terrestrial ecological survey and wetland/stream inventory summary

Project: Copenhagen Wind Farm **edr Project No:** 12012

Date: January 18, 2013

Introduction

On behalf of Copenhagen Wind Farm LLC, **edr** Companies (**edr**) performed a terrestrial ecological survey and wetland/stream inventory for the proposed Copenhagen Wind Farm (the "Project"). The survey and inventory were conducted to support the planning, preliminary siting and environmental regulatory review for the Project, including the evaluation of potential Project layout alternatives. The Project consists of approximately 62 (of which up to 49 will be constructed) wind turbines, a nine mile transmission line, and associated facilities. It is proposed to be located on private land within the Town of Denmark, Lewis County, and the Towns of Rutland, Champion and Watertown, Jefferson County, New York.

The preliminary identification of ecological communities within the Project area, including wetlands and streams, were identified through both existing data sources and reconnaissance level field evaluations. Initial data sources that were consulted include:

- National Wetland Inventory (NWI) mapping
- New York State freshwater wetlands mapping
- New York State mapped streams
- United States Geological Services (USGS) topographic quadrangle mapping
- County soils surveys
- Orthoimagery (web served)

In addition, to evaluate the potential presence of threatened or endangered species and their habitat, **edr** consulted with the New York Natural Heritage Program (NYNHP).

The study area for the survey and inventory was restricted to only those portions of parcels where anticipated project impacts might occur. Therefore, edr prepared preliminary mapping and conducted site surveys within the foot print of proposed wind turbines, access roads, the overhead transmission line, potential substation locations, O&M facility, and construction staging areas. Layout alternatives, or alternative turbine locations, were also observed. The location of electrical collection lines were still being determined at the time of the field surveys.

edr Staff Ecologists Brian Schwabenbauer and John Hecklau, performed site visits in support of the ecological survey on August 20th to 23rd, and October 2nd to 4th, 2012, respectively. The approximate boundary of terrestrial ecological communities, wetlands and streams were identified or confirmed during the site walkovers. Jurisdictional wetland/stream boundary delineations of all wetlands and streams within the Project site potentially impacted by (or immediately adjacent to) proposed Project components will be conducted during the 2013 growing season.

Subsequent to preliminary mapping, ecological communities/wildlife habitat areas were categorized/classified based on aerial photograph interpretation and field reconnaissance. During fieldwork, vegetative cover (over story, under story and ground cover) was categorized in terms of species composition and structural character. Categorization of the various ecological community types is consistent with the descriptions of *Ecological Communities of New York State* (Reschke, 1990). Based upon aerial photograph interpretation and subsequent reconnaissance level field evaluations, a map was created that depicts the approximate boundaries of terrestrial ecological communities, streams and wetlands (See Appendix A; Figure 1 of this report).

In addition, to gather preliminary information on the presence of state and federal listed threatened and endangered species and unique or significant natural communities within or in the vicinity of the study are a written request for information was sent to the New York Natural Heritage Program (NYNHP) on January 15, 2013. A written response dated January 30, 2013 from the NHP provided information on the presence of state-listed threatened and endangered species documented within or in the vicinity of the study area. Information on federally listed species was obtained from reviewing the U.S. Fish and Wildlife's online endangered and threatened species database.

Results

Ecological Communities

Based upon field observations, approximate community boundaries were noted on aerial maps and quantified. See Table 1 below and Figure 1.

Table 1. Ecological Communities

Agricultural	5,300
Successional Old-Field	275
Successional Shrubland	950
Forestland	2,900
Open Water	30
Disturbed/Developed	250

Developed land consists of unvegetated or maintained areas such as residences, farms and roads, etc. Open water is primarily farm ponds. See Appendix B for representative photos of cover types within the Project area. Forestland in the study area consists predominantly of northern hardwood forest in various stages of succession, including some smaller areas of hemlock, oak-hickory and beech-maple dominant forests. The following ecological community types were determined in the field, as defined by Reschke (1990):

Successional Old Field – Defined by Reschke as a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed (for farming or development), and then abandoned. This community was prevalent throughout the Project site with many common plant species present – goldenrods (*Solidago spp.),* asters (*Symphyotrichum spp.*), and many different upland grasses such as timothy (*Phleum pratense*) and orchard (*Dactylis glomerata*) grasses. A representative photo of successional old fields common within the Project site can be seen in Addendum B, Photo 1 of this report.

