AGRICULTURAL IMPACT STATEMENT

American Transmission Company, LLC

Paddock to Rockdale Transmission Line

Wisconsin Department of Agriculture, Trade and Consumer Protection
DATCP #3463

Published January 23, 2008

Agricultural Impact Statement

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AGRICULTURAL IMPACT STATEMENT

Paddock to Rockdale 345 kV Access Project
345 kV Transmission Line in
Rock and Dane Counties
American Transmission Company

INTRODUCTION

The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) has prepared this agricultural impact statement (AIS) in accordance with §32.035, *Wisconsin Statutes*. The AIS is an informational and advisory document that describes and analyzes the potential effects of the project on farm operations and agricultural resources, but cannot stop a project.

The DATCP is required to prepare an AIS when the actual or potential exercise of eminent domain powers involves an acquisition of interest in more than 5 acres of land from any farm operation[1]. The DATCP may choose to prepare an AIS if an acquisition of 5 or fewer acres will have a significant impact on a farm operation. Significant impacts could include the acquisition of buildings, the acquisition of land used to grow high-value crops, or the severance of land. The DATCP should be notified of such projects regardless of whether the proposing agency intends to use its condemnation authority in the acquisition of project lands. The proposing agency may not negotiate with or make a jurisdictional offer to a landowner until 30 days after the AIS is published.

The DATCP is not involved in determining whether or not eminent domain powers will be used or the amount of compensation to be paid for the acquisition of any property. The AIS reflects the general objectives of the DATCP in its recognition of the importance of conserving important agricultural resources and maintaining a healthy rural economy.

Sources of information used to prepare this statement include the *Wisconsin 2007 Agricultural Statistics* and other yearly issues; the *2002 and 1997 Census of Agriculture*; the *Rock County and Dane County Farmland Preservation Plans*; the *Soil Surveys of Rock and Dane County*; *Draft Environmental Impact Statement: Paddock to Rockdale, Volumes 1 and 2*, by the Public Service Commission of Wisconsin, *October, 2007*; the *Application for Certificate of Public Convenience and Necessity and Utility Permit Application: Paddock-Rockdale 345 kV Access Project, May 2007; Agricultural Impact Notice for Utility Projects: Paddock-Rockdale 345 kV Access Project, October 2007*. Additional sources of information are included in the Reference section at the end of this report or are referred to directly in the text.

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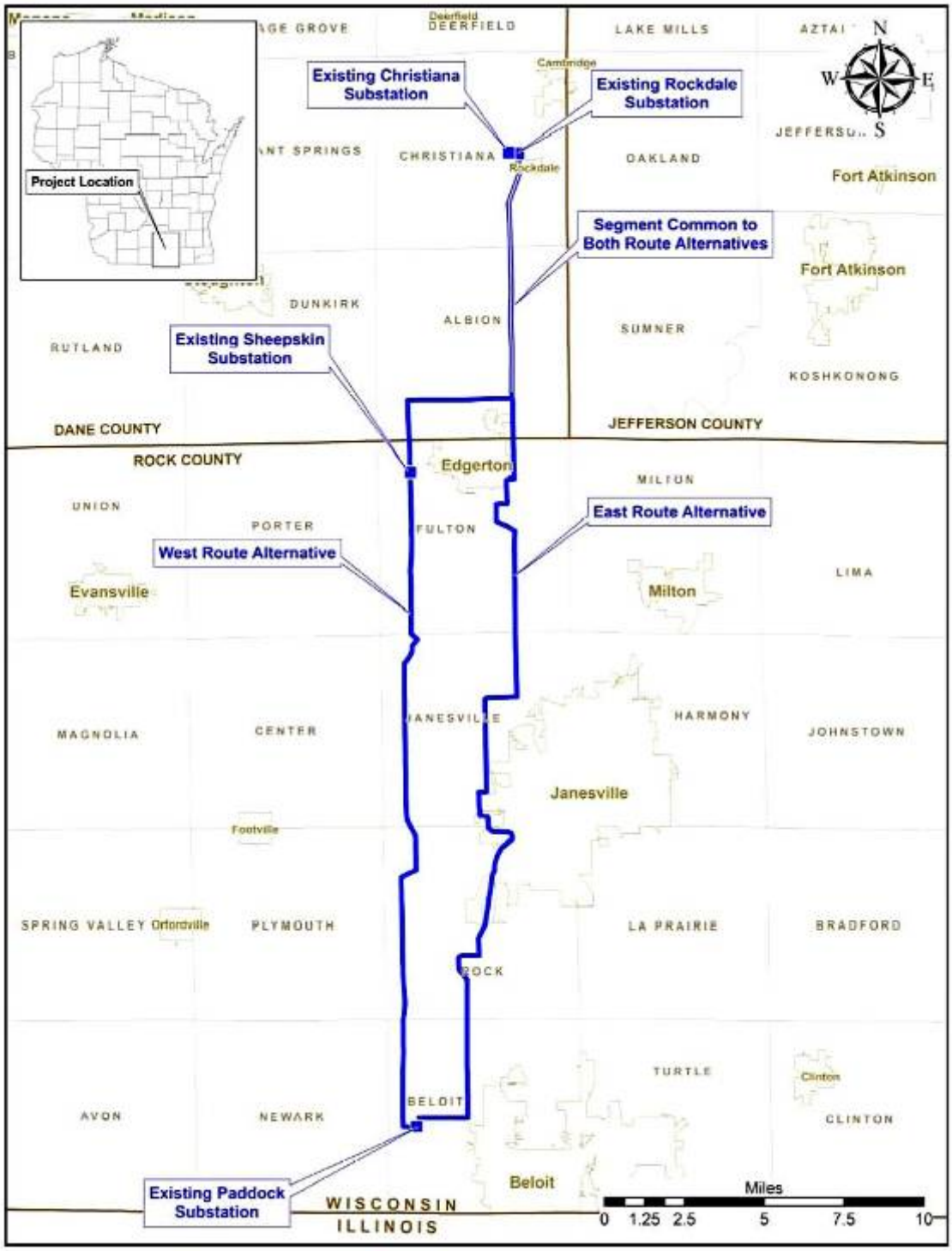
[1]The term *farm operation* includes all owned and rented parcels of land; buildings and equipment; livestock; and personnel used by an individual, partnership, or corporation under single management to produce agricultural commodities.


Project Location
Existing Christiana Substation
Existing Rockdale Substation
Segment Common to Both Route Alternatives
Existing Sheepskin Substation
East Route Alternative
West Route Alternative
Existing Paddock Substation
DEERFIELD
LAKE MILLS
CHRISTIANA
Rockdale
OAKLAND
Fort Atkinson
DUNKIRK
ALBION
SUMNER
RUTLAND
KOSHKONONG
DANE COUNTY
JEFFERSON COUNTY
ROCK COUNTY
Edgerton
MILTON
UNION
PORTER
FULTON
Evansville
Milton
LIMA
MAGNOLIA
CENTER
HARMONY
JOHNSTOWN
Janesville
SPRING VALLEY
PLYMOUTH
LA PRAIRIE
BRADFORD
TURTLE
AVON
NEWARK
CLINTON
Beloit
WISCONSIN
ILLINOIS
Miles
0 1.25 2.5 5 7.5 10

PROJECT DESCRIPTION

The American Transmission Company(ATC) proposes to construct a new 345 kilovolt (kV) transmission line, designated W-10, connecting the existing Paddock Substation in the town of Beloit in Rock County to the existing Rockdale Substation in the town of Christiana in Dane County. Two potential routes have been chosen for this line, referred to as the West (Proposed) Route and the East (Alternate) Route. At the time of the publication of this AIS, a final route selection has not been made. The West route is 34.7 miles in length and the East route is 36.1 miles. The West Route, which is preferred by ATC, would traverse parts of the towns of Christiana and Albion in Dane County and parts of the towns of Fulton, Janesville, Beloit and Rock in Rock County. The East Route would traverse all the same towns, but in addition, would go through part of the cities of Janesville and Edgerton in Rock County.

The two routes share a common segment for about 7.5 miles at the north end of the project corridor from the Rockdale Substation in Dane County south to the intersection with I-90/94. Along this common segment the new 345 kV line would share its right-of-way and transmission structures with an existing 345 kV line. Approximately 71% of the West Route and 54% of the East Route would cross agricultural land. (*ATC Application*, p. 53)

ROUTE DESCRIPTION

West Route

This route runs west .4 miles from the Paddock Substation (Segment 16), then turning north and running cross-country just east of Gesley Rd. and then east of Kessler Rd. through the town of Beloit into the town of Rock, up to the Wisconsin and Southern Railroad tracks, continuing then along the south side of the railroad to the west side of Murray Rd. (Segment 14). The route then runs north along the west side of Murray Rd. and then cross-country in a northwest direction into the town of Janesville, crossing State Trunk Highway (STH) 11 to continue north, just west of Willowdale Rd, then jogging northeast less than .5 mile north of Burrwood Drive, then north again, and then northeast again as it crosses the south branch of the Rock River, after which it jogs northwest briefly to the boundary with the town of Fulton to the north (Segment 9). The route then continues north following section lines through the town of Fulton, crossing the north branch of the Rock River, and continuing straight north past the Sheepskin Substation, 1.5 miles into the town of Albion in Dane County, where it intersects the Wisconsin and Southern Railroad tracks. (Segment 8) The route then continues another .8 mile north before turning at a 90 degree angle east cross-country past Jana Airport, U.S. Highway 51 and across I-90. (Segment 2) Just to the east of I-90, it heads straight north through the town of Albion into the town of Christiana in Dane County, and then jogs slightly northeast just past E. Church Rd., and then straight north again, to end at the Rockdale Substation, on Koshkonong Road. (Segment 1)

East Route

The east route proceeds east from the Paddock Substation in the town of Beloit, Rock County to the north-south right-of-way for the existing 138 kV transmission line, known as X-39. From there it proceeds north ¼ mile to West Beloit Newark Rd., traveling east just south of the W. Beloit Newark Road right-of-way for 1.5 miles till it reaches South Nye School Rd., where it turns north again, running along the east side of the road to a point north of West Creedy Rd. (Segment 15) From there it continues north along section lines, following existing transmission line X-39 through the town of Beloit to a point north of Finley Rd. (Segment 17) From there it continues north along section lines into the town of Rock following the right-of-way for an existing 138 kV line, X-12 to Bass Creek. (Segment 13)

After crossing Bass Creek, the route turns northwest and then north, cross-country, for .75 miles up to Eau Claire Road, where it runs east for .75 miles until it meets the right-of-way for the existing 138 kV double circuit line X-7/X-32, just east of the Rock River. (Segment 20) The route then follows the existing double-circuited transmission line X-7/X-32 that runs north by northeast along the I.C. & E Railroad between County Highway (CTH) "D" and the Rock River to the intersection with South Crosby Avenue in the city of Janesville. (Segment 11A) The route then heads northwest cross-country a short distance where it joins the right-of-way for an existing 69 kV line, labeled Y-38. (Segment 19B) Then the route heads west by northwest through the city of Janesville cross country following the Y-38 line to an intersection point with the Wisconsin & Southern Railroad line just south of Rockport Rd. (Segment 19A)

From this point, the route continues north along the Y-38 right-of-way to a point south of West Court Street in the town of Janesville. (Segment 18B) The route then heads cross country along new right-of-way to S. Austin Rd. where it then heads north to a little past W. Mineral Point Avenue, and then east to where it connects with the right-of-way for the 69 kV line Y-151. (Segment 18A) The route then turns north cross country along the existing Y-151 transmission line right-of-way to U.S. Highway 14, and then runs east for 1.2 miles on the north side of US 14 until it connects with the existing X-21transmission line right-of-way. (Segment 7A) It runs north along the east side of the X-21 right-of-way terminating at the Russell Substation. From there the route continues north along existing 138 kV line X-31 into the town of Fulton to where it intersects with the Wisconsin and Southern rail line. (Segment 3D)

Then the route heads northwest on the rail right-of-way for about .7 miles, crosses the Rock River and heads north cross country to East Dalby Rd, where it connects with an existing 69 kV line, Y-61. (Segment 3C) It follows the Y-61 right-of-way east to N. Rock River Rd., and then goes north on new right-of-way cross country, going along the east edge of the city of Edgerton, and then east again cross country on new right-of-way to where it connects with existing 138 kV transmission line, X-31. (Segment 3B) The route then follows the X-31 line north for about 2.6 miles to a point just north of I-39/90, where it joins the existing W-4/X-31 double-circuit transmission line right-of-way in the town of Albion in Dane County. (Segment 3A) From there, it heads straight north through the town of Albion into the town of Christiana in Dane County, and then jogs slightly northeast just past E. Church Rd., and then straight north

again, to end at the Rockdale Substation, on Koshkonong Road. This is Segment 1, a segment common to the West route.

CURRENT AND PLANNED TRANSMISSION STRUCTURES AND LINES ALONG THE ROUTE OPTIONS, DELINEATED BY SEGMENT

ATC has indicated that there will be no guy wires used on any of the proposed lines except possibly for temporary use during construction. Also, there will be structures removed within all segments of the West route except segment 8.

ATC staff indicted that they have already had general conversations with landowners regarding the best locations for pole placement.

West Route

Table 1- Transmission Line Specifications Along West Route

Segment # (length in miles)	Current and Planned Structures	Current Lines	Proposed Lines
16 (0.4 miles)	Existing Steel H-frames will be retained (3)	Existing 345 kV line (W-4)	New 345 kV line (W-10)
14 (8.3 miles)	Existing Steel H-frames will be removed & replaced by 43 double-circuit steel monopoles. Some new intermediate structures required. Two structures to support the 2 circuits will be used. It will be a combination of using the existing lattice structure and adding a pole or using 2 new single poles.	Existing 345 kV line (W-4)	New 345 kV line (W-10)
9 (7.9 miles)	Existing Steel H-frames will be removed & replaced by 42 double-circuit steel monopoles. Some new intermediate structures required. Two structures to support the 2 circuits will be used. It will be a combination of using the existing lattice structure and adding a pole or using 2 new single poles	Existing 345 kV line (W-4)	New 345 kV line (W-10)
8 (6.3 miles)	Existing double circuit steel lattice structures (40) will accommodate W-4 and W-10 lines; Y-12 line will be relocated to new wood poles placed directly to the east.	Existing 345 kV line (W-4) for 4.7 miles; Existing 69 kV line (Y-12) for 1.5 miles. About 4 miles of de-energized 69 kV line will be removed.	New 345 kV line (W-10)
2 (4.2 miles)	Existing Steel lattice towers will be retained; 21 double circuited steel monopoles will be added adjacent, except that in the Jana Airport area six 3-pole wood structures (modified H-frame) will be replaced by six steel doubled 3-	Existing 345 kV line (W-4)	New 345 kV line (W-10)

Table 1- Transmission Line Specifications Along West Route			
Segment # (length in miles)	Current and Planned Structures	Current Lines	Proposed Lines
	poles structures. Then a second set of modified H-frame low-profile structures will be added in parallel to accommodate the new 345 kV line. Two structures to support the 2 circuits will be used. It will be a combination of using the existing lattice structure and adding a pole or using 2 new single poles		
1 (7.6 miles)	Existing double circuit steel monopoles will be replaced with 50 new triple-circuit configuration monopole structures. Two structures to support the 2 circuits will be used. It will be a combination of using the existing lattice structure and adding a pole or using 2 new single poles	Existing 345 kV line (W-4); Existing 138 kV line (X-31)	New 345 kV line (W-10)

East Route

Table 2 - For Transmission Line Specifications Along East Route			
Segment #	Current and Planned Structures	Current Lines	Proposed Lines
15 (4.0 miles)	Existing single-circuit wood poles will be removed, and replaced with 29 double-circuit steel poles; existing underbuilt distribution lines will be relocated underground or on a separate alignment	138 kV line (X-39); some short sections of distribution line underbuild	New 345 kV line (W-10)
17 (0.8 miles)	Existing single-circuit wood poles will be removed, and replaced with 9 double-circuit steel poles	138 kV line (X-39)	New 345 kV line (W-10)
13 (1.6 miles)	Existing wood pole H-frame structures (18 of them) will be removed, and replaced with 16 double-circuit steel poles	138 kV line (X-12)	New 345 kV line (W-10)
20 (1.5miles)	No existing structures. Ten new steel monopoles will be built		New 345 kV line (W-10)
11A (4.0 miles)	Existing double-circuit lattice structures will be removed and replaced with 46 monopole steel triple-circuit structures; height and span width will be reduced for the Rock Co. Airport glide path	138 kV line (X-7); 138 kV line (X-32)	New 345 kV line (W-10)
19B (0.2 mile)	Existing double-circuit lattice structures will be removed and replaced with 1 monopole steel triple-circuit structure; height and span width will be reduced for the Rock Co. Airport glide path	138 kV line (X-7); 138 kV line (X-32)	New 345 kV line (W-10)
19A (0.7 miles)	Existing steel lattice towers will be removed and replaced by 6 double-circuit steel monopoles	69 kV line (Y-38)	New 345 kV line (W-10)
18B (0.4 miles)	Existing lattice towers will be removed,	69 kV line (Y-38)	New 345 kV line

Table 2 - For Transmission Line Specifications Along East Route			
Segment #	Current and Planned Structures	Current Lines	Proposed Lines
	and replaced with 5 double-circuit steel monopoles		(W-10)
18A (1.2 miles)	10 single-circuit steel monopoles will be constructed	none	New 345 kV line (W-10)
7A (3.9 miles)	Existing wood poles will be removed and replaced by 30 double circuit steel monopoles; existing underbuilt distribution lines will be relocated underground or on a separate alignment	69 kV line (Y-151); some short sections of distribution line underbuild	New 345 kV line (W-10)
5 (0.6 miles)	Existing structures would be paralleled by 7 single circuit steel monopole structures; existing underbuilt distribution lines will be relocated underground or on a separate alignment	138 kV line (X-21); 138 kV line (X-31); 69kV line (Y-151)	New 345 kV line (W-10)
3D (4.6 miles)	Existing double-circuit steel lattice structures would be removed, and replaced by 31 double circuit steel monopoles	138 kV line (X-31)	New 345 kV line (W-10)
3C (1.2miles)	Existing wood poles will be removed, and replaced with 12 double circuit steel monopoles	69 kV line (Y-61)	New 345 kV line (W-10)
3B (1.3 miles)	No existing structures; 9 steel monopoles would be built		New 345 kV line (W-10)
3A (2.6 miles)	Double circuit lattice structures will be removed and replaced with 15 double circuit steel monopoles	138 kV line (X-31)	New 345 kV line (W-10)
1 (7.6 miles)	Existing double circuit steel monopoles will be replaced with 50 new triple-circuit configuration monopole structures.	Existing 345 kV line (W-4); Existing 138 kV line (X-31)	New 345 kV line (W-10)

In Segments 14 and 9 of the West Route, some additional intermediate structures will be added. These would be typical steel monopole structures.

On Segment 15 of the East Route, span lengths could be significantly lengthened from a current 250-ft. to 350-ft. lengths to typical span lengths of between 650 feet and 850 feet. On Segment 17 of the East Route also, span lengths could be significantly lengthened from the current 330-foot length to typical span lengths of between 750 feet and 850 feet. Therefore, the total number of structures located in agricultural fields on these segments would decrease.

On the north-south portion of Segment 7A of the East Route, the 30 structures which currently have span lengths of 450 to 600 feet would be replace with about 23 structures having 600 to 800 foot span lengths. On the east-west part of Segment 7A, the 20 existing structures with current span lengths of 250 to 300 feet will be replaced with only eight monopoles with spans of 600 to 800 feet. In these cases, the number of existing structures on agricultural land is likely to permanently decrease.

On Segment 13 of the East Route, the 18 existing structures would be replaced by only 16 steel monopole structures, so that some span lengths could increase. It is not clear whether the two structures to be removed would be on agricultural land, but they could be.

On Segment 18B of the East Route, span lengths could be shortened slightly when the five existing structures are replaced by six new monopoles. The additional monopole structure could be on agricultural land. All parcels along Segment 18B will be affected.

On Segments 15, 7A and 5 ATC has indicated that an existing underbuild line would either be relocated underground or to a separate alignment. If the underbuilt line is relocated to a separate alignment, it would involve the acquisition of new easements, which would likely involve placing additional new monopole structures on agricultural land. The issue of relocation would only come up if the PSC chooses the East Route for the project. A decision about undergrounding versus requiring a separate alignment on new easement right-of-way would not be made until then. If the East Route is chosen, landowners would be consulted in regard to pole placement on the new alignment.

RIGHT OF WAY REQUIREMENTS AND AGRICULTURAL LAND USE ALONG THE ROUTE OPTIONS

The Agricultural Impact Notice for the Paddock to Rockdale project provides a list of estimated acreages in agricultural use by landowner, for parcels along the West (Proposed) and East (Alternate) Routes respectively, as well as the acreage of new and existing easements across these parcels which are on agricultural land. Based on this WDOR information, easements for the West route would involve 560.5 acres of existing easement and 6.2 acres of new easement for a total of 566.7 acres of agricultural land affected. The East Route would involve 279.2 acres of existing agricultural easement and 146.9 acres of new easement for a total of 426.1 acres of agricultural land affected. A copy of the list of landowners along the West and East Routes and the estimated agricultural acreage that would be taken for the Paddock-to-Rockdale Project along each route is provided in Appendix 5.

<u>West Route</u>

A 150-foot width right-of-way (ROW) is required for all of the West Route, except for a 2400-foot long portion of Segment 2 near the Jana Airport where 200 feet is required, and the north 7400 feet of Segment 8 north of the Sheepkin Substation where 180 feet will be needed. (DEIS, p. 85) The existing easement is 150 feet wide.

<u>East Route</u>

A 130-foot width of ROW is required on the East Route everywhere except for Segments 11A and 1 which require 150 feet. Existing easements on Segments 15, 17, 13 and 3D are 100 feet wide. Existing easements on Segments 19B, 18B, and 3A are either 80 feet wide or unspecified. The right-of-way easements in Segment 18A and 3C are currently 50 feet in width. The easement in Segment 7A is 80 to 100 feet wide, while that in Segment 5 is 40 feet wide, and that in Segment 3B is 60 feet wide.

PROJECT NEED

According to the FEIS for the Paddock-to-Rockdale line, the justification for the project is not based on concerns about reliability of service provision to specific areas. The need is based on the economic goal of reducing the cost of purchased power for Wisconsin customers by improving access to lower cost sources of electric power supply from elsewhere in the region. This is unlike "most previous transmission line projects". (p.11)
Specifically, ATC's initiative was in part a response to the locational marginal price (LMP) for energy in its service area that was found to be above the regional average price for the Midwest Independent Transmission System Operator (MISO) that started up in 2002. MISO is a non-profit, member-based organization operating under FERC authority as a Regional Transmission Organization. MISO's energy market began operating in a mode known as "Day 2" in April 2005, because it operates in day-ahead and real-time modes based on Financial Transmission Rights (FTR) instead of the former rigid physical transmission rights. Energy is dispatched under the MISO Day 2 system based on security constrained economic dispatch in which: "…the reliability of the network is constantly checked to avoid overloads and maintain stability. Energy is sold into the grid and energy is purchased to serve energy loads off of the grid through the MISO tariff." (p.13) ATC's service area is identified by MISO as being more constrained than that of the region overall.

ATC adopted an "Access Initiative" in 2004-2005 to evaluate the potential need for additional transmission lines into Wisconsin to reduce the delivered cost of energy to Wisconsin customers. The Paddock-Rockdale line was one of five projects for which a comparative cost-benefit analysis was done in response, and the modeling for which produced a positive economic result. ATC's proposed or West Route produced a positive net present value in six of seven scenarios that were tested. The exception was under the Slow Growth Scenario. No comparable economic analysis of different scenarios was carried out by ATC for the East Route under its "Access Initiative." However, in terms of project costs alone, the East Route was estimated to require an additional $78 million above estimates for the West Route.
The FEIS (p. 9) also confirms that it is the role of the Public Service Commission to determine whether to issue a Certificate of Public Convenience and Necessity (CPCN) that would authorize construction of this proposed transmission line. Among the determinations that the PSC must make before issuing a CPCN is that the project will provide benefits to Wisconsin customers that are reasonable in relation to the cost of the line (Wis. Stat. 196.491(3)(d)3t).

DESCRIPTION OF CONSTRUCTION PROCESS

ATC will contract with a construction company to build the transmission line and proposed substation. This contractor will subcontract some of the construction activities to another company or companies to complete the surveying and clearing of the right-of-way. It is important that the contractor and subcontractors are made aware of the requirements stipulated by ATC in their Environmental Construction Plan and that that plan fully incorporate necessary agricultural mitigation measures. This will require pre-construction training for all employees that will be involved in the construction process. ATC should make clear to all personnel what is involved to implement these requirements in the construction process. For example, ATC

should specify protocols to determine when the soil is too wet to continue construction without damaging the soil. DATCP suggests the Atterberg Test, discussed later in this report, as a reasonable in-field protocol to make this determination.

If the "too-wet" condition is established, ATC should identify options to address this condition. This could include avoidance of the field until wet soils have dried or are frozen, use of matting, or specifying that the parcel will require significant mitigation or restoration. DATCP believes that it is important that qualified environmental inspectors are hired to monitor the construction process.

The following is a general description of the transmission line construction process. Additional information about this process can be found in Chapter 4 of the *Draft Environmental Impact Statement Paddock to Rockdale 345 KV Transmission Line Project*.

Surveying and Staking the Right-of-way: Crews will survey the centerline and stake the right-of-way limits. Typically, the right-of-way will be a total of 150 feet wide if the West Route is chosen, and 130 feet if the East Route is chosen. It will include existing right-of-way and newly acquired easements.

Development of Right-of-way Access: Vehicle tracking pads, silt fences, and other applicable erosion control measures will be installed as right-of-way access is gained. Because disturbance of the access path will be intermittent, seeding and mulching of the access path will be performed if the anticipated time between disturbance-causing activities is expected to be extended.

Temporary Staging and Materials Storage Areas: Silt fences will be placed on the down-slope sides of staging and storage areas where the soil is disturbed. If access to the storage area is from a public road, a vehicle-tracking pad will be placed at the intersection. ATC has indicated that if grading is necessary, they will follow the same topsoil segregation procedures that are required on the corridor right-of-way.

Right-of-way Clearing and Preparation: Typically, the easement width is cleared of trees and brush to allow access for construction and maintenance equipment and to eliminate future conductor-to-vegetation contacts. Normally, vegetation is removed to a height of less than 6 inches but no root removal is done. Brush or trees that are cleared are disposed of in accordance with the property owner's wishes in compliance with regulatory requirements, either by removing the cleared material or storing it on the easement or adjoining land. In upland areas, some vegetative material (cuttings) may be chipped and spread on the right-of-way if permitted by the property owner. Clearing adjacent to waterways requires the preservation of a vegetative buffer of approximately 50 feet. Hand clearing of selected woody species may be required. At new pole locations, access is necessary along with a level working area. Therefore, some grading may be required around new pole locations.

Topsoil must be stripped from all excavation sites and segregated to prevent mixing with subsoil and parent material. (See Wis. Stats. § 182.017 (7)(c)1.)

Erosion control measures will be put in place on down slopes of the cleared areas where construction will disturb soils. Areas that will be cleared and further disturbed during the construction of the project will be permanently restored (seeded and mulched or matted) after construction is completed.

Matting may be installed as needed during the clearing process to ensure stable working conditions in wetlands or to provide temporary bridges across waterways. Timber is the most common type of matting material used, but composite plastic mats are also available. In many instances, these mats will be left in place during the entire transmission line construction process. Materials hauled to and from the construction locations will be transported on existing roads or rights-of-way, and/or arranged access locations where roadways are not present.

Removal of Existing Structures: On this project, in many cases, existing structures are to be replaced by new ones. Therefore existing structures would be removed utilizing bucket trucks, cranes or digger derricks, backhoes, pulling machines, pole trailers, or dumpsters as needed, before new structures are installed. After the underground portion of the poles or caissons is removed, the hole would be backfilled. The removed poles would be taken from the site and either recycled or landfilled. Concrete foundations of removed poles would only be removed to a depth of about two feet. (DEIS, p.60) After the hole is backfilled, previously stripped topsoil should be replaced and the previous surface contour restored.

Footing Installation: ATC plans to use concrete caisson footings for all structures except for the wooden monopoles used in Segment 8, and in the area of the Jana Airport (Segment 2) on the West Route where the twelve three-pole structures used will be directly embedded. (DEIS, p.71) The method of installation and the diameter and depth of the excavation will vary depending on the soil at each structure location. In general, the excavated holes will range from 5 to 12 feet in diameter and may be 9 to 45 feet deep. (DEIS, p.71)

When constructing concrete caisson foundations, the required hole is excavated, concrete caissons are formed using a rebar and bolt cage that is placed into the excavation, and concrete is poured to cover the cage. A standard drilling rig is used to excavate the holes. The completed caisson is allowed to cure to develop the necessary strength. After the caisson is cured, the pole is mounted on the caisson using the exposed bolts.

Excavated subsoil is temporarily piled off to the side of the excavation. Excess soils from excavations in upland areas will be hauled to an offsite disposal location depending on the property owner's requirements. (See Wis. Stats. § 182.017 (7)(c)4.) In any areas where conditions may be conducive to erosive losses (erodible soils, slopes, wetlands, or streams adjacent to the site), appropriate erosion control measures as described in the most recent WDNR *Construction Site Best Management Practices* (BMPs) will be installed and maintained until final restoration and revegetation is complete. In agricultural fields, the excavated topsoil should be segregated from the subsoil. Often the stripped topsoil needs to be placed on a layer of straw or geotextile fabric to enable easier removal. Excess spoil material should be hauled off site for disposal.

The presence of ground water near the ground surface can impact the construction procedures used when auguring holes. If groundwater flow into an excavation results in the excavation becoming unsuitable, it is often necessary to install a casing to support the walls of the excavation and/or to dewater the excavation. Depending on site conditions, the extracted groundwater may be de-silted and discharged to a nearby water body or to an upland area where it is allowed to re-infiltrate. In some situations it may be possible to augur the hole by using casings to maintain the stability of the hole without dewatering the site during excavation. In this situation, the groundwater is removed from the casing as it is displaced by concrete pushed into the excavation via a special concrete pouring sleeve known as a tremie. This water may contain solids from the auguring process or from contact with the fresh concrete, and is often pumped out of the hole and transported by tanker truck either to a treatment facility or to an upland site where it can be allowed to settle and re-infiltrate. The DEIS notes that "in agricultural fields, flooding can have long-lasting adverse effects and should be avoided or carefully controlled." (p.61)

In the event that shallow bedrock is encountered, modifications to the standard footing designs by either shortening the footing length and socketing into solid bedrock or anchoring directly into bedrock may be required. Another option would be removing the rock via blasting or special drilling methods to develop the full footing length. ATC has indicated that blasting will be required in places along the Rock County routes.

If very weak soils are encountered, a proposed method of footing installation in these soils may utilize vibratory methods. This consists of installing a steel caisson up to approximately 60 feet long in areas where soil stability is a concern. At locations where the vibratory techniques are used, the upper four feet of soil is removed by use of a backhoe and transported to an approved upland location for dispersal. The caisson is then advanced using vibratory methods. When the caisson has been fully advanced, the base of the structure is put in place by bolting a platform onto the steel caisson.

Pole Installation: After the base of the structure is in place, the top section(s) of the structure are transported from staging areas, assembled and put in place using a crane. Transmission towers are usually erected in sections. After the lower section is lifted into place, and bolted onto the foundation, upper sections with the arms already attached are lifted and attached. The insulator strings may already be in place on these structure sections, or they may be installed just prior to conductor installation. Pulleys used to string the wires may be already attached before the tower arms are raised into position, or may be attached after the tower erection is complete.

Conductor Installation: Large reels of rope laid out on the right-of-way are drawn through the pulleys from tower to tower, after an adequate number of structures are in place. The wire (phase) conductors are attached to the ropes and pulled into place. The conductor is then clipped to the insulator strings and properly tensioned. Helicopters may be used for conductor installation in special situations where access is limited.

