LARGE FILING SEPARATOR SHEET

CASE NUMBER 09-419-EL-BGN

FILE DATE JUL 10 2009

SECTION 3 of 3

NUMBER OF PAGES 46

DESCRIPTION OF DOCUMENT

APPLICATION CONTINUED

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2006 Status of the Organic Soils in the Scioto Marsh, Hardin County, Ohio. *Ohio Journal of Science*, 106:181-185.

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1915b 15 Minute Quadrangle, Kenton, Ohio.

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2000 Phase I Cultural Resource Survey of DPL Energy's Proposed Harrod Electric Generating Facility, in Allen County, Ohio. Prepared for DPL Energy, Inc., Dayton, Ohio, by BHE Environmental, Inc., Cincinnati, Ohio.

Table 1. Summary Data of Recorded Archaeological Sites within One Mile of Project Area

Site #	Site Type	Diagnostic Artifacts	Temporal Periods	Environmental Zone
33HR004	burials			Ground moraine
33HR008	burials			Scioto River floodplain (non-marsh)
33HR009	base camp			Ground moraine
33HR025	burials			Kame
33HR059	small camp			Ft. Wayne Moraine
33HR060	lithic scatter			Ft. Wayne Moraine
33HR061	large camp	Genesee, Adena, Big Sandy, Kirk, Snyders	Early Archaic, Late Archaic, Early Woodland, Middle Woodland	Ft. Wayne Moraine
33HR062	small camp			Ft. Wayne Moraine
33HR063	small camp			Ft. Wayne Moraine
33HR064	lithic scatter			Ft. Wayne Moraine
33HR065	hunting station		Late Archaic	Ft. Wayne Moraine
33HR066	small camp	Kirk	Early Archaic	Ft. Wayne Moraine
33HR067	small camp			Ft. Wayne Moraine
33HR068	base camp	Madison, MacCorkle, Kirk, Amos, Plano	Paleo, Early Archaic, Late Archaic, Late Woodland	Ft. Wayne Moraine
33HR069	camp			Ft. Wayne Moraine
33HR070	small camp	Palmer, Brewerton	Early Archaic	Ft. Wayne Moraine
33HR075	large camp	Kanawha	Middle Archaic	Ft. Wayne Moraine
33HR076	procurement	Madison	Late Woodland	Ft. Wayne Moraine
33HR077	procurement			Ft. Wayne Moraine
33HR078	small camp			Ft. Wayne Moraine
33HR079	lithic scatter			Ft. Wayne Moraine
33HR080	large camp	Thebes, Big Sandy, Lost Lake	Early Archaic	Ft. Wayne Moraine
33HR081	procurement			Ft. Wayne Moraine
33HR082	small camp	MacCorkle	Early Archaic	Ft. Wayne Moraine
33HR083	camp			Ft. Wayne Moraine
33HR084	small camp	Snyders	Middle Woodland	Ft. Wayne Moraine

Table 1. Summary Data of Recorded Archaeological Sites within One Mile of Project Area (*Cont'd*)

Site #	Site Type	Diagnostic Artifacts	Temporal Periods	Environmental Zone
33HR085	base camp			Ft. Wayne Moraine
33HR086	small camp	St. Charles	Early Archaic	Sand terrace
33HR087	small camp	Kirk	Early Archaic	Sand terrace
33HR088	camp	Snyders, Kirk	Early Archaic, Late Archaic, Middle Woodland	Scioto Marsh
33HR089	small camp			Sand terrace
33HR097	isolate	birdstone	Late Archaic	Sand terrace
33HR098	small camp			Sand terrace
33HR099	small camp			Sand terrace
33HR100	unknown			Sand terrace
33HR123	*lithic scatter*			Ft. Wayne Moraine
33HR127	isolate	birdstone	Late Archaic	Ft. Wayne Moraine
33HR171	unknown			Lake-planed moraine
33HR188	lithic scatter	Brewerton, MacCorkle, Hopewell	Early Archaic, Late Archaic, Middle Woodland	Ground moraine
33HR189	lithic scatter	Thebes	Early Archaic	Ground moraine

Table 2. Environmental Zones and Archaeological Site Types within One Mile of Project Area

Site Types	Environmental Zones						
	end moraine	ground moraine	planed moraine	sand terrace	marsh	river floodplain	kame
camp	11	-	-	5	1	-	-
base camp	5	-	-	-	-	-	-
lithic scatter	4	2	-	-	-	-	-
procurement	4	-	-	-	-	-	-
burial	-	2	-	-	-	1	1
isolate	1	-	1	2	-	-	-
Total	25 (63%)	4 (10%)	1 (2%)	7 (18%)	1 (2%)	1 (2%)	1 (2%)

Table 3. Schools, Churches, Cemeteries, and Recreation Areas within Five Miles of Project Area.

Recreational Areas		UTM 17 North (NAD 1983)	
Name	**Municipality**	**Easting**	**Northing**
Colonial Golfers Club*	Jackson	255313.7619	4513090.276

Schools			
Name	**Municipality**	**Easting**	**Northing**
Hardin Northern School	Washington	275565.1886	4517745.073
Billtown School (historical)	Auglaize	251178.8263	4505094.169
Auglaize School (historical)	Auglaize	251731.3091	4508255.829
Allen East Elementary School	Auglaize	252855.5911	4510256.054
Baker School (historical)	Auglaize	251911.1135	4511522.607
Beaverdam School (historical)	Auglaize	254972.1555	4508179.012
Ridge School (historical)	Auglaize	255080.1274	4511448.113
Benjamin Logan Elementary School	Richland	267296.3809	4488180.162
Roebuck School (historical)	Richland	263663.6877	4488047.228
Ada Elementary School	Liberty	261101.842	4517518.759
Ada High School	Liberty	261103.8334	4517580.426
Alger Elementary School	Marion	259703.4919	4510586.746
Bateson School (historical)	Cessna	274078.2164	4507449.417
Beech Grove School (historical)	Pleasant	277564.2538	4510863.013
Breese School (historical)	Roundhead	257759.8188	4493453.746
Buckeye School (historical)	Blanchard	277843.5263	4513910.495
Champion School (historical)	Buck	278585.1709	4497035.147
College School (historical)	Marion	258214.9671	4508165.262
Derrs School (historical)	Taylor Creek	270466.2907	4494718.784
Dunn School (historical)	Lynn	270106.4058	4498310.637
Eagle School (historical)	Washington	271184.0671	4514174.929
East Lynn School (historical)	Goshen	256217.7749	4495263.77
Elder Creek School (historical)	Roundhead	257564.0316	4501178.296
Elmwood School (historical)	Lynn	269300.2373	4501144.649
Enterprise School (historical)	Buck	276508.0686	4496819.369
Eureka School (historical)	Marion	258081.3729	4504063.507
Fariview School (historical)	Cessna	270941.2736	4508595.103
Flynn School (historical)	Lynn	269701.4171	4502706.565
Graystone School (historical)	Mc Donald	267238.8324	4490867.561
Harmony School (historical)	Mc Donald	266856.589	4494460.36
Hinkle School (historical)	Roundhead	259470.3018	4497566.112
Independent School (historical)	Lynn	272760.7018	4498939.134
Kingsley School (historical)	Marion	261492.3984	4511424.296
Klinger School (historical)	Liberty	258378.1997	4514612.464
Lawrence School (historical)	Mc Donald	263995.1385	4494797.358
Liberty School (historical)	Pleasant	277466.1955	4507594.04
Lone Oak School (historical)	Marion	260559.824	4506545.641
Lynn Valley School (historical)	Lynn	273084.1543	4501059.162
Mustard School (historical)	Liberty	264923.3838	4514432.699
Norman School (historical)	Lynn	273770.5668	4497334.139

Table 3. Schools, Churches, Cemeteries, and Recreation Areas within Five Miles of Project Area (Cont'd)

Opossum School (historical)	Mc Donald	267543.3509	4504378.938
Pleasant Hill School (historical)	Roundhead	259559.9975	4500341.713
Pleasant Valley School (historical)	Marion	258515.9519	4506580.934
Red School (historical)	Mc Donald	262434.3852	4496791.806
Rice School (historical)	Mc Donald	264376.5153	4503120.362
Rising Sun School (historical)	Marion	264690.5579	4510797.289
Roberts School (historical)	Mc Donald	264642.5952	4491442.91
Roundhead Elementary School	Roundhead	259613.5138	4493980.341
Salem School (historical)	Cessna	274230.3182	4510902.025
Schingle School (historical)	Cessna	274032.2422	4505166.597
Scioto School (historical)	Buck	275417.3806	4502778.681
Shadyvale School (historical)	Roundhead	261248.8936	4502386.611
Street School (historical)	Roundhead	257919.6719	4497647.228
Taylor Creek School (historical)	Taylor Creek	276715.2626	4492738.79
Thompson School (historical)	Marion	258322.5165	4511465.206
Upper Scioto Valley High School	Marion	264562.3787	4508239.039
Wildcat School (historical)	Taylor Creek	273634.9805	4491319.114
Woodlawn School (historical)	Liberty	261593.6485	4514570.009
Oaklief Elementary School	Pleasant	279331.5175	4503155.347
Ohio Northern University	Liberty	261659.1946	4516605.478
Gossard School (historical)	Wayne	254772.6809	4502134.252
Sugartree School (historical)	Wayne	251539.2916	4501809.338
Wallace Fork School (historical)	Wayne	252607.5389	4498562.78
School Number 1 (historical)	Wayne	255432.3063	4499303.039
Brush College (historical)	Cessna	271061.5294	4510968.321
Central School (historical)	Pleasant	279308.0274	4503156.045
North School (historical)	Pleasant	279675.91	4503669.852
Saint Anthonys School	Pleasant	279637.7897	4503177.145
Espy Elementary School	Buck	279323.8782	4502106.125
Westview Elementary School	Pleasant	278355.08	4503523.925
North Main Street Public School (historical)	Liberty	261719.3969	4517745.82
Warren G Harding College of Law	Liberty	261686.6169	4516728.074

Churches

Name	Municipality	Easting	Northing
Auglaize Church	Auglaize	251751.4501	4507452.413
Fairview Church	Cessna	272446.2086	4507869.696
Foraker Church	Lynn	269319.2076	4506299.253
High Street Church	Jackson	255210.6054	4514685.627
Mount Zion Church	Mc Donald	266613.0347	4497956.247
Mount Zion Church	Auglaize	253267.0472	4504252.649
Pleasant Hill Methodist Church	Roundhead	259718.9339	4500892.277
Quickstep Pentecostal Church of God	Marion	259777.043	4504872.932
Saint Johns Church	Washington	272755.5847	4514126.557
Saint Pauls Church	Liberty	258431.8369	4515536.933
Sugar Grove Church	Liberty	264933.3898	4517704.761

Table 3. Schools, Churches, Cemeteries, and Recreation Areas within Five Miles of Project Area (Cont'd)

Oakgrove Church (historical)	Washington	268073.1259	4517543.926
Ark of the Covenant Church	Pleasant	279026.1596	4503164.423
Calvary Baptist Church	Pleasant	278819.333	4503324.9
Calvary Tabernacle	Pleasant	278718.0362	4503080.989
Cornerstone Christian Fellowship Church	Pleasant	279259.2155	4503095.773
Deeper Life Church of Christ	Buck	278976.9842	4502301.626
First Christian Church	Pleasant	279549.3225	4503364.965
First Church of God	Pleasant	278595.4771	4503701.958
House of Prayer Pentecostal Church of God	Pleasant	279027.9939	4503226.108
Immaculate Conception Church	Pleasant	279686.5963	4503237.432
Kenton Baptist Temple	Pleasant	279587.1568	4503055.178
Payne Chapel African Methodist Episcopal Church	Pleasant	279297.356	4503588.492
Trinity United Presbyterian Church	Pleasant	279255.5515	4502972.419
Roundhead United Methodist Church	Roundhead	259795.7148	4493789.247
Belle Center Church of Christ	Richland	266968.2439	4487480.4
Belle Center United Methodist Church	Richland	266948.544	4487604.488
Reform Presbyterian Church	Richland	267046.5734	4487724.904
Hopewell Church	Wayne	253650.9998	4501646.479
Church of the Nazarene	Buck	278976.0674	4502270.792
First Baptist Church	Pleasant	279588.0714	4503086.012
First Presbyterian Church	Pleasant	279255.5515	4502972.419
Wesleyan Methodist Church	Pleasant	279027.9939	4503226.108
Epworth United Methodist Church	Buck	279350.1177	4502197.94
First Reformed United Church of Christ	Pleasant	279232.0661	4502973.117
First United Methodist Church	Pleasant	279544.7476	4503210.76
Saint Johns United Church of Christ	Pleasant	279635.9557	4503115.454
First Baptist Church	Liberty	261847.1612	4517340.361
First Church of Christ	Liberty	261759.9272	4516818.336
First Methodist Church	Liberty	261706.4816	4517344.891
First Presbyterian Church	Liberty	261694.5621	4516974.813
Grace Gospel Church	Liberty	261591.2321	4517410.356
Our Lady of Lourdes Roman Catholic Church	Liberty	262034.7252	4517334.326
Saint Marks Lutheran Church	Liberty	261859.6846	4517000.364