Successional Northern Hardwoods Forest – Defined as a hardwood or mixed forest that occurs on sites that have been cleared (for farming, logging, etc.) or otherwise disturbed. Dominant species observed on site included red maple (*Acer rubrum*), white pine (*Pinus strobus*), gray birch (*Betula populifolia*), and quaking aspen (*Populus tremuloides*). Limited examples of this community were observed within the Survey area, often in small patches of area within forestland not recently disturbed by logging activities (see Photo 2).

Northern Hardwoods Forest – Defined as a hardwood or mixed forest that occurs on sites that have been cleared (for farming, logging, etc.) or otherwise disturbed. Dominant species observed on site included red maple, white pine, gray birch, and quaking aspen. Limited examples of this community were observed in transitional areas between forested wetlands and upland forestland (e.g. Appalachian Oak Hickory Forest). A representative photo of hardwood forests common within the Project site can be seen in Appendix B, Photo 3 of this report.

Successional Shrubland – Similar to successional northern hardwoods forest, successional shrubland occurs on sites that have been previously cleared (farming, logging, etc.) or have otherwise been disturbed. This community is comprised of at least 50% shrub species. On-site, this community was observed adjacent to either developed areas (residences, farms, lawns, roadsides, etc.) or successional old fields and agricultural land (see Photos 4 and 5 of this report for representative examples).

Hemlock Northern Hardwood Forest – Reschke defines this community as a variant, mixed forest that typically occurs on middle to lower slopes of ravines, on cool, mid-elevation slopes, and on moist, well-drained sites at the margins of swamps. On site, Eastern hemlock (*Tsuga canadensis*) was observed along with tree species such as American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), red maple, black cherry (*Prunus serotina*), white pine, yellow birch (*Betula alleghaniensis*), and red oak (*Quercus rubra*).

Appalachian Oak-Hickory Forest – Reschke defines this ecological community in New York State as a hardwood forest occurring on well-drained ridgetops and south and west facing upper slopes. This community was observed in a small portion of the Project site, and is dominated by overstory tree species of oaks (*Quercus rubra*, *Quercus alba* and *Quercus velutina*) and hickories (*Carya glabra* and *Carya cordiformis*).

Beech Maple Mesic Forest – Defined as a closed-canopy hardwood forest, with co-dominating sugar maple and American beech and low density stands Eastern hemlock as observed on-site. Although not observed during the fall site visit, this community typically has an abundance of herbaceous plants present especially during the spring time

flowering season. In addition, this community has a well-developed understory which was observed, of maple and beech seedlings and common shrubs.

Representative Wetland and Stream Communities

In general, wetlands identified within the Project area exist as one or a combination of the following types: 1) emergent wetland, 2) scrub-shrub wetland, 3) forested wetland, 4) farm ponds or 5) streams (ephemeral, intermittent and perennial). Wetland types were classified according to the Cowardin classification (Cowardin, et al., 1979). Wetlands and streams identified within the Project area are depicted in Addendum A, Figure 2 of this report, and descriptions of each of the communities are presented below. Representative photos of each wetland type are located in Appendix B of this report.

Emergent wetland – The majority of the wetlands within the Survey Area are characterized as emergent or are partially emergent. Emergent wetlands occur where surface water collects in shallow basins and/or adjacent to open water. These wetlands are dominated by herbaceous vegetation, and generally characterized by soils that remain saturated or inundated throughout the year. Although the Cowardin classification was used to classify wetlands, some of the emergent wetlands in this category could be best described according to the Reschke definition as wet meadow (Reschke, 1990). Wet meadow wetlands are usually found in poorly drained, low-lying depressional areas. Wet meadow wetlands may resemble grasslands and are typically drier than other marshes, except during periods of seasonal high water. They generally lack standing water for most of the year, though snow melt, stormwater runoff, and/or a high water table allows the soil to remain saturated for a significant portion of the growing season.

