2.0 ALTERNATIVES ANALYSIS AND DESCRIPTION OF PROPOSED ACTION

2.1 PROJECT ALTERNATIVES THAT MEET THE PURPOSE AND NEED

Satisfying AEP Ohio's in-state solar requirements as discussed in **Section 1.0** (Purpose and Need) can be accomplished by the following:

- AEP Ohio building solar generation in-state;
- Contracting for some or all of the output of an in-state solar facility built by another entity;
- Or purchasing available (Ohio) s-RECs.

All of the options above require the construction of solar facilities in Ohio by some entity (AEP Ohio, 2010). AEP Ohio has concluded that it is a viable strategy to procure its renewable energy needs through options that not only meet its current needs and take advantage of federal tax benefits, but also assist in bringing manufacturing and construction jobs to Ohio and provide a means of future compliance with Ohio's solar benchmarks (Godfrey, 2011). These alternatives to the proposed action, as well as others, are discussed in more detail below.

2.1.1 AEP Ohio Building Solar Generation In-State

AEP Ohio has the option of self-developing and building solar projects in Ohio. As with many utilities in Ohio and in other states, AEP Ohio would be in a challenging position to meet its near-term mandated solar requirement by self-developing solar generation capacity in Ohio in the near term if it were to begin developing a green-field project today from scratch. The timeline required to plan, permit, construct, certify, and bring comparable facilities on-line can be in excess of two years. Unless the planning process is currently under way, utilities will likely not meet the renewable benchmark required under Ohio law within the required timeframe. To meet the Ohio mandates for in-state generation, AEP Ohio may place solar modules on rooftops or build ground-mounted solar module facilities. Regardless of the solar installation, specific design and siting criteria are necessary for environmental, safety, construction, and feasibility reasons. The two sub-options under this alternative are discussed in more detail below.

2.1.1.1 Distributed and Building-Mounted Solar Photovoltaic (PV) Panels

Distributed solar energy refers to smaller energy systems that produce energy on-site, such as roof-mounted solar PV systems. Unlike traditional "centralized" systems, where electricity is generated at a remotely located, large-scale power plant and then transmitted through power lines to consumers, distributed energy, such as PV modules, could potentially be installed on private or publicly-owned residential, commercial, or industrial building rooftops or in other disturbed areas such as parking lots or disturbed areas adjacent to existing structures such as substations. To be a viable alternative to the proposed Turning Point Solar Project, 49.9 MW of newly installed solar capacity would be necessary.

The small-scale and high costs of distributed solar energy resources are usually prohibitive factors for meeting large energy benchmarks such as those required under Ohio's Renewable Energy Standards (RES) for several reasons. First, for building-mounted projects, not all buildings are structurally capable of supporting solar equipment on rooftops. Feasibility studies relating to building structure and load capabilities, system sizing, access, security and energy production are necessary, yet time-consuming requirements for any type of solar installation, especially on buildings. Space on rooftops is often further limited in size due to other systems already in place on roofs (e.g., HVAC, etc.).

A 2008 study by the National Renewable Energy Laboratory found that "only 22 to 27% of residential rooftop area is suitable for hosting an on-site PV system after adjusting for structural, shading, or ownership issues." [U.S. Department of Energy (US DOE, 2010a)]. Second, ownership and/or lease opportunities are often a limiting factor. The Project owner must obtain exclusive rights to build a solar project if they are not the property owner. This is usually negotiated through a land lease agreement with the property owner and/or site host. Although buildings might exist that are structurally sound to support a solar project, if the building or property is not owned by AEP Ohio, building owners may choose not to enter into negotiations for a solar project to be built on their property. Proper consideration should be given to site selection to minimize the environmental footprint and harmonize with existing land uses.

A market model report shows that distributed rooftop solar PV – comprised of small, grid-tied rooftop solar PV systems, ranging in size from 1 kilowatt (kW) to about 15 kW, represents the largest segment of both U.S. and global PV markets (Easan and Denholm, 2010). In some areas of the country these small systems can aggregate to substantial megawatts. For example, California currently has over 812 MW of distributed PV systems installed, but this is spread over 79,128 separate solar projects, for an average capacity of about 10.3 kW each (Go Solar California, 2011). At this average capacity, it would take nearly 5,000 separate projects to equal the proposed Project's 49.9 MW of capacity. While distributed generation is an important part of renewable electricity generation, permitting, certifying, and installing distributed solar on this scale would be much more difficult and more costly to ratepayers.

2.1.1.2 Ground-mounted Solar Photovoltaics (PV) on Reclaimed Land

Ground-mounted solar facilities, especially on land not otherwise suitable for development, offer several advantages and are viewed in the United States as a valuable opportunity to convert brownfields into viable opportunities for clean energy and economic development. Solar energy technologies and PV systems, in particular, are well-suited to application on brownfield sites. They require little maintenance and can stand directly on the ground with little disturbance to existing site conditions. Brownfield sites are often large in size and offer the right amount of space for the construction and operation of a large solar project. The US Department of Energy (DOE) encourages brownfield revitalization by implementing renewable energy projects through many of its programs.

One example specific to solar energy is the DOE's "Brightfields" program (US DOE, 2009). The Brightfields program offers a range of opportunities to link solar energy to brownfields redevelopment which can transform community hazards and eyesores into productive, green ventures. The DOE touts the conversion of brownfields to green initiatives, particularly through the use of solar, as a clean and green option for serving local energy needs without adversely affecting air quality and climate. Another US DOE initiative, the Loan Guarantee Program, also encourages renewable energy projects on brownfield sites due to fewer environmental constraints that come with other sites (US DOE, 2010b).

2.1.2 Contracting for the Output of an In-State Solar Facility Built by another Entity

Due to the long time frames required for planning, siting and permitting such facilities, no other in-state solar developers are currently in a position to provide AEP Ohio with enough solar output that would enable them to comply with the requirements of Ohio law (ORC 4928.64) within the required timeframe discussed in **Section 1.3**. AEP Ohio has positioned itself to contract for the output of Turning Point Solar via a capital lease (the proposed Project). AEP Ohio has supported Turning Point Solar in advancing the Project through planning and land acquisition assistance. The s-RECs produced by the proposed new solar generation facility will contribute to AEP Ohio's ability to continue to meet its ongoing s-REC benchmarks as well as stimulating the Ohio economy. Due to the still developing market for Ohio s-RECs, AEP Ohio believes that it is prudent to procure its renewable energy needs through options that not only meet its current needs, but also bring manufacturing and construction jobs to Ohio and provide a means of future compliance with Ohio's increasing annual solar energy benchmarks. AEP Ohio's involvement in the Turning Point Solar Project is to invest in, lease and operate the new solar generation facility for the benefit of its customers and the State of Ohio (Godfrey, 2011).

2.1.3 Purchasing Available (Ohio) s-RECs

As addressed previously, AEP Ohio must satisfy at least half of its solar requirement with solar energy produced within Ohio, while the balance may be produced by Public Utilities Commission of Ohio (PUCO) certified out of state generators whose power generation must be shown to be deliverable into Ohio. Compliance with the benchmark requirements may be satisfied by purchasing s-RECs. **Table 2-1** shows the solar generation available to satisfy mandated solar benchmarks as of December 2010, assuming all generation performs as certified.

Table 2-1

Excerpted from AEP Ohio, 2010 (Appendix A, Table 1, page 9 of 14)

Ohio Solar Generation Status - December 8, 2010*			
Domiciled	Status	MW (nameplate)	Annual MWh**
Ohio	Certified	17.8	21,802
	Pending	0.8	879
	Sub-total	18.5	22,680
Out-of-State	Certified	11.8	14,467
	Pending	7.0	8,114
	Sub-total	18.8	22,581
Total	Certified	29.6	36,269
	Pending	7.8	8,992
	Sub-total	37.4	45,261

** Status from PUCO; "AEP_REN_INFO.xls" dated: Dec. 8, 2010*
*** Assumes 13% capacity factor for 1000kW or smaller installations, 14% capacity factor for larger installations, and a 17% capacity factor for Wyandot*

The certified solar generation values shown in **Table 2-1** are expressed in **Figure 2-1** as approximate benchmark requirements based on an assumption of 160 terawatt hours (TWh) annual retail sales in Ohio. ORC Sec. 4928.64 dictates that the actual benchmarks would depend on the actual sales in the preceding three calendar years. If aggregate in-state solar capacity is in excess of what is necessary to satisfy mandated annual benchmarks, a competitive and liquid s-REC market might be expected to emerge that would provide a viable alternative to building (or buying) additional solar generation. An analysis of the existing Ohio solar generation (as of December 2010) prepared by AEP Ohio indicates the absence of any additional Ohio solar generation *above* what is required in 2011, indicating a very "tight" market for Ohio s-RECs in 2011 (**Figure 2-1** - AEP Ohio, 2010). Since the solar benchmark mandated by Ohio law doubles in 2012 (**Table 1-2**), the market for available s-RECs deteriorates based on expectations for Ohio-based solar generation being certified and coming on-line (AEP Ohio, 2010). According to AEP Ohio, the addition of the Turning Point Solar facility, along with the 10.1 MW Wyandot Solar Farm, in Wyandot County, Ohio, will satisfy AEP Ohio's in-state (minimum of 50% of all solar) requirement through 2020 (AEP Ohio, 2010) and would meet, or slightly exceed, the total solar requirement through 2015.

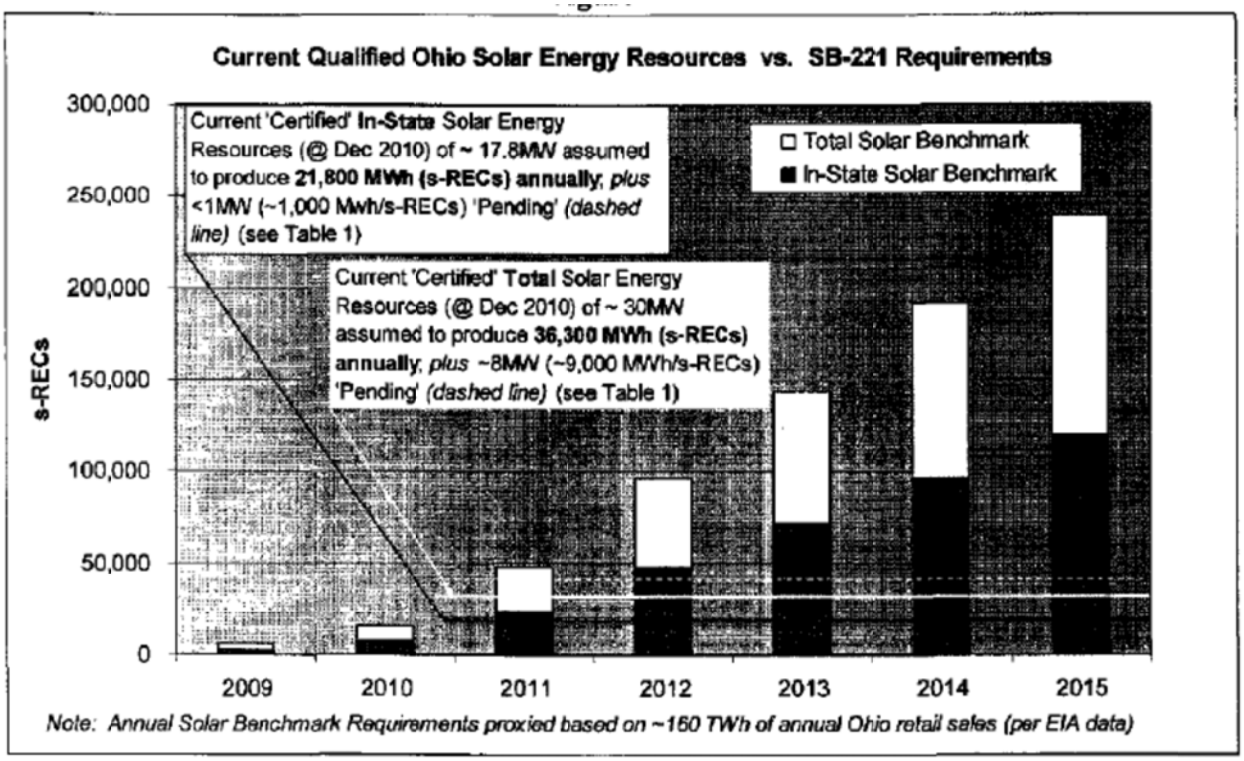


Figure 2-1: Excerpted from AEP Ohio, 2010.

An electric distribution utility or electric services company may request the PUCO to make a *force majeure* determination regarding all or part of the utility's or company's compliance obligation during any year (Union of Concerned Scientists, 2008). For purposes of a utility's compliance obligation, *force majeure* is defined under Section 4928.64 of the Ohio Revised Code as the circumstance in which a utility's reasonably expected cost of compliance exceeds its reasonably expected cost of otherwise producing or acquiring the requisite electricity by three percent or more. AEP Ohio may request the commission to make a force majeure determination pursuant to this section. The commission would consider whether AEP Ohio had made a good faith effort to acquire sufficient solar energy resources to comply, including but not limited to, by banking or seeking renewable energy resource credits or by seeking resources through long-term contracts. If the commission determines that renewable energy or solar energy resources are not reasonably available to permit AEP Ohio to comply, the commission shall modify the compliance obligation of AEP Ohio for that compliance year. In October of 2009, AEP Ohio filed an application with the PUCO to amend the Company's 2009 solar energy benchmarks and requested that the PUCO determine for solar benchmark compliance purposes a finding of *force majeure* due to the lack of supply in the Ohio s-REC market. Also in 2009, AEP Ohio issued an Ohio s-REC-only request for proposals (RFP) for which no bids were received. The PUCO acknowledged the lack of supply in the Ohio s-REC market and granted AEP Ohio's request for *force majeure*. This decision allowed AEP Ohio to add the 2009 solar benchmark shortfall amounts to its 2010 compliance benchmark. In June 2009, AEP Ohio also entered into a long-term Renewable Energy Purchase Agreement (REPA) for the output of the 10.1 MW Wyandot Solar Farm generation facility located near Upper Sandusky, Ohio (**Figure 2-2**). This new solar facility came online in April, 2010, and will aid AEP Ohio in complying with the 2010 and 2011 solar portion of the renewable energy benchmarks. However, even with the s-RECs from the Wyandot REPA, AEP Ohio will find itself short of s-RECs by the end of 2012 due to the increasing solar benchmarks it must meet for compliance with Ohio's RES (Godfrey, 2011).

Figure 2-2. Oblique aerial view of 10 MW Wyandot Solar Farm facility in Upper Sandusky, Ohio.

2.1.4 Banked Compliance

An electric distribution utility or electric services company may use RECs any time in the five calendar years following the date of their purchase or acquisition from any entity (Union of Concerned Scientists, 2008). S-RECs that are in excess of AEP Ohio's annual solar benchmark obligations under SB 221 can be banked for future years' compliance requirements. Since the solar benchmarks increase annually, any RECs that are "banked" in the short-run would eventually be depleted if no additional resources are added beyond the Turning Point Solar Project (Godfrey, 2011). Without the Turning Point Solar Project, banked compliance is not a viable option for AEP Ohio since, as is demonstrated above, the current s-REC market is extremely "tight," especially in the short to medium term given long lead times for bringing utility-scale projects online.