Cemeteries

Name	Municipality	Easting	Northing
Berry Cemetery	Wayne	255499.3815	4500628.411
Bowdle Cemetery	Roundhead	257015.862	4498078.012
Carman Cemetery	Marion	258347.3233	4512946.302
Cessna Cemetery	Cessna	275449.5923	4510834.156
Dola Cemetery	Washington	274299.238	4517783.574
Fairview Cemetery	Richland	268704.5057	4487241.242
Fairview Cemetery	Mc Donald	264986.2945	4497112.189
Fulton Cemetery	Cessna	272498.6853	4507281.576
Harrod Cemetery	Auglaize	253016.0983	4511547.451
Hinkle Cemetery	Roundhead	259563.9553	4496822.158

Table 3. Schools, Churches, Cemeteries, and Recreation Areas within Five Miles of Project Area (Cont'd)

Huntersville Cemetery	Cessna	266643.0149	4511630.834
McArthur Cemetery	Mc Donald	261210.5637	4496059.143
Norman Cemetery	Lynn	273990.5681	4497605.268
Old Fairview Cemetery	Mc Donald	264697.3485	4496905.202
Potters Field	Pleasant	277100.9613	4503252.758
Preston Cemetery	Marion	261555.5219	4510465.224
Ridge Cemetery	Auglaize	255057.6833	4511479.722
Shadley Cemetery	Marion	263129.8935	4510476.517
Sieg Cemetery	Taylor Creek	275346.3075	4492625.536
Sloan-Yelverton Cemetery	Taylor Creek	269766.9796	4491128.729
Smith Cemetery	Washington	271089.5221	4512634.398
Woodlawn Cemetery	Liberty	261682.5056	4514412.794
Hopewell Cemetery	Wayne	253673.4751	4501614.857
Saint Johns Cemetery	Liberty	258411.4107	4515630.214
Auglaize Cemetery	Auglaize	251776.998	4507513.297
Maysville Cemetery	Liberty	257016.1003	4513175.074
Mount Zion Cemetery	Auglaize	253314.0305	4504251.098
West Newton Cemetery	Auglaize	254963.374	4504350.893
Pleasant Hill Cemetery	Roundhead	259670.9356	4500862.948
New Roundhead Cemetery	Roundhead	260410.239	4493862.091
Old Roundhead Cemetery	Roundhead	260078.9607	4493810.991
Rutledge Cemetery	Roundhead	257426.9531	4497694.121
Bailey Cemetery	Taylor Creek	276807.5033	4492674.282

Parks

Name	Municipality	Easting	Northing
Ada Memorial Park*	Liberty	262289.594	4516484.575
Indian Lake State Park	Richland, Stokes	257078.640	4503652.159
Saulisberry Park*	Buck	276539.956	4499646.460
Slate Run Metro Park*	Marion	259808.187	4489933.526

* UTM coordinates represent a centroid within a polygon. The Indian Lake State Park UTMs represent that portion of the Park located within the 5-mile Project area radius.

