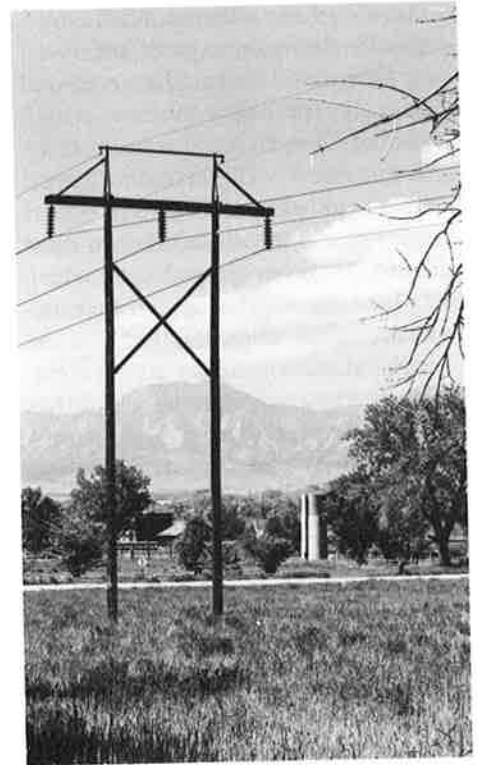


Agricultural land value changes from electric transmission lines: implications for compensation

by Robert R. Thompson and William E. Phillips

High voltage electric transmission lines may have a negative effect upon agricultural land values in Alberta, Canada, depending upon the land use.



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Landowner concern about the use of agricultural property for powerlines, pipelines and wellsites has increased appreciably in Alberta during the last half of the 1970s. As a result, 38 surface rights associations were formed throughout Alberta, mainly during 1978 through 1982. These landowner associations are primarily concerned with land use conflicts on encumbered or poten-

tially encumbered agricultural properties and with levels of compensation for such partial takings.

Landowners' concerns also prompted the establishment of the Select Committee on Surface Rights by the Alberta Legislative Assembly in 1980 to examine all aspects of surface rights in the province and to make recommendations for improved legislation and procedures. These developments prompted an interest by the authors to examine one aspect of the problem, namely the impact of high voltage electric transmission line (HVETL) installations on agricultural land values.

Past studies in Alberta have focused on reduced returns to agricultural land from the placement of HVETL towers. These studies cite increased weed control, increased risk of machinery damage, increased labor and time, decreased yields from operations overlap, affected aerial operations, altered irrigation technology and altered farm planning processes as sources of impact on agricultural land productive values.

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 land value of \$2,500 per quarter section from altered current land use.

This study focuses on potential, as well as current, land uses. Furthermore, it focuses on consumption characteristics (e.g. aesthetic values), as well as land productivity changes. Little emphasis has been given to potential uses and consumptive characteristics impacts in the past. The market value of property is the cumulation of the productive and consumptive components of demand for property. Hence market value information is used in this study to measure the total impact of HVETLs on agricultural

land values. This kind of information can provide important input into landowner compensation decisions.

Procedures

Agricultural land in and adjacent to two segments of existing 250 KV transmission lines were selected for data acquisition. Each segment is approximately 60 miles in length. One segment (Airdrie segment) runs north of Calgary, Alberta, the other (High River segment) runs south of that city. Both are in primarily dryland agricultural areas. The more northerly Airdrie segment contains two parallel HVETL which run parallel to, but present a limited view of, the Rocky Mountains. The High River segment to the south runs parallel to the Rocky Mountains and in close proximity to them. There is some irrigation in this area. Both segments are sufficiently removed from Calgary to eliminate properties with foreseeable urban development.

In order to compare prices of encumbered property sales with those of unencumbered sales for the purpose of measuring total HVETL impact, the use of "arm's-length" sales data is essential. Sales which occurred from 1976 through 1981 and involved properties encumbered by an HVETL were identified by obtaining certificates of title from the Alberta Land Titles Offices. Further documentation was obtained for those titles which had transferred or had charges registered against them regarding a possible sale.

The purchaser and/or vendor for each parcel was contacted to identify "arm's-length" sales and other sale details. Only sales information from "arm's-length" transfers were retained for analysis. There were 26 such parcels. Sales data for unencumbered parcels within five miles of the HVETL which were transferred at "arm's-length" between 1976 and 1981 were also obtained for comparison purposes. These data were obtained from the files of Deloitte Haskins & Sells Associates and from interviews with real estate agents.

The sale prices of confirmed "arm's-length" encumbered properties were compared to the sale prices of unencumbered properties. Various analytical techniques were used including a comparison of sample means of meaning-

ful paired observations and appraisal techniques.

Results

Before the comparison of sample means of meaningfully paired observations and appraisal techniques were applied, the sale prices were converted to 1981 levels in order to compare the dollar differences between pairs. Table 1 outlines the appreciation rate calculations for two regions, the View of Mountains region which includes the High River segment and the Corridor region which includes the Airdrie segment. The former region includes an approximate width of 45 miles. The latter region includes a 120 mile corridor between Calgary and Edmonton. It, too, is approximately 45 miles wide. An appropriate factor from Table 1 was multiplied by the per acre sale price for each parcel to convert that value to the 1981 level. Once all sales were on a common dollar basis, analysis was undertaken.