2.1.5 Renewable Energy Compliance Payment

The Public Utilities Commission of Ohio (PUCO) has the authority to levy a renewable energy compliance payment on electric distribution utilities or electric services companies that fail to comply with the annual requirements. An electric distribution utility or an electric services company does not have to comply with the annual requirements to the extent that its reasonably expected cost of compliance exceeds its reasonably expected cost of otherwise producing or acquiring the requisite electricity by three percent or more. In addition, a renewable energy compliance payment, administered by PUCO for non-compliance, serves as a de facto cost cap for retailers. Moreover, renewable energy compliance payments—if administered by PUCO—are not permitted to be passed through to consumers by the electric distribution utility or electric services company (Union of Concerned Scientists, 2008). Based on conversations with the utility, AEP Ohio's cost of renewable energy procurement isn't expected to exceed 3% of their total generation cost.

For solar energy resource requirements, the compliance payment began at $450 per megawatt-hour (MWh) of under compliance or noncompliance for 2009, decreased to $400/MWh for 2010 and 2011, and similarly decreases every two years thereafter through 2024 by $50/MWh, to a minimum of $50/MWh. **Table 2-2** shows the potential costs to AEP Ohio for noncompliance.

At its discretion, the PUCO may increase the amount of the compliance payment to ensure that it is not used to achieve compliance in lieu of actually acquiring or realizing energy derived from renewable energy resources. This, along with the potential compliance payments illustrated in **Table 2-2,** highlight that compliance payments are not a reasonable option for AEP Ohio.

Table 2-2. Potential Compliance Payments for Noncompliance 2011 – 2020

Year	Benchmark Solar MWh[1]	Compliance Payment per MWh of Noncompliance[2]	Total Potential Compliance Payment
2011	12,999	$400	$5,199,600
2012	24,954	$350	$8,733,900

Table 2-2. Potential Compliance Payments for Noncompliance 2011 – 2020

Year	Benchmark Solar MWh[1]	Compliance Payment per MWh of Noncompliance[2]	Total Potential Compliance Payment
2013	36,512	$350	$12,779,200
2014	47,823	$300	$14,346,900
2015	59,045	$300	$17,713,500
2016	70,490	$250	$17,622,500
2017	85,792	$250	$21,448,000
2018	100,955	$200	$20,191,000
2019	116,117	$200	$23,223,400
2020	131,170	$150	$19,675,500
2021	146,602	$150	$21,990,265
2022	162,034	$100	$16,203,353
2023	177,465	$100	$17,746,529
2024	192,897	$50	$9,644,853

[1] Source: AEP Ohio, 2010; [2] Source: Union of Concerned Scientists, 2008

2.2 PROJECT ALTERNATIVES THAT DO NOT MEET THE PURPOSE AND NEED

2.2.1 Purchase of Out-of-State s-RECs

Utilities in Ohio are allowed to procure 50% of their s-RECs from out of state facilities provided that these states must be contiguous with Ohio (IN, KY, WV, PA, and MI). Moreover, s-RECs purchased from theses state cannot be used to meet the 50% mandated as in-state by Ohio law. Therefore, purchase of out-of-state s-RECs, even if available, would not fulfill the Project purpose and need.

2.2.2 Wind Energy

Wind energy has developed rapidly during the past decade due, in part, to the federal Production Tax Credits, and the rapidly decreasing cost of wind generation. Since the ongoing cost of the "fuel" – wind – is zero, the cost to ratepayers consists of the capital costs associated with the initial installation of the equipment including the necessary transmission feeder lines, and ongoing annual maintenance costs. Although the purchase of wind energy may assist AEP Ohio in meeting its renewable energy resources benchmark mandated by Ohio law, it does not count towards the solar benchmark. Therefore, wind energy would not fulfill the Project purpose and need.

2.2.3 Biomass

Biomass is a renewable resource of high potential in southeastern Ohio due to the extensive forest reserves in the region. Conventional steam electric generation is capable of utilizing biomass fuels to provide some of the energy requirements. Although the use of biomass fuels may assist AEP Ohio in meeting its renewable energy resources benchmark mandated by Ohio law, it does not count toward the solar benchmark. Therefore, biomass energy would not fulfill the Project purpose and need.

2.2.4 Hydropower

Hydropower systems require the damming of a body of water to allow for a controlled release of water. The force of water being let out through the dam, either at a constant rate or at certain times of the day or seasons of the year, spins a turbine to generate electricity that is sent to remote regions via transmission lines. Other large dam systems generate energy through a process of moving water from different elevations within a multi-dam system. However, large-scale hydropower can have serious consequences for native species, local lifestyles, and the landscape. Although the use of hydropower may assist AEP Ohio in meeting its renewable energy resources benchmark mandated by Ohio law, it does not count toward the solar benchmark. Furthermore, no new hydropower facilities have been built in Ohio in the last several years. Therefore, hydropower would not fulfill the Project purpose and need.

2.3 PROJECT ALTERNATIVE ANALYSIS CONCLUSION

Only Alternative 2, contracting for some or all of the output of an in-state solar facility built by another entity will allow AEP Ohio to achieve its designated near to medium term solar energy benchmarks required under Ohio law. Alternatives 1, 3, 4 and 5 are not currently reasonable. Other feasible alternatives such as purchase of out-of-state s-RECs, wind energy, biomass fuels, or hydropower would not fulfill the Project purpose and need.

2.4 SITE SELECTION STUDY

2.4.1 Siting Criteria Development

Proper siting of a large solar generation facility requires substantial evaluation and due diligence. Appropriate evaluation and analysis of factors influential in siting a large facility such as the proposed 49.9MW Project can reduce costs, eliminate delays, minimize potential impacts and project opposition, and streamline the regulatory process. Conversely, improper siting can have the opposite effect. The consequences of improper siting can result in both dollars lost and/or material schedule delays. Thus, site selection criteria need to be developed that reflect both the purpose and need of the Project as well as the local setting.

Among the constraints of siting a solar electric generation facility is the need to be in close proximity to suitable electrical transmission lines. While the cost of construction of miles of transmission lines may be a smaller percentage of the total construction cost for a large generation facility (hundreds or more MW), the same infrastructure is a larger percent of the cost for a relatively small utility scale generating facility such as the Project. As a rule of thumb, for conceptual transmission planning, AEP Ohio estimates transmission line construction at approximately $1 million per mile. Another constraint of siting, especially during the construction phase of the Project, is the need for suitable surface transportation infrastructure (roads/highways) the presence of which minimizes the need for access road construction. In addition to being costly, infrastructure construction also represents additional development risks to the Project. Construction of this infrastructure may involve negotiating property acquisitions with multiple owners, which can be a long and expensive process. Therefore, proximity of the site to transmission and transportation infrastructure is important, as well as the avoidance of negative social, environmental, and regulatory impacts.

In order to conduct a technically-sound site selection process, Turning Point Solar worked in cooperation with AEP Ohio and other Project stakeholders to develop criteria specifically applicable to the Project's purpose and need.

2.4.2 Siting Criteria

2.4.2.1 Location in Appalachian Ohio/within AEP Ohio Service Area

As discussed in **Section 1.1**, Turning Point Solar intentionally located the Project in Ohio's Appalachian region to serve as a centerpiece for integrated rural economic development (Ohio Air Quality Development Authority, 2010). Since the power will be provided to AEP Ohio, the starting location for the siting study was AEP Ohio's service area, which covers most of central-eastern Ohio (Ohio Power–**Figure 2-3**) and southeastern Ohio (Columbus Southern Power–**Figure 2-4**). The availability of large tracts of previously disturbed (strip-mined) land in this area also allows for creative and productive re-use of this disturbed resource. A target area of three counties was established based on a central location in AEP Ohio's service area that would minimize transmission construction for energy delivery, and the presence of large tracts of reclaimed strip-mined land. These counties are: Morgan, Muskingum, and Noble.

2.4.2.2 Transmission Line Proximity

Close proximity (within one mile is preferred) to a substation is necessary in order to minimize interconnection costs and environmental and cultural impacts of building the transmission feeder line, sometimes referred to as a generation-tie-line ("gen-tie") from the generation facility to the point of interconnection. Additionally, the availability of an existing transmission right-of-way is preferred in order to minimize the impacts of building the gen-tie. Transmission lines and substations in the three-county area are shown in **Figure 2-5.** Transmission lines and substations within an eight mile radius of the Project Area are shown in **Figure 2-6.**

2.4.2.3 Highway Access

Highway access by way of the Interstate Highway System, US Routes or State Routes is necessary for site access. During construction of the Project, truck transportation will be used to deliver the facility components and materials. Construction workers will also need efficient road transportation to commute to the worksite. Following construction, operations and maintenance crews will continue to require efficient roadway access to fulfill their responsibilities. Close proximity (within one mile) to an Interstate Highway is preferred, followed by close proximity to a US Route, then a State Route.

