Appendix K

Agricultural Economic Impact Analysis, South Central and Southeastern Idaho

Agricultural Economic Impact Analysis
South Central and Southeastern Idaho
Gateway West Transmission Line Project

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INTRODUCTION

The following Agricultural Economic Impact Analysis evaluates the economic impacts that the Gateway West Transmission Line Project (hereafter the Project) would have on agricultural producers in Cassia and Power Counties. If approved, Segment 7 of the Gateway West Transmission Line Proposed Route would cross productive agricultural lands in these counties. Also, portions of Segment 5 would cross agricultural lands in Power County. Cassia and Power Counties are cooperating agencies in the Environmental Impact Statement (EIS) analysis of the Project being conducted by the Bureau of Land Management (BLM). A task force consisting of local farmers was set up in both counties to assist with the analysis. Based on task forces' review of the Draft EIS, the Counties requested that an independent agricultural specialist complete an assessment of the effects of the Project on agricultural producers within their jurisdictions. The BLM proposed that Gary Schneider of Schneider Consulting Services conduct this analysis and the Counties agreed. Mr. Schneider met with task force members to discuss agricultural practices in the area on November 28 and 29, 2011, and on March 21, 2012, and compiled other information on costs associated with a range of possible impacts. Results of the analysis are presented below.

STUDY AREA AND AFFECTED CROPS

The study area for this assessment includes agricultural lands in Cassia and Power Counties crossed by the Project. A broad diversity of both irrigated and dry land crops are well represented in the study area. Due to time and space constraints, this report had to narrow down the range of crops analyzed. Since almost all irrigated producers rotate their crops for various reasons, the County task force members and report author agreed upon a 3-year rotation of potatoes, sugar beets, and winter wheat as the basis for analysis in the irrigated area. Safflower and hard white spring wheat were selected as the crops to analyze for the dry land area.

DATA

This report utilizes the latest available University of Idaho Extension Service crop budget publications for baseline economic information. The potatoes, sugar beets, and irrigated wheat budgets are for South Central Idaho (Magic Valley), and the safflower (canola)[1] and hard white wheat dry land budgets are for Eastern Idaho. The Magic Valley budgets were published and released for 2011. The dry land budgets for 2011 have not been published; therefore, dry land budgets were updated by hand from 2009 by using the same percentage changes that were used

[1] The University of Idaho has not released a crop budget for safflower. Therefore, the canola budget was followed since production practices and yields are similar, although prices can differ markedly (Meadows 2011). There is a fairly narrow range among all of the dry land crops in terms of gross and/or net incomes per acre; thus, substituting other crops on an individual basis is acceptable.

in the published irrigated reports (Patterson, P. et al. 2011; Patterson, P. 2009). Cost estimates were also provided by farmers in the region when none were available from other sources, particularly on the labor and equipment required for maneuvering around towers.

TYPES OF COSTS

Expenses include both operating and ownership costs. Operating costs include those incurred in the production process during the course of the crop year including tillage, planting, spraying, fertilizing, and harvesting. Ownership costs are those that are fixed and occur regardless of production. These would include items such as depreciation, insurance, land charge, water assessment, general overhead, and a management fee of approximately 5 percent of gross returns.

Costs to the landowners if the proposed transmission line is constructed will include both one-time costs that will occur during the construction period and annual costs that will continue indefinitely after the construction is completed.

One-time Costs

The one-time costs will vary for each crop depending on the time of year that the construction process begins and the operating costs have been incurred up to that point. Table 1 depicts the accumulated costs incurred during the entire production cycle on a monthly basis for a range of crops and then provides an example of the total costs per disturbed/impacted acre. Acres disturbed would include tower sites every quarter mile (1.5 acres ea.), staging areas every 20-30 miles (20 acres ea.), helicopter fly yards every 5 miles (10-15 acres ea.), and access roads. The total cost to the landowner would include the operating costs incurred up to the commencement of construction plus the annual ownership costs and the forfeiture of profit; thus, the total cost to the landowner will depend on the month construction commences and the crop being grown. Table 1 utilizes March as an example. Ownership and lost profit estimates are included from Table 2, which is explained below.

