result from minor widening of the existing road and replacing culverts. Approximately 5 acres of the 13½ acres total wetland impact result from upgrading existing roads.

In addition to direct waterway and wetland impacts, there was concern expressed about clearing more trees for the additional roads and power lines needed for the proposed project. In all, about 300 acres of trees would be cleared for the entire project. One hundred acres of trees would be cleared at the lower elevation along Dummer Pond Road for a six mile long overhead transmission line from the transformer substation location (mile 6) down to the inter connection switching station (mile 0). Not much concern has been expressed about the environmental consequence of the transmission line clearing. In the context of the ongoing forestry practices presently occurring on this 80,000 acre tract of forest, 100 additional acres of tree clearing for a six mile long power line parallel to Dummer Pond Road is not a large change to existing management practices for the forest. Since the transmission line would be built next to Dummer Pond Road, which is currently used for hauling logs and equipment, its wildlife value is somewhat less than the more isolated areas higher up the mountains. Likewise, habitat fragmentation concerns are less in these areas because the bigger fragmentation impact occurred when the road was originally constructed, the additional clearing for the transmission line is an incremental impact to a fragmentation that already existed.

Many of the impacts involved in the upgrading of the existing logging roads would actually be an improvement over the present situation, in that smaller culverts, 24 of them, on streams on the lower elevations of the project area would be replaced with larger culverts with greater potential for aquatic species' movement through the culverts under the roads. These new culverts would be more carefully constructed than the more expedient pipes placed under the existing logging road. These improved culverts would be less subject to erosion and sedimentation. One hundred smaller culverts on smaller streams would also be replaced higher up in the watershed. In many cases the smaller culvert replacements would be an improvement over the existing situation in that they would have headwalls and splash pads to prevent erosion.

In other cases, again, mostly down in the valley along the existing logging roads, the aquatic impacts attributable to the proposed project would be somewhat less than significant. Where roads would be widened, roadside ditches would be filled and replaced with new ditches at the new edge of the widened road segment. In these instances, the existing drainage ditches, which were cut along the existing logging roads to collect drainage off of the road bed or to divert water that would have flowed from the adjacent hillside onto the road, have developed the characteristics of a wetland over time. Hydrophitic and facultative vegetation have grown up in the ditches and along their banks. While such ditches have certain wetland characteristics, they do not provide high habitat or water quality functions and values as they are roadside ditches. Some of these ditches would have to be filled to widen the roads in certain places. However, as part of the widening process, new ditches must be cut along the sides of the widened stretches to intercept and carry water away. In time, these new ditches will vegetate and provide functions similar to those older ditches which would be filled as a result of the proposed project. Thus, there would be only a temporary loss of wetland habitat (to the extent it currently exists) in such roadside ditches.

One particularly productive vernal pool will have a small portion of one edge of the pool filled by the widening of Dummer Pond Road. The size of the pool will be reduced but it should continue to be productive since the hydrology and most of the perimeter will not be changed.

As the newly-constructed ascending roads branch off the valley road and climb the mountain sides to the ridge tops, various tributary streams and narrow bands of wetlands would need to be crossed. These tributaries are for the most part fairly well defined channels. They will be culverted, that is, placed in a pipe under the road. In some cases, where there is no defined channel, they will be traversed by a porous rock sandwich or a combination of culverts and rock sandwiches. Because the new access roads will be constructed of crushed stone and gravel, water should have a tendency to soak into them rather than run off of them. In addition, there will be rock lined ditches and detention areas where necessary to prevent runoff. Provided the conditions of the New Hampshire site specific permit, contained in the NH SEC Certificate, are followed, and the precipitation landing on the road is handled so as not to concentrate it or add to the flashiness of the stream being crossed, the impact to the various streams and their ecology will be minimal. On the whole, the drainage patterns should not be significantly altered by the discharges necessary to install the culverts or rock sandwiches. The water moving down the watershed will be allowed to continue without interruption or concentration. Consequently, the ecology of the aquatic system should not be adversely affected.

A third group of waters and wetlands occur along the ridgetops in the higher elevations. This is where the wind turbines and their construction pads would be built. The grades along the ridgetops are again relatively flat but the elevations are high and the forest is of a different tree species composition. In the upper elevations the wetlands are covered in vegetation much the same as the uplands, that is, in spruce and fir trees. In reconnoitering the area, the only obvious difference between the wetlands and uplands in these high elevation areas is that the wetlands seem to have less tree cover or canopy and are more open. Sunlight penetrates to the ground surface in these openings. The acreage of wetland impact at these high elevation areas totals approximately 4 acres. The impacts are to incipient streams or depressional wetlands. There will be little effect to the aquatic régime as a result if these discharges. The amount of wetland lost is relatively small compared to what will remain.

In the context of the ongoing forestry practices occurring on this 80,000 acre tract of forest, the 200 additional acres of tree clearing for three ascending roads, three ridge top roads and 33 wind turbine erection pads is not a huge change. The existing skidder trails on these parts of the property are narrow. They are just rutted trails, where skidders have driven over the native soil. The new roads will be wider, more permanent and more continuous than the existing skidder trails. In some places, where there would need to be large cuts and fills, the new roads will have long steep side slopes. Even with provisions for covering the side slopes and shoulders over with soil on the upper elevations of Mt. Kelsey, as is required by the NH SEC Certificate, they will persist as linear openings in the forest.

These new roads may, to some slight degree, fragment the larger tracts of woods into smaller patches and reduce the habitat value of the forest immediately adjacent to the new openings. This would more clearly be the case if the roads were wide, paved and heavily used. However, the roads will be narrow and they would be little used. The forest will gradually close in over them so the opening in the forest will become progressively narrower. Considering these ameliorating factors it is not likely that the GRP WP, if permitted, would cause a significant change in the wildlife use of the area.

Additional edge habitat along the roads will be created for a period of time until the forest closes in over the new roads. This edge habitat is created along the edges between the land cleared for the new road and the tree covered land at the edge the new road. This edge habitat is a different habitat type than the dense stands of evergreens that exist on the higher elevations and on the tops of the ridges. However, this edge habitat may not persist, it will likely close in over time. It will likely gradually

become fuzzy with new growth of sapling fir and spruce trees. Thus, the access roads up to and along the mountain ridges will not likely cause a significant shift in the ecology of the area. The ecological system of the forest is too complex to predict exactly what will happen. However, a narrow, rarely used road up the mountain and along the ridge is not going to change the basic character of the area. The project area is highly modified in many places by human activities now and it will continue to be modified in the future. Absent the proposed project, over time, nearly all of these mountain forests would be cut over--that is the present plan of the property owners absent the project. If the project is permitted, some long narrow corridors will be permanently cleared and other large tracts will be permanently conserved. Most of the land with or without the project will continue to be cut over intermittently unless it is placed into permanent conservation, which is not something the owners of the parcels have expressed an interest in pursuing.

In summary, the project is going to upgrade an existing road in the lower portions of the property and add several new roads on the sides and tops of the mountains. In the lower part of the watershed the road will travel alongside Philips Brook. This road already exists as an active logging road and the proposed grading, drainage and culvert improvements will likely improve the connectivity between the brook and its tributaries. It will also reduce erosion and sedimentation into Philips Brook which is now occurring. This should have a positive effect on the brook's ecology. Many of the impacts associated with the valley road are to roadside ditches which will simply be excavated along the new toe of slope of the road embankment. The existing limited functions served by these ditches will be replaced by the new ditches. The impacts to ditches and to various waterways crossed with improved culverts account for 5 of the 13½ acres in the total impact area calculation.

The ascending roads, if carefully and properly constructed, should not be damaging to the aquatic regime. From an ecological perspective they should not present a problem. They would be few, only three. They would be narrow. The road surfaces would be permeable. The roads would be little used, and the area impacted by construction of the roads represents a tiny fraction of the available habitat.

On the top of the ridges, where the slopes are again fairly flat, there will be some direct losses of wetlands that are filled to place a pad or to cross an incipient stream or depressional wetland. The total direct wetland impact for 6 miles of ridge top roads and pads is not excessive, 4.7 acres. Again, because they are narrow, permeable, will be little used, represent a very tiny fraction of the available habitat and will be mitigated by preservation of much larger area of similar habitat, the ridge top roads and pads should have only a moderately negative impact on wildlife in the general project area.

### **5.1.2 Environmental Consequences, Birds Bats and Raptors, Applicant's Modified Alternative**

Based on the information currently available, the expected consequences for raptors or birds of prey from the project would be minor. Surveys have not found there to be a concentration of hawks migrating through the area, and if migrating hawks do traverse the project area, these species migrate during the day and could generally see the towers and rotating airfoils. The towers are substantial single poles that are visually obvious. Unlike other sites where there have been significant raptor mortality, the turbines for this location do not have thin guy wires supporting them that might present a less obvious hazard for flying birds.



For other migratory bird species passing through the area, the radar studies indicate that the night migrating passerine birds usually fly above the rotor zone of the towers. They migrate on a broad front rather than in a narrow corridor. Thus, it is expected that most of these birds will fly over or around the towers.

The consequences for bats are also expected to be minor. Survey results indicate that there are few bats in the higher elevations where the turbines will be located.

During the review process for this project, concerns have been expressed about the consequences for a few species of summer resident birds that may live at the higher elevations of the project area, particularly for the Bicknell's Thrush and the American Three-toed Woodpecker, species for which ornithologists have expressed concern about population numbers and habitat loss. It is worth noting that surveys at the project site did not locate any American Three Toed Woodpeckers, but the elevation and habitat types are suitable for this species. There is the risk of collision with the towers or rotating airfoils of the wind turbines. However, the towers are relatively few and well spread out over a length of 6 miles, and to make the best use of the wind's energy the individual wind turbines would be spaced fairly far apart. Thus, unlike other wind energy facilities with high avian mortality, the turbines are not so close together to create obstacles that are difficult for birds to avoid. The towers and the rotating airfoils can be seen at least in conditions of good visibility. The area occupied by the 33 wind turbines is quite small in comparison to the amount of area between the towers. One concern expressed specific to Bicknell's Thrush is that males of this species engage in aerial displays during the mating season and there is some possibility that some may collide with a moving airfoil or a pole tower. However, the risk of this happening seems low because of the Bicknell's Thrush's very specialized nesting habitat requirements. This species prefers patches of regenerating sapling spruce and fir of 2-3 meters in height. The pad areas immediately around the towers will be kept clear of trees. These permanently cleared areas will not be suitable breeding habitat for Bicknell's Thrush. It is possible that over time areas of mature trees near the tower pads may be blown down and they may become suitable habitat. However, in general, the areas near but outside the generator pads will either remain as existing forest stands or be allowed to grow into mature forest conditions. Therefore it seems unlikely that the areas around the turbines would provide suitable nesting habitat for the Bicknell's Thrush either now or in the future, making it less likely that males would be found in the areas near the turbines or would choose an area distant from suitable nesting habitat to do their mating displays.

If construction were allowed to proceed during the nesting season, there would be a risk of mortality to nesting birds from clearing for the construction of the roads and wind turbine pads. The trees in which the birds nest could be cut down or the nests of ground nesting birds such as the Oven Bird might be crushed. The commotion of the construction might also cause birds to abandon nests nearby the construction sites, resulting in failure to fledge their young. This risk has been ameliorated by a condition of the NH SEC Certificate that requires tree clearing and construction activities be avoided at the upper elevations during the nesting season. If the roads at higher elevation are built during late summer and fall, birds returning to the area the following spring can avoid nesting in proximity to the new road if they determine that the habitat is not suitable. They will not have their nests destroyed or have to abandon them after expending precious time and energy in constructing them.

There is also the risk that the openings created by the roads and pads will render a corridor adjacent to the road for some distance back into the woods, unsuitable as habitat for sensitive species. The degree and extent of this fragmentation effect is hard to predict. This can be and has been ameliorated to some

degree on Mount Kelsey by the HEMA plan to conserve a 1200 acre block of Mount Kelsey above 2700 feet of elevation, some other areas of conservation on the western ridges, \$750,000 to buy other conservation lands and to provide \$200,000 for NH F&G to study the issue. With the cessation of logging on important pieces of high elevation forest, due to the mitigation, the total amount of disturbance over the long term on these forest tracts would be less with the project than without it. A greater amount of undisturbed high elevation forest habitat should be a net benefit to species that require this specialized habitat.

### **5.1.3 Environmental Consequences for Cultural Resources, Applicant's Proposed Alternative**

To evaluate the effects of the towers on the setting of eligible resources, the Corps Regulatory Project Manager, the Staff Coordinator for the New Hampshire Division of Cultural Resources and GRP's Project Manager went out to the field, snow shod into the Philips Pond cabin and up to the Panorama Golf Club and looked at the proposed tower sites from these vantage points. They observed how these sites related to the ridges on which the towers would be erected. Computer based visual simulations which were presented within a visual impacts assessment, as part of the application package, were also reviewed. It was agreed by all the parties that there would be no adverse effect on any of the eligible resources. Consequently, the Section 106 process ended, no mitigation or Memorandum of Agreement would be necessary, and the ACHP would not need to be consulted.

### **5.2 Environmental Consequences of Other Alternatives**

Having considered the environmental consequences of the applicant's modified or preferred alternative, we will consider briefly the consequences of other alternatives.

#### **5.2.1 Environmental Consequences of the No Action Alternative**

If the project is not permitted and the GRP Windpark is not constructed, it is likely that the land will continue in its current use, that is logging and timber production. A few areas of high altitude logging which have been permitted, but which have been held in abeyance pending a permit decision on this application, would recommence and continue over the long term. This would likely have an adverse effect on some sensitive species of mammals and birds who reside in the areas to be cut. If the logging continues on these parcels, then large patches of the forest will be cut over and the habitat value of these patches will be diminished for species that require large tracts of intact forest. Gradually the cut over patches will heal over and the loggers will harvest other areas where the trees have grown back to a marketable size. Most of the land will continue in the current use regardless of the projects construction. The project covers only a few hundred acres in 80,000 acres. If the project is not permitted, the benefits of this project would not be realized and it is likely that a little more wood, coal, oil or gas will be burned to produce the energy that might have been produced by this facility. The land owners would also miss out on an income stream that some feel would help keep these large timberland properties in single ownership and in use for production of a renewable resource, namely wood.

#### **5.2.2 Environmental Consequences of the Initial Proposal**

The initial proposal is much the same as the applicant's preferred alternative except that it would cause slightly more direct wetland impact and would not mitigate the wetland and wildlife impacts to the degree that the preferred alternative does. Approximately ½ acre more of waters and wetlands would be

impacted and over 1,000 acres less forest would be placed under permanent protection. The initial proposal would have been more damaging to wetlands, wildlife and birds than the preferred alternative.

## **6. Compliance with Requirements of the 404 (b) (1) Guidelines - Least Environmentally Damaging Practicable Alternative (LEDPA)**

### **6.1 Jurisdictional Determination for LEDPA**

Based upon a site inspection by the Corps Regulatory Project Manager and Wetland Specialist on July 1, 2008 and our review of the wetland delineation data sheets provided by GRP consultants, the Corps of Engineers has determined that the waterway and wetland areas depicted in the wetland report by Ray Lobdell et al. accurately define the limits of waters subject to federal jurisdiction in conformance with the 1987 Corps of Engineers Wetlands Delineation Manual.

All of the waters and wetlands identified within the tract that would be impacted to build the proposed facility would also require a permit from the NH DES Wetland Bureau to comply with state wetland statutes were the project not covered by the NH SEC site evaluation process. To the extent that a very small portion of the waters and wetland within the tract may be within NH Wetland Bureau's jurisdiction but not be within Corps of Engineers jurisdiction, because they might be isolated and not part of a tributary system which leads ultimately to a navigable water of the United States, the project proponent has stipulated that they are, for the purposes of the federal application, also waters of the United States subject to Corps Section 404 jurisdiction and subject to our permitting process. A Preliminary Jurisdictional Form to this effect was signed by the Corps Regulatory Project Manager for this application and Mr. Pip Decker, Project Manager for applicant, on August 6, 2008 as part of completing the Corps permit application.

### **6.2 Screening of Alternatives**

#### **6.2.1 Screening Criteria for Determining Feasible Alternatives**

In planning this project, GRP evaluated a dozen different potential sites distributed around the northern half of New Hampshire. They evaluated these potential locations using a list of criteria and constraints thought necessary to the development of a successful site for a wind driven electric power generating facility of about 100 megawatt capacity. Some of the criteria used, for example, would be the availability of a wind resource powerful enough and consistent enough to drive the wind turbines and proximate enough to an existing electrical grid (needed to distribute the electric power generated) that it wouldn't cost too much money to get the power to market. The land owners of such a site would have to be willing to allow such a development.

A matrix listing the criteria used and describing qualitatively how the criteria were met or not met was developed. The best four of the dozen potential sites were subjected to further evaluation. Finally, the site that appeared to be the most likely to succeed was selected and a couple of scenarios or system arrays of generators for this site were considered. For the site ultimately selected, one scenario would have placed 67 smaller (1.5 mw) generators over both the western and eastern ridges on the selected site. A second scenario was later developed, which would involve half the number of generators of twice the

generating capacity deployed exclusively on the eastern ridges within the site. The initial proposal relied on two parcels: the Philips Brook and Bayroot parcels. When a third landholder, the Tillotson Corporation, agreed to lease a key piece of land on Dixville Peak that provided critical access, a new proposal relying on a smaller number of higher capacity generators became possible and eventually the preferred alternative. GRP reasoned, and upon review the Corps agrees, based on review of aerial photographs and some field reconnaissance, that the smaller number of larger generators would allow substantially less environmental impact due to the reduced need for access roads and tower pads. Simply put fewer towers and a shorter road net would mean less wetland fill and wildlife impacts. An additional benefit of concentrating the generation capacity on the east ridges is that the western ridges remain available for conservation. Portions of the western ridges lying next to the Nash Stream State Forest are included in the mitigation plan. Conserving lands adjacent to other conservation lands yields an economy of scale and many ecological benefits.

## **6.2.2 Identification of Feasible Alternatives**

### **6.2.2.1 Preferred Alternative –**

The modified proposal with the conditions and limitation imposed by the NH SEC Certificate is the preferred alternative. It meets the project Purpose and Need and is feasible in that it can be built if it also receives a Corps Permit.

### **6.2.2.2 Alternatives Determined Not to be Feasible –**

The No Action Alternative and the Partial Build Alternative, that is, the Preferred Alternative, reflected in the NH SEC certificate, minus eight towers on Mount Kelsey, and minus much of the proposed mitigation are not feasible in as much as these alternatives wouldn't achieve the project purpose.

## **6.3 Least Environmentally Damaging Practicable Alternative (LEDPA)**

To be selected as the LEDPA an alternative, must fulfill the basic project purpose, (such as construct a commercially viable wind driven facility in NH) and be practicable.

Of the alternatives considered only the applicant's initial and modified proposals are practicable.

Because it is less damaging than the initial proposal, causing less direct damage and providing greater mitigation, the applicant's modified alternative as reflected in the NH SEC Certificate is determined to be the LEDPA.

## **6.4 Minimization of Impacts**

### **6.4.1 Alignment Changes and Other Efforts to Minimize Impacts on Wetland Resources**

The GRP Windpark project has employed a variety of techniques to avoid and minimize impacts to wetland resources. The techniques are summarized below:

- The project will use 19 miles of existing logging roads for access into the generator sites. This has

reduced both the amount of wetlands to be filled and the area of trees to be cleared.

- The project has been reduced in its foot print by using fewer higher capacity generators in a more limited geographic area to produce the 99 megawatt nameplate capacity desired.
- The alignment of the access roads and location of the construction pads have been shifted where practicable to reduce the wetland impacts of the project.
- The erection of the generators will use a single blade lift technique that adds the three blades to the hub up at the top of the tower, instead of attaching the three blades to the hub on the pad and lifting the entire propeller assembly as one piece. This reduces the size of the pad necessary to assemble and erect the generators and in some instances the amount of wetland fill necessary for the project.

## **6.5 Compensatory Mitigation for Unavoidable Losses**

A comprehensive compensatory mitigation plan has been submitted by GRP. The plan responds to the two of the main environmental concerns raised over the proposal, the impact on wetlands and the impact on wildlife. The mitigation plan is basically a preservation plan. It relies almost entirely on preservation. A small amount of vernal pool creation and restoration is also planned within the preservation areas. The total mitigation plan combines the wetland mitigation plan, conservation of 620 acres of forest in the headwaters area of Philips Brook, with preservation and other actions called for in the “High Elevation Mitigation Agreement” or (“HEMA”). The HEMA calls for the preservation of 1,561 acres of land on the upper elevations of Mount Kelsey (1,281 acres), plus two smaller tracts on the western side of the property, one on Muse Mountain (60 acres) and another on Long Mountain (220 acres) adjacent to the Nash Stream State Forest. The mitigation plan calls for the permanent conservation of four tracts of land, to be deeded fee simple to NH F&G and money (\$750,000) for the NH F&G to acquire additional land for conservation. Another \$200,000 is provided for NH F&G to conduct studies on the impact of the proposal on wildlife species in the area. The location of the parcels is depicted on the attached Exhibit 9; a graphic illustration entitled “Granite Reliable Power Windpark – Mitigation Plan Preservation Areas.” We have determined that the mitigation plan provides adequate compensation for the lost functions and values of the impacted wetlands and waterways because they provide important hydrological and habitat functions for the Philips Brook Watershed and will contribute positively to the sustainability of fish populations in Philips Brook. For habitat specialists such as the Bicknell’s Thrush, which use high elevation spruce fir habitat, the preservation of some 2,300+ acres of high elevation habitat in an undisturbed state will contribute positively to the sustainability of the Bicknell’s Thrush in the parcels involved in the area west of Nash Stream State Forest. Absent the preservation effort, substantial portions of the mitigation areas would be logged, diminishing the habitat and natural hydrological values of the parcels. Under the mitigation plan, the land will be transferred to NH F&G for permanent protection. The implementation of the mitigation plan would be made a special condition of any Corps permit.

**7. Impacts to Public Interest Factors**

A summary of the projects impacts to the public interest factors is presented in the following table.

Key to Table:

Potential for Impact Effect:    +=Beneficial            ○=Negligible    -=Adverse

<b>Aesthetics</b>	While the introduction of wind turbines to a forested environment will change the appearance of these lands, because the project is back in the woods mostly out of site of the general public it will have little to no visual impact on the surrounding area.	○
<b>Air Quality</b>	The project will add a small amount of electric power generation capacity without burning fuel or adding to air emissions.	+
<b>Benthic Flora and Fauna</b>	Compliance with conditions of NH SEC Certificate which includes WQC and Site specific permit requirements should preserve receiving water quality.	○
<b>Circulation Patterns</b>	Properly sized culverts and judicious use of rock sandwiches will preserve circulation patterns.	○
<b>Drainage</b>	Again, properly sized culverts and use of rock sandwiches to pass less concentrated flows will preserve drainage patterns.	○
<b>Economics</b>	Leases of portions of forest property to wind power suppliers should add an income stream to timberland parcel owners. This should aid in keeping large parcels in single ownership. Minor construction contractor and worker benefits during construction. A few more jobs in the county. A possible return on investment for investors and profits for developers.	+
<b>Energy Needs</b>	Will add to diversity of energy supply in NH and nation. Reduced dependence on fossil fuel.	+
<b>Erosion/Accretions</b>	No effect, in light of control of storm water discharges.	○

<b>Finfish/Plankton</b>	No effect	○
<b>Flooding</b>	Compliance with site specific permit conditions should prevent any exacerbation of runoff and flooding.	0
<b>Floodplain Values</b>	Pervious road embankments and improvement of culverts should allow drainage to pass down watershed without substantial interruption or acceleration.	○
<b>Food and Fiber production</b>	A very small portion of timberland will be dedicated to permanent roads and conservation areas will remove some areas from harvesting.	○
<b>General Environmental Concerns</b>	Superimposing a small amount of power generation on these large tracts of timberland should not change the ecological balance in the area. The new use while more permanent is of relatively low intensity and will be neutralized or minimized through appropriate mitigation.	○
<b>Historical</b>	Will not have any adverse effects on properties eligible for listing on the National Register of Historic Places.	○
<b>Land Use Classifications</b>	The proposed use is compatible with existing use and is supported by local authorities.	○
<b>Mineral Needs</b>	No effect	○
<b>Navigation</b>	No effect	○
<b>Needs and Welfare of the People</b>	Needed clean energy will be supplied by development.	+
<b>Noise</b>	During the construction period there will be a lot of noise from mechanized equipment blasting etc. Animals sensitive to mans presence will be driven off temporarily. During the operation phase, 20-30 years, localized noise impacts on resident animals will be low and is not expected to be a concern. Little noise outside immediate area.	○
<b>Property Ownership</b>	Some private property will be leased; property values outside immediate area will not be negatively impacted.	○
<b>Recreation</b>	Current uses of the area for recreation	○

	will continue on most of the land. New access roads up to the towers will be gated against vehicular traffic. Snowmobile and all terrain vehicle trails will be rerouted around areas immediately adjacent to towers.	
<b>Safety</b>	Areas immediately around towers will be posted so that people are aware of the dangers of ice shedding. Gates will restrict vehicle access to new ascending roads and ridge top roads.	○
<b>Water Quality</b>	Compliance with conditions of NH WQC, site specific permit, NH SEC Certificate and Corps Permit conditions should preserve water quality.	○
<b>Wetlands</b>	Relatively small adverse impacts to wetlands, small individual impacts spread out across large geographical area; with mitigation plan impacts are adequately compensated.	-
<b>Wildlife</b>	Minor impact on wildlife due to small loss of habitat adequately mitigated.	-
<b>Water Supply and Conservation</b>	No change in water demand or supply	○

**8. Cumulative Impacts:** There are three areas where cumulative impacts could be a concern. The first area would be the cumulative effect the project could have on the quality of the aquatic resources in the project area. The project will have a large number of small impacts to waters and wetlands in the watersheds of Philips Brook and to a lesser degree in the West Branch of Clear Stream and in Dummer Ponds and Pond Brook. The question is whether the cumulative impact of all these small discharges, along with the impacts from other activities that have occurred or are likely to occur, will cause a noticeable impairment of the quality of any of these brooks. The project consists mainly of a number of wetland and waterway crossings for access roads. If each is constructed in a way that allows the water passing down the waterway to continue through the culvert under the road without introducing a lot of sediment the main receiving stream should not be adversely affected. The project has received a water quality certificate and an alteration of terrain permit as part of the NH SEC Certificate of Site and Facility. A baseline survey and water quality monitoring plan have been developed for the project. Once the project is constructed only the Windpark operation and the existing forestry operations will continue on the property. No other filling or development is planned to occur on the property. Development in these watersheds is very slow and because the area is quite undeveloped the water quality in the affected brooks should remain high.



The second area where there could be a concern about cumulative impacts would be the effect this project and others like it would have on populations of birds such as the Bicknell's Thrush that rely on the high elevation forest habitat. Approximately one dozen individual Bicknell's Thrushes were detected in the general area of the project. Eight individuals were detected on Mount Kelsey. Three were detected in areas now proposed for mitigation. All the detections were in patches of natural disturbance high elevation spruce /fir forest where blow down had occurred and regenerating spruce/fir was 2-3 meters tall. While we know that there are Bicknell's Thrushes on Mount Kelsey, it is uncertain whether, and if so, how much, suitable habitat is adjacent to the project features, and whether areas adjacent to the wind turbines would be used by this species after a wind park is constructed. It is not clear that the Bicknell's Thrush would use the bare areas around the proposed wind turbines as a base for their aerial displays and thereby be at risk of collisions. The proposed mitigation should help to sustain populations in the immediate area. Much of Mount Kelsey above 2700 feet of elevation will remain in conservation. Within this large block there would likely remain some suitable habitat at some distance from the project. In addition other areas which would be preserved on the western ridges would provide some undisturbed suitable habitat. That habitat would also be preserved by the mitigation effort. Finally the Nash Stream State Forest and the White Mountain National Forest should continue to provide suitable habitat for the Bicknell's Thrush into the future. We do not know at this time how many wind parks would be built at similar elevations in northern New England. One project north of this area that would be at high elevation was dropped from the queue. One other at slightly lower elevation south of the proposed GRP Windpark is just beginning the state application process and another is reportedly being considered. If mitigation as substantial as has been required for the GRP proposal is also required for other high elevation projects, then the habitat used by the Bicknell's Thrush population should expect a net reduction in disturbance from human activities like timber harvesting.

Lastly, the cumulative effects of the project need to be considered in the context of the potential contribution to global climate change. While the scientific understanding of climate change continues to evolve, the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report stated that warming of Earth's climate is unequivocal, and that warming is very likely attributable to increases in atmospheric greenhouse gases (GHGs) caused by human activities (anthropogenic)<sup>1</sup>. The release of anthropogenic GHGs and their potential contribution to global warming are inherently cumulative phenomena. The Fourth Assessment Report indicates that changes in many physical and biological systems, such as increases in global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential environmental impacts are linked to changes in the climate system, and that some changes could be irreversible. GHGs, which include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), are chemical compounds in the Earth's atmosphere that trap heat. Of these gases, CO<sub>2</sub> is recognized by the IPCC as the primary GHG affecting climate change. Present atmospheric concentrations of CO<sub>2</sub> are believed to be higher than at any time in at least the last 650,000 years, primarily as a result of combustion of fossil fuels. It is also very likely that observed increases in CH<sub>4</sub> are partially due to fossil fuel use, according to the IPCC Report.

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<sup>1</sup> Intergovernmental Panel on Climate Change, Fourth Assessment Report, Climate Change 2007: Synthesis Report, Summary for Policy Makers, released in Valencia, Spain, November 17, 2007.

The energy produced by the GRP WP would be free of both GHG emissions and other air pollutants. Greenhouse gas emissions from the proposed action (e.g., emissions related to construction and transportation) would be relatively small compared to the 8,026 million tons of CO<sub>2</sub>-equivalent greenhouse gases emitted in the U.S. in 2007<sup>2</sup>, and the 54 billion tons of CO<sub>2</sub>-equivalent anthropogenic greenhouse gases emitted globally in 2004. However, emissions from the proposed action in combination with past and future emissions from all other sources would contribute incrementally to the climate change impacts described above. At present we are not aware of a methodology that would allow estimation of the specific impacts this increment of climate change would produce in the vicinity of the GRP WP or elsewhere.

However, the project would generate electrical power from a renewable source of energy (wind) representing an alternative to carbon-emitting fossil fuels. Accordingly, the project would produce a given amount of energy with fewer GHG emissions than a fossil fuel-burning power plant.

## **9. State Water Quality Certification**

The NH Department of Environmental Services issued a Water Quality Certification for the project on July 16, 2009

## **10. New Hampshire Site Evaluation Committee Certificate of Site and Facility**

The NH SEC issued a Certificate on July 15, 2009 with conditions including mitigation and monitoring.

## **11. Public Interest Review**

*The Corps of Engineers Permit Regulations 33 CFR Section 320.4 require consideration of the following issues.*

(i) Extent of Public and Private Need. The purpose of the project is to add wind driven electric power generation capacity to the supply in NH. There is both a private and public need for this project, and not just this project but others too. Some who value highly the undeveloped nature of the area have expressed the opinion that there is not sufficient power produced to justify the cost to the environment. Our regulations provide that we will generally accept the need for the project, and here there are federal and New Hampshire statutes favoring the construction of new alternative energy facilities that express a national and state view on the need for facilities like this one, statutes that reflect federal and state views on the need for facilities like this one. The issuance by the Independent System Operator of New England of a permit to interconnect the proposed facility on to the grid and a NH SEC Certificate of Site and Facility is evidence the need for the facility.

(ii) Practicability of Alternatives. The applicant analyzed numerous alternatives to the proposed site. None of these alternatives would avoid wetland resources. The Corps has concluded that the Preferred Alternative is the least damaging practicable alternative and the proposal will not cause significant

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<sup>2</sup> Energy Information Administration, Report No. DOE/EIA-0573 (2007).

degradation of aquatic resources or violate water quality standards. The no-action alternative is not practicable nor is the partial build alternative.

(iii) Benefits, Detriments and Effects on Public and Private Uses to Which the Area is Suitable: The benefit of the proposed project is that it would meet in part the need for added wind driven electrical generation in the region. Increased, albeit temporary, opportunity for employment during the construction phase, in an area of high unemployment is also perceived by many to be a benefit. A small number of permanent jobs will be created for those who will operate the facility. The detriments of the proposed project are mainly the loss of some natural functions provided by wetlands (13½ acres) and forested habitat (300 acres), particularly high elevation spruce fir forest (100 acres). The area chosen for the project is sufficiently large that it can continue to be used for forestry and recreation while adding wind energy production and conservation as part of the mitigation plan to the mix. The Corps views this project, with the mitigation and monitoring that it entails, as striking a balance between the need to develop and to conserve important resources.

## **12. 404 (b) (1) Guidelines**

**(See appendix 1 Re. 404(b) (1) analysis and findings of Compliance)**

The final guidelines of the Environmental Protection Agency for the discharge of fill or dredged material (40 CFR 230) as published in the Federal Register, dated 24 December 1980, have been applied in evaluating this permit application. With the special conditions incorporated into the permit, the discharge of dredged or fill material has been found to comply with the Guidelines.

## **13. Conformity with State Implementation Plan**

The EPA regulations published as "General Conformity Rule" (58 FR 63214, November 30, 1993) to implement section 176(c) of the Clean Air Act for non-attainment areas and maintenance areas require that Federal actions, unless exempt, conform with the Federally approved state implementation plan. The impacts on air quality associated with the regulated activity described in this EA/SOF (discharge of dredged or fill material into waters of the U.S. (Section 404 of the Clean Water Act); and/or work in or affecting navigable waters of the U.S. (Section 10 of the Rivers and Harbors Act); and/or the transportation of dredged material for disposal in ocean waters (Section 103 of the Marine Protection, Research and Sanctuaries Act) have been considered and are expected to cause only *de minimis* increase in emissions. Therefore, the regulated activity is exempt from the requirements of the General Conformity Rule.

## **14. Finding of No Significant Impact (FONSI) (40 CFR 1508.13)**

I find that based on the evaluation of environmental effects discussed in this document, the decision on this application is not a major federal action significantly affecting the quality of the human environment. Under the Council on Environmental Quality ("CEQ") NEPA regulations, "NEPA significance" is a concept dependent upon context and intensity (40 C.F.R. § 1508.27). When considering a site-specific action like the proposed development of the GRP commercial utility scale wind driven electrical power generation facility, significance is measured by the impacts felt at a local scale, as opposed to a regional or nationwide context. The CEQ regulations identify a number of factors to measure the intensity of impact. These factors are discussed below, and none are implicated here in a

manner that warrants a finding of NEPA significance. A review of these NEPA “intensity” factors reveals that the proposed action would not result in a significant impact—neither beneficial nor detrimental—to the human environment. Hence, an environmental impact statement is not required under NEPA.

#### **14.1 Impacts on public health or safety:**

The proposed placement of fill in waters of the U.S. in conjunction with the construction this windpark is expected to have no effect on public health and safety. The windpark is comprised of mechanical and electrical equipment now in common use strung together to produce a relatively modest amount of electrical power. Several of these facilities are in operation or under construction in the region. The facility is slated for an isolated and undeveloped area far removed from the general population. Few people will see or hear it, and even fewer will come close to the generating or transmitting equipment. The facility will not produce any emissions.

The proposed facility presents an unlikely target for an intentionally destructive act and has an extremely low probability of attack. Gates will restrict vehicle access to new ascending roads and ridge top roads. The limited access in addition to the remoteness of the project site would deter intruders.

Theft or opportunistic vandalism would be more likely than sabotage or terrorist acts. The results of any such acts could be expensive to repair, but no substantial impacts to continued electrical service would be anticipated. No significant environmental impacts would be expected from physical damage to the proposed project or from loss of power delivery.

#### **14.2 Unique characteristics:**

It has been determined that the project would not have an adverse effect on eligible historic or cultural resources. The project area is private commercial forest property. Though the owners of the property do allow it to be used for outdoor recreation, the project area is not a park. The project area does not contain prime farmland. The project area does not contain rivers designated wild and scenic. The project area would involve the loss of some wetland and high elevation (above 2700 feet of elevation) spruce-fir forest, approximately 100 acres, on Dixville Peak and Mount Kelsey. As noted in the NH Wildlife Action Plan, there is a limited amount of this high elevation spruce-fir habitat in New Hampshire. It is valuable to several high elevation habitat specialists, and the amount of it is dwindling. The loss of this habitat is mostly due to forestry practices. (See the NH Wildlife Action Plan, Habitat Map, Exhibit 12). While high elevation spruce-fir habitat is valuable and a limited resource, it is not unique in New Hampshire or the region. (Please also refer to Exhibit 13, a GIS map that shows areas above 2700 feet elevation in the region). Some areas of high elevation exist immediately to the west in the Nash Stream State Forest and in the Bunnell Preserve belonging to The Nature Conservancy. More of it occurs in the White Mountain National Forest, in the Presidential and Mahoosuc Mountain Ranges, south of the project area. The range of mountains on which the project would be constructed near the southern end continues in a north north-east direction north of Route 26 and continues northward to the north-east corner of New Hampshire where it borders Canada. Several of these other high elevation areas were considered as candidates for a wind park but were dropped from consideration as problematic. Much of

this high elevation habitat is in public ownership and is therefore under some degree of protection from development. We do not believe the particular area of high elevation habitat that is going to be affected by this project is ecologically critical because it is a relatively small area, approximately 100 acres representing only 2% of the high elevation area within the project area and a much smaller percentage in the state and the region. Finally, in addition, the net effect of the project would be to preserve 1,735 acres above 2700 ft., much more of this habitat than it impacts. See discussion on mitigation.

#### 14.3 Controversy:

The concept of “controversy” in NEPA significance analysis is not simply whether there is opposition to the proposal, but whether there is a substantial technical or scientific dispute over the degree of the effects on the human environment. Land based wind power projects are now becoming a regular occurrence in the regulatory arena. Several in the northern tier of New England have been permitted and are operating, though not at as high an elevation as the proposed project. In this case, the Corps received some general expressions of opposition to the project by members of the public, but unlike cases where courts have found the NEPA “controversy” factor to be implicated; here there has not been a widespread outpouring of disagreement regarding the likely environmental impacts of the project from experts in natural resource or environmental fields. There has been and continues to be some debate about how significant an impact these facilities are likely to have on birds and bats. In response to the public notice, the U.S. Fish and Wildlife Service raised a number of concerns about the effect on birds and bats and opined that there was not enough information to make an informed judgment. The EPA commented that because of the scope of the activity, the Corps should consider preparing an Environmental Impact Statement on the project before deciding whether to issue a permit. *The USFWS Comments and the EPA Comments and our evaluation of them are discussed in the attached Appendix 2 entitled “Public Involvement.”* It is important to recognize that the comment letters from USFWS and EPA came at a point in time earlier in the process, and since receiving their comments much additional information about the project has been generated. The Corps met with the USFWS and the NH Fish and Game Department to discuss what was needed in the way of additional pre- and post-construction monitoring. The additional bird monitoring surveys that have been conducted subsequent to the USFWS comment letter have been provided to USFWS, and they have not provided additional comments. The information from these additional surveys confirms the initial conclusions that there is not a concentration of birds and bats in the area. We have addressed the EPA’s concerns about documenting compliance with the requirements of the 404 (b) (1) Guidelines and prepared an Environmental Assessment to comply with NEPA. At our last meeting to discuss resolution of outstanding issues, both the USFWS and the EPA indicated that while they would not withdraw their earlier comments, they would not elevate the Corps decision to higher authority, as would be their prerogative under existing interagency agreements and procedures. The USFWS requested that any permit issued provide for USFWS access to the facility and post construction monitoring results. The Corps has conditioned its permit to provide USFWS with access to the facility and access to the post construction monitoring. The EPA representative acknowledged that since the time of their comment letter, the alternatives analysis and mitigation have been brought up to an acceptable level. In light of these agencies’ comments, the efforts of the Corps to address them, and the agencies’ ultimate acquiescence to the conclusions reached by the Corps, the NEPA “controversy” factor does not mandate the preparation of an EIS here.