Ohio Power

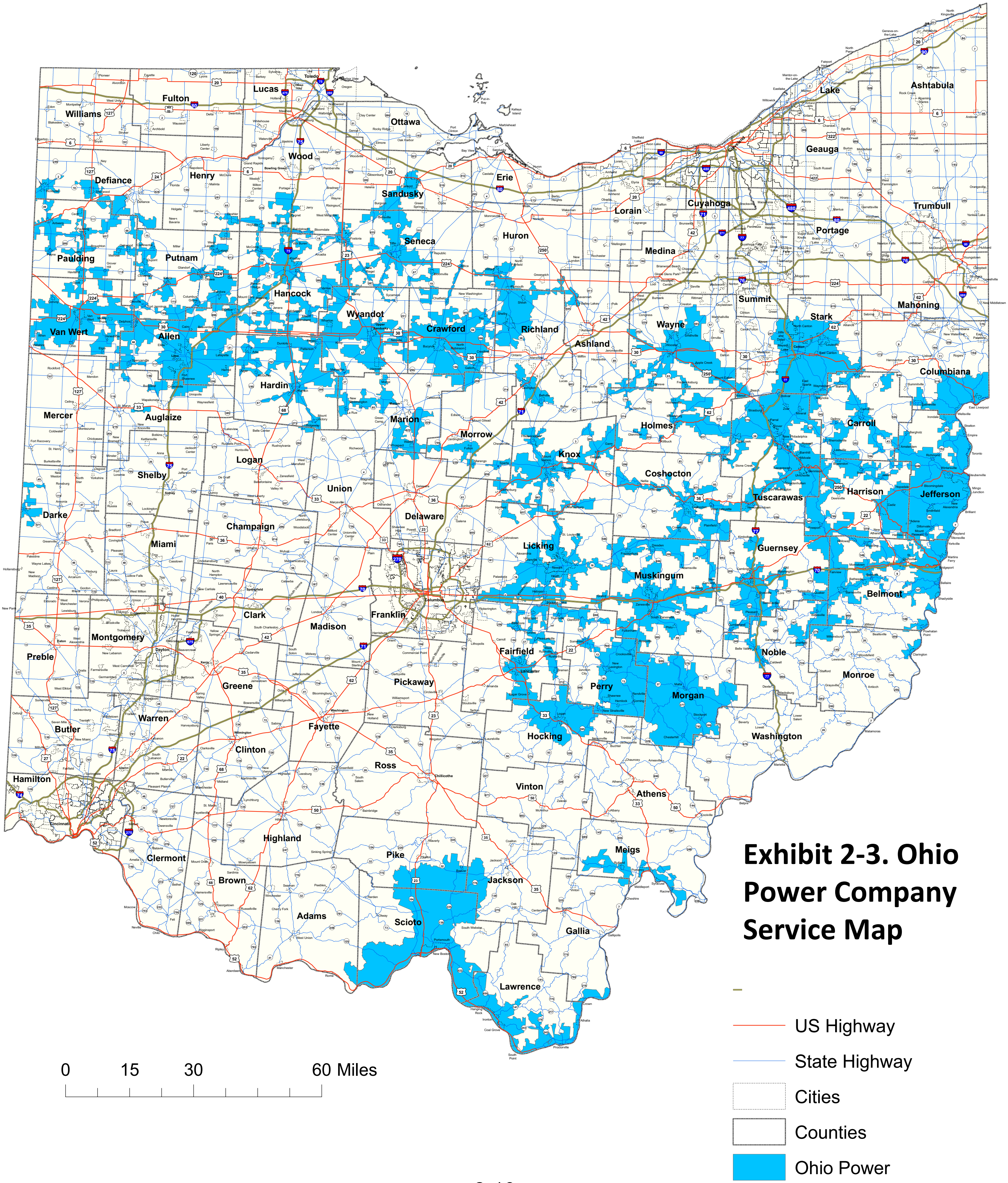


Exhibit 2-3. Ohio Power Company Service Map

Public Utilities Commission of Ohio, 2007

Columbus Southern Power

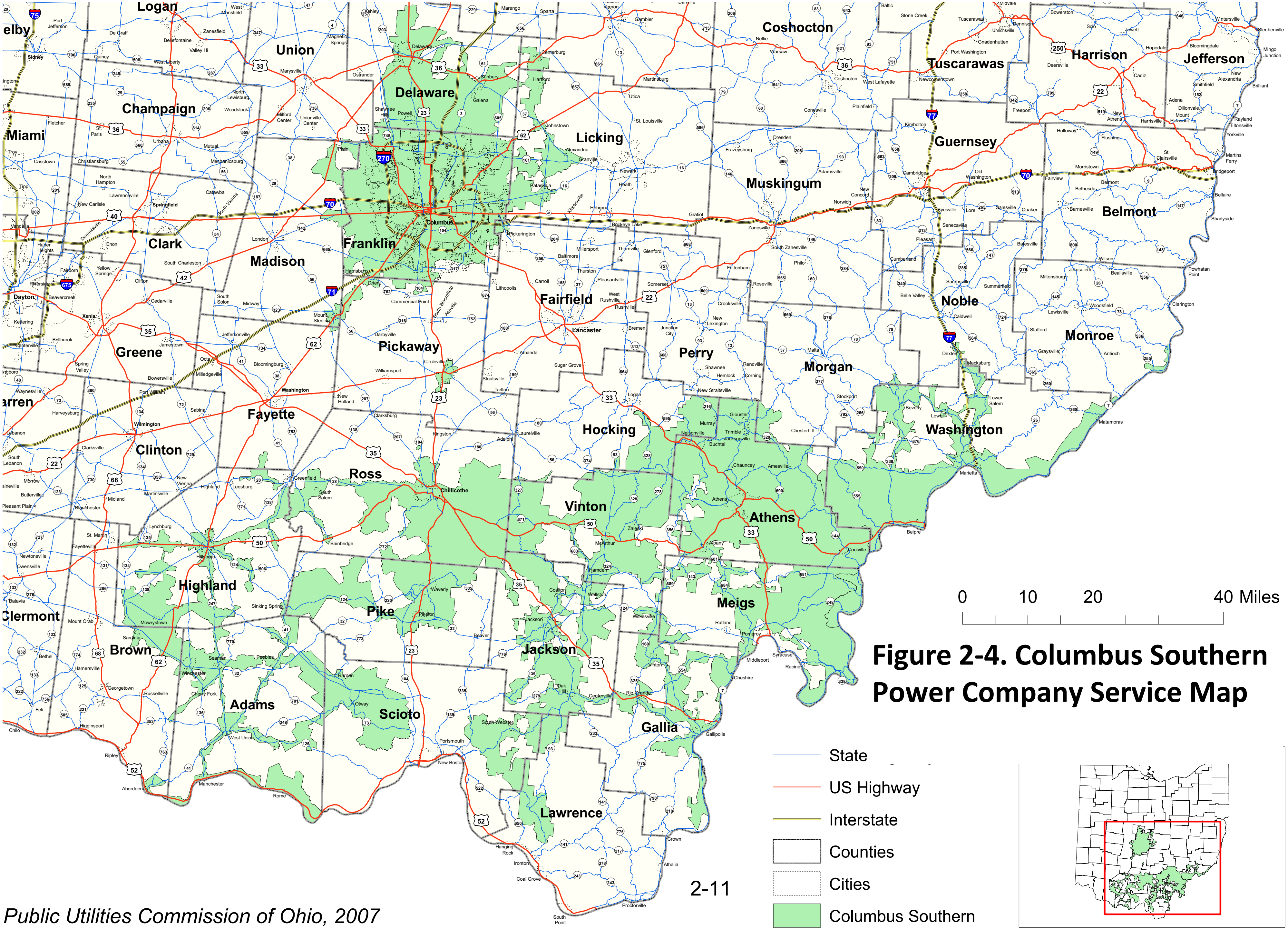
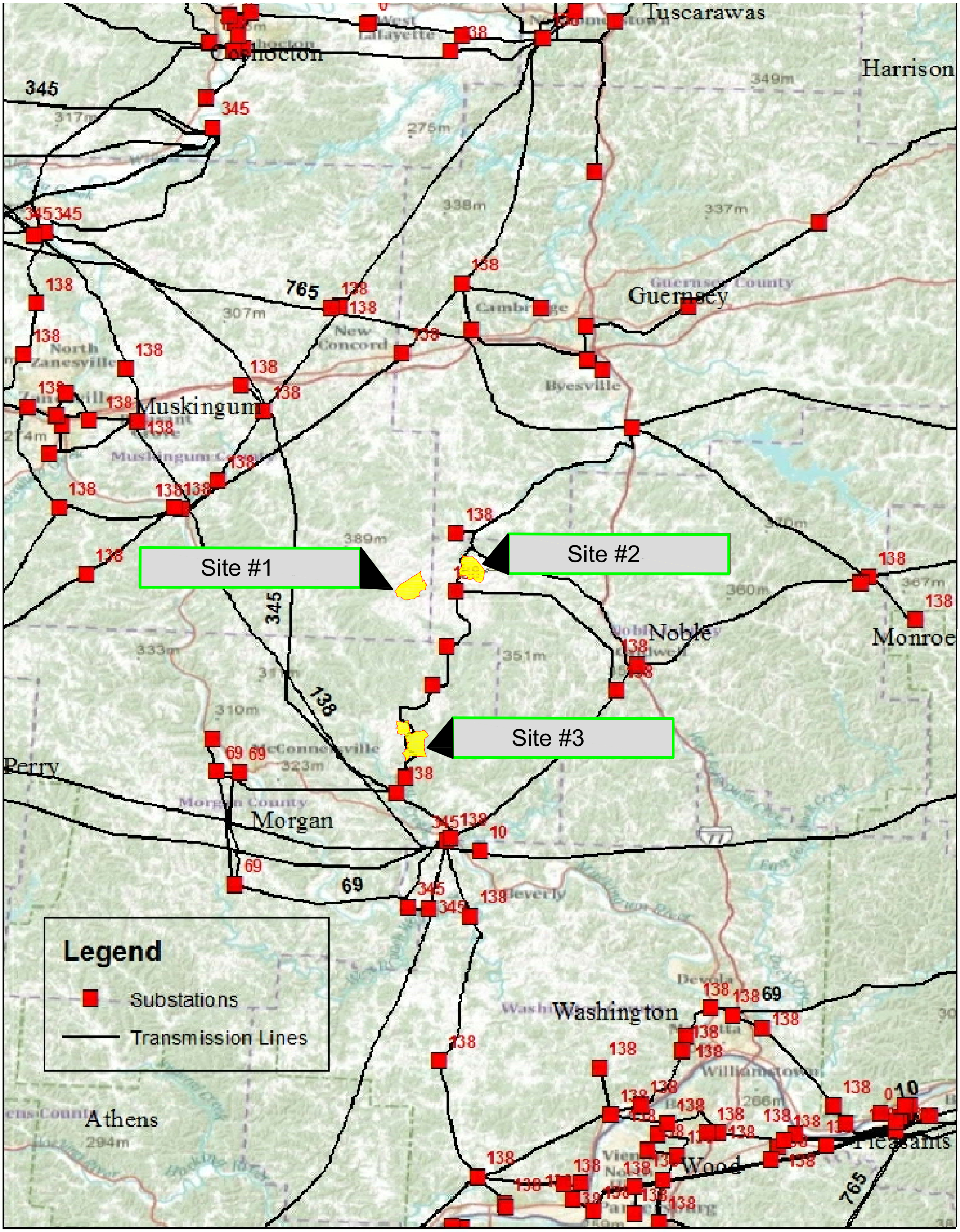


Figure 2-4. Columbus Southern Power Company Service Map

Public Utilities Commission of Ohio, 2007

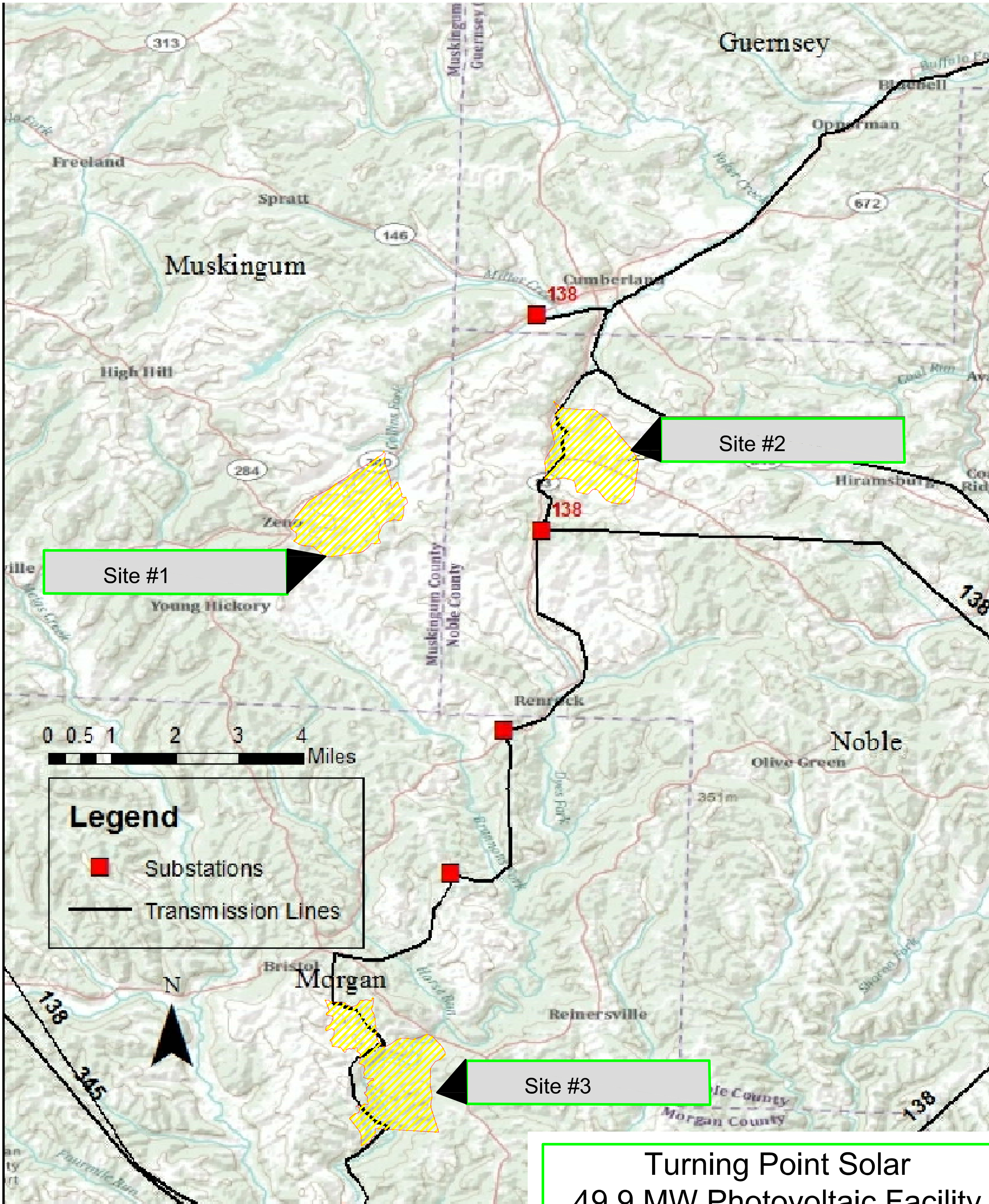


0 8 miles
1" = 8 miles

Turning Point Solar
49.9 MW Photovoltaic Facility

Figure 2-5 Transmission Line Location Overview

URS



Turning Point Solar
49.9 MW Photovoltaic Facility

Figure 2-6 Transmission Lines in Immediate Project Area

URS

0 2 miles
1" = 2 miles

2.4.2.4 Property Available for Sale/Owned by AEP Ohio or Minimal Number of Landowners

The Proposal needs a minimum of approximately 500 acres; however, higher acreage (up to 1,000 or more) allows for greater flexibility in design. Reclaimed strip-mined acreage currently owned by AEP Ohio is preferred, since this will reduce acquisition costs and allow for productive reuse of these disturbed lands. If additional land, not currently in AEP Ohio ownership needs to be acquired, a smaller number of landowners are preferred.

2.4.2.5 Topography/Current Site Use

Large tracts (500+ acres) of level land generally do not exist in Appalachian Ohio, except in the larger river bottoms. However, a relatively level site is preferred over one with highly variable topography in order to minimize the cost of grading or shading. Greater use of reclaimed strip-mined land represents the best solution for reducing costs and impacts for solar facility development and represents a productive use of a disturbed resource. To keep site preparation work (and therefore cost) to a minimum, the Project requires a contiguous 500 acre site with tracts of land that are an average grade of less than 5 percent.

Much of the strip-mined land in the three-county target area was mined during the 1970s and 1980s. Surface mining and reclamation laws during 1940 through 1972 required that trees be planted as the final vegetative cover. That type of reclamation produced forested hills and valleys. In 1972, new surface mining and reclamation laws were enacted that now result in gently rolling grasslands. Under current mining and reclamation practices, the topsoil is removed to gain access to the coal seam. Once the coal is extracted, the land is backfilled and graded to create the contours designated in the reclamation plans. Water run-offs, created to protect against soil erosion, feed into the ponds and lakes built on the reclaimed land. The topsoil that was removed before the land was mined is distributed over the area; fertilizers are used to improve the quality of the soil. Finally, the area is sown with a variety of grasses, which protect the soil from erosion and restore the land for useful purposes (AEP, 2011a).

2.4.2.6 Adjacent Land Use

To minimize social impacts and be consistent with land use policies, surrounding industrial use or reclaimed strip-mined land is preferred; however, agricultural land is also acceptable. Siting near residential uses should be avoided (while satisfying necessary criteria regarding infrastructure). Site selection criteria also favor a site that minimizes impacts to parks, public recreational areas, natural areas, historic properties, and important cultural resources.

2.4.2.7 Impacts on Floodplains

Construction in floodplains needs to be avoided. This is to avoid the negative environmental impacts of building in floodplains as well as to avoid potential damage to the facility from flooding.

2.4.2.8 Impacts on Waters of the United States

Construction in Waters of the United States (including ponds, streams and wetlands) needs to be avoided/minimized to the extent practicable to avoid impacts to these resources and preclude potential delays associated with the need to obtain permits under Section 404/401 of the Clean Water Act.

2.4.2.9 Impacts on Forested Areas

The use of forested areas should be avoided and/or minimized to the extent practicable. American Electric Power, Inc. "AEP" (the parent company of AEP Ohio) recognizes that forest protection and reforestation will not only help the company offset greenhouse gas emissions, but also serves as a centerpiece to the company's commitment to conservation and stewardship. Efficient forestry and land use practices can significantly offset greenhouse gas emissions. AEP is attempting to increase carbon sinks, thus offsetting greenhouse gas emissions, by planting trees and preserving forests. As a result, the company is involved in several reforestation projects (AEP, 2011b).

2.4.2.10 Impacts on Prime Farmland

Use of prime farmland should be avoided/minimized to the extent practicable. Prime farmland, a designation assigned by U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. Even though prime farmland soils may have been disturbed by mining activities, during reclamation this soil must be restored to a depth of at least forty-eight inches, unless a lesser depth occurred in the pre-mined soil. The operator must demonstrate restored productivity by achieving acceptable yields for three crop years before a Phase II performance security release can be approved (ODNR, 2009). A portion of the Project area is mapped not as prime farmland, but as *farmland of local importance*. This farmland is considered valuable for the production of food, feed, fiber, forage, and oilseed crops and is identified by the appropriate local authorities (USDA-NCSS, 2011). Avoidance/minimization of impacts to prime farmland or farmland of local importance is positive environmental stewardship.

Based on the above criteria, the preferred site would have the following characteristics:

- Transmission line adjacent to site.
- Near a major highway.
- Property available in AEP Ohio ownership or for sale from one landowner.
- Located on relatively level reclaimed strip-mined land
- With no or few nearby residences or schools, and no nearby parks, recreational areas or important natural or cultural resources.
- Not located in a floodplain.
- Not impacting Waters of the United States.
- Not impacting forested areas.
- Not impacting Prime Farmland or farmland of local importance.
- With a lot size 500 to 1,000+ acres (larger size allows more options for design).

2.4.3 Identification of Candidate Sites

Turning Point Solar applied the above criteria to identify candidate sites within the three-county target area. Three candidate sites, one in each of the counties listed above, were identified based on the siting criteria (**Figure 2-7**).