In some cases, separate temporary lines are used to prevent disruption of service when towers are replaced on an existing line. No temporary lines are proposed for this project, although there may be instances where guard pole structures or temporary anchors are installed to facilitate construction and to protect traffic crossing beneath the line during wire stringing operations. However, these would all be within the existing right-of-way. On this project, only energized construction will be used, in order to ensure the minimum amount of disruption to existing service to customers and because it was judged more cost-effective than using temporary lines. Energized construction will require larger and more complex equipment and probably more stringent safety procedures, since the operating lines will be "hot" as towers, conductors and lines are being replaced. The energized conductors are held on truck-mounted, insulated booms to allow replacement of structures.

Site Access: It is common practice to use a bucket truck to lift workers and the required hardware (insulator strings, pulling dollies, etc.) to their location on each structure to allow the work to be accomplished efficiently. In most areas where bucket trucks can access the construction location, the work will be done using this equipment and method. In areas where this type of vehicle access would be difficult, such as in unfrozen wetlands or where access is otherwise limited, alternative methods of construction will be used. The alternative methods still require that workers and the required hardware be able to obtain access to each structure to perform the work. However, the workers may be able to walk in or use lighter equipment (ATVs, tracked equipment, etc.) to access the structure. In these situations, ladders and climbing equipment may be used to install the hardware.

When the ground is not frozen, low-impact machinery with wide tracks will be used in unavoidable wetland areas and protective mats will be used in areas where the ground is unstable. To minimize potential impacts, protective mats may also be used as ramps in areas of steep slopes or to cross wetlands or waterways.

Cleanup and Restoration of the Right-of-way: Cleanup and permanent restoration will occur as soon as practicable following completion of the land-disturbing activities. Where crops are not present, areas are seeded with native mixes and mulched. Decompaction of agricultural soils may be needed using special equipment. (DEIS, p.62) Silt fences will remain in place until adequate vegetation is achieved. Final grading will be done to restore original slope contours. Any slope terrace or waterway disturbed by construction or maintenance must be restored to its pre-construction condition. (See Wis. Stats. § 182.017 (7)(c)2.)

Previously stripped topsoil must be replaced after backfilling of any excavation site. (See Wis. Stats. § 182.017 (7)(c)1.) It must not be mixed with subsoil or spoil material derived from the excavation site. All debris, stones and rocks resulting from construction must be removed from the right-of-way upon project completion. (See Wis. Stats. § 182.017 (7) (c) 4.) Any fence damaged as a result of construction must be repaired to its original condition. (See Wis. Stats. § 182.017 (7) (c) 5.) Any drainage tiles within the construction easement which were damaged by construction must be repaired. (See Wis. Stats. § 182.017 (7) (c) 6.)

Access to the transmission line right-of-way will be primarily from existing roads and will follow the transmission line right-of-way. Where necessary, ATC and its contractor will strive to arrange for alternate access with landowners utilizing farm lanes and private roads to avoid impacts to sensitive areas.

A construction site is usually active for up to one year on this project due to outage constraints. If construction mats are used, they may be removed and reused later.

In cases where existing structures will be removed as part of the project, the remaining space will be filled in with imported topsoil of a quality similar to that of adjacent fields.
ATC describes the procedure to be followed:

"Excess soils from existing foundations will be reused as fill for the excavated hole. Additional clean topsoil will be placed in the hole and surface graded to match existing conditions." (Answers of ATC LLC to 12/10/17 Questions/Comments regarding the Paddock-to-Rockdale Project from Mike Wyatt of DATCP, 12/20/07, p.19)

AGRICULTURAL BACKGROUND

Agriculture's contribution to the Rock[2] and Dane[3] County economies is significant according to reports prepared by the University of Wisconsin-Extension and both counties. Researchers estimated that agriculture provides jobs for 8,569 Rock County residents and 23,739 Dane County residents. These numbers represent 10.1 and 6.8 percent of each county's workforce respectively. Agriculture accounts for $1.1 billion in economic activity or 10.4 percent of Rock County's total economic activity. In Dane County, agriculture accounts for $3.19 billion in economic activity, about 11 percent of the county's total economic activity. Rock County agriculture also pays $34.6 million in taxes and Dane County agriculture pays $102.8 million in taxes. These figures do not include property taxes for local school districts.

AGRICULTURAL PRODUCTIVITY[4]

In 2006, Dane County ranked first and Rock County ranked second among Wisconsin's 72 counties in the production of corn for grain. In that same year, Rock County ranked first and Dane County ranked second in soybean production. Dane County ranked fourth and Rock County ranked tenth in the production of winter wheat. Dane County also ranked first in the

[2] *Rock County Agriculture: Value and Economic Impact*, University of Wisconsin-Extension, Cooperative Extension, Rock County, Wisconsin Farm Bureau Federation, Wisconsin Milk Marketing Board, 2004. http://www.uwex.edu/ces/ag/wisag/

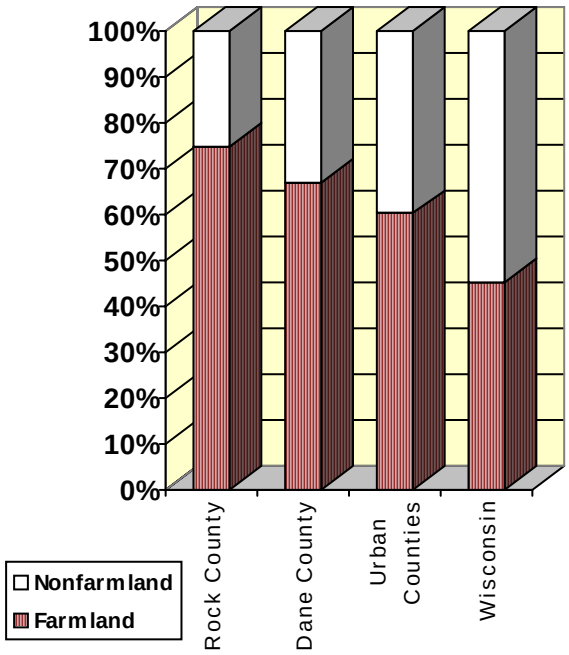
[3] *Dane County Agriculture: Value and Economic Impact*, University of Wisconsin-Extension, Cooperative Extension, Dane County, Wisconsin Farm Bureau Federation, Wisconsin Milk Marketing Board, 2004. http://www.uwex.edu/ces/ag/wisag/

[4] *Wisconsin 2006 Agricultural Statistics*, Wisconsin Agricultural Statistics Service, National Agricultural Statistics Service USDA, Wisconsin Department of Agriculture, Trade and Consumer Protection, October 2006, pp. 18 through 70.

production of corn for silage, third in milk and fourth in forage. Rock County ranked sixth in the production of sweet corn for processing and seventh in green peas for processing.

In 2006, Rock County farmers harvested 141,000 acres of corn for grain, 89,000 acres of soybeans, 30,000 acres of forage, 10,600 acres of corn for silage, and 9,700 acres of winter wheat. They also raised 46,000 head of cattle and calves and 17,500 hogs and pigs.

Chart 1
Land in Farms, 2002



Fifteen years earlier, Rock County farmers harvested 151,500 acres of corn for grain, 57,300 acres of soybeans, 38,750 acres of hay, 8,300 acres of corn for silage, and 4,300 acres of winter wheat. They also raised 75,500 head of cattle and calves, and 39,400 hogs and pigs.

Dane County farmers in 2006 harvested 157,000 acres of corn for grain, 80,600 acres of soybeans, 79,700 acres of forage, 28,600 acres of corn for silage, and 11,900 acres of winter wheat. They also raised 131,000 head of cattle and calves, and 23,500 hogs and pigs.

Fifteen years earlier, Dane County farmers harvested 208,000 acres of corn for grain, 102,100 acres of hay, 20,100 acres of corn for silage, 25,900 acres of soybeans, and 7,250 acres of winter wheat. They also raised 157,600 head of cattle and calves, and 75,000 hogs and pigs.

<u>Land in Farms, Number of Farms, and Average Size of Farms</u>

Rock and Dane Counties are classified as urban counties, which are defined as having an average of 100 or more residents per square mile. According to the *2002 Census of Agriculture*, Rock County has 343,763 acres of land in farms,[5] which represents 74.6 percent of the total land area. Dane County has 515,475 acres of land in farms representing 67.0 percent of the total land area in the county. The average for urban counties is 201,686 acres of land in farms or 60.2 percent of the total county land area. These can be compared to the average of 219,008 acres or 45.4 percent of land in farms among all Wisconsin counties. Refer to Chart 1

[5]Land in farms consists primarily of agricultural land used for crops, pasture, or grazing. It also includes woodland and wasteland not actually under cultivation or used for pasture or grazing, providing it was part of the farm operator's total operation.

for a graphic comparison of the percentage of land in farms in Rock County, Dane County, urban counties, and Wisconsin.

According to the *Census of Agriculture*, Rock County gained 11 farms (a 0.7 percent increase) between 1987 and 2002 as the total number rose from 1,518 to 1,529. Dane County had an increase of 38 farms, a 1.3 percent increase, as the total number of farms rose from 2,849 to 2,887 farms. Wisconsin as a whole gained 2,000 farms (a 2.7 percent increase) as the total number of farms in the state rose from 75,131 to 77,131 during the same period.

The amount of land in farms decreased from 357,741 to 343,763 acres (a 3.9 percent decrease) in Rock County and from 569,937 to 515,475 acres in Dane County, (a 9.6 percent loss). In Wisconsin as a whole, the amount of land in farms declined from 16.6 to 15.7 million acres (a 5.2 percent loss) during this fifteen-year period.

The average size of farms decreased from 236 to 225 acres in Rock County, from 200 to 179 acres in Dane County, and from 221 to 204 acres in Wisconsin as a whole.

Size Distribution of Farms[6]

Table 3 shows the percentage of farms in each size category for Rock County, Dane County, urban counties, and all Wisconsin counties. Proportionately, Rock County has more farms that are smaller than 50 acres in size or larger than 500 acres in size compared to the averages for urban counties and all Wisconsin counties. Dane County also has proportionately more farms that are smaller than 50 acres in size compared to the averages for urban counties and for all Wisconsin counties.

Table 3 - Percent of Farms per Size Category

Acres per Farm	**% of Rock County Farms**	**% of Dane County Farms**	**% of Urban County Farms**	**% of All Wisconsin Farms**
0-49	45.4%	40.4%	38.5%	27.6%
50-179	27.1%	32.9%	33.5%	38.2%
180-500	17.2%	19.1%	20.3%	26.0%
More than 500	10.2%	7.6%	7.7%	8.2%

Property Taxes and Values

Table 4 lists the average property tax, assessed value, and sale price per acre of agricultural land in Rock County, Dane County, urban counties, and all Wisconsin counties. The assessed values and property taxes are based on the "use value" of agricultural land. Wisconsin Statutes define agricultural land as "land, exclusive of buildings and improvements, that is devoted primarily to agricultural use." In 2004/05, average property taxes[7] on Rock County agricultural land were 27.7% higher than the average for urban counties and 36.4% higher than the average

[6] *2002 Census of Agriculture*, U.S. Department of Agriculture, Wisconsin Agricultural Statistics Service, 2004.

[7] Wisconsin Department of Revenue, Division of Research and Analysis, Bureau of Local Fiscal Policy.

for all counties. Dane County taxes on farmland were 12.1% higher than the average for urban counties and 22.8% higher than the statewide average.

Table 4 - Farmland Taxes and Assessed Value			
	2004/2005 Dollars per acre of Farmland		
	Average Tax	Assessed Value	Sale Value
Rock County	$4.42	$222	$2,990
Dane County	3.88	221	5,411
Urban Counties	3.46	186	3,671
All Counties	3.16	157	2,465

On average, the assessed value[8] of farmland in Rock County was 19.4% higher than the average for all urban counties and 41.4% higher than the average for all Wisconsin counties. The assessed value of Dane County farmland was 18.8% higher than the average for urban counties and 40.8% higher than the state average.

The average sale price[9] of farmland in Rock County was 18.6% lower than the average for urban counties and 21.3% higher than the average for all counties. In Dane County, the average sale price of farmland was 47.4% higher than the average for urban counties and 119.5% higher than the average for all counties. These values do not include land sold for nonfarm purposes, only farmland continuing in agricultural use.

Exclusive Agricultural Zoning Along Route Options

The West and East route options for the Paddock-to-Rockdale transmission project pass through the towns of Beloit, Rock, Janesville, and Fulton in Rock County, and the towns of Albion and Christiana in Dane County. As of 2007, all of these towns have certified exclusive agricultural zoning (EAZ) ordinances, which permit qualified owners of farmland within these towns to collect Farmland Preservation tax credits under Chapter 91, Wis. Stats. In Dane County, the county administers EAZ while in the four towns in Rock County crossed by the proposed transmission line, the towns administer the EAZ ordinance.

A considerable portion of the lands along the two Paddock-to-Rockdale transmission line route options are enrolled in the Farmland Preservation Program, i.e. are zoned for exclusive agriculture, or are covered by an individual farmland preservation agreement as described in Chapter 91, which prevents development for non-agricultural uses.

Table 5 - Extent of Lands Along the West (Proposed) Route in Farmland Preservation Program			
Route Segment Label	Length of Route Segment	Percent of west side of Segment in FP Program	Percent of east side of Segment in FP Program
16	0.4 miles	61.8%	61.8%
14	8.3 miles	33.4%	38.8%

[8] Ibid.
[9] *Wisconsin 2005 Agricultural Statistics*, Wisconsin Agricultural Statistics Service, National Agricultural Statistics Service USDA, Wisconsin Department of Agriculture, Trade and Consumer Protection, October 2005, pp. 10 and 11.

Table 5 - Extent of Lands Along the West (Proposed) Route in Farmland Preservation Program			
Route Segment Label	Length of Route Segment	Percent of west side of Segment in FP Program	Percent of east side of Segment in FP Program
9	7.9 miles	46.0%	46.7%
8	6.3 miles	47.1%	43.3%
2	4.2 miles	59.6%	58.4%
1	7.6 miles	83.6%	80.6%
All Segments	34.7 miles	53.2%	53.2%

Table 6 - Extent of Lands Along the East (Alternate) Route in Farmland Preservation Program			
Route Segment Label	Length of Route Segment	Percent of west side of Segment in FP Program	Percent of east side of Segment in FP Program
15	4.0 miles	32.0%	35.7%
17	0.8 miles	100%	34.1%
13	1.6 miles	92.9%	48.2%
20	1.5 miles	0.0%	0.0%
11A	4.0 miles	13.4%	0.0%
19B	0.2 miles	0.0%	0.0%
19A	0.7 miles	0.0%	0.0%
18B	0.4 miles	0.0%	0.0%
18A	1.2 miles	0.0%	0.0%
7A	3.9 miles	0.0%	2.2%
5	0.6 miles	36.5%	65.4%
3D	4.6 miles	46.0%	38.4%
3C	1.2 miles	0.0%	0.0%
3B	1.3 miles	0.0%	0.0%
3A	2.6 miles	2.2%	2.2%
1	7.6 miles	83.6%	80.6%
All Segments	36.2 miles	34.2%	29.5%

The above tables show that the West route would have a greater potential impact on Farmland Preservation Program lands than the East route would. About 71% of the West Route and 54% of the East Route cross agricultural land according to the ATC Application (p.53, May 2007), but only 53% and 34% of the routes respectively cross land that is under exclusive ag zoning. In other words, only about three-fourths of farmland along the West Route and less than two-thirds of that along the East Route is actually zoned for permanent agricultural preservation.

In addition to the lands enrolled under the Farmland Preservation Program, several parcels along Segment 14 of the West route are encumbered by conservation easements through the federal Wetland Reserve Program. (ATC Application, p.56, May 2007)

GENERAL DESCRIPTION OF AGRICULTURAL SOILS ALONG THE ROUTE(S)

The following section provides a description of the general features of the major soil groups occurring in agriculturally used soils along the Paddock to Rockdale transmission line routes by frequency of each soil's occurrence within each county. The distribution of dominant soils differs between the West (i.e. Proposed) and East (i.e. Alternate) Routes for the Paddock to Rockdale project

Rock County Soils

Along the West Route, the following soils are present in descending order in terms of their frequency along the route:

Sogn loam makes up the largest proportion of agricultural soils along the route (8.2%). This soil is somewhat excessively drained, gently sloping to very steep, loamy soil underlain by dolomite at a depth of 4 to 16 inches. Natural fertility is low and permeability is moderate. Most of the soils along the route have a 2 to 6 % slope.

The next most common soil is Warsaw silt loam (about 7.6% of agricultural soils). This soil is also well-drained, nearly level to sloping loamy soil underlain by stratified sand and gravel at a depth of 24 to 40 inches, occurring on outwash plains and terraces. About two-thirds of this soil has a 2 to 6 % slope. It has moderate permeability and natural fertility.

Oshtemo sandy loam (7.4%) is well-drained, nearly level to steep, deep loamy soil underlain by stratified sand and gravel at 40-60 inches depth. Natural fertility is moderate and permeability is moderately rapid. Most of this soil along the route has 2-6 % slopes or 6-12 % slopes, eroded.

Rockton loam (7.3%) is a well-drained, gently sloping to moderately steep, loamy soil underlain by dolomite bedrock at 20 to 40 inches. The permeability and natural fertility are both moderate. Most of this soil along the route has a 2-6 % slope.

Colwood silt loam (about 6.7%) is a poorly drained, nearly level deep loamy soil underlain by stratified lacustrine deposits of calcareous silt and fine sand at 35-inch depth, and is derived from glacial lakebeds and drainage basins. Natural fertility and permeability are moderate. The water table may be encountered within 1 foot of the surface.

Winnebago silt loam (5.8%) is a well drained and moderately well drained, nearly level to sloping, deep loamy soil underlain by gravelly sandy loam glacial till at 77 inches. Natural fertility is high and permeability is moderate. Most of this soil along the route is eroded with 2 to 6 % slope. A water table may be reached within 3 and 5 feet of the surface.

Griswold loam (5.7%) is a soil consisting of well-drained, nearly level to moderately steep, loamy deep soil underlain by calcareous gravelly sandy loam glacial till at a depth of 30 inches. It has moderate permeability and natural fertility. Most of this soil is eroded, about half with slope of 2-6 %, and about half with slopes of 6-12 %.

Kidder silt loam (5.3%) is deep, well-drained, nearly level to steep, loamy soil underlain by calcareous gravelly sandy loam glacial till at 30 inches. Most of these soils are eroded, with 2-6 % or 6-12 % slopes, and some with 20-30 % slopes. The permeability and natural fertility are moderate.

Westville loam (4.7%) is well drained, deep, well drained and moderately well drained, nearly level to sloping, loamy soil underlain by gravelly sandy loam glacial till at 83 inches depth. Natural fertility is high and permeability is moderate. The water table is 3 to 5 feet from the surface. Most of this soil along the route has a 2-6 % slope.

Durand silt loam (4.5%) is well drained and moderately well drained, nearly level to sloping, deep loamy soil underlain by gravelly sandy loam glacial till at a depth of 68 inches. The water table is within 3 to 5 feet of the surface. Natural fertility is high and permeability is moderate. Along the routes, most of this soil has a 2 to 6% slope and is eroded.

Mahalasville silt loam (4.2%) is poorly drained deep nearly level silty soil on flood plains and in drainageways, depressions and old lake basins. The water table is less than 1 foot from the surface. Permeability and natural fertility are moderate.

Dresden silt loam (4.1%) is well-drained, nearly level to steep, loamy soil underlain by sand and gravel at a depth of 24 to 40 inches, and occurs on outwash plains and terraces. About three-fourths of this soil along the route has slopes of 2-6%. It has moderate permeability and natural fertility.

Plano silt loam (3.5%) is well-drained and moderately well-drained nearly level to sloping, silty deep soil underlain by calcareous sandy loam glacial till or stratified sand and gravel at a depth of 60 inches from the surface, or at 48 inches where a gravelly substratum is present. Natural fertility is high while permeability is moderate. Along the route, about two-thirds has a gravelly substratum, but slope is mostly less than 2%.

Pecatonica silt loam (2.4%) is well drained and moderately well drained, nearly level to sloping, deep loamy soil underlain by gravelly sandy loam glacial till at a depth of 66 inches. The water table may be within 3 to 5 feet of the surface during wet periods. Natural fertility is high and permeability is moderate. Along the route, most of this soil has a 2-6% slope and is eroded.

Wauconda silt loam (2.2%) is a deep, somewhat poorly drained, nearly level and gently sloping soil in glacial lakebeds and drainage basins. This soil is silty over stratified lacustrine deposits of calcareous silt and fine sand. Unless drained, the soil is saturated with a water table at 1 to 3 feet from the surface in wet periods. The permeability and natural fertility of thus soil are moderate.

Alluvial land (2.19%) is wet, nearly level, poorly drained sediment deposited by streams with groundwater at or near the surface throughout the year unless drained, occurring on flood plains. It is subject to frequent overflow. Soil texture at the surface ranges from sandy loam to silt loam to muck.

Whalan sandy loam (2.0%) is a well-drained, nearly level to moderately steep, loamy soil underlain by dolomite bedrock at a 20 to 40 inch depth. The subsoil is formed mainly in glacial till. The permeability of this soil is moderately slow and its natural fertility is moderate.

Rotamer loam (1.8%) is a well-drained, gently sloping to very steep, loamy soil underlain by calcareous gravelly sandy loam glacial till at a 12 to 20 inch depth, mostly occurring on moraines and till plains. The permeability and natural fertility of this soil are moderate.

Along the East Route, the following soils are present in descending order in terms of their frequency along the route:

Dresden silt loam makes up the largest proportion (13.9%) of agricultural soils along the East route in Rock Co. These soils are well-drained, nearly level to steep, loamy soils underlain by sand and gravel at a depth of 24 to 40 inches, and occur on outwash plains and terraces. About three-fourths of these soils along the route have slopes of 2-6%. They have moderate permeability and natural fertility.

St. Charles silt loam (about 11.7%) is well drained or moderately well drained, nearly level to moderately steep, silty deep soil that is underlain by calcareous gravelly sandy loam glacial till or stratified sand and gravel at a 65-inch depth. Water table may be encountered between 3 to 5 feet down. Natural fertility is high while permeability is moderate. About half such soils along the route have a 2-6 % slope, and about 1/3 have a 0-2 % slope.

Griswold loam (9.7%) consists of well-drained, nearly level to moderately steep, loamy deep soil underlain by calcareous gravelly sandy loam glacial till at a depth of 30 inches. It has moderate permeability and natural fertility. Most of this soil is eroded, about half having a slope 2-6 % and about half having a slope of 6-12 % along the route.

Warsaw silt loam (8.3%) is a well-drained, nearly level to sloping loamy soil underlain by stratified sand and gravel at 24 to 40 inches depth, occurring on outwash plains and terraces. About two-thirds have 2 to 6 % slopes. This soil has moderate permeability and natural fertility.

Kidder silt loam (8.3%) is deep, well-drained, nearly level to steep, loamy soil underlain by calcareous gravelly sandy loam glacial till at a depth of 30 inches. Most of these soils are eroded, with 2-6 % or 6-12 % slopes, and some with 20-30 % slopes. This soil has both moderate permeability and natural fertility.

The Rodman-Lorenzo complex (6.9%) is excessively drained, sloping to very steep, loamy soils underlain by stratified sand and gravel at 8 to 14 inches depth, on outwash plains and terraces. Natural fertility is low and permeability is rapid. They occur along the route on steep slopes of 20 to 45%.

Rockton loam (5.9%) is a well-drained, gently sloping to moderately steep, loamy soil underlain by dolomite bedrock at a depth of 20 to 40 inches. Permeability and natural fertility are moderate. Most such soil along the route has a 2-6 % slope.

Plano silt loam (4.9%) is a well-drained and moderately well-drained, nearly level to sloping, silty deep soil underlain by calcareous sandy loam glacial till or stratified sand and gravel at a depth of 60 inches, or 48 inches where a gravelly substratum is present. Natural fertility is high while permeability is moderate. Along the route, about two-thirds has a gravelly substratum, but slope is mostly less than 2%.

Colwood silt loam (about 3.4%) is a poorly drained, nearly level deep loamy soil underlain by stratified lacustrine deposits of calcareous silt and fine sand at a depth of 35 inches, It is derived from glacial lakebeds and drainage basins. Natural fertility and permeability are moderate. The water table may be encountered at less than 1 foot from the surface during wet periods.

Troxel silt loam (2.9%) is a deep, nearly level and gently sloping, well drained and moderately well drained silty soil on foot slopes and in natural drainageways. The water table may be within 3 to 5 feet of the surface. Natural fertility is high and permeability is moderate. The soil is subject to occasional short-term flooding.

Sogn loam (2.9 %) is a somewhat excessively drained, gently sloping to very steep, loamy soil underlain by dolomite at a depth 4 to 16 inches. Natural fertility is low and permeability is moderate. Most of this soil along the route has a 2 to 6 % slope.

Mahalasville silt loam (2.3%) is a poorly drained deep nearly level silty soil on flood plains and in drainageways, depressions and old lake basins. The water table is less than 1 foot from the surface. Permeability and natural fertility are moderate.

Pecatonica silt loam (2.0%) is a well drained and moderately well drained, nearly level to sloping, deep loamy soil underlain by gravelly sandy loam glacial till at a depth of 66 inches. The water table may be within 3 to 5 feet of the surface. Natural fertility is high and permeability is moderate. Along the routes, most has a 2-6% slope, eroded.

Casco loam (1.97%) is a well-drained, gently sloping to very steep soil underlain by stratified sand and gravel at a depth of 12 to 20 inches on outwash plains and terraces. Soil along the route is eroded. Natural fertility and permeability are moderate.

Winnebago silt loam (1.87%) is a well drained and moderately well drained, nearly level to sloping, deep loamy soil underlain by gravelly sandy loam glacial till at a depth of 77 inches. Natural fertility is high and permeability is moderate. Most of this soil along the route is eroded with 2 to 6 % slope. A water table may be reached between 3 and 5 feet down.

Juneau silt loam (1.7%) is deep, well drained and moderately well drained, nearly level and gently sloping, silty soil underlain by a buried soil, occurring on foot slopes and in natural drainageways. The water table may be within 3 to 5 feet of the surface. Natural fertility is high and permeability is moderate. The soil is subject to occasional short-term flooding.

Dane County Soils

Along the West Route, the following soils are present in descending order in terms of their frequency along the route:

Ringwood silt loam is the most frequently occurring soil along this route (about 17.3% of the route). It consists of deep, well-drained, gently sloping and sloping soil on glaciated uplands. It has high fertility and moderate permeability. Along the route, most of this soil has a slope of 2 to 6%.

Next most frequent is Dodge silt loam (about 13.9%), a deep, well-drained, gently sloping and sloping soil on glaciated uplands. It has high fertility and moderate permeability. Along the route, most of it has a slope of 2 to 6%.

Batavia silt loam with gravelly substratum (10.2%) is deep, well-drained, and nearly level to sloping soil on high benches formed in deep loess and loamy outwash, with a depth to outwash sand and gravel of 42 inches. It has high fertility and moderate permeability. Along the routes, it has a slope of 0 to 6%. The depth to water table may be 3 to 5 feet from the surface.

Plano silt loam (9.1%) is a deep, well drained and moderately well drained, nearly level to sloping soil on glaciated uplands formed in loess and sandy loam glacial till or sand and gravel outwash. It has high fertility and moderate permeability. The depth to water table may be 3 to 5 feet from the surface. Along the route, the slope is mainly from 2 to 6 %.

Sable silty clay loam (7.6%) is a deep, nearly level and gently sloping, poorly drained soil on low benches in stream valleys formed in deep silty material more than 4 feet thick, underlain by sandy outwash. The soil has high fertility and moderate permeability. Seasonal high water table is within a foot from the surface. Along the route, the slope is less than 3 %.

Rockton silt loam (6.9%) is a moderately deep, well-drained, gently sloping to moderately steep soil on dolomite-controlled uplands underlain by fractured dolomite bedrock at a depth of 32 inches. The permeability of this soil is moderate and its fertility is medium. Along the route, most is eroded with a 6-12% slope. The water table is below 5 feet.

Griswold loam (6.1%) is a deep, well-drained, gently sloping to moderately steep soil on glaciated uplands formed in thick glacial till. Its permeability is moderate and fertility is medium with high organic-matter content. The water table is below 5 feet. Most of this soil along the route has a 6 to 12% slope.

Virgil silt loam (5.4%) is a deep, nearly level and gently sloping, somewhat poorly drained soil on low benches in uplands and stream valleys. It has high fertility and moderately slow permeability. The seasonal high water table is between 1 and 3 feet from the surface. Drainage is needed for maximum crop production. About one fourth of this soil along the routes has a gravelly substratum at a depth of 50 to 70 inches.

Whalan silt loam (4.5%) is a moderately deep, gently sloping to steep, well-drained soil on dolomite-controlled uplands. This soil has medium fertility, moderate permeability and low available water capacity. The seasonal high water table is below 5 feet from the surface.

Kegonsa silt loam (3.9%) is a well-drained, nearly level and gently sloping, moderately deep soil on benches on outwash plains, underlain by loose sand and gravel at a depth of 33 inches. It has medium fertility, moderate permeability and medium available water capacity. The water table is below 5 feet from the surface.

St. Charles silt loam (3.0%) is a deep, nearly level to moderately steep, well drained and moderately well drained soil on glaciated uplands. It has high fertility, moderate permeability and high available water capacity. The seasonal high water table is below 5 feet from the surface.

McHenry silt loam (2.9%) is a deep, well-drained, gently sloping to moderately steep soil on glacial uplands underlain by calcareous glacial till at a 24 to 40 inch depth. It has medium level of fertility, moderate permeability and medium available water capacity. The water table is below 5 feet from the surface.

Elburn silt loam (2.2%) is a deep, somewhat poorly drained, nearly level and gently sloping soil in glaciated stream valleys, underlain by glacial till or sand and gravel outwash. It has high fertility, high available water capacity and moderately slow permeability. The water table is 1 to 3 feet deep in the spring.

Dunbarton silt loam (2.0%) is a shallow, well-drained, and gently sloping to steep soil on uplands with fractured dolomite at a depth of 10 to 20 inches. This soil has low fertility, moderately slow permeability, and low available water capacity. The water table is at a depth of over 5 feet from the surface.

Along the East Route, the following soils are present in descending order in terms of their frequency along the route:

Ringwood silt loam is the most frequently occurring (about 22.0% of soils along the route). It consists of deep, well-drained, gently sloping and sloping soil on glaciated uplands. It has high fertility and moderate permeability. Along the route, most of it has a slope of 2 to 6 inches.

Batavia silt loam with gravelly substratum (13.4%) is deep, well-drained, nearly level to sloping soil on high benches formed in deep loess and loamy outwash, with a depth to outwash sand and gravel of 42 inches. It has high fertility and moderate permeability. Along the route, it has a slope of 0 to 6%. The depth to water table is 3 to 5 feet from the surface.

Plano silt loam (11.5%) is a deep, well drained and moderately well drained, nearly level to sloping soil on glaciated uplands formed in loess and sandy loam glacial till or sand and gravel outwash. It has high fertility and moderate permeability. The depth to water table may be 3 to 5 feet from the surface. Along the route, the slope of this soil is mainly from 2 to 6 %.

Rockton silt loam (8.7%) is a moderately deep, well-drained, gently sloping to moderately steep soil on dolomite-controlled uplands underlain by fractured dolomite bedrock at a 32-inch depth. The permeability of this soil is moderate and its fertility is medium. Along the route, most is eroded with a 6-12% slope. The water table is below 5 feet.

Griswold loam (7.7%) is a deep, well-drained, gently sloping to moderately steep soil on glaciated uplands formed in thick glacial till. Permeability is moderate and fertility is medium with high organic-matter content. The water table is below 5 feet. Most of this soil along the route has a 6 to 12% slope.

Dodge silt loam (about 7.1%), is a deep, well-drained, gently sloping and sloping soil on glaciated uplands. It has high fertility and moderate permeability. Along the route, most of this soil has a slope of 2 to 6%.

Whalan silt loam (5.7 %) is a moderately deep, gently sloping to steep, well-drained soil on dolomite-controlled uplands. This soil has medium fertility, moderate permeability and low available water capacity. Seasonal high water table is below 5 feet.

Kegonsa silt loam (5.3%) is a well-drained, nearly level and gently sloping, moderately deep soil on benches on outwash plains, underlain by loose sand and gravel at a depth of 33 inches. It has medium fertility, moderate permeability and medium available water capacity. Water table is below 5 feet down.

McHenry silt loam (3.3%) is a deep, well-drained, gently sloping to moderately steep soil on glacial uplands underlain by calcareous glacial till at a 24 to 40 inch depth. It has medium level of fertility, moderate permeability and medium available water capacity. The water table is over 5 feet down.