Emergent wetlands identified in the Survey Area are dominated by plants such as cattail (*Typha latifolia*), sedges (*Carex spp*.), rushes (*Juncus spp*.), green bulrush (*Scirpus atrovirens*), reed canary grass (*Phalaris arundinacea*), late goldenrod (*Solidago gigantea*), wool grass (*Scirpus cyperinus*), Joe-pye weed (*Eupatorium maculatum*), swamp milkweed (*Asclepias incarnata*), rice cutgrass (*Leersia oryzoides*), and boneset (*Eupatorium perfoliatum*). Evidence of wetland hydrology in the emergent wetlands identified within the Survey Area includes surface water, drainage patterns, saturated soils, microtopographic relief, and saturation visible on aerial imagery. Representative examples of emergent wetlands within the Project area are shown in Appendix B, Photos 8 and 9.

Scrub-shrub wetland – Many of the wetlands identified were found to be dominated by scrub-shrub vegetation. Scrub-shrub wetlands within the Survey Area are characterized by dense stands of shrub species less than 20 feet tall, including willows (*Salix spp*.), silky dogwood (*Cornus amomum*), red osier dogwood (*Cornus stolonifera*), gray dogwood (*Cornus racemosa*), speckled alder (*Alnus incana*), and common elderberry (*Sambucus nigra*). Herbaceous vegetation in these areas includes sensitive fern (*Onoclea sensibilis*), ostrich fern (*Matteuccia struthiopteris*), tearthum (*Persicaria arifolia*), field horsetail (*Equisetum arvense*), and various sedges. Evidence of wetland hydrology in the scrub-shrub wetlands identified within the Survey Area includes water-stained leaves, saturated soils, microtopographic relief, and saturation visible on aerial imagery. See Appendix B, Photo 10 for an example of scrub-shrub wetlands within the Project area.

Forested wetland – Forested wetland communities are dominated by trees that are 20 feet or taller, but also include an understory of shrub and herbaceous species. The wetlands within the Survey Area that are fully or partially forested include a mix of hydrophytic trees such as green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), red maple (*Acer rubrum*), black willow (*Salix nigra*), and speckled alder. They also occasionally contain an understory of shrubs including saplings of the above mentioned species, or shrub species such as dogwoods or willows. Herbaceous species in forested wetland include sedges, manna grasses (*Glyceria spp*.), spotted jewelweed (*Impatiens capensis*), pale jewelweed (*Impatiens pallida*), royal fern (*Osmunda regalis*), skunk cabbage (*Symplocarpus foetidus*), and sphagnum moss. Evidence of wetland hydrology in the forested wetlands identified within the Survey Area includes water-stained leaves, water marks, moss trim lines drainage patterns, saturated soils, microtopographic relief, and saturation visible on aerial imagery. See Appendix B, Photos 11 and 12 for examples of forested wetlands present within the Project area.

Farm Ponds - A few small farm ponds and recreation ponds are found within the Survey Area, generally in open field settings or adjacent to houses and barns. Typically, these ponds are excavated or diked, with well-defined banks. Emergent wetland vegetation tends to be limited or lacking. Although not verified, water depths are expected to be consistent with excavated ponds that are used as a source of water for livestock as well as for fishing and aesthetic purposes. Such ponds are typically a minimum of 4 feet deep. See photos 13 and 14 for examples of farm ponds within the Project area.