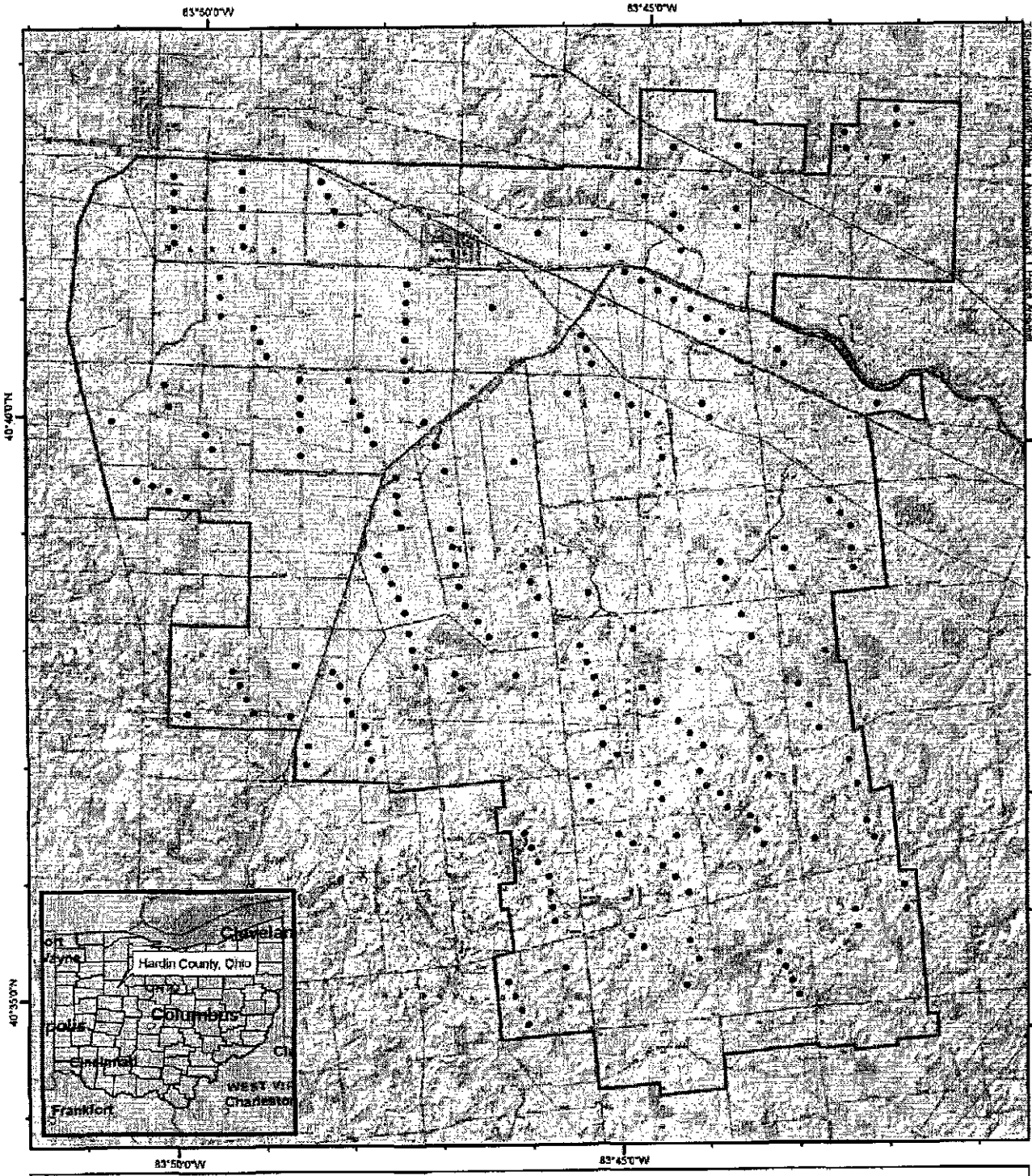


FIGURE 1 Hardin Wind Farm Location

Hardin Wind Farm, Hardin County, Ohio

June 2009

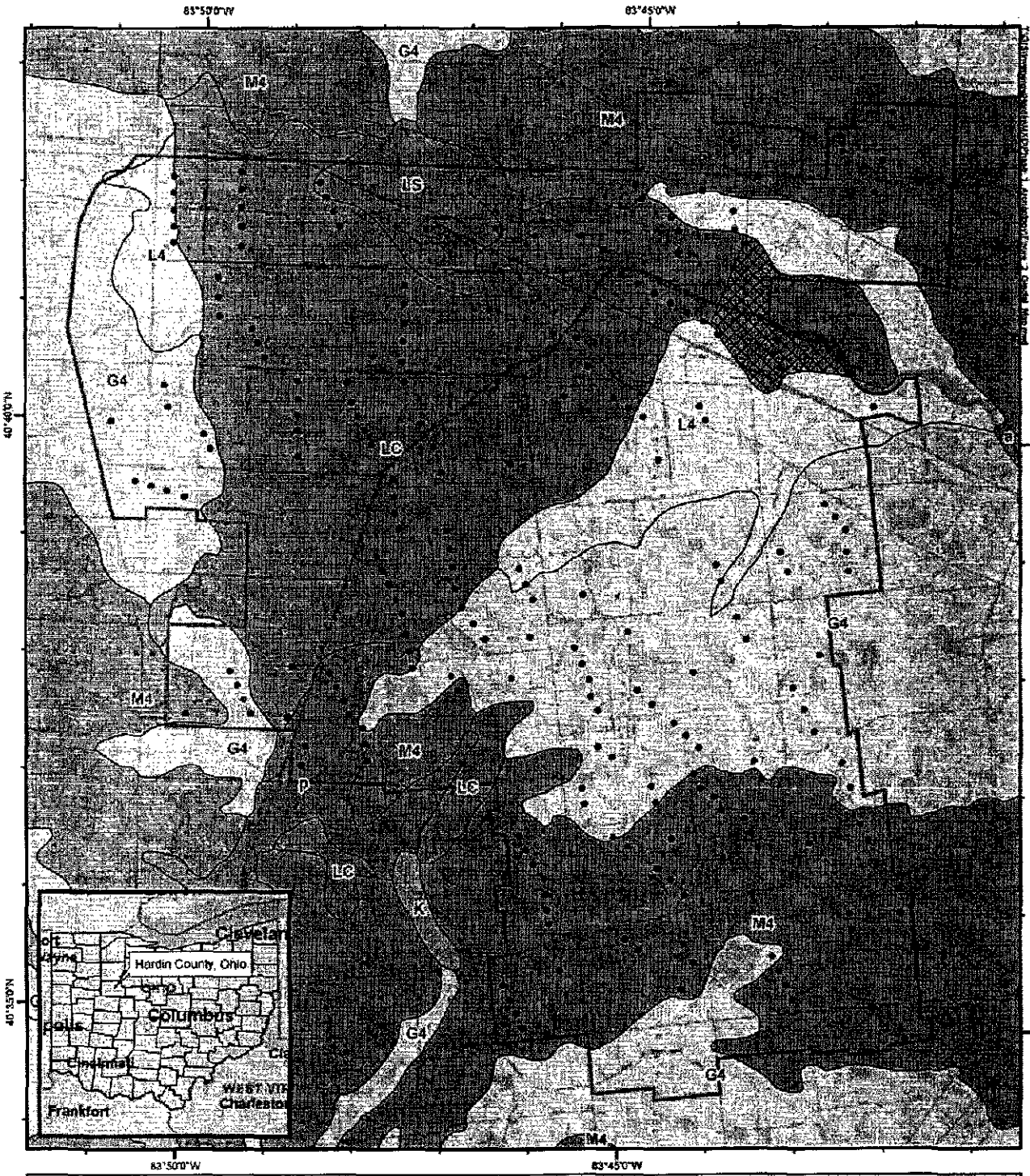


FIGURE 2 Hardin Wind Farm With Environmental Zones

Hardin Wind Farm, Hardin County, Ohio

0 0.5 1 Miles

June 2009

FIGURE 3 Hardin Wind Farm With Historic USGS Topographic Quads

Hardin Wind Farm, Hardin County, Ohio

June 2009

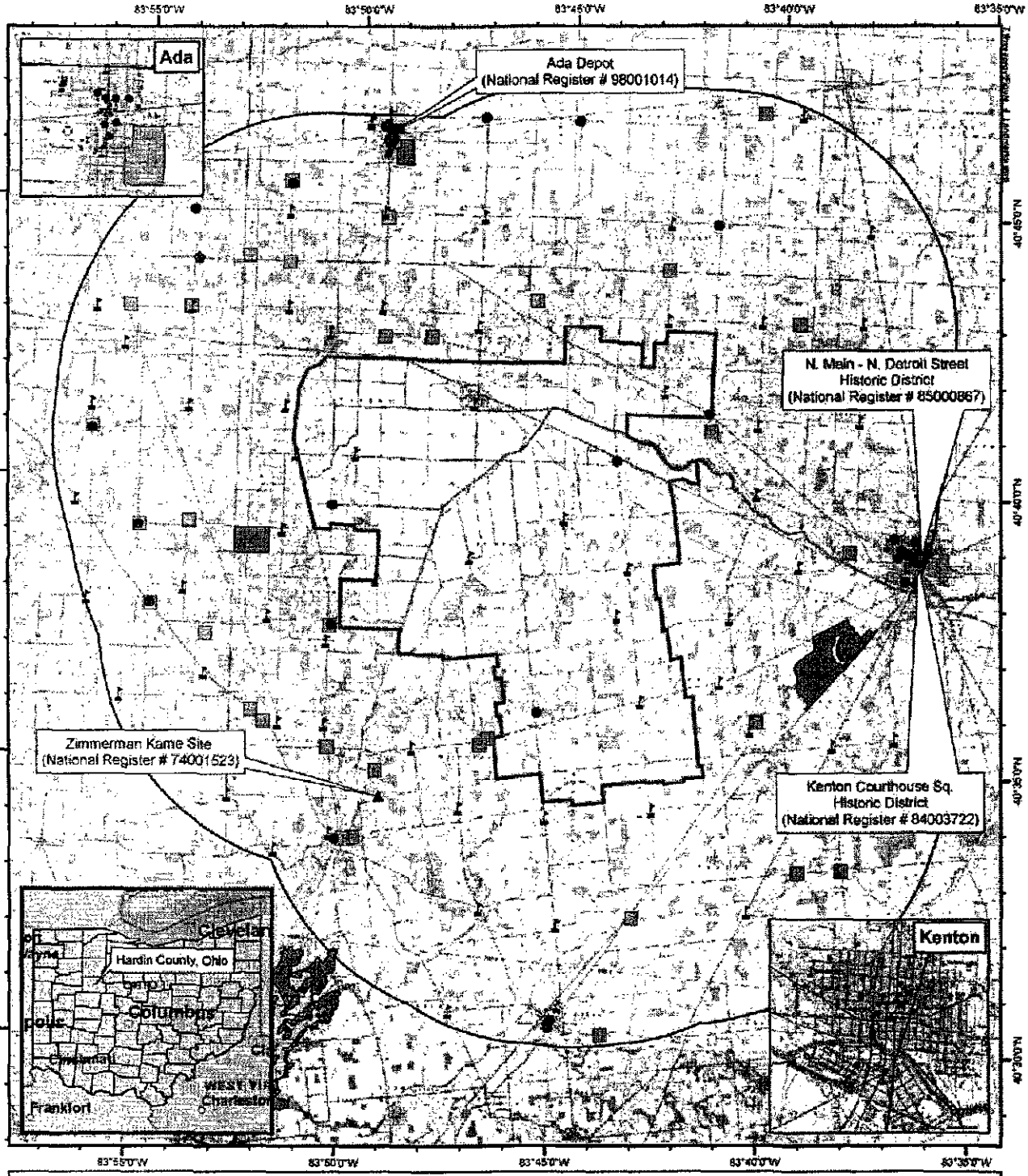


FIGURE 4 Schools, Churches, Cemeteries, and Recreation Areas

Hardin Wind Farms, Hardin County, Ohio

0 0.5 1 2 Miles

June 2009

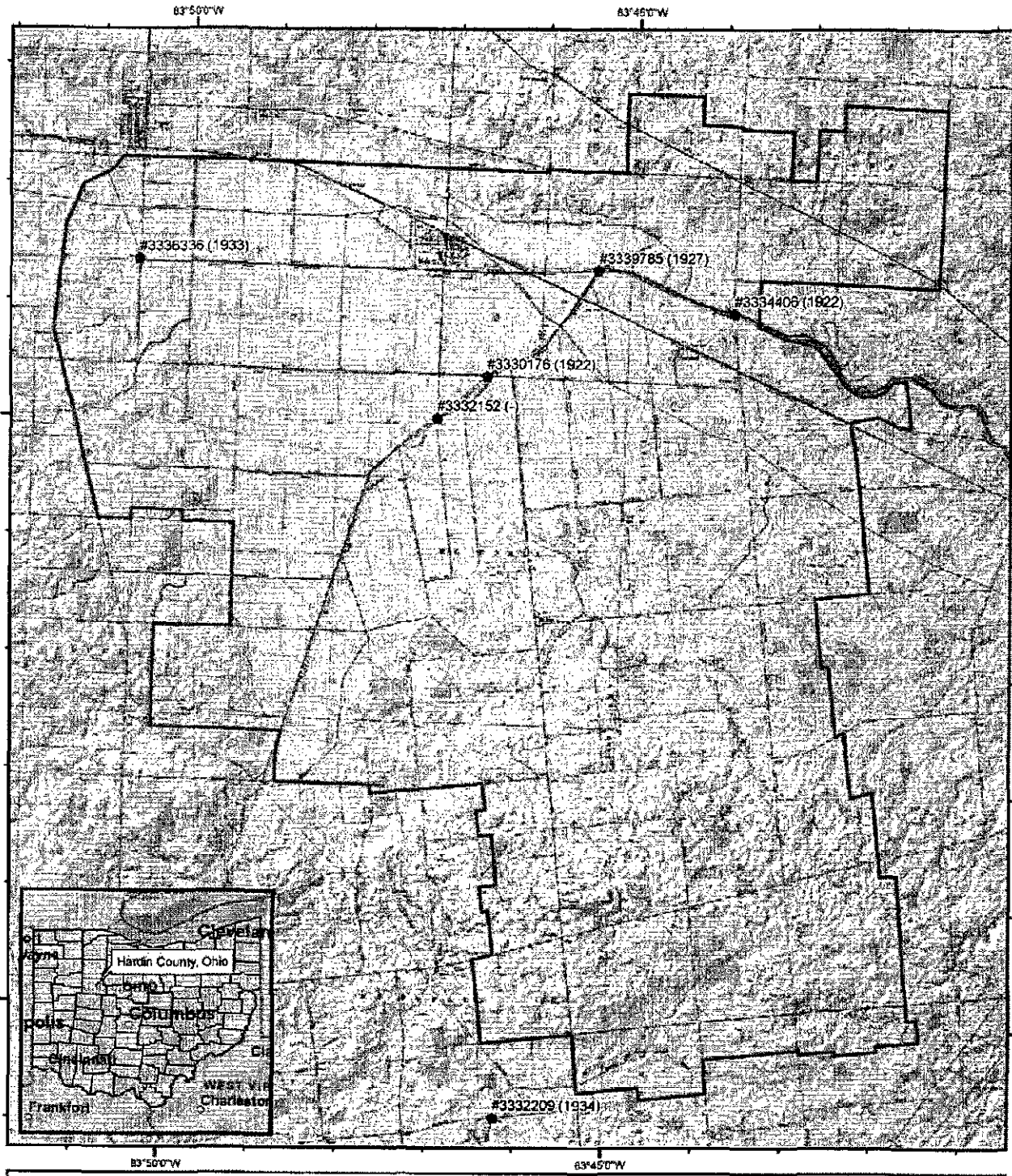
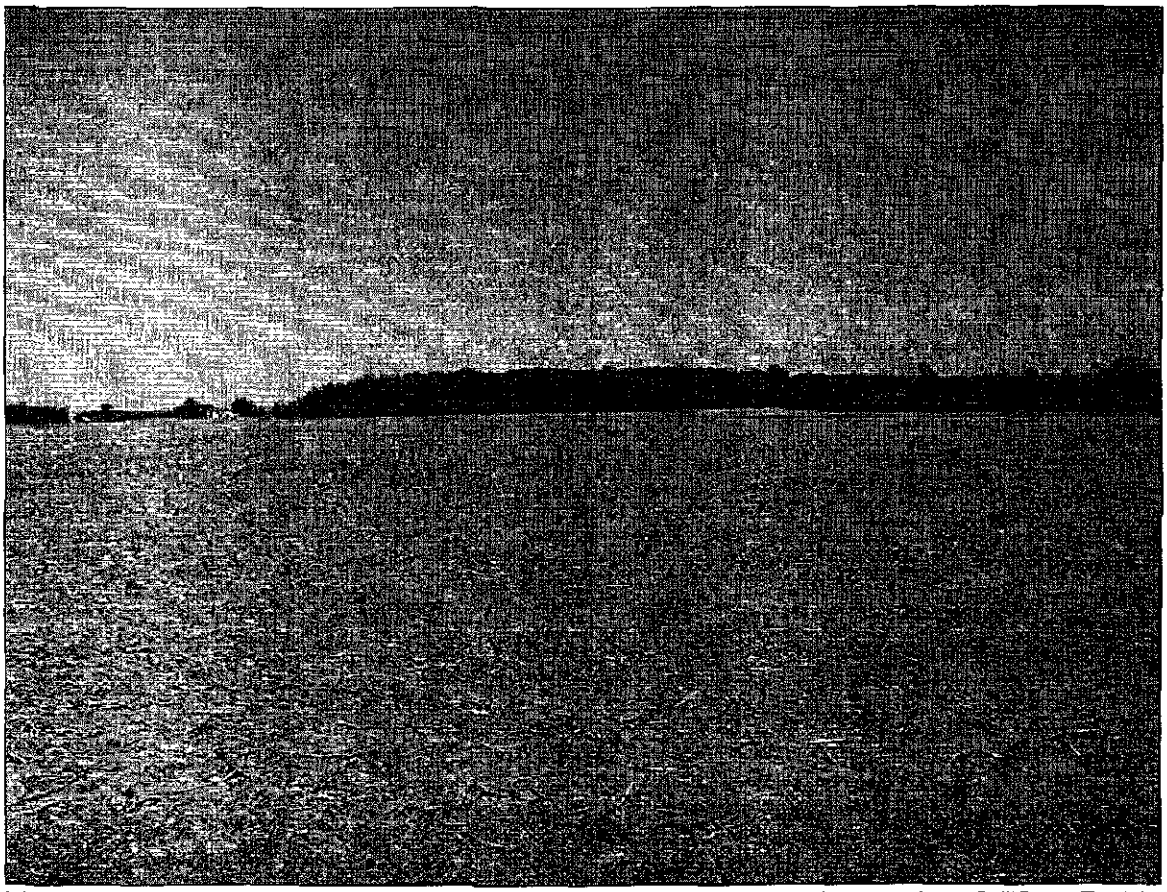


FIGURE 5 Ohio Historic Inventory Bridge Locations

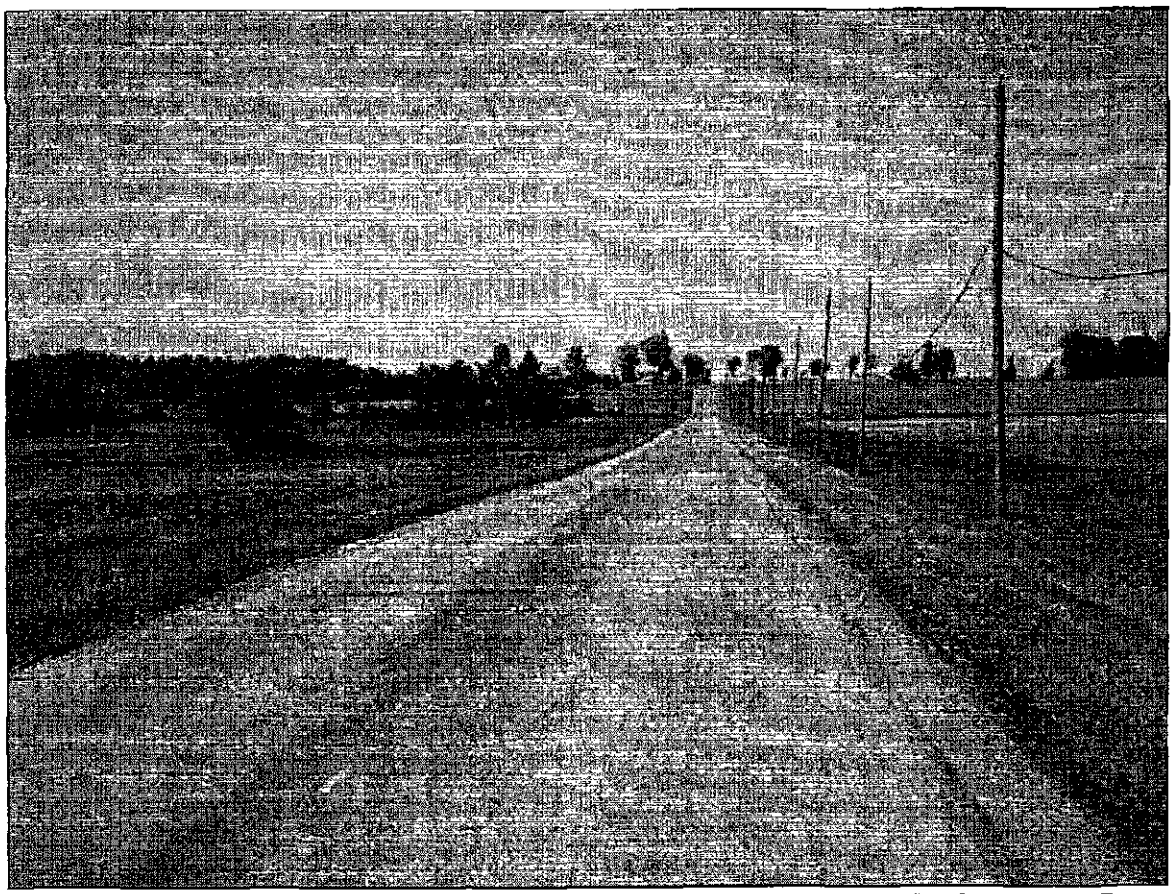
Hardin Wind Farm, Hardin County, Ohio **(Inventory no. & Date of Construction)**