Dresden silt loam (2.9%) is a well-drained, gently sloping to steep, moderately deep soil on benches in stream valleys underlain by sand and gravel. It has medium fertility, moderate permeability and medium available water capacity. The water table is more than 5 feet deep.

Elburn silt loam (2.8%) is a deep, somewhat poorly drained, nearly level and gently sloping soil in glaciated stream valleys, underlain by glacial till or sand and gravel outwash. It has high fertility, high available water capacity and moderately slow permeability. The water table is 1 to 3 feet deep in the spring.

Sable silty clay loam (2.0%) is a deep, nearly level and gently sloping, poorly drained soil on low benches in stream valleys formed in deep silty material more than 4 feet thick, underlain by sandy outwash. The soil has high fertility and moderate permeability. Seasonal high water table is within a foot from the surface. Along the route, the slope is less than 3%.

POTENTIAL AGRICULTURAL IMPACTS

OVERVIEW

There are several ways to analyze the potential impacts of a transmission line project on farmland. One way is to estimate the number of acres affected. This measurement could include the total number of acres of farmland affected by both existing and new easements. A second measure is the number of acres of new easements that would be acquired. A third metric is the extent to which a transmission line shares a corridor with an existing facility, such as another transmission line, pipeline, or highway.

The farmland area encumbered by an easement and the area directly impacted by transmission line construction are not necessarily the same. The easement area would restrict certain land uses under the transmission lines. For example, under some conditions the easement could restrict farm expansions. However, most crop growing activities could continue on the transmission line easement. ATC has estimated the number of acres of farmland and pasture that would be crossed by transmission line construction as portrayed on the detailed aerial imagery provided by ATC. (See Appendix 5) DATCP has also examined the cropland that would be lost due to the difficulty farming around transmission line structures.

The area of farmland impacted is one factor to consider when evaluating transmission line impacts on farmland. A number of additional impacts must be considered. We can separate the assessment of these potential farmland impacts into temporary impacts, permanent impacts, and impacts that will be temporary only if effective construction and restoration protocols are followed.

Temporary Impacts

Temporary impacts generally include:

1. Loss of time due to negotiation of the easement
2. Loss of cash flow while waiting for compensation for the easement.
3. Soil erosion during the construction process
4. Noise and dust during the construction process
5. Fencing required to keep livestock off the construction corridor
6. Farm or access road impacts
7. Impacts that may be associated with the staking of the ROW.
8. Disruption of cropping operations
9. Blasting to clear bedrock in excavation sites for tower structures

<u>Impacts that are Potentially Temporary</u>

Many impacts can be considered “temporary” only if certain construction and restoration guidelines are followed. These include:

1. Soil compaction
2. Soil mixing

3. Damage to surface or subsurface drainage

Permanent Impacts to Farms

Permanent impacts to farms can include:

1. Loss of farmland due to the area occupied by the pole
2. Loss of useable farmland due to the difficulty of farming around transmission line poles
3. Risk of infestation by insects and weeds based in unfarmable areas around the poles that can spread to other parts of the property
4. Risk of electrical interference with precision farming equipment
5. Risk of farm machinery running into structures
6. Alterations to the layout of existing or proposed irrigation systems
7. Increased danger of aerial spraying pesticides
8. Restrictions on future farm land uses allowed in the easement area, including future farm expansions or modernization measures
9. Potential Reduction in Property Values
10. Aesthetic Impacts
11. Health concerns related to electromagnetic fields.
12. Possible effects due to ground currents or stray voltage.
13. Disruption of crop rotations
14. Removal or impairment to farm buildings or residences

CORRIDOR-SHARING IMPACTS ON LAND OWNERS

When a linear public project is located on farmland, the likelihood increases that another linear project will be located on the property increases. This is due to state statute which requires corridor sharing where possible and the fact that acquiring easements on existing corridors may be less expensive than acquiring property through unencumbered land. In addition, there is likely to be less resistance to a project co-located within an existing right-of-way.

Wis. Stats. § 1.12(6) requires that the Public Service Commission consider corridor sharing opportunities when reviewing transmission facility projects. It states that corridor sharing should be prioritized as follows:

- Existing utility corridors;
- Highway and railroad corridors;
- Recreational trails, to the extent that the facilities may be constructed below ground and that the facilities do not significantly impact environmentally sensitive areas; and
- New corridors.

Corridor-sharing adds to the burden on host landowners by making it more likely that the presence of one utility line crossing their property will result in other utilities also using that existing right-of-way.

ATC has indicated that all existing easements will be renegotiated even if no new right-of-way is to be acquired. ATC also indicated that compensation paid to landowners who settle early in the acquisition process will be equalized once later acquisitions of easements are complete. ATC will contact those landowners who settled early in the process to give them additional levels of compensation to match that granted to those who settled later in the process. ATC expects to pay landowners from 50 to 75 percent of fee simple value for any easements they acquire for the project.

Although easements between ATC and individual landowners will be re-negotiated, there is no need to re-negotiate the language of easements between ATC and other affected condemnors along the routes such as the Wisconsin Department of Transportation, railroad, pipelines or distribution lines. For the railroad and WisDOT, ATC is required to obtain a revised permit. Easements are not involved in those cases according to ATC staff.

TEMPORARY CONSTRUCTION IMPACTS

Temporary construction impacts are the impacts that would take place during easement negotiations and during construction and restoration. Transmission line construction can temporarily impact farm operations. These impacts can include fencing of cattle from areas that are grazed to prevent them from accessing the construction corridor, constraints on farming the area adjacent to the construction corridor, dust and noise during construction, roads across farm fields to access construction right-of-way, and time spent negotiating easement conditions.

Time Loss during Negotiations

It is important that the farm owner understand how his farmland may be impacted both during and after construction. In some cases, farmland owners choose to consult with an attorney prior to signing an easement. The time spent negotiating easements can be time-consuming and represents a cost to the farmland owners; it is time that cannot be spent on managing his farm operation. This is particularly significant if these negotiations occur during planting and harvesting times.

Delayed Compensation and Cash Flow Impact

If negotiations are prolonged and a settlement is not forthcoming, the farmer may not receive timely compensation for crops that are not planted or harvested due to construction activities through his farmland. In some cases, this could result in cash flow problems to the farm operation.

Soil Erosion and Mixing during Construction

An erosion problem occurs if ruts or wheel tracks run up or down the slopes. This is why farmers are careful not to leave a dead-furrow when moldboard plowing in the fall. The spring snowmelt will erode the soil severely with channelized flow if a dead-furrow is present.

Rutting the soil with construction equipment in the transmission corridor will create a similar erosion problem. The silty soils of the project area are very susceptible to flowing water. The rutting also mixes topsoil with the subsoil. The impact depends on the depth of the ruts.

The obvious solution is to stay off the soil when it is wet, to avoid rutting. Another possibility is to use some form of matting that prevents rutting by the equipment. During pre-construction planning, ATC staff should ask land owners about the extent of their existing and/or planned drainage tiles and systems. They should also document existing drainage problems that could affect the construction easement area. (Reference Landowner Questionnaire)

About 56% of the agricultural soils along the West Route in Rock County have an average topsoil depth of 12 inches or less. The East Route in Rock County has an average topsoil depth of less than 12 inches on about 69.5% of the route. In Dane County, about 75% of the soils on both the West and East Routes have a topsoil depth of 12 inches or less.

Noise and Dust during Construction

Dust and noise due to transmission line construction can affect landowners and farm animals. If blasting is necessary to place the poles, dairy and beef cattle can stampede, breaking down fences and escaping the farm property. Fur animals and poultry are particularly sensitive to noise. ATC has indicated that blasting will be necessary along parts of the Rock County portion of each route.

Cattle Fencing during Construction

ATC should fence off the construction area to prevent cattle from wandering onto the right-of-way. If transmission line construction divides a field used for grazing, access between the divided parcels could be restricted. ATC will need to work with farmers in these instatnces to develop an access plan for the livestock or else compensate the landowner for the cost related to restrictions on grazing. If any cutting of fences is necessary during construction, ATC will install temporary gates. (See Wis. Stats., § 182.017 (7)(c)5.) Such gates may be left in place at request of the landowner.)

One of the questions that ATC staff should ask landowners about is the presence of animals on their farm operations, and the type of operation, i.e. feedlot, managed grazing, etc. Landowner schedules for manure application and storage in proximity to the right-of-way must be ascertained. (See Land Owner Checklist)

Farm Roads Needed to Access Construction Corridor

ATC has indicated that it anticipates that all of the access for the project will be from public roads. (ATC Application, May 2007, p.60) However, some areas may not be readily accessible from the road right-of-way. The company may try to obtain voluntary permission to use alternate access routes in order to minimize impacts to sensitive areas. As of this writing, no

final arrangement has been made for private access roads. ATC will begin talks with landowners to arrange appropriate access routes once a final route is selected. (See Answers of ATC LLC to 12/10/07 Questions/Comments regarding the Paddock-to-Rockdale Project from Mike Wyatt of DATCP, 12/20/07, p.18)

ATC develops an access plan for a given project that identifies where the right-of-way will be accessed by the contractor. However, the contractor may choose to modify this plan and find alternate access if that access is less damaging to the environment or less costly and the affected landowner agrees to the modification. The contractor reports to ATC where they have deviated from ATC's access plan. ATC is responsible to the landowner for damage done outside of the access plan.

Topsoil should be stripped and stockpiled before building a temporary access road across farm fields. (Wis. Stats. § 182.017 (7)(c)1) Access roads should be designed to allow proper drainage and minimize soil erosion. Geotextile construction fabric may be placed below any imported rock used to build the road, in order to protect the subsoil. If desired by the landowner, temporary roads will be left in place after construction is completed. If access roads are removed, soil restoration practices should be applied to the road to mitigate compaction.

Impacts Associated with Surveying and Staking Transmission Line Right-of-Way

If surveying or construction crews leave wire surveying flags, equipment, or other debris behind after their work is completed, these items can pose a hazard to livestock. When livestock ingest such material, they can develop what is known as "hardware disease". Ingested wires or other objects can damage the animal's viscera and may lead to death.

Another hazard to livestock that can occur during right-of-way clearing or maintenance is the removal of black walnut trees. The roots of these trees produce a toxin known as juglone that causes an allergic reaction in horses and may also affect other livestock. Care should be taken when clearing any black walnut trees to make sure that all roots, wood, bark, leaves, hulls, and sawdust are removed from any area to which livestock may have access. Even the ash from trees that have been burned may still contain the toxin. Relatively small amounts of juglone are also found in Persian (English or Carpathian) walnut trees as well as butternut, pecan, and hickory trees.

Irrigation Systems Impacts

Neither the ATC application nor the DEIS issued by the PSC identify any irrigation systems that would be affected by the Paddock-to-Rockdale project. However, one center pivot irrigation system is visible on page 14 of the orthophotographs for the West (Proposed) Route on Segment 9 in the town of Janesville. It is located just west of the route on the property of Kenneth and Joyce E. Diehls. According to ATC staff, this operation is not affected by the existing transmission line, and will not be affected by the new reconfigured line.

ATC staff should ask land owners during pre-construction discussions whether the landowner has any plans to install an irrigation system on the corridor. Impacts to existing irrigation operations should be avoided if at all possible. If future irrigation plans can be documented, any interference to that system by the proposed transmission line should be an item considered during the negotiations for the easement.

Dewatering of Caisson Hole

The caisson hole will fill with water when the hole for the caisson is augured into a somewhat poorly to poorly drained soils with either a perched or apparent water table. A 6-foot diameter hole, 10 feet deep will contain 283 cubic feet or 2,117 gallons of water. A 30-foot deep hole will contain 848 cubic feet or 6,342 gallons of water.

The usual procedure is to pump the water from the hole to a safe disposal area or to a tank truck for removal. The high water table soils along the proposed transmission line routes have characteristics that are going to make it very difficult to dewater the hole. Sand lenses will carry water to the hole quickly during the pumping process. Essentially, one has a shallow well with a high recharge rate. Disposing of the water on flat land is a significant problem.

The contractor may be able to place the concrete in the caisson hole using the "tremie" concrete placement process to place the concrete and greatly reduce the volume of water to be pumped. In this process, the concrete is pumped into the bottom of the hole which displaces the water until the concrete approaches the top of the hole or is above the water table. (Some concrete which has been diluted and is skimmed off.) The reinforcement steel cage is then vibrated into the concrete and the structure finished. This process avoids the need to pump and dispose of very large quantities of water.

Proper dewatering of the caisson hole requires pre-construction identification by ATC contractors of low areas and hydric soils that are likely to collect water during construction, as well as suitable areas for the discharge of water accumulated within he pipe trench or other excavated areas, where possible. ATC contractors should structure work to minimize accumulation of water within the excavated area and get ATC and landowner approval for all discharge locations and techniques used. Discharge locations must be well-vegetated areas that prevent the water from returning to the right-of-way, that are as far from backfilling activities as possible, and that avoid deposition of gravel or sediment onto fields, pastures, or watercourses.

If delivery of water onto cropland is unavoidable, crops cannot be inundated for more than 24 hours without severe damage to the crop. Discharge of water from non-organic farms or from hydrostatic testing must be avoided if that runoff would flow onto adjacent organic farm operations. ATC has developed an Environmental Construction Practice (ENV CP 01 G) which addresses dewatering. Although there is no language specifically protecting agricultural land, it does state:

"The Contractor shall dewater by means that will protect adjacent properties from flooding or property damage due to dewatering releases."

This protection would apply to agricultural land and crops as well as other properties.
In addition, ATC is required to comply with (Department of Natural Resources) DNR Erosion Control Technical Standards.

Erosion control measures must be used to divert the flow of pumped water and prevent erosion. Dewatering should be monitored, particularly when constructing in hydric soils or soils with a shallow water table. If damage from dewatering cannot be avoided, ATC should reasonably compensate the landowner for crop damages and restore the land to pre-construction conditions.

In Dane County, about 58% of the agricultural soils along the West Route, have a water table less than 5 feet down, while 64% along the East Route have a water table less than 5 feet down. In Rock County, about 58% of the soils along the West Route have a water table shallower than 5 feet, while 63% of the soils along the East Route are shallower than 5 feet.

Disruption of Cropping Operations

Transmission line construction can interfere with cropping operations. This is most likely to take place during spring planting operations and during the fall harvest. Working with the farm operators on the timing of construction on farm fields can reduce this impact.

POTENTIALLY TEMPORARY IMPACTS

Impacts to agricultural lands can be "temporary" if effective construction protocols are implemented when constructing through farmland. ATC should develop an Agricultural Mitigation Plan which identifies measures to potentially reduce these impacts.

Soils

The construction and maintenance of high-voltage transmission lines across or adjacent to cropland and pastures can affect the farming practices and operations in several ways. Farmers have invested in their cropland to improve or maintain yields. Some of the invested costs are an annual expense, such as fertilizer and lime. Others involve a long-term investment in agricultural drainage systems, erosion control, and sprinkler irrigation. An assessment of the possible impacts and damages to cropland begins with knowledge of the soil and its characteristics.

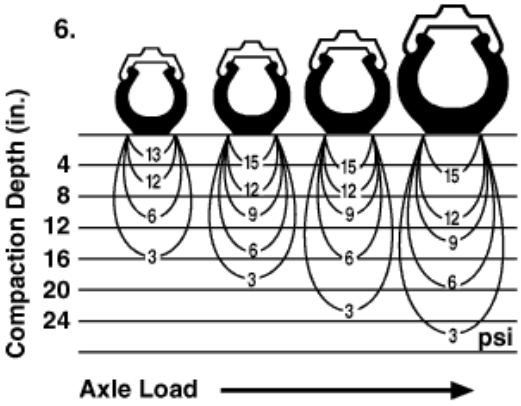
The soil descriptions and information found in the Soil Survey for Rock and Dane Counties provide the basis for the assessment. The presence of wet soils with internal drainage described as "somewhat poorly", "poorly", or "very poorly" drained suggest that surface and subsurface drainage systems may have been installed by farm operators. "Excessively well drained" or "droughty" sandy soils may be irrigated. Soils on slopes of 3 to 12 percent may have entailed

use of erosion control practices such as grass waterways, terraces or diversions, and conservation tillage systems located in the fields.

Soil Compaction

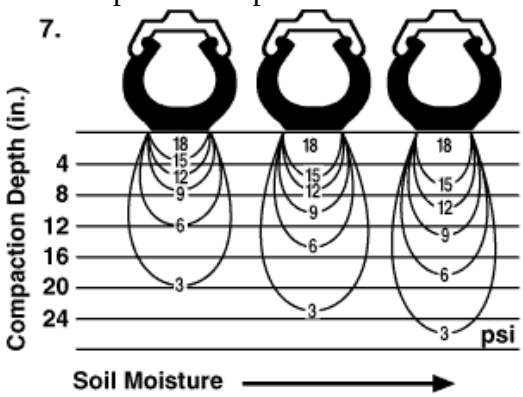
Equipment used to construct transmission lines has the potential to compact soil and reduce soil productivity on the farmland traversed by transmission line construction. Soil compaction reduces pore space between soil particles, restricting the movement of water and gases through the soil. This can affect the rooting depth of crops and the uptake of soil nutrients and water. In addition, soil compaction can decrease soil temperature, decomposition of organic matter, and a plant's ability to access required nutrients found lower in the rooting zone. It can also increase the likelihood of water erosion on farm fields.

Figure 1
Compaction Depth & Axle Load



Source: University of Minnesota Publication FO-03115 (2001)

Figure 2
Compaction Depth and Soil Moisture



Source: University of Minnesota Publication FO-03115 (2001)

Studies by several universities have shown yield reduction due to compaction can range from 10% to 40%.[10] Compaction is most evident when the crop is under additional stress. For example, this could include drought conditions or excessively wet conditions.

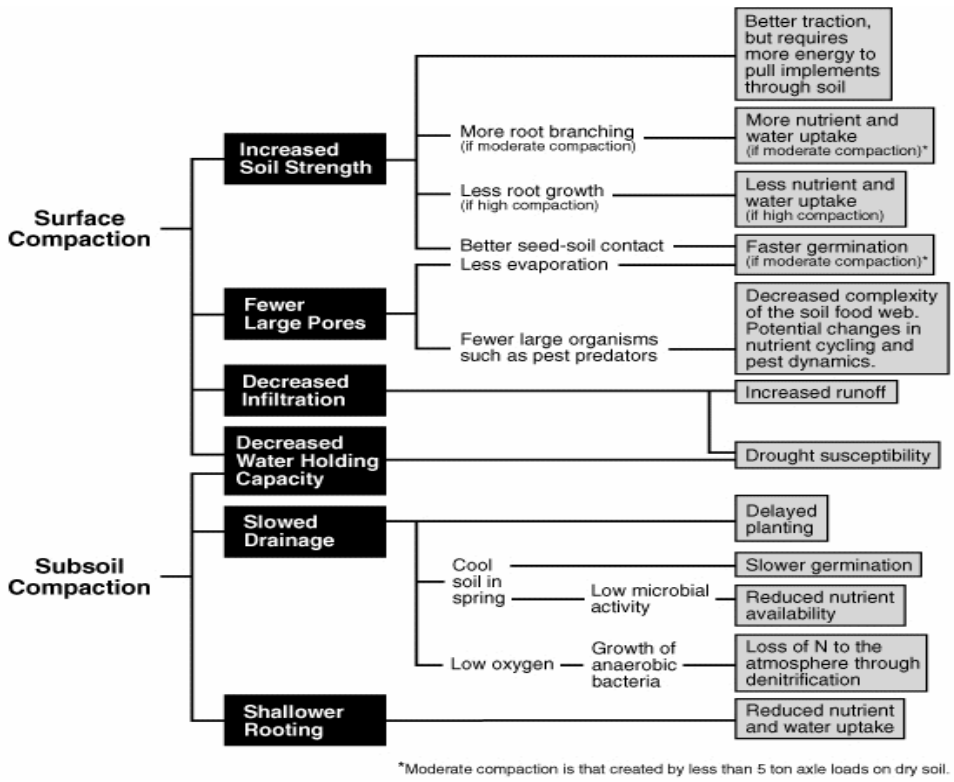
Several factors influence whether a soil becomes compacted. An important influence is soil moisture: the wetter the soil the more likely it is to be compacted from traffic. The potential for compaction also depends on the soil texture. Coarser- textured soils, like sand or sandy loam, are less likely to become compacted than are clay or silty clay loams. Finally, the axle weight of the construction equipment affects compaction. Figure 6 shows the relationship between axle load and compaction depth. Figure 7 shows the relationship between soil moisture and compaction depth.

Compaction of the soil in the root zone of agricultural crops results in reduced yields. The depth at which the compaction occurs is very important. The combination of soil structure and

[10] Effect of Compaction on Corn Yield, University of Wisconsin Publication A3367.

the soil's internal drainage are major factors in determining whether compaction will occur and at what depth. The soil structure most resistant to compaction is granular or single grained. Subangular blocky structure resists compaction forces reasonably well at a soil moisture content of roughly 50 percent field moisture capacity. Field moisture capacity is defined as the water content of soil after the excess water has drained away. It is the maximum amount of water stored in the soil for crop production. The soil structure least able to resist compaction

Figure 3
Soil Drainage and Texture Definitions



Topsoil compaction and subsoil compaction can be viewed separately. When traffic loads are relatively lightweight, less than 10 tons per axle, the soil generally will not be compacted below the 8-10 inch range - the depth at which the topsoil layer is commonly found. Compaction at this depth normally can be decompacted with typical farm tillage equipment.

Some of the heavier construction equipment that will be used on the project can compact soil to depths of 20 inches or more, resulting in subsoil compaction that is very difficult to alleviate, especially with regular tillage equipment.

Subsoil compaction is related to weight-per-axle. Total axle load affects the depth of compaction, generally the subsoil layer, while contact pressure (psi) more commonly affects

the topsoil layer. Subsoil compaction affects nutrient uptake, available water capacity, and can delay spring planting under wet conditions, consequently reducing crop yield. Indicators of soil compaction include abnormal root growth, excessive erosion, soil crusting, standing water, and uneven emergence of crops.

The soil drainage classes used in the description of the soils reflects the combined effects of surface runoff, soil permeability, and internal soil drainage. The classes are:

Excessively well drained:	Water is removed from the soil very rapidly.
Moderately well drained:	Water removed from the soil somewhat slowly so that the profile is wet for a small, but significant part of the time.
Somewhat poorly drained:`	Water is removed from the soil slowly enough to keep it wet for significant periods. The soil has a slowly permeable layer in the profile, a high water table, seepage from up-hill, or a combination of the above.
Poorly drained:	Water is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a large part of the year. The soil has a high water table, slowly permeable layers within the profile, up-hill seepage, or a combination of the above.
Very poorly drained:	Water is removed from the soil so slowly that the water table remains at or near the surface the greater part of the time. Soils of this drainage class usually occupy level or depressed sites, and are frequently ponded.

The water table is the upper limit of the waterlogged soil. Growing plants will remove soil water by transpiration during the growing season which will lower the water table and reduce downhill seepage.

An apparent water table results from an impermeable or essentially impermeable layer, below the soil profile. A perched water table occurs because a slowly permeable soil layer within the soil profile causes part of the profile to be waterlogged.

The field description of soil structure established by the soil mapper / classifier provides (1) the grade (distinctness) of structure which is the degree of aggregation, (2) The class or size of the aggregate or ped, and (3) the type of structure.

The grade or distinctness of the structure is expressed as (1) Weak being equal to poorly formed or indistinct peds (aggregates), (2) Moderate being equal to well formed or distinct peds, and (3) Strong equaling durable peds.

The class or size of aggregate or ped is expressed as (1) very fine or very thin, (2) fine or thin, (3) medium, (4) coarse or thick, and (5) very coarse or very thick. The reference to “thin” applies to platy or laminated structural shape.

The types of soil structure shape are (1) Platy (laminated) where the soil particles are arranged around a plane, generally horizontal, (2) Prism like (prismatic or columnar) where the soil particles are arranged around a vertical axis, (3) Block like or polyhedral (angular or subangular) where the soil particles are arranged around a point and bounded by flat or rounded surfaces, and (4) Spheriodal or polyhedral represented by granular or crumb. Structure-less soils are either "single grain" or massive. A massive structure is a condition where the soil particles adhere without any regular cleavage, as in a hardpan.

"Soil consistence when moist" is the consistence when the soil moisture is midway between air dry and field moisture capacity. "Friable" describes a condition where the soil material crushes easily under gentle to moderate pressure between the thumb and fore-finger. "Firm" represents the condition when the soil material crushes under moderate pressure between the thumb and fore-finger, but resistance is distinctly noticeable.

Color is the easiest condition to observe. The color of the soil material is provided to help us recognize when the surface layer becomes the subsoil, and subsoil become substratum.

Construction of a Soil Compaction Index

DATCP staff have utilized a soil compaction assessment to predict the possibility of compaction occurring on soils in agricultural fields during periods when the soil is not frozen. A soil compaction index is used as an indicator of compaction risk. This measure combines internal soil drainage (wetness) with soil structure in the soil horizons to predict compaction risk. The scalar for internal soil drainage assigns a value of 1 for "excessively drained", 2 for "well drained" and "moderately well drained", 3 for "somewhat poorly drained", and 4 for " poorly drained" to "very poorly drained" soils. The scalar for soil structure assigns a value of 1 for a granular structure, 2 for a subangular blocky and/or prismatic structure, and 3 for a platy structure.

The effort recognizes that a somewhat poorly drained soil is more likely to be compacted by the construction equipment than a well drained soil. It also recognizes that a granular soil structure is less likely to be compacted than a soil horizon with a platy structure. The **compaction index** value for a soil is calculated by multiplying the soil drainage scalar value by the soil structure scalar value. For example, the Durand silt loam, - a well drained soil (scalar value = 2) with subangular blocky structure (scalar value = 2) - would have a compaction index value of (2 x 2) = 4. The Elburn silt loam is a somewhat poorly drained soil (value = 3) with a subangular blocky structure (scalar = 2). So it would have a compaction index value of 6 (=3x2). The Mahalasville silt loam, a poorly drained soil (value = 4) with a subangular block struture (value = 2), has a compaction index of 8, which indicates that compaction will likely happen when construction equipment travels across it, unless the soil is frozen.

The possibility of compaction is divided into four categories:

Compaction Index	*Range in Terms of the Possibility of Compaction*
1-3	*None*
4	*Maybe*
5-6	*Likely*
>6	*Definitely*

Soils in the "maybe" range represent a situation where some soil penetrometer readings should be taken to determine whether any soil compaction has occurred. If compaction has occurred, it is probably near the soil surface. Chisel-plowing the travel lane may be all that is needed for remediation. Soils in the "likely" category indicate a situation where soil penetrometer readings need to be taken to a much greater depth to determine the extent of the soil compaction. Remediation may require a sub-soiling tillage tool which can reach deeper into the soil. The "Definitely" category will require extensive testing for compaction and a major remediation effort, or else planning construction and travel only when the soil is frozen.

Table 7 below shows the portion of agricultural soils along each route option which falls into any given compaction risk category, by county. In general, it shows that more of the ag soils along the West route are at greater risk for compaction than those on the East route. Roughly twice as much of the agricultural soil along the West route poses a definite or likely risk of compaction as along the East route. The soil compaction index for individual soil map units along the route is located in Appendix 7 of this report.

Table 7 - Aggregate Compaction Risk Estimates for Agricultural Soils Along Paddock-to-Rockdale Route Options by County

Compaction Risk Category	% Soils in Risk Category for West Route, in Rock County	% Soils in Risk Category for East Route, in Rock County	% Soils in Risk Category for West Route, in Dane County	% Soils in Risk Category for East Route, in Dane County
Definite Risk	13.7%	8.9%	12.3%	3.4%
Likely Risk	2.3%	0.6%	8.7%	5.1%
Possible Risk	61.5%	75.9%	79.0%	91.5%
No Risk	20.4%	14.4%	0.0%	0.0%
Length of Route Portion (miles)	14.76 miles	15.81 miles	10.25 miles	8.1 miles

Note: Totals my not equal 100% due to water bodies. Source: Based on NRCS soil map unit layer database overlaid on ATC route alignment, and interpreted using county soil surveys.

There are some mitigating circumstances which can reduce the amount of compaction that occurs. A growing crop removes water from the soil, and by doing so, reduces the amount of compaction that occurs because the soil's ability to resist compaction forces is increased. Installing a deep (subsurface or tile) drainage system designed to remove excess soil water quickly will change a somewhat poorly or poorly drained soil into a well drained soil.

"Removing excess water quickly" is defined as a drainage system that will remove a depth of ¾ inch to 1-inch of water from the drained area in 24 hours. A surface drainage system on flat soils removes surface water, and enhances the performance of the deep drainage system. So, with a drainage system, a properly drained Colwood silt loam moves from a "yes - almost sure to be compacted" category to one of "maybe or likely". Waiting for a growing crop to dry the soil down to a moisture content of 50 percent field moisture capacity, requiring a period of 5 – 7 days, will also reduce the amount of compaction that occurs.

To minimize soil compaction during the construction process, some suggested practices are to:

1) Schedule the work during the seasons (periods) when the bearing capacity of the soil is best.
2) Restrict access for vehicles or machinery that will severely compact the soil, if the soil has poor bearing capacity.
3) Use only vehicles with tracks or extra-wide tires
4) Keep the number of vehicle trips to the minimum, even though the first trip created the largest portion of the compaction.
5) Use bearing (construction) mats where needed.
6) Suspend construction activities when conditions indicate this would be detrimental.

<u>Soil Restoration: Removing Compaction in Subsoil and Topsoil</u>

Without adequate and proper compaction protocols for using the right equipment, there can be long-term damage to agricultural productivity from deep soil compaction due to construction. The delegation of decompaction to farm operators is not generally recommended. They may lack the proper equipment to decompact after pipeline construction. The scope and depth of compaction from pipeline construction greatly exceeds the compaction resulting from routine farm operations.

ATC will work with the farmer after construction is completed if soil compaction is a concern

Risks of Topsoil Mixing: Potential Adverse Impacts

The long-term damage from topsoil inversion and mixing with subsoil and spoil is not fully restored by cross-right-of-way plowing, topsoil "drift" and "green manure" techniques, even decades later. Remedial application of "green manure" techniques or fertilizer, lime and compost are not adequate to compensate for the loss of organic-matter that occurs through significant topsoil mixing. Organic-matter is crucial to root health. According to USDA soil scientist Cynthia Cambardella at the Soil Tilth Lab in Ames, Iowa: "… it can take decades to change the organic matter in soils. For the last 10 years, she has looked at the contribution of roots to organic matter on the hunch that farmers and researchers were overplaying the contribution of soil-surface plant residue to soil organic-matter levels. That hunch has proven correct. Plant roots play a much bigger role in total soil organic-matter than originally suspected, she said. In a one-year study of oat production, Cambardella learned 75 percent of new carbon in the soil came from the plant roots, while only 25 percent came from crop residue…. Cambardella applied her theory to a 30-year University of Minnesota corn-silage

study. She found corn-silage roots contributed similar levels of new carbon in the soil as in her oat study." (Jane Metcalf, "Organic Matter at the Heart of Soils", Wisc. State Farmer, June 23, 2000)

Good agricultural topsoil is a unique and invaluable resource that should be accorded top priority in terms of preservation, whatever that takes in terms of required mitigation techniques. Mixing of topsoil will reduce tilth, organic-matter and cation exchange capacity, and alter soil structure and distribution of particle sizes (particularly water stable aggregates). It can also increase rock content and concentrations of harmful salts near the surface. Once mixed or lost, full restoration would require importation of similar topsoil at great expense. It makes much more sense to prevent the mixing of the topsoil in the first place.

Soil mixing is an impact which can result from either of two operations on a transmission line project. The first is the deep rutting by the construction equipment which mixes topsoil and subsoil resulting in the topsoil or plow layer having characteristics that make it more difficult to till. There may be a permanent reduction in crop yields**.** The solution to the rutting problem is to delay travel across the land until the soil has dried enough to support the equipment**.** The construction equipment may leave tracks or shallow depressions indicating some compaction. Tracks are not ruts.