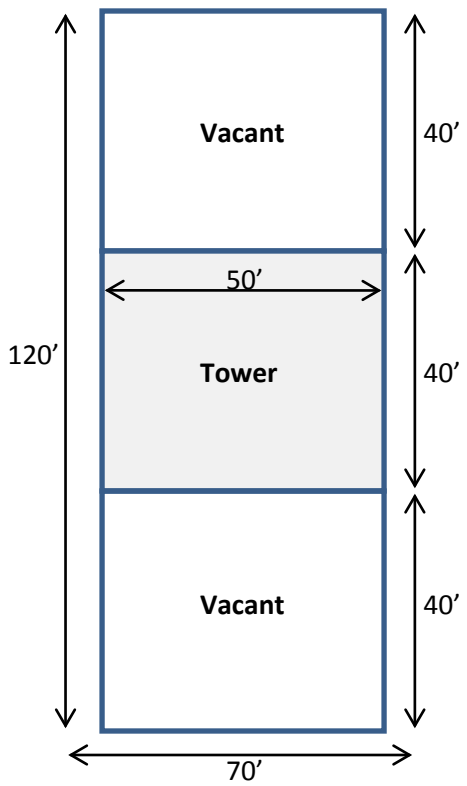
Table 1: One-Time Costs Incurred Per Disturbed/Impacted Acre during Construction Process

Month	Monthly Accrued Operating Expenses ($ dollars)				
	Potatoes	**Sugar Beets**	**Wheat**	**Safflower**	**White Wheat**
September	292	33	92	8	8
October	570	37	141	9	9
November	577	41	143	10	10
December	584	45	145	11	11
January	591	49	148	12	15
February	598	53	151	13	16
March	758	261	222	14	17
April	967	547	295	122	29
May	1501	569	364	123	102
June	1557	622	380	124	103
July	1805	644	388	125	104
August	1861	681	458	138	26
September	2469	700	--	186	--
October	2566	866	--	--	--
March Example					
Accrued Expenses	758	261	222	14	17
Ownership	1270	709	353	70	60
Lost Profit	(-108)	123	(-33)	(-6)	20
Total:	**$1,920**	**$1,093**	**$542**	**$78**	**$97**

Annual Costs

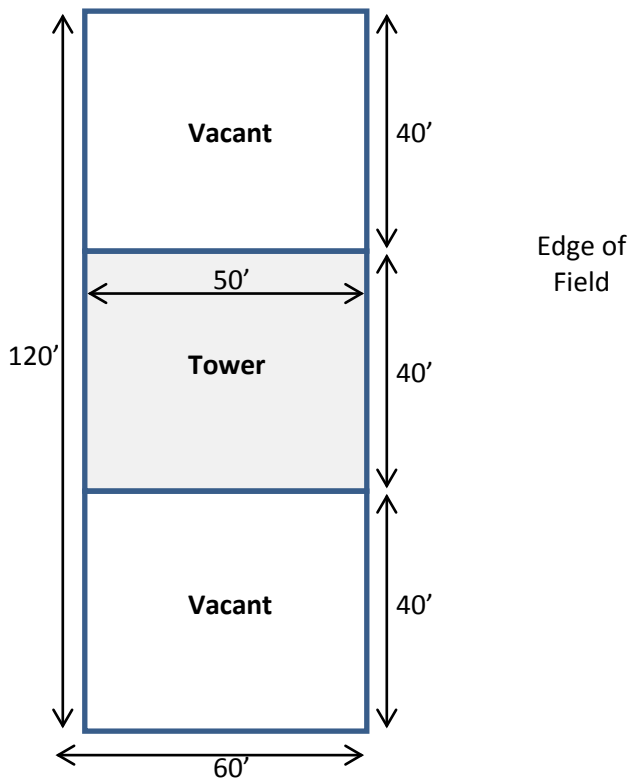
Annual costs will continue indefinitely after construction is completed. Annual costs presented will be the additional costs the landowner will incur due to the possible placement of towers within the field. Additional costs will result from both not producing a crop within the tower footprint and the extra cost of traversing around the tower for specific field operations. Figure 1 depicts the land removed from production for a tower placed in the middle of the field and Figure 2 depicts the land removed from production for a tower placed in the field along the edge. Calculations were made on a per acre basis and then converted to a cost per tower for each tower site. The footprint of the middle tower is 0.193 acres and the field edge tower is 0.165 acres.