0 0.5 1 Miles

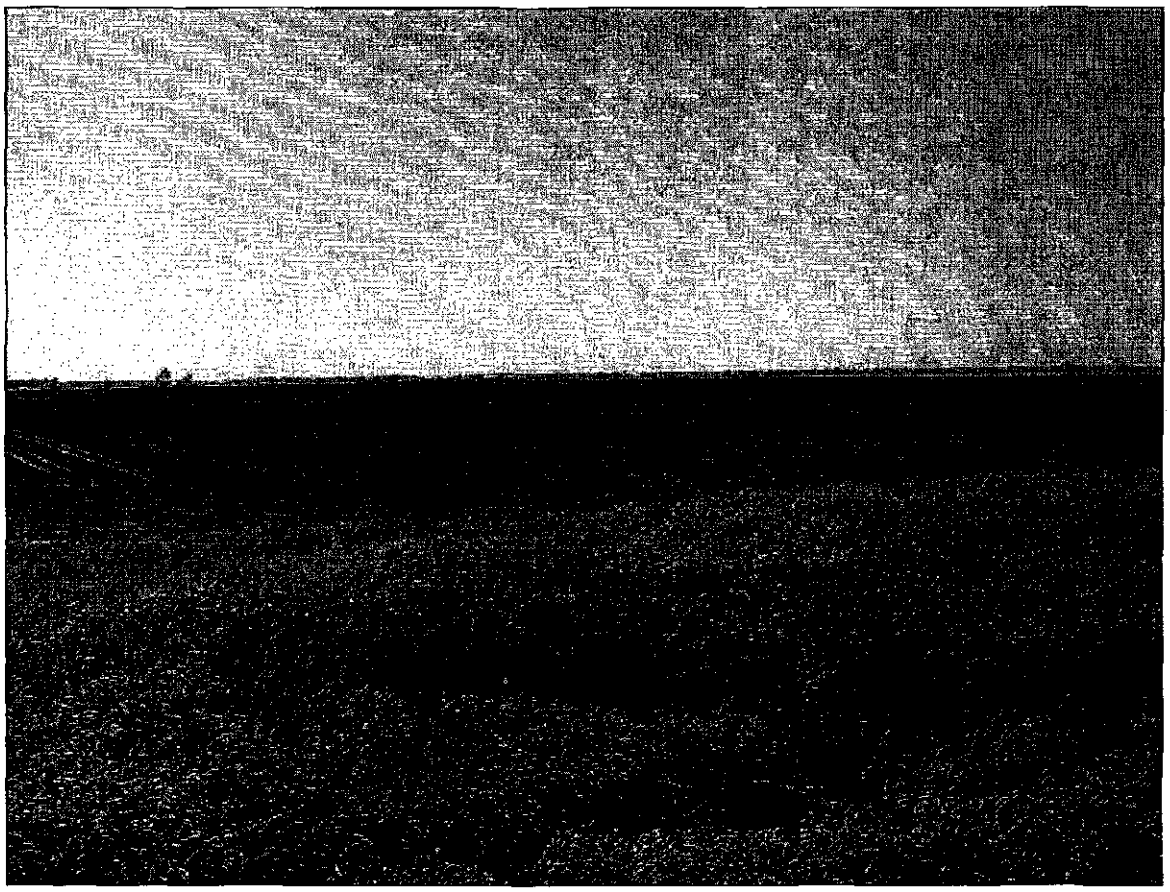
June 2009



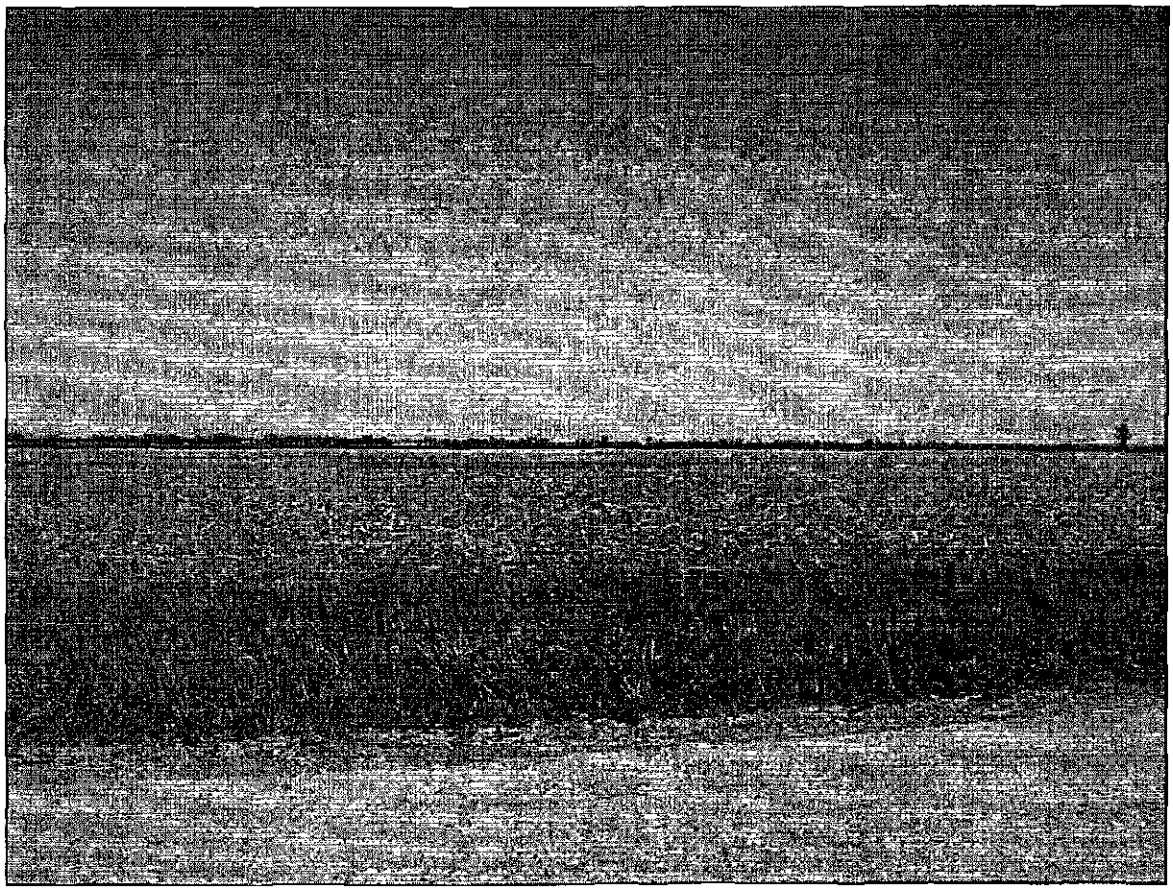
Photograph 1. Ground moraine environmental zone. From County Road 75 at Dodds Road. View east. (Photographer: Sydne B. Marshall).



Photograph 2. End moraine environmental zone is visible as rise in background. From County Road 95 near Town Road 100. View north. (Photographer: Sydne B. Marshall).

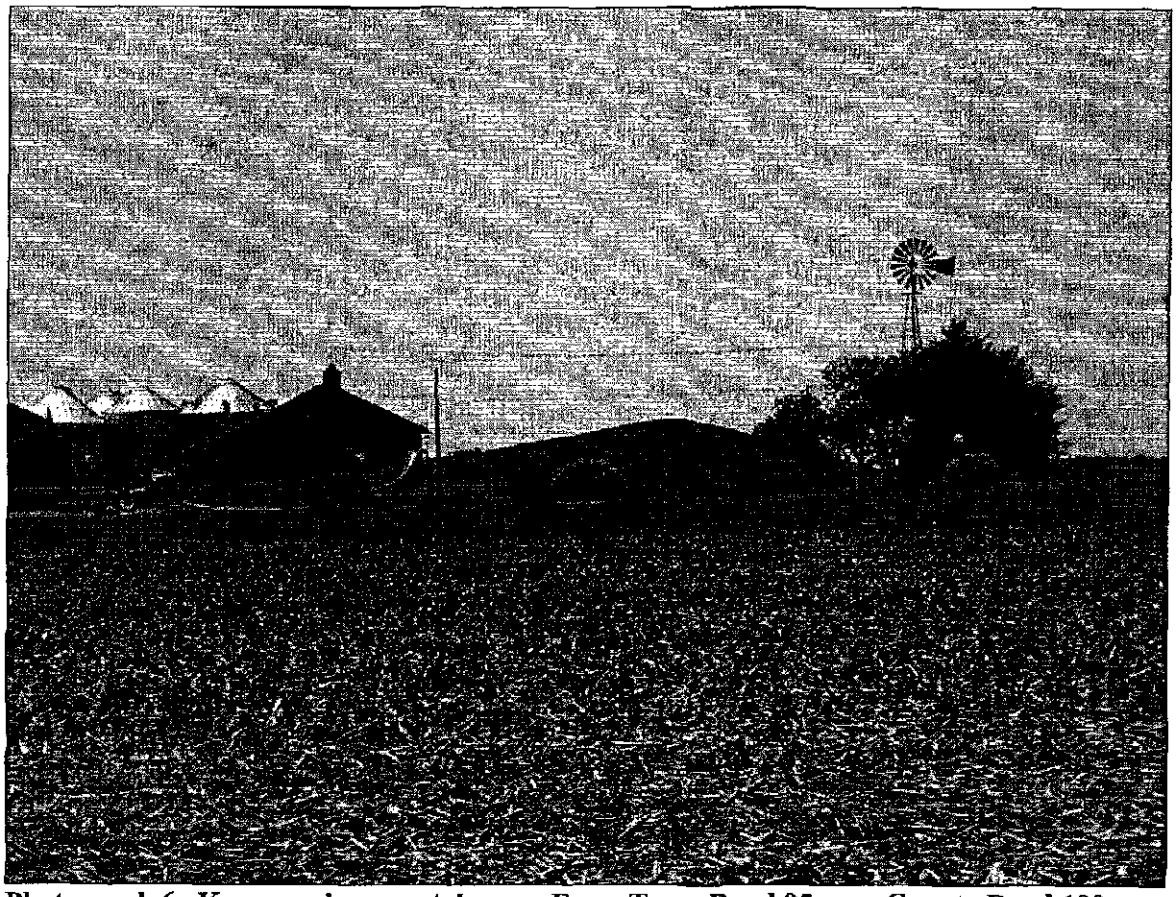


Photograph 3. Scioto Marsh environmental zone. From Hanson Road near County Road 75. View north. (Photographer: Sydne B. Marshall).



Photograph 4. Lake-planed moraine environmental zone. From County Road 35 south of Alger, Ohio. View east. (Photographer: Robert M. Jacoby).

Photograph 5. Scioto River floodplain (non-marsh) environmental zone. From County Road 95. View west. (Photographer: Robert M. Jacoby).



Photograph 6. Kame environmental zone. From Town Road 95 near County Road 180. View west. (Photographer: Robert M. Jacoby).