The second mixing problem can result from the auguring operation to excavate soil material during the construction of the concrete caisson supporting the steel pole. The general practice has been to spread the augured material, or spoil, on the soil surface in the vicinity of the pole site. The depth needed for the caisson will require that the excavation extend into the substratum of the soil. The substratum (parent material) may be glacial material (glacial junk?) with significant amounts of pebbles and cobbles (> 3 inches). The volume of spoil removed from an augured hole 6 feet in diameter and 10 feet deep is 283 cubic feet or 10.5 cubic yards (one 10 cubic yard dump truck). If this volume of spoil was uniformly spread over the land surface in the vicinity of the pole site at a depth of 1 inch, the area covered would be 3,393 square feet. The material from a 30-foot deep hole would cover an area of approximately 10,200 square feet or 0.23 acres.

To prevent mixing of topsoil with subsoil or spoil material in the excavation process, topsoil must be stripped, placed in a separate pile segregated from other excavated materials and subsequently replaced after construction is complete and excavated areas have been backfilled. This is specifically required for transmission line projects by s.182.017 (7)(c), Wis. Stats.:"*If excavation is necessary, ensure that the top soil is stripped, piled and replaced upon completion of the operation."*

DATCP believes that the same topsoil segregation requirements applied to the transmission line corridors should also apply to any temporary access roads and any storage or laydown yards used for the project. ATC has not yet made arrangements for private access roads at this time. However, they have leased use of seven storage yards, six of which will be located on agricultural land. In response to DATCP concerns, ATC has stated that:

> "The laydown yards that have been identified for use on the Paddock Rockdale Project will require minimal grading, if any at all. This will be discussed with landowners during lease agreement negotiations. If grading is necessary to prepare the laydown areas in agricultural fields, ATC will follow topsoil segregation procedures." (Answers of ATC LLC to 12/10/17 Questions/Comments regarding the Paddock-to-Rockdale Project from Mike Wyatt of DATCP, 12/20/07, p.20)

Farmers, who do not have rocks in their fields before the construction, do not wish to have rocks in the field after construction. They also know that rocks with a dimension greater than 2 inches can damage planting and harvesting equipment. The excavated material may be very different in texture and structure from the surface soil. The material may be clay or clay loam which might be mixed with a sandy loam surface soil.

The simple solution to this mixing problem is the removal of the excavated spoil material from the pole site. Spoil or parent material excavated or displaced at structure locations should be removed from agricultural lands. If the landowner has not specified a disposal location on his/her property, the subsoil will be taken off the property and spread in a suitable upland location. Wis. Stats. § 182.017 (7)(c)(4) states, "In constructing and maintaining high-voltage transmission lines on the property covered by the easement the utility shall:…..Clear all debris and remove all stones and rocks resulting from construction activity upon completion of construction."

Surface and Subsurface Drainage Systems

Agricultural drainage systems are installed to convert "somewhat poorly drained", "poorly drained" and "very poorly drained" soils to the equivalent of a well drained soil to a depth equal to the root zone of the crops being grown. The effort reduces flooding and ponding, improves soil structure, provides an aerated root zone, lengthens the growing season, and increases both infiltration and permeability rates of the soil so a greater amount of rainfall is absorbed and used by the growing crops. This increases crop yields. Field operations to till, plant and harvest the crop become more efficient.

Deep or subsurface drainage systems are designed and installed to control the apparent water table at 3 to 4 feet below the soil surface to provide an aerated root zone for the crop. The most extensive systems are rectangular with the tile lines (laterals) spaced from 50 to 100 feet apart. The laterals are connected to larger tile lines (sub-mains or mains) sized to carry the water collected from the laterals to a ditch more than 4-feet deep.

Random deep drains are used in narrow low areas or to drain small depressions. Deep drains are often installed on the outer edge(s) of grass waterways to provide a solid, dry bottom so farm equipment can cross without damaging the channel. This also provides a good root zone for the grass.

ATC has indicated that "During the aerial photo review and field investigations, drain tiles were not observed or documented." (Answers of ATC LLC to 12/10/07 Questions/Comments

regarding the Paddock-to-Rockdale Project from Mike Wyatt of DATCP, 12/20/07, p.17) ATC states that it will consult with landowners about the presence of drain tiles in fields once a final route has been selected.

Before construction begins, ATC will attempt to locate all underground drainage systems in the right-of-way. When possible, the owner should provide maps that show the location of the drains.

If possible, the travel lane within the right-of-way for construction equipment should be located between two tile drains in cases where the latter run parallel to the right-of-way. If drains are encountered during the excavation for the caisson, uninterrupted flow should be assured for upstream drains, and plugs inserted in the downstream drains to prevent silt and other debris from causing permanent or temporary obstructions. The damaged drains shall be repaired and normal flows restored when the construction of the caisson is completed.

All damaged tiles should be flagged and permanently repaired after completion of construction. Repaired tiles on or adjacent to the right-of-way must be functionally equivalent to what was there prior to construction, and must consist of materials of the same or better quality. (See Wis. Stats., § 182.017(7) (c) 6.) Local tile contractors should be used wherever possible. The owner should be notified, so he / she can be present during the repair of damaged drains.

There should be provisions in the agreement with the farmer regarding the criteria used when evaluating the damage, how repairs are made and by whom, and appropriate compensation for lost production to crops off the right-of-way before repairs are made. Not all damage is apparent during the construction period. The agreement should provide a process to address damages that are detected long after construction was completed.

Soil Erosion

The soil erosion hazard for the cropland soils on the transmission line corridors ranges from none to moderate. The practices used to control erosion are conservation tillage, contour strip cropping, terraces and / or diversions, and grass waterways.

The erosion problem that may occur during the construction process is the possible rill or gully type erosion by water collecting and transporting sediment in the wheel tracks of the equipment. Tracks that run up / down the slope provide a channel the concentrates the runoff water. Temporary slope-breaking practices, such as diversions to reroute the water, can be installed to correct any problems.

Temporary erosion controls must be properly maintained on agricultural lands throughout construction and restoration. When, necessary, such devices must be reinstalled until permanent erosion controls are installed or until restoration is completed. Temporary slope breakers will be installed to redirect water off the construction right-of-way only if requested by the landowner or a land conservation department. The independent environmental inspectors will insure that they are properly installed. Outfall from them will be directed to stable well-vegetated areas. Damage to diversion terraces, grassed waterways, outlet ditches or other

conservation practices due to transmission line construction will be repaired to their pre-construction condition.

PERMANENT IMPACTS TO AGRICULTURE

The impacts discussed here are permanent to varying degrees. Many of these impacts can be avoided or mitigated by effective implementation of an Agricultural Protection Practices plan. In addition, Chapter 187.017, Wisconsin Statutes also addresses various landowner concerns regarding the proposed project.

Loss of Farmland

About 24.6 miles of the West route and 19.5 miles of the East route would cross agricultural land. All of this length will be potentially affected by replacement, removal or addition of transmission line structures through agricultural fields. However, the vast majority of the construction procedures involve replacement of existing structures in place, rather than addition of new structures.

Easements on agricultural land for the West route would involve 560.5 acres of existing easement and 6.2 acres of new easement for a total of 566.7 acres of ag land affected. The East route would involve 279.2 acres of existing ag easement and 146.9 acres of new easement for a total of 426.1 acres of ag land affected. (ATC, 2007, Attachments A-1 and A-2) However, most of the land under easement can remain in productive agricultural use.

West Route

In the case of the West (or Proposed) Route, includes replacement of existing structures and construction of new intermediate structures would be added along the 8.3 mile length of Segment 14 and along the 7.9 mile length of Segment 9. ATC does not know at this time how many additional structures would be needed here. Much agricultural land is likely to be newly impacted. Also, along about 1.5 miles of Segment 8, the existing 69 kV line, Y-12, will be re-located to new wood pole structures east of the current ones. The portion of the 69 kV line to be re-located is the part of Segment 8 north of the Sheepskin substation to the railroad. It appears that 17 of the 22 newly re-located poles would be in farmland. (See Figure 5-A, Existing Land Use for Proposed Route, p.7, Application For Certificate Of Public Convenience And Necessity, Appendix A). These re-located poles will be placed on new right-of-way beyond the 150-foot width baseline.

Along the 4.2 miles of Segment 2, either new monopole structures or new H-frames will be added adjacent to the existing H-frame structures. For the 2400 feet length for which H-frames will be added, an additional 50-foot right-of-way width will be acquired. New right-of-way would also be needed for the 1.4-mile portion of Segment 8 north of the Sheepskin Substation.

Appendix A, Figure 5-A of the ATC Application shows structures along the proposed and alternate routes, along with current land uses adjacent to the routes.

Table 8 - Extent of Lands Along the West Route Enrolled in Farmland Preservation Program			
Route Segment Label	# of Structures Along Route Segment	# of Structures for which land use along west side of Segment is Agricultural	# of Structures for which land use along east side of Segment is Agricultural
16	4	2	2
14	51	38	35
9	34	20	17
8	44	19	20
2	21	17	10
1	51	39	34
All Segments	205	135	118

Averaging the west and east side numbers for structures that would affect agricultural land, we estimate about 164 structures would impact ag land along the West route, not counting an undetermined number of intermediate structures that would be added along 16.2 miles of the route, or about 46.7 percent of the route. Of these, 17 would be new monopole structures on new right-of- way in Segments 8 and 20. New monopole structures would be added on existing right-of-way in Segment 2. Of the other 127 structures, those on Segments 14 and 9 are H-frames, which would be replaced by monopoles. On Segment 1, monopoles would replace monopoles.

East Route

The East (or Alternate) Route would include replacement of existing structures by new steel monopoles. In addition, an existing underbuilt distribution line will be relocated underground or on a separate alignment as part of the project along the 4 miles of Segment 15, the 3.9 miles of Segment 7A, and the 0.6 miles of Segment 5. Whether the underground option or the separate alignment option is chosen, much farmland would be newly impacted. Also, new monopole structures would be added along the 1.5 miles of Segment 20 and the 1.2 miles of Segment 18A. Agricultural land is unlikely to be affected along segment 20, but may be affected along segment 18A. Also, the span lengths will be reduced along the 4 miles of segment 11A and the 0.2 miles of Segment 19B, resulting in the addition and removal of some structures. Agricultural land could be affected, depending on the protocol used for structure removal.

Table 9 - Extent of Lands Along the East Route Enrolled in Farmland Preservation Program.			
Route Segment Label	# of Structures Along Route Segment	# of Structures for which land use along west side of Segment is Agricultural	# of Structures for which land use along east side of Segment is Agricultural
15	31	14	19
17	5	0	1
13	14	7	6
20	11	0	1
11A	45	6	4
19B	3	0	0
19A	5	0	0

Table 9 - Extent of Lands Along the East Route Enrolled in Farmland Preservation Program.			
Route Segment Label	# of Structures Along Route Segment	# of Structures for which land use along west side of Segment is Agricultural	# of Structures for which land use along east side of Segment is Agricultural
18B	5	4	4
18A	10	5	3
7A	30	14	10
5	7	1	4
3D	31	14	13
3C	9	6	5
3B	12	5	5
3A	16	9	5
1	51	39	34
All Segments	285	124	114

On the East Route, an estimated average of 115 replaced structures would affect farmland, not counting that three of the ten new monopole structures to be added along Segment 20 could be on agricultural land, and five of the new monopole structures to be added along Segment 18A could be on agricultural land – route segments where there is currently no transmission line and where new right-of-way would be used. This does not include any distribution line structures moved to a new alignment along Segments 15, 7A and 5, which could involve up to 29 to 33 new structures impacting farmland, based on the current land use distribution along the poles on these segments.

Agricultural engineers have developed a methodology for estimating the land lost to agricultural production due to the presence of transmission line structures in various positions within fields. Gustafson and his associates have estimated the average acreage lost to cropped fields for different type structures as follows: 81 square feet for a single pole structure; 1700 square feet for a steel lattice; and 630 square feet for an H-frame structure. (Gustafson, et.al., 1979, Table 4, p.15)

In theory, one could use these estimated figures for acreage loss per structure to compute aggregate baseline and post-project acreage loss figures under each route option. However, given the current uncertainty regarding the total number of structures that will be added and/or subtracted from the right-of-way across farmland, this estimate cannot be made.

Loss of Land that Cannot be Cropped due to the Pole Location

The permanent impacts are significant because the pole sites are either out in farm fields or along the edges of the fields. The losses include not only the pole site, but also land which can not be properly cropped in the vicinity of the pole. Annual costs are the loss of efficiency when operating equipment, loss of seed and fertilizer due to the wave action on the equipment going around the poles, and harboring weeds, insects, and disease at the pole sites.

The specific area lost to production under each scenario will depend on the crop planted, equipment used, and willingness of the farmer to risk farming closely to the pole. The single

pole structure that will be used for this project provides much less loss of farmable area than would an H-Frame or a structure with guy wires.

H-frame structures would be replaced by single steel monopoles on segments 14 and 9 of the West route, thereby benefiting farmers. However, some new structures would be added where none exist now along these segments as well. It is unclear whether there would be a net loss or gain of farmable area to farmers along these segments.

Along Segment 2 of the West Route, new H-frame type structures would be added, which would affect additional farmland beyond that currently impacted. The proposed location of new pole sites will be near some existing sites in farm fields primarily on existing right-of-way.

On the East Route, H-frames along Segment 13 and lattice structures along segments 11A, 19B, 19A, 18B, 3D and 3A would be replaced with steel monopole structures which will allow greater access to land for some farmers along these segments. However, new monopole structures will be added on segments 20, 18A and 3B. It is likely that some farm parcels will lose farmable land around these new structures on these segments. In addition, Segment 15 (4 miles), Segment 7A (3.9 miles), and Segment 5 (0.6 miles) of the East Route could relocate existing distribution lines to a new alignment, which would involve a new loss of farmable land around the relocated distribution line poles. All of these three segments – but particularly segment 15 – involve farmland that would be directly affected. In addition, span length would be reduced on segments 11A and 19B, which would mean that new farmland could be affected by land lost to working around new poles in the fields.

One study found that "about 70 percent of the costs of towers to farmers were a result of the nonproductive area created by the presence of the tower, and the remaining 30 percent comprised time lost in working around towers, crop damage, and in some cases material waste through double coverage." (Gustafson, et. Al. 1979, 1-2) Another study similarly found that loss associated with the area around the towers that couldn't be farmed made up 70 percent of total tower-induced farm costs. (Scott, 1981, 187) Comprehensive studies of the estimated costs from farming around transmission structures based on Wisconsin-specific farm operations are not available.

However, a number of such estimates were calculated based on a model for typical Montana farming operations as part of an environmental impact assessment of a transmission project there. Although this model was based on different crops from those in Wisconsin, the basic sequence of farm operations is likely to be similar to that found here. This sequence included: pesticide application, fertilizer application, planning, in-crop spraying, harvesting, and post-harvest harrowing. The model also included an estimate for labor time and equipment. It also adjusted for the presence of the structure in the field causing "overlap areas" where equipment passes through more than once. Based on 2007 prices, it estimated the annual cost of farming around a regular span mono-pole at the field edge in the range of $13 to $16 dollars per structure; a similar amount for H-frames parallel to the field edge; $40 for H-frames perpendicular to the field edge; and $177 for H-frames in the field interior; and $150 for mono-poles in the field interior. (HydroSolutions Inc. and Fehringer Agricultural Consulting Inc.,

2007, Appendix B) Elsewhere, somewhat different figures were reported for the same project simulations:

> "In brief, the consultants say that the 2007 annual costs to farm around a small monopole, a large monopole and a H-pole in the middle of a field planted with spring wheat are $105.09, $107.98 and $120.57, respectively. The costs to farm at the edge of a field for the three structures, with the H-pole built parallel to the edge, would be $13.81, $15.06 and $14.99, respectively." (Thornton, 2007)

Another study based in Ontario examined the potential yield loss for wheat, soybeans, grain corn and silage corn from working around transmission line poles in fields. Based on 1974-5 crop prices, annual economic losses from transmission poles in fields were on the order of $14 to $18 a year for twin poles in a field. (Scott, 1981, 192)

If we assume for illustrative purposes an average cost of $15 a year for working around a monopole structure at the field edge and $100 a year for working around a monopole structure in the middle of the field, we can compute an illustrative lifetime cost estimate per structure for the two cases. Assuming a discount rate based on 20-year Treasury bill rates that closely approximate the term and risk of the payments for permanent crop loss (4.5% for 12/20/07), and a 100-year stream of income losses, we calculate an estimated net present value of income lost at $1,250 per pole at field edge, and $8, 325 per pole within a field.

One study of transmission line impacts on agricultural operations found that:

> "Average added costs per structure for dryland grain production were estimated to be in the order of $30 to $35 (Canadian) in 1978-79 which amounts to approximately $50 per structure in 1982 Canadian dollar terms. If one assumes an average of 2.5 towers per quarter section (160 acres), then the annual cost to a landowner in lost agricultural productivity is $125. This loss in perpetuity at a real discount rate of 5 percent represents a reduced market value of $2,500 per quarter section from altered current land use." (Thompson, and Phillips, 1983, 33)

Wisconsin Statutes, § 187.017 (b) states: "In determining just compensation for the interest under s.32.09**,** damages shall include losses caused by placement of the line and associated facilities near fences or natural barriers such that lands not taken are rendered less readily accessible to vehicles, agricultural implements and aircraft used in crop work, as well as damages resulting from ozone effects and other physical phenomena associated with such lines, including but not limited to interference with telephone, television and radio communication."

Areas around poles where insects and weed can proliferate

Cropland areas around transmission line poles that cannot be planted can harbor pests such as weeds and insects, which could spread to other areas of the field. This potentially can affect crop production by reducing yield in areas infested by these pests. Wis. Stats. §182.017 (7)(d) states, "The utility shall control weeds and brush around the transmission line facilities. No

herbicidal chemicals may be used for weed and brush control without the express written consent of the landowner. If weed and brush control is undertaken by the landowner under an agreement with the utility, the landowner shall receive from the utility a reasonable amount for such services."

Costs of spraying around the poles to prevent weed incursions near a tower onto cropped areas depends on pesticide cost, pesticide preparation time, travel time to and from the tower, and application time. (Scott, 1981)

In addition to the localized effects around poles, linear transmission line corridors can provide paths for the introduction of weeds and invasive species into the local farm environment. In some farm environments this can cause documentable productivity losses. For example:

> "United States v. 33.5 Acres of land, a recent Ninth Circuit case, involved the reduction in value of rangeland causes by the potential of power lines for introducing knapweed into the subject property. Knapweed is a "persistent and noxious weed which has invaded large areas of western rangeland, including since 1981, [the owner's] ranch." Once introduced, knapweed is expensive to eradicate. Knapweed replaces plants eaten by livestock and, therefore, makes infested rangeland less valuable than land that is free of knapweed. The court approved the trial court's admission of expert testimony that road construction and traffic accompanying the installation of power lines introduces knapweed into uninfested areas." (Dushoff and Henslee, 1989, p. 10-18)

<u>Interference with Precision Farming</u>

There have been concerns regarding the potential for transmission line interference with precision technology that is currently used or could be used in the future. Precision agriculture requires consistent contact with satellites to determine field location.

Farmers generally apply inputs, such as fertilizer, seed, and pesticides, based on the average needs of a field. However, significant variation in soil characteristics in a field and the most economic application of these inputs often vary within any field. In some cases, the yield variation within a field can be up to 100 percent. Precision farming addresses the spatial variability within a field by adjusting for the spatial and temporal variability in growth limiting factors. It is managing fields spatially rather than on a whole field basis.

Variable technology consists of three steps: data collecting through yield monitoring, grid soil sampling, or remote sensing; analyzing the data, and generating maps that reflect the variability within a field; using GIS/GPS map-based systems in which a database can be used to identify problems in a field. Two spatial requirements are necessary for the application of precision agriculture. One requirement is the knowledge of where the farm equipment is as it moves across a field and the other is information on selected variables as a function of position within the field. These two factors are often referred to as the "where" and "what" components.

Global Positioning Systems (GPS) are used to determine the "where" component within a few meters within a field. The "what' factor involves the application of remote sensing or collecting information on a site-specific basis through grid-sampling. Precision- agriculture applications have been relatively limited till now because of the complexity and expense involved in such applications. They are found more commonly on larger farm operations.

Currently, the most common application of precision farming is to measure yield data when harvesting. Yield monitors allow farmers to measure crop yield, grain weight and harvested area. Some applications export this information to a personal computer for further analysis. The intended outcome is to enable farmers to compensate for natural and manmade types of variability that affect crop growth.

The question of whether transmission lines may have an effect on increasingly sophisticated agriculture equipment, including the GPS component of precision agriculture systems, has come up frequently in recent years. Some experts in the field have indicated that they believe that there were no effects of transmission lines on GPS, but that the issue deserves further investigation. A technician at John Deere stated that his experience suggested that transmission lines do interfere with the GPS signal, as well as stating that this issue should be formally studied, and that he would support such a study.

A Minnesota company Xcel Energy reported doing a search to find cases of interference of transmission lines with GPS equipment as part of the environmental review process for a 345 kV transmission line project. They concluded:

> "The utilities Xcel Energy contacted did not report any significant experiences or identify any written industry sources relating to interference between high voltage transmission lines and GPS units, satellite communication devices or cellular phones. Similarly, Company engineers could not identify any circumstances where persons living or working near a high voltage transmission line reported such interference with these communication devices. Rather, the Company's engineers noted that Company survey crews use GPS units. The crews routinely work along and under high voltage transmission lines, including 345 kV lines, and have not encountered interference." (State of Minnesota, 2005, Item 54)

Expert testimony by J. Michael Silva for Montana Alberta Tie Ltd. strongly supports the view that a proposed 345 kV transmission line will have no effect Global Positioning System (GPS) electronic devices associated with precision agriculture applications. In this case the concern had been that proximity to power lines may interfere with farm equipment's ability to accurately receive the satellite signals needed to guide the field position of variable-application farm equipment.
According to Silva, who did both extensive measurement and theoretical analysis to determine the possibility of transmission line impacts on GPS signals, a minimum signal-to-noise ratio must be present for the GPS to operate, and "the noise must be in the same frequency band as the GPS receiver to cause interference. As a practical matter, power lines produce little to no noise in these microwave bands." (Silva, 2007, 8) The microwave frequency of GPS satellite

signals is about 1,227 – 1575 MHz. For the same reason, differential correction signals determined from ground-reference stations are also unlikely to be affected by transmission lines. (Silva, 2007, 11)

One other possible mode of transmission line interference considered by Silva is if the overhead wires, or conductors of the line, partially blocked the satellite signals through scattering. According to Silva, "Theoretical analysis showed that this was not possible due to the small "electrical size" of power line conductors relative to a GPS signal wavelength and the large height ground of the electric wires."(Silva, 2007, 8) Silva performed multiple experiments under varied weather conditions to document the effect on GPS signal strength from driving under several large high voltage transmission lines, without finding any effect. Silva also points out that cellular phones are spectrum microwave devices similar to GPS, yet "transmission towers are commonly used for cell phone base stations." In fact, he notes:

> "Many cell phone base stations have a GPS antenna for precise network operations described above. These GPS antennas are mounted directly on high voltage transmission line towers…. The large-scale use of high voltage transmission line towers for cellular base station antennas and for mounting high accuracy GPS antennas is a practical example of modern GPS use near power lines. … Some of these GPS units are mounted inside high voltage electric power substations." (Silva, 2007)

Silva's testimony does leave room for two possible remaining ways that transmission lines could conceivably act to affect GPS-guided equipment. The first case would be if the power line tower physically blocked the line-of-sight between a fixed base station used to provide differential correction to satellite information and a mobile piece of farm equipment, just as a building or a tree might similarly block a satellite signal "depending on the relative instantaneous satellite and user positions." (Silva, 2007, 12) He sees this as highly unlikely.

The other method by which GPS might be affected, while speculative, remains worthy of further investigation. This would be through the transmission line being a media for conveyance of higher frequency harmonics of electromagnetic energy that are near to GPS frequencies.

> "Performance of GPS can be degraded due to unintentional electromagnetic energy from a variety of sources, especially those that produce higher frequency harmonics near to the GPS frequencies." (Silva, 2007, 13)

However, Silva sees it as unlikely that harmonics of the 60 Hz. frequency of power lines would be a source of GPS interference.

> "A harmonic is an integer multiple of the basic frequency at which a device is designed to operate and it is usually much lower in intensity than the primary frequency. High voltage transmission lines have very little harmonics and would not be a source of interference to GPS." (Silva, 2007, 13)

Radio frequency electric currents present on transmission lines are used for communications and remote control by electric utilities. In addition, there are many high frequency transients present on power lines originating due to switching derived from sources along the line that affect power quality. These factors may contribute to biological effects attributed to power frequency fields near transmission lines in real-life conditions. (Vignati and Giuliani, 1997) According to measurements by Vignati and Giuliani, higher frequency radio waves can induce the same level of current density at two orders of magnitude less intensity level than 60 Hz power frequency fields.

> It was shown before that passing from 50/60 Hz to100 kHz, a value of magnetic induction 20,000-fold lower, is capable of producing the same density of the capacitative component of current. This means that in passing from 50/60 Hz to 100k Hz the threshold for the same illness could be lowered from 0.2uT to values probably ranging from 10 to 100pT. Values of RF magnetic induction around these orders of magnitude are frequently found near power lines. In fact, in our experiments we found magnetic induction levels of about 50 pT 50 m from one of these lines." (Vignati and Giuliani, 1997, 1572)

Power quality issues have become an increasingly relevant factor affecting the performance of transmission lines. It is known that stray voltage on farms can be induced from transmission lines and triplen harmonics carried on distribution lines. Contributions to stray voltages are affected by factors such as the current in the transmission line, proximity to a distribution line, the length of a parallel section, soil resistivity, and the additive phase angle between induced and load currents in the grounded neutral system. (Patel and Lambert, 2006)

The transients and harmonics induced by proliferation of electronic equipment owned by property owners along or near transmission and distribution lines can contribute to induced current effects on adjacent property owners further down the line.

> “A recent area of research into NEV [neutral-to-earth voltage] relates to triplen harmonic currents flowing on distribution system neutral conductors. These odd multiples of the fundamental 60-Hz current add instead of canceling out on the neutral conductor, thereby creating harmonic NEV levels. The causes of these harmonic currents include harmonic generating equipment owned by the end user and circuit resonances created by distributed capacitor banks. Harmonics due to customer loads is expected to increase over time as more equipment such as variable frequency drive wasters and air conditioning equipment proliferate and as more televisions, PCs and other home entertainment equipment use increases.” (Dorr, 2005, 2)

Another concern has been corona generated interference of a transmission line with nearby radio and television signals. Some non-GPS components of increasingly sophisticated on-farm technologies may mimic radio and television technology. A study commissioned for a 230- kV transmission line concluded that “Corona-induced radio and television interference levels are not expected to be an issue at the 230 kV level.” (Montana Alberta Tie Ltd., 2006)

> "The most significant factor with respect to radio and television interference is not the level of the transmission line induced noise, but how it compares with the strength of the broadcast signal. Very few problems have been associated with existing 230 kV transmission line radio noise. …Television interference due to corona is usually observed only during foul weather and is generally only associated with transmission lines with voltage greater then 345 kV. In addition, modern-day cable and satellite television are not subject to corona-generated interference. …Interference of citizen's and mobile communications is usually caused by signal blocking effects. Because no lattice steel towers are planned for the line, this is not expected to be a problem. Noise in the frequency range of cellular phones is almost non-existent and the technology used by these devices is superior to that used in two-way mobile radio." (Montana Alberta Tie Ltd., 2006)

Typically, a transmission company will agree to inspect and repair any loose or damaged hardware to minimize corona effects and to take any necessary action to restore radio or TV or cellular reception to pre-project levels.

Any damages resulting from transmission line interference with GPS-based or other farm equipment would be compensable under Wis. Stats., § 182.017 (7) (b).

Risk of Damage to Machinery

Farming around transmission line poles can be difficult, particularly for larger farm equipment. Farmers may attempt to reduce the area that cannot be cropped around the pole by planting as closely as possible to the transmission line structure. This increases the likelihood of hitting the pole with farm implements. It is unlikely that the transmission line structure proposed for this project would be damaged. However, the farm implements may be damaged significantly. This impact would be especially troublesome if it occurred during crop planting or harvesting when time is especially crucial.

Aerial Application of Pesticides

The location of transmission line poles in cropland can restrict aerial application of pesticides and increase the danger of making applications. In determining just compensation for an interest under Wis. Stats. § 32.09, damages shall include losses caused by placement of the line and associated facilities near fences or natural barriers such that lands not taken are rendered less readily accessible to vehicles, agricultural implements and aircraft used in crop work, as well as damages resulting from ozone effects and other physical phenomena associated with such lines, including but not limited to interference with telephone, television and radio communication. Any transmission line interference with accessibility of aircraft for pesticide application over farmland is compensable under Wis. Stats, §182.017 (7) (b).
When agricultural pilots have to maneuver to avoid transmission lines, uneven or imprecise aerial spraying may result in: 1) some cropped areas being missed resulting in weed growth and or pest infestations that reduce yields; 2) increased cost from hand application of pesticides in "missed areas"; 3) increased risk of liability from pesticide drift on neighboring properties.

It should be noted that a Centers for Disease Control analysis of fatal injuries to pilots working in U.S. agriculture between 19921 and 2001 found that "agricultural pilots are at increased risk for fatal injury compared with pilots in all other industries." (Morbidity and Mortality Weekly Report, 2004) In addition, from 1992 to 1998, it was reported that "one third of pilot fatalities in the crop service industry resulted from aircraft contact with a tower, power line, or tree." (Suarez, 2000 cited in MMWR, 2004)

Restriction on Land Use within Easement

Permanent easements restrict certain activities on the easement area or right-of-way. Easements can be viewed as lost opportunities to the farmland owners. Compensation for easements may take this into consideration. These lost opportunities could include restriction on building construction, expansion or modification of irrigation systems, and planting of certain types of trees or other vegetation that mature to heights above those compatible with maintaining the transmission line.

The easement is a contract between ATC and the individual landowner. It will identify specifically the kinds of structures that will be placed on a given landowner's property, and the number and location of each. An example of an easement is included in Appendix 3. ATC will negotiate new easements along the entire project route, including where there is an existing easement that would permit the construction of this project.

ATC has indicated that it will send damage claims forms and closure letters to each of the affected landowners after construction is completed. ATC also has indicated that it wants to establish a positive relationship and work with landowners to try to address issues in a manner that will be satisfactory to both the landowner and ATC. DATCP suggests that one way to improve the likelihood of establishing a positive relationship with the landowner is to hire an agricultural consultant to facilitate communication between the landowners, the contractors and ATC.

In places where the new transmission line right-of-way would parallel existing road or pipeline right-of-way, the new transmission line right-of-way will usually overlay a portion of the existing right-of-way, which would reduce the amount of right-of-way that must be acquired from adjacent landowners.

An easement acquired for transmission line right-of-way does not open the right-of-way for general public access or use. Both the landowner and the easement owner have property rights in the right-of-way. These rights should be clarified in the easement contract. Landowners should review their easement contracts carefully and should consult an attorney if they unsure what they are signing.

Valuation of Transmission Line Easements

Wis. Stats. § 32.09 provides that the compensation paid for an easement is determined as the difference between the market value of the entire property of the landowner immediately before the date of evaluation, and that of the remainder immediately after that date, assuming completion of the project and taking into account not only the permanent or temporary loss of land, but any damages to the remainder. Although Wisconsin law therefore does not separate the compensation amount paid for the property interest taken (the permanent easement or temporary easements) from that due for damages to the remainder, some jurisdictions may. A number of states recognize the incorporation of damages to the remainder into a similar before and after measure of the value of the whole parcel. (Allen, 1954, 804-809) Some states have case law upholding full fee simple value for the easement area taken, while others indicated that the amount allowed was less than fee simple value of that area. (Allen, 1954, 790-795)

The burden of proof is on the landowner to demonstrate the validity of any particular item of damage as it affects market value. In Wis Stats. § 32.09 (6) (e) it specifically says the condemnor "may consider damages which may arise during construction" and alludes to damages due to any "limitations on use of the property."

In Wis Stats. § 32.09 (6)(r) owners of condemned easements on agricultural lands are also allowed the option of receiving payment in the form of an agreed-upon annual payment instead of a lump sum payment. However, if such lands revert to non-agricultural use or are rezoned out of agricultural use, these payments are discontinued.