Streams – Streams within the Project area are primarily located within agricultural fields, forests, hedgerows, and old-field communities, and generally have a gentle gradient (0-3%). The majority of the streams are located within the transmission site. Most of the identified streams are intermittent, with a rocky substrate, and did not have well defined and established riparian corridors typical of larger, perennial stream/river systems. The majority of streambeds did not have a large flow of water at the time of the field investigation, likely due to the lack of adequate precipitation during the 2012 growing season. Water depths within the channels with stream flow averaged 2-6 inches. See Photos 15 to 18 for examples of streams within the Project area.

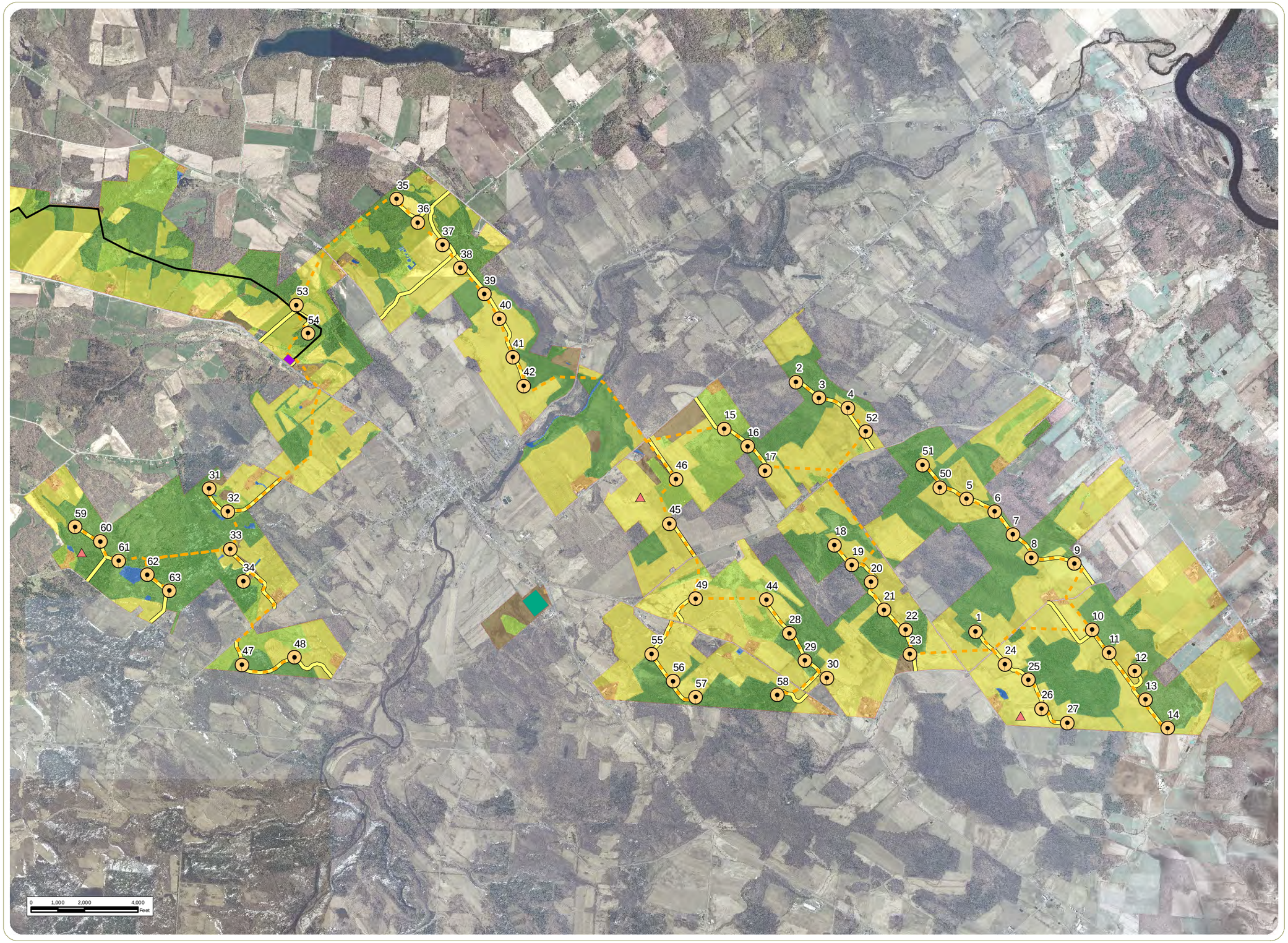
Threatened and Endangered Species

The NYNHP response letter dated January 30, 2013 stated that one vascular plant (rock-cress (*Draba arabisans*)), one bird (upland sandpiper (*Bartramia longicauda*)), and one special aquatic community (confined river) are within or in the vicinity of the project site. The NHP listing for rock-cress is a historical record dating back to 1923. The upland sandpiper has been documented within 0.5 mile of the study area. The special community is confined river and is associated with the Deer River.

Review of the U.S. Fish and Wildlife Services (USFWS) online database indicated only one federal listed endangered species (Indiana Bat) has been documented in Jefferson County and no endangered or threatened species have been documented in Lewis County.

Appendix A

Figures



Copenhagen Wind Farm

Town of Denmark, Lewis County and Towns of Rutland, Champion, and Watertown, Jefferson County

Figure 1A:Vegetative Community Types - Generation Site

February 2013

- Wind Turbine
- Meteorological Tower
- Collection Substation
- O&M Building/Laydown Yard
- Electrical Interconnect
- Transmission Line
- Access Road
- Project Area

Vegetative Communities

- Agricultural Land
- Disturbed/Developed
- Forestland
- Successional Old Field
- Open Water
- Scrub/Shrub

Notes:
Basemap: NYS 2-Foot Resolution Aerial Photography

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Figure 1B:Vegetative Community Types - Transmission Site

February 2013

- Wind Turbine
- POI Station
- Collection Substation
- Electrical Interconnect
- Transmission Line
- Access Road
- Project Area

Vegetative Communities

- Agricultural Land
- Disturbed/Developed
- Forestland
- Successional Old Field
- Open Water
- Scrub/Shrub