#### 14.4 Uncertain impacts:

The impact of the new roads and wind turbines on mountain ridges on the birds that use the high elevation spruce-fir forest is not entirely certain. It is clear that there would be a direct loss of a relatively small amount of this high elevation habitat. There will also be indirect impacts from fragmentation effects, a possible diminution of the suitability of the remaining adjacent habitat. The degree to which this will occur is uncertain. However, the road cuts up to and along the mountain ridges are linear, relatively narrow and occupy a very tiny portion of the total habitat, and the roads will be rarely used. Such long narrow incisions in the forest are less likely to cause serious fragmentation of habitat than the forestry practices that are now occurring, which seriously alter large blocks of habitat. Whether and to what degree birds and bats will collide with the wind turbines is also not certain. It does not appear that the project area is a major flyway for migratory passerine birds that travel at night or for migrating raptors that fly by day, so it does not seem likely that there will be collisions by large numbers of migrating birds. It does not appear that bats are likely to use the high elevation areas where the turbines will be located. For resident birds, the Bicknell's Thrush is a species which the resource agencies have expressed concern. The pads around the towers will be of crushed stone and relatively devoid of vegetation, and are therefore not the type of habitat that this species uses for nesting. Likewise, over time as the areas surrounding the roads and pads are allowed to grow in, they will not provide suitable nesting habitat for this species, as it prefers smaller 2-3 meter tall sapling spruce and fir. However, it is possible that forest stands adjacent to the roads and wind turbines could be subject to blow down, and in such areas subsequent regeneration could provide suitable habitat for Bicknell's Thrush for a period of a few years. Whether Bicknell's Thrush would occupy these areas and whether their areal mating displays would bring them into collisions with the wind turbines is a matter of uncertainty. The wind turbines are limited in number, large in size, visible and well spread out. While the effect that habitat loss and disturbance will have on birds and bats which reside in the area is not certain, New Hampshire wildlife officials testified in the NH SEC process that with adequate conditions, monitoring and mitigation the project was not likely to significantly adversely affect populations of state threatened species (of which the Bicknell's Thrush is one). Pre-construction and post-construction monitoring should help to answer some of the outstanding questions and may provide information which could be used for adaptive management. Such monitoring is a condition of the NH SEC Certificate and will be made a condition of the Corps permit. The protection of substantial blocks of high elevation spruce-fir habitat from logging should serve as a "hedge" against the uncertainty of impacts to birds and bats. While there is some acknowledged uncertainty about impacts associated with the project, these do not rise to the level of NEPA significance.

#### 14.5 Precedent for future actions:

The decision here is based upon the facts of the proposed project, and does not set precedent for future Corps permit decisions, which, like this decision, will be based upon their own merits and their own facts.

#### 14.6 Cumulative significance:

One other smaller wind park has been constructed in Lempster, N.H. Several others are in construction or operation in Vermont and Maine. These are at lower elevation. Consequently the impact to high elevation spruce-fir habitat and the species that make use of such habitat, which has been the major issue with this project, were not at issue. The main activity impacting such high elevation habitat is commercial logging, and while the GRP wind project will result in the loss of some of this habitat, the net effect of the project with the preservation components of the mitigation plan will be an overall

decrease in human disturbance to this habitat. The number of wind power projects that will be developed in the region in the foreseeable future is not known, and while it is expected that there will be others, from the alternatives analysis that was presented by GRP it seems doubtful there will be a large number. The largest loss of high elevation spruce-fir habitat in the region is attributable to logging. If, as in this case, mitigation required for future projects can be put into preservation, so that the net effect of the project is to preserve more of the habitat than is consumed, the cumulative effect of the continued logging and additional high elevation wind power production should be sustainable. The other main concern with this and other wind energy projects is the direct mortality of birds and bats striking the wind turbines. Based on the monitoring that has occurred for this project, it appears unlikely that the GRP project will cause any major bird and bat mortality, and as such is unlikely to contribute to a significant impact to regional bird and bat population declines. As noted by a recent workgroup of experts examining the interaction of birds and bats with wind turbines, the estimated cumulative impact of bird mortality from wind turbines is an order of magnitude lower than other human causes such as buildings and windows, power lines, vehicles, pets, etc. National Wind Coordinating Collaborative, spring 2010. It is not expected that the GRP project will contribute to a cumulatively significant impact to high elevation spruce-fir habitat or the mortality of avian species.

With regard to the potential cumulative effects on global climate change, although the project would contribute incrementally to cumulative increases in greenhouse gases and related climate change when combined with other projects globally, GHG emissions from the proposed GRP WP would involve minimal amounts of CO<sub>2</sub> from construction and transportation, and would not be significant.

#### **14.7 Historic resources:**

There will be no adverse effect on Historic Resources.

#### **14.8 Endangered species:**

The USFWS has concurred with our assessment that the proposed project will not likely adversely affect the Canada Lynx, the only endangered species potentially located in the project area.

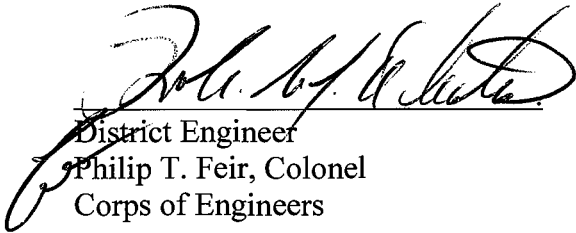
#### **14.9 Potential violation of state or federal law:**

This action, if permitted by the Corps, would not violate federal law, and as evidenced by the issuance of the NH SEC Certificate of Site and Facility, would not violate state law.

### **15. Public Interest Finding**

I have considered all factors relevant to this proposal including cumulative effects. Potential factors included conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and

fiber production, mineral needs, consideration of property ownership and, in general, the needs and welfare of the people. After weighing favorable and unfavorable effects as discussed in this document, I find that this project is not contrary to the public interest and that a Department of the Army permit should be issued.

 6/25/10  
District Engineer  
Philip T. Feir, Colonel  
Corps of Engineers

- Attachments:  
Appendix 1 Section 404 (b) (1) Guidelines Compliance Determination GRP Wind Park Project  
Appendix 2 Public Involvement Comments Received and Corps Responses

Reg, BrC, A1 RichR, GRP EA 62 4 10



# Granite Reliable Power Permit Application #NAE-2008-410

## Environmental Assessment Appendix 1

### Section 404(b)(1) Guidelines Compliance Determination

(Ref.: 40 CFR Part 230, Federal Register, 24 December 1980)

#### I. Review of Compliance (230.10(a)-(d))

A review of the permit application indicates:

<p>a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic project purpose unless there are no practicable alternatives to the proposed activity (if no, see Sec. 2 and information gathered for EA alternative); Summary of reasons for YES: See GRP EA. Other locations are impracticable or have other adverse environmental consequences. Larger array of smaller towers would likely be more damaging. Partial build alternative would not be practicable.</p>	<p><u>Yes</u> <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p>
<p>b. The activity does not appear to: 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally listed endangered or threatened species or their habitat; and 3) violate requirements of any Federally designated marine sanctuary ( if no, see Sec. 2b and check response from resource and water quality certifying agencies); WQC issued. US F&amp;WS concurs w/ NLTAA .</p>	<p><u>Yes</u> <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p>
<p>c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values (if no, see Section 2); EPA while they had concerns about alternatives analysis and the adequacy of mitigation did not raise the issue of significant degradation. USF&amp;WS misinterprets the guidelines thinking secondary impacts to terrestrial and aerial wildlife individuals and habitat is significant degradation of aquatic ecosystem prohibited by the guidelines. Secondary effects to birds, bats, pine marten etc. must be disclosed and considered but are not prohibited by the Clean <u>Water</u> Act 404(b)(1) guidelines <b>40 CFR Part 230 §</b></p>	<p><u>Yes</u> <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p>
<p>d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see Sec. 5); See NH SEC Certificate and COE EA</p>	<p><u>Yes</u> <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p>

#### 2. Technical Evaluation Factors (Subparts C-F):

	a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)	Not Applicable	Not Significant	Significant
1)	Substrate impacts		X	
2)	Suspended particulate / turbidity impacts		X	
3)	Water column impacts		X	
4)	Alternation of current patterns and water circulation		X	
5)	Alteration of normal water fluctuations /hydroperiod		X	
6)	Alteration of salinity gradients	X		

b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)		Not Applicable	Not Significant	Significant
1)	Effect on threatened / endangered species and their habitat. Checked w/USF&WS NLAA Lynx.	X		
2)	Effect on the aquatic food web		X	
3)	Effect on other wildlife (mammals, birds, reptiles and amphibians)		X	
c. Potential Impacts on Special Aquatic Sites (Subpart E)				
1)	Sanctuaries and refuges	X		
2)	Wetlands		X	
3)	Mudflats	X		
4)	Vegetated Shallows	X		
5)	Coral reefs	X		
6)	Riffle and pool complexes		X	
d. Human Use Characteristics (Subpart F).				
1)	Effects on municipal and private water supplies		X	
2)	Recreational and commercial fisheries impacts		X	
3)	Effects on water related recreation		X	
4)	Aesthetic impacts		X	
5)	Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.	X		

3. Evaluation of Dredged or Fill Material (Subpart G):

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. Clean fill and blasted and crushed local rock used.		Check when appropriate
1)	Physical characteristics	<u>Yes</u> <input checked="" type="checkbox"/>
2)	Hydrography in relation to known or anticipated sources of contaminants	
3)	Results from previous testing of the material or similar material in the vicinity of project	<u>Yes</u> <input checked="" type="checkbox"/>
4)	Known, significant sources of persistent pesticides from land runoff or percolation	
5)	Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances	
6)	Other public records of significant introduction of contaminants from industries, municipalities or other sources	
7)	Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man induced discharge activities	<u>Yes</u> <input checked="" type="checkbox"/>
8)	Other sources (specify)	
List of appropriate references and comments: GRP submittals to COE and NH DES & SEC		

b. An evaluation of the appropriate information in 3a above indicates that there is a reason to believe (1) the proposed dredged or fill material is not a carrier of contaminants, or (2) that levels of contaminants are <u>substantively similar</u> at extraction and disposal sites, or (3) <u>acceptable constraints</u> will be implemented to prevent contaminants from being transported beyond the disposal site. The material meets the testing exclusion criteria.	<u>Yes</u> <input checked="" type="checkbox"/> No <input type="checkbox"/>
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4. Disposal Site Delineation (230.11(f)) N/A

a. The following factors as appropriate, have been considered in evaluating the disposal site.		Check when appropriate
1)	Depth of water at disposal site	<u>Yes</u> <input checked="" type="checkbox"/>
2)	Current velocity, direction and variability at disposal	<u>Yes</u> <input checked="" type="checkbox"/>
3)	Degree of turbulence	<u>Yes</u> <input checked="" type="checkbox"/>
4)	Water column stratification	
5)	Discharge vessel speed and direction	
6)	Rate of discharge	
7)	Dredged material characteristics (constituents, amount and type of material, settling velocities)	<u>Yes</u> <input checked="" type="checkbox"/>
8)	Number of discharges per unit of time	
9)	Other factors affecting rates and patterns of mixing ( specify)	
List of appropriate references and comments. Running water will be absent due to low flow conditions or diverted during discharges.		
b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and / or size of the mixing zone are acceptable. This is for open water dredged material disposal. N/A		<u>Yes</u> <input checked="" type="checkbox"/> No <input type="checkbox"/>

5. Actions to Minimize Adverse Effects ( Subpart H):

All appropriate and practicable steps have been taken, through the application of recommendations of 230.70 - 230.77 to ensure minimal adverse effects of the proposed discharge.	<u>Yes</u> <input checked="" type="checkbox"/> No <input type="checkbox"/>
List actions taken and comments. BMP's will be implemented and maintained during construction activities. Erosion and sedimentation controls will be used. All materials used for fill will be clean material free of contamination.	

6. Factual Determination (230.11):

A review of appropriate information as identified in items 2- 5 above indicates that there is minimal potential for short or long-term environmental effects of the proposed discharge as related to:		
a)	Physical substrate at the disposal site (review sections 2a, 3, 4, and 5)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
b)	Water circulation, fluctuation and salinity(review sections 2a,3,4 and 5)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
c)	Suspended particulate / turbidity (review sections 2a, 3, 4,and 5)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> *
	Explain*	
d)	Contaminant availability (review sections 2a, 3, and 4)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> *
	Explain*	
e)	Aquatic ecosystem structure and function (review sections 2b,2c,3 and 5)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
f)	Disposal site (review sections 2, 4, and 5)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> *
	Explain*	
g)	Cumulative impact on the aquatic ecosystem	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> *
	Explain*	
h)	Secondary impacts on the aquatic ecosystem	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
	Explain*	

7. Compliance Determination:

a. The proposed disposal sites for the discharge of dredged or fill material comply with the Section 404(b)(1) guidelines		Yes <input type="checkbox"/>
		No <input type="checkbox"/>
b. The proposed disposal site for the discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following special conditions: <b>See permit special conditions and EA</b>		<u>Yes</u> <input checked="" type="checkbox"/>
		No <input type="checkbox"/>
c. The proposed disposal site for the discharge of dredged or fill material <b>does not</b> comply with the Section 404(b)(1) guidelines for the following reason(s):		Check when appropriate
1)	There is a less damaging practicable alternative SEE EA.	NO
2)	a) The activity violates water quality or effluent standards WQC issued.	NO
	b) The activity jeopardizes threatened or endangered species or their habitat See AR.	NO
	c) The activity violates marine sanctuary requirements	N/A
3)	The proposed discharge will result in significant degradation of the aquatic ecosystem. See EA and above.	NO
4)	The proposed discharge does not include practicable and appropriate measures to minimize potential harm to the aquatic ecosystem. BMPs will be followed. WQ will monitored.	NO
5)	Insufficient information to make a reasonable judgment Fairly large record. Project will be monitored before during and after construction. See EA and permit conditions.	NO

Prepared by:

*Richard Roach*  
 Richard Roach 3/14/2010

Project Manager

Date

Footnotes:

1. A negative, significant, or unknown response indicates that the permit application may not be in compliance with the Section 404(b)(1) guidelines. Summary comments are included.

2. See the Environmental Assessment and Statement of Findings for additional discussions.

Granite Reliable Power Permit Application # NAE-2008-410

Environmental Assessment Appendix 2

Public Involvement Comments Received and Corps Responses

**Public Notice / Public Comment**

A public notice adequately describing the proposed work was issued on January 27, 2009, sent to all known interested parties and published on our website. An extensive public involvement process, piggy backing on the New Hampshire Site Evaluation Committee (“NH SEC”) process, was conducted over a six month period, beginning in October 2008 and continuing through March 2009.

On August 6, 2008 GRP applied for the Corps permit. Previous to this, through pre-application meetings beginning in January 2008, the Corps had been made aware of the impending 404 permit application and the parallel SEC Certificate of Site and Facility process. The Corps’ Regulatory Project Manager (“CRPM”) for the project, in an attempt to streamline the Corps process and avoid duplication, attended the initial NH SEC pre-hearing conference. At the pre hearing conference the CRPM announced the Corps intention to try to meld the Corps NEPA and Permit Review Process with the State’s parallel NH SEC process. The CRPM requested that the public hearings or informational meetings to be held by the NH SEC, as part of their public involvement process, be made joint hearings. The NH SEC cooperated and agreed to make their hearings joint hearings. Accordingly, the CRPM attended the initial public informational meeting in Lancaster on October 2, 2008. In brief remarks made at the beginning of the hearing, the CRPM announced to those attending the initial public informational meeting, that if the project were to be built, a Corps permit would also be required and consequently, the Corps was in the position of the having to consider a parallel application. He mentioned the need for the Corps to insure compliance with NEPA and the CWA 404(b) (1) guidelines in making its independent decision on the application.

Subsequently, in its January 27, 2009 Public Notice on the proposal, the Corps again noted the concurrent NH SEC process, included a reference to the web link for the NH SEC and encouraged attendance at the upcoming NH SEC Public Hearing which was planned to be held in Coös County, in Lancaster, in March. The CRPM attended the Public Hearing in Lancaster the evening of March 23, 2009 and gave a very brief explanation of his presence and took notes. The CRPM also attended numerous other technical sessions and Public Hearings held by the NH SEC. At these technical and deliberative sessions, the CRPM listened to most of the testimony, the closing arguments and the public deliberations of the NH SEC. All of the proceedings were made available to the public by either attending the hearings or following the proceedings on a website [www.nhsec.state.nh.us](http://www.nhsec.state.nh.us) . Comments received in response to the Corps Public Notice are noted below, have been evaluated and are included in the Corps administrative record of this action.

## **Federal Resource Agency Comments and Corps Responses:**

10.3.1 **EPA Comments:** The U.S. Environmental Protection Agency (EPA) responded to the Corps Public Notice (“CPN”) in a letter Dated March 11, 2009. In their letter, the EPA reiterated what the impacts were, including impacts to both wetlands and uplands and emphasized the importance of the habitats found at higher elevations. They praised the cooperation of the applicants in ameliorating the effects of the proposal on the environment but found that, at the time of the CPN, both the alternative analysis and mitigation proposal were inadequate. They also suggested that, in view of the scale of the project and its impacts to wetland and upland habitats and the sensitivity of the high altitude habitat, the Corps should consider preparing an EIS for the project. They further recommended that, until the issues they raised were adequately addressed, the Corps not issue a permit for the project.

**Corps Response to EPA Comments:** In response to the EPA comments, the analysis of alternatives has been more thoroughly documented. The applicant’s “final” alternative analysis was not submitted until October 1, 2009, and the Corps received clarifications of the alternatives analysis as recently as April 2010. One week after receipt of the “final” alternatives analysis report, on October 8, 2009, at the Concord, N.H. office of the U.S. Fish and Wildlife Service (“USFWS”), in a meeting to discuss the concerns of both the EPA and USFWS, EPA indicated that based on the additional information provided, the alternatives analysis acceptable. Also, by the time of the October 2009 meeting, the mitigation proposal had also been improved and clarified. Based on the discussions between the agencies, the Corps believes that with the changes to the proposal that have occurred since the comments were received, the EPA is now satisfied with the alternatives analysis and agrees that the mitigation proposed is appropriate to the scope and degree of impacts. In our October 2009 meeting, EPA indicated that while they would not withdraw their comments on the application or comment further, they did not wish to elevate the matter (as would be their prerogative under existing interagency protocols and procedures). As for the suggestion that the Corps seriously consider the need to prepare an EIS, we have. In accordance with the NEPA implementing regulations, the Corps has prepared an Environmental Assessment (“EA”). The Corps has evaluated the various factors of NEPA “significance” and our determination of the need for an EIS are contained in Section 10.6 of this document under the heading “Finding of No Significant Impact.” It should be noted that our regulations provide that Environmental Impact Statements will generally not be prepared for regulatory permit actions.

**USFWS Comments:** The US. Fish and Wildlife Service responded to the public notice in a letter dated March 12, 2009. In their letter, USFWS objected to the proposal and recommended that an EIS be prepared before a permit decision was made. USFWS expressed concern that the project would conflict with the use of the area by Bicknell’s Thrush. The Bicknell’s Thrush is a bird species that breeds in areas of regenerating spruce/fir forest and the males of the species engage in aerial displays that might cause them to be injured by rotating blades of the windmills. USFWS also stated that the requirements of the EPA 404 (b)(1) Guidelines, 40 C.F.R. § 230.10(a) were not met, that the proposed discharges would cause or contribute to significant degradation under 40 C.F.R. § 230.10(c), and the project therefore could not be permitted. USFWS also opined that the project would have likely have significant effect on the human environment, thereby triggering the need for an EIS. USFWS suggested that the purpose and need for the project be should be more broadly defined than was expressed in the Corps Public

Notice. They questioned the use of 99 MW of generation capacity as a criterion for selecting a suitable site and objected to excluding from the alternatives analysis sites in neighboring states. USFWS also objected to use of smooth bore plastic pipes for culverts on intermittent streams because they would prevent passage of aquatic species. USFWS suggested time of year restrictions to protect nesting birds and spawning and incubating fish. They expressed concern for Bicknell's Thrush, which they referred to variously as at risk and imperiled (but not endangered or threatened pursuant to the Endangered Species Act). USFWS expressed a view that wind turbines were not appropriate in Bicknell's Thrush habitat because the access roads would render existing nesting areas less suitable or unsuitable and a number of breeding individuals might be struck by turbine blades during aerial displays by the males. USFWS expressed concern with the fragmentation effect the roads and pads would have on high-elevation forest interior species of birds such as the Swainson's Thrush, Ovenbird and White-Throated Sparrow and on mammals such as the Pine Marten. They expressed concern that the installation of roads up to and along the ridgetops of the mountains would cause a swath of forest five hundred meters wide to be unsuitable or less suitable for the aforementioned species. USFWS stated that the bird, bat, and raptor surveys performed for this project were inadequate, too limited in time and geographic scope to give a good picture of the use of the area by these avian species. They pointed out that birds and bats flying through the rotor swept zone of the windmills might be struck by the blades or injured by the sudden change in air pressure encountered in wind wakes near the blades.

**Corps Response to USFWS comments.** Below follows our evaluation of the issues raised by USFWS in the order that they appeared in their comment letter.

Project Purpose: USFWS stated that the purpose and need has been defined too narrowly and should be broadened to include the development of renewable energy (not limited to wind-generated electricity) over a wider geographic area. The Corps disagrees with such an approach, and believes it ignores relevant regulations and judicial opinions on this subject. The Corps regulations—and courts reviewing this issue—recognize that a purpose and need statement cannot be drawn so narrowly that only a permit applicant's proposal would meet the stated purpose and need. Simmons v. U.S. Army Corps of Engineers, 120 F.3d 664, 666 (7<sup>th</sup> Cir. 1997) (an "obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing 'reasonable alternatives' out of consideration."). At the same time, Corps regulations and judicial decisions acknowledge that the Corps must take into account the goals and needs of an applicant. See, e.g., Friends of the Earth v. Hintz, 800 F.2d 822, 833 (9<sup>th</sup> Cir. 1986). Indeed, one court noted that "it would be bizarre if the Corps were to ignore the purpose for which the applicant seeks a permit and to substitute a purpose it deems more suitable." Louisiana Wildlife Federation v. York, 761 F.2d 1044, 1048 (5<sup>th</sup> Cir. 1985) Here, the applicant is in the business of developing project financed wind energy projects. They are not interested in building, for example, a wood fired boiler/steam driven facility. The applicant's purpose for this project is to build a utility scale facility in the State of New Hampshire. We think it is reasonable to limit the alternatives analysis to sites wholly within New Hampshire. The State of New Hampshire has indicated its interest in developing alternate energy sources and have developed an expedited regulatory process to consider such proposals. Thus, limiting the alternatives to sites in New Hampshire reflects not just the applicant's desires, but a broader public purpose as expressed in New Hampshire law and the policy choices articulated therein. Having to study everywhere before one could build anywhere would make it impracticable to



ever get through the planning stages before constructing a facility. The Corps believes that developing a wind powered electric generation facility within a particular state is a sufficiently large geographic area to allow consideration of a reasonable range of alternatives. Similarly, choosing a nominal size for a facility for a rough comparison of alternative site locations seems reasonable, and here the applicant has reasonably explained that in light of the infrastructure costs associated with a wind energy facility, the facility must be of a certain generating capacity to make a viable enterprise. This economic reality is therefore appropriate to consider as part of the project purpose statement as it plays a role in determining reasonable and feasible alternatives.

Off-site alternatives: USFWS was not satisfied with the off-site alternatives analysis. They stated that because wetlands were not delineated on any of the other sites before the preferred site was selected, wetlands were not adequately considered. The Corps recognized that the documentation of alternatives was not adequate at the time of the public notice, and since that time has worked with the applicant to address this. While the analysis conducted to compare the off-site alternatives did not include site-specific wetland and stream delineations, the sites were examined using coarser-scale methodologies, such as the U.S. Fish and Wildlife Service's National Wetlands Inventory maps and U.S. Geological Survey maps. Ultimately, this analysis concluded that no site would result in substantially less/different impacts to waters of the United States than the proposed site in Coos County. The Corps and EPA agreed that the applicant's scale for comparative analysis was appropriate for evaluating the various sites across the state. The Corps does not believe it would be practical or necessary in this situation to require detailed onsite wetland delineation to compare the various alternatives. The applicant has done a reasonable and rational comparative analysis of the alternatives as discussed earlier in the EA document.

We note that the EPA, the agency that authored the 404(b)(1) Guidelines, in a meeting to discuss resolution of outstanding objections that took place at the USFWS office in Concord, NH on October 8, 2009, acknowledged that the revised alternative analysis presented at that meeting would meet the documentary requirements of the Guidelines. Delineating the location of all wetlands on all parcels considered for a project would be impractical and extremely expensive. The Corps concluded that a reasonable screening process was used to select a promising site and the sites that were dropped from further consideration were dropped for understandable and logical reasons involving numerous factors, not just the presence of waters of the United States. Thus, a reasonable range of alternative sites were considered and the requirement to consider a reasonable range of alternatives has been satisfied. The Corps and EPA—not USFWS—are the agencies with statutory responsibility for ensuring the satisfaction of the standards of 404(b), and here, both the Corps and EPA are satisfied with the approach taken.

On-site Alternatives: USFWS suggested that in considering on-site alternatives, a smaller project that would impact less high altitude habitat should have been more thoroughly considered. They point to the fact that at the time the project was planned, the exact location of wetlands on the

preferred site and on alternate sites were not known. Because of this, USFWS concluded that the requirement to demonstrate avoidance of wetlands and waters and wetlands was not met. USFWS noted that no delineation work was available for the western ridges at the site, so again, wetland avoidance was not demonstrated. The Corps is satisfied that wetlands and waters were a consideration in the selection of alternatives. Many waters and wetlands are shown on the USGS topographic maps and some are shown on the USFWS National Wetland Inventory maps that were consulted in the route planning process. The 404(b)(1) Guidelines provide that waters are to be avoided to the extent practicable and that unavoidable wetland impacts must be mitigated to the maximum extent practicable. Selecting a route or layout for a road involves many practical considerations, including costs, logistics and technical considerations. The layout chosen took advantage of an existing network of logging roads. Only a portion of the roads utilized for the project would be on new locations. During the Corps review process, some changes to the route alignment were made to reduce direct impacts to waters and wetlands and substantial additions to the proposed mitigation were made. The issue of compliance with the 404(b) (1) Guidelines is covered in Section 6, 7 & 8 of the EA.

USFWS stated that the applicant should have delineated all the wetlands, especially high elevation spruce/fir wetlands, on the site before formulating their plans in order to demonstrate compliance with the requirement to avoid and minimize wetland impacts. USFWS speculated that situating towers at lower elevations might have produced a viable project with less environmental impact. USFWS pointed to wetlands found on the higher ridge tops and theorized that towers placed near the western ridge tops at lower elevation would have been less damaging and asked that we complete the “necessary wetland delineation work and analysis” before making a permit decision. We do not believe the approach described by USFWS would be practical or is required by NEPA or the 404(b) (1) guidelines. Direct wetland impacts are an important but not the only criteria for making a permit decision. An alternative that directly filled the least amount of wetland might not be the least damaging, as other environmental consequences need to be considered. It also might not be practicable; many engineering and economic factors have to be considered. The overall effect of the project on sensitive wildlife species at a landscape scale seems to have been a greater environmental concern here than the amount of wetland directly impacted by the project. The 404(B)(1) Guidelines provide that the least damaging practicable alternative may take into account other adverse environmental consequences and consideration of practicability. The formulation of the project was decided based on a number of factors. During the regulatory review process, there seemed to be a consensus among the resource agency personnel involved in the discussions that the 33 tower proposal on the eastern ridges would be less damaging than 67 towers spread out over both the western and eastern ridges. This was especially so as negotiations for project modifications proceeded and the applicant agreed to the high elevation mitigation package which would place several high elevation areas including portions of the western ridges into conservation.

The western ridges have the advantage of being adjacent to the Nash Stream State Forest, which is already in conservation, were thought to be as valuable as eastern ridges, and by virtue of being adjacent to conservation land were highly suitable for mitigation. The USFWS absented themselves from discussions on mitigation despite repeated invitations to participate. If one compares the 67 tower layout (See Exhibit 10, an illustration entitled “Granite Reliable Power,

LLC, Granite Reliable Windpark, Alternatives Analysis Exhibit, WEST RIDGE & EAST RIDGE TURBINE STRING, Dated, March 2010”) with the 33 tower layout (See Exhibit 2, an illustration entitled ”Granite Reliable Power, LLC, Granite Reliable Power Windpark, OVERALL SITE LAYOUT EXHIBIT”), the 33 tower layout would appear to be less damaging to both wetlands and the environment as a whole. This is because the 33 tower layout uses fewer towers, fewer roads and takes up less space. Locating the project on the eastern ridges also leaves the western ridges available for conservation to mitigate project impacts.

Stream Crossings: USFWS objected to the use of smooth bore plastic pipe as culverts in intermittent streams because the pipes would not be imbedded and therefore would not have the natural stream bottom. USFWS argued that this would hamper the passage of aquatic life through the culverts. Generally speaking, USFWS’s point here would be more compelling in the context of perennial streams, as opposed to the intermittent streams that would be culverted with pipe for this project. Because these streams are intermittent they do not carry water during dry periods. We do not believe the use of plastic pipe will prevent the passage of aquatic organisms because truly aquatic organisms do not live in these drainage ways that dry out during much of the year. Even small fish or minnows, for example, do not reside in this class of stream. The main function of these waterways is to carry water off the mountain during rain events and during spring runoff. Of course, along with the water, some sediment and organic matter is carried down these streams. It is for this reason that these intermittent waterways are an important part of the watershed ecology, not because of the movement of aquatic species. An occasional smooth bore plastic pipe placed in an intermittent stream to allow a woods road to pass over it is going to have only a minimal affect on the ecology of the tributary and subsequent receiving waters. State stream crossing rules recently implemented allow HDPE pipe culverts in these situations, and the NH DES, the state agency with responsibility for ensuring that state water quality standards are met, has permitted the use of these pipes in these locations. The Corps asked the project engineers to provide us with cost estimates for using partially buried box culverts as USFWS suggested. The costs were five or six times greater for box culverts compared with high density polyethylene (“HDPE”) pipe culverts. Given the great cost difference and the lack of corresponding benefit to the aquatic ecosystem due to the intermittent nature of the streams where such pipe culverts would be placed, the Corps concluded that the applicant’s proposal was reasonable.

Time of year restrictions: USFWS suggested that vegetation clearing activities avoid the bird nesting period from March through July and in stream work be avoided during fall/winter and spring/early summer to protect fish spawning/incubation. The suggestion for limiting construction during the bird nesting season has been adopted. The state permit provides that no clearing will occur at high elevations until August to protect birds nesting at the higher altitudes from having their nests disturbed. The applicant has agreed to this condition of both the state and federal permit. The NH DES Water Quality Certificate and our permit conditions will require best management practices and extensive water quality monitoring to insure water quality in the perennial streams is not impaired. This should adequately protect fish in the larger streams.

Old Growth Stands: USFWS objected to the crossing of stands of what they consider old growth spruce/fir on Dixville Peak and Kelsey Mountain. USFWS contended that the high elevation wetland systems on the mountains in the project area warrant special protection

because they serve as critical habitat for habitat specialists such as the Bicknell's Thrush and Pine Marten (a mammal of the weasel family). While some of the habitat in the project area is habitat for such species it is not clear that all or even most of it is presently suitable habitat for the Bicknell's Thrush. Bicknell's Thrushes require regenerating spruce/fir, habitat potentially found at the higher elevations of the project. The ridge line roads appear to cross mature stands, not regenerating stands, of spruce/fir and this project would only affect a limited amount of it. It is possible that if these areas are not developed, and not logged, some patches of spruce fir will be blown down naturally and later regenerate into suitable habitat. However, it is not clear that if this project is not developed the areas of concern to the USFWS would not be at least partially harvested by loggers. While strips of Dixville Peak, which may provide Bicknell's thrush habitat, would be heavily impacted by development of the project, substantial portions of habitat will be relatively undisturbed. The mitigation proposal would permanently protect a substantial area of similar habitat in other areas. We note that the NH F&G Department, the state agency with responsibility for the conservation of these species, has testified in favor of this project, taking into consideration the value of permanently protecting those areas contained in the mitigation package.

Breeding Birds: USFWS repeatedly expressed concern about the Bicknell's Thrush, a species that USFWS considers to be "at great risk" due to highly restricted and fragmented breeding habitat and other factors contributing to a declining population. USFWS also points out that the project would have an adverse affect on numerous forest-interior species of birds, species like the Oven Bird. USFWS notes that the adverse effect is not just from the direct loss of habitat but also from the fragmentation effect of the roads which allow easier access for competitive species and the increase in edge habitat along the sides of the roads. The Corps does not doubt that the proposed project will have some adverse consequences for some species specializing in using the kind of habitat in which this project would be built, but it is a question of the degree of impact and what would happen in the absence of the project. The fragmentation effect of a narrow, unpaved, seldom used road deep in the forest is not the same as a primary or secondary paved highway. How much the road alignment through the forest will affect forest interior species and how deep into the adjacent forest the effects will be felt are matters that cannot be precisely quantified. Will an Oven Bird nest within ten feet of a forest road that is traversed twice a day? Probably not. Will an Oven Bird nest within one hundred yards? Possibly. The Bicknell's Thrush uses regeneration stands of spruce/fir and the male engages in aerial displays associated with mating. The proposed project would clear about 90 acres of spruce/fir up on the ridges and 33 wind turbines would be spaced out along 6 miles of ridge top roads. The wind turbines on each of the ridge lines would be spaced about  $\pm \frac{1}{4}$  mile apart. It stands to reason that there will remain suitable habitat on the mountains despite the intrusion of the 33 windmills. A substantial portion of Mount Kelsey above 2700 feet of elevation and a few other similarly valuable habitats would be placed in permanent protection. If a relatively narrow and somewhat perforated band on the ridges of several mountains can be developed for wind power, then a large block of habitat can be permanently protected. Considering the mitigation, it would appear that there is room on the mountain for both the development and the birds. It may be possible, if thought appropriate by NH F&G Department, for some clearings in the forest to be created within the permanently protected area, to promote suitable breeding habitat for the Bicknell's Thrush away from the dangers presented by the windmills.

Significant degradation: USFWS opined that the project if permitted would cause or contribute to significant degradation of waters of the United States. In support of this argument, USFWS then pointed out the risks and dangers to the Bicknell's Thrush, a bird that lives on the land, in the trees and in the air. The Bicknell's Thrush is not an aquatic species. The Corps is aware that there is a danger to the Bicknell's Thrush and that there are potentially secondary impacts to birds from permitting discharges into the waters. However, the Corps does not believe the project will cause or contribute to significant degradation of any of the nation's waters or water dependent species. Some of the wetlands to be filled presently are forested wetlands dominated by spruce and fir trees. The uplands and wetlands are covered in the same vegetation and provide the same function, that is, wildlife habitat. However, most of the trees that would be removed for this project are in upland forest not in wetlands. The potential effects of the various fills on the aquatic system stem from the affect of a number of road crossings and fill pads. We do not believe that any of the individual discharges are going to significantly alter the aquatic regime nor are the numerous crossings cumulatively going to degrade the aquatic resource. Our earlier discussion of environmental consequences bears this out. We note that the EPA, which has some oversight responsibilities in the context of 404 permitting, did not raise this as an issue.

Radar Survey: USFWS was not satisfied with the spatial or temporal coverage of the radar surveys conducted for this project. The radar surveys were designed to help determine whether there are likely to be a lot of passerine birds migrating through the project area at night in the spring and fall at an altitude which might result in these migrating birds colliding with wind turbines. USFWS commented that not enough places along the line were surveyed and too few seasons were covered to give a good idea of the use of the air space along the length of the project and over a period of years. The consultant's report concludes that the migrations over the area are over a broad front, there are no concentrations of birds flying through the area and the vast majority of birds migrating over the area are at a height above the rotor swept zone of the windmills. Thus there is limited avian mortality risk. After reviewing the various reports on bird migration in the area and listening to the testimony of the applicant's consultants and the testimony of the NH F&G Department it is our evaluation that the bird migration in this area is on a broad front and there are no concentrated areas where there would be an especially high risk to birds migrating through the area or to resident bird populations. However, the data shows that on some occasions during the survey more than a third of the birds passing over the site were below the height of a wind turbine. It is easy to imagine that birds landing or taking off from this general area could be in the rotor swept zone. Weather conditions might also cause birds to land in the area. However, most of the birds migrating for long distances generally fly above the rotor swept zone, and the surveys did not show that the project area is a location where numerous passerine birds regularly land. With all the variables it is clear that there is going to be some risk to migrating birds. There is no clear correlation between general passage rates and bird mortality. There is certainly some risk of mortality to birds seasonally residing in the area and to those that fly over these mountain ridges. The NH SEC Certificate is conditioned and the Corps permit will be conditioned on monitoring the mortality to birds and bats during the initial operation of the proposed facility. If necessary the permit can be modified to take into account unanticipated high mortality to migrating birds.

Bats: USFWS was not satisfied with the adequacy of the acoustic surveys for bats. USFWS thought the fall survey work began too late to capture all of the bat migration. USFWS expressed concern that only one location where a windmill would be placed (on Owlhead

Mountain) was sampled, with a view that not enough of the ridgelines were sampled. USFWS asserted that the acoustic detectors would not detect bats up in the rotor swept zone. USFWS also indicated that if the bats were not echo locating, acoustic detectors would not reveal their presence. Two relatively high elevation areas on the property were surveyed. The Trio Ponds met tower is in an area that was under consideration for the 67 tower alternative and is typical of the general area. It seems unlikely that bats would be found at the higher elevation of the rotor swept zone if they weren't detected also at the intermediate height of the upper met tower detector. The consultant's report seems to indicate that there is not a high level of bat activity up at the top of the mountain. Being cooler and windier up on the mountain tops compared to the valleys, it is not surprising that there isn't a lot of bat activity at the top of the mountain. Since there isn't a high concentration of bats it seems logical that there wouldn't be a high number of collisions. As with birds there is some chance of collisions between bats and rotor blades. Post construction monitoring should reveal if our assumptions are correct. USFWS will have access to the site, involvement in the development of the post construction monitoring plan to detect bat mortality and will be provided the resulting data. Monitoring at the recently constructed Lempster site found the estimated fatality rate for bats to be 7 bats per tower per year. While acknowledging that the Lempster facility is at a lower elevation (and more bats would therefore be expected to be present than at the GRP facility), if the mortality rate for the GRP Windpark were similar to that at Lempster the total mortality for bats would be in the 200 -300 range.

Raptors: USFWS found that the raptor survey results were different than other raptor surveys done at Weeks State Park 20 miles south of the project area. They suggested repeating the raptor surveys for longer periods for spring and fall migrations. Responding to USFWS comments and to NH F&G Department's concerns, additional fall and spring raptor surveys were conducted. The results were similar to the earlier studies, and further support the expectation that there will not be significant mortality to raptors from the project.

Bicknell Thrush Collision Risk: USFWS pointed out that Bicknell's Thrushes had collided with other structures in other places and thought there would be dangers of doing so with the proposed wind towers. USFWS pointed out that resident birds arriving and departing the area and others stopping in the area during migration would have to fly through the rotor swept zone. They thought migrating birds flying over the ridges might also fly low enough to collide with the towers or blades. Finally because the Bicknell's Thrush does an aerial display as part of its breeding pattern there would likely be some collisions during the aerial displays. The Corps is aware of the potential risk but it is hard to quantify. At the same time, it is hard to believe that a bird that is so specialized in its habitat requirements would choose an open unvegated area next to a tall tower to do its mating display or to land after migration. The Corps does not think it is likely that more than a few hundred birds per year in total will be killed by collisions but will require a monitoring plan to determine mortality.

Wind Wake: USFWS thought the applicant should provide information on the effect of wind wake forces on birds, bats and insects. The Corps is aware that bats may be injured by entering low pressure areas near the surface of the airfoils or blades of the windmills. The danger is much like the danger of collision. The Corps knows there is some level of risk but does not think it is very high or that a large number of individuals are likely to be killed in this way.

NEPA/EIS: USFWS was of the opinion that the proposed project would have a significant effect on the human environment and therefore an EIS should be required. USFWS pointed to the uniqueness of the high elevation areas on the mountains and the importance of the areas to Pine Marten and Bicknell's Thrush. The Corps has thoroughly considered the impacts of the project on high elevation habitat, and conclude that in light of the extensive mitigation package that will protect areas from future logging and other impacts, the project will result in an overall net benefit to the species that use this habitat. USFWS characterized the proposal as highly controversial, noting that intervenor groups had raised concerns in the NH SEC process. As discussed in the FONSI section, the NEPA "controversy" factor is not simply whether a project has opponents, but whether there is significant disagreement over the impacts of a proposal from a technical or scientific perspective. Here, the NH SEC process did not reveal extensive disagreements among scientists, biologists, or other technical experts. Rather, the NH SEC process seemed to have resulted in a consensus among New Hampshire resource agencies such as NH DES and NH F&G regarding the impacts of the project and the appropriate level of mitigation. USFWS stated that the project would create a permanent change in land use from undeveloped to commercial/industrial use on high elevation habitat. The Corps agrees that the placement of wind turbines in these locations is a different use of these forest lands, but it must be recognized that these forests are currently managed for a commercial purpose, namely the harvest of timber products. These areas are not protected wilderness, but private lands where timber harvest occurs and is planned to occur in the absence of the windpark project. USFWS stated that because GRP would use all the remaining transmission capacity in northern Coös County, other renewable energy projects would be foreclosed. The Corps does not view the allocation of transmission capacity in the grid as a relevant subject for the present NEPA analysis as it is not within the purview of the decision that the Corps is making. This is the responsibility of the Independent System Operator ("ISO") of New England, and this entity has approved the interconnection of the proposed facility into the grid. Opening the scope of the current NEPA analysis to address the allocation of the ISO grid among possible renewable energy projects would be an unwieldy exercise that goes far afield of the decision that is before the Corps. Moreover, contrary to the suggestion of USFWS, if the existing grid infrastructure cannot handle additional renewable energy generation, to the extent that other such facilities are desired, needed, and appropriate, the grid capacity can be increased with upgrades of the infrastructure—it is not a finite resource. USFWS pointed out that the Deerfield Wind project in Searsburg, Vermont was found to require an EIS even though it was smaller and lower in elevation. Unlike the project under review here, the Deerfield Vermont Project was on Federal land and the U.S. Forest Service had to decide whether to allow the expansion of wind power generation facility onto public land. In such a circumstance, the additional opportunities for involvement afforded to the public by the preparation of an EIS would be more important and useful as the proposed project would be impacting public resources, a situation where the views and concerns of the general public would play an even more critical role. In the case of GRP, the proposal is a private project on private land, and it is only the requirement for a federal permit that subjects the proposal to NEPA. In this context, generally the private owners of private property have expectations to use their property in a lawful manner as they see fit, and the general public generally has less expectation to have a say over such activities on privately owned lands. Partially for this reason, Corps regulations state that ordinarily, regulatory permit decisions do not require an EIS. In the context of this project, the Corps has examined the CEQ NEPA "significance" factors as they relate to the proposed action and has concluded with a FONSI.