Potential Reduction in Property Values

Numerous studies have shown there is often a small but real discount in residential property values due to the presence of transmission lines on a property. This discount appears in many peer reviewed studies comparing the market value of similar properties with and without transmission lines crossing them, but there are also a number of peer reviewed studies which show no significant difference in sale price between properties with and without a transmission tower on them. A review summarized by the Wisconsin Public Service Commission in its Final Environmental Impact Statement for the Arrowhead-Weston Electric Transmission Line Project found that the presence of a power line can reduce home values up to 14 percent, but that effects tend to decrease over time. (PSC, 2000, 214-215) Negative proximity effects on residential properties are not limited to properties actually crossed by a line. (Colwell, 1990, 127)

There is a large body of literature on the subject. The disparity in findings among various studies continues to generate controversy about the extent of such effects. Recent peer-reviewed studies tend to reinforce the 5 to 15% range for reduction in values from proximity to a power line. A 1992 survey of appraisers found average impacts estimated at a reduction of 10 percent in residential values in proximity to a line. (Delaney and Timmons, 1992) A recent study of residential subdivisions in England found reductions between 6% and 17.7% for residences near a line. (Sims and Dent, 2005, 673) A recent study of over 500 houses in the

Montreal area found 5% to 15% reductions in house prices from adjacency to a transmission line. (Des Rosiers, 2002) Another recent study of 27,000 properties in the Toronto area found a 4 to 6.2 percent reduction of power lines within 1 kilometer of a power line, after controlling for other variables. (Haider and Haroun, 1999, 22) On the other hand, another study found no significant difference in prices. (Wolerton and Bottemiller, 2003) However, the latter researchers caution that:

> "This conclusion cannot and should not be generalized outside of the data, however. The caution regarding generalization stems from the data not being a representative random sample from the counties analyzed and the four counties not being representative of other counties and/or locations. The limits on generalizations is a universal problem for real property sale data because analysis is constrained to properties that sell and sold properties are never a randomly drawn representative sample. Hence, generalization must rely on the weight of evidence from numerous studies, samples, and locations." (Wolverton and Bottemiller, 2003, 6)

The reasons given for the lower price of similar properties where a transmission line is present are often attributed to aesthetic factors, or to real or perceived health risks believed to be associated with magnetic fields associated with the lines. These two major factors have often been perceived as contributing to a potential decrease in the property value of land on which a transmission line is present.

Numerous studies have attempted to link electromagnetic radiation to health risks. Data from these studies have produced differing levels of evidence supporting or dismissing the validity of this linkage. The possible connection between electromagnetic fields and health risks could affect the real estate market, irrespective of whether this connection is established. Since it is nearly impossible to prove a negative - for example that something does not cause cancer - it is likely that the EMF controversy will not soon be resolved.

A transmission line may create a negative visual impact. This depends on the landowner's perception of the pole placement across their property, which would include each individual landowner's perception of what is visually acceptable or unacceptable.

There are of course other factors constraining the uses of parcels having transmission line structures. If a transmission line crosses farmland, such as pasture or cropland, the area between the towers can remain in farming if proper construction protocols are implemented. At the tower location however, generally a 6 foot-by-6 foot standard structure, 100 percent of the utility is lost within the base of the tower. Towers may also present an obstacle for operating farm equipment and controlling weeds at tower locations. These factors as well as any other elements unique to the property are taken into consideration to determine the loss in value within the easement area, as well as outside the easement area in cases of damages to the remainder of the parcel. Transmission line impacts on farm – as opposed to residential – property values need to be documented on a case by case basis.

We consider in more detail below the potential reduction in property values from the risk of electromagnetic field effects and from potential aesthetic impacts.

Impacts on Property Values of the Perception of Risk from Electromagnetic Fields

One area of concern with transmission line projects has been the way that the market value of the property for resale could be affected, involving the right of the landowner to sell of the property. Damages related to increased risk of economic loss associated with impairments to a property that exist or may occur are sometimes known as "stigma" damages. (Mitchell, 2000, 162-163) In many cases, landowners have sought to demonstrate that the fear of adverse heath effects from exposure to transmission line electromagnetic (EM) fields on their land contributes to reduced re-sale value for their parcel.

The majority of state courts that have considered the issue uphold the admissibility of evidence as to fear of adverse health effects of EM fields from transmission lines as a potential element affecting the market value of the property through the perceptions of buyers and sellers of land similar to that of the subject property. Within the majority of court cases, there are two main views. In the first class of jurisdictions, fear of such injury is admissible as an element affecting property values in condemnation proceedings regardless of whether there are reasonable grounds or scientific basis to the fears. This requires only a showing that the buying public is affected by such fear affecting the willingness of people to buy properties with utility easements for certain uses.

The overall majority upholds such admissibility even in the absence of any reasonable demonstrated scientific basis for such fear, as long as it can be shown that such fear operates as a real factor in marketplace transactions affecting re-sale of the property. This view characterizes courts in the states of Arkansas, California, Florida, Indiana, Iowa, Kansas, Louisiana, Missouri, New York, North Carolina, Ohio, Oklahoma, South Dakota, Virginia, and Washington as well as the Sixth Circuit Courts of Appeals. (See Jaconetty, 2001. However, Jaconetty cites evidence that this view is also the view of the New York and Florida courts, even though it doesn't include them on the list. Schutt gives a somewhat different list of states with this view: California, Florida, Georgia, Iowa, Kansas, Louisiana, Missouri, New Mexico, New York, Ohio, South Dakota, Virginia, Washington, and the Fifth and Sixth Circuit Courts of Appeals. (Schutt, 1996, 136-137; Also See Springer and Mawn, 1994, 290; Gulbis, 1983, 638, 644)

According to a recent review article, most states have rejected the view that fears must be grounded in science to be recognized as reasonable as a basis for compensation in condemnation proceedings. (Gibson, 1995, 432) A Florida Supreme Court case provides an example of this type. Expert testimony as to the reasonableness of the fear was held to be unnecessary. (See Florida Power & Light v. Jennings, 518 So.2d 895 (Fla.1987), cited in Mulhall, 1991, 925) In an Arizona case, the court held a landowner could offer proof of the likelihood of harm and how it would affect a hypothetical buyer, regardless of whether a public

fear of this harm had been documented. (145 Ariz. 151, 700 P.2d 849 (1984), cited in Springer and Mawn, 1994, p.289)

In the second category of legal cases, courts having what is known as the "intermediate view", also require that in addition to evidence that the fears affect market value, evidence must be provided that the fears are based on reason, experience or science. (Schutt, 1996; Springer and Mawn, 1994; 288; Gulbis, 1983) Courts in the nine states of Connecticut, Georgia, Kentucky, Maryland, Nebraska, New Jersey, Tennessee, Texas and Utah have taken this view according to one reviewer. (Jaconetty, 2001) Another reviewer includes the courts of Arkansas, Connecticut, Indiana, Kentucky, Nebraska, New Jersey, North Carolina, Oklahoma, Tennessee, Texas, Utah and Wyoming in this category, as well as the Ninth Circuit Court. (Schutt, 1996, 133-134)

The minority view holds that testimony as to the fear of effects from high voltage transmission lines is subjective and hence inadmissible regardless of scientific evidence. This is the position of courts in Alabama, Illinois and West Virginia. (Jaconetty, 2001; Schutt, 1996, 130) They have denied entirely that fears about transmission lines or gas pipelines are compensable. Notably absent from all these lists are the Wisconsin courts. However, the majority view mentioned earlier appears to show substantial similarity of content to that of many case law decisions in Wisconsin.

In partial takings of property, items of damage or loss are to be considered "without restriction because of enumeration" in § 32.09(6), Wis. Stats. Damages are not restricted to those items enumerated explicitly in the statute. Based on Wisconsin case law, damages can include any impact which can be shown to influence market value of the easement-encumbered land in the view of buyers and sellers of similar properties. Wisconsin case law consistently holds that any factor which can be shown to affect market value and which would influence a prudent purchaser is legally admissible unless specifically excluded by law. (Herro v. DNR, 67 Wis 2d 420(1974); Vollbrecht v. State Hwy. Commission, 31 Wis. 2d 640 (1966); Kencrete Products Co. v. State Hwy. Commission, 24 Wis.2d 359-360 (1963); Nichols, 3rd ed., Sec.12-1, pp. 12-15; Shuler, 1992, 9-12) The courts leave it in the hands of the jury to determine what factors would reasonably have been considered by a buyer. (Vollbrecht, 31 Wis.2d 645 (1966))

Aesthetics

Aesthetics are often assumed to be a factor in reducing the value of properties encumbered by a transmission line right of way. Case law has upheld in many cases the admissibility of potential negative aesthetic effects of transmission lines on the value of farm property, but only where the line is actually located on the property in question. (For examples, see 97 American Law Reporter 3d, "Unsightliness of Powerline or Other Wire, Or Related Structure, As Element of Damages in Easement Condemnation Proceeding") In other cases, courts have held that "unsightliness" was inadmissible without a showing of direct physical disturbance to the subject property resulting in damage "in excess of that sustained by the general public." (Ibid., p.594)

In general, courts require that in order to be compensable, damages suffered by a subject property must be different in kind, not merely in degree, from those suffered by the general public or other properties in the neighborhood of the line. This distinction is commonly referred to as that between "special" and "general" damages. However, the Colorado Supreme Court, deviating from prior decisions, argued that "the very nature of a power line … necessarily causes any adverse aesthetic effect of a power line to be experienced throughout the general community…. We conclude that the general damage/special damage distinction has no validity in the present context, that is, when the reduction in property value results from a taking of a portion of the land held by the property owner." (See 728 P.2d 700 (Colo. 1986), cited in Dushoff and Henslee, 1989, pp.10-14 to 10-15)

The issue of how and the extent to which subjective aesthetic concerns may affect the value of property, including farmland, may vary greatly from case to case. However, in general, there has been an evolution toward increasing public concern with or opposition to transmission lines related to their appearance. This concern is often focused on lines that go through wealthy or high-amenity urban parks or scenic rural landscapes. It is considerably less common to see it applied to flat, generic farmland typical in some parts of the country. However, in other parts of the country, like New England or certain parts of Wisconsin, farmland itself has significant scenic power and contributes to agricultural tourism and tourism generally within certain regions. The variation in attractiveness of viewsheds along a linear corridor can be mapped, and such techniques have been increasingly accepted in court decisions on appraised value of wilderness or rural properties. (Devitt, 1988; Chenoweth, 1991)

> "Whatever the nature of the landscape between the observer and the transmission line, the immediate surroundings of each tower will influence the potential visual effect magnitude of the structure." (Hadrian, Bishop and Mitcheltree, 1988, 268)

Despite utility concerns with the aesthetic impact of power lines and structures for the last 40 years, an industry survey concluded that there has been little reliable research on the subject. A 1990 report found that "the paucity and inconclusiveness of the research can be interpreted as an indication that transmission line aesthetic evaluation is an area of professional practice that is in too early a stage of development to have generated either pressures for validation or a framework for evaluation." (Priestley and Evans, 1990 cited in Tikalsky and Willyard, 2007, 31)

> "The effect of aesthetic design on public perception of electrical transmission structures remains an elusive topic. …Despite more than 40 years of research, findings relating these two subjects are far from being established as definitive." (Tikalsky and Willyard, 2007, 31)

One study based on people's ratings of scenic beauty in photos of landscapes with and without a transmission line present found that the maximum adverse impact of a tower on perceived viewshed beauty occurred at the minimum viewing distance. It generally declined with distance up to a distance of 1 kilometer, and then remained constant. (Hull and Bishop, 1988) The visual impact of a transmission tower depends on the landscape context in which it is located. The

greatest perceptual impact of a tower occurs in landscapes otherwise rated as most scenic. (Ibid., p.107, See also Dewitt, 1988))
Complicating the ability to measure the impact of transmission lines on perceived landscape scenic beauty is the difficulty in separating people's aesthetic complaints about the lines from their growing concerns and fears about the potential biological effects of EM fields around the lines. One study observed that "vague public fears about health, safety, and other environmental aspects of the transmission system often get attached to the appearance issues." (Priestley, 1984 cited in Tikalsky and Willyard, 2007, 30)

> "By the late 1980s, the EMF issue had started to erupt, and it became difficult if not impossible, to separate aesthetics-related opposition from health-related opposition. The public may not have liked the look of a line, but expressing fear regarding the potential health effects of EMF became a stronger and more compelling argument for public opposition." (Tikalsky and Willyard, 2007, 30)

One direct measure of the salience of aesthetic concerns about transmission line projects is the extent of local pressure to have the line buried underground.

> "Pressure from community groups and state regulators in some areas of the country are forcing utilities to compare the cost of constructing new overhead transmission lines versus constructing underground transmission lines." (Bradshaw, 2007)

The cost to place a transmission line underground is up to 20 times the cost of building it above ground. (Looms, 1990; Nieminen and Seppa, 1996) Also, placing powerlines underground does not shield nearby residences from magnetic field exposures. "At the center of an underground transmission line, [magnetic] fields from a buried line can actually be higher than those from an overhead line." (American Electric Power) Despite these facts, there is increasing pressure for undergrounding power lines in both urban and rural contexts.

> "Public opinion is now so powerful a force in many parts of the USA, Europe, and especially Great Britain, that the prospective visual appearance of a power line may be crucial, in deciding whether or not its construction will be allowed. For example, in some parts of England and Wales which are of outstanding natural beauty the construction of orthodox steel-towered lines, using vertical suspension strings, is not permitted. Only those constructions which are inconspicuous, both in height of tower and choice of insulator, are accepted. Similar constraints have led, in North America especially, to radical proposals for compaction of power lines and to strategic analyses of the consequences of replacing 'power corridors', in which several lines run nearly parallel, by one or two circuits at higher voltage. Underground cables have been quite widely used, especially in Great Britain, not only in urban areas but also in places where towers would be intolerable." (Looms, 1990)

As an example of efforts other than burying lines to address aesthetics consider one list of potential mitigation measures from a U.S. Forest Service Needs Assessment for a project:

> "Rerouting segments of transmission lines to areas less obtrusive. Screening of transmission line towers, substations, structures. Replacement of towers with less obtrusive structures. Siding buildings with nonreflective materials, adopt Forest Service design guidelines. Paint buildings like colors. Develop a design standard for buildings, signs, structures, etc. Bury distribution lines." (U.S. Forest Service, 1998)

Electromagnetic Fields (EMF)

Electric and magnetic fields (EMF) are produced by everything that carries or is operated by electricity. EMFs exist in the air around all electrical equipment and devices from toasters to power lines. An electric field is produced by voltage, the electrical force that causes current to flow in a conductor. Electric fields are reduced in strength (shielded) by trees and buildings. These fields are measured in units of kilovolts per meter (kV/m) or volts per meter (V/m) for weaker fields. Current, the movement of electrons in the conductor, produces a magnetic field. Magnetic fields pass through most objects including buildings. They are usually measured in units of milligauss (mG). Alternating electric fields and magnetic fields both cause induced currents.

The magnetic fields of transmission lines are relatively small compared to some other common sources. For example, at the edge of a 50-foot right-of-way for a 230 kV line, the average magnetic fields are 7 mG with peaks of 15 mG. A clothes washer ranges from 2 to 30 mG, an electric shaver from 1 to 90 mG, an electric range from 4 to 40 mG, and a hairdryer from 1 to 70 mG. Magnetic fields are directly related to the amount of current flowing on the line and transmission lines typically have higher voltages but less current flow than distribution lines. Transmission lines can have high electric fields that are dependent on the voltage of the line, distance to the line, objects in the area, and extent of the objects' grounding.

Information about the effects of EMF on human health can be found in the EMF section of the Final Environmental Impact Statement prepared by the PSCW for the Gardner Park-Central Wisconsin-Morgan-Werner West project. One summary of research findings for EMF health effects can be found in the National Institute of Environmental Health Sciences (NIEHS) study titled *Assessment of Health Effects from Exposure to Power Line Frequency Electric and Magnetic Fields*. The National Institutes of Health (NIH) published this study in June of 1998 (NIH publication number 983981). Additional research on the potential biological effects of power frequency fields, including some more recent work, is cited in a "Comments" document submitted by DATCP staff to PSC dated February 15, 2006 in response to the Arrowhead Weston Draft EIS. For more information or a copy of the report, contact DATCP at (608) 224-4645, or (608) 224-4650.

A new review and analysis of existing data on biological effects of EM fields, titled the BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electrogmagnetic Fields was recently released by an illustrious team of researchers. It argues for new regulatory limits on ELF based on "biologically relevant" levels "set below those exposure levels that have been linked in childhood leukemia studies to increased risk of disease, plus an additional safety factor." (Carpenter and Sage, 2007, 23) The report suggests "a

1 mG (0.1 uT) planning limit for habitable space adjacent to all new or upgraded power lines". The new proposed standard explicitly recognizes the non-thermal nature of many significant ELF EM biological effects.

The current consensus from most studies that have been done to assess transmission line effects in farm situations is that the electromagnetic fields generated by the transmission lines running through farms have no significant effects on crops:

- Osborn, C. Tim, et. al. (1982) "Overhead Electric Transmission Line and Support Structures: Cost and Yield Effects in the Production of Cotton and Soybeans." Journal of the American Society of Farm Managers and Rural Appraisers. Vol. 46, No. 2, October.
- Roy, W. R. and J. V. King. (1983) A Study of the Growth of Winter Wheat Near an Ultra-High Voltage Transmission Line. American Electric Power. North Liberty, Indiana.

or on livestock:

- Algers, Bo and Katarina Hennichs. (1985) "The Effect of Exposure to 400 kV Transmission Lines on the Fertility of Cows. A Retrospective Cohort Study." Preventive Veterinary Medicine. Vol. 3.
- Algers, Bo and Jan Hultgren. (1987) Effects of Long-Term Exposure to a 400 kV, 50-Hz Transmission Line on Estrous and Fertility in Cows." Preventive Veterinary Medicine. Vol. 5.
- Amstutz, Harold E. and David B. Miller (1980) "A Study of Cattle Near 765 kV Transmission Lines." International Congress on Diseases of Cattle. Vol. 1.
- Angell, R. F., et. al., (1990) "Effects of a High-Voltage Direct-Current Transmission Line on Beef Cattle Production." Bioelectromagnetics. Vol. 11.
- Ganskopp, D. C., et. al. (1989) Distribution and Behavior of Cattle Exposed to +500 kV DC Transmission Lines. Eastern Oregon Agricultural Research Center. Burns, Or.
- Ontario Hydro Environmental Resources Section. (1980) High Voltage Transmission Effects on Livestock. December.
- Mercer, Dwight. (1985) "Biological Effects of Electric Fields on Agricultural Animals." Veterinary and Human Toxicology. Vol. 27, No. 5. October.

Many of the studies that have been done were with higher voltages than those proposed in this project.

Recent more extensive laboratory controlled studies of the effects of EMF on cattle have been conducted at the specially built facility at McGill University near Montreal, Quebec. This facility was built to assess the hazards of a proposed 735 kV line to be built in Quebec. A number of papers have been developed from this work:

- Burchard, Javier F., et. Al. (1996) "Biological Effects of Electric and Magnetic Fields on Productivity of Dairy Cows." Journal of Dairy Science. Vol. 79: 1549-1554
- Burchard, Javier F., et. al. (1998) "Effect of Electric and Magnetic Fields on Nocturnal Melatonin Concentrations in Dairy Cows." Journal of Dairy Science. Vol. 81: 722-727
- Burchard, Javier F., et. al. (1998) "Effects of electromagnetic fields on the levels of

biogenic amine metabolites, quinolinic acid, and –endorphin in the cerebrospinal fluid of Dairy Cows." Neurochemical Research. Vol. 23:1527-1531

- Burchard, Javier F., et. al. (1999) "Macro- and trace element concentrations in blood plasma and cerebrospinal fluid of dairy cows exposed to electric and magnetic fields." Bioelectromagnetics. Vol. 20: 358-364
- Burchard, Javier F. (2000) "Magnetic and Electric Fields from High Tension Lines: Do They Have Any Biological Effect on Cows?" Rural Electrical Issues Conference. March 2& 3rd, 2000 Lincoln, Nebraska
- Burchard, Javier F. ,et.al. (2003) "Effect of 10kV, 30 uT, 60 Hz Electric and Magnetic Fields on Milk Production and Feed Intake in Nonpregnant Dairy Cattle." Bioelectromagnetics. Vol.24, Issue 8: 557-563.

To summarize this work, it could be stated that EMF caused a biological response in dairy cattle, affecting the production variables. However, these variables remained within the normal distribution for the population of dairy cattle in the province of Quebec. These responses were also observed in some physiological variables. These changes do not appear to represent a health hazard for exposed cattle; however, researchers involved point out the need for further research. In the 2003 study, the EMF exposure resulted in an average decrease of 4.97% in milk yield, 13.78% in fat corrected milk yield, and 16.39% in milk fat. From the small numbers used in this work, it is still unclear if there is a true biological response involved in response to EMF. Additional research is required to fully understand these interactions.

Stray Voltage

Stray voltage is defined by the PSCW as a natural phenomenon that can be found at low levels between two contact points in an animal confinement area where electricity is used. Electrical systems, including farm wiring systems and utility distribution systems, must be grounded to the earth according to the electrical safety code to ensure continuous safety and reliability.

Stray voltage often goes unnoticed by humans but can affect cows on dairy farms. Small stray voltage shocks are created when a cow makes contact between an energized point, such as a feeder, and the earth or concrete floor at a different voltage. Dairy cows can show changes in behavior or production if a level of stray voltage above a few volts is present, but these behavioral changes alone are not good indicators of the electrical situation. DATCP and the PSCW Rural Electrical Power Service (REPS) program suggest that all farmers routinely (every year or two) have their electrical system tested for stray voltage and other electrical safety concerns.

According to the PSCW docket 05-EI-106, the response level for stray voltage is 1.0 volt at cow contact from all sources. This level of stray voltage is considered to be below the level at which most cows would react. If an investigation determines that the utility is contributing 0.5 of a volt or more to the cow contact voltage, the utility will take immediate action to lower its contribution. Free investigative services are available to landowners who have livestock containment facilities. Landowners should contact their electricity provider to request such investigations prior to transmission line construction.

Distribution lines carry lower voltages (12.5 kV and lower) than transmission lines and they distribute power to neighborhoods and individual homes and businesses. Although it is not common, there is a possibility that a transmission line paralleling a distribution line may induce a measurable steady voltage or neutral to earth voltage (NEV) on the distribution neutral. There are methods that ATC can use to address this issue where transmission lines parallel distribution lines.

It is known that stray voltage can be induced from transmission lines and triplen harmonics carried on distribution lines. (Patel and Lambert, 2006) Contributions to stray voltages are affected by factors such as the current in the transmission line, proximity to a distribution line, the length of a parallel section, soil resistivity, and the additive phase angle between induced and load currents in the grounded neutral system. (Ibid.) ATC states that:

> "The transmission line may induce voltage in metal clad buildings, fences and other metallic objects in close proximity to the line. Wis. Stats. §182.01 (7)(c)8 requires a transmission owner, in constructing a high voltage line on property covered by an easement, to supply and install any necessary grounding of a landowner's fences, machinery and buildings. ATC will comply with this requirement in constructing this project." (Answers of ATC LLC to 12/10/07 Questions/Comments regarding the Paddock-to-Rockdale Project from Mike Wyatt of DATCP, 12/20/07, p.18)

Transmission lines that do not parallel distribution lines (for example that are perpendicular) have been shown capable of inducing stray voltage but the amount is less than where the transmission line parallels a distribution line. In one study, measurements indicated that a transmission line contributed about 73% of a residential customer's stray voltage. It was found that "Stray voltages due to induction can be significantly higher compared to those due to load currents." (Patel and Lambert, 2006)

Stray voltage is possible on occasion if another long and inadequately grounded metal structure such as fencing, water piping, a gas line, etc. runs parallel to the transmission line and is connected to a building that houses livestock.

The Institute of Electrical and Electronics Engineers (IEEE) created a working group on stray voltage in 2005 to coordinate ongoing studies and develop guidelines. (IEEE, 2005) The Electric Power Research Institute has a research program related to neutral to earth voltage issues (NEV) in urban areas, noting that it is becoming a more prevalent issue.

> "Elevated Neutral to Earth and Urban Stray Voltages is an EPRI research project intended to support testing, measurement and mitigation of some of the common types of contact voltages around swimming pools, pipelines, animal contact areas and in urban locations." (EPRI, 2001)

Some of the specific topics relevant to this AIS which inform the EPRI research program include the following (Ibid.):

- Power circuit resonance conditions creating magnified neutral-to-earth voltage potentials
- Animal contact area related to health and productivity impacts
- Impacts of power-line carrier communication technologies and other transient switching devices on the magnitudes of stray voltage.
- Voltages on rail, gas and water line installations near power line right of ways
- Contributions of transmission lines to elevated NEV levels at animal contact areas
- Harmonic neutral currents interfering with the operation of signals at railroad crossings
- Harmonic neutral currents interfering with telecommunication circuits
- Nonlinear impacts of voltage waveforms and voltage magnitudes on humans and animals

Crop Rotations

The most common rotation is 2 - 3 years of field corn, followed by soybeans, and then 3 years of alfalfa for the livestock (beef and dairy) farms. There is a trend toward fewer livestock operations and more cash grain (corn and soybean) farms.

The construction activity across a field may cause farmers to alter the rotation. A farmer may plant an extra year of row crop and delay planting the field to alfalfa if construction will occur in the seeding year. Given the high cost of seeding the crop, it may pay for the operator to avoid the loss of a 25 – 40 foot strip of production across the field for 3 years, by delaying planting alfalfa for a year. One can reseed, but the effort may not be successful. But one result for a dairy operation may be a shortage of alfalfa forage (hay or silage), which results in 1) a need to buy haylage or hay or 2) a need for more corn silage, and 3) an adjustment in the programmed diet for the herd. There may be increased feed costs for buying forage or protein supplements, such as soybean oil meal.

The farmer may choose to keep a field in alfalfa an extra year, rather than move to the first year of field corn. The population of alfalfa plants in the field is reduced each year, with an increase in the percentage of grass. Without advance knowledge of the construction schedule, the farmer may not fertilize (top-dress) the forage with potassium (K2O) in the fall. The result is lower yield and poorer quality of the forage (alfalfa) than the previous year.

The farmers can make adjustments in their crop rotation, if they know the construction schedule in advance. They may wish to plant a row crop during the year of construction and the year following construction to have an additional opportunity for tillage to remove any residual effects of compaction caused by the construction equipment.

Safety Issues when Farming Near Transmission Lines

Direct Contact and Arcing

The most significant risk of injury from a transmission line is the danger of electrical contact.

Unlike the wiring in a home, the conductors of overhead transmission lines are not enclosed by an insulating material. Electrical contact between an object on the ground and an energized conductor can occur even if the two do not actually touch. In the case of high voltage lines, electricity will arc across an air gap if the object on the ground comes close enough to a conductor. The distance between an object and a transmission line needed for arcing varies with the voltage at which the line is operated. In general, the arcing distance for a 345 kV line is two to three feet and for a 115 kV line it is one to one and one half feet. However, it is recommended that objects on the ground not be raised more than 14 feet above the ground in the vicinity of any power line. The 14-foot limitation is a general rule of thumb. In some instances, it can be exceeded without any problems. Farmers should contact ATC if they need to exceed this recommendation to be sure that their situation is safe for anticipated farming activities.

Transmission circuits are built to automatically de-energize upon contact with the ground or if phase conductors are severed. Therefore, the danger of electric shock from a downed transmission line is minimal.

Farmers must be careful where transmission lines sag due to high air temperatures. In areas where the soil shifts significantly with wind, the resulting dunes can elevate the earth under a line. If the safety limit needs to be exceeded or equipment close to the height limit is routinely used under a line, - such as bale wagons, bale elevators, grain augers, cranes, or large combines, - farmers should check with ATC to confirm the necessary clearance requirements. This may include confirming that the earth-to-line distances have not changed since the line was constructed.

Injuries are more likely to occur with lower voltage power lines (12.5 kV to 115 kV) than with higher voltage lines because contact with the lower voltage lines is more likely. The electrical conductors for lower voltage lines are closer to the ground, smaller, and less noticeable. An injury from contact with a 12.5 kV line can be just as serious as that from a 500 kV line. Some general safety tips for farmers working near any power line include the following. Most of these are taken from *Farmers Urged to Watch Electrical Hazards during Harvest Season* found at www.safeelectricity.org.

- Always lower portable augers or elevators to their lowest possible level (under 14 feet) before moving or transporting and be aware of your surroundings when raising them.
- When moving large equipment or high loads near a power line, always use a spotter, someone to help make certain that contact is not made with a power line.
- Be aware of increased height when loading and transporting larger modern tractors with higher antennas.
- Never attempt to raise or move a power line to help clear a path.

- Never raise ladders, poles, pipes, or rods near power lines. Remember that nonmetallic material such as lumber, tree limbs, and hay can conduct electricity depending on moisture and dirt contamination.

From the Ozark Border Electric Cooperative website:

> "The overhead electric wires aren't the only electrical contact that can result in a serious incident. Pole guy wires are grounded to the neutral; but when one of the guy wires is broken, it can cause an electric current disruption. This can make those neutral wires anything but harmless. If you hit a guy wire and break it, call the utility to fix it. Don't do it yourself. When dealing with electrical poles and wires, always call the electric utility."

It's also important for operators of farm equipment or vehicles to know what to do if the vehicle comes in contact with a power line. It's almost always best to stay in the cab and call for help. Warn others who may be nearby to stay away and wait until the electric utility arrives to make sure power to the line is cut off.

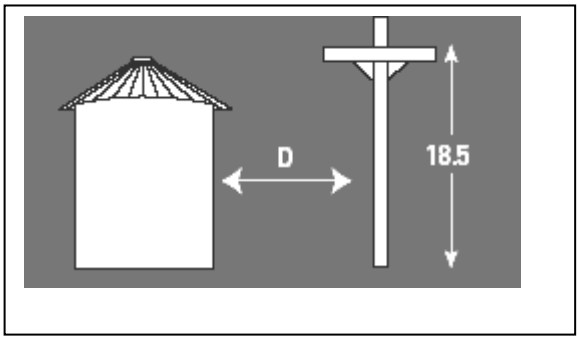
If the power line is energized and you step outside, your body becomes the path and electrocution is the result. Even if a (distribution) power line has landed on the ground, there is still the potential for the area nearby to be energized.

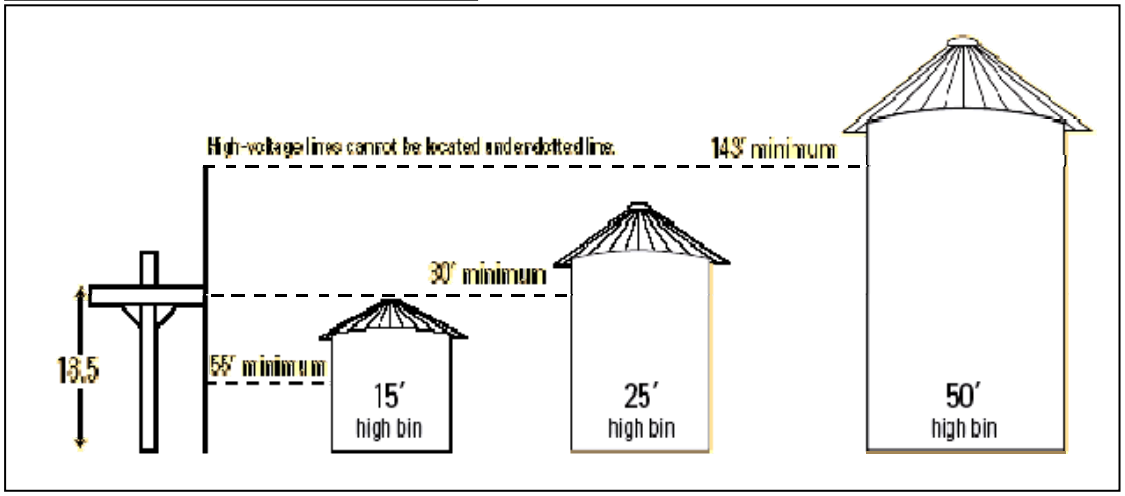
Stay inside the vehicle unless there's fire or imminent risk of fire. In that case, the proper action is to jump – not step – with both feet hitting the ground at the same time. Do not allow any part of your body to touch the equipment and the ground at the same time. Continue to shuffle or hop to safety, keeping both feet together as you leave the area. Once you get away from the equipment, never attempt to get back on or even touch the equipment. Many electrocutions occur when the operator dismounts and, realizing nothing has happened, tries to get back on the equipment."