Notes:
Basemap: NYS 2-Foot Resolution Aerial Photography

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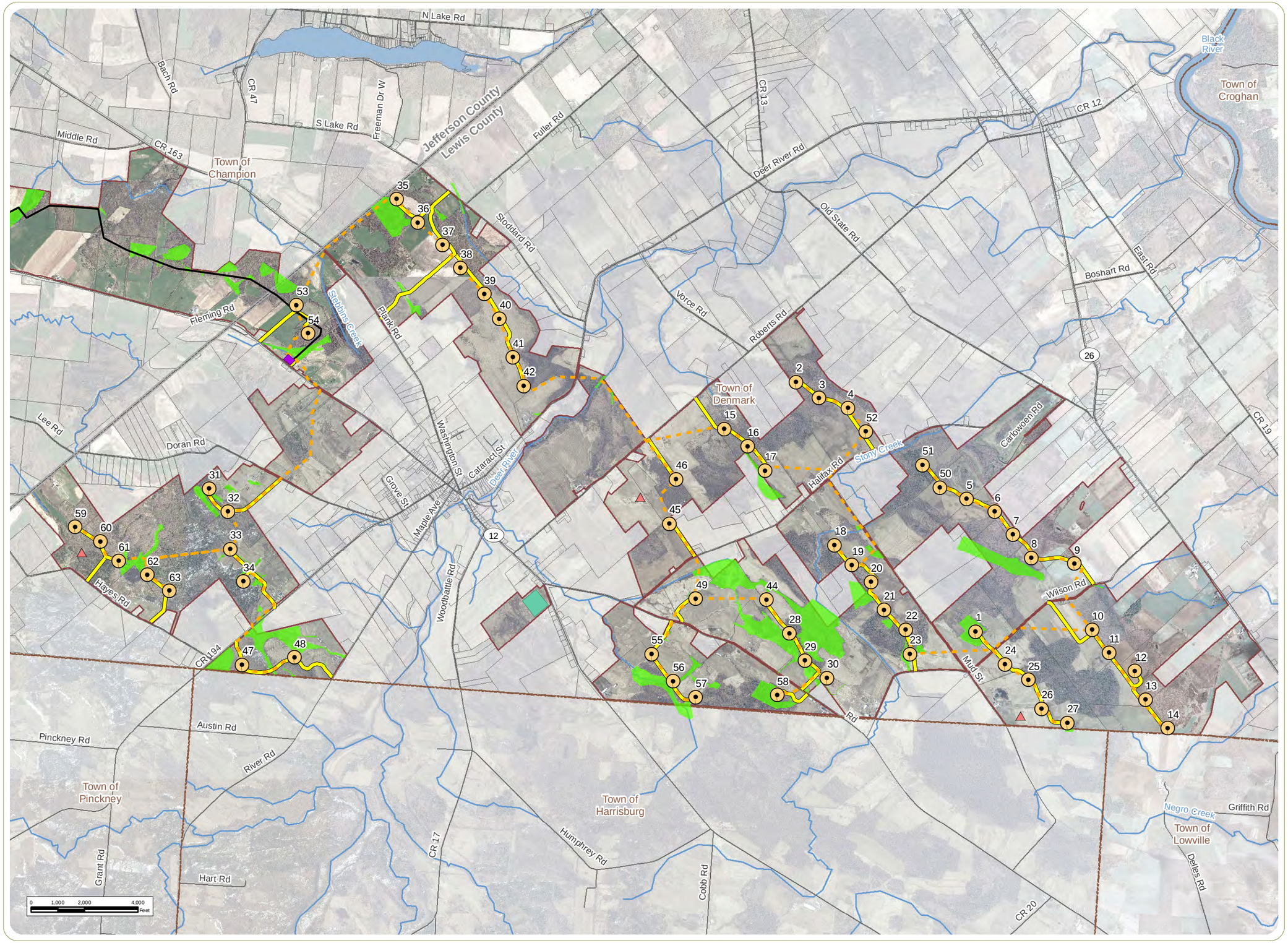

Copenhagen Wind Farm

Town of Denmark, Lewis County and Towns of Rutland, Champion, and Watertown, Jefferson County

Figure 2A: Approximate Wetlands - Generation Site

February 2013

- Wind Turbine
- Meteorological Tower
- Electrical Interconnect
- Transmission Line
- Access Road
- Collection Substation
- O&M Building/Laydown Yard
- Approximate Wetland
- Project Boundary
- Parcel Boundary
- Town Boundary
- County Boundary

Notes:
Basemap: 2-foot resolution orthoimagery and ESRI StreetMap North America, 2012.