Client#: 86214 0INVEINV

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 06/22/2009

PRODUCER
Willis of Illinois, Inc.
One East Wacker Drive
Suite 1800
[redacted]ago, IL 60601

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED
Invenergy Wind Development Co., LLC
One South Wacker Drive, Suite 2020
Chicago, IL 60606

INSURERS AFFORDING COVERAGE	NAIC #
INSURER A: Federal Insurance Company	
INSURER B:	
INSURER C:	
INSURER D:	
INSURER E:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A		GENERAL LIABILITY	35848841	03/31/09	03/31/10	EACH OCCURRENCE	$1,000,000
		X COMMERCIAL GENERAL LIABILITY				DAMAGE TO RENTED PREMISES (Ea occurrence)	$1,000,000
		CLAIMS MADE X OCCUR				MED EXP (Any one person)	$25,000
		X BI/PD Ded: 2,500				PERSONAL & ADV INJURY	$1,000,000
		GEN'L AGGREGATE LIMIT APPLIES PER:				GENERAL AGGREGATE	$2,000,000
		POLICY PRO-JECT LOC				PRODUCTS - COMP/OP AGG	$2,000,000
A		AUTOMOBILE LIABILITY	73546390	03/31/09	03/31/10	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
		X ANY AUTO				BODILY INJURY (Per person)	$
		ALL OWNED AUTOS				BODILY INJURY (Per accident)	$
		SCHEDULED AUTOS				PROPERTY DAMAGE (Per accident)	$
		X HIRED AUTOS					
		X NON-OWNED AUTOS					
		GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
		ANY AUTO				OTHER THAN AUTO ONLY: EA ACC	$
						AGG	$
A		EXCESS/UMBRELLA LIABILITY	79851261	03/31/09	03/31/10	EACH OCCURRENCE	$25,000,000
		X OCCUR CLAIMS MADE				AGGREGATE	$25,000,000
		DEDUCTIBLE					$
		RETENTION $					$
A		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	78390391	06/01/09	06/01/10	X WC STATU-TORY LIMITS OTH-ER	
		ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED?				E.L. EACH ACCIDENT	$1,000,000
		If yes, describe under SPECIAL PROVISIONS below				E.L. DISEASE - EA EMPLOYEE	$1,000,000
						E.L. DISEASE - POLICY LIMIT	$1,000,000
		OTHER					

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

CERTIFICATE HOLDER

Evidence of Insurance

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE
E. Thomas Pilsman

IMPORTANT

If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

DISCLAIMER

The Certificate of Insurance on the reverse side of this form does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder, nor does it affirmatively or negatively amend, extend or alter the coverage afforded by the policies listed thereon.

Executive Summary – Wind Power GeoPlanner™

Licensed Microwave Search & Worst Case Fresnel Zone

Comsearch performed an analysis to evaluate the potential effects of the planned Hardin project in Hardin County, Ohio on existing non-Federal Government microwave telecom systems.

Microwave Search Results: Comsearch's Wind Power GeoPlanner™ provides a graphical representation of affected microwave paths and provides supporting technical parameters. The microwave path data is overlaid on topographic basemaps. Comsearch identified 4 microwave paths that intersect the project area (see Figure 1 and Table 1 below).

Comsearch then calculated a Worst Case Fresnel Zone (WCFZ) for each microwave path in the project area. The mid-point of a full microwave path is the location where the widest (or worst case) Fresnel zone occurs. Fresnel zones are calculated for each path using the following formula.

$$Rn \cong 17.3\sqrt{\frac{n}{FGHz}\left(\frac{d1d2}{d1+d2}\right)}$$

Where,
R_n = First Fresnel Zone Radius, meters
n = The Number 1
F_{GHz} = Frequency of Microwave Link, GHz
d1 = Distance to Wind Turbine from Microwave Station 1, km
d2 = Distance to Wind Turbine from Microwave Station 2, km

note: For WCFZ calculation d1 = d2

The calculated WCFZ radius, giving the linear path an area or swath, buffers each microwave path in the project area. The distance unit is in meters and can be found in the column attribute "WCFZ." In general, this is the XY area where the planned wind turbines should be avoided, if possible. These areas are shown in Figure 2.

Please note that because the turbine locations were not provided, we could not determine if any potential obstruction cases exist between the planned wind turbines and the microwave systems. If the latitude and longitude values for turbine locations are provided, Comsearch can identify specific microwave telecom paths and turbines where a potential XY conflict exists. Additionally, when wind turbines need to be located inside a WCFZ, Comsearch can provide a detailed clearance study, which considers the vertical Z-height clearance objectives.

Map Projection: The ESRI® Shapefiles contained in the enclosed GeoPlanner CD are in NAD 83 UTM Zone 17 projected coordinate system.

Comsearch Contact:
Denise Finney, Account Manager
Phone: (703) 726-5650 Fax: (703) 726-5595
Email: dfinney@comsearch.com

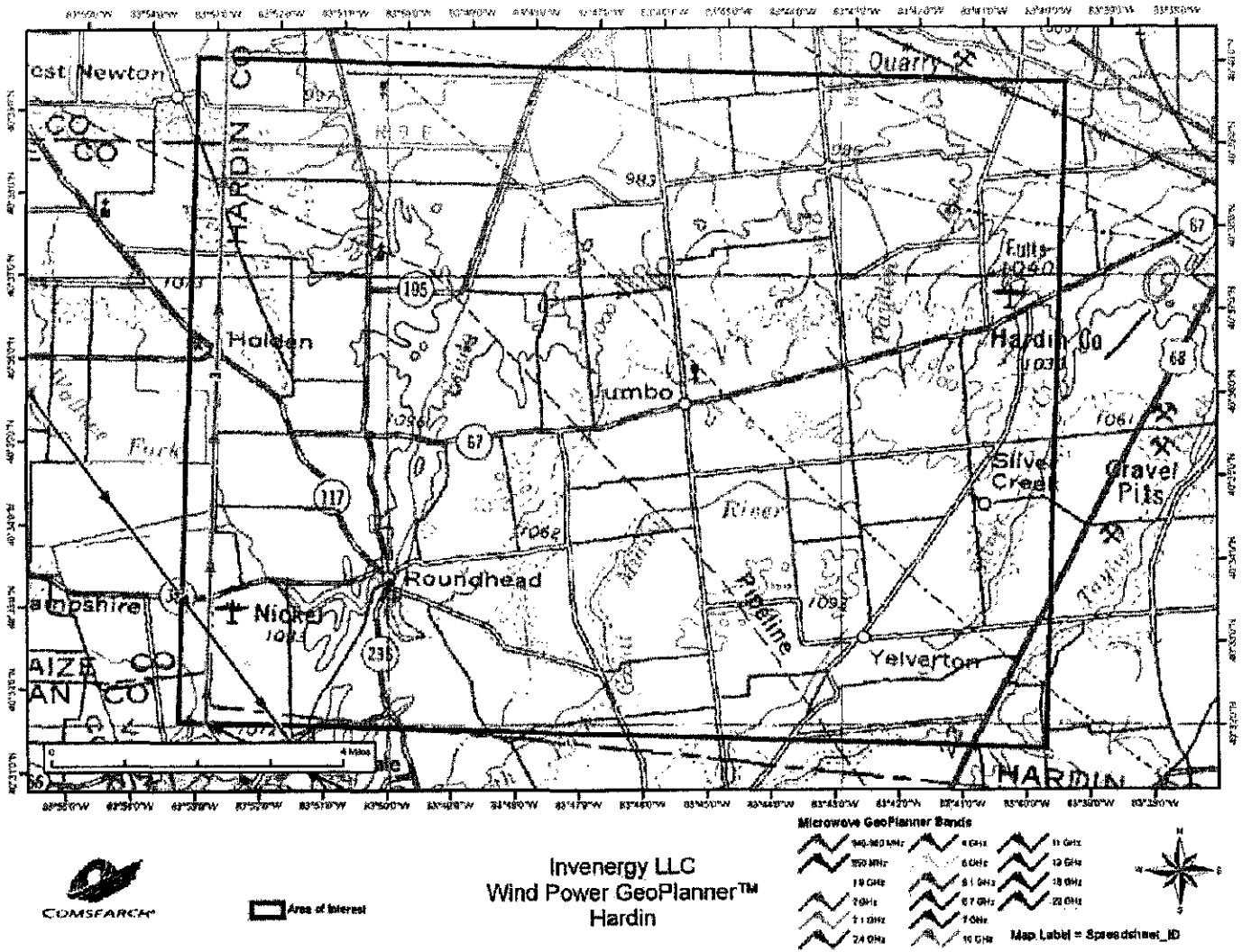
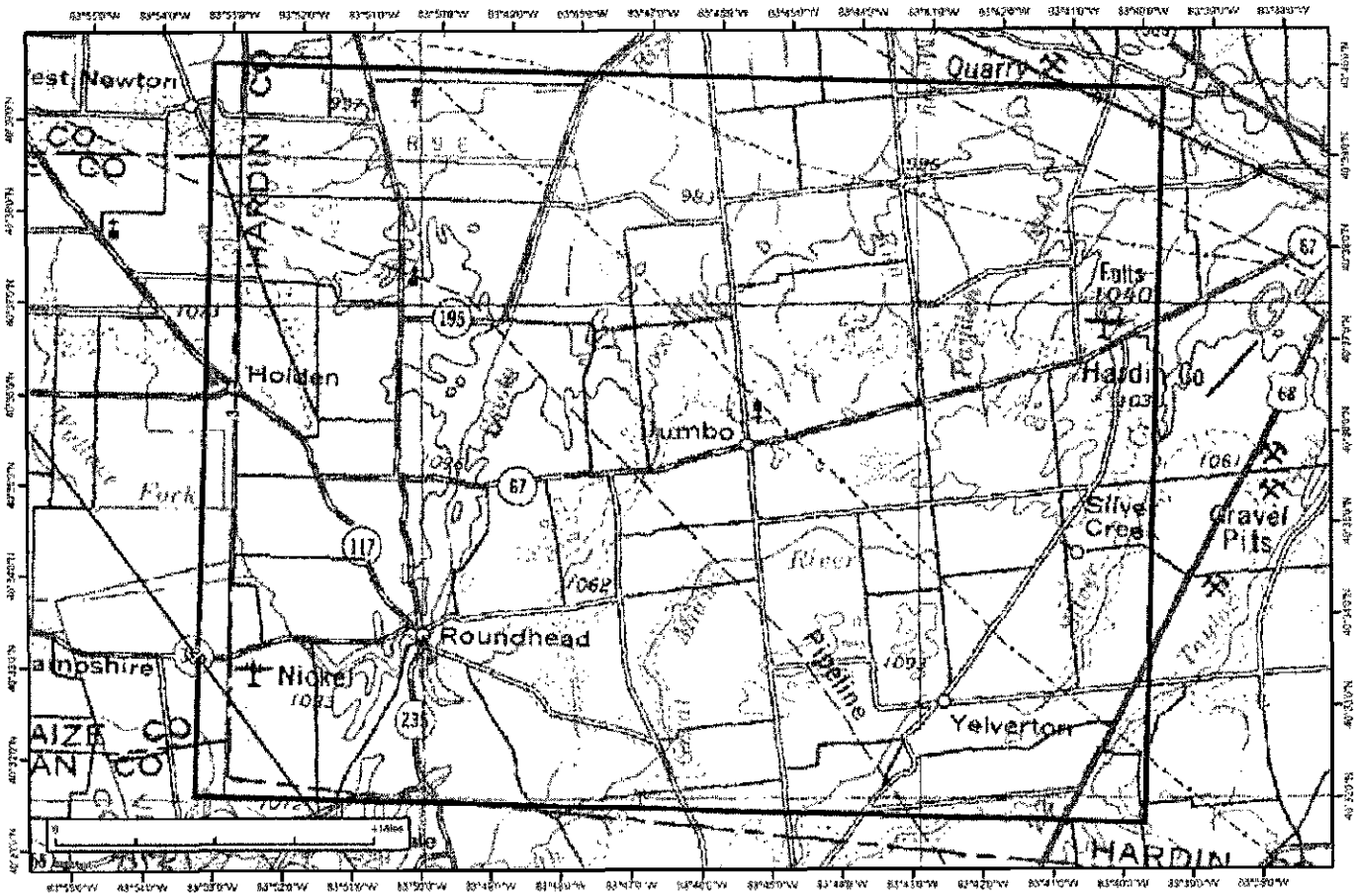


Figure 1 – Wind Power GeoPlanner™



COMSEARCH

Invenergy LLC
Wind Power GeoPlanner™
Hardin

WCFZ
Area of Interest
Map Label = Spreadsheet_ID

ID	Name Site 1	Name Site 2	Call Sign Site 1	Call Sign Site 2	Band Name	Licensee	WCFZ (m)
1	BELLFONTAINE	INDIAN LAKE	WML561	WPTB397	Lower 6 GHz	New Par	17.41
2	LIMA	BELLEFONTAI	WNTS208	KQJ89	Upper 6 GHz	AMERICAN ELECTRIC POWER SERVICE CORP.	24.27
3	INDIAN LAKE	LIMA EAST	WPTB397	WPSK794	Lower 6 GHz	Cellco Partnership - Ohio	18.15
4	RUSHYLVANIA	INDIAN LAKE	WPTQ901	WPTB397	11 GHz	New Par	10.83

Table 1 – Microwave GeoPlanner Links Considered in Analysis (See enclosed mw_geopl.xls for more detailed information and GP_dict_matrix_description.xls for field description)

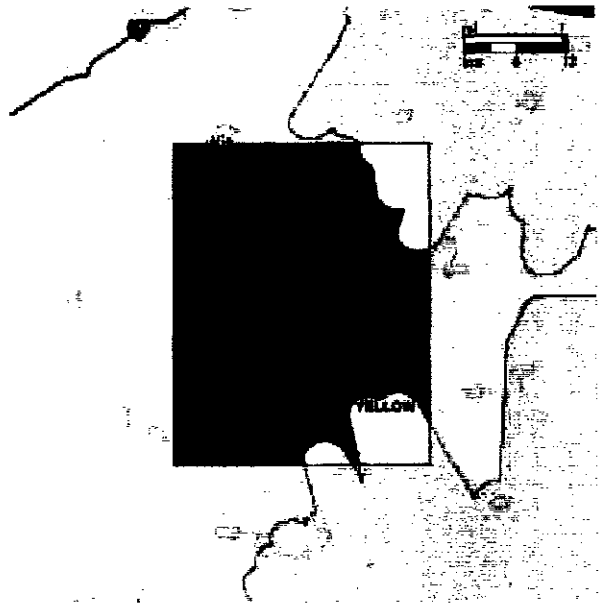
Long Range Radar Tool

Disclaimer:

- For initial evaluation of the potential impacts of obstructions on Air Defense and Homeland Security radars only. This evaluation does not indicate potential impacts on other radars. This is only a prescreening tool, intended to assist proponents in their initial siting process.