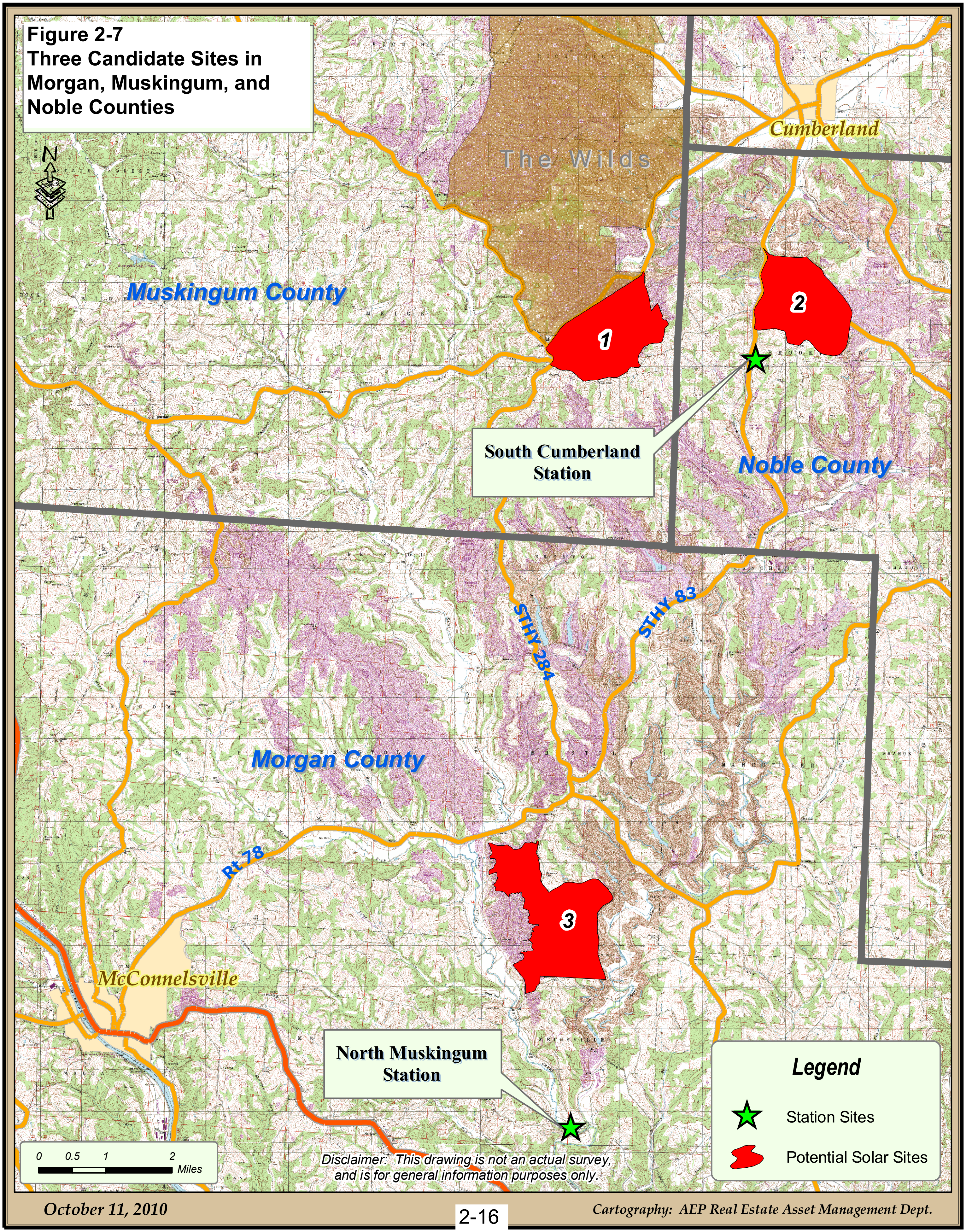
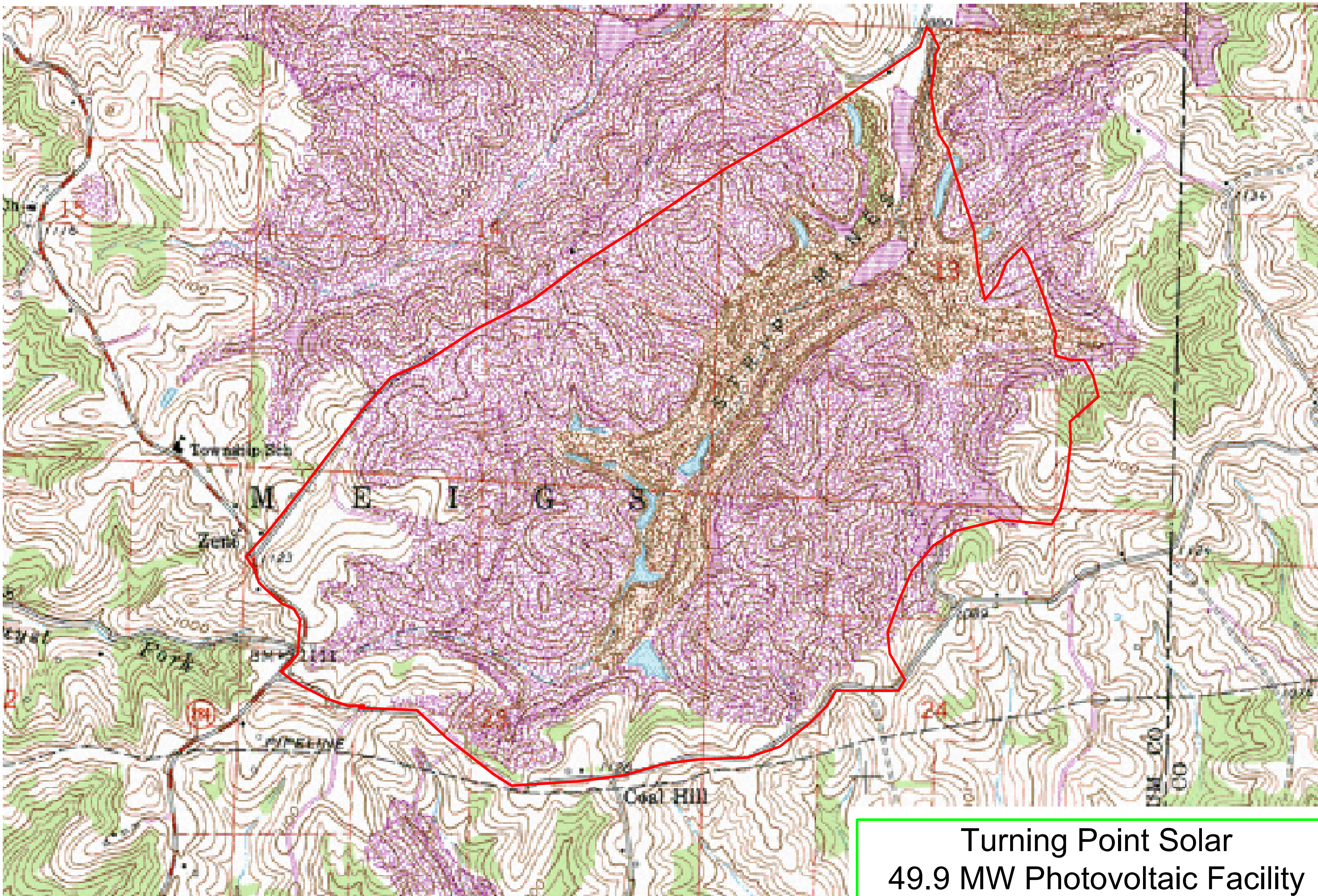


Figure 2-7
Three Candidate Sites in Morgan, Muskingum, and Noble Counties
The Wilds
Cumberland
Muskingum County
1
2
South Cumberland Station
Noble County
STHY 284
STHY 83
Morgan County
Rt 78
3
McConnelsville
North Muskingum Station
Legend
Station Sites
Potential Solar Sites
0 0.5 1 2 Miles
Disclaimer: This drawing is not an actual survey, and is for general information purposes only.
October 11, 2010
Cartography: AEP Real Estate Asset Management Dept.



0 1500'
1" = 1500'

Turning Point Solar
49.9 MW Photovoltaic Facility

Figure 2-8 Site 1 Recent USGS Topographic Quadrangle Map

URS

Site #1 consists of approximately 1000 acres of former strip-mined land adjacent to The Wilds, a wildlife conservation center in Meigs Township, Muskingum County.

Site #2 consists of approximately 771 acres of former strip-mined land in Brookfield Township, Noble County.

Site #3 consists of approximately 1,300 acres of former strip-mined land in Bristol and Meigsville Townships, Morgan County.

2.4.4 Site Descriptions

2.4.4.1 Site #1

Site #1 consists of 1,000+ acres in Sections 4, 13, 23, and 34 of Meigs Township, in southeastern Muskingum County. It occurs on the Cumberland, Ohio USGS quadrangle map (**Figure 2-8**). At its closest approach, Site #1 lies about 0.2 miles from the Muskingum/Noble County line and about 2.5 miles from the Muskingum/Morgan County line. From **Figure 2-6**, it can be seen that Site #1's boundary is more than two miles from the nearest substation, which is the South Cumberland Substation. This means that a gen-tie line of over two miles would need to be constructed to connect the generation facility at Site #1 to the substation. At approximately $1M per mile of gen-tie line, this would cost the Project at least $2M, without taking into account layout of the project and precise engineering of the gen-tie along topographical features.

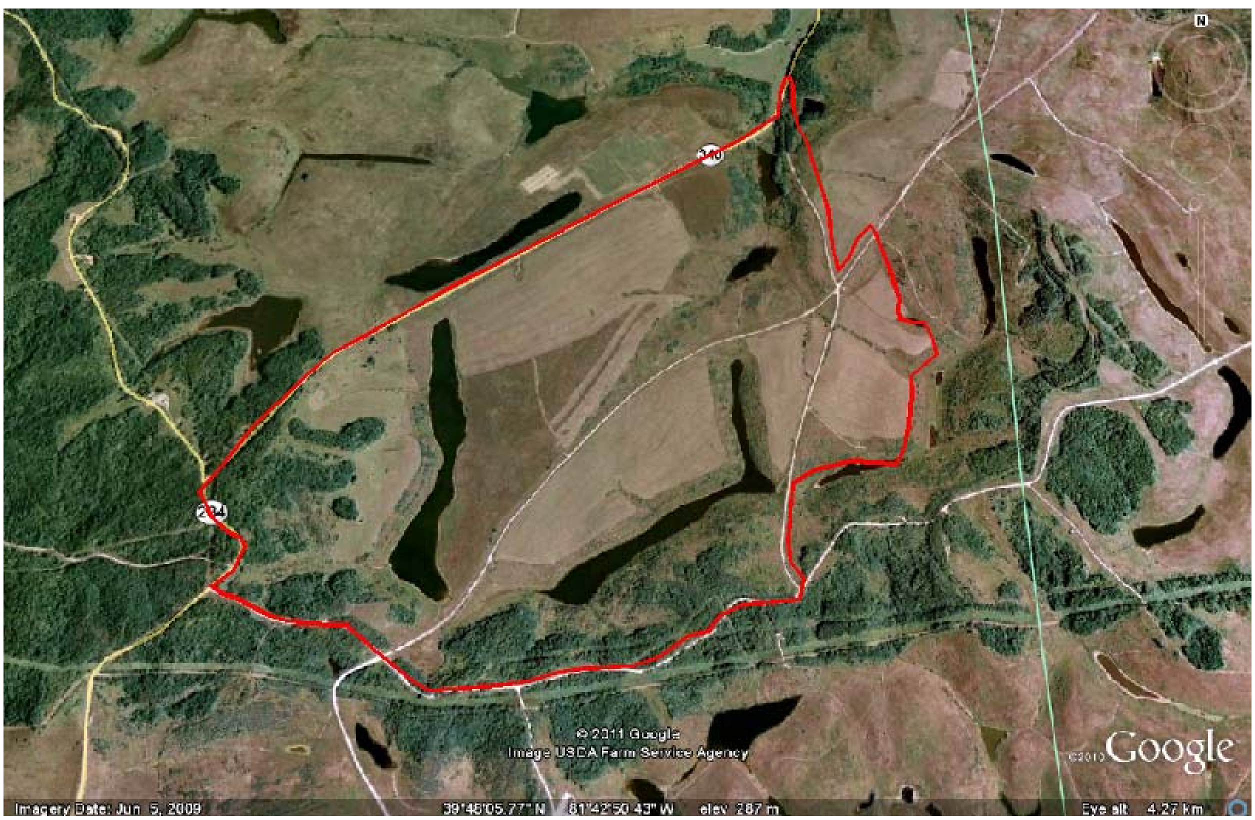


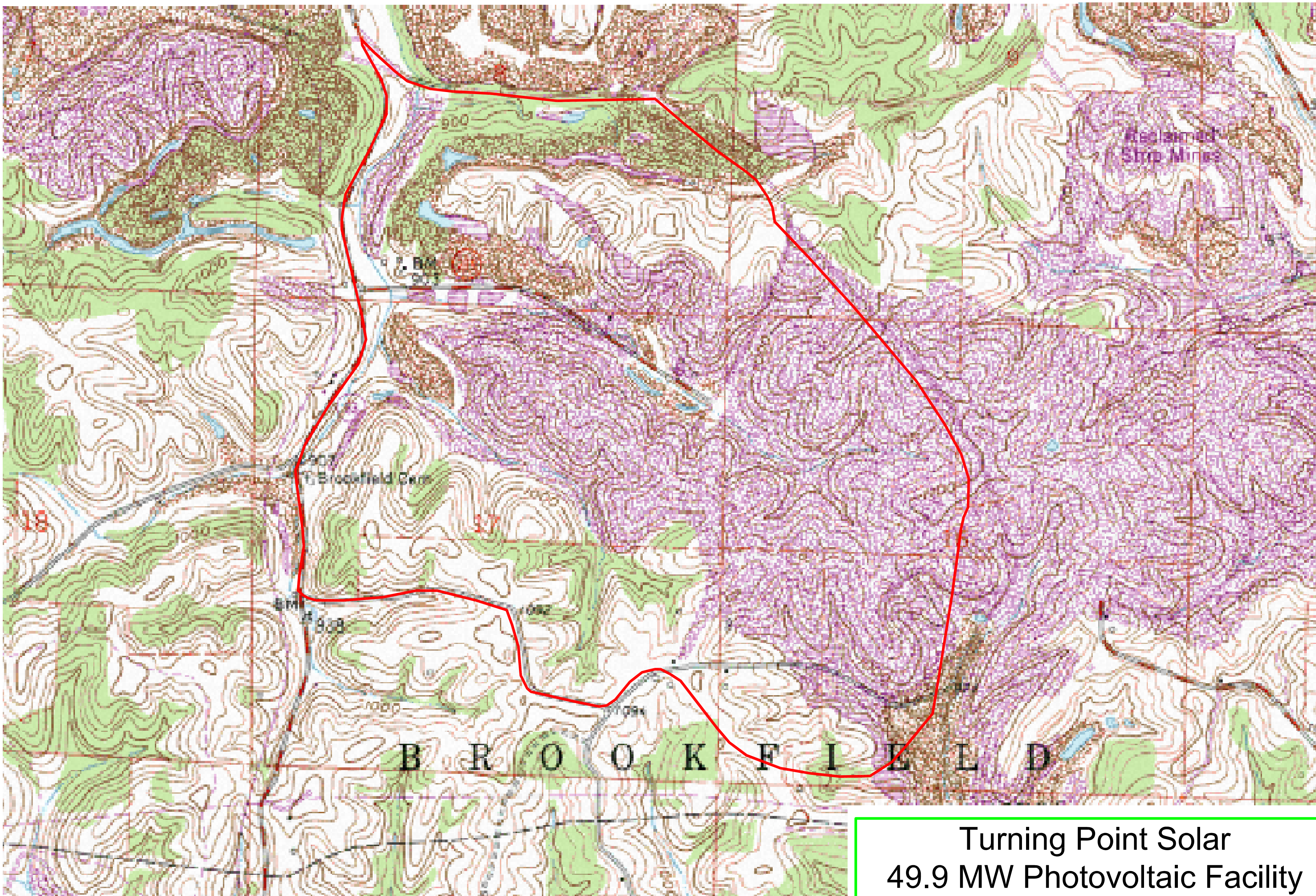
Figure 2-9. Recent aerial photo of Site #1.