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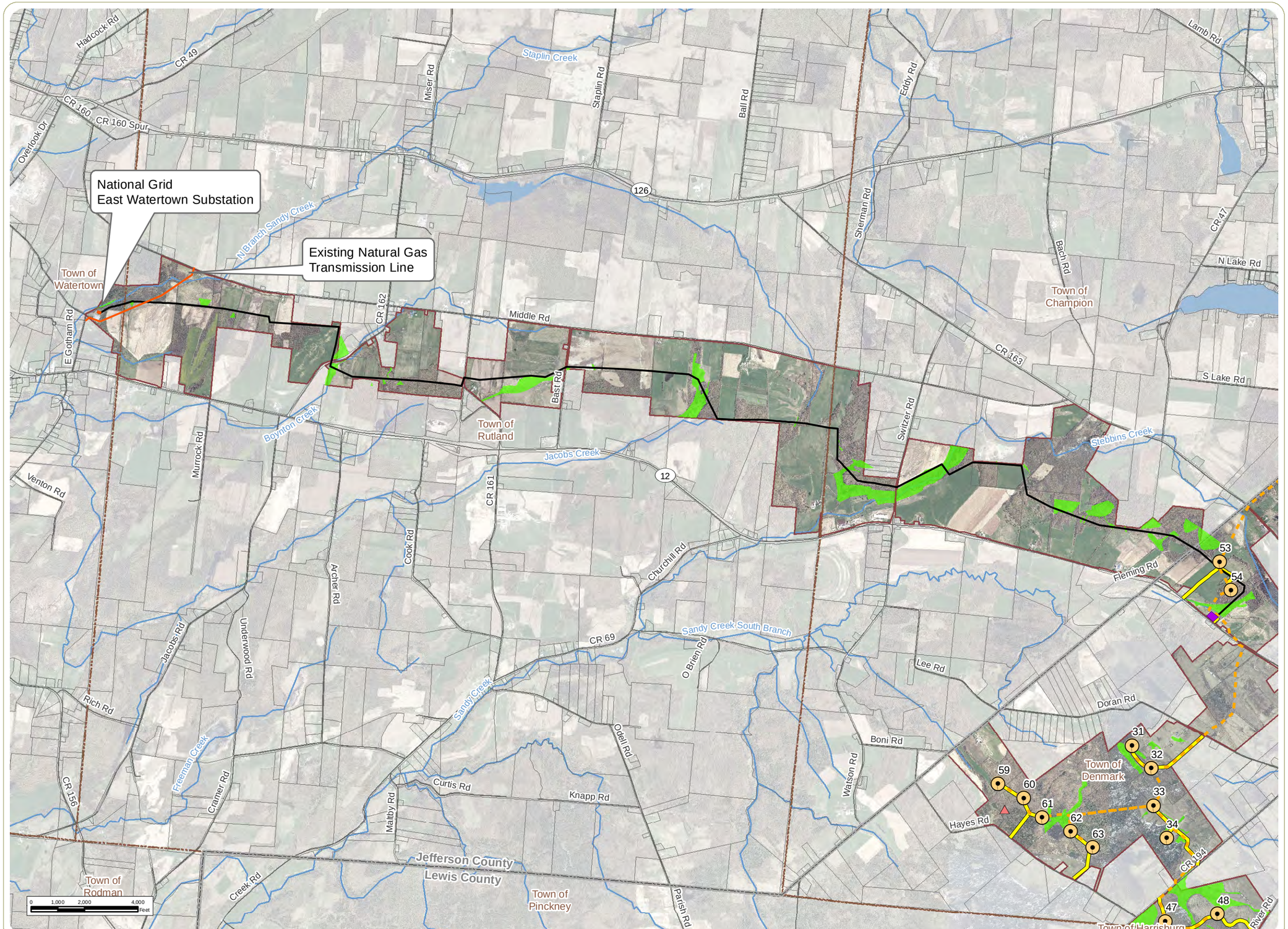

Copenhagen Wind Farm

Town of Denmark, Lewis County and Towns of Rutland, Champion, and Watertown, Jefferson County

Figure 2B: Approximate Wetlands - Transmission Site

February 2013

- Wind Turbine
- Meteorological Tower
- Electrical Interconnect
- Transmission Line
- Existing Gas Transmission Line
- Access Road
- Collection Substation
- POI Station
- Approximate Wetland
- Project Boundary
- Parcel Boundary
- Town Boundary
- County Boundary

Notes:
Basemap: 2-foot resolution orthoimagery and ESRI StreetMap North America, 2012.

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Appendix B

Photo Documentation

Photo 01

Successional old field

Photo 02

Successional northern hardwoods forest

Photo 03

Hardwood forest

Photo 04

Successional shrubland

Photo 05

Successional shrubland

Photo 06

Agricultural land (hay field)

Photo 07

Agricultural land (alfalfa and hay fields)

Photo 08

Emergent wetland

Photo 09

Emergent wetland

Photo 10

Scrub-shrub wetland

Photo 11

Forested wetland

Photo 12

Forested wetland

Photo 13

Farm pond

Photo 14

Farm pond

Photo 15

Perennial stream

Photo 16

Intermittent stream channel (agricultural swale)

Photo 17

Ephemeral stream channel

Photo 18

Deer River Gorge