Finally, in summary, there have been many project modifications and additional information developed since USFWS commented on the initial proposal. More raptor and breeding bird surveys have been done. More monitoring will be done during construction and operation of the facility. The Corps permit will be conditioned as requested by USFWS to provide access to the site, input to the monitoring plan and access to the data developed so they can exercise their responsibilities under the Migratory Bird Treaty Act. There are also different opinions on the overall effect that the project would have on species that use the high elevation forest such as the Pine Marten and the Bicknell's Thrush. The NH F&G, after considering the mitigation that was eventually included in the application, testified to the NH SEC that they were not opposed to the modified project. In addition, they have worked with the Corps, the applicant and USFWS to plan for monitoring during construction and operation of the facility so as to better understand and minimize the effect of the project on fish and wildlife resources. We are aware that the development of the project will alter some high elevation habitat and that the areas cleared for the project and to some degree the forest adjacent to the cleared area will be less useful to some species. However, other valuable habitat, that otherwise would be destroyed by logging will be preserved. In addition, if the project were not built the logging on a substantial portion of the high elevation forest would continue. The Corps is aware that the operation of the wind turbines will pose some risk to birds and bats. The Corps does not know how many birds will collide with the wind turbines. Surveys indicate there are some birds and bats in the areas where the windmills are proposed, and that migrating birds pass by the area but not particularly high concentrations of them. Post construction surveys of a windpower project at another New Hampshire location, in Lempster, have found mortality rates of 6-7 birds and bats per tower per year. As with the Lempster facility, here there is a requirement to monitor and report dead birds and bats found around the towers. The information generated from post-construction monitoring will benefit the body of scientific information about the interaction between avian species and wind energy facilities, as well as allow for adaptive management of the facility as necessary.

**Comments received from the general public in response to the public notice and how we address them. (To aid in keeping track of the comments and responses we have labeled each public comment and given it a number. Similarly we have labeled each Corps response and given it the corresponding number.)**

**PC= Public Comment      CR=Corps Response**

**PC#1:** Executive Councilor Raymond Burton wrote on February 13, 2009. Councilor Burton strongly supported the speedy approval of the project citing the benefits of the project in providing renewable electric power and the mitigation package in protecting wetlands, waters, habitat and wildlife. He characterized the project as important to New Hampshire.

**CR#1:** The benefits of the project and the magnitude of the mitigation package have weighed heavily in our permit decision. We have tried to balance the need for speed with the need for a thorough review of the proposed project.

**PC# 2:** Mr. Jonathan Frizzell, of Colebrook, an alternate member of the Planning Board for the Unincorporated Places in Coos County, wrote February 2, 2009. He supported the proposal believing the proposal would help maintain long term ownership of large contiguous blocks of land.



**CR#2:** Lease revenues from wind energy production may be an incentive to keep the land in current use. In addition revenues from the project will enable a substantial amount of high elevation habitat to be placed in conservation.

**PC#3:** Mr. Frederick King commented on February 16, 2009. Mr. King wrote on behalf of the Coos County Commissioners, the governing body for the unincorporated places within the county, supporting the project.

**CR#3:** The view of the Coos County Commissioners is an important indicator of the local view of the public interest.

**PC#4:** The White Mountain Ridge Runners commented on February 11 and February 24, 2009. Mr. Larry Gomes, for the ski mobile club, indicated that, after discussion with GRP, there would be no impact on their trails and supported the project.

**CR#4:** The comment indicates to the Corps that the proposed use is compatible with current use in that outdoor recreation will not be interfered with to any substantial degree.

**PC#5:** Mr. Robert Leclerc, of Milan Excavating, commented on February 25, 2009. He supported the project indicating that the impact on the land would be justified by the benefits of sustainable power.

**CR#5:** The Corps evaluation is that the project is not contrary to the public interest and it satisfies the requirements of the 404(b) Guidelines.

**PC#6:** Brookfield Renewable Power which produces hydropower in the area wrote on February 26, 2009. Mr. Michael Cutter, General Manager, expressed concern that GRP would use up the remaining capacity on the electric transmission and encouraged the Corps to contact the Independent System Operator of New England (ISO) to determine if the project was electrically viable with respect to interconnection to the grid before approving the permit.

**CR #6:** ISO NE has given approval for the interconnection of the proposed facility on to the grid.

**PC#7:** Mr. John W. Lanier wrote on February 25, 2009 referring to an article by Mr. Harrigan in the New Hampshire Sunday News on February 22, 2009. He thought there was a lack of understanding among the general public and political entities as to the extent and magnitude of the project. He urged the Corps make sure the 404 permit process was followed and strongly consider requiring the preparation of an EIS due to the magnitude of the project and the amount of public concern about the effects.

**CR#7:** We have followed our usual process as prescribed in our permit regulations, the 404(b) (1) Guidelines and the NEPA regulations. We have prepared an Environmental Assessment of the project and concluded with a finding of no significant impact.

**PC#8:** Mr. Jeffrey W. Elliot wrote on 25 February 2009. In his letter Mr. Elliot decried the lack of enforcement of the Endangered Species Act and the Migratory Bird Treaty Act. He pointed

out the importance of what he referred to as ‘Sky Islands’ as unique and valuable habitat for certain species that need this particular climate to live. He seemed to be of the opinion that destroying these important areas in the North Country to supply power to Boston and New York was not entirely proper.

**CR#8:** We are aware of the importance of the habitats and natural resources impacted by this project, and have attempted to balance the need for development and conservation of these important resources by way of the extensive mitigation, with 1,561 acres of high elevation habitat being placed into conservation. These lands, absent the mitigation for the project, would be subject to commercial timber harvesting. The Corps has concluded, and the USFWS agrees, that project is not likely to adversely affect any species listed as endangered. The Migratory Bird Treaty Act<sup>1</sup> and the Endangered Species act are enforced by the USFWS, not the Corps.

**PC#9:** Ms. Jeanette Lee wrote on February 25, 2009. She believed the project would harm several endangered species of birds. She thought that the proposal would industrialize a beautiful unspoiled area and therefore be adverse to the interest of tourism.

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<sup>1</sup> The Migratory Bird Treaty Act (“MBTA”), 16 U.S.C. §§ 703-712, is a strict liability federal criminal statute that prohibits the “take” of migratory birds without appropriate permits. USFWS administers this statute and issues such permits, but there is no permitting regime governing “incidental takes” by which birds are killed unintentionally by structures or activities that are performed without the intent of killing or harming birds (as opposed to an activities like hunting or depredation). While USFWS has pursued criminal cases against individuals and entities that have “incidentally taken” bird species in such manner, because there is no ability to obtain permits for such activities, USFWS has stated that it will exercise its prosecutorial discretion in situations where individuals and entities work with USFWS to minimize the likelihood of incidental take of bird species. Here, it is incumbent upon the applicant to work with USFWS. The Corps has advised the applicant of this, and the applicant has agreed to allow USFWS onto their property during project operation to monitor and analyze the impacts of the facility on migratory birds. It is important to note that while one federal district court has found a federal agency civilly liable pursuant to the Administrative Procedure Act (“APA”), 5 U.S.C. 701-706, for incidental takes of birds without an MBTA permit, Center for Biological Diversity v. Pirie, 191 F. Supp. 2d. 161 (D.D.C. 2002), all other federal courts reviewing such MBTA claims against federal agencies have found either that the MBTA simply does not apply to federal agencies, see, e.g., Sierra Club v. Martin, 110 F.3d 1551 (11<sup>th</sup> Cir. 1997); Newton County Wildlife Assn. v. U.S. Forest Service, 113 F.3d 110, 115 (8<sup>th</sup> Cir. 1997), or that it does not apply to federal agencies for incidental take of birds, see, e.g., Seattle Audubon Society v. Evans, 952 F.2d 297, 302 (9<sup>th</sup> Cir. 1991); Mahler v. U.S. Forest Service, 927 F. Supp. 1559 (S.D. Ind. 1996); Newton County Wildlife Assn. v. U.S. Forest Service, 113 F.3d 110, 115 (8<sup>th</sup> Cir. 1997). The Corps has not received an MBTA incidental take permit because USFWS does not issue such permits, and the vast majority of courts reviewing this issue have concluded that federal agencies are not subject to the strictures of the MBTA in this context. To the extent that the logic of the Pirie case, the one and only case where a federal agency was found to require an MBTA permit for the incidental take of birds, was followed, it is worth noting that the case involved claims of take of migratory birds at a Navy bombing range. In that case the “take” was arguably closer to a direct take than an incidental take where the birds would be directly killed by bombs being dropped. Moreover, unlike that case, here the Corps is not the entity taking the actions that may result in incidental take, it is the applicant, GRP. Thus, it would not be the Corps but GRP who would be the proper entity to receive such a permit. As noted above, because USFWS does not have an MBTA permitting program in place for the incidental take of migratory birds, USFWS seeks the cooperation of individuals and entities to minimize takes of migratory birds and exercises its prosecutorial discretion correspondingly.

**CR#9:** The Corps is aware that there are birds which specialize in the high elevation spruce-fir forest, but in conducting a Section 7 consultation with USFWS the only species listed pursuant to the federal Endangered Species Act expected to be present in the project area is the Canada Lynx. The Corps concluded, and USFWS agreed, that the project would not likely adversely affect the Canada Lynx. As for bird species in the project area, the Corps does not believe that the project as presently planned including extensive mitigation will harm those species. Because of the location of the within the interior of a private commercial forest and the small number of people who will operate the project, we do not believe the project will have a significant effect on tourism or the local economy once the project is constructed and operating. The Corps believes the project will have minor visual impacts and moderate environmental impacts for which there will be adequate mitigation.

**PC# 10:** Ms. Kathy Keene, of Jefferson, commented on February 27, 2009. Ms. Keene was concerned about the roads effects on the mountains and the receiving waters. She also expressed concern with the consultant engineer's expertise to handle such a project. She cited the NH SEC testimony of a Dr. Gary Sanford, a consultant hired by the NH Attorney General's Counsel for the Public to review the project and testify to the NH SEC on behalf of the public. The concerns expressed were that the project should avoid, minimize and mitigate wetland impacts. Concerns were expressed for the water quality of receiving streams and over the loss of fish and wildlife habitat. She opined that wetland impacts had not been avoided or minimized, the extent of wetland impacts had been underestimated, insufficient information had been obtained to assess secondary impacts, no hydrogeological analysis had been done to assess subsurface groundwater flow diversions, no blasting evaluations had been done to assess bed rock fracture impacts to wetlands, no detailed inventory of wildlife habitat characteristics had been provided, the mitigation was not adequate, the replacement of vernal pools had not been adequately planned, and the mitigation does not replace wetland function. She urged the preparation of an EIS. On January 11, 2010 Ms. Keene inquired as to when a decision would be made on requiring an EIS for the project.

**CR#10:** The NH DES has issued a Water Quality Certificate with myriad special conditions aimed at assuring the project does not harm the receiving streams. The Consultant Engineer is a Registered Professional Engineer in good standing in New Hampshire. The plans for the road have received the necessary alteration of terrain permit which was also issued with myriad conditions. The NH SEC heard the testimony of Dr. Sanford and after considering it decided to issue a Certificate of Site and Facility. We have evaluated the issues raised by Dr. Sanford in this Environmental assessment. The applicant has demonstrated satisfactorily that wetlands have been avoided, minimized and mitigated in a way that is appropriate to the scope and degree of impacts.

**PC#11:** The Audubon Society of New Hampshire wrote on February 27, 2009. The Society President, Michael J. Bartlett, expressed concerns over the impacts to sensitive habitats and species of special conservation concern and encouraged the Corps to require and EIS for the proposed project. He also expressed concern over the effect the access roads and alteration of terrain would have on the hydrology of the area and the water quality of receiving streams. Mr. Bartlett also enclosed a more detailed letter written to Mr. Thomas Burak, Chairman of the NH SEC, emphasizing the importance of high elevation spruce-fir forest habitat to the American

Three-toed Woodpecker, recommending the NH SEC deny the certificate for turbines located above 2700 ft. elevation, adopt siting guidelines for wind energy facilities in NH and develop standardized guidelines for pre- and post-construction wildlife studies at wind energy facilities in New Hampshire.

**CR#11:** The siting guidelines or zoning approach, zoning whole geographic areas, such as high elevation spruce/fir forest areas, suitable or unsuitable for wind powered electric generation facilities, was considered at the state level. That approach was not adopted. Instead, New Hampshire has adopted the present NH SEC process. The NH SEC process provides for allowing potential developers to prospect for suitable areas, develop plans and make application to permit a particular site and facility. Under the NH SEC process, each individual application is subject to an expedited analysis on its own merits. The Clean Water Act and the Corps Regulations leave land use planning to the states. See 33 CFR Part 320.4(j) (2). It is worth noting that surveys of the project area did not reveal the presence of the Three-toed Woodpecker. Please see also Corps Responses # 8, 9 and 10.

**PC#12:** The Appalachian Mountain Club (AMC) wrote February 27, 2009. Mr. David Publicover, for the AMC, noted that they were interveners in the NH SEC process and repeated their concerns for the Corps record. They expressed concern with the road building at high elevation and on steep slopes. They were concerned that the roads would interfere with the hydrology or drainage patterns and that soil erosion would occur. They noted that rainfall is higher at higher elevations. They suggested the use of rock sandwiches as a way of crossing over wetland seeps. They commented on the necessity of both the Corps and NH DES exercising oversight of the project to insure compliance with permit conditions aimed at environmental protection.

**CR#12:** Through their active participation in the project the AMC contributed much in the way of obtaining project modifications which will mitigate the adverse impacts about which they were concerned. Rock sandwiches will be used to cross wetland seeps. Erosion control water bars have been added to the project. Several thousand acres of high elevation spruce-fir habitat will be protected from logging. Review of the NH SEC transcripts reveals that in view of the modifications made to the initial proposal the AMC is satisfied that the issues they raised are resolved.

**PC#13:** Mr. Brian Ruth of Lancaster commented on February 27, 2009. He was concerned with the loss of Bicknell's Thrush habitat. He opined that NH Fish and Game had cut a mitigation deal. He urged thorough study on the facility.

**CR#13:** With the substantial mitigation that has been added to the project the loss of Bicknell's habitat will be adequately compensated. We believe the NH F&G wisely negotiated changes to the project that will benefit species that use the high elevation spruce-fir habitat. As a result

there will be a net increase in the amount of habitat available for Bicknell's thrush over what there would have been if the facility was not constructed.

**PC#14:** Mr. Scott Gilbert commented via e-mail on February 27 and again on March 06, 2009. He was concerned about negative impacts on environmental and aesthetic conditions. He also requested that a public hearing be held to gauge the public's reaction to the proposal.

**CR#14:** The Corps Regulatory Project Manager responded via e-mail to Mr. Gilbert's request, suggesting he attend the public hearing scheduled by the NH SEC in Coos County at the end of March, which the Corps would also attend. We indicated we would consider his request for a Corps public hearing and get back to him with our decision. Mr. Gilbert responded that he planned to attend and seemed satisfied with that avenue of input. We have now decided that since we had participated so extensively in the SEC public involvement process, attending all the hearings, and are, therefore, well aware of what the public's views are, there would be no benefit to holding a separate Corps public hearing. In an e-mail dated June 18, 2010, Mr. Gilbert indicated that he did not believe a Corps public hearing would be necessary in light of the SEC hearings and the opportunities provided for the public to express their views in that context. In light of his June 18, 2010 comments, the Corps is treating Mr. Gilbert's request for a public hearing to be withdrawn.

**PC#15:** Mr. Brendan Whittaker of Brunswick, VT wrote on March 09, 2009. As a former State Energy Director and Vermont Secretary of Natural Resources, Mr. Whittaker was concerned that the project would get proper Federal review.

**CR#15:** We share Mr. Whittaker's view that a thorough federal review is warranted. We believe we have given the proposed project a proper review. We are aware of what the important issues are and have taken a hard look at them. We hope that a reading of this Environmental Assessment and Statement of Finding will bear that out.

**PC#16:** Mr. Burr Tupper commented on March 09, 2009. He was in support of the project because it was in a remote area and would be an alternative to fossil fuel.

**CR#16:** We believe the isolation of the proposed site from most human receptors has some advantages in reducing visual and noise impacts.

**PC#17:** Mr. Barry MacDonald of Lincoln commented on March 09, 2009. He cited an article in the Union Leader, disagreed with the writer, Mr. Harrigan, and expressed support for the wind farm.

**CR#17:** The newspaper piece to which Mr. Macdonald referred sparked quite a bit of comment on the application, in favor and in opposition. We think the issues are important and worthy of discussion. The Corps is neither a proponent nor an opponent of the project, but the Corps appreciates the role of the press in stimulating discussion and participation in the public interest review process.

**PC#18:** Mr. Robert Heath of Centre Harbor, commented on March 09, 2009 supported the project, citing its remote location.

**CR#18:** See Corps Response #16.

**PC#19:** Mr. Daniel Dwyer of Auburn, commented on March 09, 2009. He was concerned about the cost/benefit ratio. He thought the output low and the environmental impact high. He thought the location flawed citing the impact on old growth forest. He urged the preparation of an EIS to ensure proper consideration of the environment.

**CR #19:** While the cost benefit ratio is a criterion in our decisions whether to construct a civil works project with federal funds, the benefit cost ratio is not used in deciding whether and under what circumstances to permit a private project on private property. In the Regulatory arena, we must decide whether the substantive criteria for permit issuance are met using the 404(b) (1) Guidelines, and whether the project is contrary to the public interest. (See 33 CFR part 320.4 and 323.6). We have prepared a thorough environmental assessment of the project and conclude that an EIS is not required.

**PC#20:** Ms. Brenda J. Whittaker wrote on March 09, 2009 urging the Corps to conduct a thorough environmental review of the project.

**CR #21:** See Corps Response # 7.

**PC#21:** Ms. Linda Gould of Bedford commented on March 11, 2009. She did not think the benefits outweighed the negative impacts.

**CR #21:** See Corps Response # 19.

**PC#22:** Mr. Gregory Reynolds of Manchester commented on March 11, 2009. He opposed the project because it would interpose new roads in a remote wilderness area and would not benefit the North Country.

**CR #22:** The area is commercial forest. It is not a remote wilderness. Please also see Corps Response # 19.

**PC#23 :** Ms. Beverly Miller wrote on March 12, 2009 in opposition to the project. She was of the opinion that the turbines would deface the area and have environmental impact.

**CR #23:** We believe the visual impacts are minor and agree that there will be some environmental impacts. See also corps response number 19.

**PC# 24:** Mr. Sherman Moulton of New Hampton commented on March 12, 2009. He opposes the project because he believes it will be a blight on the landscape. He will be able to see the windmills from his camp. The project will provide access to potential vandals.

**CR #24:** We appreciate that though the windmills would be distant from many locations, there are some camps closer to them. The visual impact will be greater for those that are closer. Whether they would constitute blight on the landscape is a subjective judgment. They will be visible and they are not natural. While the project location may become better known and possibly visited more often, access to the camps will not be increased or decreased by the project.

**PC#25:** Mr. Robert Pennington wrote on March 14, 2009 protesting a negative effect on tourism and the local economy.

**CR #25:** See Corps Response # 9.

**PC#26:** Mr. Kevin Shyne wrote on March 19, 2009. He uses the area for hunting and recreation. He objected to the intrusion of blinking lights and giant fan blades and urged the preparation of an EIS to understand the full scope of the project.

**CR #26:** While the project will introduce visual elements into the area that many will not find attractive, and may reduce the enjoyment of some who visit the property. The area will continue to be available for recreation if the landowners continue to allow it. The slight depreciation of the aesthetic qualities of the area is not sufficient to require the preparation of an EIS.

**PC#27:** Mrs. Robert Sperry of Mirror Lake wrote questioning whether the large cost to the environment was worth the small amount of power generated. She wondered how many wind towers it would take to equal the production of one nuclear powered plant.

**CR #27:** Please see Corps response number 19. The Corps is not in the position of deciding whether a nuclear power plant would be a better way to supply the region's or the nation's power needs. Rather, the Corps is responsible for deciding on the application before the agency. This review does not allow the Corps to make broader energy policy choices, but rather to simply review the proposed activity in the context of NEPA, the 404(b) Guidelines, and the Corps Public Interest Review.

**PC#28:** A petition with over 100 signatures was received in support of a wind farm in Coos County, New Hampshire.

**CR#28:** The Corps is aware that there is support for the proposed project in the area.

**PC#29:** Mr. Steven Langella of Manchester wrote on March 10, 2009. Mr. Langella mountain bikes in the project area. He believes the area is special and that project would ruin the pureness of the area. He questions the benefit of the project and believes it may damage the economy. He believes that the area should be preserved for future generations.

**CR#29:** The project area is certainly undeveloped and is enjoyed by many for various forms of outdoor recreation. The project will in some respects detract from the feeling of being in the back woods. There will be more evidence of human presence in the form of power lines, transformer stations, maintenance sheds and roads. This will further dispel the illusion of being in a wilderness. We believe the decision strikes a balance between the need to develop resources and the need to conserve them. It should be borne in mind that the area is not a public park or wilderness area, but a privately owned commercial forest. Based on the management of wilderness areas in the White Mountains National Forest, if this area were a publicly owned wilderness area it is doubtful the commenter would be allowed to ride his mountain bike within it. See also Corps Response # 9.

# **NEEDS AND ALTERNATIVES ANALYSIS**

**Granite Reliable Power Windpark  
Granite Reliable Power, LLC**



**NEEDS AND ALTERNATIVES ANALYSIS  
FOR THE  
GRANITE RELIABLE POWER WINDPARK  
FOR  
GRANITE RELIABLE POWER, LLC**

**August 3, 2009**

**Project Number 07198  
Horizons Engineering, LLC**

**GRANITE RELIABLE POWER WINDPARK**  
**NEEDS AND ALTERNATIVES ANALYSIS**

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# **GRANITE RELIABLE POWER WINDPARK**

## **NEEDS AND ALTERNATIVES ANALYSIS**

August 3, 2009

### **1.0 INTRODUCTION**

#### **1.1 The Applicant – Granite Reliable Power, LLC**

Granite Reliable Power, LLC (GRP) is a Delaware Limited Liability Company and is registered with the New Hampshire Secretary of State to do business in New Hampshire. GRP is majority-owned by Noble Environmental Power, LLC (NEP) of Essex, Connecticut, and a leading wind power development company in the United States with over 1,000 megawatts of wind generation that are in the later stages of development or construction, or are in operation.

Noble Environmental Power has successfully developed, constructed and financed over 726 megawatts (MW) of wind power capacity across the United States. The company is focused on developing projects that are attractive to various types of investors who will in turn provide funds in the form of project financing required to construct and operate these projects over their useful life.

GRP proposes to develop the Granite Reliable Power Windpark in central Coos County in northern New Hampshire. GRP proposes to install wind turbines and/or electrical interconnection facilities at a preferred location to be verified through the process of an alternatives analysis contained within this report.

#### **1.2 Historic and Global Overview**

The state of New Hampshire's reliance on fossil-fuel generated electric power inevitably subjects the state (and the region) to a number of possible scenarios for unanticipated hardships to businesses and citizens. Fluctuation in supply and pricing of fossil fuels is a serious risk to economic stability and presents problems for business planning. Instability and risks going forward are likely to increase. Environmental issues related to the consumption of fossil fuels will become a more significant factor in decision-making by senior policy makers.

#### **1.3 Existing Situation**

##### **1.3.1 Regional Supply and Demand**

The 2002 New Hampshire Energy Plan produced by the Governor's Office of Energy and Community Services stated that although New Hampshire generates more electricity annually than it uses, the vast

majority of fuels used to generate energy are imported. At the time the Governor's Energy Plan was written, a very limited amount of energy was generated from renewable sources.

Policy papers at federal and state levels of government and findings such as this lead to the creation in New Hampshire of the Renewable Portfolio Standard law, RSA 362-F, passed by the New Hampshire legislature in 2007.

The 2002 Governor's Energy Plan also forecasted that total New Hampshire energy demand is expected to grow at an average rate of 2.2% annually between 2000 and 2020. Oil, the fuel with the highest demand, was projected to grow at 2.0% per year, while electricity and natural gas would grow at 3.1% and 3.2% respectively. It is important to note that these projections show that the use of energy is forecast to grow at rates well above the growth of population (projected to be only 1%), meaning that there will be an increase in energy use per capita over this 20 year period. It is also important to note that these statements were made before current findings regarding the damaging effects to the environment of continued use of fossil fuels and the recent global economic crises which are exacerbated by supply and demand for fossil fuels.

### **1.3.2 State Mandated Supply of Alternative Energy Sources**

RSA 378:37 of the New Hampshire Public Utilities Commission states that it is the energy policy of the state "to meet the energy needs of the citizens and businesses of the state at the lowest reasonable cost while providing for the reliability and diversity of energy sources; the protection of the safety and health of the citizens, the physical environment of the state, and the future supplies of nonrenewable resources; and consideration of the financial stability of the state's utilities."

### **1.3.3 The Proposal to Construct a Wind Energy Facility in New Hampshire**

NEP has focused a large portion of its development efforts on the northeastern United States, specifically in states that have defined renewable energy goals. The passing of the Renewable Portfolio Standard law in New Hampshire helped to make the state an attractive area to develop renewable energy projects. This fact, coupled with several areas of exceptional wind resources, lead NEP to explore the potential for development of a viable wind energy facility in New Hampshire.

The construction and operation of this project will help to meet the needs of the citizens and businesses of the state, as well as attain the goals stated in the State's energy policy including generating 25% of electricity through renewable resources.

The additional power provided by this Project will be used to meet current and future electricity demands via non-polluting generation and (at 99MW) will triple the amount of installed wind power capacity in New Hampshire.

#### **1.3.4 Justification for Project Size – 99MW**

GRP's business model revolves around development of mid-sized wind energy facilities, typically around 100MW in size. Given the company's financing structure smaller projects would generally not be viable development options. Wind energy projects are subject to an economy of scale, in which certain fixed costs exist regardless of the number of turbines being constructed. This is particularly evident in New Hampshire, where the strongest wind resources are located in remote areas on the tops of large mountains. Certain fixed costs, such as the cost of development and permitting, building a substation, a switching station, and paying for access to transmission, will not change regardless of the size of the proposed project. These costs, along with the purchase of turbines and construction payments, will be recovered primarily from the sale of electricity and renewable energy credits. While the installation of fewer turbines may require slightly less infrastructure (such as roads and collection), the decrease in the overall cost of the project, while considering the aforementioned fixed costs, is relatively small. Meanwhile the loss of one turbine results in a significant decrease in the potential energy generation at the site and consequently would decrease the project's ability to repay these fixed costs in a timely manner. Given the current state of the financial markets, projects that cannot repay their debt obligations within a reasonable timeframe will not receive financing. NEP has performed detailed analyses of the GRP project and has determined that a project significantly smaller than 99MW would not be viable from a financing stand point.

## **2.0 PROJECT PURPOSE AND NEEDS**

### **2.1 The Need for Alternative Energy Supply**

The purpose of the proposed project is to provide 99 MW of safe, renewable alternative energy in the State of New Hampshire. The proposed 99 MW is estimated to supply 300,000 MWH per year which is enough to supply 40,000 households with clean, renewable energy.

The need for clean, renewable energy is a clear and present requirement to respond to global warming issues and to reduce our country's dependence on the limited supply and reliability of fossil fuels. The New England

Electricity Scenario Analysis by ISO New England, Inc.<sup>1</sup> released in 2007 suggests that to meet the region's CO<sub>2</sub> emissions target under the Regional Greenhouse Gas Initiative will require the addition of substantial amounts of low or zero CO<sub>2</sub> emitting resources to the region.

In the past decade, New England has seen a substantial investment in new power production facilities made in response to market signals and regional energy related policies. Newer power plants, which were planned and built when natural gas prices were forecast to remain relatively low, generate electricity using natural gas as the primary fuel.

Even though newer plants are more efficient and have lower emissions than the older plants, natural gas prices have doubled since 2000 which has resulted in electric energy price spikes and concerns about the lack of fuel diversity and overall system reliability.

New England has long been a region with some of the highest retail electricity costs in the nation. Policy makers are searching for ways to lower, or at least stabilize, electricity bills. At the same time policymakers and consumers alike want the power sector to make progress towards more environmentally sensitive projects. To improve system reliability, system planners have identified the need to diversify the types of fuels used to generate electricity and decrease the region's dependence on natural gas.<sup>2</sup>

The implementation of energy sources such as wind power represents an opportunity to find the balance between economic and environmental goals while ensuring energy supply reliability.

The State of New Hampshire has been proactively implementing legislation beginning around 2000 to mandate the production of electricity from sources that do not contribute to greenhouse gasses. The additional power provided by this project will be used to meet current and future electricity demands via non-polluting generation. Adding this cost efficient source of electricity to the region will help to maintain or lower prices for all customers, since wind power will help promote fuel diversity and a supply shift away from New England's historical reliance on natural gas. By adding this renewable source of electricity, this project will help New Hampshire utilities attain their requirements under the Renewable Portfolio Standard law, RSA 362-F.

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<sup>1</sup> New England Electricity Scenario Analysis: Exploring the economic, reliability, and environmental impacts of various resource outcomes for meeting the region's future electricity needs, ISO New England Inc., August 2, 2007.

<sup>2</sup> 2006 Regional System Plan, Holyoke, MA: ISO New England, October 26, 2006.

### **3.0 ALTERNATIVES ANALYSIS**

#### **3.1 Scope of Study**

The general criteria used to screen potential windpark sites are the following:

- Adequate wind resource (wind speed at least 7.5 m/s).
- Proximity to an existing road network for access
- Proximity to a transmission line with adequate capacity (at least 100MW) to carry power from a facility.
- The land must be developable, i.e. unencumbered and available for lease or easement.
- Minimal environmental constraints (and therefore potential impacts)
- Local community support for the project.

Other criteria are important for site selection, but as a starting point these criteria were used to identify potential sites throughout the region.

In 2006 an extensive wind site prospecting and screening process for potential windpark sites was conducted by GRP and their planning team. The process began on a regional level using topographic maps, maps of existing electrical infrastructure, publicly available datasets depicting environmental attributes (e.g. wetlands, species of concern, cover type, land use etc.), and wind speed maps developed by AWS Truewind. Higher elevations typically exhibited average wind speeds that are most likely to achieve the minimum of 7.5 meters per second (16.8 miles per hour) needed for a commercially viable windpark. Once a group of locations were identified, a more detailed site specific screening was conducted to better assess wind characteristics, community support for a windpark, and potential ecological issues.

As a result of the initial screening, GRP identified approximately twelve potential sites throughout New Hampshire for the development of a windpark.

#### **3.2 Criteria for Selection of Practicable Alternatives**

Under Section 404 of the Clean Water Act, the Administrator of the permit for an activity involving the dredge or fill of materials in waters of the United States is authorized to require applicants to evaluate practicable alternatives to the proposed discharge which would have less adverse impacts on aquatic ecosystems, so long as the alternative does not have other significant adverse environmental impacts.

As defined in Section 404, an alternative is considered practicable if it is available and capable of being undertaken after taking into consideration cost, existing technology, and logistics in light of the overall project purpose.



If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.

Rulings by the Council on Environmental Quality concerning the administration of the National Environmental Policy Act (NEPA) provide guidance to agencies regarding the selection of alternatives in permitting situations. In a particular ruling it was determined that an agency's responsibility to examine alternatives is bounded by some notion of feasibility. NEPA does not require examination of purely conjectural possibilities whose implementation is deemed remote and speculative. The applicant's purpose and need for the proposed activity should be incorporated into an agency's decision of which alternatives to consider in the application.

With these underlying regulations in mind, GRP established a set of criteria upon which to further evaluate the potential site locations that had been identified.

A comprehensive ranking matrix has been established to tabulate a wide range of selection criteria for each of the regional sites that were considered alternatives under the general criteria described in section 3.1 above. See Table 1, ALTERNATIVES ANALYSIS (Appendix 3). Each of the selection criteria and sources of supporting documentation are described below.

### **3.2.1 Wind Resource**

The map titled Wind Resource in New Hampshire, compiled by AWS Truewind (Appendix 2), depicts the mean annual wind speed at 70 meters above ground level throughout the state. It also shows conservation lands and approximate location of electric transmission lines required for commercial wind power generation. This map served as the basis for the initial screening of potential sites.

GRP has determined that the minimum average wind speed necessary to support commercial wind power development is 7.5 meters per second (16.8 miles per hour).

### **3.2.2 Land Availability**

For a positive rating in this criterion the ownership structure of the land must be a favorable long term lease or easement without encumbrances. Generally, windparks are built for the local community and local owners to benefit from lease payments, complimenting the owner's current activities such as timber harvesting or farming.

GRP considered a number of sites throughout the state but some were eliminated at the initial screening stage due to encumbrances on the use of land for a windpark. Land that is in conservation status, whether private or public, was eliminated at the outset.

### **3.2.3 Proximity to Transmission Line**

The GRP business model has identified that the windpark should be no more than 15 miles from a transmission line in order for the project to be financially viable. Development and construction of long lengths of high voltage (115kV and higher) transmission lines can be cost prohibitive for a smaller project as it further increases the fixed costs required to support the project. This does not necessarily mean that if all other factors were favorable, the need for construction of a long transmission line would eliminate an alternative, but it would require GRP to revise their business model.

### **3.2.4 Transmission Line Capacity**

The windpark must be interconnected to a transmission line with a capacity of at least 115 kV in order to transmit the power that will be generated by the 99 MW project. To be financially viable, the proposed windpark must connect to a transmission line that will not require significant upgrading or expansion, as the costs for these upgrades can be prohibitive.

### **3.2.5 Parcel Size**

The smallest nameplate capacity for turbines considered for this project is the 1.5 MW turbines produced by General Electric. Based on a minimum separation distance between towers of approximately 1,000 feet, and assuming a maximum of 67 towers needed to meet the stated output goal of 99MW using the smallest towers considered, the project requires approximately a minimum of 1,000 contiguous acres to be viable.

### **3.2.6 Visual, Historic and Archeological Factors**

To undertake an assessment of the visual, historic and archeological aspects of the alternative sites would require field studies and a Phase 1A Site Assessment. New Hampshire Division of Historic Resources does not provide public records of archaeologically significant sites. It would not be practical to undertake a Phase 1A Assessment for each of the alternative sites, therefore, this criterion is limited to an assessment of potential visual impacts and other observations of the presence of and relationship to historically significant sites.

### **3.2.7 Other Environmental Factors**

#### **3.2.7.1 Wetlands**

Each alternative site was investigated for the potential presence and extent of wetlands through a review of National Wetlands Inventory Maps (NWI), 1990-1992 produced by the US Fish & Wildlife Service. In one case, the Pittsburg alternative, NWI maps were not available so the USGS map was reviewed. At this level of analysis, with very little actual on-the-ground investigation, the wetlands mapping review provided indications of wetlands and terrain that would be conducive to wetlands, and the review was used to establish the relative ranking of each site to the others.

#### **3.2.7.2 Wildlife**

To determine the potential for wildlife impacts the map of Highest Ranked Wildlife Habitat by Ecological Region produced by NH Fish & Game, Wildlife Action Plan was reviewed. As in the case of the wetlands review, this map provides indications of the likelihood of there being concerns to wildlife and wildlife impacts. The review at this level also allows a relative ranking of each of the sites.

Additionally, each of the alternative sites was screened using the New Hampshire Natural Heritage Bureau's (NHB) DataCheck Tool to determine a "yes/no" of potential impacts. According to NHB, however, using the Wild Action Plan habitat maps is more accurate for initial screening as these maps depict the interaction of plant and animal communities.

#### **3.2.8 Public Support**

GRP and the planning team evaluated town and county zoning ordinances to determine if the development of a windpark would be in compliance with applicable regulations. Additionally, members of the planning team arranged meetings with local or regional planning boards and select boards to ascertain the potential for either amending ordinances where the windpark would not be in compliance or to measure support to allow the project to be developed without significant public concerns.

#### **3.2.9 Access**

The logistics of transporting tower components and the turbine to a lay down area at a proposed site are of major concern. There must be primary and secondary highways within reasonable proximity to the project site.

The GRP business model does not include funding for upgrading highways. Once the components arrive at the lay down area, the

logistics of transporting them to their installation site are evaluated in criterion 3.2.10 below.

### **3.2.10 Construction Logistics**

The need to build new roads or upgrade existing roads to transport the components to their installation site is a significant aspect of the viability of a proposed alternative site. Wherever possible, GRP would attempt to use an existing road network to minimize construction costs. The quantity of roads to build and the degree of construction difficulty has a significant impact on the costs of the project as well as the potential ecological impacts and permitting feasibility. A preferred site would have a road network already developed and require minimal upgrading and new road construction.

### **3.2.11 Expandability/Connectivity**

Some of the proposed alternative sites are of insufficient size to install enough turbines to meet the stated production goal of 99MW. In some cases, however, a smaller site may be interconnected to another potential site in order to achieve the necessary number of turbines. In these instances, the proximity of the alternative sites to each other, and the feasibility and distance to electrically connect these sites was also used to determine the ranking of this criterion.

### **3.2.12 Financial Viability**

The ranking of this criterion is derived through an intuitive and empirical judgment based on all of the previous criteria, including available wind resource, expected development costs, parcel size, proximity to and size of transmission line, local support, environmental impacts during and following construction, and the overall assessment of the site's ability to satisfy the business model.

The ranking is an empirical approach to determining which site is the best alternative in New Hampshire for the development of a commercial scale windpark.

### **3.2.13 Other Factors**

Other factors include any particular aspects of an alternative site that does fall directly into one of the other criteria. For example, the Ossipee site has six regional air fields within 13 miles; it is likely that the FAA has placed restrictions on the height of structures in this area.

Within these areas of low ceiling it is not possible to construct wind turbines of a size needed for a commercially viable windpark (typically, a minimum 80m tower height). This represents a significant flaw (a 1 ranking) for this site.

Another example is the Appalachian Trail running through the Success site. Although this conservation land is only a portion of the site, it runs nearly through the middle of the site. The location of the trail poses significant constraints to the design of a potential windpark. Also, its cultural and aesthetic value would pose difficulties with permitting a project in this area. This situation may not be as fatal as a restriction on structure height but it still represents the lowest ranking for a site.

Other factors are described in greater detail in the next section of this analysis.

### **3.3 Ranking of Alternatives – Ranking Matrix**

A ranking matrix has been created to assign relative values to each of the selection criteria noted above. Each of the evaluation criteria is assigned a ranking value of one to five with one being unfavorable and five being favorable. If a fatal flaw is recognized at a site, a zero is assigned under the “Other Factors” criterion.

The goal of this approach is to establish a short list of alternatives to be further evaluated for suitability. Of the twelve alternative sites, four will be chosen for further evaluation based on the total score, the importance of “Other Factors”, and a subjective analysis of the rankings throughout each of the criteria.

The ranking matrix spreadsheet, Table 1 (Appendix 3), is attached at the back of this report. The highlighted cells show the alternative sites that will be the focus of further evaluation.

### **3.4 Preliminary Evaluation of Alternative Sites**

Using the ranking matrix and a review of the selection criteria as they apply to each site, a number of the alternative sites were eliminated early in this process. The overall ranking of these sites provided the majority of the input for their elimination, yet the presence of significant negative “Other Factors” contributed to these decisions. Sites that were eliminated are:

- Site “C”, Ossipee: This site has a potential fatal flaw of being in proximity to six regional air fields.
- Randolph: This site is not large enough to support a full 99MW build out and not close enough to other potential sites for there to be a viable interconnection. Additionally, portions of this site are on public lands, i.e. US Forest Service land and Town of Randolph park land.