Recent and historical topographic maps were compared with a recent aerial photo (**Figure 2-9).** It is apparent that Site #1 has been strip-mined almost in its entirety. Based on the historical topographic mapping, the site consisted of a series of ravines and ridges surrounding the headwaters and a few unnamed tributaries of Collins Fork. Site #1 has four stream segments totaling 16,424 linear feet. **Figure 2-9** shows that the site is currently dominated by two large linear ponds (about 37 and 33 acres) in the western and southern portion of the site. Another linear pond lies along the site's southeastern boundary. A series of two smaller ponds, connected by a short stream, lie in a remnant of the Collins Fork Valley in the northern extension of the site.

A few relatively large (about 52 and 72 acres) areas of young forest occur along the west and south margins of Site #1, but site boundaries have been drawn to exclude most large forested areas. Site #1 has two relatively small areas of mapped prime farmland as well as some minor areas of "farmland of local importance" mapped along the northwest, west, and southern site boundary.

2.4.4.2 Site #2

Site #2 consists of nearly 771 acres in Sections 8, 9, 15, 16, and 17 of Brookfield Township, in western Noble County. It occurs on the Cumberland and Caldwell North, Ohio USGS quadrangle maps (**Figure 2-10**). At its closest approach, Site #2 lies about 1.1 miles from the Muskingum/Noble County line and about 3.2 miles from the Noble/Morgan County line. From **Figure 2-6**, it can be see that Site #2's boundary is approximately 0.8 miles along an existing transmission line corridor from the nearest substation. Thus, gen-tie line costs for Site #2 would be at least approximately $800,000 without taking into account layout of the project and precise engineering of the gen-tie along topographical features.



0 1500'
1" = 1500'

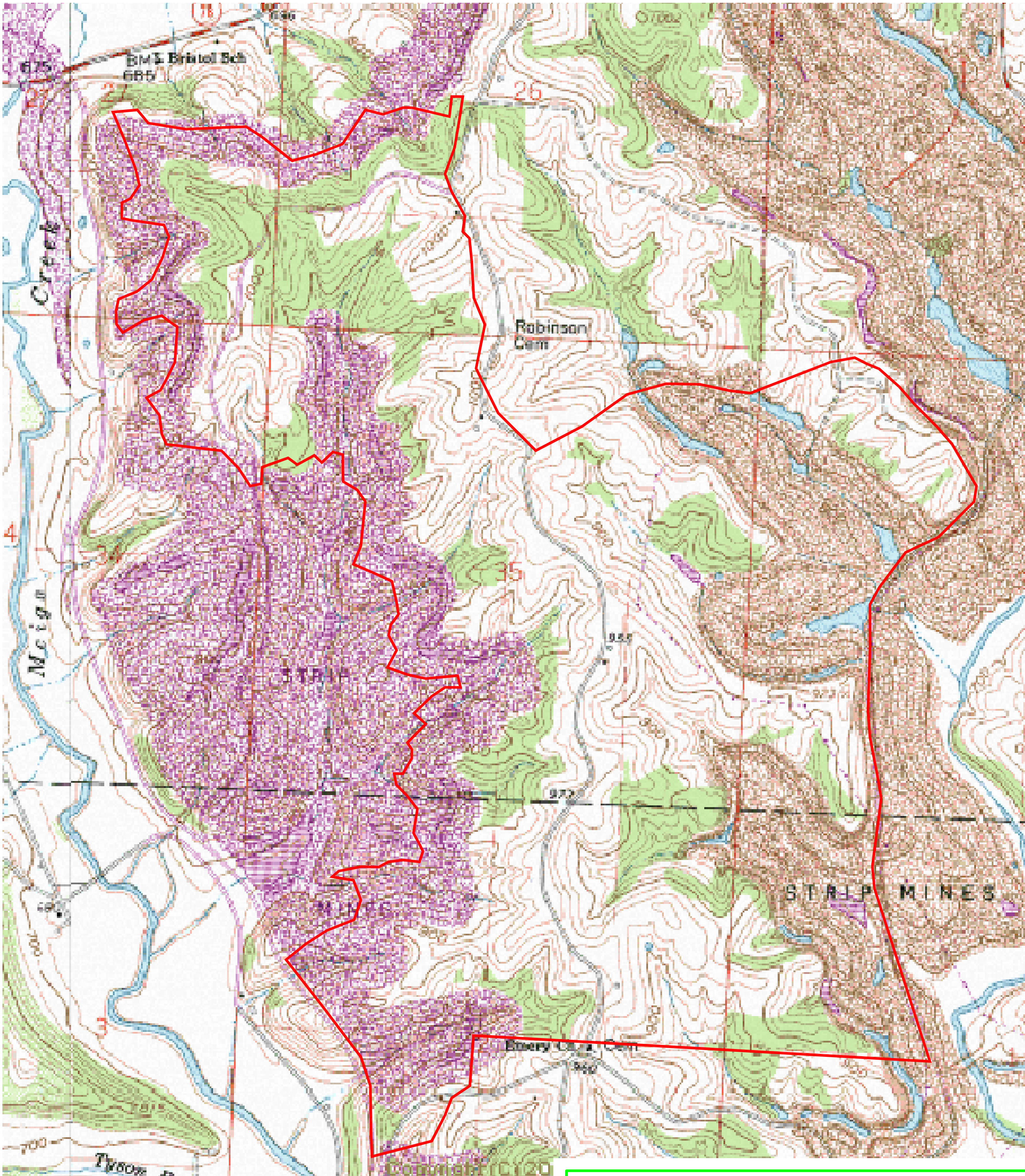
Turning Point Solar
49.9 MW Photovoltaic Facility

Figure 2-10 Site 2 Recent USGS Topographic Quadrangle Map

URS

Figure 2-11. Recent aerial photo of Site #2.

Although not apparent from the recent topographical map (**Figure 2-10**), it is apparent from the recent aerial photograph (**Figure 2-11**) that Site #2 has also been strip-mined almost in its entirety. Based on the historical topographic mapping, the site originally consisted of three parallel ridges, separated by short, west/northwest-flowing unnamed tributaries of Rannells Creek, which flows northward along the far western boundary of the site. Rannells Creek joins with Collins Fork to form Buffalo Fork about 2.5 miles north of Site #2. Site #2 has six stream segments totaling 21,327 linear feet.



Turning Point Solar
49.9 MW Photovoltaic Facility

Figure 2-12 Site 3 Recent USGS Topographic Quadrangle Map

0 1500'
1" = 1500'

URS

Figure 2-11 shows that the site contains some narrow ponds along its southern border, a large pond in the northern section, and a few other smaller scattered ponds. A few small areas of young forest occur along the west and south margins of Site #2, but site boundaries have been drawn to exclude large forested areas. Site #2 has no areas of mapped prime farmland, but does have an area of “prime farmland if protected from flooding” mapped along the western site boundary (NRCS, 2011a).

2.4.4.3 Site #3

Site #3 consists of 1,300+ acres in Sections 25, 26, 27, 35, and 36 of Bristol Township and Sections 1 and 2 of Meigsville Township, in northeastern Morgan County. It occurs on the Reinersville and McConnellsville, Ohio USGS quadrangle maps (**Figure 2-12**). At its closest approach, Site #3 lies about 4.2 miles from the Morgan/Muskingum County line and about 3.7 miles from the Noble/Morgan County line. From **Figure 2-6**, it can be seen that Site #3 is approximately 1.6 miles along an existing transmission line corridor from the nearest substation. Thus, gen-tie line costs would be at least $1.6M without taking into account layout of the project and precise engineering of the gen-tie along topographical features.

Figure 2-13. Recent aerial photo of Site #3.

Although not apparent from the recent topographical map (**Figure 2-12**), it is apparent from the recent aerial photograph (**Figure 2-13**) that Site #3 has also been strip-mined almost in its entirety. Based on the historical topographic mapping, the site originally was dominated by a north-south trending ridge that bends to the west in the northern part of the site. Short side-ridges and ravines emanate from this central ridge, channeling runoff to two streams on either side. On the west lies Meigs Creek, a south-flowing tributary of the Muskingum River. On the east lies

Dyes Fork, and it flows south to join Meigs Creek two miles south of Site #3. Site #3 has 17 stream segments totaling 29,951 linear feet. **Figure 2-13** shows that the site contains ponds scattered throughout, with a few of the larger ponds in the east- and south-central portion of the site. A few small areas of young forest occur along the south and east margins of Site #3, but site boundaries have been drawn to exclude large forested areas. Site #3 has five scattered areas of mapped prime farmland as well as relatively large areas of "farmland of local importance" mapped along the central spine of the site.

Table 2-3. Descriptions of Sites According to Siting Criteria

Siting Criteria	Comments		
	Site #1	**Site #2**	**Site #3**
Transmission Line Proximity	Site #1 is more than two miles from the nearest transmission line or substation. A gen-tie line of over two miles would need to be constructed to connect the generation facility at Site #1 to the substation at a cost of at least $2M.	Site #2 is approximately 0.8 miles along an existing transmission line corridor from the nearest substation. Thus, gen-tie line costs for Site #2 would be at least $800,000.	Site #3 is approximately 1.6 miles along an existing transmission line corridor from the nearest substation. Thus, gen-tie line costs for Site #3 would be at least $1.6M.
Highway Access (See **Figure 10**)	To access I-77, would need to travel north via SR 340/146 4.2 miles, then south via SR 340 7.2 miles, and south via SR 841 for 0.7 mile for a total of **12.1 miles**	To access I-77, would need to travel north via SR 83 2.3 miles, east via SR 340/146 0.2 miles, then south via SR 340 7.2 miles, and south via SR 841 for 0.7 mile for a total of **10.4 miles**	To access I-77, would need to travel east on an access road 0.8 miles, south via SR 78/83 1.0 mile, then east via SR 340 13.0 miles for a total of **14.8 miles**
Property Available for Sale/Minimal Landowners	Entire site currently owned by AEP Ohio	Entire site currently owned by AEP Ohio	Entire site currently owned by AEP Ohio
Topography/ Current Site Use	Site consists of rolling slopes, virtually all of site is reclaimed strip-mined land	Site consists of relatively gentle, broad slopes, virtually all of site is reclaimed strip-mined land	Site consists of relatively steep slopes, virtually all of site is reclaimed strip-mined land
Adjacent Land Use	Site is immediately adjacent to private nature preserve (The Wilds)	Site is immediately bounded on two sides by additional reclaimed strip-mined land	Site is immediately bounded on one side by additional reclaimed strip-mined land
Avoidance/ Minimization of Floodplain Impacts	Site #1 has no impacts on floodplains	Site #2 has no impacts on floodplains	Site #3 has no impacts on floodplains
Avoidance/ Minimization of Waters of the U.S. Impacts	Site #1 includes 79 acres of ponds, has four stream segments totaling 16,424 linear feet, and has scattered small wetlands	Site #2 includes 35 acres of ponds, has six stream segments totaling 21,327 linear feet, and has scattered small wetlands	Site #3 includes 33 acres of ponds, has 17 stream segments totaling 29,951 linear feet, and has scattered small wetlands
Avoidance/ Minimization of Forested Areas Impacts	Site #1 includes about 165 acres of young forest	Site #2 includes about 5 acres of young forest	Site #3 includes about 65 acres of young forest
Avoidance/ Minimization of Prime Farmland Impacts	Site #1 has 14 acres of mapped prime farmland.	Site #2 has no acres of prime farmland, but 26 acres mapped as "prime farmland if protected from flooding."	Site #3 has 30 acres of mapped prime farmland.

Table 2-4. Ranking of Sites According to Siting Criteria

Siting Criteria	Ranking[1]		
	Site #1	**Site #2**	**Site #3**
Transmission Line Proximity	3	1	2
Highway Access	2	1	3
Property Available for Sale/Minimal Landowners	1	1	1
Topography/Current Site Use	2	1	3
Adjacent Land Use	3	1	2
Avoidance/Minimization of Floodplain Impacts	1	1	1
Avoidance Minimization of Waters of the U.S. Impacts	3	2	1
Avoidance Minimization of Forested Areas Impacts	3	1	2
Avoidance Minimization of Prime Farmland Impacts	1	2	3
Total Score	19	11	18

[1] Score of 1 is best at meeting criterion, 2 is intermediate, 3 is worst; thus lowest Total Score is best.

2.4.5 Site Selection Conclusion: Selection of a Preferred Site

As one can see from **Table 2-4**, Site #2 is the preferred site based on six of the nine criteria (the land owner criteria resulted in the same score for all three sites), which includes proximity to transmission lines, highway access, and land use, among others. While Site #1 and #3 are preferred for two other criteria each, they both have higher overall scores than Site #2, which has the lowest total score among the three sites, and the lowest score signifies that the site is best at meeting the criteria outlined above. Thus, based on the ranking of sites according to the siting criteria described in **Table 2-4**, Site #2 was selected as the Preferred Site.

2.5 DESCRIPTION OF PROPOSED ACTION

The following sections describe the major components of the proposed solar generation facility, the proposed transmission interconnection, water supply and wastewater disposal, and the operating characteristics of the proposed facility. Information on environmental attributes such as noise and air pollutant emissions during construction and operation is also presented. The construction methods and schedule are also provided below and serve as the basis for the environmental impact assessment presented later in this EA.

2.5.1 Introduction

TPS is developing the Turning Point Solar energy generation project on 771 acres of land in southeastern Ohio (**Figure 1-1**). The Project is a proposed 49.9 megawatt (MW) solar generation facility using photovoltaic module arrays mounted on fixed solar racking equipment. The Project would be built on reclaimed coal strip mine land owned by Ohio Power Company at a site located in Noble County, Ohio, about eight miles northwest of Caldwell, Ohio and three miles south of Cumberland, Ohio, to the east of SR 83. Access to the facility is from SR 83. The facility site is located approximately 20 miles (via state routes) south of Cambridge, Ohio, 29 miles (via Interstate and state routes) southeast of Zanesville, Ohio, and 39 miles (via Interstate and state routes) north of Marietta, Ohio. The proposed solar generating facility would interconnect to Ohio Power Company's South Cumberland 138/69kV substation.

2.5.2 Site Description

The proposed Project site lies in Brookfield Township in rural western Noble County, Ohio. The site is a 771-acre reclaimed coal strip mine owned by AEP Ohio. It is bordered on the west by Renrock Road/SR 83 and surrounded on three sides by additional reclaimed strip-mined land owned by AEP Ohio. AEP Ohio has full ownership of property within a half mile radius of the project site.