A comparison of sample means of meaningfully paired observations involves the selection of the one best comparable (no HVETL) for each encumbered parcel. The pairs are selected to be as similar as possible in all attributes which influence sale price. Adjustments to the sale price of the comparable are made for apparent dissimilarities between the comparable and the

subject using standard appraisal techniques as specified by the Appraisal Institute of Canada.

The difference of means of meaningfully paired observations technique of analysis was then used to determine whether or not the price of encumbered properties is significantly lower than that of unencumbered properties.

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Table 1. Agricultural Property Appreciation Rates, 1976 to 1981

View of Mountains Region				
Year	Number of Sales	Average Dollars Per Acre	Percent Increase	Factor
1976	35	268.17		3.57
1977	64	295.38	10.14	3.24
1978	77	420.45	42.35	2.28
1979	81	572.58	36.18	1.67
1980	90	739.36	29.13	1.30
1981	11	958.36	29.62	1.00
Corridor Region				
Year	Number of Sales	Average Dollars Per Acre	Percent Increase	Factor
1976	36	347.53		2.83
1977	98	361.88	4.13	2.72
1978	85	429.80	18.77	2.29
1979	77	651.18	51.51	1.51
1980	86	852.63	30.94	1.15
1981	23	983.83	15.39	1.00

Table 2. Results of Paired Comparisons by Segment

Segment	Number of Pairs	Mean Value * Per Acre (1981 \$)	
		HVETL	No HVETL
High River	11	1,033	1,134
Airdrie	7	1,226	1,262

Table 2 presents a comparison of means for each segment. Only 18 of a potential 26 pairs are used since suitable comparables for eight subject parcels did not exist. The statistics show that there is a significant difference between value means for the High River segment but not between means for the Airdrie segment.

In other words, the value of encumbered properties is lower than that of unencumbered properties along the High River segment. However, there is no significant difference between the value of encumbered and unencumbered properties along the Airdrie segment even though the mean value of the former is lower than that of the latter.

The results in Table 2 indicate that the price of encumbered properties along the High River segment appears to be impacted more than the price of properties along the Airdrie segment. Two obvious differences between the two regions are irrigation potential and mountain view (aesthetics). The High River segment has these characteristics.

In order to test the importance of these characteristics, the pairs along the High River segment are divided into two groups. The first group consists of encumbered sales which the buyers feel have potential for irrigation. The second group consists of the balance of encumbered sales along the High River segment. Results are presented in Table 3.

The value of encumbered property with irrigation potential is significantly less than the value of unencumbered properties along the High River segment. In the absence of irrigation potential, aesthetic value may have appeared stronger.

The finding outlined in Table 3 shows the value of the property which is encumbered by an HVETL and which the landowner feels has irrigation potential, is significantly less than the value of comparable unencumbered property.

The configuration of the HVETL may be quite important regarding the reduction in property value from an HVETL. Therefore, configuration of the HVETL on the five properties with irrigation potential is considered. The HVETL traverses three of the properties diagonally and is parallel to the boundary of the other two properties but is located approximately one quarter of the way into the property. In all five instances, the use of a quarter section pivot irrigation system is eliminated because of the HVETL. Other types of irrigation systems, such as a wheel roll or a smaller pivot, could be used to irrigate portions of each of the five properties. No encumbered sales with an HVETL parallel to and on the property boundary, which the landowner feels has irrigation potential, were found. Therefore, impacts of the HVETL which are located on the property boundary of land with irrigation potential were not studied.

Conclusion

The results of the comparison of means indicate that an HVETL may have a negative impact on agricultural land values depending upon land use.

However, the difference of means tests show that significance varies depending on land use. The sale prices of agricul-

tural properties without irrigation potential and encumbered by an HVETL do not experience a significant reduction in market value. However, the price of encumbered properties which have irrigation potential are reduced when the HVETL is not adjacent to the property boundary. The unique circumstances of individual cases need to be determined before assessing impact.

An implication can be drawn from these results. The determination of compensation to landowners for a loss of rights, and hence a financial loss, must

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Changes in productive and consumptive land uses, agricultural technology and HVETL tower design all interact such that HVETL installations have varying impacts on the values of various agricultural properties.

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Table 3. Results of Paired Comparisons by Irrigation Potential

High River Segment	Number of Pairs	Mean Value ** Per Acre (1981 \$)	
		HVETL	No HVETL
Irrigation Potential	5	945	1,119
Remainder	6	1,106	1,147

*The mean values for High River are significantly different from one another at the 5 percent level. $T = -1.13$ at 6° of freedom. The differences of means per Airdrie were not significantly different. $T = -2.23$ at 10° of freedom.

**The mean values for Irrigation Potential are significantly different from one another at the 5 percent level. $T = -2.63$ at 4° of freedom. The differences of means per the remainder were not significantly different. $T = 0.74$ at 5° of freedom.