- Site “E”, Alton: The Alton site has strong but limited wind resources and it would be visible from the tourist and populated areas surrounding Lake Winnepesaukee, resulting in a low ranking for public support.
- Stratford Bog: Although this site has excellent wind resources, a large portion of the land is owned by The Nature Conservancy. GRP considers any land with portions that are in some form of public or private conservation to be significantly constrained.
- Stark: This is a relatively small site compared to land use needs of the GRP project, but at 3,754 acres it could potentially be interconnected to the Stratford Bog site. Given the low ranking of the Stratford Bog site, however, the Stark site was determined to be non-viable on its own. Also, this site and the Ossipee site have the greatest percentage of land designated on the Wildlife Action Plan mapping as “Highest Rank Habitat by Condition in New Hampshire”.
- Colebrook: This is a small site (677 acres) with strong public support and no significant Other Factors. However, the wind resource relative to other potential sites is less than satisfactory; average wind speed of less than 6.5 m/s, it is over 20 miles from the nearest transmission line, and the National Wetlands Inventory maps show the likelihood of a substantial amount of wetland. Overall, the financial viability of this site is very low.
- Pittsburg: This site is small (roughly 1,300 acres), it is over 15 miles from the nearest transmission line, highway access is limited, it is not in close proximity to other potential sites, and the overall financial viability is low.
- Stewartstown: This site has poor wind resources, it is a relatively small site (1,875 acres), and it is over 15 miles from the nearest transmission line.

The remaining alternative sites – West Ridge, Success, East Ridge, and Tillotson/Balsam – have been subjected to further more detailed analysis.

#### **4.0 HIGHEST RANKED ALTERNATIVE SITES**

As mentioned above, eight of the twelve alternative sites were eliminated following the initial review. To accomplish a higher level of review and analysis for each of the four short-listed sites, GRP took a closer look at wind resources and the characteristics of the land and the environment.

The selection criteria that have been quantified at a higher level include wind resources, the site’s distance to the nearest transmission line with adequate capacity, parcel size, potential wetland and wildlife impacts, highway access to the site and the need for new road construction, and the overall financial viability of the alternative.

## **4.1 The Short List Selection Criteria**

In order to evaluate the merits of each of the short listed alternatives relative to each other a more detailed analysis of the sites has been prepared.

Using similar criteria as applied to the full alternatives analysis GRP and its planning team have expanded upon and quantified the characteristics of each site in a format that will allow a comparison of the attributes of each site to one another. Evaluation criteria that are not suitable to be quantified (such as land availability and public support) are provided further explanation and qualified to the degree possible.

Each of the short list sites were studied in the field by GRP personnel and discussions were held with officials from the surrounding communities and other stakeholders. With the exception of the West Ridge and East Ridge, however, detailed field studies were not undertaken. A thorough map analysis combined with first hand investigations of each site provided the appropriate information to complete Table 2 (Appendix 4) and determine the preferred alternative site.

A brief explanation of the approach to the evaluation criteria as shown in Table 2 is provided below.

### **4.1.1 Wind Resource**

Meteorological towers were set up in 2007 on the West Ridge and East Ridge sites to collect wind data. Wind data for the other two sites was compiled from study of the AWS Truewind wind resource mapping for the State of New Hampshire.

### **4.1.2 Land Availability**

Input to this criterion did not change from the initial alternatives analysis.

### **4.1.3 Distance to Transmission Line**

The distance is measured from the proposed location of the nearest turbine to the main transmission line, referred to as the interconnection point.

### **4.1.4 Transmission Line Capacity**

The ranking that was derived in the initial alternatives analysis is repeated here.

### **4.1.5 Parcel Size**

To calculate parcel size a circle was drawn around the site to reference the general area where the turbines, construction/maintenance roads, and electric conductor lines would be placed. The circle is not intended to show exact locations of these components as this would require detailed site design.

Measuring the parcel size using this method provides a relative metric to be used to evaluate not only the parcel's ability to provide adequate land to meet GRP's goals, it also provides a metric to determine the potential for there to be impacts throughout the site.

#### **4.1.6 Visual, Historic and Archaeological Factors**

Input to this criterion did not change from the initial alternatives analysis. To obtain additional site specific information concerning cultural and historic resources would require a minimum of a Phase 1A level of investigation undertaken by an archaeologist. At the point when this alternatives analysis was investigating the short list of sites, GRP did not feel that a Phase 1A investigation was needed for sites other than the East Ridge which was ultimately determined to be the preferred site.

#### **4.1.7 Other Environmental Factors**

##### **4.1.7.1 Wetlands**

A detailed design of internal roads and other infrastructure to support each site was not undertaken at this level of analysis, therefore specific impacts to wetlands could not be identified. In order to quantify the potential for wetland impacts, however, each site was evaluated using the US Fish & Wildlife Service, National Wetlands Inventory mapping to measure the total acres of wetlands that are within the circle of each site. Additionally, the total length of streams shown on the National Wetlands Inventory Maps was measured.

As another metric and to add another dimension to the analysis, the acreage of wetland within the circle is shown as a percentage of the total land area within the circle.

##### **4.1.7.2 Wildlife**

The initial study of potential impacts to wildlife was undertaken via input from the New Hampshire Natural Heritage Bureau DataCheck service as well as a review of the New Hampshire Fish & Game Wildlife Action Plan, Wildlife Habitat mapping. To provide additional information for the short listed sites, the acreage of land above the 2,700 foot elevation within the circle was measured. It is interesting to note that the sites with the highest average wind speed also have the highest percentage of terrain above 2,700 feet.

The percentage of land within the circle that is above 2,700 feet is also shown in order to assist in quantifying the potential for wildlife impacts at sensitive elevations.



#### **4.1.8 Public Support**

Input to this criterion did not change from the initial alternatives analysis.

#### **4.1.9 Access**

The distance from the closest secondary highway to the interconnection point was measured. It is assumed that roads that are a lesser class than secondary highways are likely to require upgrading in order to handle the oversize loads that must be transported to the site.

Upgrading of roads would likely result in further environmental disruption and would clearly require additional costs.

#### **4.1.10 Construction Impacts**

In order to assess the potential for impacts resulting from the construction of internal access roads for transporting towers, turbines, and construction equipment to the tower sites, GRP has performed a slope analysis for the lands within each of the sites. The slope analysis was broken down by slopes from 0% to 25% and those above 25%. The basis for this breakdown is that construction on or around slopes above 25% will have greater earth disturbance and environmental disruption than slopes below 25%. Although it is not practical to quantify the extent of wetland impacts or the number of stream crossing within each of the sites at this time, the relative presence of wetlands throughout the site (as identified in item 4.1.7.1, above) also has a bearing on the estimate of potential construction impacts.

It should be noted that GRP plans to utilize existing logging roads and service roads within the chosen site as much as possible to minimize the need for new road construction.

#### **4.1.11 Financial Viability**

The ranking that was derived in the initial alternatives analysis is repeated here.

#### **4.1.12 Overall Rank**

The ranking that was derived in the initial alternatives analysis is repeated here.

### **4.2 Selection of the Preferred Site**

Table 2 shows a quantitative breakdown of the attributes of the four short list sites. To the extent possible at this level of feasibility assessment, GRP has been thorough in estimating the dimensions or magnitude of the selection criteria. At a minimum, these estimates provide a means to evaluate the relative value of each site, but they also provide insight to the decision making process and the opportunities and constraints regarding the development of a windpark at each site.

The following sections encapsulate the information shown in Table 2 and provide a brief description of findings and conclusions.

#### **4.2.1 Tillotson/Balsams Site**

The Tillotson/Balsams site has a number of positive attributes such as good wind resource (7.5 m/s and above), good land availability (over 1,000 acres), and strong public support.

Those attributes are outweighed, however, by a number of negative aspects such as the significant distance to the nearest transmission line (more than 18 miles), the potential visual and cultural issues related to proximity to the historic Balsams Hotel, the length of access to the site (at least 6 miles from the closest secondary highway to the proposed interconnection/lay down location), and the percentage of terrain within the parcel that has slopes exceeding 25%. These negative aspects indicate the potential for significant environmental impacts and a low financial viability for the project. As a result this site is removed from further consideration as the preferred site.

#### **4.2.2 Success Site**

The Success site is large (over 20,000 acres), has good wind resources (at or above 7.5m/s), the location of the closest tower to the interconnection point is less than 10 miles, adjacent to highway access, and there is potentially good local support for a project. However, there are several constraints that result in a relatively low ranking for this site. The large size of the site is beneficial in that it provides substantial opportunities for tower placement, however, a substantial road network would need to be built in order for turbines to maximize the wind resource. Also, there are several land use constraints which are detriments to this site: the Appalachian Trail traverses the site, a substantial portion of the site is in the State of Maine, and the current landowner intends to place additional acreage into conservation. The constraints present at this site result in a low feasibility for GRP to acquire rights for land use, significant construction impacts, and low financial viability. This site is eliminated from further consideration.

#### **4.2.3 West Ridge Site**

The West Ridge site has the least amount of wind resource of the four short list sites (as corroborated by the low percent of land within the circle that is above the 2,700 foot elevation). The land is readily available for lease or acquisition, there is good public support, and the distance from the interconnection/lay down point is minimal. A large portion of this site abuts the Nash Stream Forest resulting in a potential visual impact for visitors to the Forest. The limited wind resource coupled with the proximity to Nash Stream Forest eliminates this site from further consideration.

#### **4.2.4 East Ridge Site**

The East Ridge site received the highest score on the Table 1 Alternatives Analysis and the quantitative study in Table 2 confirms that there are no significant impediments to the development of a windpark on this site. This site has very good wind resources, the land is available for easement from willing private landowners, the distance from the nearest tower to the interconnection point is approximately 7 miles, the size of the parcel is well over the 1,000 acres required, there are no significant visual, historical, or archaeological factors, wetlands and terrain above 2,700 feet elevation are moderate, there is significant public support, access from a secondary highway to the interconnection/lay down point is less than one mile, and potential construction impacts are moderate. As shown on Table 2, there is a significant length of streams on the site, but this is largely due to the length of collector line that will run from the nearest tower location to the interconnection point along the Philips Brook corridor. The financial viability of this site is high.

The East Ridge site is the preferred and proposed site for the GRP Windpark. More detail regarding the characteristics and benefits of this site are provided below.

#### **4.3 East Ridge - The Preferred Site**

Following the initial evaluation of twelve potential alternative sites and the short list of the four highest ranking alternatives, the East Ridge site is proposed to be built on private land in an upland region of Central Coos County. The thirty-three, 3 MW proposed wind turbines will be located on three tracts of commercial timber land; the Philips Brook, The Bayroot land, and a smaller portion of privately owned land on Dixville Peak.

GRP and its planning team have undertaken intensive field studies utilizing the services of numerous meteorological, land use, and environmental specialists to determine the most efficient configuration for the placement of towers while avoiding or minimizing environmental impacts.

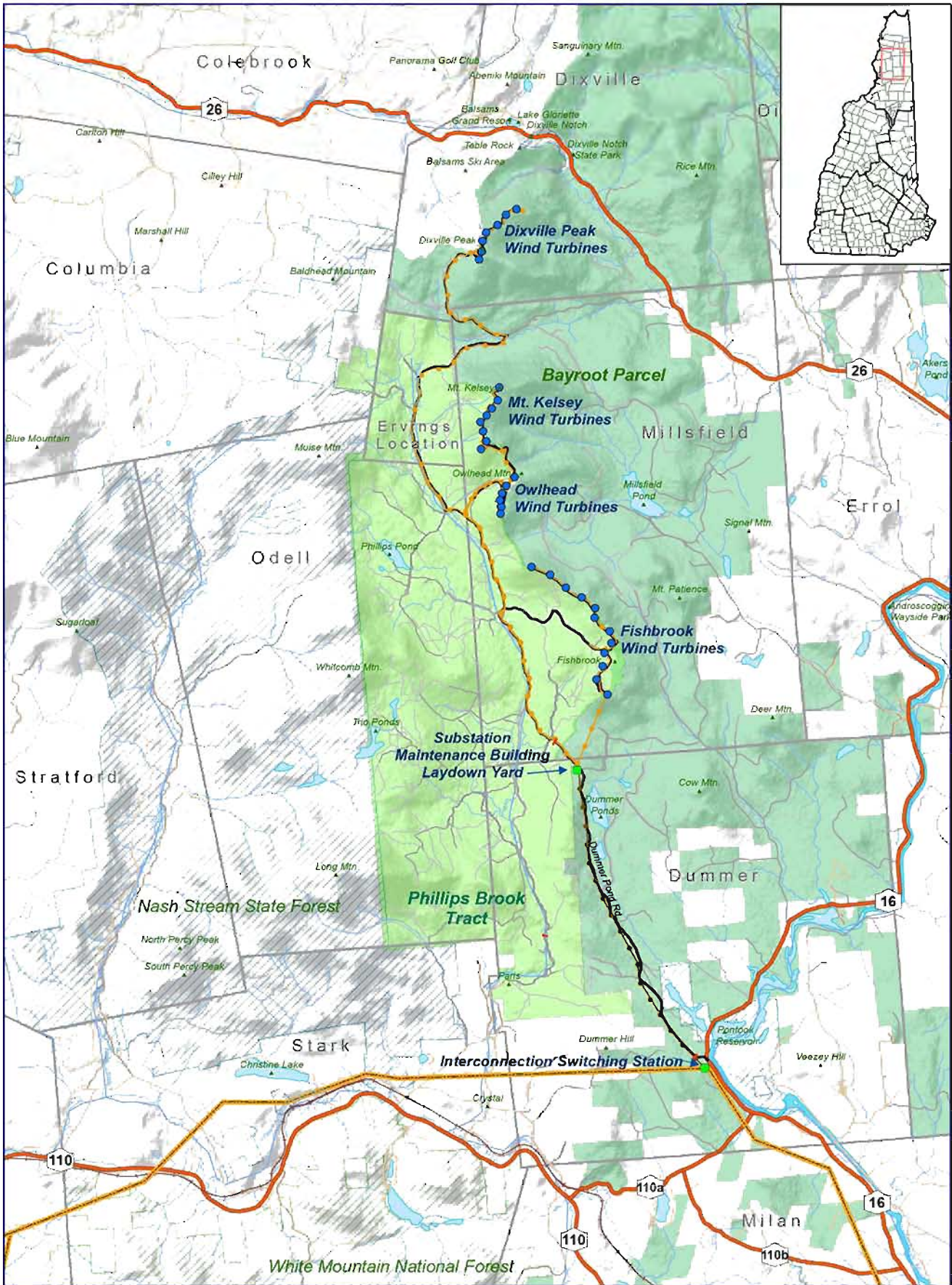
The results of the planning and design efforts are summarized in the following sections and the final design is based on two years of discussion, review and analysis by the New Hampshire Department of Environmental Services, New Hampshire Natural Heritage Bureau, the Division of Historical Resources, the Department of Resources and Economic Development and the New Hampshire Fish and Game Department.

The Project includes the construction of approximately 12 miles of new access road and upgrading of about 19 miles of existing private logging roads. A 34.5 kV electrical collection line will gather the power from the wind turbines and deliver it to a substation to be approximately 1.5 miles south of the wind turbine strings. A 115kV electrical interconnection line will be constructed to deliver the power from the substation to the interconnection switching station located adjacent to an existing 115 kV electric transmission line owned by Public Service of New Hampshire (PSNH). This electrical line will span approximately 5.8 miles along the existing Dummer Pond Road in the vicinity of the Philips Brook corridor. A maintenance building and lay down yard will be constructed in the vicinity of the substation to accommodate construction and operation of the Project.

The proposed windpark location is primarily a linear project with wind turbines to be installed along the north-south oriented ridges in the region. The northern extent of the Project site is located in the upper reaches of Dixville Peak (elevation 3,482 feet). Extending south from Dixville Peak, the wind turbines will be located on the named summits of Mount Kelsey (elevation 3,468 feet), Owlhead Mountain (elevation 2,867 feet), and an unnamed ridge commonly referred to as Fishbrook Ridge that terminates to the north of Dummer Pond at elevations of approximately 2,582 feet. In its longest dimension, the Project components will span approximately 14.5 miles from the northernmost wind turbine to the existing transmission line at the south end.

The Project will be powered by 33 wind turbines with a name plate capacity of 3.0 megawatts (MW) each, for a total installed capacity of 99 MW. The wind turbines proposed to be used are the “V90” series manufactured by Vestas Wind Systems A/S. When GRP first envisioned this windpark project 67, 1.5 MW turbines were planned for. The good wind resources at the preferred site allow this to be reduced to 33, 3MW turbines, thus reducing the footprint required for tower locations and the environmental impacts associated with construction and maintenance of the windpark.

GRP believes that this site, referred to as East Ridge, is the most viable alternative as it is the least environmentally disruptive proposed alternative and the best location for a commercially viable windpark. On July 15<sup>th</sup>, 2009, GRP received a certificate of site and facility for the preferred project on the East Ridge site from the New Hampshire Site Evaluation Committee. The committee found that the project does not have an unreasonable adverse impact on aesthetics, historic sites, air and water quality, the natural environment, public health and safety, and is consistent with the state’s energy plan.

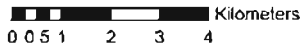
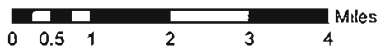


**Geographic Features Near the Granite Reliable Power Windpark**

Data: Publicly available data from NH GRANIT. All other data is proprietary to Granite Reliable Power LLC.

June 2008

- Wind turbine site
- Substation or switching yard
- Electric collection line
- Electric interconnection line
- Access road
- Existing gates
- Existing transmission line
- Local roads
- Private roads
- Railroad
- Bayroot Parcel
- Phillips Brook Tract
- New Hampshire state land
- US Forest Service land





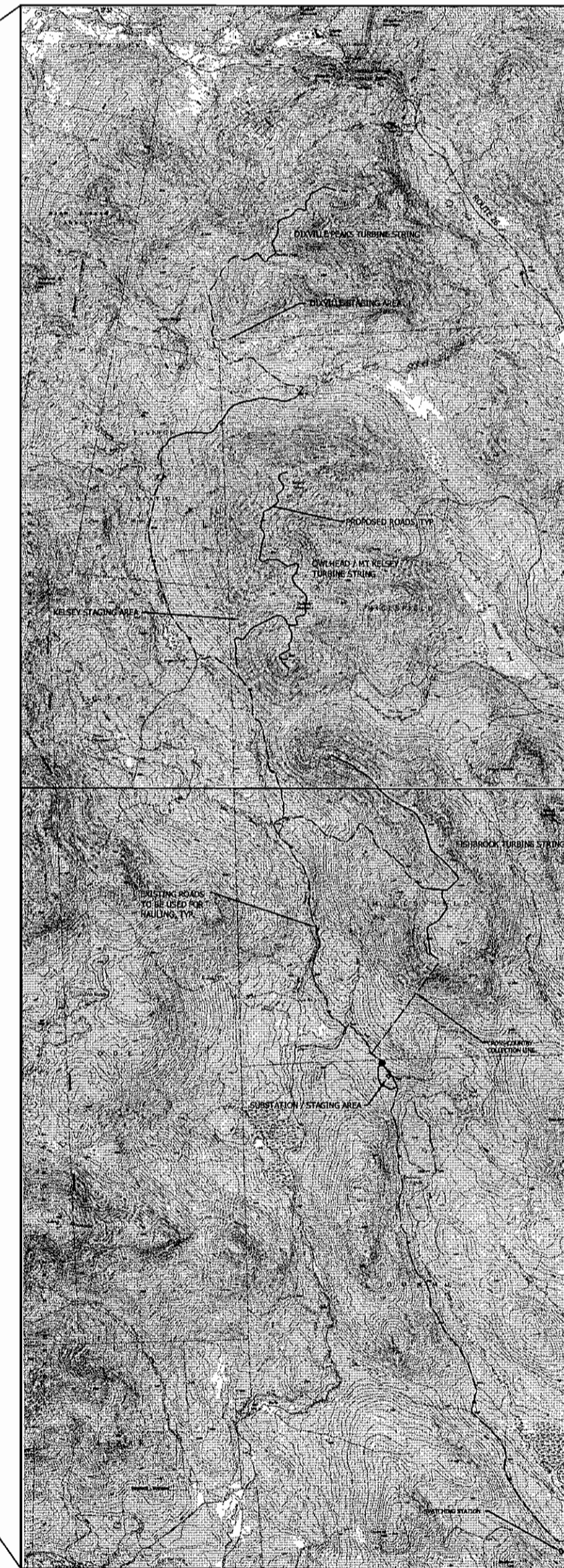
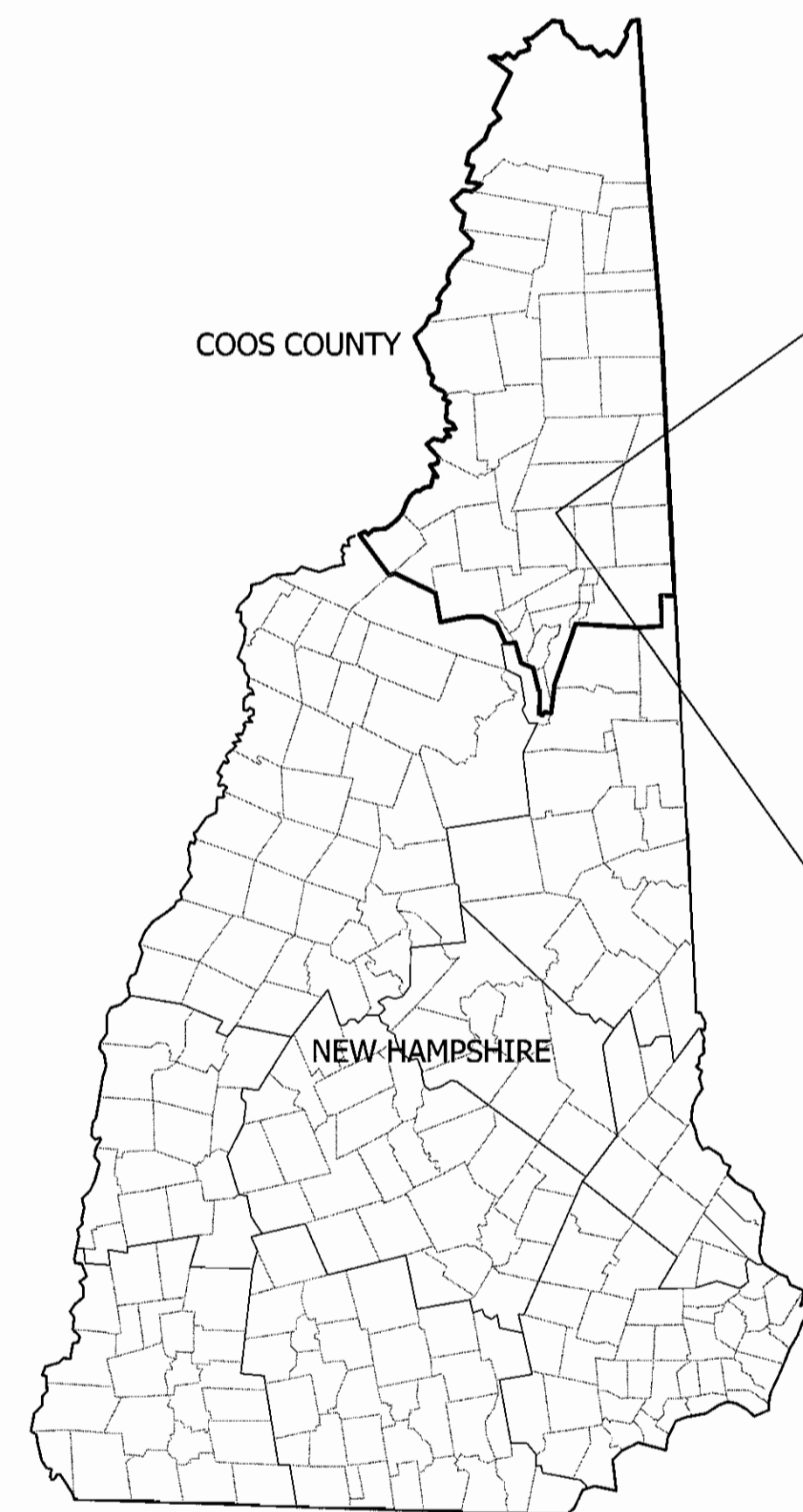
# GRANITE RELIABLE POWER, LLC

## GRANITE RELIABLE POWER WIND PARK

COOS COUNTY, NEW HAMPSHIRE

JULY 2008

REVISED DECEMBER 2008



LOCATION PLAN

SCALE: 1" = 5,000'

OWNER:

GRANITE RELIABLE POWER, LLC  
8 RAILROAD AVENUE  
ESSEX, CT 06426  
(860) 581-5010

CIVIL ENGINEER / SURVEYOR:

**horizons**  
*Engineering<sup>LLC</sup>*

34 SCHOOL STREET  
LITTLETON, NH 03561  
(603) 444-4111

ELECTRICAL ENGINEER:

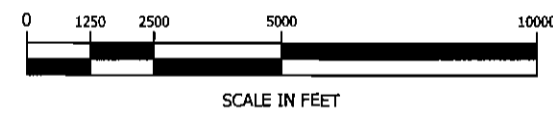
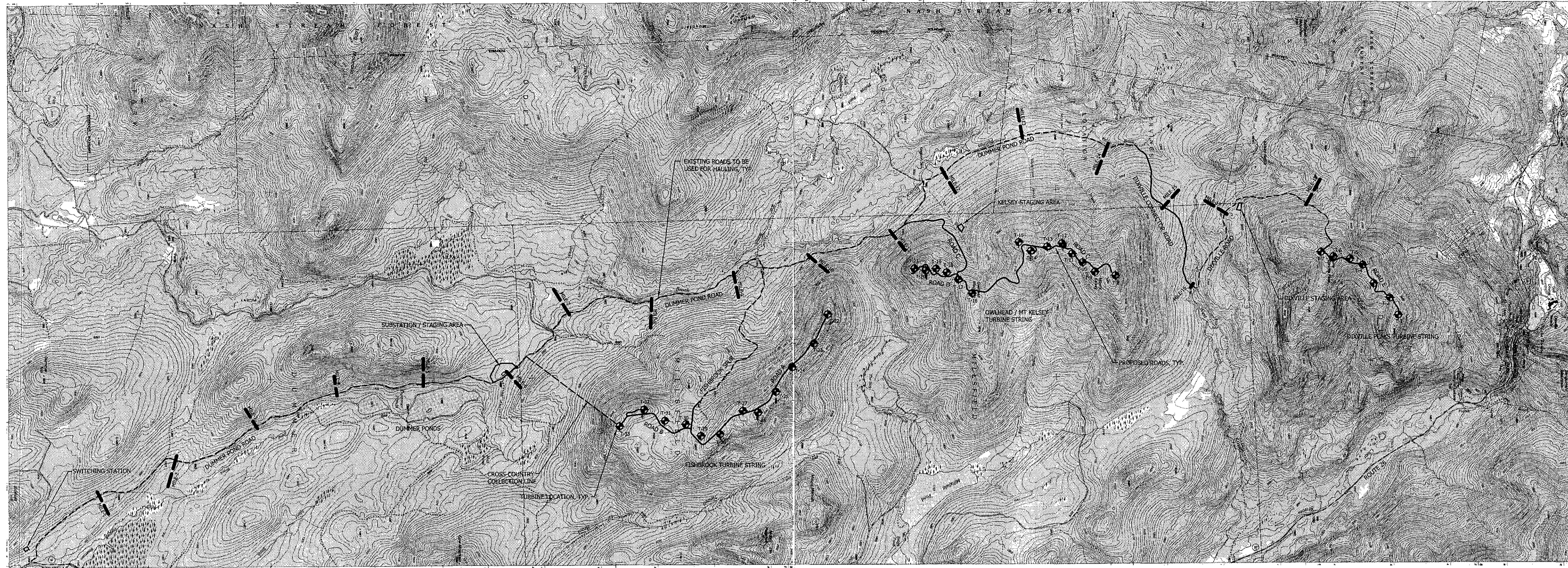
CBX ENERGY ENGINEERING  
24 COMMON STREET  
WATERVILLE, ME 04901  
(207) 872-7239

COORDINATING WETLAND SCIENTIST:

LOBDELL & ASSOCIATES, INC.  
88 GALE CHANDLER ROAD  
LANDAFF, NH 03585  
(603) 838-6880

**OVERALL SHEET LEGEND**

- EXISTING ROAD TO BE UPGRADED
- - - PROPOSED ROAD
- ⊕ PROPOSED TOWER



**GENERAL NOTES**

1. ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THESE PLANS AND TECHNICAL SPECIFICATIONS FOR GRANITE RELIABLE POWER, LLC - GRANITE RELIABLE POWER WIND PARK DATED DECEMBER 2008.
2. NO EXISTING MONUMENTS, BOUNDS, OR BENCHMARKS SHALL BE DISTURBED WITHOUT FIRST MAKING PROVISIONS FOR RELOCATION.
3. ALL WORK SHALL BE PERFORMED WITHIN THE PROPERTY OF, AND EASEMENTS SECURED BY, THE OWNER.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DATA COLLECTION AND PREPARATION OF RECORD DRAWINGS.
5. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR CONTROLLING EROSION IN ALL AREAS DISTURBED BY HIS ACTIONS. COSTS FOR REQUIRED EROSION CONTROL, REGARDLESS OF WHETHER OR NOT SUCH MEASURES ARE SHOWN ON THE ENGINEERING DRAWINGS, SHALL BE BORNE BY HIM.
6. UTILITY LOCATIONS ARE BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR IS RESPONSIBLE FOR LOCATION AND PROTECTION OF EXISTING UTILITIES AND SHALL REPAIR ANY DAMAGE AS QUICKLY AS POSSIBLE AT HIS OWN EXPENSE. ALL UTILITIES ENCOUNTERED SHALL BE LOCATED BY DEPTH AND TIES AND SHOWN BY THE CONTRACTOR ON HIS "AS BUILT" DRAWINGS. HAND EXCAVATION SHALL BE DONE WHEREVER UNDERGROUND UTILITIES ARE SHOWN OR ANTICIPATED. THE CONTRACTOR SHALL CONTACT DGS AND THE APPROPRIATE AUTHORITIES PRIOR TO ANY CONSTRUCTION IN ORDER TO VERIFY EXISTING CONDITIONS AND UTILITY LOCATIONS.
7. DESIGN FOR ALL PORTIONS OF THE PROJECT WITH THE EXCEPTION OF A SECTION OF DIXVILLE ROAD AND DIXVILLE RIDGELINE HAVE BEEN BASED ON SURVEY AND TOPOGRAPHIC INFORMATION PROVIDED BY M. HARKEN OF MISSION, KANSAS. DESIGN OF DIXVILLE ROAD AND DIXVILLE RIDGELINE IS BASED ON USGS CONTOURS.
8. WETLANDS WERE DELINEATED IN THE PROJECT AREA IN THE FALL OF 2007 AND THE SPRING OF 2008 ACCORDING TO THE STANDARDS OF THE FEDERAL MANUAL FOR DELINEATION OF JURISDICTIONAL WETLANDS (1987) AND NH WETLANDS BUREAU REGULATIONS, BY THE FOLLOWING NH CERTIFIED WETLAND SCIENTISTS: RAYMOND LOBUELL, CSS, CWS (DELINEATION COORDINATOR), MICHAEL CUDMO, CSS, CWS; GREG HOWARD, CSS, CWS; MARC JACOBS, CSS, CWS; THOMAS PERAGALLO, CSS, CWS; NANCY RENDALL, CSS, CWS; JONATHAN BISSON, CSS, CWS; SEAN SWENEY, CWS, PE; JENNIFER WEST, CWS; BARRY KEITH, CWS; DAVID ALLAIN, CSS, CWS; PATRICK FARBARIN, CWS; AND LIZ GARLO, CWS. WETLANDS WERE CLASSIFIED ACCORDING TO THE "CLASSIFICATION OF WETLANDS AND DEEPWATER HABITATS OF THE UNITED STATES" BY COWARDIN, ET AL. AND NH WETLANDS BUREAU REGULATIONS. SEE WETLANDS APPLICATION NARRATIVE FOR FURTHER INFORMATION. WETLANDS FLAGS WERE RECENTLY SURVEYED BY HORIZONS ENGINEERS OF LITTLETON, NH AND BOUNDARIES PLACED ON THE PLAN. WETLAND BOUNDARY SURVEY INFORMATION ON PLAN SHEETS MAY REQUIRE REVISIONS, WHICH WILL BE ACCOMPLISHED IN THE NEAR FUTURE.
9. WETLAND FLAGS WERE FIELD LOCATED WITH TRIMBLE GPS RECEIVERS, INCLUDING MODELS GEOM WITH EXTERNAL ZEPHYRUS ANTENNA, PROBE BACK SYSTEMS AND PROXIM. THESE RECEIVERS ARE CLASSIFIED AS "MAPPING GRADE" SUB-METER SYSTEMS. ALL RAW GPS DATA WAS DIFFERENTIALLY CORRECTED USING THE BEST AVAILABLE CORS STATION, AND WORK SCHEDULES WERE ADJUSTED TO AVOID HIGH POOR VALUES AS MUCH AS POSSIBLE. PLEASE BE ADVISED THAT SUB-METER RESULTS ARE OBTAINABLE ONLY WITH THE BEST CONTROLLED CONDITIONS, AND SOME LOCATIONS MAY BE SUBJECT TO ERRORS IN EXCESS OF ONE METER DUE TO ATMOSPHERIC CONDITIONS, POOR SATELLITE GEOMETRY, AND MULTI-PATH ERRORS.
10. THE PLANS DEPICT PROPOSED CULVERTS, EXISTING CULVERTS TO REMAIN, AND EXISTING CULVERTS TO BE REPLACED. CULVERTS TO REMAIN ARE ASSUMED TO HAVE ADEQUATE COVER, LENGTH, AND HYDRAULIC CAPACITY BASED ON LIMITED FIELD SURVEY AND INSPECTION. SOME CULVERTS IDENTIFIED TO REMAIN MAY HAVE TO BE REPLACED OR LENGTHENED DURING CONSTRUCTION AFTER FIELD REVIEW BY THE ENGINEER. PROPOSED CULVERTS MAY REQUIRE MODIFICATIONS TO LOCATION OR CONFIGURATION, AFTER FIELD REVIEW BY THE ENGINEER.
11. ROADS HAVE BEEN DESIGNED USING ASSUMED DESIGN VEHICLE PARAMETERS. ADEQUACY OF VERTICAL AND HORIZONTAL GEOMETRY SHALL BE VERIFIED PRIOR TO CONSTRUCTION. DESIGN MODIFICATIONS MAY BE REQUIRED.
12. ELEVATIONS SHOWN FOR TOWER BASES ARE APPROXIMATE. EXACT ELEVATIONS ARE TO BE BASED ON SITE SPECIFIC SOILS INFORMATION AND TOWER FOUNDATION DESIGN PREPARED BY A LICENSED GEOTECHNICAL ENGINEER.
13. UNDERDRAIN MAY BE REQUIRED IN ALL CUT SECTIONS FOR ROAD AND TOWER PAD CONSTRUCTION. LOCATIONS ARE TO BE DETERMINED BY FIELD ENGINEER / OWNER.
14. CLEARING OF TREES WITHIN WETLANDS IS TO BE CONDUCTED DURING WINTER MONTHS, WHEN THE GROUND IS FROZEN. DISTURBANCE OF WETLANDS OUTSIDE OF THE PERMITTED IMPACT AREAS IS PROHIBITED.

**COLLECTION SYSTEM LEGEND**

- | EXISTING   | PROPOSED       |
|--|----------------|
| — ONE —  | — ONE —        |
| ○  | ○              |
| Y  | Y              |
| □  | □              |
| 35 KV 500 KCMIL AL W/ 1/2 NEUTRAL CONCENTRIC SHIELD UNDERGROUND CABLE  | — 500 KCMIL —  |
| 35 KV 1000 KCMIL AL W/ 1/2 NEUTRAL CONCENTRIC SHIELD UNDERGROUND CABLE | — 1000 KCMIL — |
| 35 KV 1/0 AWG AL W/ 1/2 NEUTRAL CONCENTRIC SHIELD UNDERGROUND CABLE    | — 1/0 —        |

**LEGEND**

- | EXISTING                            | PROPOSED                            |
|-------------------------------------|-------------------------------------|
| — 1588 —                            | — 1598 —                            |
| — 1600 —                            | — 1600 —                            |
| — ROAD CENTERLINE —                 | — ROAD CENTERLINE —                 |
| — EDGE OF GRAVEL —                  | — EDGE OF GRAVEL —                  |
| — TREELINE —                        | — TREELINE —                        |
| — WETLAND —                         | — WETLAND —                         |
| — PERENNIAL STREAM —                | — PERENNIAL STREAM —                |
| — INTERMITTENT STREAM —             | — INTERMITTENT STREAM —             |
| — DITCH WETLAND —                   | — DITCH WETLAND —                   |
| — CULVERT —                         | — CULVERT —                         |
| — SILT FENCE —                      | — SILT FENCE —                      |
| — PVIOUS BERM —                     | — PVIOUS BERM —                     |
| — SLOPE DRAIN —                     | — SLOPE DRAIN —                     |
| — CHECK DAM —                       | — CHECK DAM —                       |
| — SEDIMENT TRAP —                   | — SEDIMENT TRAP —                   |
| — HAYBALE CHECK DAM —               | — HAYBALE CHECK DAM —               |
| — GRAVEL ROAD —                     | — GRAVEL ROAD —                     |
| — UPGRADE TO EXISTING GRAVEL ROAD — | — UPGRADE TO EXISTING GRAVEL ROAD — |
| — NRCS SOILS BOUNDARY —             | — NRCS SOILS BOUNDARY —             |
| — NRCS SOILS DESCRIPTIONS —         | — NRCS SOILS DESCRIPTIONS —         |
| — WETLAND IMPACTS —                 | — WETLAND IMPACTS —                 |
| — GUARD RAIL —                      | — GUARD RAIL —                      |
| — STONE FILL —                      | — STONE FILL —                      |
| — STONE ARMORED SLOPE —             | — STONE ARMORED SLOPE —             |
| — VEGETATED ARMORED SLOPE —         | — VEGETATED ARMORED SLOPE —         |
| — RUBBER WATER DIVERTER —           | — RUBBER WATER DIVERTER —           |

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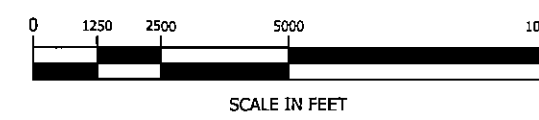
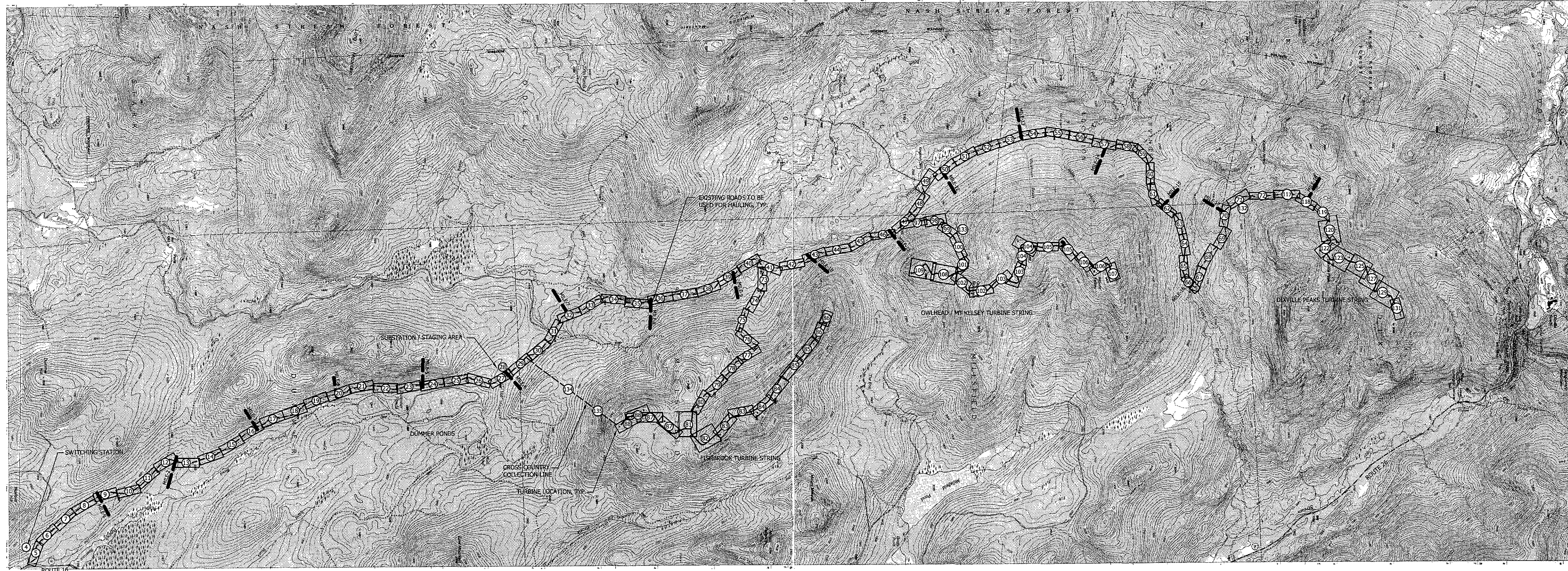
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GRANITE RELIABLE POWER WIND PARK  
COOS COUNTY, NEW HAMPSHIRE

**OVERALL SITE PLAN, GENERAL NOTES & LEGEND**

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PLB	PLB
CHECKED BY:	ARCHIVE #:
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SHEET 2 OF 143