Instructions:

- Enter either a single point or a polygon and click submit to generate a long range radar analyis map.
- At least three points are required for a polygon, with an optional forth point.
- The largest polygon allowed has a maximum permimeter of 100 miles.



Analysis Type: Polygon

Point	Latitude				Longitude			
	Deg	Min	Sec	Dir	Deg	Min	Sec	Dir
1	40	45	40.71	N	83	52	26.30	W
2	40	26	14.91	N	83	52	26.30	W
3	40	26	14.91	N	83	36	54.64	W
4	40	45	40.71	N	83	36	54.64	W

Horizontal Datum: NAD83

Map Legend:

- **Green:** No anticipated impact to Air Defense and Homeland Security radars. Aeronautical study required.
- **Yellow:** Impact likely to Air Defense and Homeland Security radars. Aeronautical study required.
- **Red:** Impact highly likely to Air Defense and Homeland Security radars. Aeronautical study required.

TRANSPORTATION STUDY

FOR CONSTRUCTION OF A WIND FARM IN HARDIN COUNTY, OHIO

Prepared for:

Hardin Wind Energy, LLC

Prepared by:

TETRA TECH

420 Madison Avenue, Suite 1001
Toledo, Ohio 43064

Submitted:

June 2009

EXECUTIVE SUMMARY

In support of the construction of a wind farm by Hardin Wind Energy, LLC in Hardin County, Ohio, Tetra Tech performed a transportation study with two goals: 1) develop a regional delivery plan, and 2) perform a local road review to evaluate potential impacts to local roadway infrastructure. The results of this study are presented in this report in two parts: a Regional Delivery Plan and a Local Road Review.

Regional Delivery Plan

Two preliminary regional delivery routes have been developed for the transportation of wind turbine generator (WTG) components from two regional origins to four general locations within the project area. The two regional origin routes were assumed to be Interstate 75 (I-75) to the west of the project area, and the proposed Hardin Rail Logistics Center near Dunkirk, Ohio to the north of the project area.

The preliminary regional delivery route from I-75 consists of using State Route 309 to the northern vicinity of the project area. The regional delivery route from the Hardin Rail Logistics Center consists of using Township Road 125 to State Route 701 to County Road 95 or to State Route 195 to the northern vicinity of the project area. Internal to the project area, the primary delivery routes will be State Route 195, County Road 95, Township Road 95 and County Road 110.

Additional study will be required for these preliminary routes to determine what improvements will be needed in order to accommodate long, heavy and high permit trucks carrying WTG components. The local road review provides further discussion of the impacts of the transport of these permit trucks on the roadway infrastructure along the regional delivery route.

Local Road Review

The local road review consisted of a desktop and field review of the roads along the preliminary regional delivery route, to identify possible impacts from project construction and to identify potential mitigation measures.

There are three main areas of impacts expected to the local roads from the wind farm construction traffic. They include impacts to the roads, bridges and intersections. The Hardin County Engineer is a key stakeholder in these impacts and the County is currently working on their process for permitting truck loads in access of the state's legal limits. The anticipated impacts, including potential mitigation, include:

- The pavement condition of the county and township roads along the regional delivery route is generally good. However, the Hardin County Engineer is concerned about how the construction of this project will impact the condition of the roads. As part of a local permit process the County is developing, they will require the wind farm developer to obtain

pavement cores of the existing roads and perform an engineering evaluation to determine the existing capacity of the pavement to support loads. If the capacity does not equal the anticipated actual loads, the County will require improvements to the roads to increase their capacity. The County has problems maintaining acceptable pavement condition in the areas where the soil is highly organic "black muck" in the Scioto Marsh area. There is a potential that extensive roadway improvements will be required in this area.

- Truck loads heavier than the state legal loads limits may impact the existing county and township bridges. There is only one bridge in the project vicinity, along County Road 150, that is currently posted for loads less than the state legal limit. This bridge will likely have to be avoided. In general, a majority of the other county and township bridges are in good condition. See the figure titled, *Project Area Transportation Constraints* for the location of the County's bridges. [NOTE: It appears that some bridges are omitted from the Ohio Department of Transportation's database. Tetra Tech is in the process of contacting the Hardin County GIS Coordinator in an effort to obtain more comprehensive information for the bridges in the Project area. Upon completion of this additional investigation, Tetra Tech will issue an amended report.] For superload vehicles (gross weight in excess of 120,000 pounds) the County would have to look at the impacts to bridges on a case by case basis.
- Turns from the transport of long WTG components will require the truck and/or trailer to travel outside of the existing pavement at intersections. These wide turns will impact the facilities around the intersections including ditches, signs and utility poles. The County will be interested in seeing how these loads impact each intersection, and how they will be mitigated. Mitigation activities will likely include installing gravel fill outside of the pavement limits as a temporary pavement surface for truck/trailer turns, installation of drainage pipes in these fill locations as an alternate means of drainage and relocation of utility poles, signs and other appurtenances. Some corners of various intersections will need to be avoided because of issues that would be difficult or expensive to mitigate.

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FIGURE LIST

Regional Delivery Routes from I-75

Regional Delivery Routes from Hardin Rail Logistics Center

Project Area Transportation Constraints

Typical Intersection Turning Analysis

1.0 INTRODUCTION

Hardin Wind Energy, LLC is planning to construct a wind farm in portions of Lynn, Cessna, Marion, Roundhead, McDonald and Taylor Creek Townships in Hardin County, Ohio. In support of this project, Tetra Tech performed a transportation study with two goals: 1) develop a regional delivery plan, and 2) perform a local road review to evaluate potential impacts to local roadway infrastructure. The results of this study are presented in this report in two parts: a Regional Delivery Plan and a Local Road Review.

2.0 REGIONAL DELIVERY PLAN

Preliminary regional delivery routes were developed for transport of wind turbine generator (WTG) components from two potential local origins to four destinations in the project area.

2.1 Origins

The two regional origin routes were assumed to be Interstate 75 (I-75) to the west of the project area, and the proposed Hardin Rail Logistics Center near Dunkirk, Ohio to the north of the project area.

2.2 Destinations

In order to simplify this Regional Delivery Plan, four locations were selected that represent the approximate center of the four quadrants of the project area. These four locations were utilized as the destinations during development of the Regional Delivery Plan.

2.3 Regional Delivery Route from I-75

It is assumed that the company hired by Hardin Wind Energy to transport the wind turbine components will be responsible for facilitating the delivery to an interstate exit near the project. Interstate 75 is the closest interstate route to this project. To link I-75 to the project vicinity, State Route 309 (SR 309) appears to be the most suitable route due to the factors listed below. See figure *Regional Delivery Routes from I-75* for the route.

- It provides the shortest route from I-75 to three of the four project destinations.
- In the rural areas it has wide shoulders.
- There are no tight turns required along SR 309.
- The geometry of the exit ramp from I-75 to SR 309 appears to be adequate for proper turning of WTG delivery vehicles.
- There are no load posted bridges on SR 309.
- SR 309 provides direct access to SR 195 and CR 95, two major arteries in the regional delivery routes.

The disadvantage of using SR 309 is that the exit ramp from I-75 terminates in an urban area of the City of Lima. It is likely that short-term traffic closures will be required on SR 309 when long trucks delivering some of the WTG components are turning from the I-75 exit ramp to SR 309. These traffic closures can likely be accomplished using law enforcement officials, with minimal impact to the traveling public.

2.3.1 Alternate Route

SR 117 originates at SR 309 approximately 600 feet east of the I-75 and SR 309 interchange. State Route 117 is an alternate route that may be beneficial for access to wind turbine sites in the southern portion of the project area. However, it was not selected as the primary route because SR 309 is closer to three of the four project destinations. Although this route was not field reviewed, a desktop review of aerial photography, overpass locations and load posted bridges did not indicate any "fatal flaws" in using SR 117 as an alternate route from I-75.

2.4 Regional Delivery Route from the Hardin County Rail Logistics Center

According to Mr. John Hohn, Vice President of Economic Development for Hardin County, a developer has an option on 256 acres of land that is located along the Chicago Fort Wayne and Eastern Rail line just west of Dunkirk, Ohio. The developer plans to create an intermodal rail logistics center (RLC) that would be utilized for unloading WTG components delivered by rail for local delivery via truck to the site.

Tetra Tech developed a delivery route from the RLC to the four destinations in the project area. See figure *Regional Delivery Routes from Hardin Rail Logistics Center* for the route. In developing this route, we considered the following:

- Minimize the number of turns;
- Avoid locations where obstructions would inhibit turns from oversize trucks; and,
- Utilize state routes where possible without creating excessive additional travel distance.

Based on these constraints, the following routes were eliminated from consideration due to the factors listed above.

- From the RLC to west on CR/TR 30 to south on CR 95 – Obstructions at the intersection of TR 30 and CR 95 include a large ditch and retaining wall in the southwest quadrant, which would be costly to modify to accommodate turns by long trucks. In addition, the railroad crossing on CR 95 has a potential vertical constraint due to poor vertical curve geometry.

- From the RLC to south on TR 125 to west on SR 81 – SR 81 traverses through the Village of Dola. Within and just west of the Village, SR 81 has some sharp curves which would likely cause truck turning problems. The buildings in Dola adjacent to the intersection would likely impede truck turning movements.

2.5 Ohio Department of Transportation Superload Permit Requirements

According to Mr. Jeff Whiteman, who is a superload permit specialist with the Ohio Department of Transportation (ODOT), there are three considerations for a permit load that ODOT must evaluate: width, height and weight. Mr. Whiteman said that height is typically the most restrictive, since overhead bridges cannot be modified without substantial cost implications. In his experience with WTG permit loads, the blade transport is typically not a problem because the loads and heights are not excessive, only the length. Typically the haulers have not had a problem with length; because the routes they travel have do not have tight turning radii. The nacelle is usually heavy but not high. Concerns arise with transport of the tower sections, since these sections may weigh 250,000 pounds and may be 15'-6" high. Mr. Whiteman said that loads coming from Indiana or Pennsylvania are typically not a problem on height, but loads traveling from Kentucky or Michigan on I-75 can be problematic.

Mr. Whiteman said that once ODOT's permit office receives an application for a superload, their staff analyze the loadings and review the vertical clearances and determine if the desired route passes or fails. He said that if there are problems with the weight, problems may be mitigated by going slower over the structure, using traffic control to limit the other traffic using the bridge, etc. If there is a height problem with a bridge, ODOT will attempt to find another route.

If an origin and a destination are supplied to the ODOT Permit Office, Mr. Whiteman indicated that they would be willing to perform a preliminary evaluation of the permit loads on the state's roads, to help determine the best routes to the project site.

2.6 Additional Considerations

For any of the wind turbine components that are transported to the project via state highways, Interstate 75 may not be the route chosen by the transportation company hired by Hardin Wind Energy. United States Route 30 to the north and US 33 to the south are both interstate-type U.S. routes that could be utilized by the transportation company depending upon the origin of the wind turbine components. If one of these other routes is utilized, additional study would be required to determine the best routes from these U.S. highways to the project area.

3.0 LOCAL ROAD REVIEW

A local road review was conducted in order to identify possible impacts from the project's construction on the county and township roads and to identify possible mitigation measures. The issues that were reviewed include impacts to the local road pavement condition, bridge load capacity, and turning impacts from trucks delivering long WTG components.