Figure 1: Tower Placed in the Middle of a Field



Area where no crop planted: 70 feet by 120 feet = 8,400 square feet or 0.193 acres
Includes tower footprint (50 x 40 feet), plus 40 feet on each end and 10 feet on each side to allow for safe maneuvering of equipment around the tower.

Figure 2: Tower Placed Along the Edge of a Field



Area where no crop planted: 60 feet by 120 feet = 7,200 square feet or 0.165 acre. Includes tower footprint (50 x 40 feet), plus 40 feet on each end and 10 feet on the field-adjacent side to allow for safe maneuvering of equipment around the tower.

Planting potatoes and sugar beets around a tower is very difficult due to the large equipment size, the need to lift the equipment out of the ground after stopping at the tower, and the inability to turn some of the equipment while it is still in the ground. After lifting the equipment out of the ground, the vehicle must back up, go around the tower, and then maneuver back into position on the other end to resume the operation (in this discussion "end" refers to the incoming direction where the equipment comes to a stop and the other "end" refers to where the operation resumes). A 40 foot allowance was made on both ends to allow for ample maneuvering and a 10 foot allowance was made for each side to allow for safe traversing of the equipment around the tower (two 10-foot allowances for a tower in the middle of the field and one 10-foot allowance for a tower placed along the edge of the field). Due to the use of wide planters, it is difficult to get close to the side of the tower: Therefore, the actual distance will vary from 5 to 20 feet depending on the distance from the tower required by the planter. Spraying and fertilizing operations will allow for traversing around the middle tower circumference without stopping. On crops other than potatoes and sugar beets, the equipment can traverse around the middle tower circumference for all field operations, which allows for a complete and more efficient coverage.

Table 2 displays the annual costs incurred for each tower location including the tower footprint area (no crop planted) and the area around the tower (overlap) that requires a duplication of operations due to the extra time (labor and equipment) and materials for maneuvering around the tower for each operation during the course of the production cycle. Discussions with local farmers indicate that compaction caused by this additional maneuvering plus the overlap of the fertilizer and chemical application would result in an estimated 20 percent crop loss (Fehringer 2011; Macdonald 2011; Hydro Solutions 2007) which would be from reduced yield and/or quality (test weight, density etc.).

Table 2: Annual Costs per Tower

Irrigated						
					Tower Footprint	
	Potatoes	Sugar Beets	Wheat	Weighted Average	Middle (0.193 ac)	Edge (0.165 ac)
Ownership Costs	1270	709	353	777/acre	142	121
Lost Profit	(-108)	123	(-33)	(-6)/acre	(-1)	(-1)
Duplication of Operations (see Table 3)					**$839**	**$195**
Weed Control (3 times/yr)	labor 1.5 hrs @ $16 = $24 x 3		= $72			
	equip 1.5 hrs @ $10 = $15 x 3		= $45			
	chemical @ $5 = $5 x 3		= $15			
		Total	=$132		132	132
			Total Annual Cost Per Tower		**$1,112**	**$447**

Dry Land						
			Middle		Edge	
	Safflower	White Wheat	Safflower	White Wheat	Safflower	White Wheat
Ownership Costs	70	60	11	10	10	8
Lost Profit	(-6)	20	(-1)	3	(-1)	3
Duplication of Operations (see Table 3)			133	91	30	22
Weed Control (Same as Irrigated)			132	132	132	132
	Total Annual Cost Per Tower		**$275**	**$236**	**$171**	**$165**

Table 3 displays the annual costs per tower for the duplication of operations caused by the need to go around the tower to get full coverage that also results in some overlap, depending on the equipment width. Although there would be no overlap on potatoes and sugar beets for the planting, tillage, and harvest operations, an estimated cost was included for these operations to account for the additional time to maneuver all of the large equipment used in these operations, including trucks for harvesting plus idle time at the storage shed (Stoker 2011; Patterson, R. 2011). The information shown in Table 3 was inserted into Table 2 to include in the annual costs. The crop loss for the edge towers is significantly less than for the middle of the field towers, because the middle tower includes one complete encircling of the tower that is not possible on the field edge. Table 4 includes the price and yields used in the analysis.