The National Electric Safety Code requires that power lines be at least 18 feet above the highest point on any grain bin with which portable augers and other portable filling equipment is used. Figure 2 on the following page illustrates the recommended distances that grain bins should be away from transmission lines. It was taken from Alliant Energy's *Safety Notice: Grain Bin Clearance Regulations* from its Overhead Power Lines web page. Because transmission lines are not coated like electrical cords, contact with the line is dangerous. Farmers must be cautious when moving tall farm equipment like elevators and conveyors near transmission line. Adequate clearance must be maintained between farm machinery and transmission lines. An 18-foot clearance should be maintained from the highest fill port of the grain bin and the transmission lines.

Figure 2
Project Loction Map

Height of Grain Storage Structure	D= Minimum distance from line* to bin wall
15 feet	55 feet
20 feet	68 feet
25 feet	80 feet
30 feet	93 feet
35 feet	104 feet
40 feet	118 feet
50 feet	143 feet
60 feet	168 feet
70 feet	193 feet
80 feet	218 feet





According to the Bonneville Power Administration (BPA) located in the northwestern United States, "All types of irrigation systems, including center-pivot systems, can be operated safely near or on a power line right-of-way. However, irrigators should avoid situations where a solid stream of water can come in contact with a conductor, even if the possibility is remote." Also from BPA, "Caution should be used in storing, handling, and installing irrigation pipe, and in operating spray irrigation systems near power lines. Irrigation piping should be moved in a horizontal position under and near all power lines to keep it away from conductors overhead." Regarding center-pivot systems, BPA says, "Center-pivot circular irrigation systems installed near or under transmission lines can develop hazardous shock potentials during operation and maintenance. To eliminate these hazards: farmers should provide a good electrical ground for the pivot point; farmers should not touch the sprinkler pipe or its supporting structures when the system is operating under, or parallel to and near, a transmission line; and farmers should perform repairs/maintenance of the system with the sprinkler pipe perpendicular to the transmission line." This information comes from BPA's *Living and Working Safely around High-Voltage Power Lines*.

Although there has been no report of the accidental ignition of fuel caused by spark discharges induced from transmission line fields, it is recommended that vehicles be refueled at least fifty feet from the centerline of a transmission line corridor that is 345 kV or greater.

Farm Electrical Safety Resources

The following websites provide additional information about electrical safety on farms.

Alliant Energy's Overhead Power Lines Webpage: this site also includes links to information about electrical safety on farms and electrical safety around grain bins.
http://www.alliantenergy.com/docs/groups/public/documents/pub/p014716.hcsp

Safe Electricity, an Illinois project
http://www.safeelectricity.org/results.asp?ID=260&mode=print

Living and Working Safely around High-Voltage Power Lines, a publication of Bonneville Power Administration
http://www.transmission.bpa.gov/NewsEv/pdfs/LivingAndWorking.pdf

Farming Safely around Electrical Power Lines, a publication of ElectSafe
http://www.elecsafe.info/images/farmer_safety_booklet.pdf

Static Discharge

Under certain conditions, a perceptible electrostatic voltage can be induced on such objects as large vehicles, permanent and temporary fences, metal buildings, shade cloth support structures used in ginseng gardens, or irrigation systems. This can happen when the object is near a high-voltage transmission line and is insulated from the ground. When a person or animal touches the object, a shock will be felt similar to what you may receive when you cross a carpet and then touch a doorknob. The static discharge is momentary, but can be painful. The magnitude of the static discharge depends on the voltage of the transmission line, distance from the conductors, size or length of the object, its orientation to the line, and the extent of grounding of the object to the earth.

This condition can be corrected by effectively grounding the object to the earth. Sometimes this is simply done by dragging a chain behind a tractor. Irrigation systems, metal buildings, and long wire fences may require additional assistance from ATC to remove the nuisance static discharges if they are close to the right-of-way.

Induced Internal Currents

An internal electric voltage and current is induced in any conducting object such as a plant or an animal that is in an AC electric or magnetic field. These fields are also referred to as electromagnetic fields (EMF). Induced internal current is one of the primary mechanisms by

which EMF from power lines could cause a biological response. Unlike a static discharge or stray voltage, the level of the induced internal current density does not usually reach a sufficient level to cause a perceivable shock.

Some of the many factors that influence the induced current densities are the strength of the electric field, the shape of the body in the field, the cross-sectional areas at any point between the line and the earth, the extent of grounding of the object to earth, and the nature of the internal structures of the object.

Corrosion on buried pipelines running parallel to a transmission line can occur if those pipelines are not properly grounded. This occurs where pipelines and transmission lines share a portion of their rights-of-way. Transmission lines can induce voltages on a nearby pipeline, which could lead to corrosion of the pipeline. This problem has been made worse by improvements in coatings that reduce the number of imperfections on the surface of a pipeline, which reduces the number of grounding opportunities. The problems of induced voltages and pipeline corrosion can be reduced by properly grounding the pipeline and providing adequate distance between the power line conductors and the pipeline.

Temporary Access for Maintenance and Repair

ATC will notify landowners and renters in person about one week or more before any scheduled maintenance starts. Landowners and renters who live out of the area will receive written notification via mail. In cases where ATC does not know who is renting an affected agricultural parcel, notification of the renter will occur after the owner is contacted. For emergency repairs, landowners and renters will normally be contacted afterwards.

After maintenance or repairs are completed, a representative from ATC's real estate department will contact landowners and renters to establish compensation for damages. Damage payments for crops are based on the most up-to-date commodity prices and the condition of the affected area.

Biosecurity

ATC will use farm mitigation practices that focus on avoiding contact with livestock and manure. Compensation could be offered to the agricultural landowner for not spreading manure during this period. If avoidance is not possible, ATC will work with the farmers to develop protocols specific to a landowner's farm operation. These protocols may include removal of manure, organic material, and soil from tires where equipment crosses land containing livestock or manure.

If the PSCW approves the project, ATC has indicated that it will work with the agricultural producers along the approved route to follow any farm disease mitigation practices currently in place on the affected farms. The least expensive method to minimize the spread of agricultural diseases and pests would be to isolate the property within the proposed easement and remove it from agricultural production during the construction period. However, this may be problematic

especially given that from start to completion, line construction may take several months. Compensation could be offered to the agricultural landowner for not spreading manure during this period. Other options include the use of cleaning stations. The need for and location of cleaning stations would be determined by ATC during discussions with each landowner.

Mats are often used to reduce compaction from heavy equipment traveling on the transmission line right-of-way. Given that these mats may be moved as sequential operations proceed along the project route, they could provide an avenue for disease or contaminant transmission between farm sites. Therefore, it is essential when these mats are moved that appropriate protocols be in place to prevent disease transmission risks. Contractors and crews must be trained to observe necessary precautions when moving equipment or mats to such farm sites in order to avoid adverse impacts to farm operations.

Impacts on Forested Land

Affected forest land owners will maintain ownership of any trees that need to be cut as a result of the proposed project. The manner in which these trees are handled should be negotiated between ATC and the affected landowner before construction begins. Typically, any timber or saw logs are stacked on the edge of the right-of-way in upland locations for the landowner's disposition. Smaller diameter trees and limbs, often referred to as slash, are usually chipped and disposed of according to the landowner's wishes: spread on the right-of-way, piled on the edge of the right-of-way for the landowner's use, or disposed of according to other agreed-upon arrangements. Slash may also be disposed of by burning, but local permits may be required for this.

When right-of-way is cleared on forest land, the contractor may use a technique called feathering. This means that the right-of-way is not left with a straight, abrupt edge along the cleared area. Instead, trees are cut in a manner that leaves a staggered edge. This may reduce the potential for degrading the quality of the remaining forest by reducing the amount of sunlight and wind in the remaining forest. Increased sunlight and wind can cause changes in the microclimate along the cleared edge of a forest. Feathering may also soften the visual impacts of right-of-way clearing. Planting low-growing trees and shrubs along forested edges of cleared right-of-way can have positive effects similar to feathering.

Impacts to Farm Buildings

ATC has stated that no farm buildings or residences will be acquired for the current project. ATC also did an inventory of the number of farmsteads along the various alternative project routes where buildings would be within 100 feet of the proposed right-of-way centerline. This was based on 2005 National Agriculture Imagery Program (NAIP) photography and field observations during June to August 2006. Four farm-related buildings were noted that would be within 100 feet of the West (or Proposed) route centerline: three metal sheds used for equipment storage (Segment 8 and Segment1) and a commercial kennel (Segment 9). Five farm-related buildings would be within 100 feet of the East (or Alternate) route centerline: a

dairy barn (Section 15); two buildings for goats or other animals (Segment 13); an unused animal building (Segment 7A); and a metal shed used for equipment storage (Segment 1).

NEGOTIATION PROCESS FOR ESTABLISHING THE AMOUNT OF COMPENSATION

After ATC receives approval for its application and the PSC issues the order to build the project, they will begin contacting landowners to inform them of the PSC order and to request surveying permission. ATC has said that they will try to work with landowners to address their concerns. However, if landowners don't respond to ATC's contact attempts, the company will not know what concerns landowners might have. ATC's offer of compensation should be based on the fair market value of the easement to be acquired and any damages to the remaining parcel. If easement negotiation is not possible, ATC may seek condemnation of the easements needed.

If an easement is acquired through condemnation, the court assigns the legal obligations. Under a court-ordered settlement, ATC may not have flexibility when addressing individual landowner concerns ATC has said it would still be willing to work with the landowners in such cases. The "Landowner Bill of Rights" still applies on condemned land. But if condemnation is used, it doesn't result in an easement contract between ATC and the landowner. It results in a court decision instead.

Refer to Appendix 2 for the complete text of the "Landowners' Bill of Rights" and Appendix 3 for a sample easement.

CONCLUSIONS AND RECOMMENDATIONS

As discussed in this AIS, there are a variety of temporary, permanent, and potentially temporary but possibly permanent adverse impacts to agricultural land and operations that can occur as a result of the Paddock to Rockdale transmission line construction project. ATC has stated that ag lands will be restored "to the extent practicable" (ATC Application, p.53) and that ATC will work with property owners "to the extent practicable." It has stated that "ATC will work with landowners to reduce impacts" in Farmland Preservation areas, "where practicable". (ATC Application, p. 54) ATC indicated that it will employ environmental monitors who "will have knowledge and experience with procedures used for agricultural protection." (Answers of ATC LLC to 12/10/-07 Questions/Comments regarding the Paddock-to-Rockdale Project from Mike Wyatt of DATCP, dated 12/20/07, p.13)

> "Environmental monitors will be involved in decisions made in the field and landowners will be consulted regarding work done on their properties." (Ibid., p.17)

However, ATC notes that: "The extent to which environmental monitors' and landowners' recommendations will be taken into account may vary in each case depending on site-specific circumstances." (Ibid.) Therefore, ATC has considerable leeway in the application of protective measures to assure the integrity of agricultural lands crossed by the project.

To address landowner concerns for protecting their agricultural land, it is crucial that any relevant easement conditions be incorporated into the construction line list for the project, and that all contractors, subcontractors, crews and inspectors are advised of the necessity of conforming to such site-specific protective requirements. ATC states:

> "Site-specific information regarding construction impacts on agricultural lands will be included in the CMP [Construction Management Plan]. For example, if a bio-security issue exists on a particular property and it is determined that an access shift is necessary of if additional bio-security procedures need to be implemented , then this information will be incorporated in the CMP and compliance with such procedures will be inspected by the Environmental monitors." (Answers of ATC LLC to 12/10/17 Questions/Comments regarding the Paddock-to-Rockdale Project from Mike Wyatt of DATCP, 12/20/07, p. 20)

Such site-specific information and easement requirements also need to be incorporated into the construction line list.

The DATCP recommends the following as ways to mitigate the potential adverse impacts associated with the proposed project:

1. If this project is approved, ATC should construct as much as possible of the chosen lines when the ground is frozen. This will minimize soil compaction and reduce the risk of spreading diseases and pests between farms.

2. ATC will offer to have an agricultural specialist available meet with the farmland owner if requested.

3. Information from the pre-construction farm interviews should be incorporated into the bid packages and line lists used by the contractors and inspectors.

4. ATC should consult with affected farmland owners to determine the least damaging locations for transmission support structures. DATCP supports ATC's plans to use single-pole structures rather than H-frames or lattice structures and to remove existing support structures where they are no longer needed.

5. If ruts are created in the portion of the right-of-way that crosses farmland, ATC should make reasonable attempts to restore the affected soils as quickly as possible.

6. Landowners who will have easements acquired for the proposed project should be familiar with the "Landowners' Bill of Rights" which is found in §182.017 (7) and also included in Appendix 2. ATC may ask landowners to waive some or all of the rights listed in this statute, but the landowners are not required to waive any of these rights.

7. The county conservationists for the project area should be consulted to ensure that construction proceeds in a manner that minimizes drainage problems, crop damage, soil compaction, and soil erosion on adjacent farmland.

8. All farmland owners and operators should be given advance notice of acquisition and construction schedules so that farm activities can be adjusted accordingly. To the extent feasible, the timing of the acquisitions and construction by ATC and its contractors should be coordinated with landowners to minimize crop damage and disruption of farm operations.

9. ATC should strip and segregate the topsoil over and around all excavation sites on the project to assure that the topsoil is not mixed with lower quality subsoil and underlying parent material.

10. ATC should make sure that all excavated glacial till and other spoil material is removed from the site and not deposited over, or mixed with, the topsoil in the fields surrounding the excavation site, except where the landowner has made other arrangements with ATC.

11. Wherever ATC is removing transmission structures, they must be sure to replace the newly created space where the poles were with imported topsoil of a quality similar to that of the adjacent farm fields.

12. ATC should make sure that its construction monitors are adequately trained, experienced and knowledgeable in agricultural issues and practices, and in "state of the art" measures to prevent and mitigate damage to agricultural land during transmission projects.

13. ATC should implement comprehensive training to all construction supervisors, inspectors and crews to assure they understand in a practical way the best management practices and other steps needed to optimally protect the integrity of agricultural lands during project construction and restoration.

14. ATC should ensure that its contractors and subcontractors incorporate all necessary site-specific easement conditions to protect agricultural resources, as well as all statutory requirements and PSC permit conditions regarding agricultural land protection into its construction line list, and into any bid documents for the project.

Landowners should follow the guidelines listed below when workng around power lines:

1. Check for overhead power lines before lifting or clearing debris from irrigation pipes.

2. Never stack hay bales or other items under overhead power lines.

3. Do not spray water on power lines or equipment. For irrigation systems, there may be a safety problem with arcing across the "air gap" because the end guns spray a stream of water much higher than the desired 15-foot maximum height under the transmission

line. The problem can handled by carefully orienting the "end guns" so they are not operating near the transmission line.

4. Keep farm machinery away from power lines, poles and guy wires (the support cables for power poles). If you strike a guy wire or pole, call your power company immediately, you may have weakened the structure or created slack in the line.

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Appendix 1
Agricultural Impact Statements

The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) is required to prepare an Agricultural Impact Statement (AIS) whenever more than five acres of land from at least one farm operation will be acquired for a public project if the agency acquiring the land has the authority to use eminent domain for the acquisition(s). The DATCP has the option to prepare an AIS for projects affecting five or fewer acres from each farm. An AIS would be prepared in such a case if the proposed project would have significant effects on a farm operation. The agency proposing the acquisition(s) is required to provide the DATCP with the details of the project and acquisition(s). After receiving the needed information, DATCP has 60 days to analyze the project's effects on farm operations, make recommendations about it and publish the AIS. DATCP will provide copies of the AIS to affected farmland owners, various state and local officials, local media and libraries, and any other individual or group who requests a copy. Thirty days after the date of publication, the proposing agency may begin negotiating with the landowner(s) for the property.

Section 32.035 of the *Wisconsin Statutes:* Agricultural impact statement.

(1) Definitions. In this section:
(a) "Department" means department of agriculture, trade and consumer protection.
(b) "Farm operation" means any activity conducted solely or primarily for the production of one or more agricultural commodities resulting from an agricultural use, as defined in s. 91.01 (1), for sale and home use, and customarily producing the commodities in sufficient quantity to be capable of contributing materially to the operator's support.
(2) EXCEPTION. This section shall not apply if an environmental impact statement under s. 1.11 is prepared for the proposed project and if the department submits the information required under this section as part of such statement or if the condemnation is for an easement for the purpose of constructing or operating an electric transmission line, except a high voltage transmission line as defined in s. 196.491(1)(f).
(3) PROCEDURE. The condemnor shall notify the department of any project involving the actual or potential exercise of the powers of eminent domain affecting a farm operation. If the condemnor is the department of natural resources, the notice required by this subsection shall be given at the time that permission of the senate and assembly committees on natural resources is sought under s. 23.09(2)(d) or 27.01(2)(a). To prepare an agricultural impact statement under this section, the department may require the condemnor to compile and submit information about an affected farm operation. The department shall charge the condemnor a fee approximating the actual costs of preparing the statement. The department may not publish the statement if the fee is not paid.

Appendix 2
Wisconsin Statutes Section 182.017
"Landowners' Bill of Rights"

(7) High-voltage transmission lines. Any easement for rights-of-way for high-voltage transmission lines as defined under s. 196.491(1)(f) shall be subject to the conditions and limitations specified in this subsection.

(a) The conveyance under ch. 706 and, if applicable, the petition under s. 32.06(7), shall describe the interest transferred by specifying, in addition to the length and width of the right-of-way, the number, type and maximum height of all structures to be erected thereon, the minimum height of the transmission lines above the landscape, and the number and maximum voltage of the lines to be constructed and operated thereon.

(b) In determining just compensation for the interest under s. 32.09, damages shall include losses caused by placement of the line and associated facilities near fences or natural barriers such that lands not taken are rendered less readily accessible to vehicles, agricultural implements and aircraft used in crop work, as well as damages resulting from ozone effects and other physical phenomena associated with such lines, including but not limited to interference with telephone, television and radio communication.

(c) In constructing and maintaining high-voltage transmission lines on the property covered by the easement the utility shall:

1. If excavation is necessary, ensure that the top soil is stripped, piled and replaced upon completion of the operation.
2. Restore to its original condition any slope, terrace, or waterway which is disturbed by the construction or maintenance.
3. Insofar as is practicable and when the landowner requests, schedule any construction work in an area used for agricultural production at times when the ground is frozen in order to prevent or reduce soil compaction.
4. Clear all debris and remove all stones and rocks resulting from construction activity upon completion of construction.
5. Satisfactorily repair to its original condition any fence damaged as a result of construction or maintenance operations. If cutting a fence is necessary, a temporary gate shall be installed. Any such gate shall be left in place at the landowner's request.
6. Repair any drainage tile line within the easement damaged by such construction or maintenance.
7. Pay for any crop damage caused by such construction or maintenance.
8. Supply and install any necessary grounding of a landowner's fences, machinery or buildings.

(d) The utility shall control weeds and brush around the transmission line facilities. No herbicidal chemicals may be used for weed and brush control without the express written consent of the landowner. If weed and brush control is undertaken by the landowner under an agreement with the utility, the landowner shall receive from the utility a reasonable amount for such services.

(e) The landowner shall be afforded a reasonable time prior to commencement of construction to harvest any trees located within the easement boundaries, and if the landowner fails to do so, the landowner shall nevertheless retain title to all trees cut by the utility.

(f) The landowner shall not be responsible for any injury to persons or property caused by the design, construction or upkeep of the high-voltage transmission lines or towers.

(g) The utility shall employ all reasonable measures to ensure that the landowner's television and radio reception is not adversely affected by the high-voltage transmission lines.

(h) The utility may not use any lands beyond the boundaries of the easement for any purpose, including ingress to and egress from the right-of-way, without the written consent of the landowner.

(i) The rights conferred under pars. (c) to (h) may be specifically waived by the landowner in an easement conveyance

Appendix 3 - Sample ATC Transmission Line Easement

Document Number

ELECTRIC TRANSMISSION LINE EASEMENT
CERTIFICATE OF COMPENSATION
NOTICE OF RIGHT OF APPEAL
Wis. Stat. Sec. 182.017(7)

The undersigned Grantor(s) _____ **(hereinafter called the "Landowner"),** in consideration of the sum of one dollar ($1.00) and other good and valuable consideration, receipt of which is hereby acknowledged, does hereby grant, convey and warrant unto **American Transmission Company LLC, a Wisconsin limited liability company, hereinafter called the "Grantee",** its successors, assigns, licensees and manager, the perpetual right and easement to construct, install, operate, maintain, repair, replace, rebuild, remove, relocate, inspect and patrol a line of structures, comprised of wood, concrete, steel or of such material as Grantee may select, and wires, including associated appurtenances for the transmission of electric current, communication facilities and signals appurtenant thereto, upon, in, over and across property owned by the Landowner in the _____ **of** _____, **County of** _____, **State of Wisconsin, described as follows:**

(Add description of land and description of easement strip)

The location of the easement strip is as shown on the attached drawing, marked Exhibit "C", and made a part of this document.

The easement has the following specifications:

EASEMENT STRIP:

Length _____

Width _____

TRANSMISSION STRUCTURES:

Number _____

Maximum height above existing ground level _____feet

TRANSMISSION LINES:

Maximum nominal voltage _____ kV

Number of circuits _____

Number of conductors _____

Number of static wires _____

Minimum height above existing landscape (ground level) _____

Record this document with the Register of Deeds

Name and Return Address:
American Transmission Company LLC
Attn: Real Estate Department
(add address)

Parcel Identification Number(s)

The Grantee is also granted the associated necessary rights to:

1) Enter upon the easement strip for the purposes of exercising the rights conferred by this easement. 2) Construct, install, operate, maintain, repair, replace, rebuild, remove, relocate, inspect and patrol the above described facilities and other appurtenances that the Grantee deems necessary. 3) Trim, cut down and remove any or all brush, trees and overhanging branches now or hereafter existing on said easement strip. 4) Cut down and remove such trees now or hereafter existing on the property of the Landowner located outside of said easement strip which by falling might interfere with or endanger said line(s), together with the right, permission and authority to enter in a reasonable manner upon the property of the Landowner adjacent to said easement strip for such purpose.

The Grantee shall pay a reasonable sum for all damages to property, crops, fences, livestock, lawns, roads, fields and field tile (other than trees trimmed or cut down and removed), caused by the construction, maintenance, replacement or removal of said facilities.

Landowner, for itself, its successors and assigns, agrees that it will not locate any dwelling or mobile home intended for residential occupancy within the limits of the easement strip. Landowner, for itself, its successors and assigns, further agrees that within the limits of the easement strip it will not construct, install or erect any structures or fixtures, including but not limited to swimming pools, construct any non-residential type buildings or store any inflammable goods or products, plant trees or shrubs, place water, sewer or drainage facilities, or change the grade more than one (1) foot without first securing the prior written consent of the Grantee.

The parties hereto do hereby agree to the terms and conditions set forth in Exhibit "A", "B" and "___", attached hereto and incorporated herein. The term "utility" on said Exhibit "A" shall mean Grantee.

This agreement is binding upon the heirs, successors and assigns of the parties hereto, and shall run with the lands described herein.

As provided by PSC 113, the Landowner shall have a minimum period of five days to examine materials approved or provided by the Public Service Commission of Wisconsin describing the Landowner's rights and options in the easement negotiating process. The Landowner hereby voluntarily waives the five-day review period, or acknowledges that they have at least five (5) days to review such materials.

Landowner warrants and represents that Landowner has good title to the property described herein, free and clear from all liens, except: _____

The Landowner hereby accepts a lump sum payment in consideration of the grant of this easement.

WITNESS the signature(s) of the Landowner this _____ day of _____, 200__.

_____(SEAL) Signature	_____(SEAL) Signature
_____ Printed Name	_____ Printed Name
_____(SEAL) Signature	_____(SEAL) Signature
_____ Printed Name	_____ Printed Name

Landowner

Printed Name of Mortgagee or Corporation

_____(SEAL) Signature	By _____ Signature
_____ Printed Name	_____ Printed Name
	Attest:
_____(SEAL) Signature	By _____ Signature
_____ Printed Name	_____ Printed Name

Mortgagee

ACKNOWLEDGEMENT

STATE OF WISCONSIN)
) ss
COUNTY OF)

Personally came before me this _____ day of _____, 200__, the above named _____ to me known to be the person(s) who executed the foregoing instrument and acknowledged the same.

_____
Signature of Notary

_____
Printed Name of Notary

Notary Public, State of Wisconsin

My Commission expires (is) _____

ACKNOWLEDGEMENT

STATE OF WISCONSIN)
: SS
COUNTY OF_____)

Personally came before me this _____ day of _____, 200__, the above named _____to me known to be the person(s) who executed the foregoing instrument and acknowledged the same.

_____
Signature of Notary

_____
Printed Name of Notary

Notary Public, State of _____

My Commission expires (is) _____

ACKNOWLEDGEMENT

STATE OF WISCONSIN)
: SS
COUNTY OF _____)

Personally came before me this _____ day of _____, 200__, _____ President, and _____, of the above named corporation, known to me to be the persons who executed the foregoing instrument and to me known to be such _____ President and _____ of said corporation, and acknowledged that they executed the foregoing instrument as such officers, as the deed of said corporation, by its authority.

_____
Signature of Notary

_____
Printed Name of Notary

Notary Public, State of _____

My Commission expires (is) _____

EXHIBIT "A"
[WI Sta. 182.017(7)]

1. In constructing and maintaining high-voltage transmission lines on the property covered by the easement, the utility shall:

   a) If excavation is necessary, ensure that the topsoil is stripped, piled and replaced upon completion of the operation.

   b) Restore to its original condition any slope, terrace, or waterway, which is disturbed by the construction or maintenance.

   c) Insofar as is practicable and when the Landowner requests, schedule any construction work in an area used for agricultural production at times when the ground is frozen in order to prevent or reduce soil compaction.

   d) Clear all debris and remove all stones and rocks resulting from construction activity upon completion of construction.

   e) Satisfactorily repair to its original condition any fence damaged as a result of construction or maintenance operations. If cutting a fence is necessary, a temporary gate shall be installed. Any such gate shall be left in place at the Landowner's request.

   f) Repair any drainage tile line within the easement damaged by such construction or maintenance.

   g) Pay for any crop damage caused by such construction or maintenance.

   h) Supply and install any necessary grounding of a Landowner's fences, machinery or buildings.

2. The utility shall control weeds and brush around the transmission line facilities. No herbicidal chemicals may be used for weed and brush control without the express written consent of the Landowner. If weed and brush control is undertaken by the Landowner under an agreement with the utility, he shall receive from the utility a reasonable amount for such services.

3. The Landowner shall be afforded a reasonable time prior to commencement of construction to harvest any trees located within the easement boundaries, and if he fails to do so, he shall nevertheless retain title to all trees cut by the utility.

4. The Landowner shall not be responsible for any injury to persons or property caused by the design, construction or upkeep of the high-voltage transmission lines or towers.

5. The utility shall employ all reasonable measures to ensure that the Landowner's television and radio reception is not adversely affected by the high-voltage transmission lines.

6. The utility may not use any lands beyond the boundaries of the easement for any purpose, including ingress to and egress from the right-of-way, without the written consent of the Landowner.

ADDENDUM

The undersigned Landowner, this _____ day of _____ , 200__, does hereby waive the rights provided in the following paragraphs of this Exhibit "A": _____

The right, permission and authority is granted to Grantee to apply chemicals for the purposes of brush control in said easement strip.
The right, permission and authority is also granted to Grantee to enter in a reasonable manner upon the property of Landowner outside of said easement strip for the further purpose of access to said strip of land to construct, erect, operate, maintain and replace said electric transmission line facilities.

Witness:

_____ _____
Signature

_____ _____
Signature
Landowner

EXHIBIT "B"

CERTIFICATE OF COMPENSATION

SECTION 32.06 (2A) WISCONSIN STATS.

DATED THIS _____ DAY OF _____ , 200__ .

Pursuant to Section 32.06(2a) notice is hereby given of the acquisition of a certain easement attached hereto and made a part hereof by this reference. The names of all persons or parties having an interest of record in the property affected by such easement immediately prior to the acquisition of the easement are the following:

Landowner:

Mortgagee(s):

Land Contract Vendor(s):

Others:

Such easement grants unto Grantee, its successors and assigns, the right, permission and authority to construct, maintain and operate (an) electric transmission line(s) for the purpose of transmitting electric energy, communications and signals upon, in, over and across the easement strip as described on the instrument to which this exhibit is attached.

The total consideration paid for such easement was $ _____ .

NOTICE OF RIGHT OF APPEAL

In accordance with Section 32.06 (2a) Wisconsin Stats., any of the above named persons or parties shall have six (6) months from the date of the recording of this certificate to appeal the amount of compensation herein stated by filing a petition with the Judge of the Circuit Court of _____ County, Wisconsin, who shall assign the matter to the Chairperson of the County Condemnation Commissioners for hearing under Sub. (8). Notification of such petition shall be made to all persons or parties having an interest of record in the above property, and the procedures prescribed under Subs. 9 (a) and (b), 10, 12 and Chs. 808 and 809 shall govern such appeals.

This instrument drafted by _____ on behalf of American Transmission Company, PO Box 47, Waukesha, Wisconsin 53187-0047.

Appendix 4 – ATC Agricultural Inventory/Issue Identification

AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

ATC AGRICULTURAL INVENTORY/ISSUE IDENTIFICATION

ATC Number: **Line Designation:** Saukville to St. Lawrence Date: _____, 2007

LANDOWNER INFORMATION:

OWNER:

Address , ,

Phone #

TENANT:

Address

Phone #

PP Sheet(s) Structure(s) | | | | | | |

, Section , T-R

Farm Type (Dairy, Hobby, etc.) _____ Size of Farm (acres) _____

THE FOLLOWING OPERATIONS/ACTIVITIES OCCUR WITHIN THIS FARM:

Livestock:

Dairy _____ Pastured in the easement area? Yes _____ No _____

Beef _____ Pastured in the easement area? Yes _____ No _____

Other (please specify): _____ Pastured in the easement area? Yes _____ No _____

Manure Spread on Fields Yes _____ No _____

Crop Type (please specify): _____

Organic Operation? Yes _____ No _____ Specify Type: _____

Bio-security Plan? Yes _____ No _____

Other Conservation Practice: _____

May ATC restrict livestock access to work area? Yes _____ No _____

Fencing in or near easement area? Yes _____ No _____ _____
specify type of fence and attach location map:

Are there drain tile, drainage ditches, or culverts in or near the easement area? If yes, please provide copy of map or sketch of the approximate location. Yes _____ No _____

Is there an irrigation system in or near the easement area: If yes, please provide a copy of map or sketch of the approximate location. Yes _____ No _____

Soil Notes (well drained vs. wet, etc.) _____

Would you like to meet with an Agricultural Specialist? Yes _____ No _____

Other agricultural concerns to be addressed during construction:

_____

_____

Continue on attached copies if needed.