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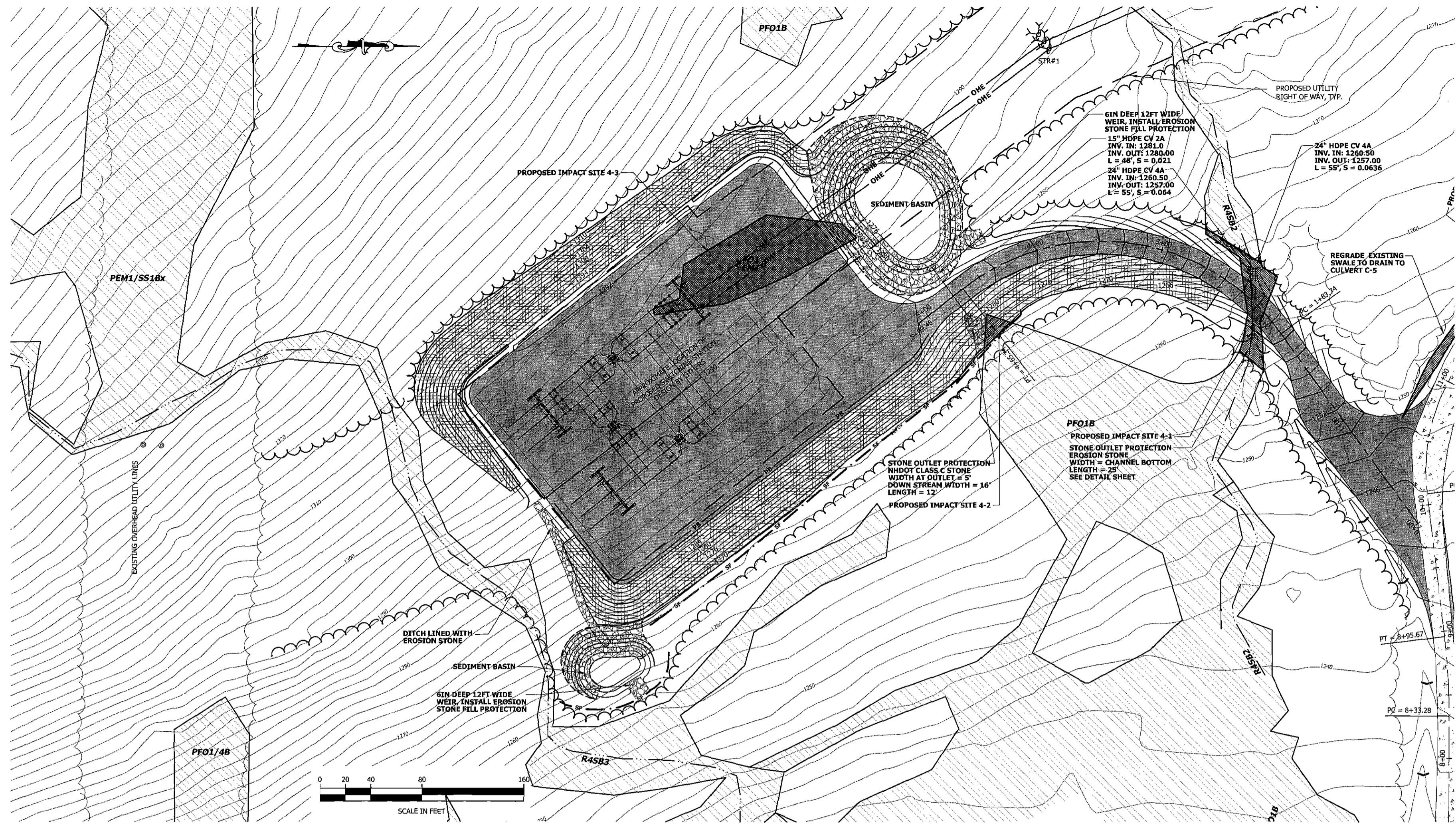
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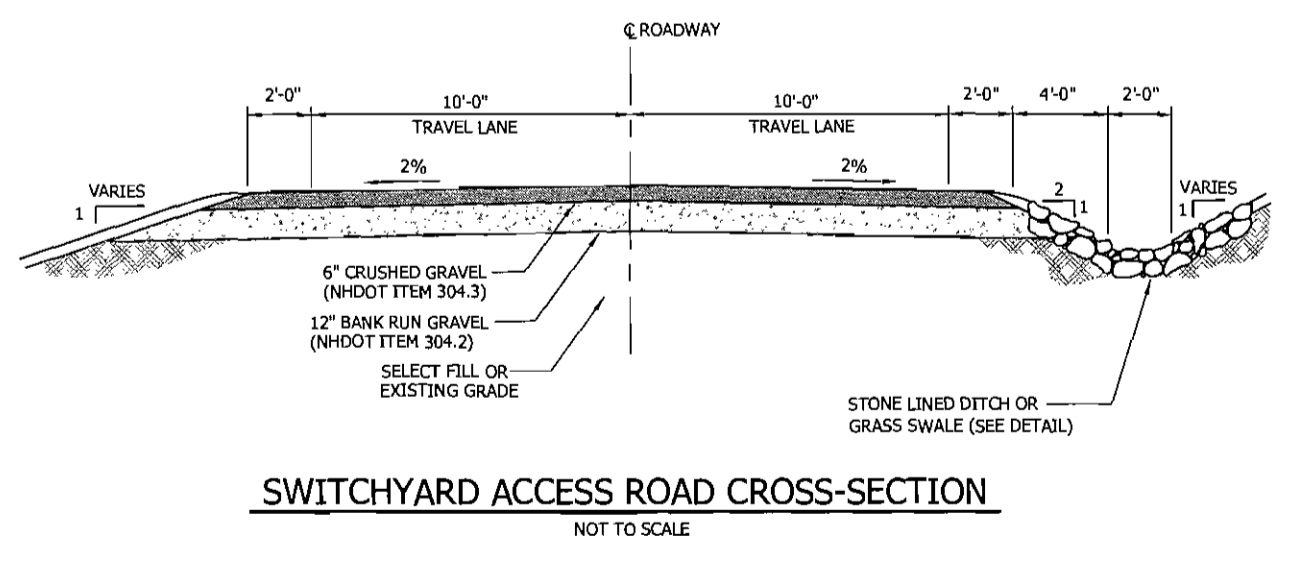
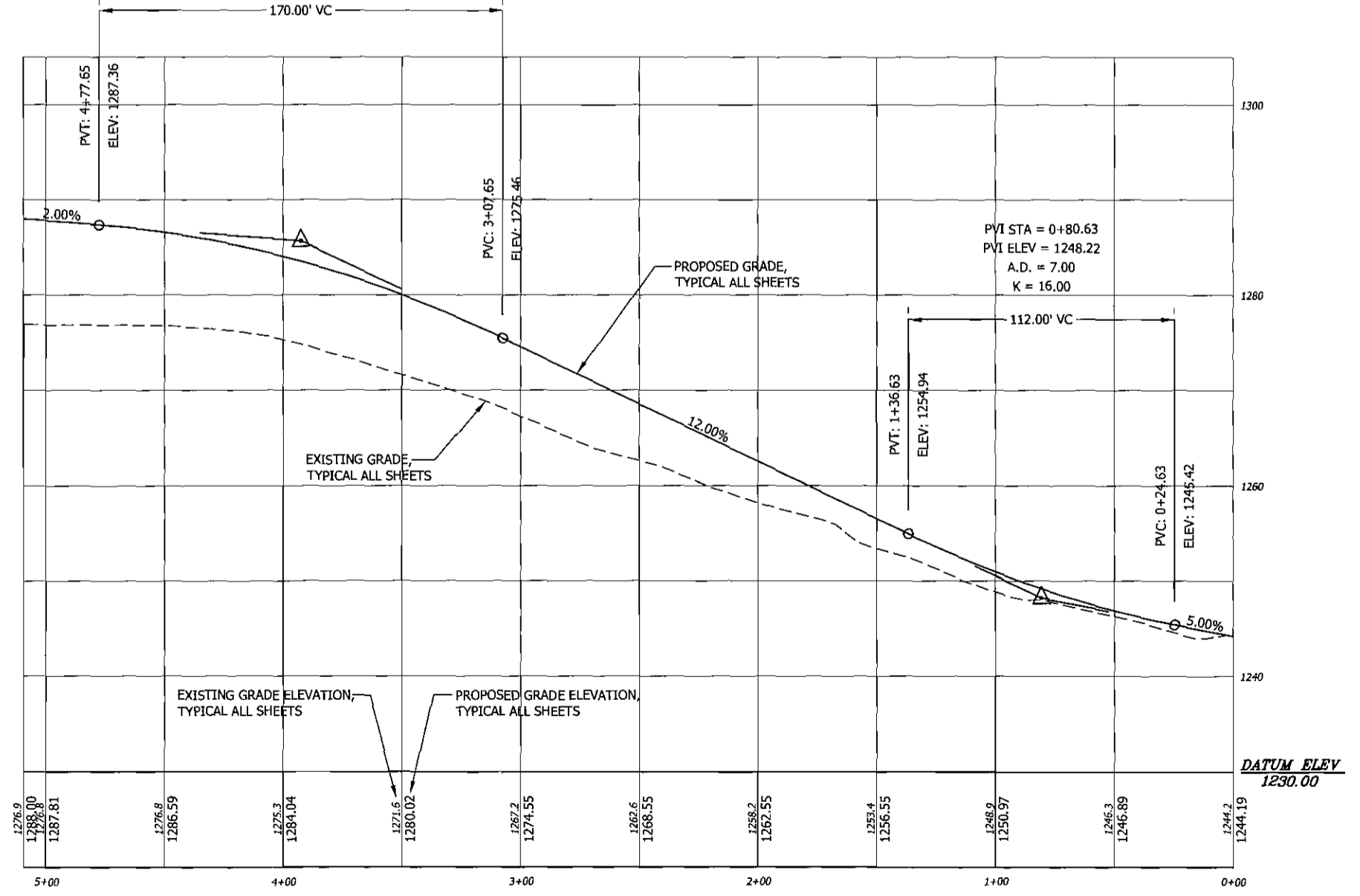
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COOS COUNTY, NEW HAMPSHIRE  
OVERALL PLAN SHEET LAYOUT  
AND SHEET INDEX

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PVI STA = 3+92.65  
PVI ELEV = 1285.66  
A.D. = -10.00  
K = 17.00



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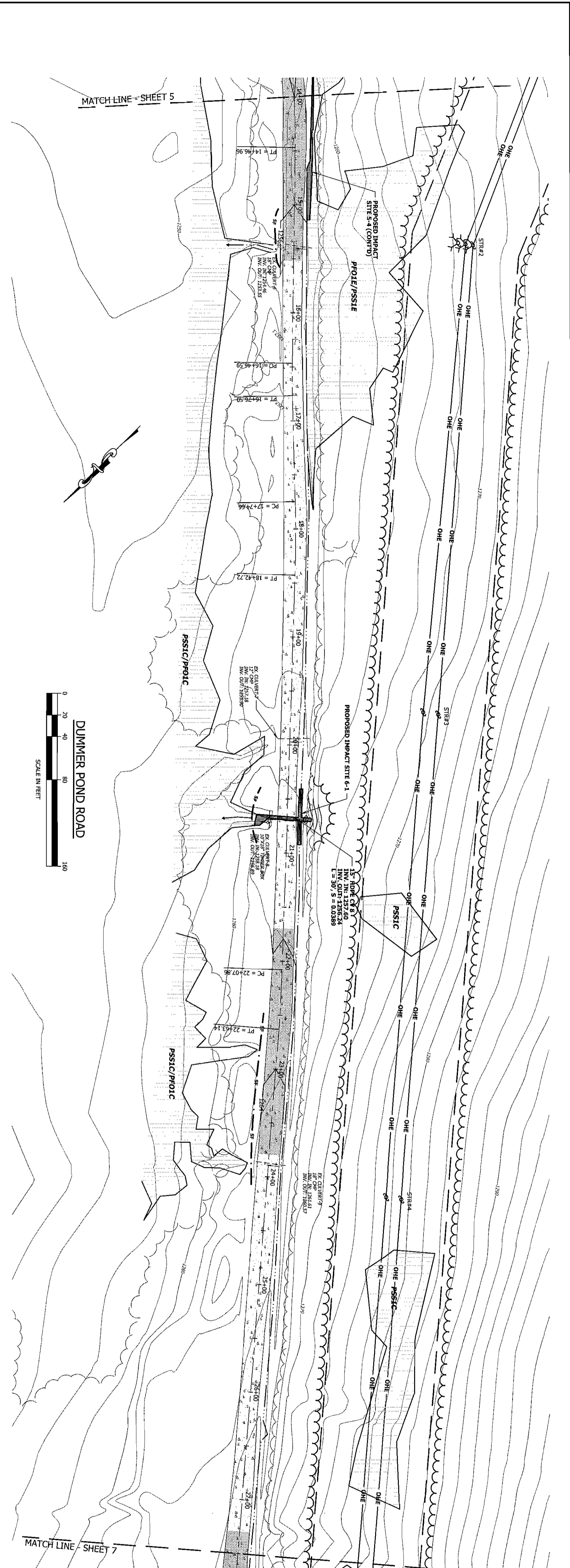
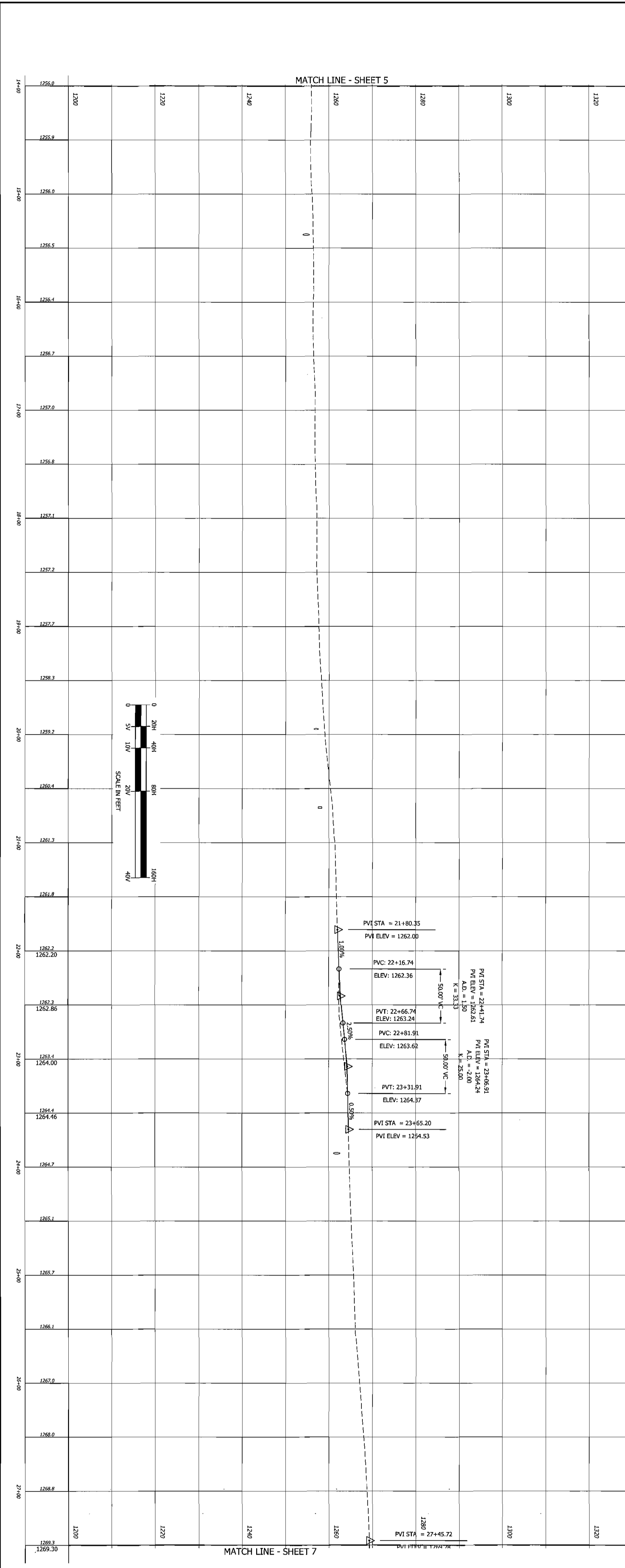
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SWITCHING STATION AND ACCESS ROAD  
GRAADING, DRAINAGE AND EROSION  
CONTROL SITE PLAN

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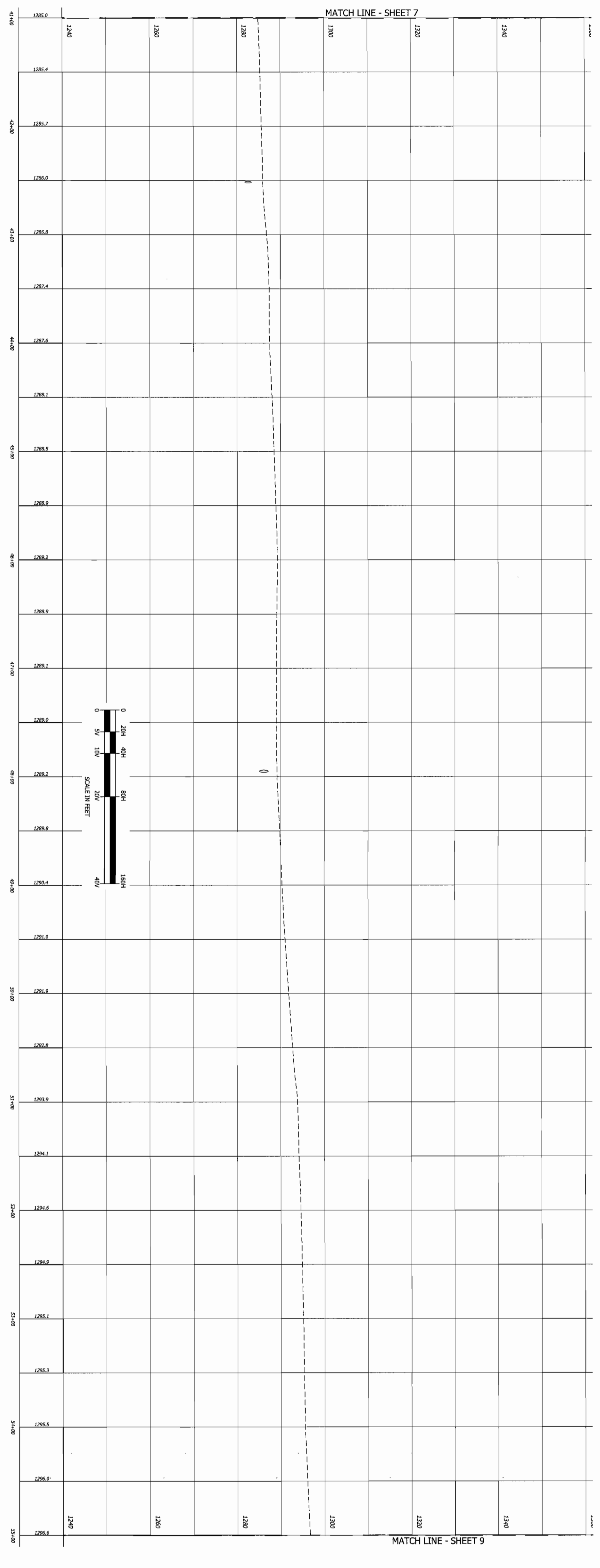
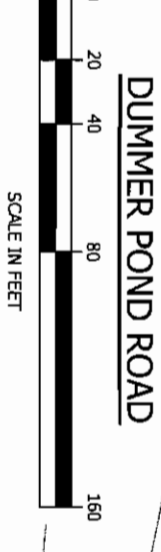
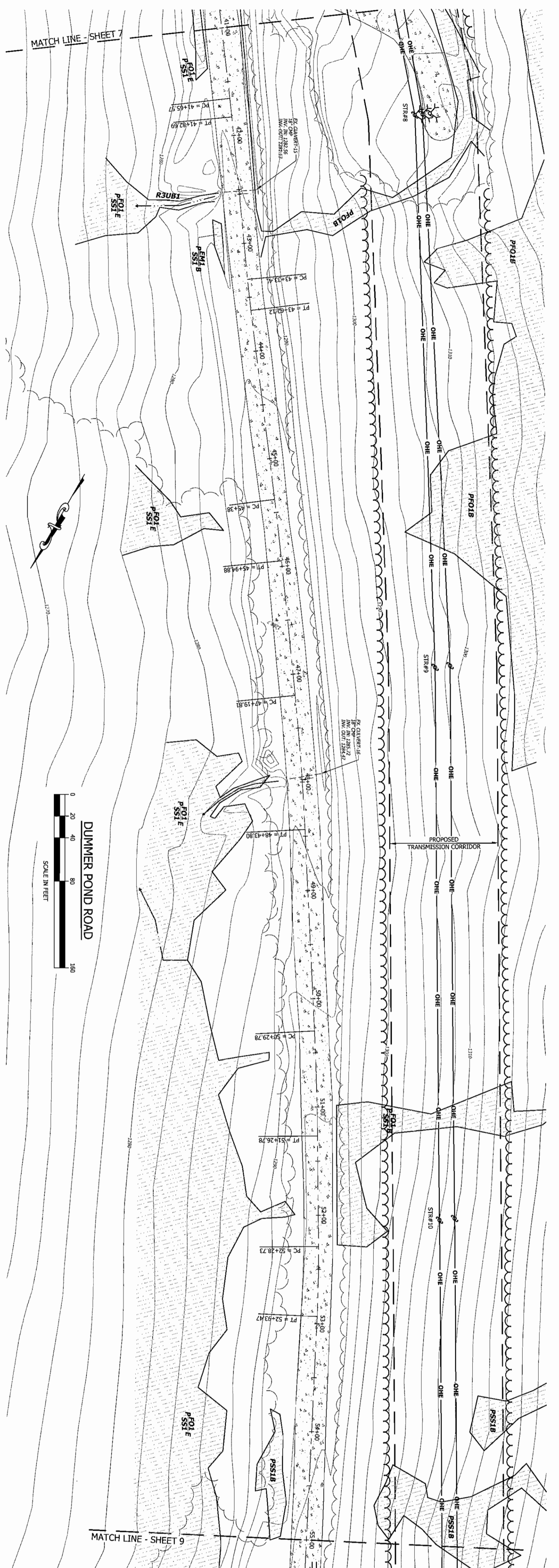
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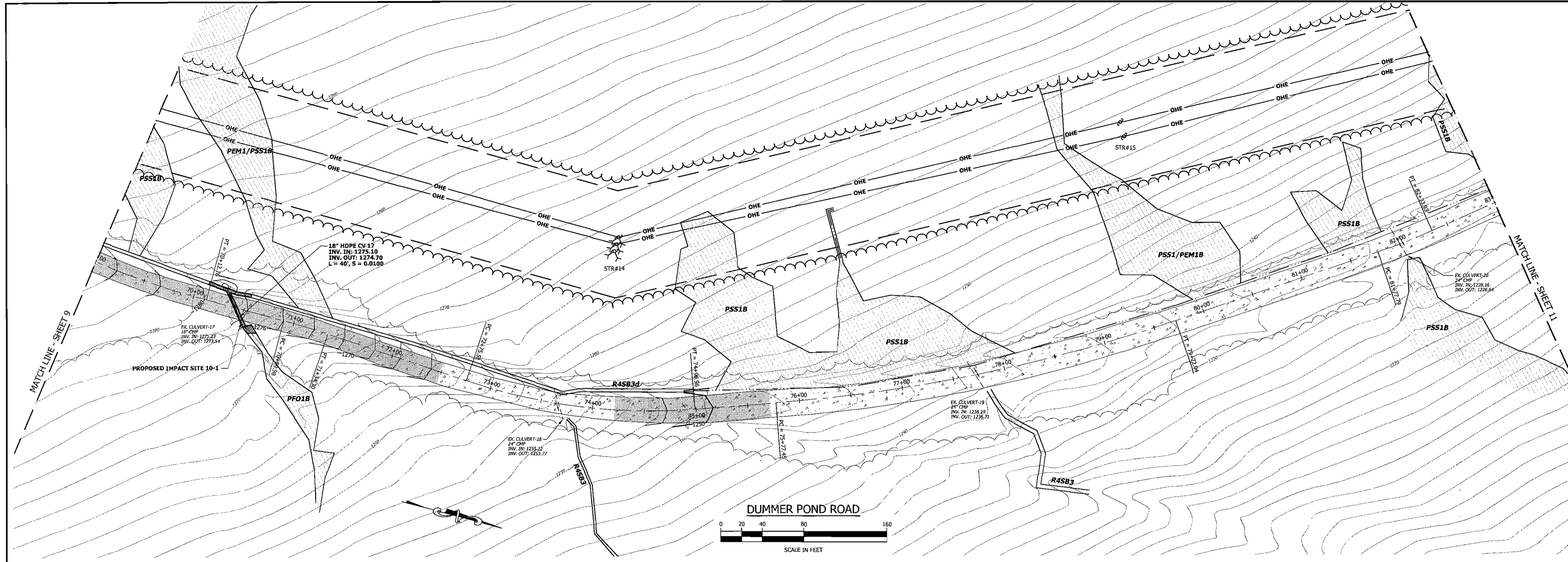
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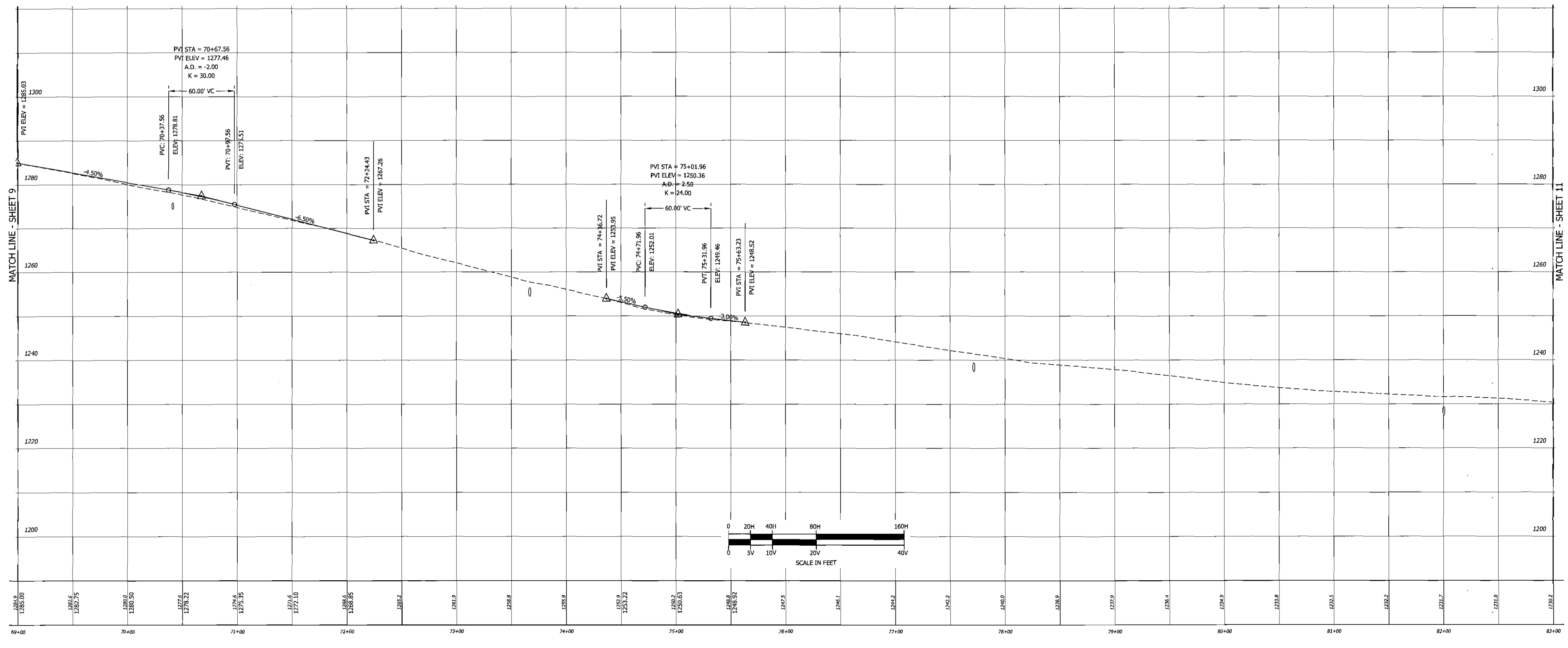
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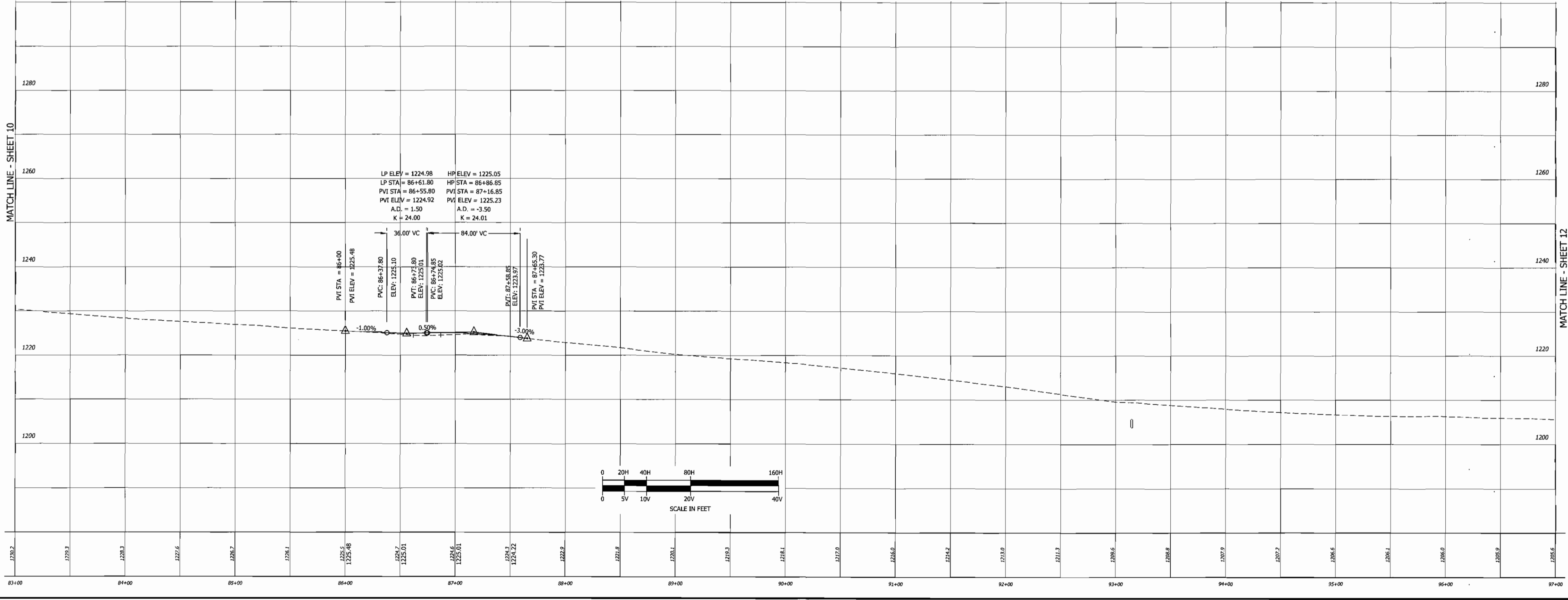
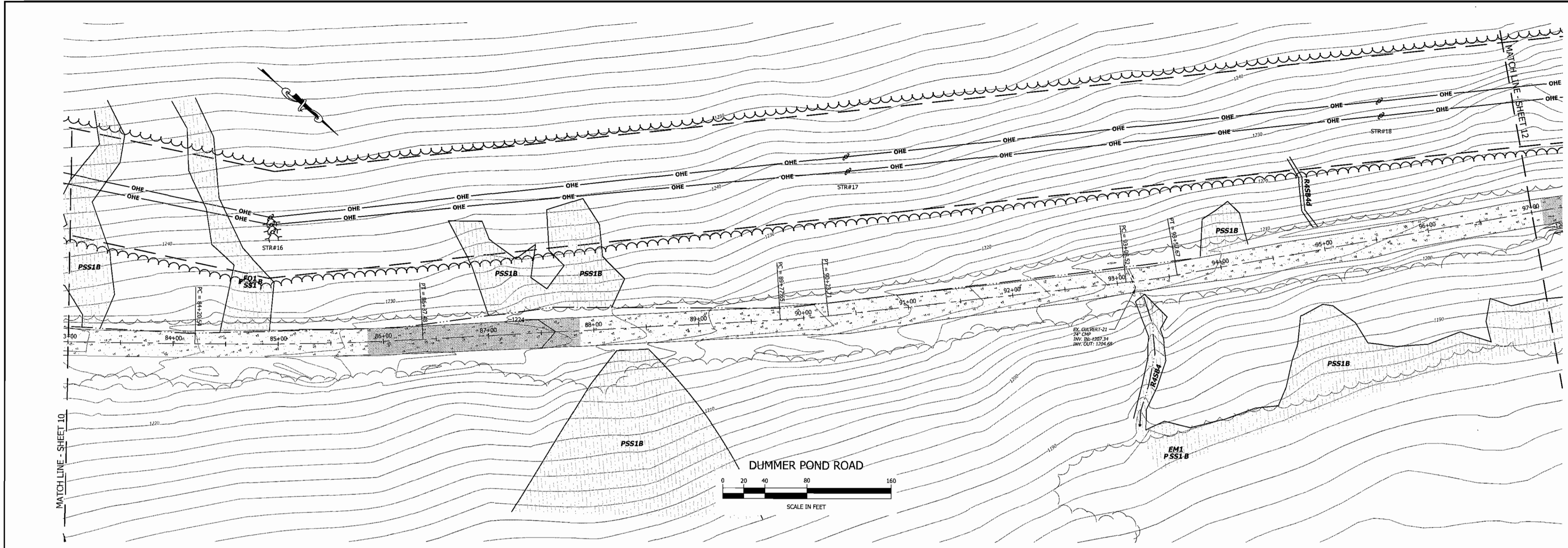
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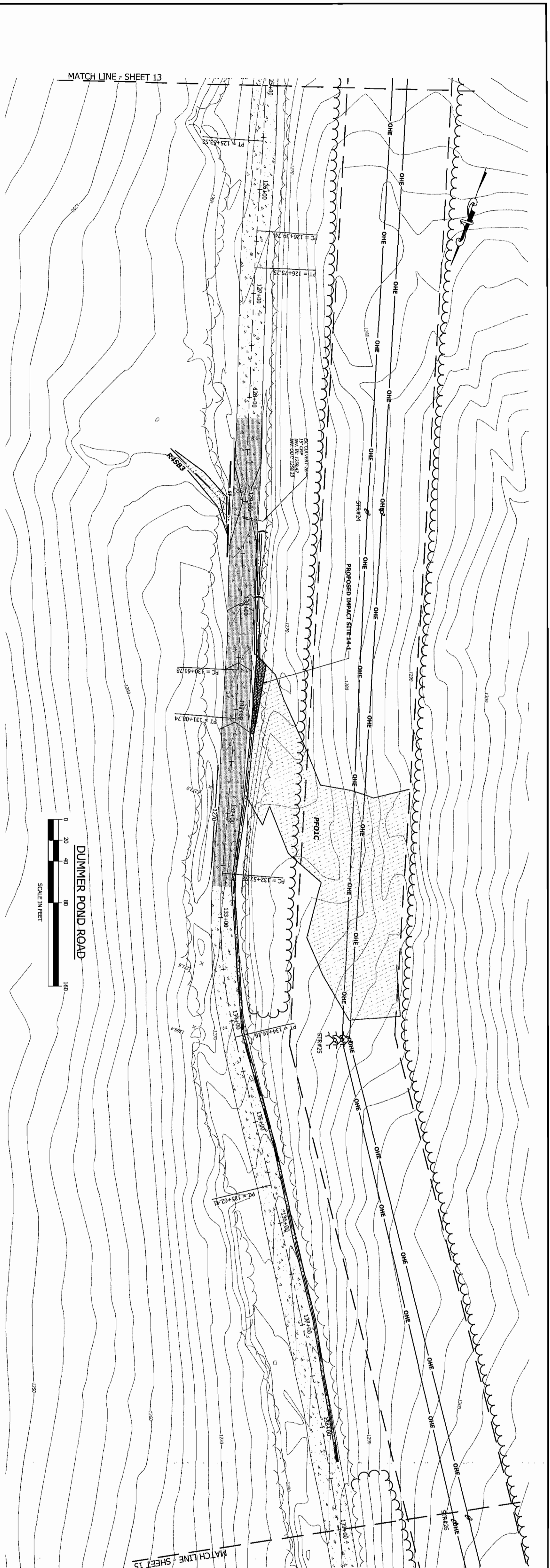
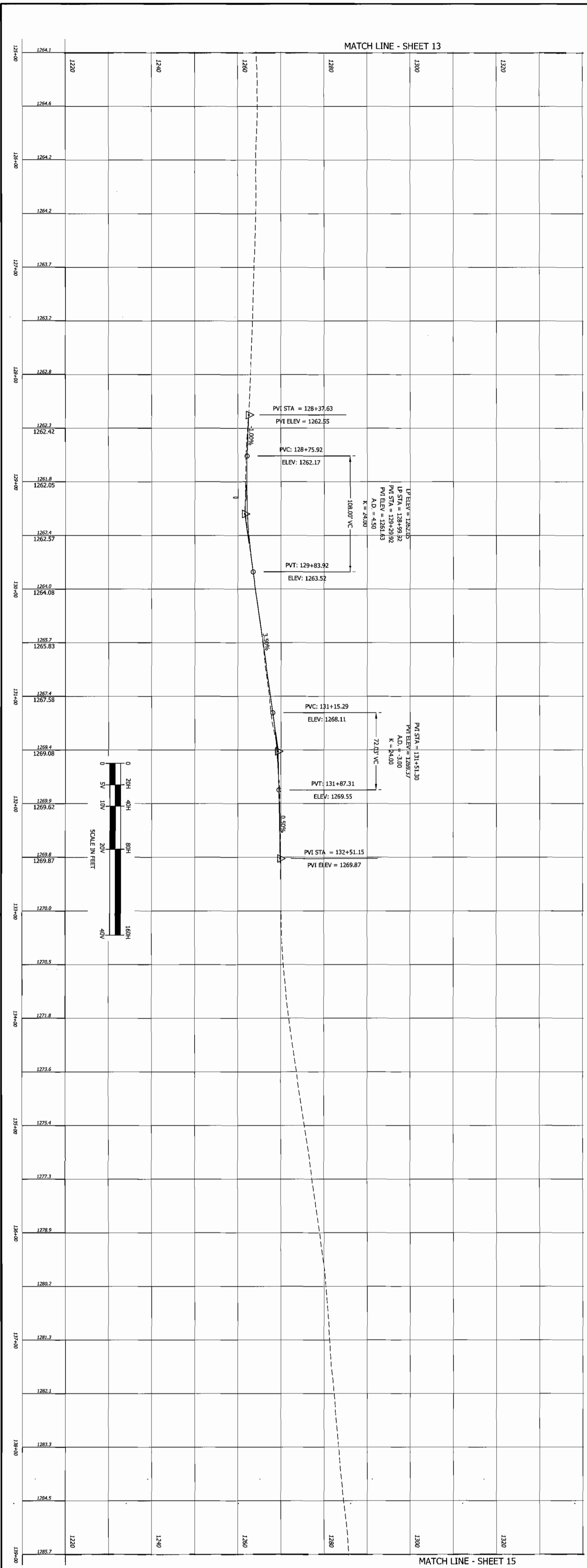
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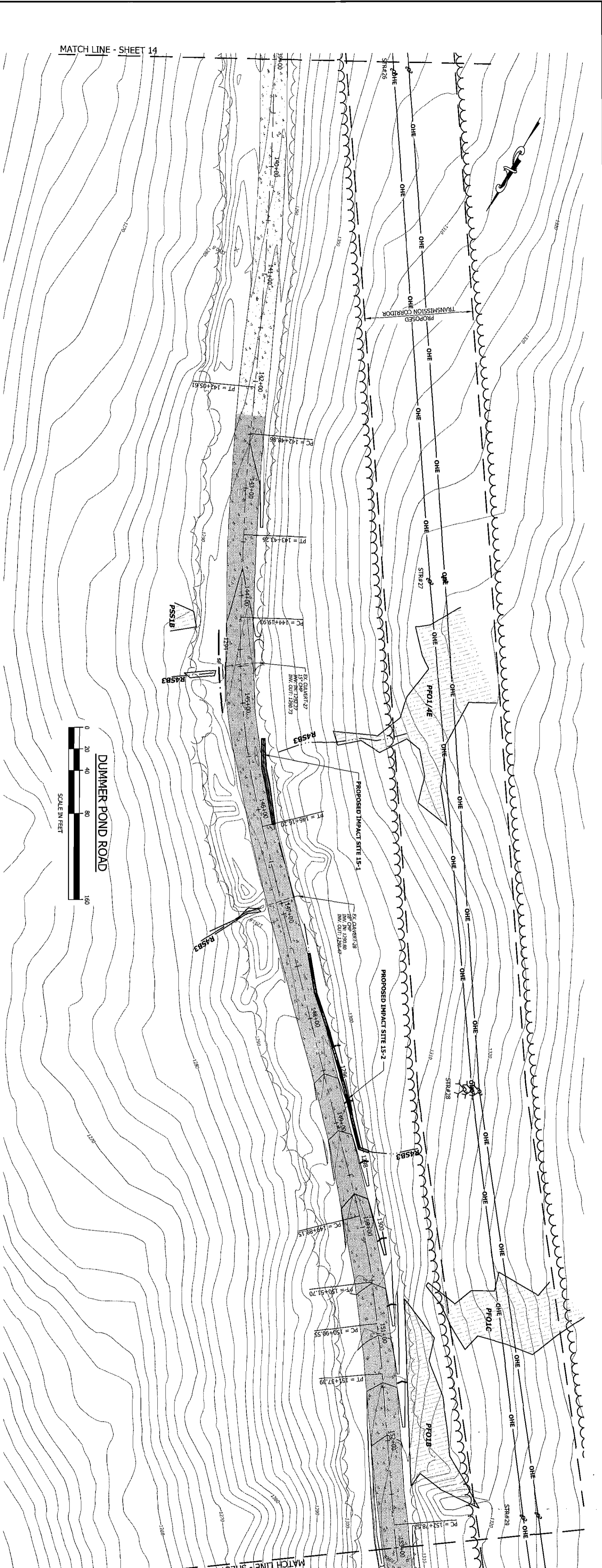
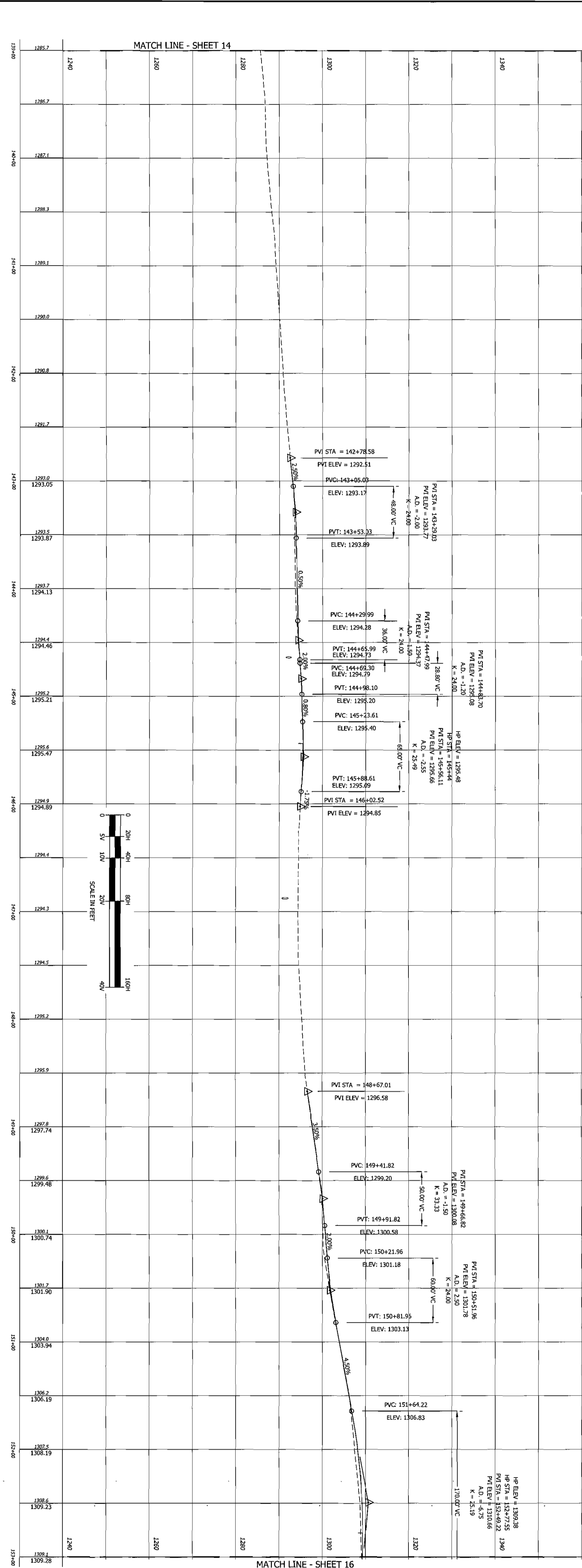
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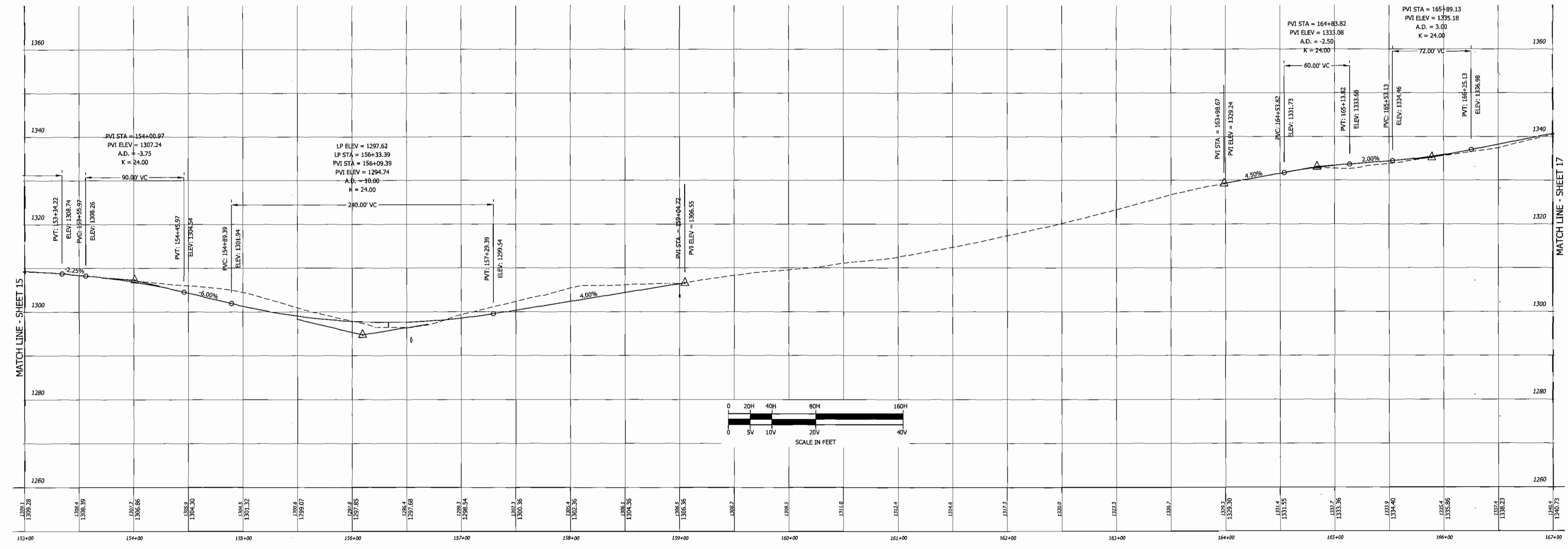
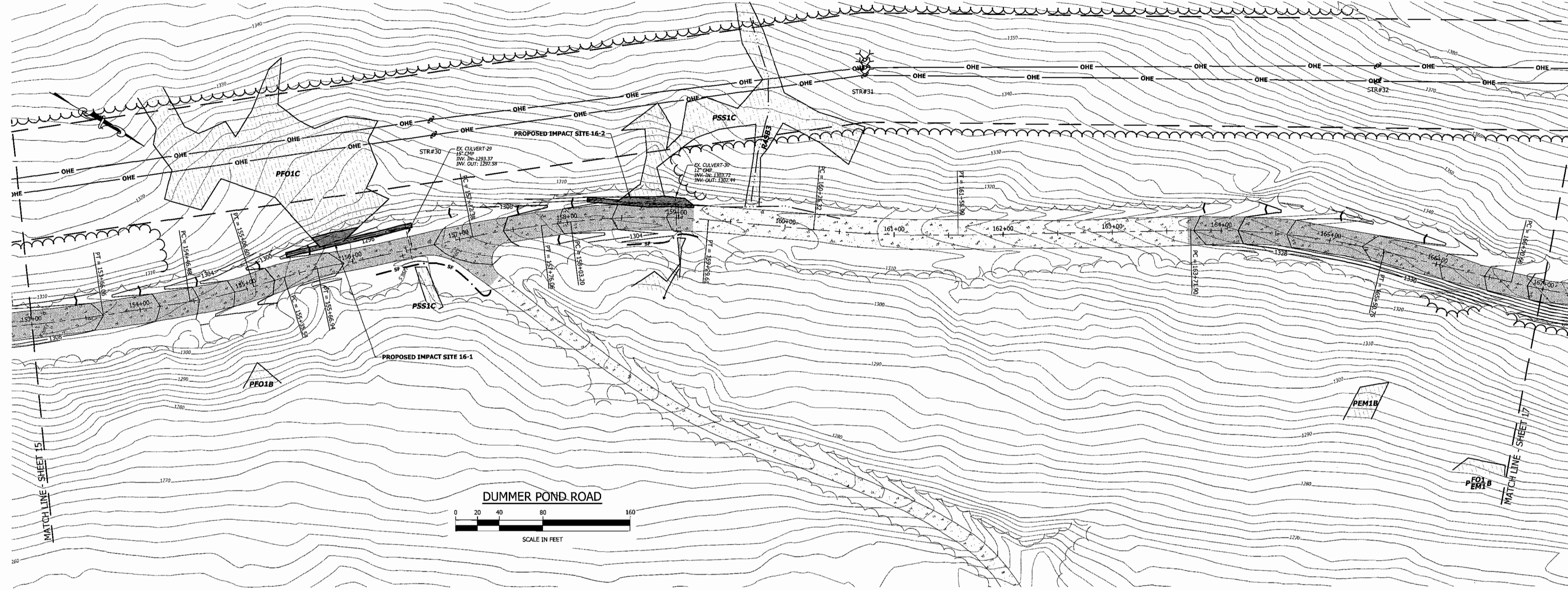
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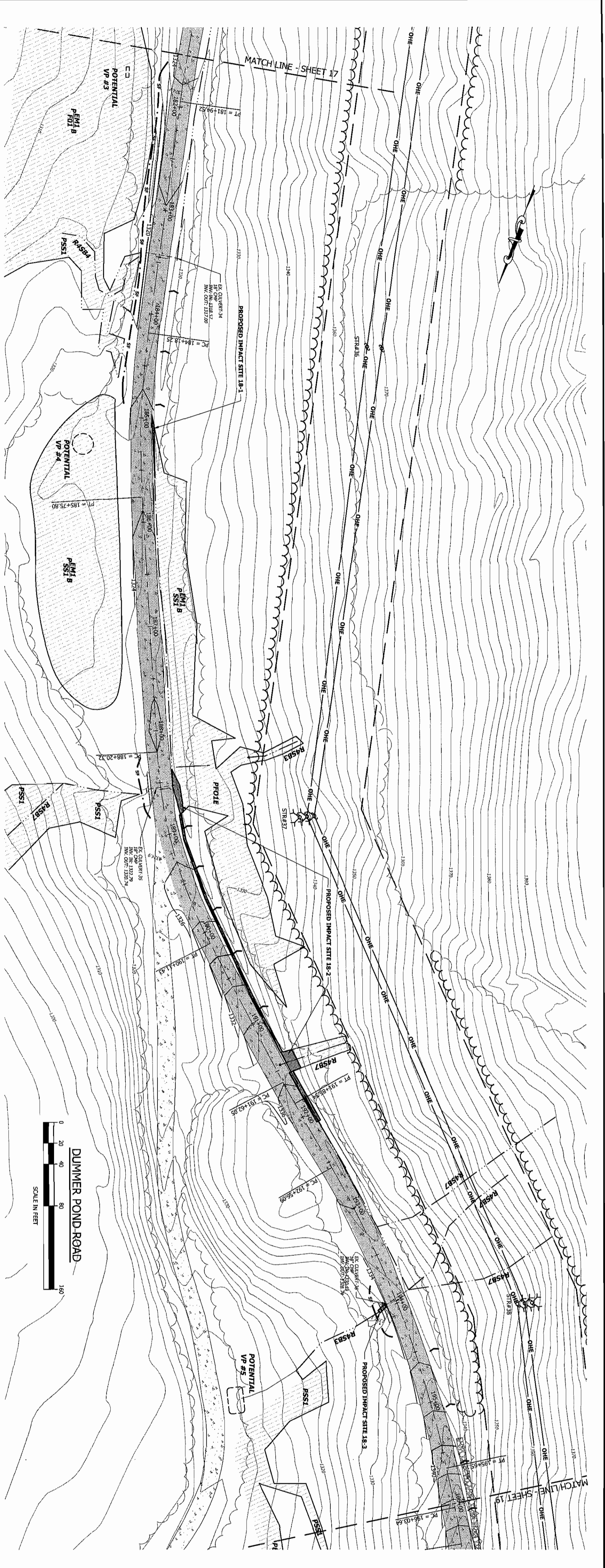
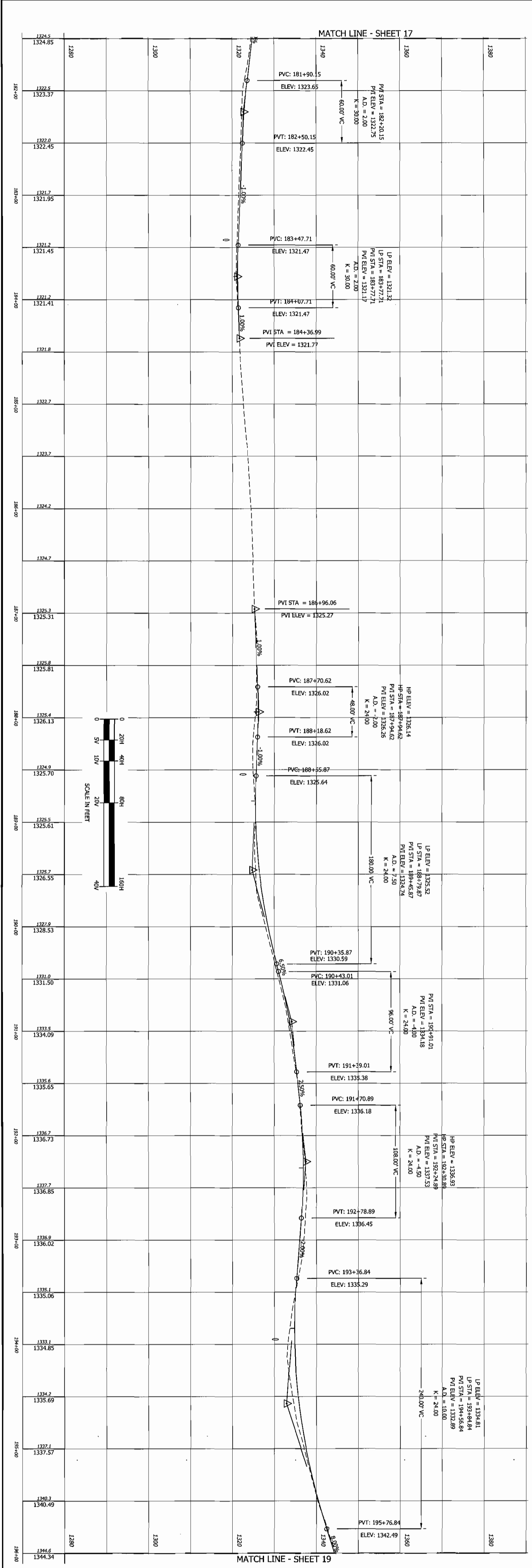
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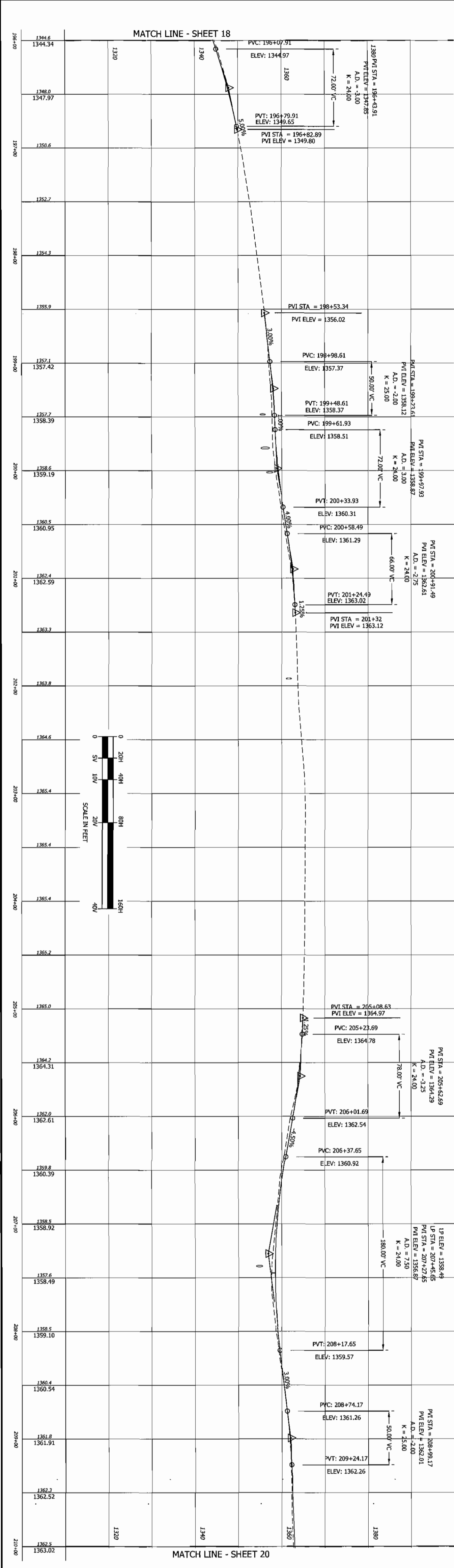
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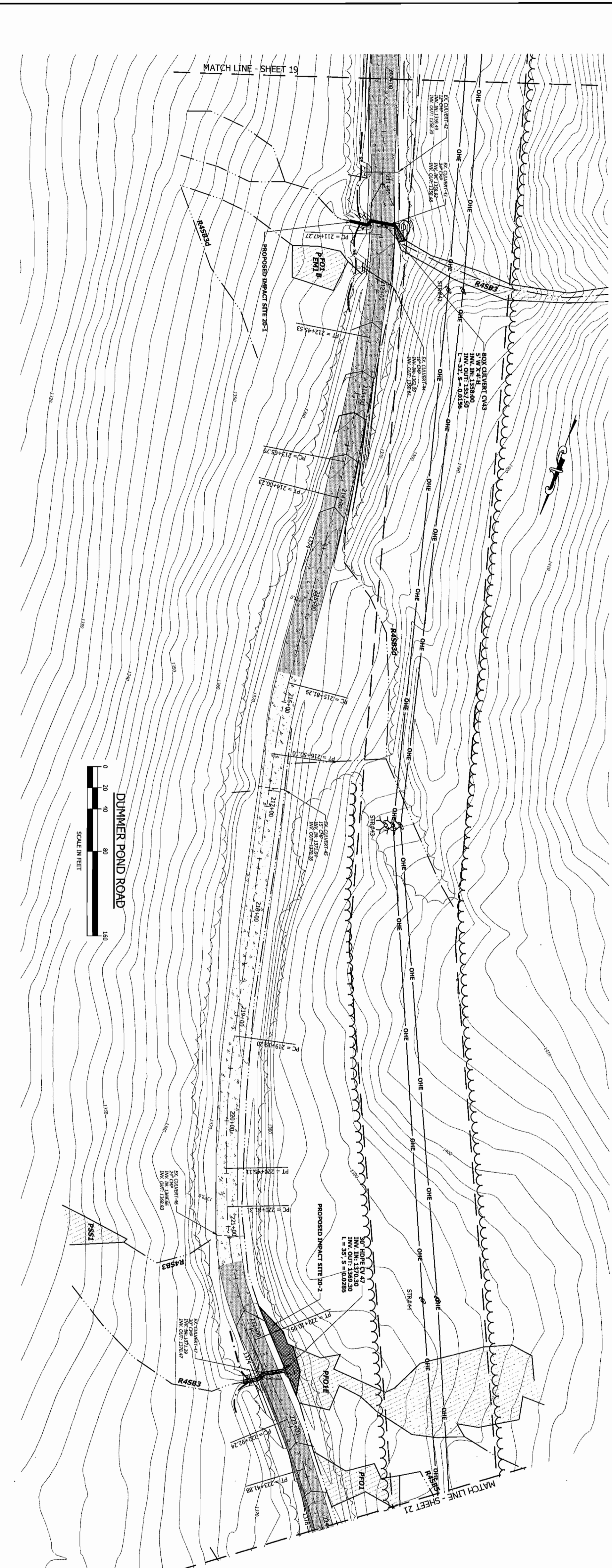
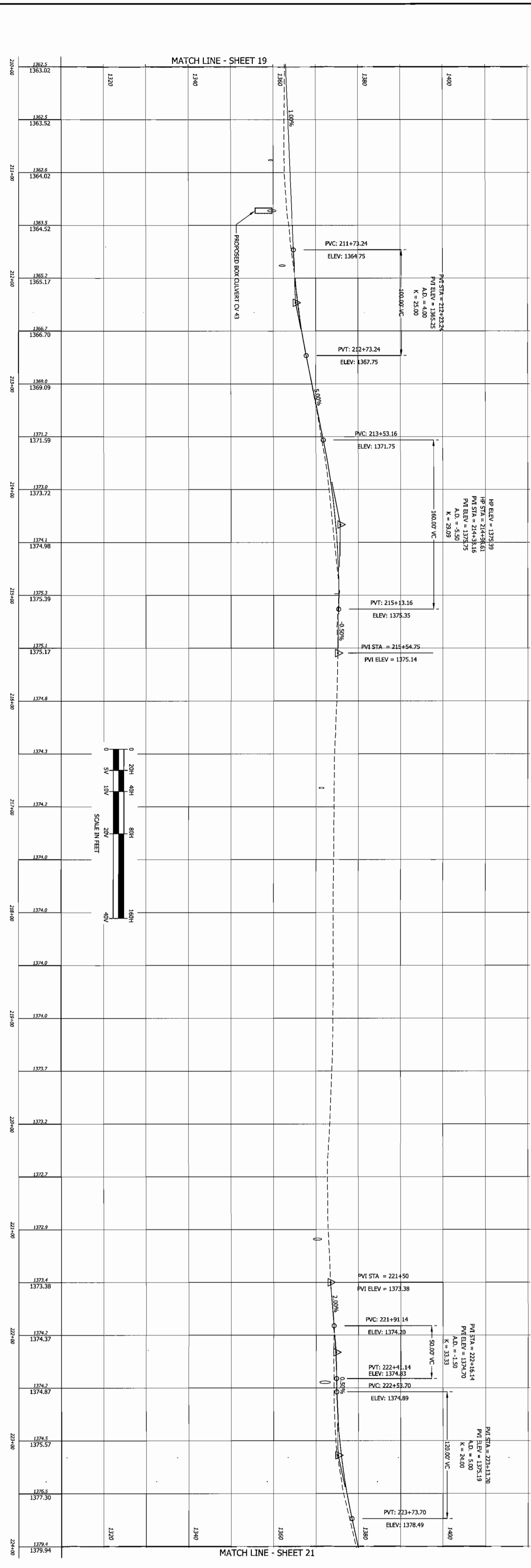
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**SITE PLAN AND ROADWAY PROFILE**