Table 3: Duplication of Operations

Annual Cost Per Tower in Middle of Field						
	Irrigated				Dryland	
	Potatoes	Sugar Beets	Wheat	Weighted Average	Safflower	White Wheat
Planting	15	15	6	12	7	4
Fertilizer	334	115	72	174	30	8
Chemical	128	48	44	73	24	20
Tillage	65	30	4	33	2	2
Harvest	45	34	9	29	6	4
Crop Loss	942	422	189	518	64	53
Totals	**$1,529**	**$664**	**$324**	**$839**	**$133**	**$91**
Annual Cost Per Tower on Field Edge						
	Irrigated				Dryland	
	Potatoes	Sugar Beets	Wheat	Weighted Average	Safflower	White Wheat
Planting	15	15	4	11	3	2
Fertilizer	92	33	20	48	7	6
Chemical	13	6	5	8	3	2
Tillage	65	30	3	33	2	2
Harvest	45	34	5	28	7	3
Crop Loss	122	55	25	67	8	7
Totals	**$314**	**$173**	**$62**	**$195**	**$30**	**$22**

Table 4: Price and Yields Used in Analysis

	Irrigated			Dry Land		
	Potatoes	Sugar Beets	Wheat	Safflower[1/]	White Wheat	Pasture
Price	$7.75 cwt[2/]	$50 ton	$5.90 bu[2/]	$0.25 lb[2/]	$7.00 bu[2/]	$20 AUM[2/]
Yield	475	33	125	1,000	30	0.5

1/ Meadows 2011
2/ Cwt: hundred weight (100 pounds); bu: bushels; lb: pound; AUM: Animal Unit Month

Sprinkler Irrigation

The placement of towers in an irrigated field will cause problems that would have to be addressed and tolerated indefinitely. Where pivots are used they would be unable to traverse the entire circle and, consequently, adjustments would have to be made in the irrigation system to accommodate the tower. The adjustment would vary considerably based on the location of the tower in relation to the pivot center. One option would be to retrofit the existing pivot with an extra set of wheel assembly on each pivot tower, plus replace the existing tires with taller ones to increase the pivot's efficiency in reversing its direction if the schedule requires the pivot to return to its starting point. Local experience indicates that this would require an investment of about $28,000 (Leslie, L; West, T.), which would result in an annual cost of $20 per pivot acre

per year for depreciation and interest on the investment. A pie shaped wedge will result from the tower obstruction that will either not be irrigated at a cost of $921 per acre for ownership costs, lost profit and weed control with no crop being produced, or, depending on the size of the wedge, either hand lines, a solid set or a wheel line could be utilized to cover the area in the wedge. This would require an additional investment in irrigation equipment and possibly a mainline. Solid sets require an investment of about $2,200 per acre (Butler 2011), which would cost about $200 per acre per year within the wedge area for depreciation, interest on the added investment, and labor for setting out and retrieving the lines. Moving hand lines daily would require considerably less investment but more labor than a solid set system. If enough acreage existed in the wedge, a wheel line could possibly be feasible. A full length wheel line costs about $13,000 (Butler 2011) with shorter ones costing less according to their length, which would add about $60 per acre per year within the wedge area for depreciation and interest on the added investment. Also, additional costs for labor and vehicles would be incurred, which would vary depending on the size of the wedge.