The site consists of rolling terrain that ranges in elevation from 990 feet to 1,090 feet above mean sea level, with slopes ranging from approximately 1% to 20% . The site was formerly used for strip mining up until the late 1980s. When the mining ceased, reclamation efforts resulted in the establishment of gently rolling grasslands. The site was graded and seeded for open grass fields and ponds. The ponds were intended to mitigate soil erosion potential, especially during the time that grass had yet to be well established. Once well established, the grass is intended to mitigate soil erosion potential.

The site contains wetlands and streams, but due to its location on a regional drainage divide, it does not receive off-site storm runoff. It is situated on the upstream edges of three watersheds and adjacent areas tend to drain away from the site (watershed USGS Hydrologic Unit Codes: 05030201; 05040004; 05040005). The site mostly drains to the northwest to Rannells Creek, which eventually drains to the Muskingum River. Other portions of the site drain to the southeast to Dyes Fork, and to the east to Coal Run, which eventually drain to the Ohio River.

The site's drainage begins as sheet-flow over the landscape. Some runoff discharges the site as sheet-flow. Some drainage collects in roadside ditches and culvert/road crossings where it concentrates before leaving the site. Most drainage flows into on-site streams and ponds. One perennial stream, eight ephemeral streams, and twelve intermittent streams exist on the site. The ponds either retain the water or overflow off of the site.

The Federal Insurance Rate Map (FIRM) by the Federal Emergency Management Agency (FEMA) shows that there are no Special Flood Hazard Areas on the site. Thus, there are no 100-year floodplains on the site.

2.5.3 Generating Facility Description

The Project, as proposed, will produce 49.9 MW of electricity using solar photovoltaic (PV) modules. Sunlight is converted directly into electricity using standard yet state-of-the-art PV modules. To achieve the required project output, the Project would install high-efficiency monocrystalline PV modules and would utilize fixed solar racking equipment.

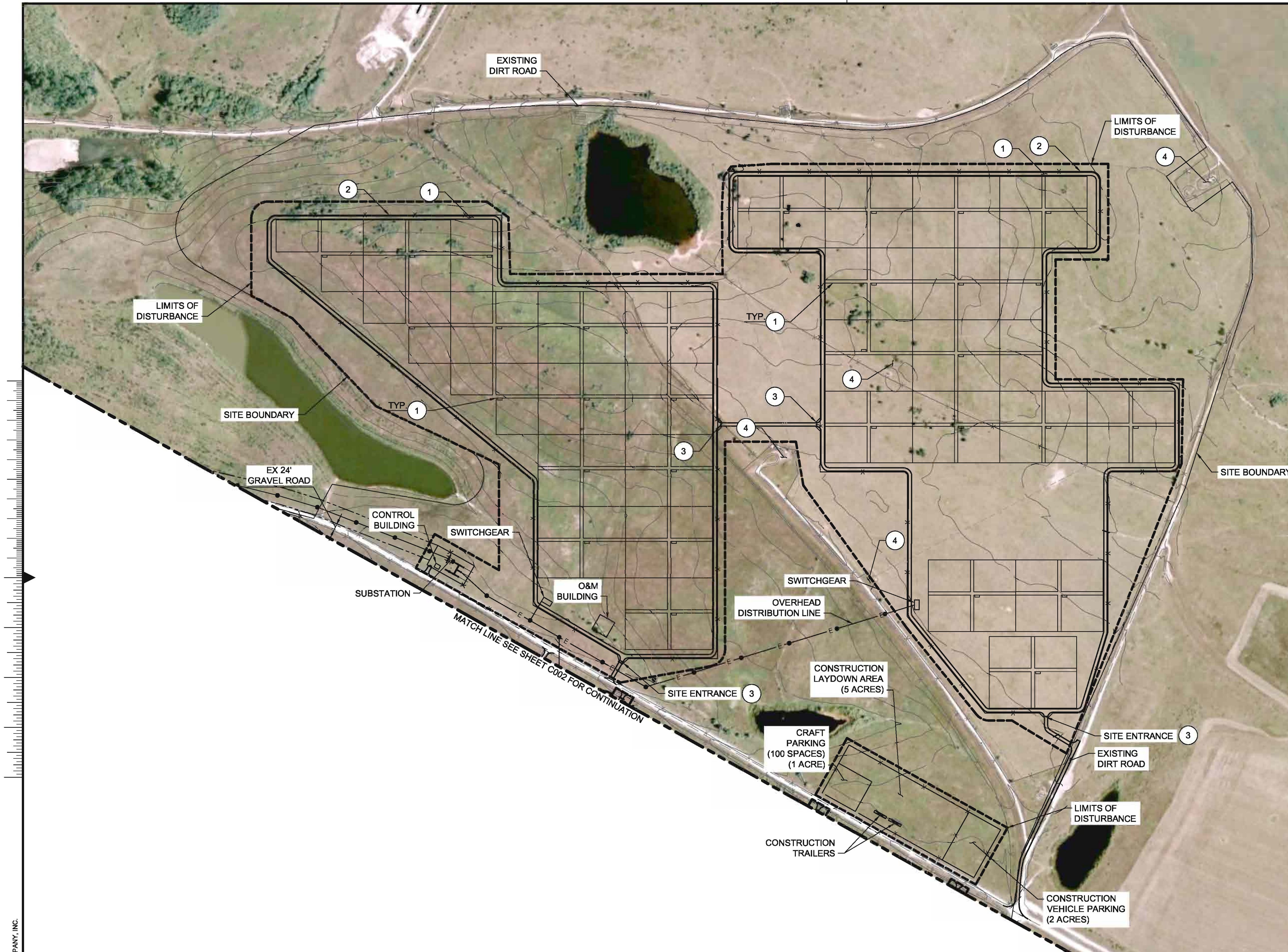
All Project facilities would be designed, constructed, and operated in accordance with applicable laws, ordinances, regulations, and standards. The proposed Project would be constructed in three phases: Phase 1 (20 MW) is expected to come online in 2012 or 2013; Phase 2 (15 MW), is expected to come on-line in 2014; and Phase 3 (14.9 MW) is expected to come online in 2015. However, the potential exists to construct the project on an expedited basis. Regardless of the overall construction period, the project construction procedures would be the same. The Project construction would begin at the northeast side of the property and move to the south and west. The first 20 MW phase would require approximately 160 acres for its operational phase. The second 15 MW phase would require approximately 120 acres, and the final 14.9 MW phase would require approximately 120 acres, for a total acreage for the completed Project of approximately 400 acres. The construction lay down area would consist of approximately 8 acres and would be situated on the east side of the property. Please refer to the site layout in **Figures 2-14a & b.**

The project site comprises approximately 771 acres, but development would occur only on approximately 400 acres and would include the following components:

- PV modules sufficient to produce 49.9 MWac
- PV module steel support structures
- Electrical inverters and transformers
- Buried electrical collection conduit
- An operations and maintenance (O&M) building
- A septic system and leach field
- On-site access roads
- Security fencing
- On-site substation and transmission structures

Each PV module would be approximately 3 feet by 5 feet; however, as technology changes during the life of the Project, larger modules may be used. All modules would be oriented toward the south and southwest and angled upward at a degree that would maximize solar resource efficiency, currently estimated at 25 degrees. Module faces would be non-reflective to eliminate glare and black or blue in color.

The PV solar modules would be mounted on direct-driven steel support structures that would result in the modules being approximately 6 feet in height above the ground. The steel support structures would be constructed of corrosion-resistant and galvanized steel. Concrete foundations would not be required for PV module mounts.



no.	date	by	ckd	description
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B	7/29/11	TD	TG	REVISED LAYOUT
C	8/24/11	TD	TG	REVISED LAYOUT
D	10/28/11	NT	TD	REVISED LAYOUT TO AVOID WETLANDS

524.54'
430.23'

1 MWAC SOLAR ARRAY

SYSTEM PARAMETERS
5236 ISOFOTON 240 W MODULES
DC CAPACITY: 1256.88 kWp
AC CAPACITY: 1 MWAC
DC:AC RATIO: 1.257

25° FIXED TILT MOUNTING SYSTEM
28.44' ROW SPACING
22 MODULES PER STRING
4 STRINGS PER ARRAY
4 ARRAYS PER ROW
15 ROWS

SYSTEM DESCRIPTION
(50) 1 MWAC SOLAR ARRAY
49.9 MWAC NAMEPLATE CAPACITY

LEGEND

- PROPOSED OVERHEAD DISTRIBUTION LINE
- PROPOSED SECURITY FENCE
- PROPOSED POWER POLE
- SITE BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING MAJOR CONTOURS
- EXISTING GAS LINE
- EXISTING FENCE
- EXISTING UNPAVED ROAD

KEYED NOTES

1. 20' GRAVEL ROADWAY. SEE DETAIL 1 SHEET C003.
2. SECURITY FENCE. SEE DETAIL 3 SHEET C003.
3. DOUBLE SWING GATE. SEE DETAIL 2 SHEET C003.
4. EXISTING WELL / TANK TO REMAIN.

NORTH

0 300' 600'
SCALE IN FEET

Burns & McDonnell
SINCE 1898

date JULY 19, 2011
detailed R. BOHRER
designed T. DOWELL
checked T. GRAF

Figure 2-14a Site Layout - Northeast Half

TURNING POINT SOLAR

SITE LAYOUT

project 62758
contract
drawing C001 – rev. D
sheet of sheets
file 62758C001.dwg

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no.	date	by	ckd	description
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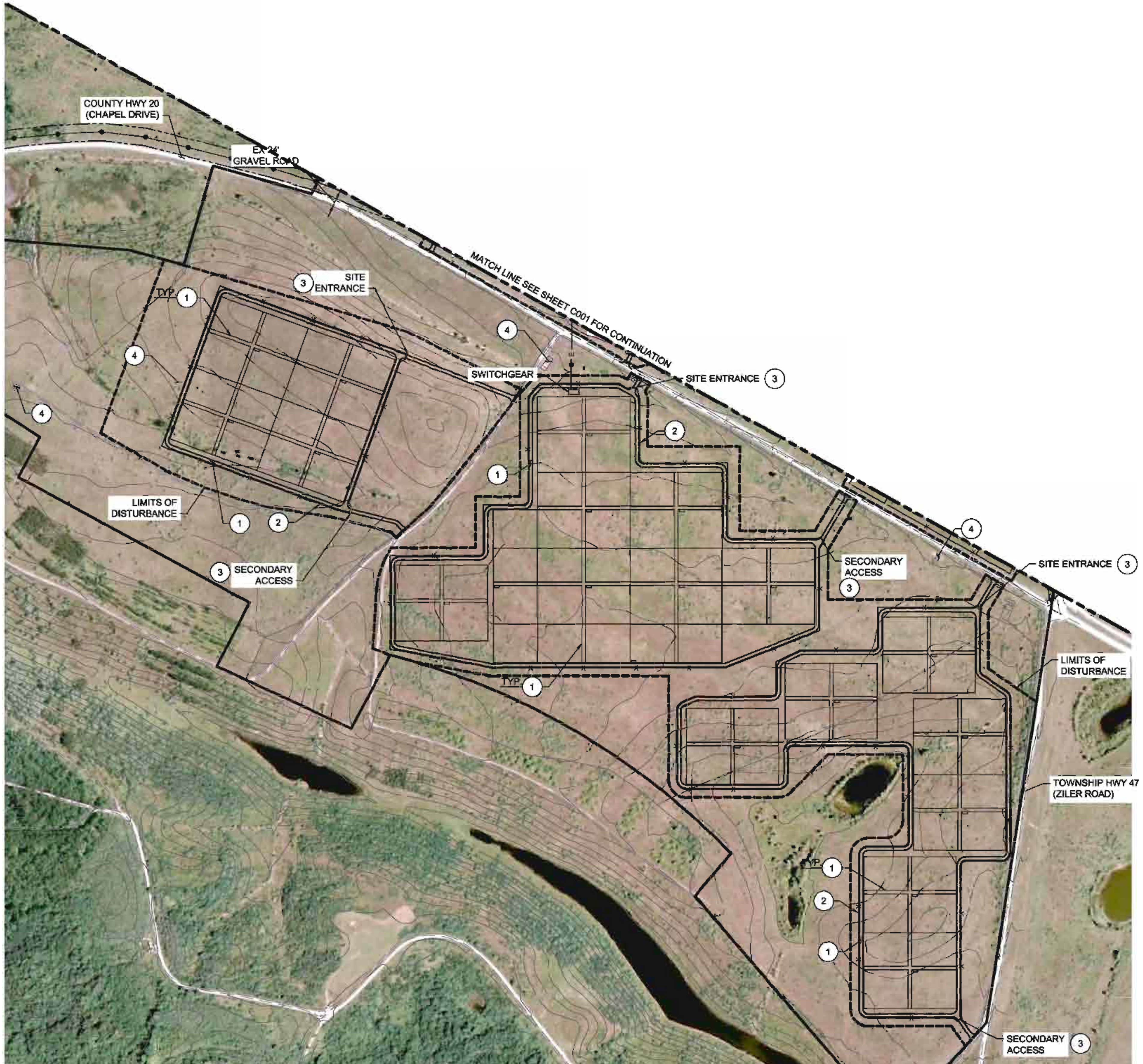
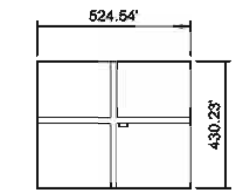
B	7/29/11	TD	TG	REVISED LAYOUT





1 MWAC SOLAR ARRAY

SYSTEM PARAMETERS
5236 ISOFOTON 240 W MODULES
DC CAPACITY: 1256.88 kWp
AC CAPACITY: 1 MWAC
DC:AC RATIO: 1.257

25° FIXED TILT MOUNTING SYSTEM
28.44' ROW SPACING
22 MODULES PER STRING
4 STRINGS PER ARRAY
4 ARRAYS PER ROW
15 ROWS

SYSTEM DESCRIPTION
(50) 1 MWAC SOLAR ARRAY
49.9 MWAC NAMEPLATE CAPACITY

LEGEND

- PROPOSED OVERHEAD DISTRIBUTION LINE
- PROPOSED SECURITY FENCE
- PROPOSED POWER POLE
- SITE BOUNDARY
- LIMITS OF DISTURBANCE
- EXISTING MAJOR CONTOURS
- EXISTING GAS LINE
- EXISTING FENCE
- EXISTING UNPAVED ROAD

KEYED NOTES

1. 20' GRAVEL ROADWAY. SEE DETAIL 1 SHEET C003.
2. SECURITY FENCE. SEE DETAIL 3 SHEET C003.
3. DOUBLE SWING GATE. SEE DETAIL 2 SHEET C003.
4. EXISTING WELL / TANK TO REMAIN.