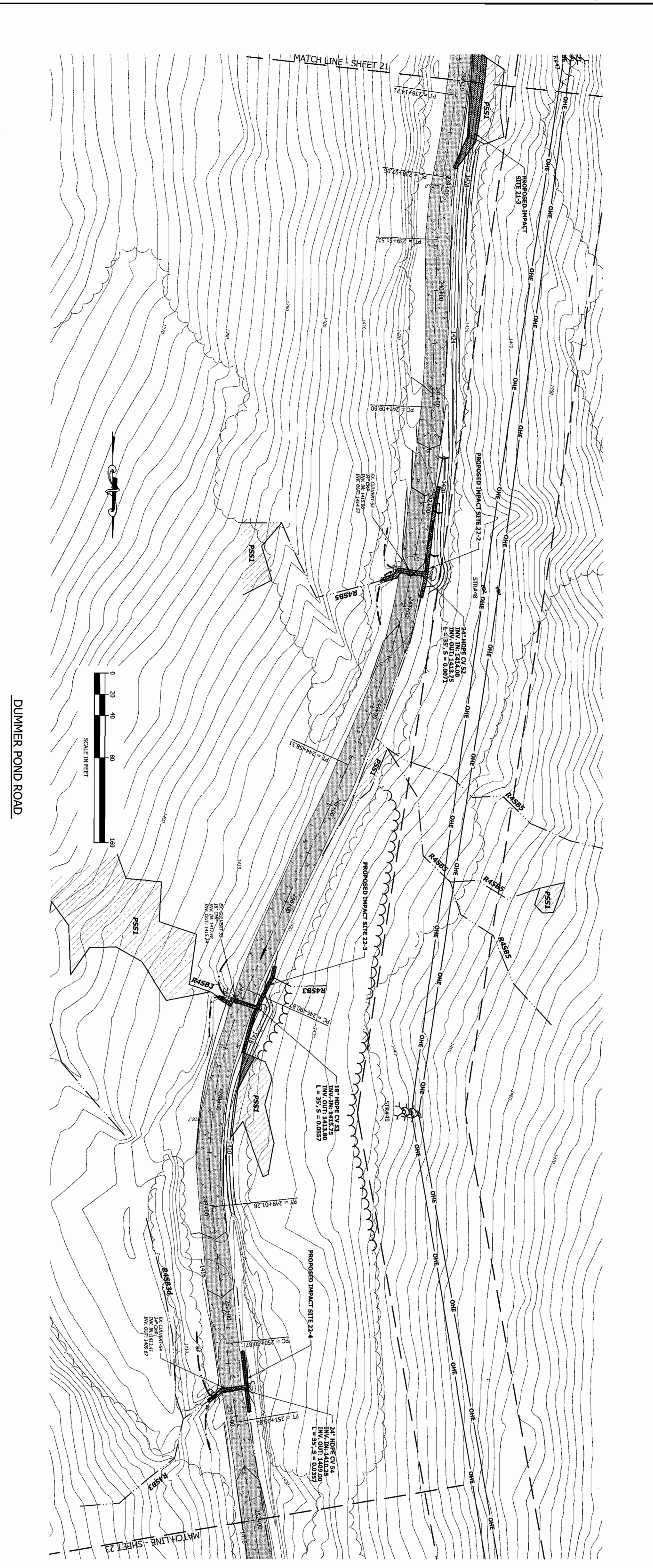
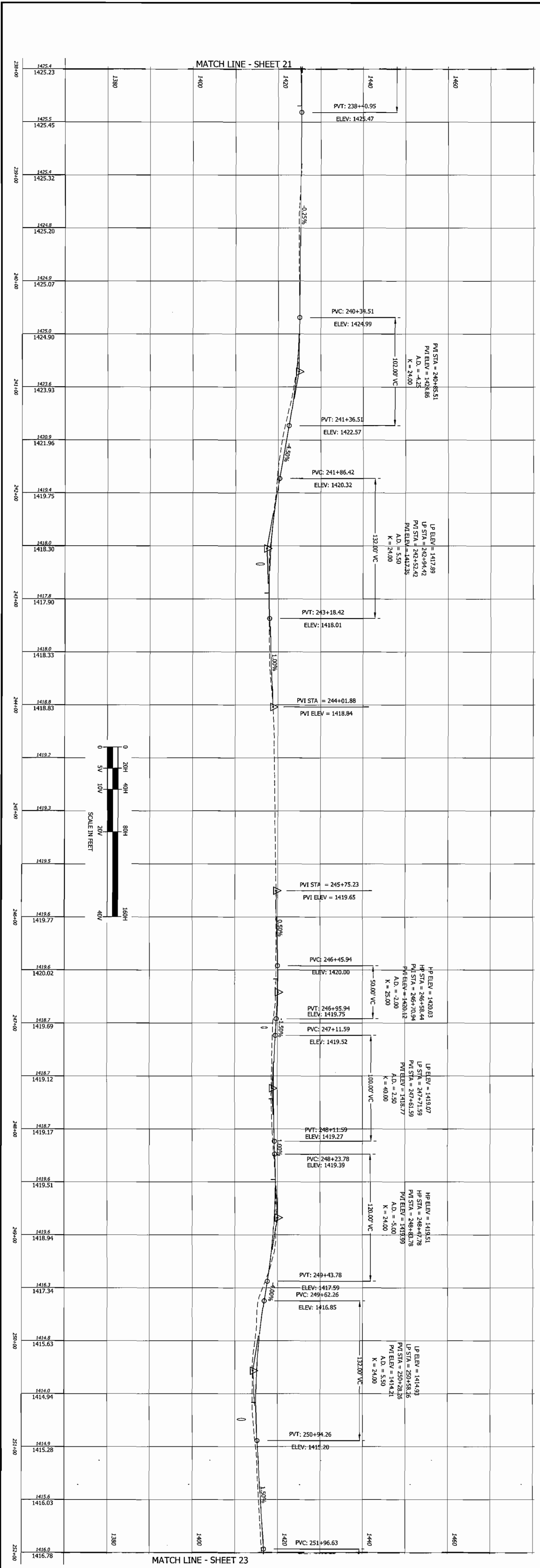
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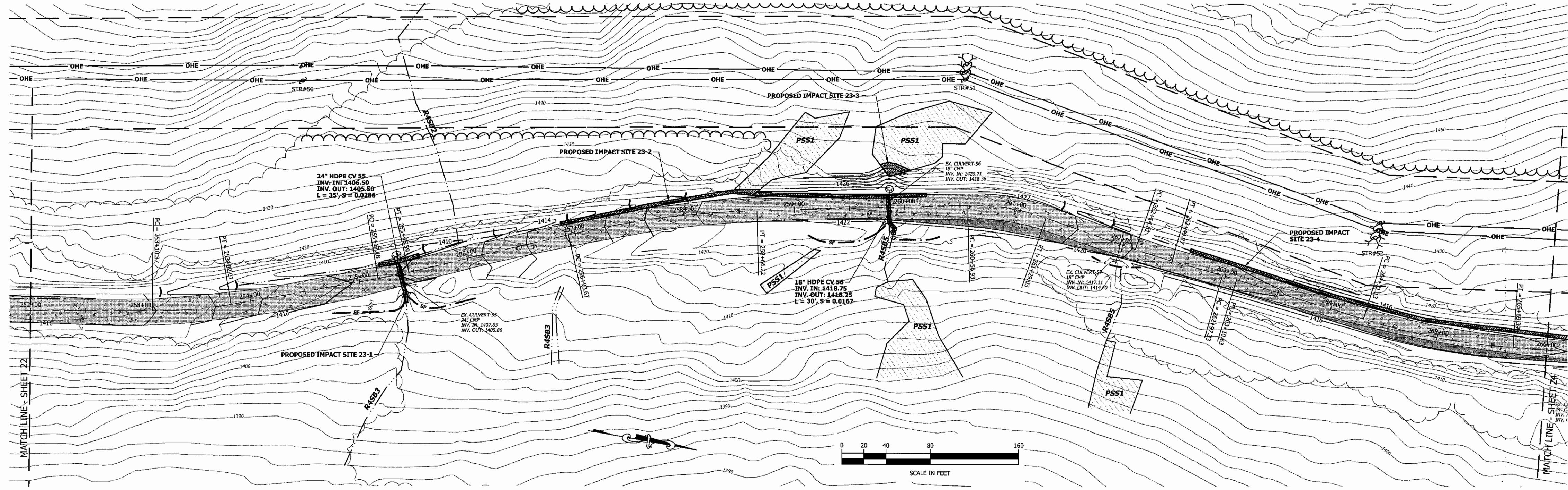
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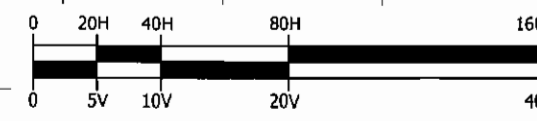
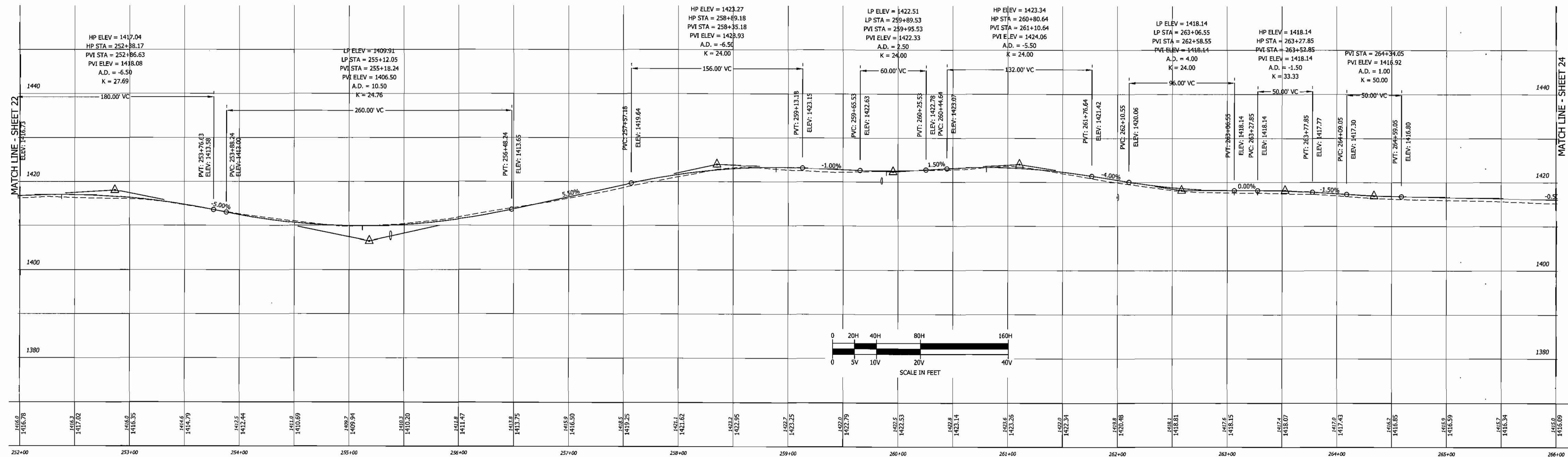
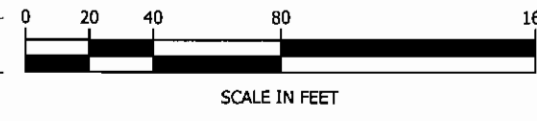
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DUMMER POND ROAD



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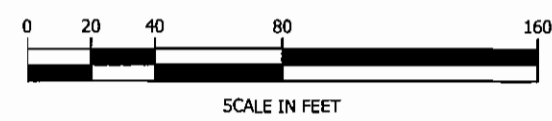
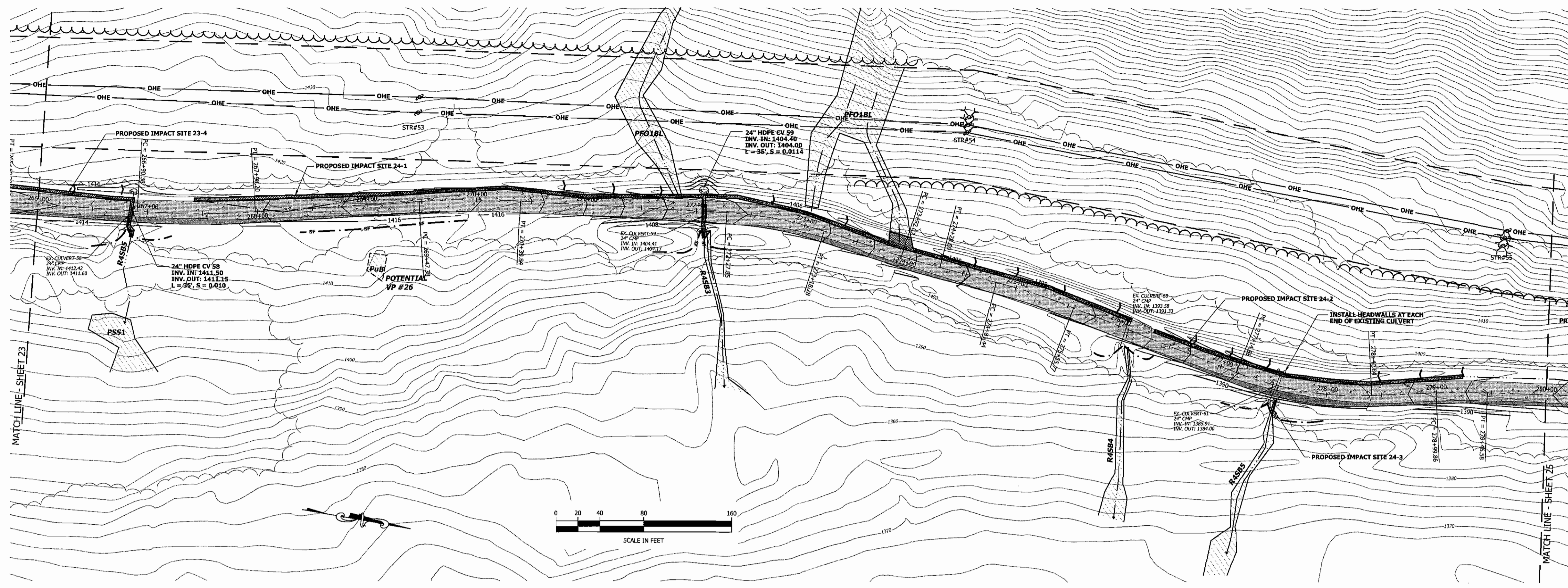
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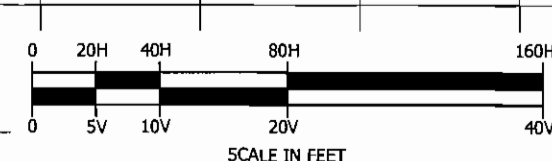
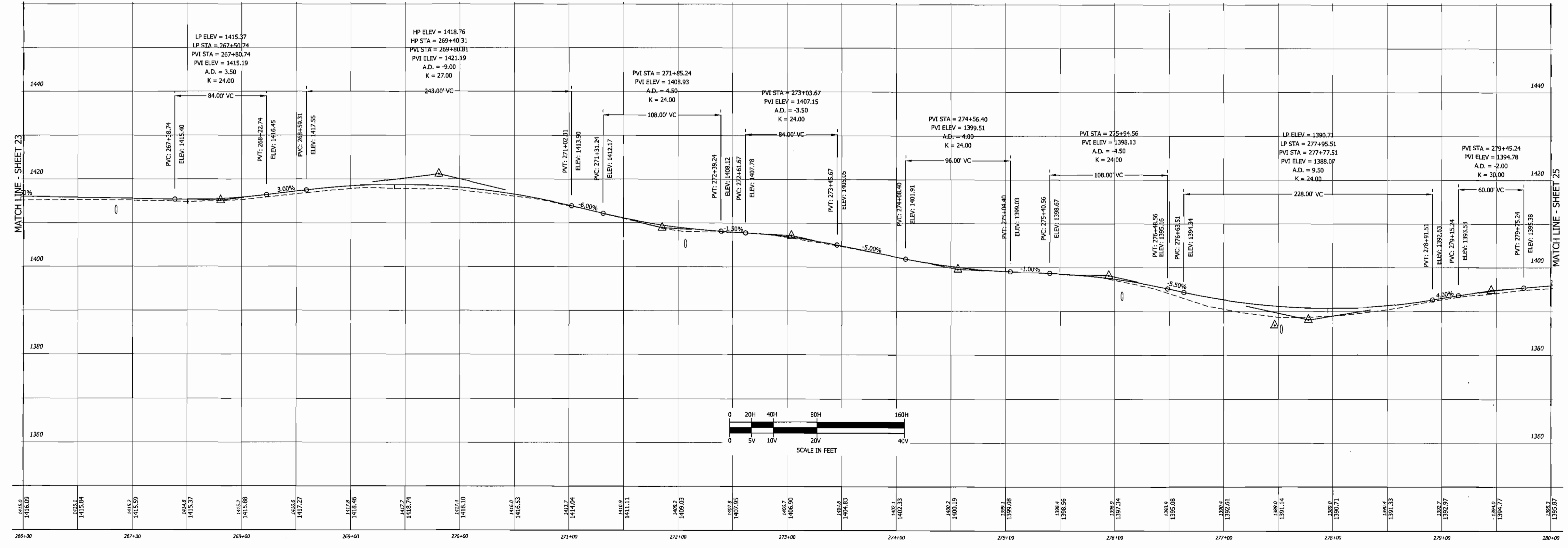
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PUB	PUB
CHECKED BY:	APPROVED BY:
SP	T-HPB