_____ _____
ATC Contractor/Representative Landowner

12/19/2007 Page 1

Appendix 5

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres					Easement Acreages		
Last Name	**First Name**	Agricultural Acreage	Undeveloped	Agricultural Forest	Other	Total	**Existing**	**New**	**TOTAL**
American Transmission Company LLC		0	0	0	35.9	35.9	2.3	0	2.3
Hanewall Farms Inc.		264.0	5.0	0	5.1	274.1	13.1	0	13.1
Green Valley Farms		115.0	1.0	0	0.0	116.0	2.8	0	2.8
Bliss	Craig & Virginia	8.9	0	0	1.0	9.9	0.6	0	0.6
Koeshall	William & Ruthanne	8.9	0	0	1.0	9.9	0.6	0	0.6
Beeler	Daniel & Barbara	43.0	0	0	0.7	43.7	3.4	0	3.4
Didier	Craig & Virginia	8.9	0	0	1.0	9.9	0.6	0	0.6
Jones Jr	Ronald & Dawn	8.9	0	0	1.0	9.9	0.6	0	0.6
Cain Sr	Major & Maxine	37.0	1.0	0		38.0	2.3	0	2.3
Mathews	Gloria	20.0	0	0	0	20.0	1.5	0	1.5
Sprackling Saunders - Trustee	Nellie	37.0	1.0	0	2.0	40.0	2.3	0	2.3
Polky	Richard & Carol	7.8	0	0	1.4	9.2	0.8	0	0.8
Wright	Michael & Heather	18.8	0	0	1.0	19.8	2.3	0	2.3
Haney	Johnny & Jeanie	72.0	5.0	0	1.5	78.5	4.8	0	4.8
Fink	James & Fay	15.8	0	0	2.0	17.8	1.5	0	1.5
Rykowski	Max & Alvetta	75.0	1.0	0	1.0	77.0	1.1	0	1.1
Heffel	William & Evelyn	38.0	0	0	1.9	39.9	4.5	0	4.5
Wells	Melvin & Tamra	8.0	0	0	1.8	9.8	1.1	0	1.1
Walker	Darby & Ranae	13.0	1.0	0	6.0	20.0	3.4	0	3.4
Hughes	Whilden	197.7	3.2	0	0	200.9	10.1	0	10.1
Anderson	Larry & Patti	34.3	2.4	33.0	2.0	71.7	5.2	0	5.2
Hughes	Whilden & Judith	80.0	0	0	0	80.0	12.3	0	12.3
Noss	Sidney	100.8	16.7		2.0	119.5	9.0	0	9
Case	John	54.0	0	6.4		60.4	13.6	0	13.6
Compton	Stephen	173.0	63.9			236.9	13.6	0	13.6
Reilly	William	47.8	40.0			87.8	4.5	0	4.5
Bergendal	Rick & Mary	92.7	1.0			93.7	9.1	0	9.1
O'Leary	Bryce & Keith	113.5	5.5		1.0	120.0	9.1	0	9.1
O'Leary	Timothy	93.0	3.0	25.0	1.0	122.0	4.5	0	4.5
Lewis	John & Janice	56.2	9.1	10.0		75.3	4.5	0	4.5
Murray	James & Margo	71.6	6.6		1.0	79.2	4.6	0	4.6
Connell	Dean & Elizabeth	101.9	11.6		2.0	115.5	8.9	0	8.9
Weis	John	228.4	4.5		4.0	236.9	13.6	0	13.6
Rebout & Sons Farm	Roger	106.6	16.0			122.6	5.3	0	5.3
Willing	Dale	72.3	2.3		2.5	77.1	3.8	0	3.8
Schmidley	Michael & Kathryn	35.4	0.8		2.5	38.7	0.7	0	0.7
Frank	Donald & Bruce	100.0	0			100.0	11.4	0	11.4
Wegner	Richard	0	0		4.9	4.9	2.1	0	2.1
Rebout & Sons Farm	Roger	191.5	2.0		4.0	197.5	13.6	0	13.6
Krebs	Wesley & Jean	149.3	1.0			150.3	7.8	0	7.8
HSBC Bank USA		0				0	NON AGRICULTURAL		
Krebs	Wesley & Jean	71.0	2.0			73.0	4.5	0	4.5
Ellison	Delores	79.0	1.0			80.0	4.5	0	4.5

Appendix 5

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres					Easement Acreages		
Last Name	**First Name**	Agricultural Acreage	Undeveloped	Agricultural Forest	Other	Total	**Existing**	**New**	**TOTAL**
Stier Ltd Partnership		77.0	3.0			80.0	4.5	0	4.5
Clark		0				0	NON AGRICULTURAL		
Fewell		0				0	NON AGRICULTURAL		
Blum		0				0	NON AGRICULTURAL		
Terpstra		0				0	NON AGRICULTURAL		
Palan		0				0	NON AGRICULTURAL		
Hoesly		0				0	NON AGRICULTURAL		
Harper		0				0	NON AGRICULTURAL		
Krauter		0				0	NON AGRICULTURAL		
Bauer		0				0	NON AGRICULTURAL		
Grorud		0				0	NON AGRICULTURAL		
Gloede		0				0	NON AGRICULTURAL		
Budensiek		0				0	NON AGRICULTURAL		
Madson Living Trust	Mark	43.5				43.5	2.8	0	2.8
American Transmission Company LLC		4.4				4.4	4.5	0	4.5
Reilly	Gaylen & Carol	24.2	0.5			24.7	2.2	0	2.2
Diehls	Kenneth & Joyce	77.4	0.8			78.2	4.5	0	4.5
Reilly	John	76.0	2.0		2.0	80.0	4.5	0	4.5
Cullen	James & Cynthia	18.0				18.0	0.9	0	0.9
Gehrig	Raymond & Audrey	18.0				18.0	0.9	0	0.9
TNT Earth LLC		18.0				18.0	0.8	0	0.8
Buttke	Scott	14.8			2.0	16.8	0.9	0	0.9
Slinden	Andrew & Melissa	15.1				15.1	1.4	0	1.4
Grand Videre Enterprise LLC		0				0	NON AGRICULTURAL		
Gehrig	Raymond & Audrey	52.2		27.4	8.0	87.6	8.2	0	8.2
Anderson	Richard & Paula					0	NON AGRICULTURAL		
Jones	Richard	0				0	NON AGRICULTURAL		
Boy Scouts of America		0				0	NON AGRICULTURAL		
Reddin	Susan & Thomas					0	NON AGRICULTURAL		
Precourt	Ernest	0				0	NON AGRICULTURAL		
Boy Scouts of America		0				0	NON AGRICULTURAL		
Garber	Gerald & Chrisine					0	NON AGRICULTURAL		
Browns Backachers LLC		0				0	NON AGRICULTURAL		
Hartzell		0				0	NON AGRICULTURAL		
Lowery		0				0	NON AGRICULTURAL		
Brewer		0				0	NON AGRICULTURAL		
Johnson		0				0	NON AGRICULTURAL		
Grassi		0				0	NON AGRICULTURAL		
Snyder		0				0	NON AGRICULTURAL		

Appendix 5

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres					Easement Acreages		
Last Name	**First Name**	Agricultural Acreage	Undeveloped	Agricultural Forest	Other	Total	**Existing**	**New**	**TOTAL**
Seyfarth		0				0	NON AGRICULTURAL		
Jacoby		0				0	NON AGRICULTURAL		
Lathrop		0				0	NON AGRICULTURAL		
Larson	David & Darlene	29.0	2.7	15.0	1.0	47.7	2.3	0	2.3
Falk	Allen	22.0	0	11.0	0	33.0	2.3	0	2.3
Sayre Farms LLC	Tom & Donna	379.3	10.5	28.4	2.0	420.2	13.8	0	13.8
Long		0				0	NON AGRICULTURAL		
Long Jr		0				0	NON AGRICULTURAL		
Sayre Farms LLC	Tom & Donna	172.4	1.9	0	0	174.3	11.2	0	11.2
Suhr		0				0	NON AGRICULTURAL		
Samuelsen	Thor & Birgit	75.0	7.0	24.3	1.0	107.3	6.4	0	6.4
Fox	Joan	0				0	NON AGRICULTURAL		
Pratt	William & Marilyn	145.0	3.0	8.5	1.0	157.5	6.8	0	6.8
Ruosch	Kenneth & Vivian	67.0	1.0	4.6	1.0	73.6	2.3	0	2.3
Geske - Witt	Douglas & Cynthia	34.0	1.0	4.9	0	39.9	2.3	0	2.3
Danielson	Ruth	107.0	6.3	9.1	1.0	123.4	6.8	0	6.8
Amundson	Rodney & Judith	130.0	19.4	4.0	1.0	154.4	4.5	0	4.5
Wileman Farms, Inc.	Howard	67.0	9.0	4.3	1.0	81.3	6.8	0	6.8
Nelson	Donald & Donna	75.0	3.0	1.0	1.0	80.0	6.1	0	6.1
Tofsland	Ione	61.0	9.4	0	1.0	71.4	1.5	0	1.5
Wisconsin Power and Light		0	0	0	40.8	40.8		0	0
Tofsland	Ione	81.6	19.2	0	2.0	102.8	7.7	0.6	8.3
Hazeltines Storage LLC		69.0	3.0	3.0	1.0	76.0	4.2	0.8	5
Jensen	Verne	148.3	3.0	2.1	3.0	156.4	7.8	1.3	9.1
Fuchs	Robert	37.9	0	0	2.0	39.9	4.5	0.9	5.4
McGuire	Robert & Tammy	86.7	2.5	2.0	3.0	94.2	3.6	0.7	4.3
Hazeltine Trust		22.5				22.5	NON AGRICULTURAL		
Nelson	Donald & Donna	28.0	8.7	0	0	36.7	2.2	0	2.2
Blihovde	Karen	14.0	0.5	0	0	14.5	0.8	0	0.8
Cook	Robert & Jane	5.7	0	0	0	5.7	0.5	0	0.5
Hermanson	Roger & Gail	68.0	2.7	0	2.0	72.7	7.7	0	7.7
Showers	Charles	53.7	4.0	0	2.0	59.7	2.4	0	2.4
BTL Ag Inc		95.6	0.5	3.0	4.0	103.1	4.8	0	4.8
Wileman Farms, Inc.	Howard	74.2	3.0	4.0	2.0	83.2	4.5	0	4.5
Brekken	David	90.7	2.3	0	2.0	95.0	9.1	0	9.1
BTL Ag Inc		40.6	0	0	0	40.6	4.5	0	4.5
Schoenfeld	William & Elizabeth	40.0	37.0	3.0	0	80.0	9.1	0.4	9.5
Crazy Acres, Inc.	James Wileman	13.9	20.5	1.0	0	35.4	7.8	1.5	9.3
Roberts	Donald	0.0				0.0	NON AGRICULTURAL		
Roy Matuszak	Eugene Wojcik &	0.0				0.0	NON AGRICULTURAL		

Appendix 5

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres					Easement Acreages		
Last Name	**First Name**	Agricultural Acreage	Undeveloped	Agricultural Forest	Other	Total	**Existing**	**New**	**TOTAL**
Crazy Acres, Inc.	James Wileman	70.4	0.5	2.3		73.2	7.6	0	7.6
Staff	Jon	0.0				0.0	NON AGRICULTURAL		
J & M Land Co		0.0				0.0	NON AGRICULTURAL		
Kohel	Betty	0.0				0.0	NON AGRICULTURAL		
Ambrose		0.0				0.0	NON AGRICULTURAL		
Lohmar		0.0				0.0	NON AGRICULTURAL		
TMT Janesville LLC		0.0				0.0	NON AGRICULTURAL		
Eastman Hunting Club Inc		8.4	0	0	0	8.4	2.1	0	2.1
Maurer	Walter	10.6	6.0	0	0	16.6	2.6	0	2.6
Ormson	Darwin & Patricia	38.0	0	0	2.0	40.0	1.9	0	1.9
Lyke	Robert & Sandra	34.0	1.3	0	1.0	36.3	4.5	0	4.5
Crazy Acres, Inc.	James Wileman	18.4	0	0	0	18.4	2.3	0	2.3
Ladd Trust		49.9	1.7	0	0	51.6	6.8	0	6.8
Crazy Acres, Inc.	James Wileman	37.8	2.5	0	0	40.3	4.5	0	4.5
Wileman	James	39.1	1.0	0	0	40.1	4.5	0	4.5
Crazy Acres, Inc.	James Wileman	38.3	1.5	0	0	39.8	4.5	0	4.5
Wileman	James	111.4	3.5	0	0	114.9	13.6	0	13.6
Crazy Acres, Inc.	James Wileman	63.7	1.7	0	0	65.4	9.1	0	9.1
Sund	Ann	17.1	3.0	0	0	20.1	2.3	0	2.3
Stolen Farms, Inc	Sidney	47.8	9.7	0	0	57.5	6.8	0	6.8
Hammes	Oren	36.6	2.0	0	2.0	40.6	4.5	0	4.5
Mickelson	Scott & Julie	117.3	1.4	0	1.0	119.7	13.6	0	13.6
Vethe	Dale & Cindy	37.0	1.0	1.1	1.0	40.1	4.5	0	4.5
Powers	Lee	40.1	0	0	0	40.1	4.5	0	4.5
Gunnelson	David	71.6	6.5	31.0	2.0	111.1	13.6	0	13.6
A & D Olson Farms	Allen & David	32.0	2.0	1.0	1.0	36.0	4.6	0	4.6
Lien and Sons, Inc	Howard	264.9	11.9	47.6	4.0	328.4	25.8	0	25.8
		7007.1	452.2	318.0	192.0	7969.3			
TOTAL ACRES							**560.5**	**6.2**	**566.7**

Appendix 6

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres							
		Agricultural		Agricultural			**Easement Acreages**		
Last Name	**First Name**	Acreage	Undeveloped	Forest	Other	Total	**Existing**	**New**	**TOTAL**
Hanewall Farms Inc.		157.0	2.2	0	0	159.2	5.4	2.7	8.1
Endthoff		0	0	0	0	0	NON-AGRICULTURAL		
Merlet Trust	Roger & Phyllis	158.0	2.0	0	0	160.0	3.0	1.5	4.5
Stankewitz	Vincent	36.0	1.0	0	0	37.0	1.5	0.8	2.3
Strom	Virginia	39.0	1.0	0	0	40.0	3.0	1.5	4.5
Olson		0				0	NON-AGRICULTURAL		
Covey		0				0	NON-AGRICULTURAL		
Arnold		0				0	NON-AGRICULTURAL		
Nitz		0				0	NON-AGRICULTURAL		
Shepardson Rev Living Trust	Chritiane	78.0	1.0	0	1.0	80.0	2.3	0.8	3.1
Rollette Trust	Ervin	152.0	1.0	0	1.0	154.0	3.0	1.0	4.0
Melby		0				0	NON-AGRICULTURAL		
Pahlas		0				0	NON-AGRICULTURAL		
Rollette		0				0	NON-AGRICULTURAL		
Rollette		0				0	NON-AGRICULTURAL		
Salzer		0				0	NON-AGRICULTURAL		
Doeden		0				0	NON-AGRICULTURAL		
Dwyer Trust	Dennis	213.0	1.6	0	0	214.6	7.1	2.8	9.9
Finley Living Trust	Laura	77.0	2.0	0	1.4	80.4	4.1	2.0	6.1
Brown Family Trust	David & Beverly	205.2	2.0	0	2.0	209.2	3.0	1.5	4.5
Scalissi	Nina	34.0	1.0	4.2	2.0	41.2	2.0	1.0	3.0
Finley Living Trust	Laura	70.7	18.0	0	0	88.7	3.3	1.6	4.9
Schmid	Ivan & Marian	55.0	1.0	0	1.2	57.2	1.5	0.8	2.3
Alverson	Edward & Marilin	31.2	64.0	0	1.1	96.3	1.8	0.9	2.7
Jones	Douglas	54.0	76.7	0	0	130.7	6.0	1.5	7.5

Appendix 6

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres							
		Agricultural		Agricultural			**Easement Acreages**		
Last Name	**First Name**	Acreage	Undeveloped	Forest	Other	Total	**Existing**	**New**	**TOTAL**
McFarlane Pheasants Inc		48.0	31.0	0	1.0	80.0	0.0	1.5	1.5
Johnson	Ruth	129.0	14.1	0	0	143.1	6.0	1.5	7.5
Cash	Francis & Rose	55.8	0.8	0	0	56.6	0.0	1.1	1.1
Salamone	Sylvester & Julaine	4.0	0	0	0.0	4.0	0.0	0.4	0.4
Sengupta	Upal & Tracy	29.3	0	0	0	29.3	1.6	1.1	2.7
Trudgeon	Michael & Paula	15.6	0	0	0	15.6	1.5	0.8	2.3
Goke	Marion	43.0	3.0	0	1.0	47.0	0.0	3.6	3.6
Van Beek	Rodney	0	33.3	0	2.0	35.3	0.0	3.1	3.1
Town of Rock		0				0	NON-AGRICULTURAL		
Hendricks		0				0	NON-AGRICULTURAL		
Lamb		0				0	NON-AGRICULTURAL		
Hendricks Land Development Co		0				0	NON-AGRICULTURAL		
Piper		0				0	NON-AGRICULTURAL		
Cleasby		0				0	NON-AGRICULTURAL		
Boudreau		0				0	NON-AGRICULTURAL		
Parkhurst		0				0	NON-AGRICULTURAL		
Rollie		0				0	NON-AGRICULTURAL		
O'Brien		0				0	NON-AGRICULTURAL		
Parkhurst		0				0	NON-AGRICULTURAL		
Childs		0				0	NON-AGRICULTURAL		
Role		0				0	NON-AGRICULTURAL		
Morris	Michael	14.0	28.0	0	0	42.0	2.8	1.4	4.2
Jones		0				0	NON-AGRICULTURAL		
Wisconsin Power and Light		0				0	NON-AGRICULTURAL		
Decker	Caryl	14.0	0	0	0	14.0	0.4	0.2	0.6

Appendix 6

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres							
		Agricultural		Agricultural			**Easement Acreages**		
Last Name	**First Name**	Acreage	Undeveloped	Forest	Other	Total	**Existing**	**New**	**TOTAL**
City of Janesville		0				0	NON-AGRICULTURAL		
Gunn		0				0	NON-AGRICULTURAL		
City of Janesville		0				0	NON-AGRICULTURAL		
Gunn	Rosemary & Kevin	7.1	0	0	0	7.1	1.7	0.8	2.5
City of Janesville		0				0	NON-AGRICULTURAL		
Abraham	Russell	0	0	0	6.7	6.7	1.7	0.9	2.6
Rebman		0				0	NON-AGRICULTURAL		
Moose Lodge		0				0	NON-AGRICULTURAL		
City of Janesville						0.0	2.0	1.8	3.8
Keenlance		0				0	NON-AGRICULTURAL		
Austin Conservancy Group	Howard & Elizabeth	71.6	3.4	0	2.0	77.0	1.5	7.9	9.4
Martelle Properties LLC		0				0	NON-AGRICULTURAL		
Marklein Builders		88.4	3.0	0	0	91.4	1.5	1.3	2.8
Austin	Howard	50.5	0	0	0	50.5	0.0	1.3	1.3
Austin Land Corp	F & Carol	135.0	2.0	0	2.8	139.8	0.0	2.5	2.5
Buehl	Kenneth & La Vaughn	75.3	1.7	0	3.0	80.0	0.0	0.8	0.8
McClusky	Geraldine	0		0	20.2	20.2	0.0	2.3	2.3
Rick	Michael & Milissa	34.0		0	4.0	38.0	2.0	4.0	6.0
Hamilton		108.8	2.0	0	1.0	111.8	4.4	3.9	8.3
Buehl	Kenneth & La Vaughn	47.4	0.5	0	3.0	50.9	1.8	1.6	3.4

Appendix 6

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres							
		Agricultural		Agricultural			**Easement Acreages**		
Last Name	**First Name**	Acreage	Undeveloped	Forest	Other	Total	**Existing**	**New**	**TOTAL**
Buehl	Kenneth & La Vaughn	69.3	0.8	7.0	3.0	80.1	2.4	2.1	4.5
City of Janesville		0	0	0	0	0	1.6	1.4	3.0
Reamer	Elsie	104.0	0	0	2.0	106.0	3.3	2.9	6.2
Schneider	Bruce & Cathy	24.5	0	0	38.3	62.8	0.9	0.8	1.7
ABC North River Hills		0				0	NON-AGRICULTURAL		
Schneider-Prochaska		0				0	NON-AGRICULTURAL		
Town of Janesville		0				0	NON-AGRICULTURAL		
Boettcher		0				0	NON-AGRICULTURAL		
Frees		0				0	NON-AGRICULTURAL		
Bonson		0				0	NON-AGRICULTURAL		
Hinds - Doerr		0				0	NON-AGRICULTURAL		
Newkirk		0				0	NON-AGRICULTURAL		
Kepp		0				0	NON-AGRICULTURAL		
Farrington	Allen & Harriet	56.6	1.0	0	0	57.6	2.8	2.6	5.4
Reams		0				0	NON-AGRICULTURAL		
Baumann		0				0	NON-AGRICULTURAL		
Morin - Siebert		0				0	NON-AGRICULTURAL		
Stapleman		0				0	NON-AGRICULTURAL		
Wisconsin Power and Light		0				0	NON-AGRICULTURAL		
Grunzel Farms Inc		224.0	3.7	0	3.0	230.7	7.3	6.4	13.7
Schambow	Richard & Judith	0	0	0	7.2	7.2	0.6	0.5	1.1
Pennycook	Jane	27.0	2.0	10.0	1.0	40.0	1.2	1.1	2.3
Squire	David & Mary	0	0	0	15.0	15.0	1.2	1.1	2.3

Appendix 6

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres							
		Agricultural		Agricultural			**Easement Acreages**		
Last Name	**First Name**	Acreage	Undeveloped	Forest	Other	Total	**Existing**	**New**	**TOTAL**
Marklein Builders		0				0	NON-AGRICULTURAL		
Martin		0				0	NON-AGRICULTURAL		
Morse & Schneider		0				0	NON-AGRICULTURAL		
McCumber		0				0	NON-AGRICULTURAL		
Kuschel		0				0	NON-AGRICULTURAL		
Schreier	William & Linda	77.8	1.2	0	1.0	80.0	2.4	2.1	4.5
Quade	Willard & James	166.5	2.0	0	0	168.5	5.5	4.8	10.3
Downing	Roger	66.0	1.0	0	1.0	68.0	1.8	1.6	3.4
Roehl		0				0	NON-AGRICULTURAL		
Martin Farm Holdings LLC	James Thorpe -	305.2	17.0	43.6	1.0	366.8	7.3	6.4	13.7
Heth Farms LLC	Dwayne	35.9	0	0	0	35.9	1.3	1.1	2.4
Campbell		0				0	NON-AGRICULTURAL		
Bank One Trust	E Moniak - J Munson	61.0	2.0	5.7	0	68.7	1.3	1.2	2.5
Lietz	Frederick	58.0	1.0	12.6	1.0	72.6	1.3	1.2	2.5
L & E Farms		23.0	19.0	42.0	0	84.0	2.4	2.1	4.5
Kutter	Joanne	10.0	20.0	46.0	2.0	78.0	3.7	5.2	8.9
Hurd Farm Inc.	Jon	41.0	11.0	64.0	0	116.0	0.0	2.4	2.4
Schuette	Todd	24.0	4.0	44.6	0	72.6	0.0	4.6	4.6
Schuette	Wayne	38.0	4.0	34.7	1.0	77.7	0.0	7.5	7.5
Rock Materials LLC	Cedar Lake Sand & Gravel	10.0	25.0	17.0	10.0	62.0	0.0	2.5	2.5
Learn		0				0	NON-AGRICULTURAL		
Yeske		0				0	NON-AGRICULTURAL		
Town of Fulton		0				0	NON-AGRICULTURAL		
Walsh - Ison		0				0	NON-AGRICULTURAL		

Appendix 6

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres							
		Agricultural		Agricultural			**Easement Acreages**		
Last Name	**First Name**	Acreage	Undeveloped	Forest	Other	Total	**Existing**	**New**	**TOTAL**
Frank	Richard & Roger	10.2	0.0	0	0	10.2	0.0	1.5	1.5
Hajas	Peter & Lori	12.0	26.0	3.5	0	41.5	1.2	4.6	5.8
Edgerton Hospital		48.0	0	22.0	0	70.0	2.0	1.7	3.7
M & I Bank		0				0	NON-AGRICULTURAL		
City of Edgerton		0				0	NON-AGRICULTURAL		
Nicks		0				0	NON-AGRICULTURAL		
Olson	Marilyn	87.7	4.0	31.0	0	122.7	3.6	3.2	6.8
Jenner	Kenneth & Jeanne	40.0	18.0	43.6	10.0	111.6	1.2	1.1	2.3
Kruckenberg	Chester	78.2	9.4	10.2	0	97.8	4.8	4.2	9.0
MLG Limited Partnership		8.0	0	0	0	8.0	0.4	0.3	0.7
Kienbaum Trust	William	43.4	1.5	0	0	44.9	1.5	1.3	2.8
City of Edgerton		21.3	0	0	0	21.3	1.4	1.2	2.6
Simmons		0				0	NON-AGRICULTURAL		
Ziliox		0				0	NON-AGRICULTURAL		
Johnson	Robert & Leona	14.9	0	4.0	0	18.9	0.3	0.2	0.5
Teubert		0				0	NON-AGRICULTURAL		
Johnson	Robert & Leona	42.0	1.0	2.0	3.0	48.0	2.0	1.8	3.8
TMT Janesville		0				0	NON-AGRICULTURAL		
Eastman Hunting Club Inc		8.4	0	0	0	8.4	2.1	0	2.1
Maurer	Walter	10.6	6.0	0	0	16.6	2.6	0	2.6
Ormson	Darwin & Patricia	38.0	0	0	2.0	40.0	1.9	0	1.9
Lyke	Robert & Sandra	34.0	1.3	0	1.0	36.3	4.5	0	4.5

Appendix 6

PADDOCK - ROCKDALE
LANDOWNER LIST WITH AGRICULTURAL ACREAGES
AND EASEMENT ACREAGES
PREFERRED ROUTE

		FARM USAGE - in acres							
		Agricultural		Agricultural			**Easement Acreages**		
Last Name	**First Name**	Acreage	Undeveloped	Forest	Other	Total	**Existing**	**New**	**TOTAL**
Crazy Acres, Inc.	James Wileman	18.4	0	0	0	18.4	2.3	0	2.3
Ladd Trust		49.9	1.7	0	0	51.6	6.8	0	6.8
Crazy Acres, Inc.	James Wileman	37.8	2.5	0	0	40.3	4.5	0	4.5
Wileman	James	39.1	1.0	0	0	40.1	4.5	0	4.5
Crazy Acres, Inc.	James Wileman	38.3	1.5	0	0	39.8	4.5	0	4.5
Wileman	James	111.4	3.5	0	0	114.9	13.6	0	13.6
Crazy Acres, Inc.	James Wileman	63.7	1.7	0	0	65.4	9.1	0	9.1
Sund	Ann	17.1	3.0	0	0	20.1	2.3	0	2.3
Stolen Farms, Inc	Sidney	47.8	9.7	0	0	57.5	6.8	0	6.8
Hammes	Oren	36.6	2.0	0	2.0	40.6	4.5	0	4.5
Mickelson	Scott & Julie	117.3	1.4	0	1.0	119.7	13.6	0	13.6
Vethe	Dale & Cindy	37.0	1.0	1.1	1.0	40.1	4.5	0	4.5
Powers	Lee	40.1	0	0	0	40.1	4.5	0	4.5
Gunnelson	David	71.6	6.5	31.0	2.0	111.1	13.6	0	13.6
A & D Olson Farms	Allen & David	32.0	2.0	1.0	1.0	36.0	4.6	0	4.6
Lien and Sons, Inc	Howard	264.9	11.9	47.6	4.0	328.4	25.8	0	25.8
TOTAL ACRES							**279.2**	**146.9**	**426.1**

Appendix 7
Soil Compaction Risk Tables

Table A-1
Paddock to Rockdale Soil Compaction Risk
Soils Along Proposed (West) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Alluvial Land	Aw	Poorly Drained	4			
Brookston Silt Loam	Br	Poorly Drained	4	Subangular Blocky17" to 30"; frim 17-21"; friable 21-30"	2	8
Casco Loam, 12 to 20 %, eroded	CaD2	Well Drained	2	Subang bl 5-18"; firm 5-14"; very friable 14-18"	2	4
Casco Loam, 20to 35 %, eroded	CaE	Well Drained	2	Subang bl 5-18"; firm 5-14"; very friable 14-18"	2	4
Colwood Silt Loam	Co	Poorly Drained	4	Subang bl 14 - 35"; friable to very friable	2	8
Dresden Silt Loam, 0 to 2 %	DrA	Well Drained	2	Subang Bl 8 - 34"; friable 8-19"; firm 19-34"	2	4
Dresden Silt Loam, 2 to 6 %	DrB	Well Drained	2	Subang Bl 8 - 34"; friable 8-19"; firm 19-34"	2	4
Dresden Silt Loam, 6 to 12 % eroded	DrC2	Well Drained	2	Subang Bl 8 - 34"; friable 8-19"; firm 19-34"	2	4
Durand Silt Loam, 0 to 2 %	DuA	Well Drained, Mod. Well Drained	2	Subang Bl 12-60"; firm 12-31"; friable 31-60"	2	4
Durand Silt Loam, 2 to 6 %, eroded	DuB2	Well Drained,Mod. Well Drained	2	Subang Bl 12-60"; firm 12-31"; friable 31-60"	2	4
Durand Silt Loam, 6 to 12 %, eroded	DuC2	Well Drained,Mod. Well Drained	2	Subang Bl 12-60"; firm 12-31"; friable 31-60"	2	4
Edmund Loam, 6 to 12 %, eroded	EdC2	Well Drained	2	Subang Bl 8-17"; firm 8-13"; very firm 13-17"	2	4
Elburn Silt Loam, 0 to 3 %	ElA	Somewhat Poorly Drained	3	Subang BL 15-45'; Prismatic 45-60'; fr 15-24" & 45-60", firm 24-45"	2	6
Gotham Loamy Sand, 2 to 6 %	GP	Somewhat Excessively Drained	1.5	Crumb Structure 7-38"; granular	1	1.5
Griswold Loam, 2 to 6%, eroded	GrB2	Well Drained	2	Subang Bl 11 to 30"; firm 11 to 26"; friable 26-30"	2	4
Griswold Loam, 6 to 12%, eroded	GrC2	Well Drained	2	Subang Bl 11 to 30"; firm 11 to 26"; friable 26-30"	2	4

Table A-1
Paddock to Rockdale Soil Compaction Risk
Soils Along Proposed (West) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Juneau Silt Loam, 0 to 3 %	JuA	Well Drained,Mod. Well Drained	2	Subang Bl 41-60"; firm 41-60"	2	4
Kane Loam, 0 tp 3 %	KaA	Somewhat Poorly Drained	3	Subang Bl 11 to 31"; Massive 31-34'; firm 17-31"; friable 11-17" & 31-34"	3	95
Kidder Sandy Loam, 2 to 6%	KdB	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Kidder Silt Loam, 2 to 6%, eroded	KeB2	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Kidder Silt Loam, 6 to 12%, eroded	KeC2	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Kidder Silt Loam, 12 to 20%, eroded	KeD2	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Kidder Silt Loam, 20 to 30%	KeE	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Lorenzo Loam, 2 to 6 %	LoB	Well Drained	2	Subang Bl 10-15"; firm 10-15"; Subang bl to granular 15-17"	2	4
Lorenzo Loam, 6 to 12 %, eroded	LoC2	Well Drained	2	Subang Bl 10-15"; firm 10-15"; Subang bl to granular 15-17"	2	4
Lorenzo Loam, 12 to 20 %	LoD	Well Drained	2	Subang Bl 10-15"; firm 10-15"; Subang bl to granular 15-17"	2	4
Mahalasville Silt Loam	Ma	Poorly Drained	4	Prismatic, parting to Subang Bl 15-33"; Prismatic 33-60"; firm 15-33"; friable 33-60"	2	8
Mahalasville Silt Loam, overwash	Mb	Poorly Drained	4	Prismatic, parting to Subang Bl 15-33"; Prismatic 33-60"; firm 15-33"; friable 33-60"	2	8
Ogle Silt Loam, 2 to 6%	OgB	Well Drained	2	Subang Bl 17-96"; firm 23-96"; friable 17-23"	2	4
Oshtemo Sandy Loam, 0 to 2 %	OoA	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4

Table A-1
Paddock to Rockdale Soil Compaction Risk
Soils Along Proposed (West) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Oshtemo Sandy Loam, 2 to 6 %	OoB	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4
Oshtemo Sandy Loam, 6 to 12 %, eroded	OoC2	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4
Oshtemo Sandy Loam, 12 to 25%, eroded	OoD2	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4
Palms Muck	Pa	Very Poorly Drained	4	massive, nonsticky	4	16
Pecatonica Silt Loam, 2 to 6 %, eroded	PeB2	Well Drained,Mod. Well Drained	2	Subangular Bl 10-66"; very firm 28-36"; firm 10-26" and 36-66"	2	4
Plano Silt Loam, 2 to 6 %	PlB	Well Drained,Mod. Well Drained	2	Subangular Bl 14-60"; firm 20-50"; friable 14-20" & 50-60"	2	4
Plano Silt Loam, 6 to 12 , eroded	PlC2	Well Drained,Mod. Well Drained	2	Subangular Bl 14-60"; firm 20-50"; friable 14-20" & 50-60"	2	4
Plano Silt Loam, gravelly substratum, 2 to 6 %	PmB	Well Drained,Mod. Well Drained	2	Subangular Bl 14-60"; firm 20-50"; friable 14-20" & 50-60"	2	4
Ringwood Silt Loam, 2 to 6 %, eroded	RnB2	Well Drained	2	Subangular Bl 14-32"; friable 14-21"; firm 21-32"	2	4
Ringwood Silt Loam, 6 to 12%, eroded	RnC2	Well Drained	2	Subangular Bl 14-32"; friable 14-21"; firm 21-32"	2	4
Rockton Loam, 2 to 6 %	RpB	Well Drained	2	Subangular Bl 10-27"; friable 10-18"; firm 18-27"	2	4
Rockton Loam, 6 to 12 %, eroded	RpC2	Well Drained	2	Subangular Bl 10-27"; friable 10-18"; firm 18-27"	2	4
Rockton Loam, 12 to 20 %, eroded	RpD2	Well Drained	2	Subangular Bl 10-27"; friable 10-18"; firm 18-27"	2	4
Rodman-Lorenzo Complex, 20 to 30 %	RrE	Excessively Well Drained	1	Subangular blocky,very friable 5-50"	2	2
Rotamer Loam, 2 to 6%, eroded	RtB2	Well Drained	2	Subangular Blocky, firm 8-19"	2	4