NORTH

0 300' 600'
SCALE IN FEET

Burns & McDonnell

date: JULY 19, 2011
detailed: R. BOHRER
designed: T. DOWELL
checked: T. GRAF

Figure 2-14b Site Layout - Southwest Half

TURNING POINT SOLAR

SITE LAYOUT

project: 62758
contract:
drawing: C002 — rev. B
sheet of sheets
file 62758C002.dwg

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Rows of modules would be spaced between 15 and 25 feet apart to prevent shading of adjacent rows. Rows of modules would be combined into blocks with a centrally located inverter-transformer complex. Each block would contain the number of modules required to optimize the amount of generation compatible with the inverter's operating range. Electrical energy in the form of direct current (DC) generated by the PV modules would be combined in combiner boxes and routed to the inverter. A combiner box is a small electrical enclosure, approximately one cubic foot in size, which would be mounted on the PV racking system and would allow the PV string voltages to be placed in parallel, increasing the DC output.

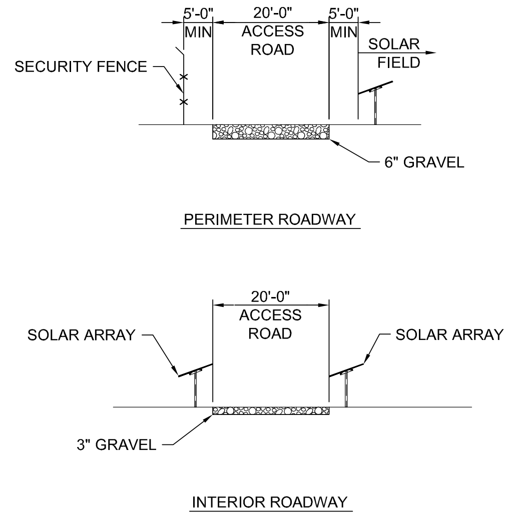
Electricity from module combiner boxes would be gathered via an underground or rack-mounted DC collection system from the arrays to centralized inverters. The inverters collect the DC power and convert it to alternating current (AC) so it can be stepped up to medium voltage and then to 69kV through a transformer, and then transmitted to the electrical grid at the South Cumberland Substation. The inverters would either be outdoor inverters or would be housed in noise-minimizing shelters which also allow for cooling in the summer.

The main access road, which would be a 24-foot-wide gravel road with a gate, would enter the site from the west from SR 83. The interior access roads would be 12-foot-wide gravel roads which will provide access to major electrical equipment within each block. These are estimates that are subject to layout alterations prior to final design.

Also onsite would be a self-contained emergency diesel-fired generator and storage tank to run a fire pump and supply power to the administration building if needed, and a 1,000 gallon above-ground gasoline tank for the fueling of on-site vehicles.

The facility would be fenced with a minimum 3-meter (10-foot) chain link fence with three strands of barbed wire on top and with a privacy lattice around the perimeter (**Figure 2-14c**). Entrance to the facility would be through one 7.3-meter (24 feet) wide motorized gate equipped with a security monitoring system, including a camera and intercom system, remotely controlled from the control room in the administration building and O&M building.

Grades would be established to minimize the amount of earthwork required to construct the facilities and to maintain control of stormwater runoff. All areas disturbed during construction would be graded to a smooth surface. Selected areas would be covered with appropriate material, as conditions require (e.g., asphalt concrete for road base and gravel for other surfaces). Finish grading would be performed to conform to the finished design elevations for surface drainage and to prepare the areas for the installation of the project components. Limited grading is expected to be required because of the nearly flat terrain. Rainfall from the site would continue to be drained by sheet flow. A series of interrupter swales would be used to both reduce the velocity of the runoff as well as allow the rainfall to be absorbed into the ground replenishing local ground water levels.



ROADWAY DETAIL 1 C001 & C002

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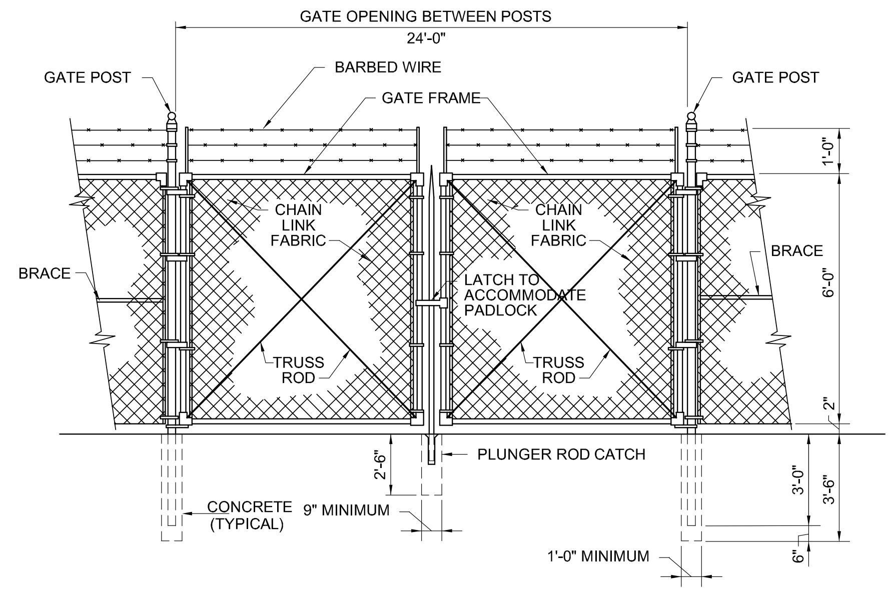
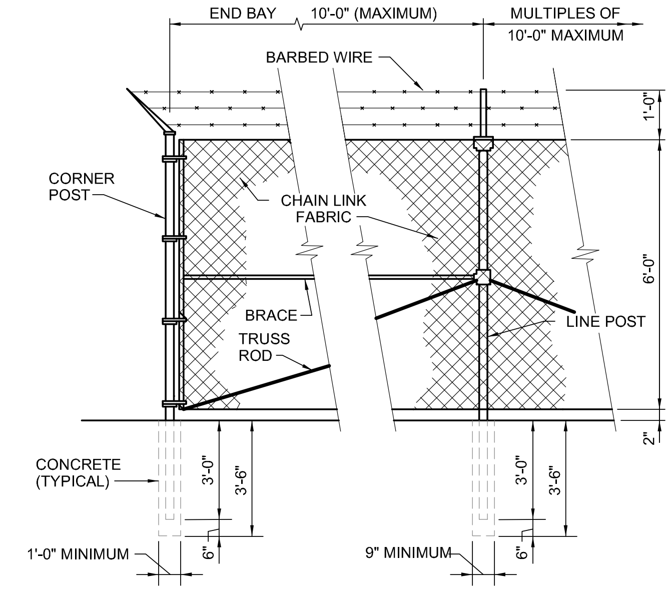


DOUBLE SWING GATE 2 C001 & C002

NOT TO SCALE



SECURITY FENCE 3 C001 & C002

NOT TO SCALE

no.	date	by	ckd	description
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B	7/29/11	TD	TG	REVISED LAYOUT

date JULY 22, 2011
detailed R. BOHRER
designed T. DOWELL
checked

Figure 2-14c Roadway, Gate and Fence Details

TURNING POINT SOLAR

FENCING AND ROADWAY DETAILS

project 62758
contract
drawing C003 – rev. B
sheet of sheets
file 62758C003.dwg

Millimeters
Scale For Microfilming
Inches

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NORTH

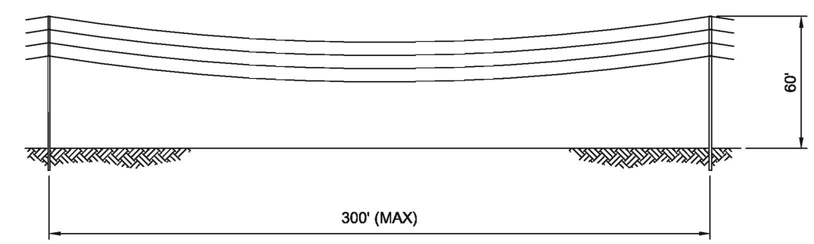
0 300' 600'
SCALE IN FEET

LEGEND

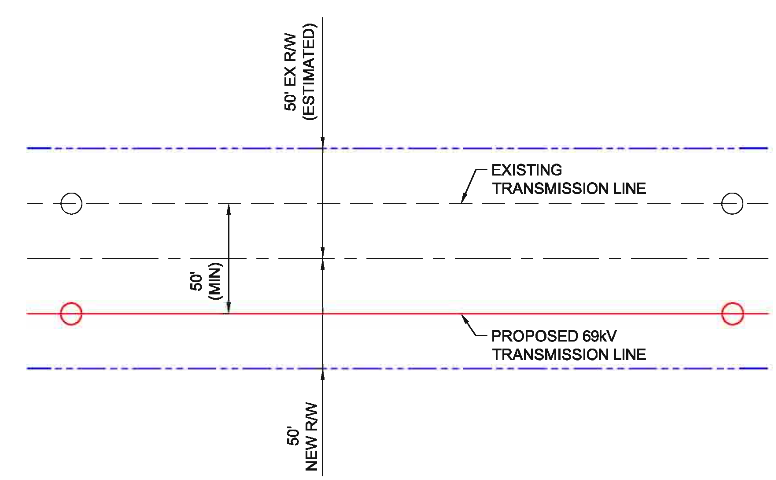
(box)	PROPERTY BOUNDARY
(dashed line)	LOCATION OF EXISTING 69 kV TRANSMISSION LINE
(red line)	LOCATION OF PROPOSED 69 kV TRANSMISSION LINE
(dash-dot line)	EASEMENT
(red dot)	POWER POLE

NOTES:

1. THE DRAWING IS PRELIMINARY IN NATURE AND SHALL BE USED FOR PERMITTING PURPOSES ONLY.
2. ALL DIMENSION SHOWN ON THIS EXHIBIT ARE RECOMMENDATION ONLY. ACTUAL DIMENSIONS WILL NEED TO BE OBTAINED FROM UTILITY COMPANY PRIOR TO CONSTRUCTION.



ELEVATION VIEW



PLAN VIEW

SECTION VIEW OF 69 kV LINE (A / -)

0 20' 40' 80'
SCALE IN FEET

2-32

no.	date	by	ckd	description

PRELIMINARY - NOT FOR CONSTRUCTION

Burns & McDonnell SINCE 1898

date JULY 26, 2011	detailed A. PADILLA
designed T. GRAF	checked K. EKSTROM

Figure 2-15a Transmission Line Routing Overview

TURNING POINT SOLAR
TRANSMISSION LINE ROUTING EXHIBIT

project 62758	contract
drawing E001	rev. B
sheet	of sheets

file 62758E001.dwg

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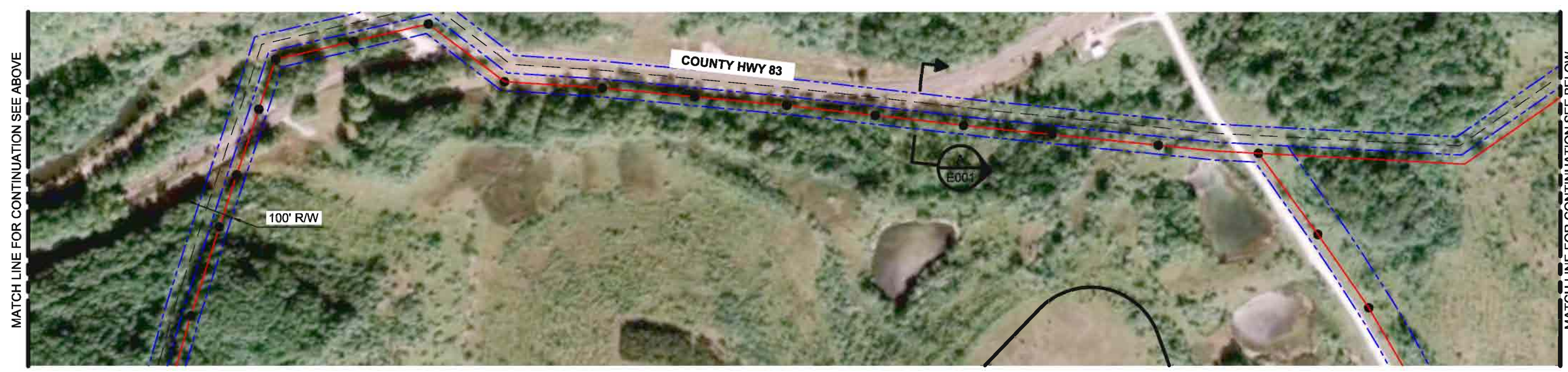
TOP PLAN VIEW

0 200' 400'
SCALE IN FEET

NORTH



MIDDLE PLAN VIEW

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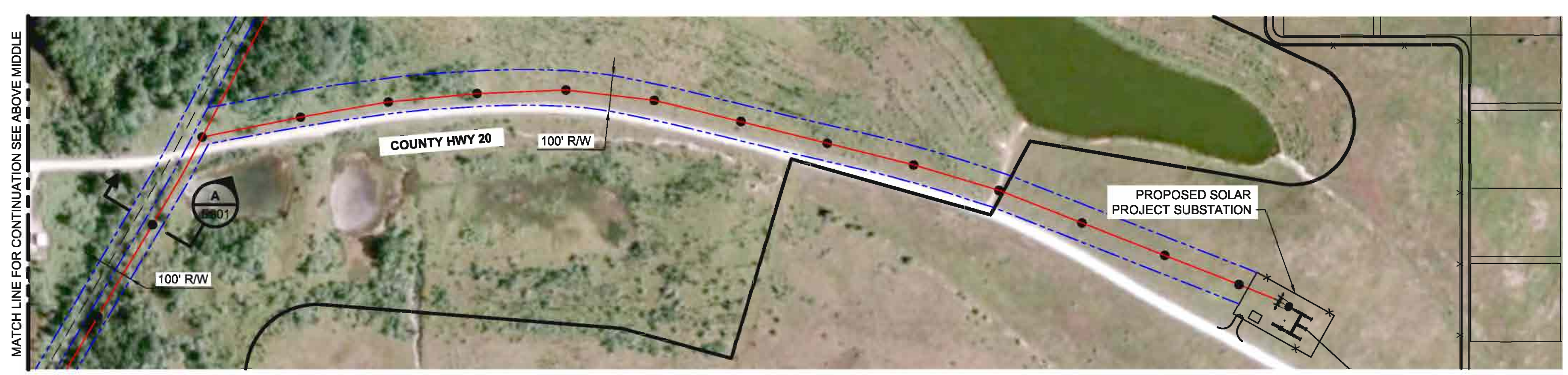
SCALE IN FEET

NORTH



BOTTOM PLAN VIEW

0 200' 400'
SCALE IN FEET

NORTH

no.	date	by	ckd	description

PRELIMINARY - NOT FOR CONSTRUCTION

Burns & McDonnell SINCE 1898

date JULY 26, 2011	detailed A. PADILLA
designed T. GRAF	checked K. EKSTROM

Figure 2-15b Transmission Line Routing Detail

TURNING POINT SOLAR
TRANSMISSION LINE ROUTING EXHIBIT

project 62758	contract
drawing E002 –	rev. B

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The gen-tie interconnection line for the Project would run for 1.87 miles to the South Cumberland substation. The TPS gen-tie system would require construction of approximately 1.87 mile of 69 kV feeder transmission line within a 100-foot wide corridor from a dead-end structure in the switchyard to AEP Ohio's existing South Cumberland 138/69kV substation south of the facility along the route shown in **Figures 2-15a & b**. The proposed transmission line would be supported by 60-foot tall wood monopole structures that would be spaced approximately 250-300 feet apart. Approximately 1.29 miles of the proposed corridor would be located immediately adjacent and parallel to an existing 69 kV electric transmission line right-of-way (ROW) but would not involve rebuilding and replacement of the existing electric transmission line (**Figure 2-16**). It is anticipated that the substation and transmission line will be installed during the first three months of construction.