SHEET 23 OF 143



DUMMER POND ROAD



NO.	DATE	REVISION DESCRIPTION	ENG	DWG
1	1/2008	REVISED AS PER INDCOORDINATES & LOT COMMENTS	PLB	PLB

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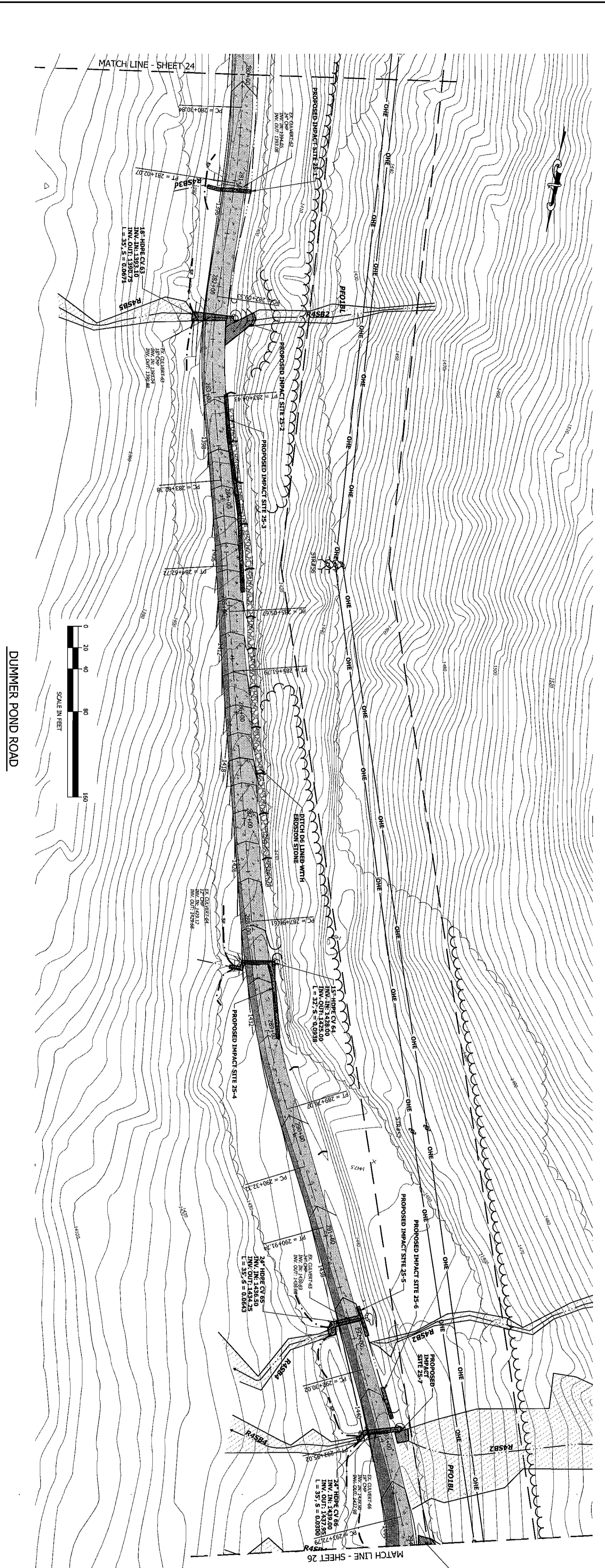
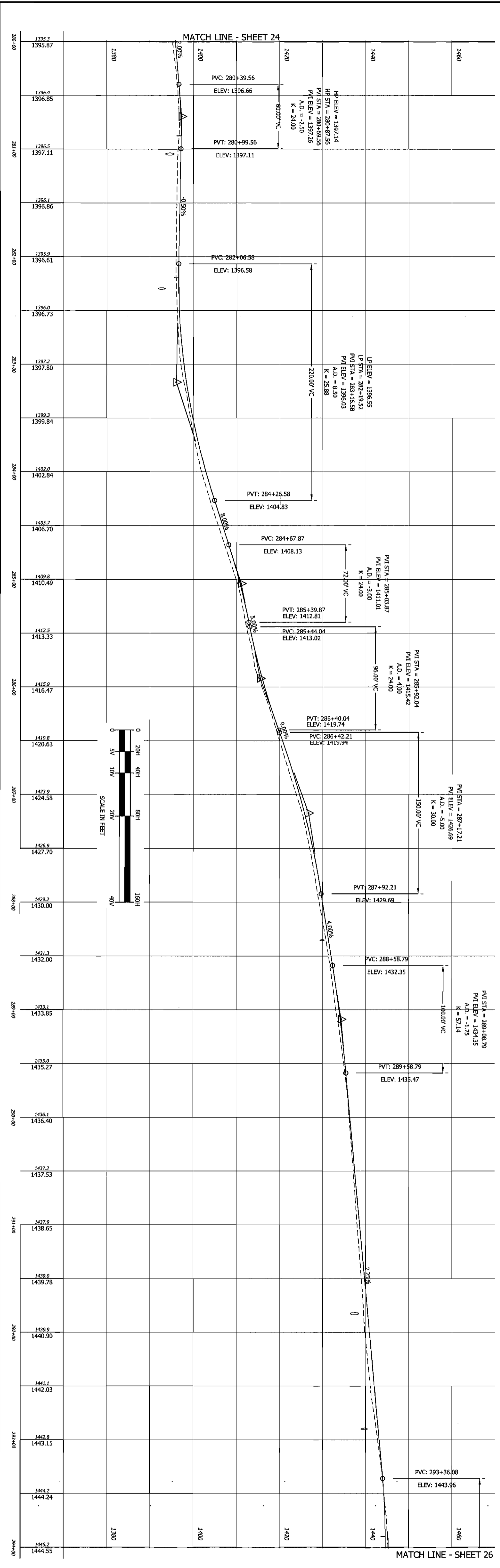
**GRANITE RELIABLE POWER, LLC**  
GRANITE RELIABLE POWER WIND PARK  
COOS COUNTY, NEW HAMPSHIRE

EXISTING ROADWAY IMPROVEMENTS  
SITE PLAN AND ROADWAY PROFILE

DATE:	PROJECT #:
JULY 2008	07990
ENGINEER BY:	DRAWN BY:
PLB	PLB
CHECKED BY:	ARCHITECT:
SHL	H-HRB

SHEET 24 OF 143

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DATE:	PROJECT #:
JULY 2008	07090
ENGINEER BY:	DRAWN BY:
PLB	PLB
CHECKED BY:	ARCHIVE #:
SML	H-4498

**GRANITE RELIABLE POWER, LLC**  
**GRANITE RELIABLE POWER WIND PARK**  
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**EXISTING ROADWAY IMPROVEMENTS**  
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**Horizons Engineering**

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NO.	DATE	REVISION DESCRIPTION	ENG	DWG
1	12/08	REVISE AS PER NIDES-WETLANDS & AOT COMMENTS	PLB	PLB

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# Compensatory Wetland Mitigation Plan Analysis Granite Reliable Power Wind Park

R. Lobdell, CWS  
Lobdell Associates Inc.  
Revised 2/12/09

## **1. Introduction**

The purpose of this report is to summarize the alternatives considered in developing the compensatory mitigation plan for the Granite Reliable Power, LLC wind park project which is proposed in the Towns of Dummer, Dixville, Ervings Location, Millsfield, and Odell.

For the purposes of this report, the project area is defined as the linear area in and adjacent to the project as shown on the project plans and includes a 500 foot diameter circle around each wind turbine location and an area along the proposed roads with a width from 200 to over 400 feet. The project site is the 80,000 acres of commercial forest land on which the project is located.

## **2. Wetland Mapping and Classification**

Wetlands in the project area were delineated according to the standards of the 1987 Federal Manual (COE, 1987) and the rules of the NH Wetlands Bureau. Wetlands were flagged in the field by NH certified wetland scientists in the months of April, May, and June of 2008. The wetland flags were surveyed onto the project plans by Horizon Engineering. Horizons Engineering assembled a team of wetland scientist to complete the mapping which included the following NH certified wetland scientists: Raymond Lobdell, CSS, CWS (Delineation Coordinator); Michael Cuomo, CSS, CWS; Greg Howard, CSS, CWS; Marc Jacobs, CSS, CWS; Thomas Peragallo, CSS, CWS Nancy Rendall, CSS, CWS; Jonathan Sisson, CSS, CWS; Sean Sweeney, CWS, PE Jennifer West, CWS; Barry Keith, CWS; David Allain, CSS, CWS; Patrick Fairbairn,



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Wetlands were classified by the same team of wetland scientists according to the US Fish and Wildlife Service (USFWS) classification method as described in [Cowardin. et al. \(1979\)](#). Wetland classifications are shown on the project area plans.

The wetlands in the project area are primarily forested with poorly drained glacial till and shallow to bedrock soils. Generally speaking, vegetation in both the wetlands and adjoining uplands is dominated by facultative and or facultative upland plants. As the elevation increases, so does the presence and dominance of hydrophytes found in the uplands. Therefore, soils rather than vegetation was frequently the most important factor in wetland determination. Soils, however, were often problematic due to cryic conditions above 2500 feet, dark parent materials, and spodic conditions.

The dominant vegetative class is Palustrine forested wetland including evergreen forested, broad leaf deciduous forested, and complexes of the two. Tree species often also dominate in the sapling and shrub layers in both forested and more recently cut over areas. Evergreen species include balsam fir, red spruce, and black spruce with an understory of evergreen saplings and shrubs and a ground cover which includes sphagnum, goldthread, and occasional concentrations of ferns and sedges, Deciduous forested wetlands include yellow birch, red maple, and sugar maple with a shrub layer including hobblebush, striped maple, willow, raspberry, and an herb layer including sensitive fern, trout lily, jewel weed, false hellebore, and foam flower, Additional wetland classes include Palustrine scrub shrub wetlands of speckled alder and willow. Concentrations of carex, juncus and scripus species were often found in skidder trails; and alder, willow, and elderberry were found in mature ditches along the edge of log roads and skid trails.

The project area is located in the headwaters of two major river systems-the Connecticut and the Androscoggin. The majority of the main road system and the access roads to the FishBrook and Kelsey/Owlhead turbine strings drain to the west and are part of the Phillips Brook subwatershed, which drains to the south to the Upper Ammonoosuc River and on to its connection with the Connecticut in Northumberland. The Dixville turbine string access road drains eastwards to West Branch Clear Stream and then on to the Androscoggin River in Errol. Finally, the first six miles of the main access road from Route 16 drains to the east to Dummer Pond Brook which flows southeast to the Pontook Reservoir, a part of the Androscoggin River.

### **3. Wetland Functions and Values**

For the purposes of discussing wetland functions and values within the project area, the wetlands have been placed into three groupings based primarily on elevation, slope, and existing/ proposed land use. The groupings are as follows:

Group 1 – Includes wetlands in lower reaches of the project from Route 16 along

the Dummer Pond Road corridor with northern hardwood and low-land spruce-fir forest with a corridor length over 14 miles. The road which divides the project area is a private well maintained logging road used for the transportation of wood products from the area. A high percentage of the wetlands are impacted by the road system, ditching, skid trails and decades of logging. Wetland classes are dominated by Palustrine forested deciduous and deciduous/ evergreen mix with both seasonal and perennial streams crossing or paralleling the road system. Elevations range from 1200 feet at the junction of Route 16 and Dummer Pond Road to 2200 at the turn up to the Dixville Peak turbine string.

Group 2 – Includes wetlands along the three access road corridors for each of the turbine strings-Fishbrook, Kelsey/Owlhead, and Dixville Peaks- and the transmission line. These corridors are also located in northern hardwood and low-land spruce-fir forests and have less developed existing roads which include secondary logging roads that are not currently in use and have had many of the culverts removed and may or may not be used for recreational trails for snowmobiles or ATVs. They are relatively steep with elevations ranging from 1700 to about 2400 feet. Wetlands in this group are Palustrine forested deciduous, Palustrine forested evergreen and a combination of deciduous/evergreen, generally with poorly drain mineral soils. Most streams present are seasonal, fast flowing mountain streams.

Group 3 – Includes wetlands along the three strings of the turbines Fishbrook, Kelsey/Owlhead, and Dixville Peaks and are generally located in a high-elevation spruce-fir forest system. Wetlands are predominately Palustrine forested evergreen.

A qualitative function and values assessment of wetlands in the project area has been completed by Lobdell Associates. The evaluation was completed using a method developed by the COE detailed in a report entitled "The Highway Methodology Workbook Supplement" (COE, 1999). Although the system was developed primarily for projects where the characterization of wetlands was necessary for permit requirements for Section 404 of the Clean Water Act, the system is suitable for a variety of evaluation applications. The system evaluates thirteen functions and values. Each of the wetland groupings in the project area was evaluated and the results are shown in Table 1 and discussed below. Evaluations were based on professional judgment, using information collected in the field and from existing maps and reports.

**1. Groundwater Recharge Discharge:** This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. Considerations for this function included the presence of glacial outwash soils or potential aquifers. All three wetland groups are dominated by glacial till and have no identified aquifers ( USGS (Plates #4 and 7. WRIR 96-4318) nor are there any public or private wells in the immediate area.

**2. Floodflow Alteration:** This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods to reduce flood peaks. None of the 3 wetlands groups have significant floodflow value characteristic and they protect no land uses directly downstream from damage.

**3. Fish and Shellfish Habitat:** This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat. Group 1 wetlands include Phillips Brook and tributaries including No. 3 Brook, Walkinson Brook, Wells Brook, and Kelley Brook, which may support populations of brook trout. Group 2 wetlands include the West Branch Clear Stream in the Androscoggin River watershed which also may support populations of brook trout. While trout are not stocked on site, the streams are stocked with trout further down the watershed.

**4. Sediment/Toxicant/Pathogen Retention:** This function reduces or prevents degradation of water quality. It relates to the potential effectiveness of the wetland as a trap for sediments, toxicants or pathogens in runoff water from surrounding uplands of upstream eroding areas. None of the wetland groups have significant characteristics that support this function due to steepness, high associated water course velocities, road side ditches. There are no wells or water supplies immediately downstream. However, Groups 1 and 2, and to a lesser degree 3, are potential sources of sediment from commercial logging activities in and around them.

**Table 1**  
**Wetland Functions and Values**

<b>Function</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Groundwater Recharge	7	5,7	6
Floodflow	3,13	2,3,	2,3,
Fish/Shellfish	1,4,7,8,14,17	1,4,7,8,14,17	1
<b>Sediment/Toxicant</b>	<b>1,10</b>	<b>1,10</b>	<b>1,10</b>
Nutrient Removal	-	-	-
Production Export	1,4	1,4	1
Sediment/Shoreline	1,2,3,8	1,2,3,8	2,8
<b>Wildlife Habitat</b>	<b>2,4,5,7,8,17</b>	<b>2,4,5,7,8,17</b>	<b>2,4,5,7,8,17</b>
<b>Recreation</b>	<b>2,3,4,5</b>	<b>2,3,4,5</b>	<b>2,3,4,5</b>
Educational/Scientific	-	-	-
Unique/Heritage	19	19	19
Visual/Aesthetic	4	4	
Endangered	1	1	1

See Attachment B for explanation of reference numbers for rationales for each

-function/value determined not present

**Bold primary functions**

**5. Nutrient Removal/Retention Transformation:** This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms. This function is limited in all three wetland groups due to wetland characteristics including a lack of nutrient attenuation, steepness and high velocities in associated streams. No significant nutrient sources exist above the wetlands.

**6. Production Export:** This function evaluates the effectiveness of the wetland to produce food or usable products for man or other living organisms. Wildlife use the wetlands as a source of food and were observed in the wetlands including deer, moose, bear, beaver, woodcock and a variety of other birds. Food sources are particularly high in the re-growth present in forested wetlands that have been logged.

**7. Sediment/Shoreline Stabilization:** This function considers the effectiveness of a wetland to stabilize stream banks and shorelines against erosion. The wetlands and associated streams are sloping, have high velocities and evidence of sediment in wetlands and stream bank erosion present, particularly in Groups 1 and 2 due to commercial forestry upstream.

**8. Wildlife Habitat:** This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. All wetlands on the site have this as an important value for a wide variety of reasons including location in a large undeveloped forest, high water quality, cover, food, etc. Group 3 wetlands have the least vegetative interspersions, open water or variety of food sources. Additional information on wetland wildlife functions is available elsewhere in the project's application.

**9. Recreation:** This function considers the wetland and associated watercourses to provide either consumptive or non-consumptive recreational opportunities. While the lack of either large open water or wide streams limits traditional wetland recreational opportunities, the recreational value of wetlands is high due to their location in a large undeveloped forest that is currently available for recreation including hunting, fishing, hiking, etc.

**10. Educational/Scientific Value:** This value considers the suitability of the wetland as a site for an outdoor classroom or as a location for scientific study or research. While the extensive logging road system makes otherwise remote educational or research sites accessible, the educational value of all wetlands is low due to remoteness from schools, research, and educational facilities that would most likely have more diverse wetlands at closer locations. Group 3 wetlands being more remote than Group 1 do offer high elevation and cryic soil research opportunities.

**11. Uniqueness/Heritage:** This value considers the effectiveness of the wetland or its associated water bodies to provide certain special values including archaeological sites, critical habitat, ecological system health, etc. None of these wetlands provides this

function. However, there are opportunities for wildlife viewing along the main logging road in Group.

**12. Visual Quality/Aesthetics:** This value considers the visual and aesthetic quality or usefulness of the wetland. The wetlands are forested and cannot easily be viewed. Additionally, commercial forest activities, including logging, yarding and the transportation of wood products is on-going therefore reducing this value. However, the hardwood forest in Groups 1 and 2 do turn vibrant colors in the fall.

**13. Endangered Species Habitat:** This value considers the suitability of the wetland to support threatened or endangered species. The NH Natural Heritage Inventory was contacted and their report is enclosed with the wetlands application. Several state threatened or endangered species in the vicinity of all three wetland groups include the Osprey, American Marten, Common Loon, Northern Harrier, Pied-billed Grebe, Farwell's Water Milfoil, Lily leaved Twayblade, and Wapato.

#### **4. Wetland Impacts**

The total wetland impacts for this project are 13.5 acres with 537 wetland impact sites ranging in size from less than 4 to 16,925 square feet in size. Wetland impact sites include ditches, seasonal stream crossings, perennial stream crossings (15), forested wetlands, scrub shrub wetlands, and emergent wetlands. Many of the impacts are small with over 50% less than 500 square feet and many of these in wetlands previously impacted by logging. These include ditches and shrub or emergent wetlands formed in previously disturbed areas. Approximately 50% of the impact sites are streams or existing ditches while the remainder are Palustrine forested wetlands.

Wetland Impacts also included vernal pools. A total of 1 natural vernal pool and 7 man-made, mature vernal pools are directly impacted by the project due to road construction or re-construction. They range in size from 65 to 1549 square feet with all located along access roads. Four are located at higher elevations. Total extent of vernal pool impact is 3,454 square feet.

The revised Table of Impacts and plans in the wetlands application package, prepared by Horizons Engineering, detail the wetland impact sites.

## 5. Compensatory Mitigation Opportunities

Various options were assessed to mitigate the 13.5 acres of unavoidable wetland impacts including the in lieu of mitigation fee, restoration, creation, upland buffer preservation, or a combination of options.

- **In Lieu of Mitigation Fee**

This mitigation option is not available in NH for this project since the wetland impacts area is greater than one acre.

- **Restoration/Creation Alternative Analysis- logging yards and logging impact areas.**

Opportunities for restoration within the project area relate almost exclusively to impacts from commercial logging operations. These include truck roads, skidder trails, and log yards. As part of the mitigation alternatives analysis, a preliminary study of logging impact areas was undertaken. While there are logging impacts throughout the 80,000 acres, the study focused on inventorying logging impacts within the area, specifically Dummer Pond Road. This is the main log truck road into the site and within the wetland delineation corridor of the project.

The study included inventorying all logging impact areas along either side of the road from its junction with Route 16 to where the project access road turns off Dummer Pond Road, a distance of over 13 miles. The preliminary inventory was conducted in June of 2008 and the results are shown in Table 2. A total of 23 potential restoration sites were found which vary in size from about ¼ to 1 acre in size and include 17 yards, 4 skidder trails with associated wood slash/debris, and linear piles of stumps/soil from road building operations. Material in the yards includes bark, chips, limbs and other wood debris and soil material incorporated during log yard operations. The depth of material varies from one to several feet. Yards are located on one or both sides of the road and vary in size, both in length and width. Skidder trails inventoried are those that were associated with the yards and exhibited the logging BMP of filling wet ruts with logging slash to minimize erosion and sedimentation.

**Table 2**  
**GRP Preliminary Logging Restoration Site Inventory-6/18/08**

Site	Dummer Pond Road Mile	Side of Dummer Road	Type	Approx. Size (ft.)	Approx. Extent (acres)	Comment
1	1	East	Debris Piles	30' x 900'	.62	Old piles of soil, stumps from road
2	1	East	Yard#1	75' x 350'	.60	Log yard abutting road
3	1	East	Debris Piles	30' x	.69	Old piles of soil, stumps from when road was
4	1	East	Debris Piles	30' x	1.38	Old piles of soil, stumps from when road was
5	2	East	Yard #2	100' x	.23	
6	3	East	Yard #3	100' x	.69	Near alternate switch yard site
7	3	West	Yard #4	50' x 150'	.2	
8	4	West & East	Yard 5	50' x 200'	.23	
9	5	West	Yard #6	50' x 200'	.23	
10	5	West & East	Yard #7	50' x 250'	.29	
11	7	West & East	Yard #8	75' x 300'	.52	Mostly on east
12	7	East	Yard #9	100' x	.23	
13	10	West & East	Yard #10	75' x 175'	.30	One of larger yards
14	11	West	Yard #11	100' x	.23	
15	11	East	Skidder	20' x 600'	.28	Thick layer of slash laid in wetland-recent
16	11	East	Skidder	20' x 100'	.05	Thick layer of slash laid in wetland-recent
17	11	East	Yard #12	100' x	.34	
18	11	West	Yard #13	100' x	.57	

19	11	East	Skidder	20' x 300'	.18	
20	12	East	Yard #14	150' x	.52	
21	12	West	Yard #15	100' x	.46	
22	12	West & East	Yard#16/Sk	100' x	.58	Yard both sides of road with skidder trail with
23	13	West & East	Yard #17	50' x 250'	.29	West side wetland, east upland

Restoration of the yards would include both wetland and upland components and consist of removal of log debris, shaping to blend in with surrounding landscape, seeding down with a forest wetland seed mix, and planting with native trees and shrubs. Creation of wetlands in these areas would be preferred over using other, more natural upland areas because the disturbance renders the upland value of these areas extremely low.

The preliminary inventory shows that while restoration and creation opportunities exist that exceed the required compensatory mitigation requirements, this is not the preferred mitigation alternative for several reasons. First the surrounding land will remain in commercial forest operation. These yards and other impacts were generally located by foresters in areas that best met the logistical needs of a particular logging operation. Since all of these areas will continue to be logged, logging yards will always be needed, so it makes little sense to eliminate the existing yards only to impact similar areas again at a later date. Secondly, the restoration sites are all relatively small and spread out which limits their value and each would require an easement to protect the area in perpetuity. Monitoring them long-term would be problematic and expensive as well.

During the wetland delineation site tour in July, 2008, which included Rich Roach and Paul Minkum of the US Army Corps of Engineers, and Craig Rennie of the NH Wetlands Bureau, several of the restoration sites inventoried were visited. It was the consensus of the group that restoration of these sites may not be the best mitigation opportunity for this project.

- **Wetland Creation**

Wetlands could be created in a number of areas and opportunities exist for creating wetland either isolated or adjacent to existing wetlands. However, wetland creation was rejected due to the presence of substantial wetland resources already in the vicinity; the need to protect a small, isolated area in a commercial forest setting, and the relative difficulty and time required (40 years) to create a forested wetland on sloping basal glacial till locations.



- **Upland Buffer Protection**

Many opportunities exist on the over 80,000 acre site to mitigate lost functions and values through the preservation of important wetlands and buffers. Lobdell Associates evaluated the project site using existing information including USDA-NRCS soils maps, NWI maps, aquifer and floodplain maps, and the NH Fish & Game Action Plan. Four sites were further evaluated and one site selected which was detailed in the mitigation assessment plan submitted with the application. Figure 1 shows the four sites evaluated and they are described as follows.

**Site #1**

This site is located in the southeastern corner of the tract and would buffer Dummer Pond Brook wetland complex on both sides at its inlet to the Pontook Reservoir on the Androscoggin River. It would abut protected lands associated with the reservoir. Elevations range from about 1240 feet to 1440 with moderate slopes. The site is mostly glacial till hydric soils with several wetland communities present. The lower portion has been identified as a potential aquifer. The area has high ranking state and regional wildlife habitat.

**Site #2**

This site is located in the mid-portion of the tract and would buffer a lower portion of Philips Brook which flows through a large wetland complex located about 6 miles from the Brook's junction with the Upper Ammonoosuc River. Elevations on the site range from 1460 to 2180 feet with slopes ranging from flat within the large wetland complex to steep to the northwest. The site is surrounded by commercial forest land. Soils on the site are compact glacial tills with about ¼ of the site hydric soils which are located primarily in the one wetland complex along Phillips Brook. The lower portion has been identified as a potential aquifer. The area has high ranking state and regional wildlife habitat.

**Site #3**

This site is located upstream of Site #2 and buffers Phillips Brook and a small wetland complex. It is located approximately 11 miles from the Brook's junction with the Upper Ammonoosuc River. Elevations on the site range from about 2,000 to 2,380 feet with slopes ranging from moderate on the east to very steep to the west. The site surrounded by commercial forest land. Soils on the site are a complex of shallow to bedrock and deep basal till soils with about ½ of the site hydric soils and forested wetlands. The area has high ranking state and regional wildlife habitat.

**Site #4**

This site is located at the northwestern portion of the tract and is located in the headwaters of Philips Brook and buffers Phillips Brook on its west side and two named headwater tributaries. The site is located in Ervings Location and Columbia and is approximately 15 miles upstream of the junction of Phillips Brook and the Upper

Ammonoosuc River. Elevations on the site range from 2,100 to 2,950 feet with slopes ranging from gently sloping in the headwater wetlands to very steep. The site abuts the Nash Stream State Forest to the west. Soils on the site include cryic temperature regime soils at the upper elevations, shallow to bedrock soils, very poorly drained organic soils (with evidence of beaver ponds) and deep basal glacial till areas. The area has high ranking state and regional wildlife habitat.

### **Upland Buffer High Elevation Habitat Area**

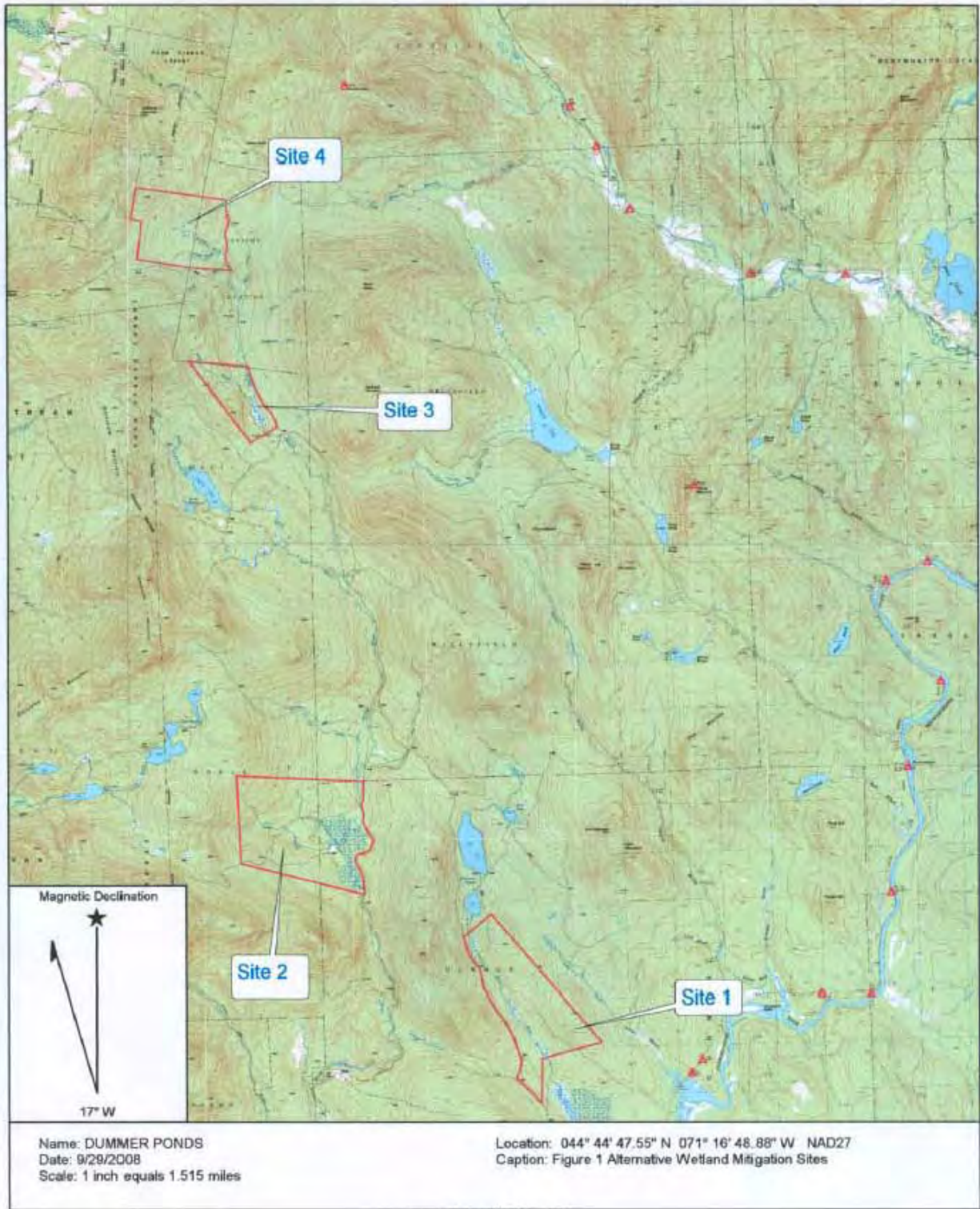
As part of the overall, environmental assessment of the project, the impact of the project on high elevation habitat and potential impacts to State and Federal threatened high elevation species (eg. American marten, Bicknells Thrush, and American three-toed woodpecker) has been assessed for GRP by Stantec. GRP originally proposed approximately 350 acres of high elevation mitigation conservation area consisting of areas around towers on Owlhead and Mt. Kelsey ridge and 200 foot buffers along the access road to the ridgeline.

After discussions with NH Fish & Game, a revised high elevation mitigation plan was proposed which includes protection of 1600 acres of high elevation spruce-fir forest which is estimated to have over 100 acres of forested wetland.

### **Wetland Creation-Vernal Pools**

Since vernal pools are impacted by the project, it is proposed vernal pools be created as the only way to mitigate those losses. Seven man-made (skidder ruts and log road excavations) and one natural vernal pools will be impacted. Four of these are located at higher elevations.

While potential vernal pool creation areas would appear to be plentiful, based on the presence of man-made vernal pools throughout the site, vernal pool creation sites should be located where they will not be impacted by future commercial logging operations. Therefore, they should be located in areas that will be protected and not subject to future logging.



**Figure 1**  
**Potential Mitigation Area Locations**

## **6. Proposed Compensatory Mitigation Plan**

Based on the above assessment the following mitigation plan is proposed. It includes a combination of alternatives with upper buffer protection as the main mitigation option but also including restoration and creation components. The plan far exceeds any minimum required or recommended compensatory ratios.

### **Upland Buffer Preservation**

Two preservation areas are proposed totaling over 2,200 acres

- The proposed Phillips Brook Mitigation Area consists of approximately 620 acres located within the Town of Columbia and unincorporated Ervings Location. The area buffers Phillips Brook on the east and the Nash Stream State Forest on the west and south borders. Seventy five percent of the site is in the headwaters of Phillips Brook watershed, identified by the Northern Forest Alliance as one of its priority areas for conservation (FY07 Strategic Conservation Opportunities Report) and the remaining 25% is in the headwaters of Simms Brook which is part of the Nash Stream watershed. Much of the area is considered high value wildlife habitat based on the NH Fish & Game's Wildlife Action Plan. See Figure 2.
- The proposed High Elevation Habitat Preservation Area consisting of 1,600 acres of high elevation spruce-fir forest on Kelsey Peak that would be preserved in perpetuity with no cutting allowed. The boundaries of the mitigation area have been prepared in consultation with New Hampshire Fish and Game and relate to high elevation mitigation for Spruce/Fir forest and wildlife species of concern-Bicknell's Thrush, American Pine Marten, and Three-toed Woodpecker. See Figure 3. The area contains an estimated 100 acres or more of forested wetland.

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The wetlands in the project area are primarily forested with poorly drained glacial till and shallow to bedrock soils. Generally speaking, vegetation in both the wetlands and adjoining uplands is dominated by facultative and or facultative upland plants. As the elevation increases, so does the presence and dominance of hydrophytes found in the uplands. Therefore, soils rather than vegetation was frequently the most important factor in wetland determination. Soils, however, were often problematic due to cryic conditions above 2500 feet, dark parent materials, and spodic conditions.

The dominant vegetative class is Palustrine forested wetland including evergreen forested, broad leaf deciduous forested, and complexes of the two. Tree species often also dominate in the sapling and shrub layers in both forested and more recently cut over areas. Evergreen species include balsam fir, red spruce, and black spruce with an understory of evergreen saplings and shrubs and a ground cover which includes sphagnum, goldthread, and occasional concentrations of ferns and sedges, Deciduous forested wetlands include yellow birch, red maple, and sugar maple with a shrub layer including hobblebush, striped maple, willow, raspberry, and an herb layer including sensitive fern, trout lily, jewel weed, false hellebore, and foam flower, Additional wetland classes include Palustrine scrub shrub wetlands of speckled alder and willow. Concentrations of carex, juncus and scripus species were often found in skidder trails; and alder, willow, and elderberry were found in mature ditches along the edge of log roads and skid trails.

The project area is located in the headwaters of two major river systems-the Connecticut and the Androscoggin. The majority of the main road system and the access roads to the FishBrook and Kelsey/Owlhead turbine strings drain to the west and are part of the Phillips Brook subwatershed, which drains to the south to the Upper Ammonoosuc River and on to its connection with the Connecticut in Northumberland. The Dixville turbine string access road drains eastwards to West Branch Clear Stream and then on to the Androscoggin River in Errol. Finally, the first six miles of the main access road from Route 16 drains to the east to Dummer Pond Brook which flows southeast to the Pontook Reservoir, a part of the Androscoggin River.

### **3. Wetland Functions and Values**

For the purposes of discussing wetland functions and values within the project area, the wetlands have been placed into three groupings based primarily on elevation, slope, and existing/ proposed land use. The groupings are as follows:

Group 1 – Includes wetlands in lower reaches of the project from Route 16 along

the Dummer Pond Road corridor with northern hardwood and low-land spruce-fir forest with a corridor length over 14 miles. The road which divides the project area is a private well maintained logging road used for the transportation of wood products from the area. A high percentage of the wetlands are impacted by the road system, ditching, skid trails and decades of logging. Wetland classes are dominated by Palustrine forested deciduous and deciduous/ evergreen mix with both seasonal and perennial streams crossing or paralleling the road system. Elevations range from 1200 feet at the junction of Route 16 and Dummer Pond Road to 2200 at the turn up to the Dixville Peak turbine string.

Group 2 – Includes wetlands along the three access road corridors for each of the turbine strings-Fishbrook, Kelsey/Owlhead, and Dixville Peaks- and the transmission line. These corridors are also located in northern hardwood and low-land spruce-fir forests and have less developed existing roads which include secondary logging roads that are not currently in use and have had many of the culverts removed and may or may not be used for recreational trails for snowmobiles or ATVs. They are relatively steep with elevations ranging from 1700 to about 2400 feet. Wetlands in this group are Palustrine forested deciduous, Palustrine forested evergreen and a combination of deciduous/evergreen, generally with poorly drain mineral soils. Most streams present are seasonal, fast flowing mountain streams.

Group 3 – Includes wetlands along the three strings of the turbines Fishbrook, Kelsey/Owlhead, and Dixville Peaks and are generally located in a high-elevation spruce-fir forest system. Wetlands are predominately Palustrine forested evergreen.

A qualitative function and values assessment of wetlands in the project area has been completed by Lobdell Associates. The evaluation was completed using a method developed by the COE detailed in a report entitled "The Highway Methodology Workbook Supplement" (COE, 1999). Although the system was developed primarily for projects where the characterization of wetlands was necessary for permit requirements for Section 404 of the Clean Water Act, the system is suitable for a variety of evaluation applications. The system evaluates thirteen functions and values. Each of the wetland groupings in the project area was evaluated and the results are shown in Table 1 and discussed below. Evaluations were based on professional judgment, using information collected in the field and from existing maps and reports.

**1. Groundwater Recharge Discharge:** This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. Considerations for this function included the presence of glacial outwash soils or potential aquifers. All three wetland groups are dominated by glacial till and have no identified aquifers ( USGS (Plates #4 and 7. WRIR 96-4318) nor are there any public or private wells in the immediate area.

**2. Floodflow Alteration:** This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods to reduce flood peaks. None of the 3 wetlands groups have significant floodflow value characteristic and they protect no land uses directly downstream from damage.

**3. Fish and Shellfish Habitat:** This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat. Group 1 wetlands include Phillips Brook and tributaries including No. 3 Brook, Walkinson Brook, Wells Brook, and Kelley Brook, which may support populations of brook trout. Group 2 wetlands include the West Branch Clear Stream in the Androscoggin River watershed which also may support populations of brook trout. While trout are not stocked on site, the streams are stocked with trout further down the watershed.

**4. Sediment/Toxicant/Pathogen Retention:** This function reduces or prevents degradation of water quality. It relates to the potential effectiveness of the wetland as a trap for sediments, toxicants or pathogens in runoff water from surrounding uplands of upstream eroding areas. None of the wetland groups have significant characteristics that support this function due to steepness, high associated water course velocities, road side ditches. There are no wells or water supplies immediately downstream. However, Groups 1 and 2, and to a lesser degree 3, are potential sources of sediment from commercial logging activities in and around them.

**Table 1**  
**Wetland Functions and Values**

<b>Function</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Groundwater Recharge	7	5,7	6
Floodflow	3,13	2,3,	2,3,
Fish/Shellfish	1,4,7,8,14,17	1,4,7,8,14,17	1
<b>Sediment/Toxicant</b>	<b>1,10</b>	<b>1,10</b>	<b>1,10</b>
Nutrient Removal	-	-	-
Production Export	1,4	1,4	1
Sediment/Shoreline	1,2,3,8	1,2,3,8	2,8
<b>Wildlife Habitat</b>	<b>2,4,5,7,8,17</b>	<b>2,4,5,7,8,17</b>	<b>2,4,5,7,8,17</b>
<b>Recreation</b>	<b>2,3,4,5</b>	<b>2,3,4,5</b>	<b>2,3,4,5</b>
Educational/Scientific	-	-	-
Unique/Heritage	19	19	19
Visual/Aesthetic	4	4	
Endangered	1	1	1

See Attachment B for explanation of reference numbers for rationales for each

-function/value determined not present

**Bold primary functions**



**5. Nutrient Removal/Retention Transformation:** This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms. This function is limited in all three wetland groups due to wetland characteristics including a lack of nutrient attenuation, steepness and high velocities in associated streams. No significant nutrient sources exist above the wetlands.

**6. Production Export:** This function evaluates the effectiveness of the wetland to produce food or usable products for man or other living organisms. Wildlife use the wetlands as a source of food and were observed in the wetlands including deer, moose, bear, beaver, woodcock and a variety of other birds. Food sources are particularly high in the re-growth present in forested wetlands that have been logged.

**7. Sediment/Shoreline Stabilization:** This function considers the effectiveness of a wetland to stabilize stream banks and shorelines against erosion. The wetlands and associated streams are sloping, have high velocities and evidence of sediment in wetlands and stream bank erosion present, particularly in Groups 1 and 2 due to commercial forestry upstream.

**8. Wildlife Habitat:** This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. All wetlands on the site have this as an important value for a wide variety of reasons including location in a large undeveloped forest, high water quality, cover, food, etc. Group 3 wetlands have the least vegetative interspersions, open water or variety of food sources. Additional information on wetland wildlife functions is available elsewhere in the project's application.

**9. Recreation:** This function considers the wetland and associated watercourses to provide either consumptive or non-consumptive recreational opportunities. While the lack of either large open water or wide streams limits traditional wetland recreational opportunities, the recreational value of wetlands is high due to their location in a large undeveloped forest that is currently available for recreation including hunting, fishing, hiking, etc.

**10. Educational/Scientific Value:** This value considers the suitability of the wetland as a site for an outdoor classroom or as a location for scientific study or research. While the extensive logging road system makes otherwise remote educational or research sites accessible, the educational value of all wetlands is low due to remoteness from schools, research, and educational facilities that would most likely have more diverse wetlands at closer locations. Group 3 wetlands being more remote than Group 1 do offer high elevation and cryic soil research opportunities.