Table A-1
Paddock to Rockdale Soil Compaction Risk
Soils Along Proposed (West) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Rotamer Loam, 6 to 12%, eroded	RtC2	Well Drained	2	Subangular Blocky, firm 8-19"	2	4
Rotamer Loam, 12 to 20%	RtD	Well Drained	2	Subangular Blocky, firm 8-19"	2	4
St. Charles Silt Loam, gravelly substratum, 0 to 2 %	SbA	Well drained,Mod. Well Drained	2	Subangular Bl 9-65"; friable 9-37" & 60-65"; firm 22-60"	2	4
Sebewa Silt Loam	Se	Poorly Drained	4	Subangular Bl 18-30"; firm 18-30"	2	8
Sogn Loam, 2 to 6%	SoB	Somewhat Excessively Drained	2	Granular, friable, no B layer	1	2
Sogn Loam,6 to 12%, eroded	SoC2	Somewhat Excessively Drained	2	Granular, friable, no B layer	1	2
Troxel Silt Loam, 0 to 3 %	TrA	Well Drained,Mod. Well Drained	2	Granular, friable 38-46"; Subang Bl, firm 46-60"	2	4
Warsaw Silt Loam, 0 to 2 %	WaA	Well Drained	2	Subang Bl 14-36"; friable 14-19"; firm 19-36"	2	4
Warsaw Silt Loam, 2 to 6 %	WaB	Well Drained	2	Subang Bl 14-36"; friable 14-19"; firm 19-36"	2	4
Warsaw Silt Loam, 6 to 12 %, eroded	WaC2	Well Drained	2	Subang Bl 14-36"; friable 14-19"; firm 19-36"	2	4
Wauconda Silt Loam, 0 to 3 %	WcA	Somewhat Poorly Drained	3	Subang Bl 8-37"; friable 8-12" & 32-37"; firm 12-32"	2	6
Westville Loam, 2 to 6 %, eroded	WfB2	Well Drained,Mod. Well Drained	2	Subang Bl 13-83"; firm 13-48"; friable 48-83"	2	4
Westville Loam, 6 to 12 %, eroded	WfC2	Well Drained,Mod. Well Drained	2	Subang Bl 13-83"; firm 13-48"; friable 48-83"	2	4
Whalan Sandy Loam, 6 to 12 %, eroded	WhC2	Well Drained	2	Subang Bl 6-36"; friable 6-13"; firm 13-31"; very firm 31-36"	2	4
Whalan Loam, 2 to 6 %, eroded	WlB2	Well Drained	2	Subang Bl 6-36"; friable 6-13"; firm 13-31"; very firm 31-36"	2	4
Winnebago Silt Loam, 2 to 6%, eroded	WnB2	Well Drained	2	Subang Bl 11-77"; firm 11-70"; friable 70-77"	2	4

Table A-1
Paddock to Rockdale Soil Compaction Risk
Soils Along Proposed (West) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Winnebago Silt Loam, 6 to 12%, eroded	WnC2	Well Drained	2	Subang Bl 11-77"; firm 11-70"; friable 70-77"	2	4
Zurich Silt Loam, 2 to 6 %	ZuB	Well Drained,Mod. Well Drained	2	Subang Bl 6-37"; Platy 37-40"; very friable 6-12"; firm 12-37"; friable 37-40"	21	4
				Length of Soils (feet) with Definite Potential for Subsoil Compaction		10636
Total Length Along Proposed Route - Rock County				Length of Soils (feet) with Likely Potential for Subsoil Compaction		1775
				Length of Soils (feet) which May Have Potential for Subsoil Compaction		47953
				Length of Soils (feet) with No Potential for Subsoil Compaction		15861

Table A-2
Paddock to Rockdale Soil Compaction Risk
Soils Along Alternate (East) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Adrian Muck	Ad	Very Poorly Drained	4	subang blocky 4-16" & 24-32"; platy 16-24"; nonsticky sapric	2	8
Brookston Silt Loam	Br	Poorly Drained	4	Subangular Blocky17" to 30"; frim 17-21"; friable 21-30"	2	8
Casco Loam, 6 to 12 %, eroded	CaC2	Well Drained	2	Subang bl 5-18"; firm 5-14"; very friable 14-18"	2	4
Casco Loam, 12 to 20 %, eroded	CaD2	Well Drained	2	Subang bl 5-18"; firm 5-14"; very friable 14-18"	2	4
Colwood Silt Loam	Co	Poorly Drained	4	Subang bl 14 - 35"; friable to very friable	2	8
Dresden Silt Loam, 2 to 6 %	DrB	Well Drained	2	Subang Bl 8 - 34"; friable 8-19"; firm 19-34"	2	4

Table A-2
Paddock to Rockdale Soil Compaction Risk
Soils Along Alternate (East) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Dresden Silt Loam, 6 to 12 % eroded	DrC2	Well Drained	2	Subang Bl 8 - 34"; friable 8-19"; firm 19-34"	2	4
Dresden Silt Loam, 12 to 25 %, eroded	DrD2	Well Drained	2	Subang Bl 8 - 34"; friable 8-19"; firm 19-34"	2	4
Edmund Loam, 6 to 12 %, eroded	EdC2	Well Drained	2	Subang Bl 8-17"; firm 8-13"; very firm 13-17"	2	4
Elburn Silt Loam, 0 to 3 %	ElA	Somewhat Poorly Drained	3	Subang BL 15-45'; Prismatic 45-60'; fr 15-24" & 45-60", firm 24-45"	2	6
Elburn Silt Loam, overwash, 0 to 3 %	EoA	Somewhat Poorly Drained	3	Subang BL 15-45'; Prismatic 45-60'; fr 15-24" & 45-60", firm 24-45"	2	6
Eleva Sandy Loam, 6 to 12 %, eroded	EvC2	Well Drained	2	Subang Bl 6-28"; friable to very friable	2	4
Flagg Silt Loam, 2 to 6 %	FlB	Well Drained	2	Subang Bl 8 - 82"; prismatic 19-31"; v friable 8-19" & 31-45"; firm 19-31" & 45-50"	2	4
Gotham Loamy Sand, 2 to 6 %	GP	Somewhat Excessively Drained	2	Crumb Structure 7-38"; granular	1	2
Griswold Loam, 0 to 2 %	GrA	Well Drained	2	Subang Bl 11 to 30"; firm 11 to 26"; friable 26-30"	2	4
Griswold Loam, 2 to 6%, eroded	GrB2	Well Drained	2	Subang Bl 11 to 30"; firm 11 to 26"; friable 26-30"	2	4
Griswold Loam, 6 to 12%, eroded	GrC2	Well Drained	2	Subang Bl 11 to 30"; firm 11 to 26"; friable 26-30"	2	4
Juneau Silt Loam, 0 to 3 %	JuA	Well Drained,Mod. Well Drained	2	Subang Bl 41-60"; firm 41-60"	2	4
Kane Loam, 0 to 3 %	KaA	Somewhat Poorly Drained	3	Subang Bl 11 to 31"; Massive 31-34'; firm 17-31"; friable 11-17" & 31-34"	3	9
Kidder Sandy Loam, 2 to 6%	KdB	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Kidder Silt Loam, 2 to 6%, eroded	KeB2	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4

Table A-2
Paddock to Rockdale Soil Compaction Risk
Soils Along Alternate (East) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Kidder Silt Loam, 6 to 12%, eroded	KeC2	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Kidder Silt Loam, 12 to 20%, eroded	KeD2	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Kidder Silt Loam, 20 to 30%	KeE	Well Drained	2	Subang Bl 7-30"; Firm 11-28"; friable 7-11" & 28-30"	2	4
Mahalasville Silt Loam	Ma	Poorly Drained	4	Prismatic, parting to Subang Bl 15-33"; Prismatic 33-60"; firm 15-33"; friable 33-60"	2	8
Mahalasville Silt Loam, overwash	Mb	Poorly Drained	4	Prismatic, parting to Subang Bl 15-33"; Prismatic 33-60"; firm 15-33"; friable 33-60"	2	8
Marsh	Mc	Poorly Drained	4	Prismatic, parting to Subang Bl 15-33"; Prismatic 33-60"; firm 15-33"; friable 33-60"	2	8
Oshtemo Sandy Loam, 2 to 6 %	OoB	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4
Oshtemo Sandy Loam, 12 to 25%, eroded	OoD2	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4
Oshtemo Sandy Loam, 12 to 25%, eroded	OsA	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4
Oshtemo Sandy Loam, 6 to 12%,dark variant, eroded	OsC2	Well Drained	2	Subang Bl 16-34"; granular 34-45"; friable to very friable	2	4
Otter Silt Loam	Ot	Poorly Drained	4	subangular Bl 8-34"; very friable	2	8
Palms Muck	Pa	Very Poorly Drained	4	massive, nonsticky	4	16
Pecatonica Silt Loam, 2 to 6 %, eroded	PeB2	Well Drained,Mod. Well Drained	2	Subangular Bl 10-66"; very firm 28-36"; firm 10-26" and 36-66"	2	4
Pecatonica Silt Loam, 6 to 12 %, eroded	PeC2	Well Drained,Mod. Well Drained	2	Subangular Bl 10-66"; very firm 28-36"; firm 10-26" and 36-66"	2	4

Table A-2
Paddock to Rockdale Soil Compaction Risk
Soils Along Alternate (East) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Plano Silt Loam, gravelly substratum, 0 to 2 %	PmA	Well Drained,Mod. Well Drained	2	Subangular Bl 14-60"; firm 20-50"; friable 14-20" & 50-60"	2	4
Plano Silt Loam, gravelly substratum, 2 to 6 %	PmB	Well Drained,Mod. Well Drained	2	Subangular Bl 14-60"; firm 20-50"; friable 14-20" & 50-60"	2	4
Rockton Loam, 2 to 6 %	RpB	Well Drained	2	Subangular Bl 10-27"; friable 10-18"; firm 18-27"	2	4
Rockton Loam, 6 to 12 %, eroded	RpC2	Well Drained	2	Subangular Bl 10-27"; friable 10-18"; firm 18-27"	2	4
Rodman-Lorenzo Complex, 20 to 30 %	RrE	Excessively Well Drained	1	Subangular blocky,very friable 5-50"	2	2
Rodman-Lorenzo Complex, 30 to 45 %	RrF	Excessively Well Drained	1	Subangular blocky,very friable 5-50"	2	2
Rotamer Complex, 30 to 45%	RuF	Well Drained	2	Subangular Blocky, friable 3-12"	2	4
St. Charles Silt Loam, 2 to 6 %	SaB	Well drained,Mod. Well Drained	2	Subangular Bl 9-65"; friable 9-37" & 60-65"; firm 22-60"	2	4
St. Charles Silt Loam, gravelly substratum, 0 to 2 %	SbA	Well drained,Mod. Well Drained	2	Subangular Bl 9-65"; friable 9-37" & 60-65"; firm 22-60"	2	4
St. Charles Silt Loam, gravelly substratum, 2 to 6 %	SbB	Well drained,Mod. Well Drained	2	Subangular Bl 9-65"; friable 9-37" & 60-65"; firm 22-60"	2	4
Sebewa Silt Loam	Se	Poorly Drained	4	Subangular Bl 18-30"; firm 18-30"	2	8
Sisson Loam, 2 to 6 %	SkB	Well Drained	2	Subangular Bl 7-39"; firm 14-23"; friable 7-14" & 23-29"	2	4
Sogn Loam, 2 to 6%	SoB	Somewhat Excessively Drained	1.5	Granular, friable, no B layer	1	1.5
Sogn Loam, 30 to 45%	SoF	Somewhat Excessively Drained	1.5	Granular, friable, no B layer	1	1.5

Table A-2
Paddock to Rockdale Soil Compaction Risk
Soils Along Alternate (East) Route - Rock County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Troxel Silt Loam, 0 to 3 %	TrA	Well Drained,Mod. Well Drained	2	Granular, friable 38-46"; Subang Bl, firm 46-60"	1.5	3
	W					
Warsaw Silt Loam, 0 to 2 %	WaA	Well Drained	2	Subang Bl 14-36"; friable 14-19"; firm 19-36"	2	4
Warsaw Silt Loam, 2 to 6 %	WaB	Well Drained	2	Subang Bl 14-36"; friable 14-19"; firm 19-36"	2	4
Westville Loam, 0 to 2 %	WfA	Well Drained,Mod. Well Drained	2	Subang Bl 13-83"; firm 13-48"; friable 48-83"	2	4
Winnebago Silt Loam, 2 to 6%, eroded	WnB2	Well Drained	2	Subang Bl 11-77"; firm 11-70"; friable 70-77"	2	4
Worthen Silt Loam, 0 to 3 %	WoA	Well Drained,Mod. Well Drained	2	Subang Bl 24-60"; very friable to friable	2	4
Zurich Silt Loam, 0 to 2 %	ZuA	Well Drained,Mod. Well Drained	2	Subang Bl 6-37"; Platy 37-40"; very friable 6-12"; firm 12-37"; friable 37-40"	2.1	4
Total Length along Alternate Route - Rock County						
				Length of Soils (feet) with Definite Potential for Subsoil Compaction		7446.4532
				Length of Soils (feet) with Likely Potential for Subsoil Compaction		490.8232
				Length of Soils (feet) which May Have Potential for Subsoil Compaction		63321.5524
				Length of Soils (feet) with No Potential for Subsoil Compaction		12004.5073

Table A-3
Paddock to Rockdale Soil Compaction Risk
Soils on Only Proposed (West) Route - Dane County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Batavia Silt Loam, Gravelly Substratum, 0 to 2%	BbA	Well Drained	2	Subang Bl 10-36" & 44-50" with prism 36-44"; firm; v firm 44-50"	2	4
Batavia Silt Loam, Gravelly Substratum, 2 to 6%	BbB	Well Drained	2	Subang Bl 10-36" & 44-50" with prism 36-44"; firm; v firm 44-50"	2	4
Del Rey Silt Loam, 0 to 3%	DfA	Somewhat Poorly Drained	3	Subang Bl 7-44"; friable 7-9"; firm 9-44"	2	6
Dodge Silt Loam, 2 to 6%	DnB	Well Drained	2	Subang Bl 9-40"; firm 9-29"; very firm 29-44"	2	4
Dresden Silt Loam, 2 to 6%	DsB	Well Drained	2	Subang Bl 11-36"; firm 11-31"; friable 31-36"	2	4
Dresden Silt Loam, 6 to 12%, eroded	DsC2	Well Drained	2	Subang Bl 11-36"; firm 11-31"; friable 31-36"	2	4
Dunbarton Silt Loam, 20 to 30%, eroded	DuE2	Well Drained	2	Subang Bl 7 to 18"; firm 7-11"; very firm 11-15";extrem. firm 15-18"	2	4
Elburn Silt Loam, 1 to 4%	EfB	Somewhat Poorly Drained	3	Subang Bl 16-45"; firm 16-45"	2	6
Elburn Silt Loam, gravelly substratum, 0 to 3%	EgA	Somewhat Poorly Drained	3	Subang Bl 16-45"; firm 16-45"	2	6
Griswold Loam, 6 to 12%	GwC	Well Drained	2	Subang Bl 14-37"; friable 14-19" & 28-37"; firm 19-28"	2	4
Griswold Loam, 12 to 20%, eroded	GwD2	Well Drained	2	Subang Bl 14-37"; friable 14-19" & 28-37"; firm 19-28"	2	4
Kidder Loam, 6 to 12%, eroded	KdC2	Well Drained	2	Subang Bl and firm, 9 to 38"	2	4
Kidder Loam, 12 to 20%, eroded	KdD2	Well Drained	2	Subang Bl and firm, 9 to 38"	2	4
Kegonsa Silt Loam, 2 to 6%	KeB	Well Drained	2	Subang Bl and firm, 12 to 33"	2	4
Kidder Soils, 10 to 20%, eroded	KrD2	Well Drained	2	Subang Bl and firm, 9 to 38"	2	4

Table A-3
Paddock to Rockdale Soil Compaction Risk
Soils on Only Proposed (West) Route - Dane County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Marshan Silt Loam	Mc	Poorly Drained	4	Ang Bl & v firm 13-18";prismatic & firm 18-24";subang bl & friable 24-33"	2	4
McHenry Silt Loam, 2 to 6%	MdB	Well Drained	2	Subang Bl and firm, 7 to 33"	2	4
McHenry Silt Loam, 6 to 12%, eroded	MdC2	Well Drained	2	Subang Bl and firm, 7 to 33"	2	4
Montgomery Silty Clay Loam	MoA	Poorly Drained	4	Subang bl, firm 17-25"; ang bl, frim 25-43" prismatic, very firm 32-45"	2	8
Palms Muck	Pa	Very Poorly Drained	4	Subang Bl 10-18"; very friable 10-31"; play C layer 31-37"	2	8
Plano Silt Loam, 0 to 2%	PnA	Well Drained, Moderately Well Drained	2	Subang Bl or prismatic 11-46"; firm 16-33"; friable 11-16" & 33-46"	2	4
Plano Silt Loam, 2 to 6%	PnB	Well Drained, Moderately Well Drained	2	Subang Bl or prismatic 11-46"; firm 16-33"; friable 11-16" & 33-46"	2	4
Plano Silt Loam, gravelly substratum, 2 to 6%	PoB	Well Drained, Moderately Well Drained	2	Subang Bl or prismatic 11-46"; firm 16-33"; friable 11-16" & 33-46"	2	4
Radford Silt Loam, 0 to 3%	RaA	Somewhat Poorly Drained	3	Subang Bl 36 - 56"; firm 36-50"; very firm 50-56"	2	6
Ringwood Silt Loam, 2 to 6%	RnB	Well Drained	2	Subang Bl, firm 12 to 36"	2	4
Ringwood Silt Loam, 6 to 12%, eroded	RnC2	Well Drained	2	Subang Bl, firm 12 to 36"	2	4
Rockton Silt Loam, 2 to 6 %	RoB	Well Drained	2	Subang Bl 14-32"; friable 14-18"; firm 18-32"	2	4
Rockton Silt Loam, 6 to 12%, eroded	RoC2	Well Drained	2	Subang Bl 14-32"; friable 14-18"; firm 18-32"	2	4

Table A-3
Paddock to Rockdale Soil Compaction Risk
Soils on Only Proposed (West) Route - Dane County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Rockton Silt Loam, 12 to 30%, eroded	RoD2	Well Drained	2	Subang Bl 14-32"; friable 14-18"; firm 18-32"	2	4
Sable Silty Clay Loam, 0 to 3%	SaA	Poorly Drained	4	Subang or prismatic, firm 19-42"	2	8
St. Charles Silt Loam, 0 to 2%	ScA	Poorly Drained	4	Subang or prismatic, firm 19-42"	2	8
St. Charles Silt Loam, 2 to 6%	ScB	Poorly Drained	4	Subang or prismatic, firm 19-42"	2	8
Troxel Silt Loam, 1 to 4%	TrB	Well Drained	2	Subang Bl 28-60"; friable 28-31"; firm 31-60"	2	4
Virgil Silt Loam, 1 to 4%	VrB	Somewhat Poorly Drained	3	Subang Bl 9-56"; firm 9-30" &44-56"; very firm 30-44"	2	6
Virgil Silt Loam, gravelly substratum, 0 to 3%	VwA	Somewhat Poorly Drained	3	Subang Bl 9-56"; firm 9-30" &44-56"; very firm 30-44"	2	6
Wacousta Silty Clay Loam	Wa	Poorly Drained	4	Subang Bl, firm 12-21"	2	8
Whalan Silt Loam, 2 to 6%	WxB	Well Drained	2	Subang Bl, firm 10-27"	2	4
Whalan Silt Loam, 6 to 12%, eroded	WxC2	Well Drained	2	Subang Bl, firm 10-27"	2	4
				Length of Soils (feet) with Definite Potential for Subsoil Compaction		6635
Total length				Length of Soils (feet) with Likely Potential for Subsoil Compaction		4721

Table A-3
Paddock to Rockdale Soil Compaction Risk
Soils on Only Proposed (West) Route - Dane County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
				Length of Soils (feet) which May Have Potential for Subsoil Compaction		42767
				Length of Soils (feet) with No Potential for Subsoil Compaction		0

Table A-4
Paddock to Rockdale Soil Compaction Risk
Soils on Only Alternate (East) Route - Dane County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Batavia Silt Loam, Gravelly Substratum, 0 to 2%	BbA	Well Drained	2	Subang Bl 10-36" & 44-50" with prism 36-44"; firm; v firm 44-50"	2	4
Batavia Silt Loam, Gravelly Substratum, 2 to 6%	BbB	Well Drained	2	Subang Bl 10-36" & 44-50" with prism 36-44"; firm; v firm 44-50"	2	4
Del Rey Silt Loam, 0 to 3%	DfA	Somewhat Poorly Drained	3	Subang Bl 7-44"; friable 7-9"; firm 9-44"	2	6
Dodge Silt Loam, 2 to 6%	DnB	Well Drained	2	Subang Bl 9-40"; firm 9-29"; very firm 29-44"	2	4
Dresden Silt Loam, 2 to 6%	DsB	Well Drained	2	Subang Bl 11-36"; firm 11-31"; friable 31-36"	2	4
Dresden Silt Loam, 6 to 12%, eroded	DsC2	Well Drained	2	Subang Bl 11-36"; firm 11-31"; friable 31-36"	2	4
Dunbarton Silt Loam, 20 to 30%, eroded	DuE2	Well Drained	2	Subang Bl 7 to 18"; firm 7-11"; very firm 11-15";extrem. firm 15-18"	2	4
Elburn Silt Loam, 1 to 4%	EfB	Somewhat Poorly Drained	3	Subang Bl 16-45"; firm 16-45"	2	6
Elburn Silt Loam, gravelly substratum, 0 to 3%	EgA	Somewhat Poorly Drained	3	Subang Bl 16-45"; firm 16-45"	2	6
Griswold Loam, 6 to 12%	GwC	Well Drained	2	Subang Bl 14-37"; friable 14-19" & 28-37"; firm 19-28"	2	4
Griswold Loam, 12 to 20%, eroded	GwD2	Well Drained	2	Subang Bl 14-37"; friable 14-19" & 28-37"; firm 19-28"	2	4
Kidder Loam, 12 to 20%, eroded	KdD2	Well Drained	2	Subang Bl and firm, 9 to 38"	2	4
Kegonsa Silt Loam, 2 to 6%	KeB	Well Drained	2	Subang Bl and firm, 12 to 33"	2	4

Table A-4
Paddock to Rockdale Soil Compaction Risk
Soils on Only Alternate (East) Route - Dane County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Kidder Soils, 10 to 20 %, eroded	KrD2	Well Drained	2	Subang Bl and firm, 9 to 38"	2	4
Marshan Silt Loam	Mc	Poorly Drained	4	Ang Bl & v firm 13-18";prismatic & firm 18-24";subang bl & friable 24-33"	2	4
McHenry Silt Loam, 2 to 6%	MdB	Well Drained	2	Subang Bl and firm, 7 to 33"	2	4
McHenry Silt Loam, 6-12%, eroded	MdC2	Well Drained	2	Subang Bl and firm, 7 to 33"	2	4
McHenry Silt Loam, 12-20%, eroded	MdD2	Well Drained	2	Subang Bl and firm, 7 to 33"	2	4
Montgomery Silty Clay Loam	MoA	Poorly Drained	4	Subang bl, firm 17-25"; ang bl, frim 25-43" prismatic, very firm 32-45"	2	8
Orion Silt Loam, wet	Os	Somewhat Poorly Drained	3	Platy (buried soil) friable 4-15"; friable 15-31"subang bl (A layer) 37-44"	3	9
Plano Silt Loam, 0 to 2%	PnA	Well Drained, Moderately Well Drained	2	Subang Bl or prismatic 11-46"; firm 16-33"; friable 11-16" & 33-46"	2	4
Plano Silt Loam, 2 to 6%	PnB	Well Drained, Moderately Well Drained	2	Subang Bl or prismatic 11-46"; firm 16-33"; friable 11-16" & 33-46"	2	4
Plano Silt Loam, gravelly substratum, 2 to 6%	PoB	Well Drained, Moderately Well Drained	2	Subang Bl or prismatic 11-46"; firm 16-33"; friable 11-16" & 33-46"	2	4
Radford Silt Loam, 0 to 3%	RaA	Somewhat Poorly Drained	3	Subang Bl 36 - 56"; firm 36-50"; very firm 50-56"	2	6
Ringwood Silt Loam, 2 to 6%	RnB	Well Drained	2	Subang Bl, firm 12 to 36"	2	4

Table A-4
Paddock to Rockdale Soil Compaction Risk
Soils on Only Alternate (East) Route - Dane County

Soil Map Unit	musym	Drainage Class	Assigned Drainage Factor	Subsoil Structure Description	Assigned Structure Factor	Compaction Index
Ringwood Silt Loam, 6 to 12%, eroded	RnC2	Well Drained	2	Subang Bl, firm 12 to 36"	2	4
Rockton Silt Loam, 2 to 6 %	RoB	Well Drained	2	Subang Bl 14-32"; friable 14-18"; firm 18-32"	2	4
Rockton Silt Loam, 6 to 12%, eroded	RoC2	Well Drained	2	Subang Bl 14-32"; friable 14-18"; firm 18-32"	2	4
Rockton Silt Loam, 12 to 30%, eroded	RoD2	Well Drained	2	Subang Bl 14-32"; friable 14-18"; firm 18-32"	2	4
Sable Silty Clay Loam, 0 to 3%	SaA	Poorly Drained	4	Subang or prismatic, firm 19-42"	2	8
St. Charles Silt Loam, 2 to 6%	ScB	Poorly Drained	4	Subang or prismatic, firm 19-42"	2	8
Troxel Silt Loam, 1 to 4%	TrB	Well Drained	2	Subang Bl 28-60"; friable 28-31"; firm 31-60"	2	4
Virgil Silt Loam, gravelly substratum, 0 to 3%	VwA	Somewhat Poorly Drained	3	Subang Bl 9-56"; firm 9-30" &44-56"; very firm 30-44"	2	6
Whalan Silt Loam, 2 to 6%	WxB	Well Drained	2	Subang Bl, firm 10-27"	2	4
Whalan Silt Loam, 6 to 12%, eroded	WxC2	Well Drained	2	Subang Bl, firm 10-27"	2	4
Total Length				Length of Soils (feet) with Definite Potential for Subsoil Compaction		1446
				Length of Soils (feet) with Likely Potential for Subsoil Compaction		2182
				Length of Soils (feet) which May Have Potential for Subsoil Compaction		39105
				Length of Soils (feet) with No Potential for Subsoil Compaction		0
				Topsoil <= 12 in.		

Appendix 8
AMERICAN TRANSMISSION COMPANY

AGRICULTURE PROTECTION PRACTICES

Paddock Rockdale 345 kV Access Project

Introduction

ATC has developed a process for identifying potential impacts to each farm property along a transmission route. In general, this process includes working with the landowner first and completing a field assessment before determining the appropriate farm protection practices in agreement with that landowner. Our intent, as we implement this practice, is to consider cost, project schedule and individual landowner contracts and agreements in the decision-making process.

The actual expected practices would vary according to:

- The activities of the landowner and the farm operator.
- The type of agricultural operation.
- The susceptibility of site-specific soils to compaction.
- The degree of construction occurring on the parcel.
- The ability to avoid areas of potential concern.

The details of ATC's proposed process have been outlined by the company in the following steps.

Step 1: Background site information

The company will coordinate with landowners to obtain information regarding farm operation, locations of farm animals and crops, current farm biological security practices, landowner concerns, other structures in relation to the ROW, and potential access routes. This information will be used by ATC to identify potential constraints along the ROW that could determine the placement of access roads and construction staging or material laydown areas.

Step 2: Site assessment

The company may also conduct site assessments surveys along the ROW to gather information required to determine potential constraints along the ROW. During the site assessment, the suitability of locations for potential access roads, staging or laydown areas, and the need for site-specific agricultural protection measures will be assessed. The property will be assessed through site visits or by using available information such as aerial photos, agency or organization information, and the results of the off-site surveys. In addition, during the easement acquisition process, ATC ROW agents will document the type of agricultural operations and any landowner concerns regarding impacts to their property.

Step 3: Development of agricultural avoidance and protection measures

Avoidance and protection methods will be identified based on the issues or concerns identified by the landowner, landowner agreement, information gathered in Steps 1 and 2, site conditions, and

costs. ATC field inspectors, construction supervisors, and contractors will work proactively to develop and utilize additional methods or measures to prevent or minimize impacts that are cost-effective and that allow the project to continue on schedule.

Agricultural Avoidance and Protection Measures

The methods used to minimize impacts to agricultural land have been developed based on ATC's field experience with transmission line construction on agricultural lands and discussions with DATCP.

To address concerns regarding animal and crop disease or impacts to organic farms, the following protection measures may be utilized:

- Avoidance of areas of concern by obtaining alternate access
- Working with landowners to alter farming practices (an example would include changing the timing of manure spreading)
- Use of exclusion methods such as fencing
- Use of barriers between construction equipment and agricultural land (examples include construction matting, ice roads in winter)
- Physical removal of potential contaminants from the access path or construction equipment

To address impacts to agricultural soils, the following methods may be utilized:

- Avoidance of areas where impacts may occur by altering access routes
- Use of existing roads or lanes utilized by the landowner (subject to written permission from the landowner)
- Use of construction matting or ice roads to minimize compaction, soil mixing, significant rutting, or damage to existing drainage ways and tiles
- Use of low ground pressure and or tracked equipment to minimize rutting and soil compaction
- Time construction activities to occur during dry or frozen conditions
- Use of de-compaction methods as appropriate (chisel plowing)

Step 4: Implementation and Monitoring

Before construction begins, ATC will consult again with the tenant and/or landowner to determine if they have any additional agricultural impact concerns. Pertinent information about farming practices would be documented. Then, site-specific construction details would be further developed, based on this consultation and construction site conditions.

For example, if the landowner has implemented or requests specific protection measures, those measures will be documented and implemented where practicable. Site-specific protection practices developed as a result of this consultation will be incorporated into construction documents and provided to the construction coordinator or supervisor, construction crews, and environmental monitor.

The construction coordinator and ATC environmental monitors will be responsible for the inspection and monitoring of the proposed agricultural protection practices during construction.

GLOSSARY

Access Roads/Routes – Temporary and permanent roads used to access the right-of-way from existing public and private roadways.

Agricultural lands – Lands used for production of crops, vegetation, or raising livestock.

Ice Roads – Roads that are constructed in winter out of snow and ice or by utilizing freezing conditions.

Landowner(s) – A person holding fee or land contract vendee title to on the transmission line route or under any facilities associated with the transmission line from whom the applicant is seeking or has obtained a temporary or permanent easement, or any person or persons legally authorized by the aforementioned to make decisions regarding the mitigation of impacts on such Agricultural Land.

Organic Farm – Agricultural farms using, where possible, agronomic, biological, and mechanical methods, in place of synthetic materials, to fulfill any specific function on the farm.

Right-of-Way – All permanent or temporary easements acquired by the applicants for the purpose of construction and operation of the transmission line.

Staging Areas/Lay-down Areas – Areas where construction materials and equipment will be stored until needed. Pre-assembly of construction materials may also occur.

Tenant – Any person, other than Landowner, lawfully residing on or renting which makes up the right-of-way