3.1 Typical Construction Vehicles

Construction of each wind turbine will require construction vehicles to utilize the local road system to access each wind turbine location. The following list provides a general idea of the number and type of different construction trucks that would be required to construct each wind turbine. The list does not include any mobilization of equipment and assumes that no fill will be removed from the project site.

Wind Turbine (per turbine)

- 3 blade trucks (permit load)
- 1 nacelle and hub truck (permit load)
- 4 tower section trucks (permit load)
- 150 dump trucks of aggregate
- 30 concrete trucks
- 2 semi trucks for steel components
- 1 semi truck for other components

In addition, one substation will be required for this project. The following list provides a general idea of the number and type of different construction trucks that would be required to construct a substation.

Substation (one per project)

- 150 dump trucks of aggregate
- 30 concrete trucks
- 1 main transformer truck (permit load)
- 2 semi trucks of transformer oil
- 2 semi trucks of other transformer components
- 10 semi trucks of other substation components

3.2 Potential Hardin County Permit Requirements

According to the Hardin County Engineer, Mr. Michael Smith, his office is working with the Hardin County Prosecutor on the County's future permitting process for oversize and overweight vehicle permit loads. He anticipates that the County will require developers to show that the County's transportation infrastructure will not be adversely impacted by the permit loads. This may include requiring the developer to review impacts to the pavement, bridges and truck turning from oversize (long) loads. A discussion of the potential requirements in each of these

areas follows. Mr. Smith anticipates that the permit process will be finalized by the end of the summer or early fall of 2009.

3.2.1 Pavement Condition

As part of the overweight permit process, the Hardin County Engineer anticipates that the County will require the developer to prepare analyses that show that the existing pavement on the county and township roads have the capacity to support any permit loads (loads heavier than the state legal loads). The County will require the developer to obtain roadway pavement cores and perform an engineering analysis to determine the allowable load capacity of the road, and to determine the required load capacity based on the permit loads. This analysis will have to be signed and sealed by an Ohio registered Professional Engineer, and reviewed and approved by the County. If the capacity of the pavement is not adequate for the heavy loads, the developer will be required to upgrade the pavement to handle the loads.

During our site visit, we observed that most of the pavement on the county and township roads is in good condition. However, approximately half of the area lies within the Scioto Marsh, a former wetland area that was drained in the 1800's to allow farming of the fertile soil. According to the Hardin County Engineer, it is difficult to keep a stabilized pavement due to poor support from the high organic "muck" soil in this area. In the past several years, the County has attempted to stabilize some of the roads within the Scioto Marsh area by adding large amounts of aggregate and bituminous pavement to the existing roads.

All roads reviewed, except one, were asphalt pavements consisting of either chip and seal or hot mix asphalt pavement. The exception, TR 100 from CR 35 to SR 195 has a crushed bituminous and aggregate surface for most of its length. The County recently pulverized the existing asphalt pavement due to its poor condition. However, unless an evaluation of the pavement capacity is made based on its composition, it is difficult to evaluate its capacity for heavy loads.

At the intersection of CR 110 and SR 195, there is a sign posted for CR 110 that states "No Commercial Trucks over 4 tons empty". In addition, there is an identical sign posted for CR 35 at its intersection with CR 110. The County Engineer stated that these signs are posted because of the poor pavement condition of these roads. He said that the County has no legal means to enforce the restrictions, but they use the signs to discourage heavy vehicles from using these roads.

3.2.2 Bridge Loads

The Hardin County Engineer has jurisdiction over all of the bridges on county or township roads. According to the County, there are six existing bridges under the jurisdiction of the Hardin County Engineer that are currently posted for allowable loads less than the state legal loads.

According to Mr. Brad Ealey with the County Engineer's office, their office will be reviewing the allowable load capacity of some of the County's bridges after the annual bridge inspections are completed this year. Mr. Ealey expects the allowable loads to be lowered on more of the County's bridges after he completes the inspections and performs structural evaluations.

One of the existing load posted bridges is located along the south boundary of the project area, on County Road 150 (CR 150) between Township Road 95 (TR 95) and TR 65. It is a steel beam bridge with a timber deck, and it is posted for an allowable load of 20 tons. It is unlikely that this bridge can be utilized by WTG Delivery Vehicles without being improved, and therefore this bridge is shown as a constraint location on the figure titled, *Project Area Transportation Constraints*. If a wind turbine access road(s) is located along this portion of CR 150, consideration will have to be given to accessing the road(s) without crossing this bridge. In general, a majority of the other county and township bridges are in good condition. For superload vehicles (gross weight in excess of 120,000 pounds) the County would have to look at the impacts to bridges on a case by case basis.

3.2.3 Permit Truck Turning

The Hardin County Engineer anticipates that the wind farm developer will have to show the impacts and mitigation on the local infrastructure in locations where trucks carrying long WTG components will be making turns.

Truck Turning Analyses

Preliminary truck turning analyses were performed on the intersections along the delivery route to identify locations of concern. Our analysis involved utilizing AutoTurn 6.0 software to model the truck turns. A Trail King trailer with steerable axles as shown in the GE Energy document *Commercial Documentation – Wind Turbine Generator Systems GE 2.5xl – American Units Only* (GE Energy document) was utilized for the analysis. This truck and trailer configuration is capable of hauling a 160-foot (48.7 meter) blade.

The existing pavement widths of the county and township roads vary from approximately 13 feet to 24 feet. The existing radius of the edge of the pavement at a typical intersection is approximately 25 to 50 feet. According to the GE Energy document, the turning radius of a blade transport vehicle is approximately 117-feet for the tire clearance and 147-feet for the load clearance. Even if the entire pavement area is utilized, the load and tires will go outside the limits of the existing roadway. Temporary widening of the pavement surface with an aggregate roadway surface will be required to accommodate the trucks.

The AutoTurn blade transport turning analysis at a typical intersection is illustrated in the figure titled, *Typical Intersection Turning Analysis*. This analysis assumed that the existing pavement surface would be widened in three different directions in order to better balance the impacts, and to attempt to keep the

impacts within the existing right of way. Any impacts that extend outside of the right of way would require easements from adjacent property owners.

A desktop review of aerial imagery was performed and a field inventory was taken at the intersections along the regional delivery routes where turns are required to reach the four general delivery locations. This review focused on identifying obstructions near the intersections that would make long-load truck turns infeasible without extensive improvements and/or access easements of private land. No major obstructions were observed that would make any of the required turns infeasible along the regional delivery routes.

We performed long-load turning analyses for all the turns required along the regional delivery routes. These wide turns will impact the facilities around most intersections where turns are required. The facilities that will be impacted include ditches, signs and utility poles.

As part of the oversize load permitting process, the County will be interested in seeing how these long-load truck turns will impact the locations where turns are required, and how the impacts will be mitigated. Mitigation required will likely include installing gravel fill outside of the pavement limits as a temporary pavement surface for truck/trailer turns, installation of drainage pipes in these fill locations as an alternate means of drainage and relocation of utility poles, signs and other appurtenances.

An additional desktop review was performed and a field inventory was taken at the intersections along the regional delivery routes where additional turns are anticipated to the local roads that will provide access to the wind turbine site driveways. There were several locations identified where intersection geometry or obstructions such as adjacent deep ditches or bridges would make long-load turns infeasible because extensive improvements would be required to avoid the obstruction. The turns that appear to be infeasible are shown on the figure titled, *Project Area Transportation Constraints*, along with other transportation constraints identified within the project area.

3.3 Vertical Impacts

Bumps, Hills and Dips

Another consideration is the potential that the existing county and township roadway systems have locations where bumps, hills and dips will cause a vertical interference with the transport of some of the wind turbine components. According to the GE Energy access roads transportation document, there is a general requirement that no more than a 6-inch bump or dip in 50-feet of pavement is allowable for access roads. In the field study, we observed that many township roads had poor vertical geometrics, including crests, bumps and dips that would likely exceed these requirements. However, visual identification

of the exact location of these vertical constraints is difficult and was outside the scope of this study. We recommend that Hardin Wind Energy perform a survey of the final delivery routes to determine exact locations of vertical constraints. This could be accomplished economically utilizing a truck-mounted GPS survey unit and driving the delivery routes. The survey information could be analyzed in the office to identify locations where the roadway profile will exceed the allowable bump and dip specifications.

Overhead Utility Lines

There are numerous overhead utility lines crossing the delivery routes. While most lines are likely higher than the legal height for vehicles, 13'-6", there may be lines that are not high enough for over height permit loads that may reach 15'-6". The height of the lines along the delivery routes should be measured well in advance of the transport of over height loads. If any lines are too low, coordination with the utility company will be required in order to raise the lines.

Overhead Bridges

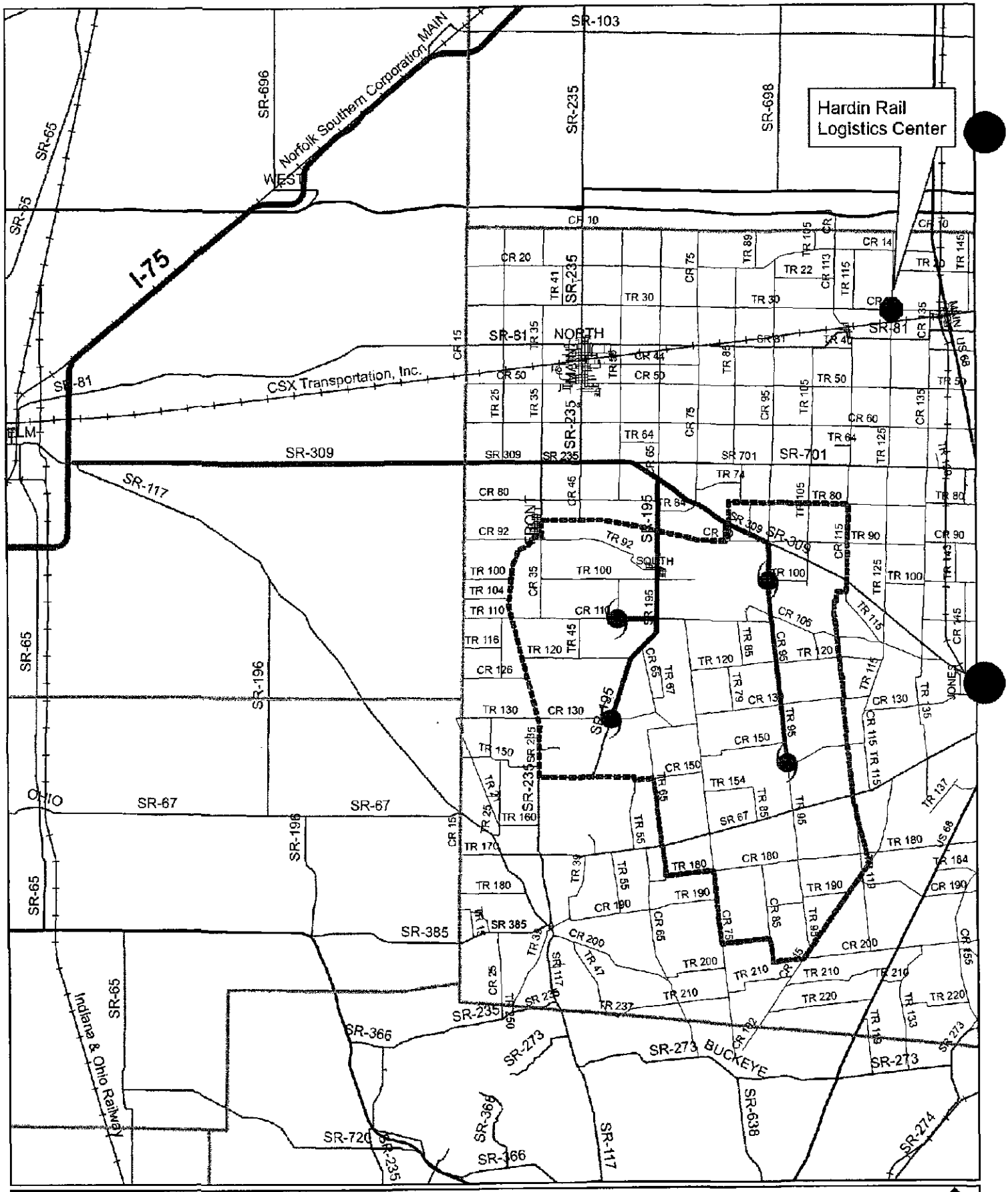
There are no overhead bridges along the regional delivery route and within the project area that would obstruct over height permit loads.