**11. Uniqueness/Heritage:** This value considers the effectiveness of the wetland or its associated water bodies to provide certain special values including archaeological sites, critical habitat, ecological system health, etc. None of these wetlands provides this

function. However, there are opportunities for wildlife viewing along the main logging road in Group.

**12. Visual Quality/Aesthetics:** This value considers the visual and aesthetic quality or usefulness of the wetland. The wetlands are forested and cannot easily be viewed. Additionally, commercial forest activities, including logging, yarding and the transportation of wood products is on-going therefore reducing this value. However, the hardwood forest in Groups 1 and 2 do turn vibrant colors in the fall.

**13. Endangered Species Habitat:** This value considers the suitability of the wetland to support threatened or endangered species. The NH Natural Heritage Inventory was contacted and their report is enclosed with the wetlands application. Several state threatened or endangered species in the vicinity of all three wetland groups include the Osprey, American Marten, Common Loon, Northern Harrier, Pied-billed Grebe, Farwell's Water Milfoil, Lily leaved Twayblade, and Wapato.

#### **4. Wetland Impacts**

The total wetland impacts for this project are 13.5 acres with 537 wetland impact sites ranging in size from less than 4 to 16,925 square feet in size. Wetland impact sites include ditches, seasonal stream crossings, perennial stream crossings (15), forested wetlands, scrub shrub wetlands, and emergent wetlands. Many of the impacts are small with over 50% less than 500 square feet and many of these in wetlands previously impacted by logging. These include ditches and shrub or emergent wetlands formed in previously disturbed areas. Approximately 50% of the impact sites are streams or existing ditches while the remainder are Palustrine forested wetlands.

Wetland Impacts also included vernal pools. A total of 1 natural vernal pool and 7 man-made, mature vernal pools are directly impacted by the project due to road construction or re-construction. They range in size from 65 to 1549 square feet with all located along access roads. Four are located at higher elevations. Total extent of vernal pool impact is 3,454 square feet.

The revised Table of Impacts and plans in the wetlands application package, prepared by Horizons Engineering, detail the wetland impact sites.

## 5. Compensatory Mitigation Opportunities

Various options were assessed to mitigate the 13.5 acres of unavoidable wetland impacts including the in lieu of mitigation fee, restoration, creation, upland buffer preservation, or a combination of options.

- **In Lieu of Mitigation Fee**

This mitigation option is not available in NH for this project since the wetland impacts area is greater than one acre.

- **Restoration/Creation Alternative Analysis- logging yards and logging impact areas.**

Opportunities for restoration within the project area relate almost exclusively to impacts from commercial logging operations. These include truck roads, skidder trails, and log yards. As part of the mitigation alternatives analysis, a preliminary study of logging impact areas was undertaken. While there are logging impacts throughout the 80,000 acres, the study focused on inventorying logging impacts within the area, specifically Dummer Pond Road. This is the main log truck road into the site and within the wetland delineation corridor of the project.

The study included inventorying all logging impact areas along either side of the road from its junction with Route 16 to where the project access road turns off Dummer Pond Road, a distance of over 13 miles. The preliminary inventory was conducted in June of 2008 and the results are shown in Table 2. A total of 23 potential restoration sites were found which vary in size from about ¼ to 1 acre in size and include 17 yards, 4 skidder trails with associated wood slash/debris, and linear piles of stumps/soil from road building operations. Material in the yards includes bark, chips, limbs and other wood debris and soil material incorporated during log yard operations. The depth of material varies from one to several feet. Yards are located on one or both sides of the road and vary in size, both in length and width. Skidder trails inventoried are those that were associated with the yards and exhibited the logging BMP of filling wet ruts with logging slash to minimize erosion and sedimentation.

**Table 2**  
**GRP Preliminary Logging Restoration Site Inventory-6/18/08**

Site	Dummer Pond Road Mile	Side of Dummer Road	Type	Approx. Size (ft.)	Approx. Extent (acres)	Comment
1	1	East	Debris Piles	30' x 900'	.62	Old piles of soil, stumps from road
2	1	East	Yard#1	75' x 350'	.60	Log yard abutting road
3	1	East	Debris Piles	30' x	.69	Old piles of soil, stumps from when road was
4	1	East	Debris Piles	30' x	1.38	Old piles of soil, stumps from when road was
5	2	East	Yard #2	100' x	.23	
6	3	East	Yard #3	100' x	.69	Near alternate switch yard site
7	3	West	Yard #4	50' x 150'	.2	
8	4	West & East	Yard 5	50' x 200'	.23	
9	5	West	Yard #6	50' x 200'	.23	
10	5	West & East	Yard #7	50' x 250'	.29	
11	7	West & East	Yard #8	75' x 300'	.52	Mostly on east
12	7	East	Yard #9	100' x	.23	
13	10	West & East	Yard #10	75' x 175'	.30	One of larger yards
14	11	West	Yard #11	100' x	.23	
15	11	East	Skidder	20' x 600'	.28	Thick layer of slash laid in wetland-recent
16	11	East	Skidder	20' x 100'	.05	Thick layer of slash laid in wetland-recent
17	11	East	Yard #12	100' x	.34	
18	11	West	Yard #13	100' x	.57	

19	11	East	Skidder	20' x 300'	.18	
20	12	East	Yard #14	150' x	.52	
21	12	West	Yard #15	100' x	.46	
22	12	West & East	Yard#16/Sk	100' x	.58	Yard both sides of road with skidder trail with
23	13	West & East	Yard #17	50' x 250'	.29	West side wetland, east upland

Restoration of the yards would include both wetland and upland components and consist of removal of log debris, shaping to blend in with surrounding landscape, seeding down with a forest wetland seed mix, and planting with native trees and shrubs. Creation of wetlands in these areas would be preferred over using other, more natural upland areas because the disturbance renders the upland value of these areas extremely low.

The preliminary inventory shows that while restoration and creation opportunities exist that exceed the required compensatory mitigation requirements, this is not the preferred mitigation alternative for several reasons. First the surrounding land will remain in commercial forest operation. These yards and other impacts were generally located by foresters in areas that best met the logistical needs of a particular logging operation. Since all of these areas will continue to be logged, logging yards will always be needed, so it makes little sense to eliminate the existing yards only to impact similar areas again at a later date. Secondly, the restoration sites are all relatively small and spread out which limits their value and each would require an easement to protect the area in perpetuity. Monitoring them long-term would be problematic and expensive as well.

During the wetland delineation site tour in July, 2008, which included Rich Roach and Paul Minkum of the US Army Corps of Engineers, and Craig Rennie of the NH Wetlands Bureau, several of the restoration sites inventoried were visited. It was the consensus of the group that restoration of these sites may not be the best mitigation opportunity for this project.

- **Wetland Creation**

Wetlands could be created in a number of areas and opportunities exist for creating wetland either isolated or adjacent to existing wetlands. However, wetland creation was rejected due to the presence of substantial wetland resources already in the vicinity; the need to protect a small, isolated area in a commercial forest setting, and the relative difficulty and time required (40 years) to create a forested wetland on sloping basal glacial till locations.

- **Upland Buffer Protection**

Many opportunities exist on the over 80,000 acre site to mitigate lost functions and values through the preservation of important wetlands and buffers. Lobdell Associates evaluated the project site using existing information including USDA-NRCS soils maps, NWI maps, aquifer and floodplain maps, and the NH Fish & Game Action Plan. Four sites were further evaluated and one site selected which was detailed in the mitigation assessment plan submitted with the application. Figure 1 shows the four sites evaluated and they are described as follows.

**Site #1**

This site is located in the southeastern corner of the tract and would buffer Dummer Pond Brook wetland complex on both sides at its inlet to the Pontook Reservoir on the Androscoggin River. It would abut protected lands associated with the reservoir. Elevations range from about 1240 feet to 1440 with moderate slopes. The site is mostly glacial till hydric soils with several wetland communities present. The lower portion has been identified as a potential aquifer. The area has high ranking state and regional wildlife habitat.

**Site #2**

This site is located in the mid-portion of the tract and would buffer a lower portion of Philips Brook which flows through a large wetland complex located about 6 miles from the Brook's junction with the Upper Ammonoosuc River. Elevations on the site range from 1460 to 2180 feet with slopes ranging from flat within the large wetland complex to steep to the northwest. The site is surrounded by commercial forest land. Soils on the site are compact glacial tills with about ¼ of the site hydric soils which are located primarily in the one wetland complex along Phillips Brook. The lower portion has been identified as a potential aquifer. The area has high ranking state and regional wildlife habitat.

**Site #3**

This site is located upstream of Site #2 and buffers Phillips Brook and a small wetland complex. It is located approximately 11 miles from the Brook's junction with the Upper Ammonoosuc River. Elevations on the site range from about 2,000 to 2,380 feet with slopes ranging from moderate on the east to very steep to the west. The site surrounded by commercial forest land. Soils on the site are a complex of shallow to bedrock and deep basal till soils with about ½ of the site hydric soils and forested wetlands. The area has high ranking state and regional wildlife habitat.

**Site #4**

This site is located at the northwestern portion of the tract and is located in the headwaters of Philips Brook and buffers Phillips Brook on its west side and two named headwater tributaries. The site is located in Ervings Location and Columbia and is approximately 15 miles upstream of the junction of Phillips Brook and the Upper

Ammonoosuc River. Elevations on the site range from 2,100 to 2,950 feet with slopes ranging from gently sloping in the headwater wetlands to very steep. The site abuts the Nash Stream State Forest to the west. Soils on the site include cryic temperature regime soils at the upper elevations, shallow to bedrock soils, very poorly drained organic soils (with evidence of beaver ponds) and deep basal glacial till areas. The area has high ranking state and regional wildlife habitat.

### **Upland Buffer High Elevation Habitat Area**

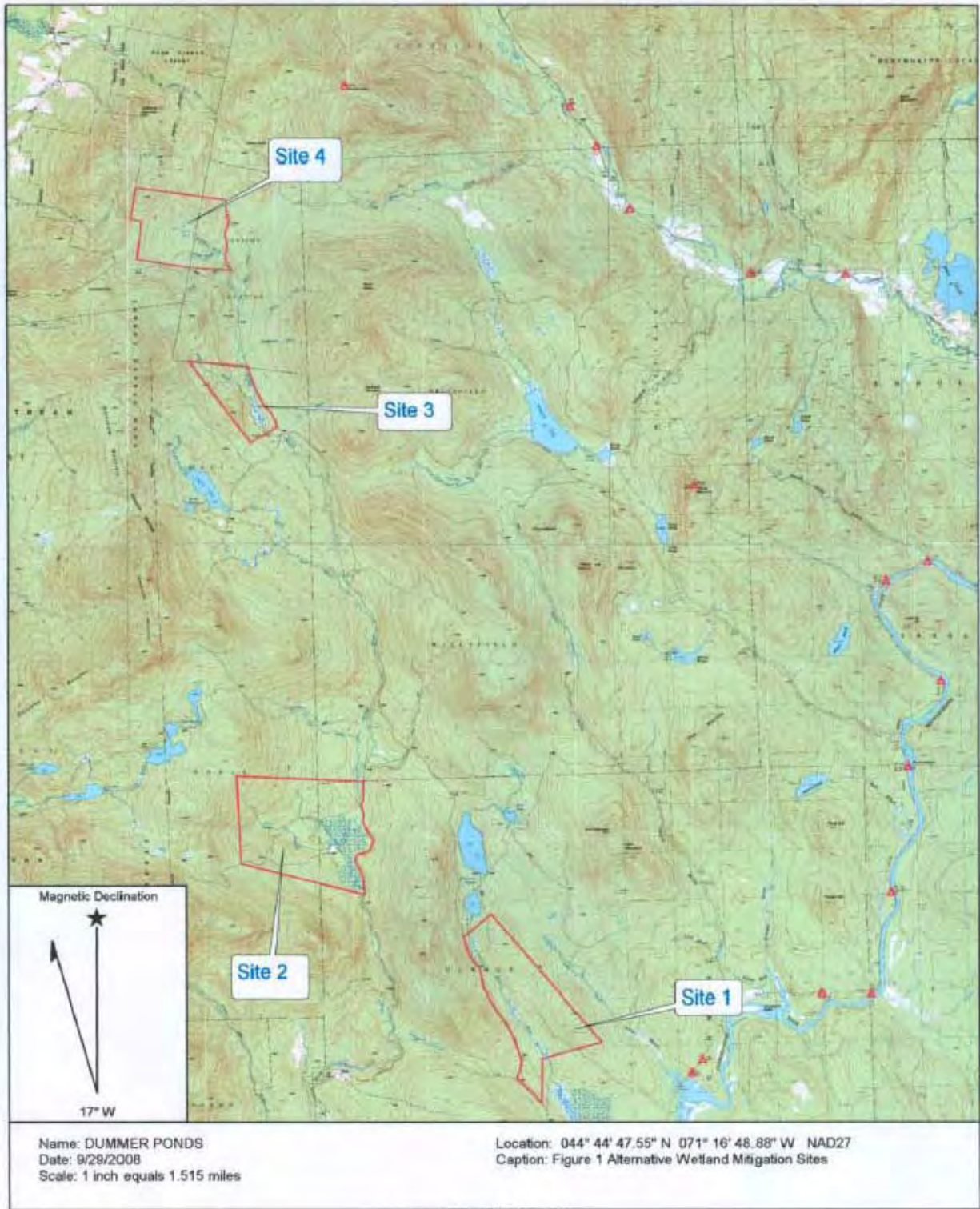
As part of the overall, environmental assessment of the project, the impact of the project on high elevation habitat and potential impacts to State and Federal threatened high elevation species (eg. American marten, Bicknells Thrush, and American three-toed woodpecker) has been assessed for GRP by Stantec. GRP originally proposed approximately 350 acres of high elevation mitigation conservation area consisting of areas around towers on Owlhead and Mt. Kelsey ridge and 200 foot buffers along the access road to the ridgeline.

After discussions with NH Fish & Game, a revised high elevation mitigation plan was proposed which includes protection of 1600 acres of high elevation spruce-fir forest which is estimated to have over 100 acres of forested wetland.

### **Wetland Creation-Vernal Pools**

Since vernal pools are impacted by the project, it is proposed vernal pools be created as the only way to mitigate those losses. Seven man-made (skidder ruts and log road excavations) and one natural vernal pools will be impacted. Four of these are located at higher elevations.

While potential vernal pool creation areas would appear to be plentiful, based on the presence of man-made vernal pools throughout the site, vernal pool creation sites should be located where they will not be impacted by future commercial logging operations. Therefore, they should be located in areas that will be protected and not subject to future logging.



**Figure 1**  
**Potential Mitigation Area Locations**



## **6. Proposed Compensatory Mitigation Plan**

Based on the above assessment the following mitigation plan is proposed. It includes a combination of alternatives with upper buffer protection as the main mitigation option but also including restoration and creation components. The plan far exceeds any minimum required or recommended compensatory ratios.

### **Upland Buffer Preservation**

Two preservation areas are proposed totaling over 2,200 acres

- The proposed Phillips Brook Mitigation Area consists of approximately 620 acres located within the Town of Columbia and unincorporated Ervings Location. The area buffers Phillips Brook on the east and the Nash Stream State Forest on the west and south borders. Seventy five percent of the site is in the headwaters of Phillips Brook watershed, identified by the Northern Forest Alliance as one of its priority areas for conservation (FY07 Strategic Conservation Opportunities Report) and the remaining 25% is in the headwaters of Simms Brook which is part of the Nash Stream watershed. Much of the area is considered high value wildlife habitat based on the NH Fish & Game's Wildlife Action Plan. See Figure 2.
- The proposed High Elevation Habitat Preservation Area consisting of 1,600 acres of high elevation spruce-fir forest on Kelsey Peak that would be preserved in perpetuity with no cutting allowed. The boundaries of the mitigation area have been prepared in consultation with New Hampshire Fish and Game and relate to high elevation mitigation for Spruce/Fir forest and wildlife species of concern-Bicknell's Thrush, American Pine Marten, and Three-toed Woodpecker. See Figure 3. The area contains an estimated 100 acres or more of forested wetland.



Photo 4-3A:  
Impact 4-3  
Looking South



Photo 6-1A: Impact 6-1  
Looking North



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(603) 444-4111

Wetlands Permit Application  
Granite Reliable Power, LLC  
Granite Reliable Power Wind Park  
Coos County, New Hampshire  
Wetland Photographs  
Project No. 07198



Photo 7-1A: Impact 7-1  
Looking West



Photo 7-1B: Impact 7-1  
Looking East



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Photo 12-1A: Impact 12-1  
Looking West



Photo 12-1B: Impact 12-1  
Looking East



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Photo 12-2A:  
Impact 12-2  
Looking Northwest



Photo 12-2B:  
Impact 12-2  
Looking Southeast



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Photo 15-2A: Impact 15-2  
Looking Northwest



Photo 18-2A:  
Impact 18-2  
Looking East



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Photo 18-3A:  
Impact 18-3  
Looking West



Photo 18-4A:  
Impact 18-4  
Looking Southeast



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Photo 19-2A: Impact 19-2  
Looking East



Photo 20-1A:  
Impact 20-1  
Looking West



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Photo 21-1A: Impact 21-1  
Looking Northwest



Photo 21-3A: Impact 21-3  
Looking North



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Photo 26-3A:  
Impact 26-3  
Looking South



Photo 26-3B:  
Impact 26-3  
Looking East



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Photo 31-6A:  
Impact 31-6  
Looking Southwest



Photo 35-1A:  
Impact 35-1  
Looking Northeast



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Photo 38-3A:  
Impact 38-3  
Looking East



Photo 40-2A: Impact 40-2  
Looking South



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Photo 41-1A:  
Impact 41-1  
Looking Southwest



Photo 41-2A: Impact 41-2  
Looking North



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Photo 41-5A: Impact  
41-5 Looking  
Southwest



Photo 45-1A: Impact 45-1  
Looking North



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**Granite Reliable Power Wind Park**  
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**Wetland Photographs**  
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Photo 45-1B: Impact 45-1  
Looking East



Photo 46-3A: Impact  
46-3 Looking West



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Photo 48-1A: Impact 48-1  
Looking Southwest



Photo 48-2A: Impact  
48-2 Looking West



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Coos County, New Hampshire  
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Project No. 07198





Photo 49-2A: Impact  
49-2 Looking  
Northeast



Photo 49-2B: Impact  
49-2 Looking  
Southwest



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Project No. 07198



Photo 51-2A: Impact  
51-2 Looking North



Photo 51-2B: Impact  
51-2 Looking  
Southwest



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Project No. 07198



Photo 52-1A: Impact  
52-1 Looking East



Photo 53-2A: Impact  
53-2 Looking North



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Wetlands Permit Application  
Granite Reliable Power, LLC  
Granite Reliable Power Wind Park  
Coos County, New Hampshire  
Wetland Photographs  
Project No. 07198



Photo 53-2B: Impact  
53-2 Looking  
Northwest



Photo 55-4A:  
Impact 55-4  
Looking Northeast



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Photo 55-4B: Impact  
55-4 Looking West



Photo 55-6A: Impact  
55-6 Looking East



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**Granite Reliable Power, LLC**  
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**Coos County, New Hampshire**  
**Wetland Photographs**  
**Project No. 07198**



Photo 57-1A:  
Impact 57-1  
Looking Northwest



Photo 57-2A: Impact  
57-2 Looking  
Northwest



34 School Street  
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Photo 57-3A:  
Impact 57-3  
Looking Northwest



Photo 57-4A:  
Impact 57-4  
Looking West



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Granite Reliable Power, LLC  
Granite Reliable Power Wind Park  
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Photo 57-5A: Impact 57-5  
Looking North



Photo 57-5B: Impact 57-5  
Looking North



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**Granite Reliable Power, LLC**  
**Granite Reliable Power Wind Park**  
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Photo 57-6A: Impact  
57-6 Looking West



Photo 57-7A:  
Impact 57-7  
Looking Southwest



34 School Street  
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(603) 444-4111

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Granite Reliable Power, LLC  
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Photo 58-3A:  
Impact 58-3  
Looking West



Photo 58-9A: Impact 58-9  
Looking South



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Granite Reliable Power, LLC  
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Photo 59-2A: Impact  
59-2 Looking West



Photo 59-2B:  
Impact 59-2  
Looking East



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Photo 64-1A: Impact 64-1  
Looking North



Photo 64-1B: Impact 64-1  
Looking Southwest



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Photo 64-4A: Impact  
64-4 Looking East



Photo 64-4B:  
Impact 64-4  
Looking North



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(603) 444-4111

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Photo 66-4A: Impact 66-4  
Looking West



Photo 66-4B: Impact  
66-4 Looking East



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Granite Reliable Power, LLC  
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Project No. 07198

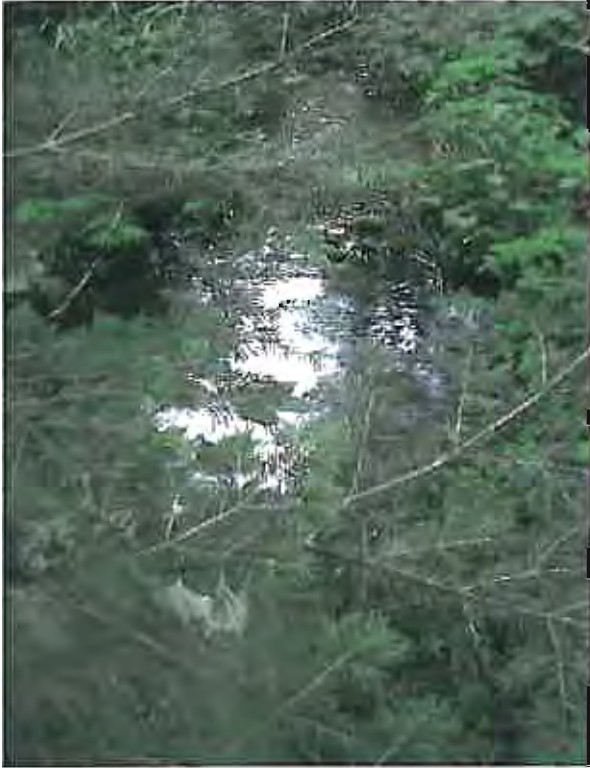


Photo 67-1A: Impact 67-1  
Looking West



Photo 69-9A: Impact  
69-9 Looking West



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**Wetlands Permit Application**  
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Photo 69-9B:  
Impact 69-9  
Looking South



Photo 70-2A: Impact 70-2  
Looking Southeast



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**Wetlands Permit Application**  
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Photo 72-1B:  
Impact 72-1  
Looking Northeast



Photo 73-6A:  
Impact 73-6  
Looking North



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Photo 78-6A: Impact  
78-6 Looking  
Northeast



Photo 78-6B:  
Impact 78-6  
Looking Southwest



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Granite Reliable Power, LLC  
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Project No. 07198



Photo 83-1A: Impact  
83-1 Looking West



Photo 83-1B:  
Impact 83-1 Looking  
Northwest



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Granite Reliable Power, LLC  
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Photo 85-1A: Impact  
85-1 Looking  
Southeast



Photo 85-2A:  
Impact 85-2  
Looking Northwest



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Granite Reliable Power, LLC  
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Photo 86-1A: Impact  
86-1 Looking West



Photo 86-2A:  
Impact 86-2  
Looking South



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Granite Reliable Power, LLC  
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Photo 87-1A: Impact  
87-1 Looking  
Southeast



Photo 87-1B:  
Impact 87-1  
Looking South



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Wetlands Permit Application  
Granite Reliable Power, LLC  
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Photo 87-3A: Impact  
87-3 Looking South



Photo 97-1A: Impact  
97-1 Looking North



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Photo 97-1B:  
Impact 97-1  
Looking Southwest



Photo 97-6A: Impact  
97-6 Looking West



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Photo 97-6B:  
Impact 97-6  
Looking Northeast



Photo 100-2A:  
Impact 100-2  
Looking Northwest



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Wetlands Permit Application  
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Photo 102-1A:  
Impact 102-1  
Looking West



Photo 102-1B:  
Impact 102-1  
Looking South



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Photo 104-1A:  
Impact 104-1  
Looking East



Photo 104-2A:  
Impact 104-2  
Looking West



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Photo 104-5A:  
Impact 104-5  
Looking South



Photo 105-5A:  
Impact 105-5  
Looking North



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Photo 105-7A:  
Impact 105-7  
Looking West



Photo 105-11A:  
Impact 105-11  
Looking East



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Wetlands Permit Application  
Granite Reliable Power, LLC  
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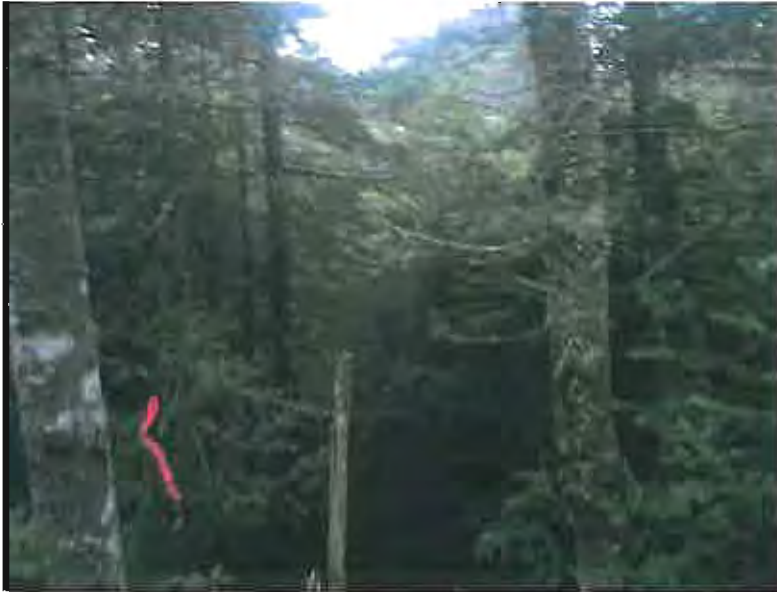


Photo 106-7A:  
Impact 106-7  
Looking West



Photo 106-9A:  
Impact 106-9  
Looking West



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Photo 120-7A:  
Impact 120-7  
Looking North



Photo 123-2A:  
Impact 123-2  
Looking Southwest



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Photo 123-3A:  
Impact 123-3  
Looking Southeast



Photo 123-5A:  
Impact 123-5  
Looking East



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Photo 125-2A:  
Impact 125-2  
Looking East



Photo 129-7A:  
Impact 129-7  
Looking North



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Photo 129-7B:  
Impact 129-7  
Looking South



Photo 131-6A:  
Impact 131-6  
Looking Southeast



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Granite Reliable Power, LLC  
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Photo 132-1A:  
Impact 132-1  
Looking West



Photo 132-2A:  
Impact 132-2  
Looking Southwest



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**Wetlands Permit Application**  
**Granite Reliable Power, LLC**  
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**Coos County, New Hampshire**  
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Photo 132-2B:  
Impact 132-2  
Looking East



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Wetlands Permit Application  
Granite Reliable Power, LLC  
Granite Reliable Power Wind Park  
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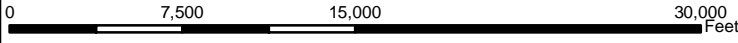
# Granite Reliable Power Windpark

Towns of Dixville, Millsfield, Odell & Ervings Location, Coos Co., NH

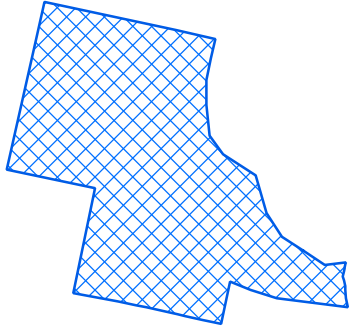
## Mitigation Plan Preservation Areas

-  High Elevation Mitigation Land
-  Wetland Mitigation Area
-  Bayroot Parcel
-  Phillips Brook Tract
-  Proposed Windpark Turbines
-  Proposed Windpark Roads

Projection: UTM Nad 83 Zone 19  
General GIS from Wagner Forest Mgt.  
Wind Farm specific GIS from Horizons Engineering  
Date: 3/9/10  
1:100,000



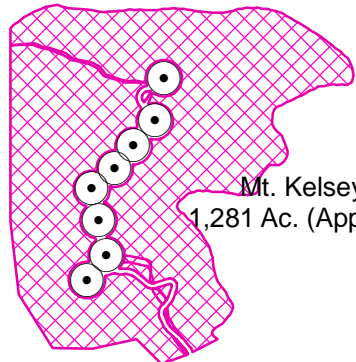
Wetlands Mitigation Area  
620 Ac. (Approx.)



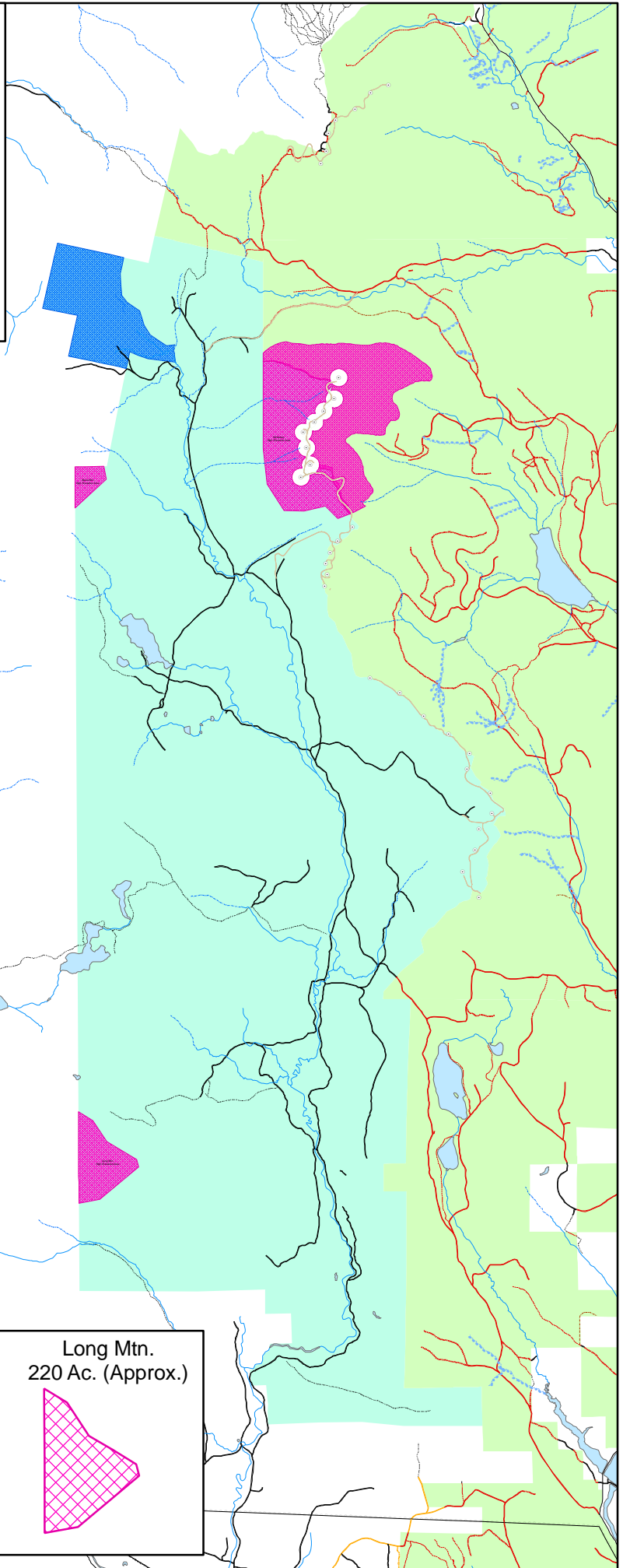
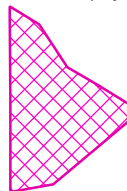
Muse Mtn.  
60 Ac. (Approx.)

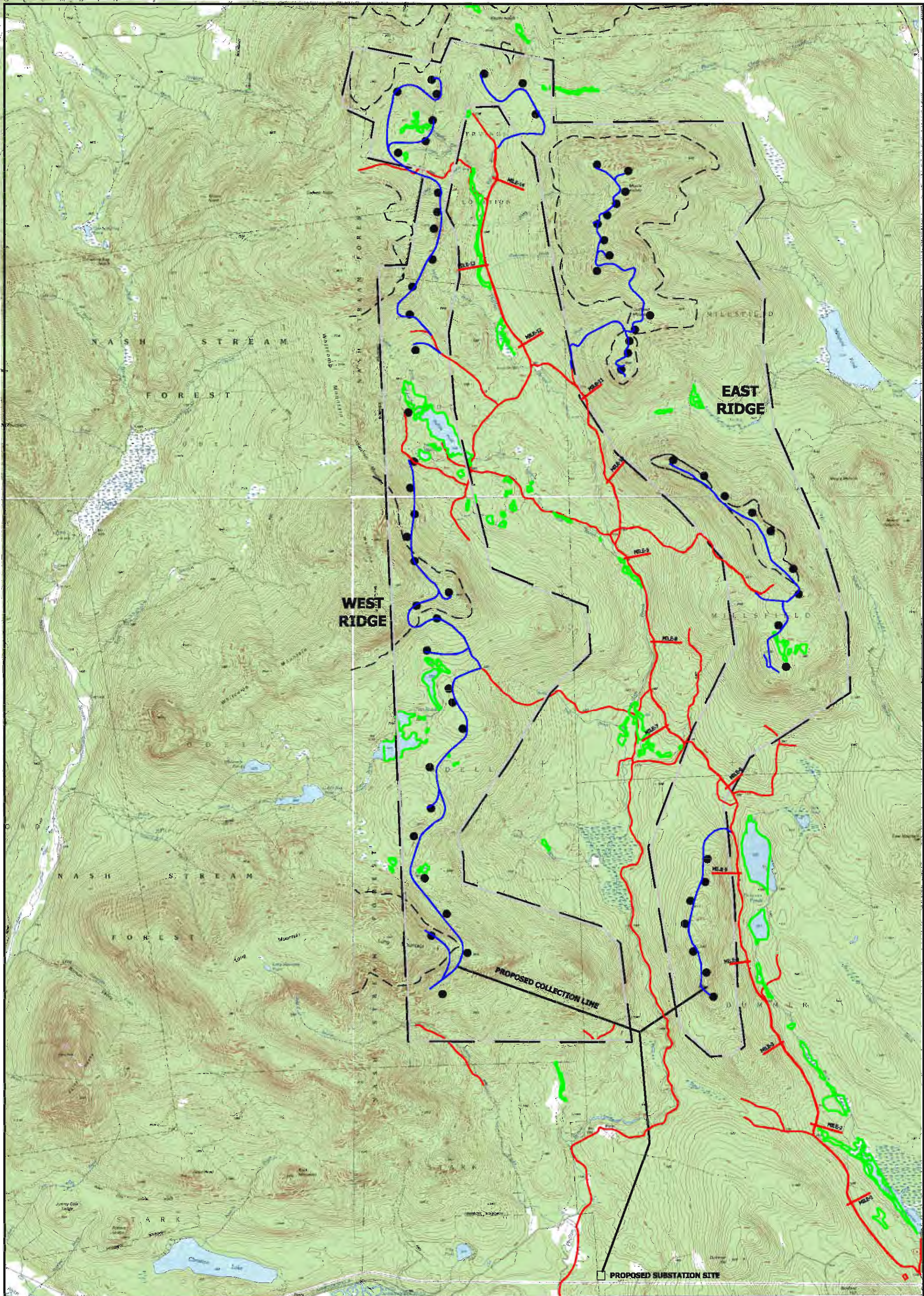


Mt. Kelsey  
1,281 Ac. (Approx.)



Long Mtn.  
220 Ac. (Approx.)





0 2500 5000 10000

SCALE IN FEET

- EXISTING ROADS
- PROPOSED ROADS
- PRELIMINARY TURBINE LOCATION
- PRELIMINARY PROJECT BOUNDARY
- WETLANDS (FROM NATIONAL WETLAND INVENTORY)
- ELEVATION 2700 FEET

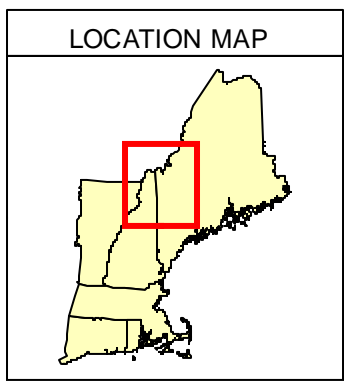
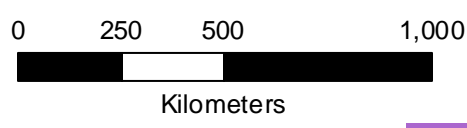
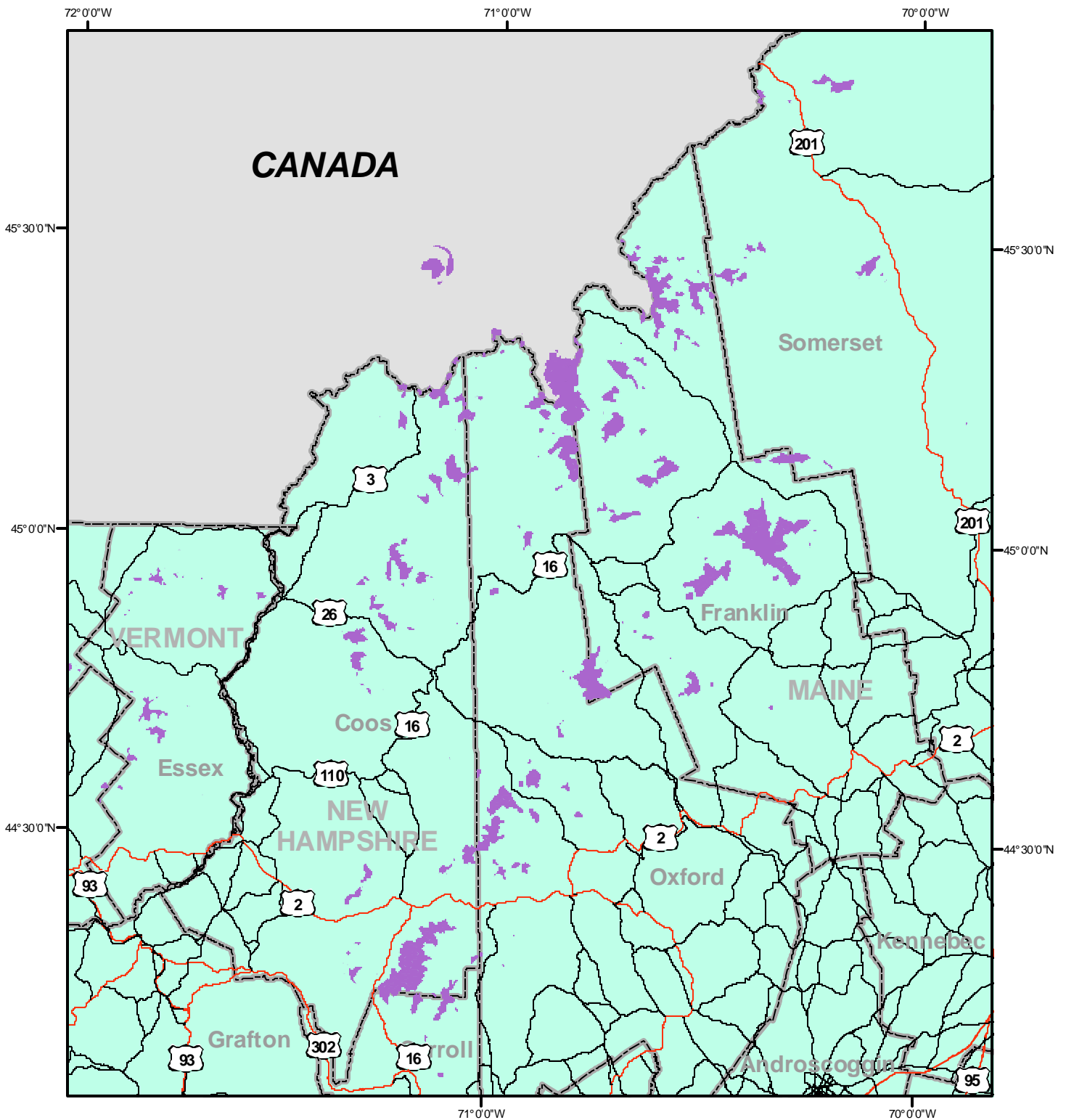
DATE: MARCH 2010  
 PROJECT #: 07198  
 ENGINEER: PLB  
 DRAWN BY: LJM/RSP  
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 SHEET 1 OF 1

GRANITE RELIABLE POWER, LLC  
 GRANITE RELIABLE POWER WIND PARK  
 COOS COUNTY, NEW HAMPSHIRE

ALTERNATIVE ANALYSIS EXHIBIT  
 WEST RIDGE & EAST RIDGE TURBINE STRINGS

**horizons**  
 Engineering, Inc.  
 31 School Street  
 Littleton, NH 03561  
 Phone 603.444.4111 - Fax 603.444.1343

# Areas of 2700+ feet Elevation



- Elevations > 2700 feet
- Counties\_NewEngland
- Major Highways
- Highways/Roads