The plant substation footprint will be approximately 250 feet (ft) by 125 ft, and will be within the 400 acre disturbed area. This will include the main step up transformer(s) to 69 kV, four (4) 34.5-kV circuit breakers, one (1) 69-kV circuit breaker, disconnect switches, 34.5-kV bus tubing, metering (optional), and dead end structures for the overhead lines. The plant substation will also include a 30 ft by 25 ft control building within the substation footprint that houses relays, controls, and related equipment. The plant substation will have a crushed rock surface. The substation will be surrounded by chain link fencing and will include a security gate for access.

Figure 2-16. View south from Chapel Drive of existing 69 kV wood monopole transmission line. Proposed transmission line will immediately parallel this line to the east (left).

The 1.87 mile transmission line required for the Project represents a carefully engineered corridor from a designed facility. The 0.8 mile transmission line used in **Section 2.4.4.2** and **Table 2-3** represented a rough estimate made prior to any detailed engineering or site design from the nearest point of the proposed alternative project site to the closest substation. It is likely that carefully engineered transmission line corridors from designed facilities would add similar distances to the transmission lines of the other alternatives and thus Site #2 would remain the closest of the three sites to a substation.

2.5.4 Water Supply and Waste Disposal

Once the facility is operational, there is expected to be minimal water usage onsite due to the fact that the solar facility itself does not require significant amounts of water.

Water, however, would be required for the following uses:

- Potable water. Potable water would be supplied from a potable water skid for use by plant personnel.
- Untreated service water for general site uses.
- Fire protection, which will also use untreated service water.
- Water for annual module washing, which would be purchased from local suppliers and trucked to the site. The Project would have low water use requirements, since water is only needed for periodic washing of the solar panel surfaces to remove dirt and deposits. The long-term need for the Project is projected to be approximately 1.25 acre-feet (about 400,000 gallons) per year to wash the solar panels. However, annual precipitation and inspection may dictate that modules need to be washed biennially.

A stormwater drainage system designed to match existing drainage patterns and meet all local regulations would be employed. It would collect and direct all rainwater from the Project site and would direct flow to locations away from the facility. Stormwater discharges from construction activities are subject to Best Management Practices (BMPs) designed and implemented for construction activities.

A septic tank and leach field would be constructed alongside the Phase 1 lay down area near the O&M building. The septic tank would be procured locally and would conform to all federal, State, and County requirements for configuration, fittings, and approved vendors.

The septic leach field would be sized according to good engineering practice and County requirements and would be based on percolation data obtained from tests conducted in the proposed leach field location.

The Engineering, Procurement, and Construction (EPC) contractor would engineer and construct the Project and related facilities and be responsible for waste management. Typical wastes generated during construction include paper, wood, glass, plastics, and excess concrete and metal scraps. During construction, the EPC contractor would retain a private waste hauler to pick up non-hazardous materials for disposal offsite. Minimal solid waste is expected to be generated during operations. Typical wastes generated include packing material, metal scrap, machine parts, defective or broken electrical materials, and other miscellaneous solid waste.

Minimal amounts of hazardous waste would be generated and may include solvents, lubricating oils, and paints. These would be collected and disposed of in an approved location.

2.5.5 Construction

Site facilities and amenities would be established during the first month of the solar field build-out. The majority of these would be located in the construction lay down area. These would consist of site offices, restroom facilities, meal rooms, parking areas, vehicle marshaling areas, and construction material/equipment storage areas. Construction power for the temporary site facilities will be provided by mobile diesel-driven generator sets.

The Project would disturb approximately 400 acres. Rough grading would be done by large dozers and scrapers. Fine grading would be accomplished by motor graders, loaders and backhoes. Trenching would be accomplished by self-propelled trenchers and backhoes. Depths of cuts and fills would vary throughout the site between one and ten feet depending upon the location. Special attention would be made for the placement and alignment of the solar modules to follow the existing contours of the land where possible to reduce earth moving operations.

It is anticipated that the Project's substation and transmission line would be installed during the first three months of construction. Operation should start during the 4th month subject to the transmission feeder line being completed as solar blocks would be brought online as soon as they are completed. The operation of the site during construction would have limited impact compared to the remaining work being done on the project site. **Table 2-5** presents an estimated construction schedule assuming a one-year construction period for all project phases. As discussed above, construction may occur in a less intense manner over three years.

Table 2-5. Worst-Case Scenario Construction Schedule

Estimated Construction Schedule	**Construction Time (Months)**											
Task Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Clear and Grub, Site Survey layout	■											
Temporary Power	■											
Transmission Line	■	■	■									
Substation	■	■	■									
Rough Grading	■	■	■	■	■							
Fine Grading		■	■	■	■	■	■	■	■	■	■	■
Install Support Posts & Frame			■	■	■	■	■	■	■	■	■	■
Install Modules				■	■	■	■	■	■	■	■	■
Trenching and Backfill				■	■	■	■	■	■	■	■	■
Administration Building									■	■	■	■
Complete Construction												■

Construction personnel over the construction period would include:

- Civil personnel;
- Fencing personnel;
- PV support pole driver personnel;
- PV mechanical installation personnel;
- PV electrical personnel;
- Project management personnel;
- Environmental monitors;
- Startup and testing personnel;
- O&M and control building personnel.

The number of construction workers and the associated construction equipment will vary during the construction period as shown in **Table 2-6**. A peak construction workforce of 100 is anticipated during any given month.

Table 2-6. Construction Equipment and Workforce

Construction Equipment & Labor List	Construction Time (Months)											
Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Personal Vehicles - 100 to 350 hp +/- (cars/pickups - gas) (1hr/day & 5 days/week)	20	40	60	80	80	80	80	80	80	80	80	60
Pickup - 350 hp +/- (1/2 ton - gas) (8 hrs/day & 5 days/week)	4	4	4	6	6	8	8	8	8	8	8	6
Pickup - 350 hp +/- (3/4 ton - diesel) (8 hrs/day & 5 days/week)	2	2	3	4	4	4	4	4	4	4	4	3
Pickup - 350 hp +/- (1 ton - diesel) (8 hrs/day & 5 days/week)	1	1	3	4	4	4	4	4	4	4	4	3
Water Truck - 350 hp +/- (diesel) (8 hrs/day & 5 days/week)	2	2	2	2	2	1	1	1	1	1	1	1
Tractor with Mower (diesel) (8 hrs/day & 5 days/week)	1											
Motor Grader - 200 hp +/- (diesel) (8 hrs/day & 5 days/week)	1	1	1	1	1	1	1	1	1	1	1	1
Dozer - 400 hp +/- (diesel) (8 hrs/day & 5 days/week)	1	2	2	2	1							
Pan Scraper - 300 hp +/- (diesel) (8 hrs/day & 5 days/week)	2	4	4	4	2							
Compactor - 300 hp +/- (diesel) (8 hrs/day & 5 days/week)	1	2	2	2	1							
Front End Loader - 200 hp +/- (diesel) (6 hrs/day & 5 days/week)	1	2	2	2	1							
Backhoe with Loader 100 hp +/- (diesel) (6 hrs/day & 5 days/week)	2	2	2	2	2	2	2	2	2	2	2	2
Dump Truck - 350 hp +/- (diesel) (6 hrs/day & 5 days/week)	2	2	2	2	2	2	2	2	2	2	2	2
Trencher - 100 hp +/- (diesel) (4 hrs/day & 5 days/week)	1	2	3	4	4	4	4	4	4	3	2	1
All Terrain Forklift - 100 hp +/- (diesel) (4hrs/day & 5 days/week)	1	1	2	4	4	4	4	4	4	2	1	1

Table 2-6. Construction Equipment and Workforce

Construction Equipment & Labor List	Construction Time (Months)											
Description	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Semi Delivery Truck & Trailer - 350 hp +/- (diesel) (4 hrs/day & 5 days/week)	1	1	2	3	3	3	3	3	3	2	2	1
Concrete Delivery Truck - 350 hp +/- (diesel) (4 hrs/day & 5 days/week)	1	2	3	4	4	4	4	4	4	3	2	2
Power Line Truck - 350 hp +/- (diesel) (6 hrs/day & 5 days/week)	2	2	2	2	2	2	2					
Construction Labor (8 hrs/day & 5 days/week)	30	60	80	100	100	100	100	100	100	100	100	80

The main project staging area would accommodate employee parking, delivery trucks, construction equipment, and other activities.

Routes for trucks hauling materials and construction equipment would primarily follow SR-83, allowing for safer travel by larger container trucks and wide-load trucks carrying heavy equipment. Material delivery would include all components of the switchyard, O&M building, fencing, PV module components, inverters, and additional miscellaneous items. It is expected that the majority of the construction equipment listed in the Construction Equipment & Labor List above is readily available in a 30-mile radius of the site from the communities of Caldwell and Byesville, Ohio. The majority of the equipment would be delivered by semi-tractor trailer combination vehicles. Construction materials including concrete to be delivered by ready mix trucks would most likely also be traveling from these same communities within a 30-mile radius from the job site. It is expected that the majority of special backfill materials including sand and gravel is readily available within 30 miles of the site and would be delivered by semi-tractor trailer trucks or dump trucks. General building materials needed for the administration/maintenance building should readily be available in the surrounding communities within the 30-mile radius. It is anticipated that any construction equipment, labor, construction materials and general building materials, if not readily available from within the 30-mile radius, would be available from within Ohio.

The solar modules are planned to be manufactured in Napoleon, Ohio, which is approximately 250 miles from the job site. The modules would need to be delivered by semi-tractor trailer trucks to the job site. The associated framing to support the solar panels would most likely be delivered from within the state of Ohio no more than 250 miles from the job site.

Major electrical equipment including transformers and inverters should be available within the continental U.S. and would be delivered by semi-tractor trailer trucks. The Project will attempt to source the majority of equipment from within the state of Ohio, which means that deliveries would come from no more than 250 miles from the site. Power poles for the transmission line should be available in Columbus, Ohio, approximately 100 miles from the job site and would be delivered by semi-tractor trailer truck.

Material deliveries would be on-going throughout construction; much of the heavy construction equipment would arrive to the site early and stay for the duration of construction of each phase.

2.5.6 Operations & Maintenance

The Project is expected to be remotely monitored and to be maintained by full time staff from other power plants in the area. The proposed Project would operate seven days per week during daylight hours. Operational activities would consist of monitoring system operational status, performance, and diagnostics from the control room in the O&M building. System production forecasting and scheduling with the utility would also occur in the O&M building, along with operational planning. Operations activities would include meter reading and production reporting, along with updating O&M manuals. In addition, a decision to remotely monitor for security purposes or to staff with security personnel would be made prior to the facility becoming operational and may change as the additional phases are brought online.

The Project would be fenced to prevent access by the public to ensure public safety and protect equipment from theft and vandalism. Gates would be installed at all site access roads. The operator of the Project would provide security at the site, and security staff would routinely traverse the site in lightweight vehicles and all-terrain vehicles. The proposed Project would be equipped with day/night closed-circuit security cameras and human-activated motion lighting. Inverters would be checked twice annually for general component maintenance. The PV field would be inspected once annually for degrading wires, modules, and combiner boxes, as well as for mechanical fastener tightening. The SCADA system would also identify underperforming system components, and these components would be checked as required.

Damaged or underperforming PV modules and mechanical fasteners would be replaced as required. Underperforming inverters would be serviced or replaced as required.

During construction, localized and portable lighting would be used where work is occurring. Lighting would be powered by generators and would include switches to cut power when lighting is not required during construction.

During operation of the Project, power for lighting and other uses would be supplied from the interconnection to the power grid.

All lighting will adhere to state and local lighting codes, if any.

2.5.7 Project Decommissioning

The Project would be in operation for a minimum of 25-30 years, with the possibility of a subsequent re-powering of the project for additional years of operation. If the plant is decommissioned at the end of its expected life span or upon its eventual decommissioning, whenever that occurs, the Project owner would be responsible for the removal, recycling, or disposal of all solar arrays, inverters, transformers and other structures on the site. TPS anticipates using the best available recycling measures at the time of decommissioning.

The proposed Project would be constructed with numerous recyclable materials, including glass, semiconductor material, steel, and wiring. When the Project reaches the end of its operational life, the component parts would be dismantled and recycled as practicable. All waste resulting from the decommissioning of the facility would be transported by a certified and licensed contractor and taken to a landfill/recycling facility in accordance with all local, State, and federal regulations.

2.5.8 Transportation

Existing roads would be used for construction access to the site. No upgrades to off-site roads are anticipated. The proposed internal roadways to be constructed are shown on **Figures 2-14a & b,** with internal roadway details shown on **Figure 2-14c**. Construction traffic would include all labor, construction management staff, contractors, contractor equipment, vendors, and material and equipment deliveries. The frequency of the daily auto traffic will would proportionate to on-site labor projections. In addition to the normal vehicle auto traffic, deliveries of heavy equipment and construction materials would likely average between 15 and 20 large trucks per week in the first three months. This would be reduced to a likely average of between 3 and 5 large trucks per week in the second three months, tapering off thereafter. Truck deliveries during the day under normal conditions should not coincide with the early morning or late afternoon labor vehicle traffic.

2.5.9 Employment

Based on similar type projects, the construction force is described above. The average daily workforce during construction is likely to be about 80 people, with a peak construction workforce of 100. All construction activity may be completed within a shorter or longer time period. The facility would be operated remotely and will not require permanent staff on-site.

2.5.10 Project Permits

The initial Project engineering is occurring in 2011, and construction would commence in 2012.

The permits, approvals and coordination listed in **Table 2-7** must be acquired and/or completed prior to the initiation of construction activities for the Project.

Table 2-7. Required Permits, Approvals, and Coordination

Agency	Permit, Regulatory Compliance, or Coordination
Federal	
Rural Utilities Service	NEPA Compliance and Approval of Financial Assistance, Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act Consultation
U.S. Fish and Wildlife Service	Section 7 of the Endangered Species Act, Migratory Bird Treaty Act of 1918, and Bald and Golden Eagle Protection Act of 1972
U.S. Army Corps of Engineers	Sections 401 and 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899
Department of Agriculture – Natural Resources Conservation Service	Farmland Conversion Form - Form AD-1006
State	
Ohio Department of Natural Resources	Fish and Wildlife Coordination Act (16 USC 661-666c)
Ohio Environmental Protection Agency	Section 401 of the Clean Water Act, Ohio Isolated Wetlands Law (Ohio Revised Code 6111.02 to 6111.028)
Ohio Environmental Protection Agency	National Pollutant Discharge Elimination System (NPDES) Permit for construction activities (CFR 122.30-122.37)
Ohio Historic Preservation Office	Section 106 of the National Historic Preservation Act coordination