4.0 RECOMMENDATIONS

We recommend the following to further evaluate and begin planning for the transport of WTG components to the project.

1. Continue to communicate with the County Engineer about their local oversize and overweight vehicle permit requirements. Begin the engineering and additional studies that the County anticipates will be required as part of their permit process, as outlined in this report.
2. Perform a survey of the local delivery routes utilizing a truck-mounted GPS to determine locations of bumps, crests and dips that would interfere with the transport of WTG components.
3. Utilize the Project Area Transportation Constraints map to help plan the locations of the access roads to the WTG sites.
4. When it is determined where the WTG component permit loads will originate from, contact the Ohio Department of Transportation Permit Office and request that they perform a preliminary evaluation to determine the best routes for the permit loads to travel to the project site utilizing the federal and state highway system.

FIGURES

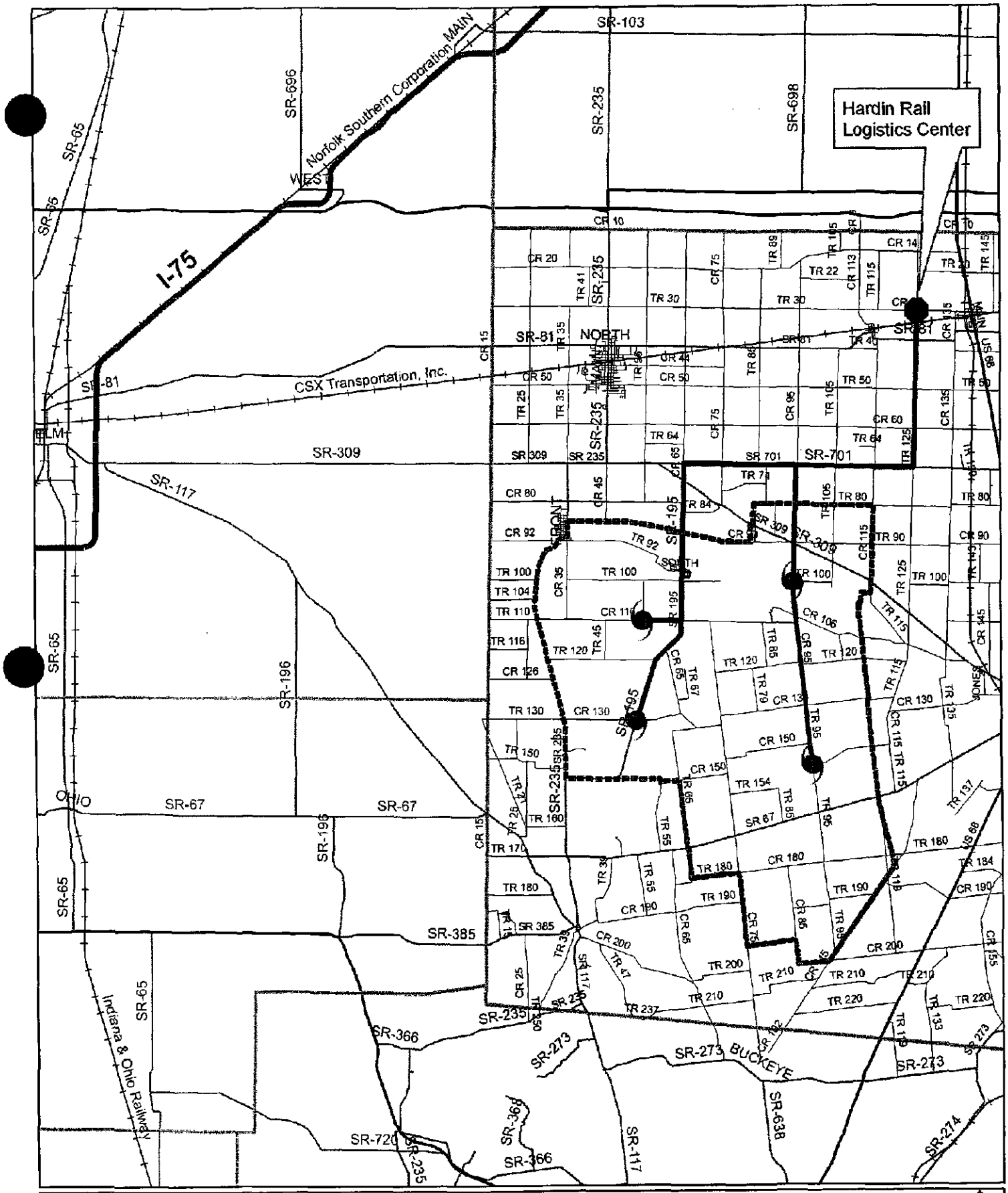


Regional Delivery Routes from I-75

Hardin County, Ohio

June 24 2009

Hardin Wind Energy LLC

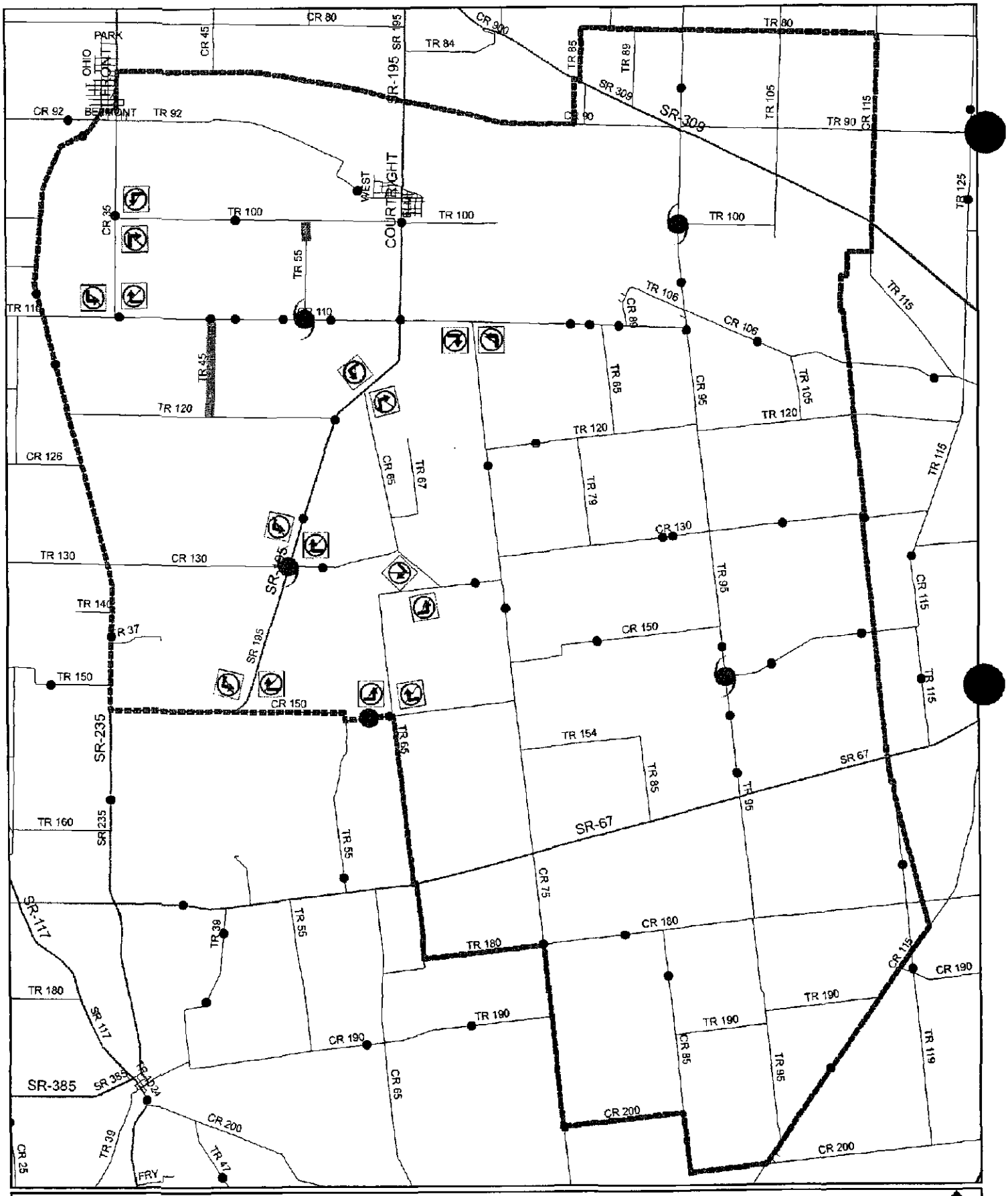


Regional Delivery Routes from Hardin Rail Logistics Center

Hardin County, Ohio

June 24, 2009

Hardin Wind Energy LLC

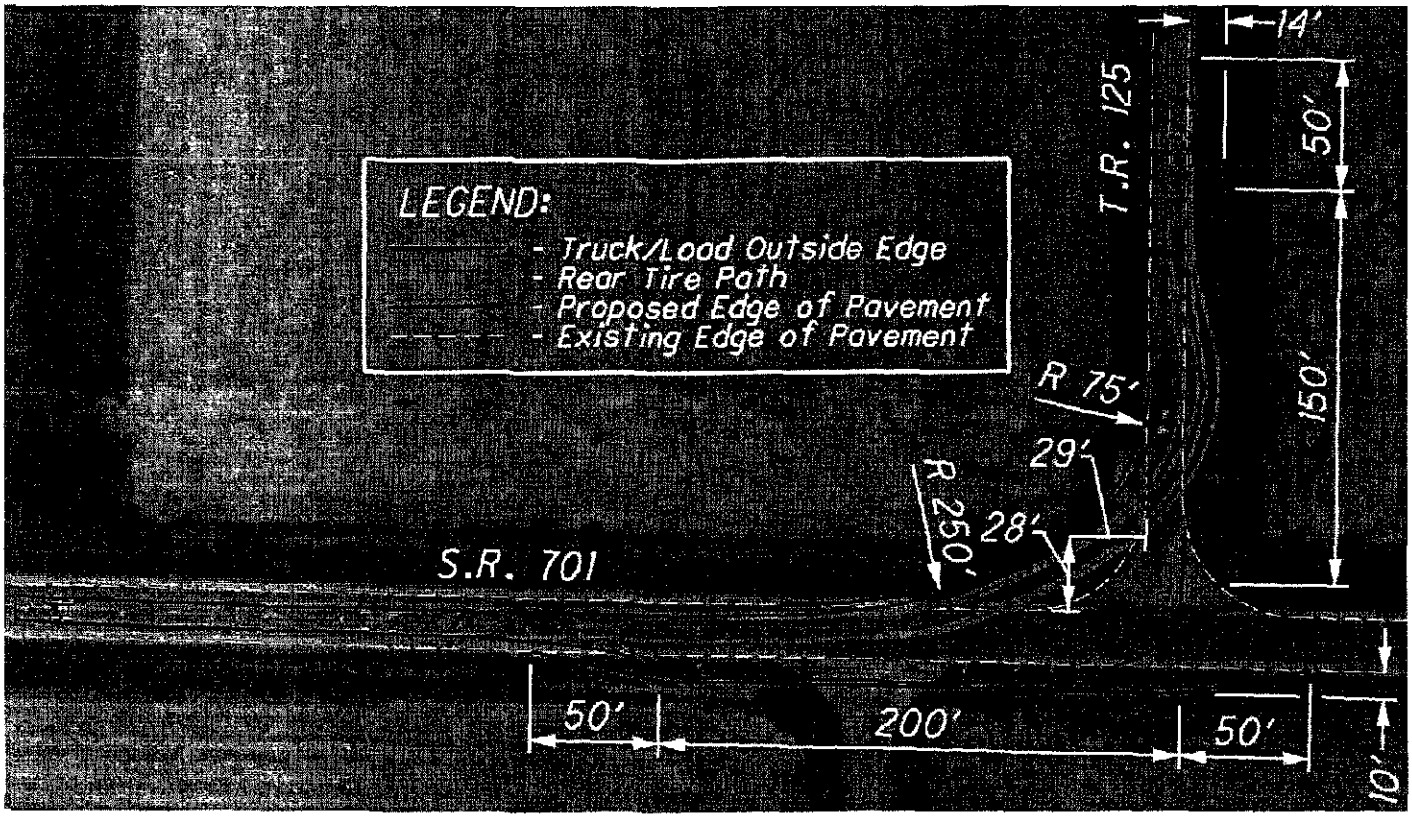


Project Area Transportation Constraints

Hardin County, Ohio

June 24, 2009

Hardin Wind Energy LLC



N

Typical Intersection Turning Analysis

Hardin County, Ohio

June 24, 2009

Hardin Wind Energy LLC