Extra labor and vehicle expense for disconnecting and reconnecting existing wheel line systems would be required to maneuver around tower structures during the entire irrigation period. Based on an informal grower survey (Task Force 2012) it is estimated that the additional labor and vehicle expense for moving wheel lines around a tower obstruction on the edge of the field would result in an additional $1,300 cost per tower per year for the wheel line system. If the tower is located anywhere in the middle of the field or on the edge where the mainline supplies the wheel line, it becomes impractical and too cumbersome to move the wheel line from one side of the tower to the other. This would require the addition of another wheel line to cover the remainder of the field, or the remainder of the field would not be irrigated, depending on the acreage involved.

Another option would be to install a corner arm to the existing pivot that would be utilized to traverse around the tower. This would minimize the acreage that could not be irrigated with the pivot. The corner arm would be limited to those situations where the power line tower is located within 280 feet (Lindsay Manufacturing) of the outer edge of the pivot. This would require an investment of about $50,000 (Jensen 2012), which would result in about $30 per pivot acre per year for depreciation and interest on the added investment.

Adding a half pivot may be considered by some landowners. This would result in two half pivots being used instead of one full pivot. This would require an investment of $80,000 to $100,000 for the pivot, plus ancillary items that would add about $50 to $65 per pivot acre per year for depreciation and interest on the added investment. Increased repairs would add another $5 to $10 per pivot acre per year, approximately.

Articulated pivots could be utilized to traverse around obstructions in the pivot area. This system requires a considerable investment and would increase the time required to complete the irrigation cycle, which could pose a significant problem in providing timely water to the potato crop during hot weather every third year in the rotation and thus may not be feasible.

Delivering water to potatoes would be the most crucial phase in the crop rotation due to their sensitivity to moisture stress during certain periods of the growth cycle. Increasing the water delivery interval between irrigations can be detrimental depending on the duration of the increased interval, particularly if a pivot must reverse directions to return to its starting point (Kruckeberg 2012). There would be a potential risk of moisture stress where the reverse pivot

traverses in excess of 80 percent of the entire circle, with the potential stress increasing as the pivot area coverage increases.

Considerable research has been done by the University of Idaho related to potato production with limited water supply (King et al. 2004). Several scenarios were studied, and the one that most closely approximates a scenario where a reverse pivot traverses 98 percent of the circle resulted in a 4 percent reduction in yield of Russet Burbank potatoes. Interpolating the data would indicate that crops with pivots traversing between 80 and 98 percent would suffer between a 1 and 4 percent yield reduction. This would result in a potato crop value loss of about $12 to $50 per pivot acre per year based on a three year rotation. There was considerable variance among varieties, so operators would need to study closely which varieties might work best for them if there are concerns about adequate water deliveries.

It would be too cumbersome to include specific economic data in this report for each of the countless scenarios that could exist regarding irrigating around power line towers including the location of the tower in the field, the size of the wedge area, available labor, type of crop(s), soil type, type of existing irrigation system, potato varieties, producer management techniques, etc. Each individual operation would have to be considered on its own merits and a corresponding water delivery system designed by a qualified irrigation specialist in the most efficient manner to accommodate the situation created by the tower obstruction.

Land Other than Tower Footprint and Roadways Removed from Production

Land outside the tower footprint or roadway areas may be removed from production with the installation of a power line. An example would be land that could be unreachable for irrigation within a center pivot system due to tower interference. Added annual costs **per acre** on irrigated ground for this situation would include:

Ownership costs	$777
Lost profit	(-6)
Weed control	150[2]
Total per acre annual cost	***$921***

Soil Compaction

In addition to the annual cost per tower, a **per acre** cost on potatoes may be incurred on potatoes for substituting ground spraying near power lines where aerial spraying may be limited. A survey of five aerial applicators indicated that a buffer zone of up to 100 feet on each side of a power line is adequate for pilot safety (Parker 2011; Hubler 2011; Driscoll 2011; Shamblin 2011; Bybee 2011). This means that up to a 200-foot-wide strip for towers located in the middle of a field and a 100-foot-wide strip for those located on the field edge would have to be ground sprayed, where feasible.

Research at the University of Idaho Parma Research Station (Thornton 2011) showed a yield reduction of 11.4 hundred weight (cwt) of potatoes per acre from soil compaction as a result of ground spraying four times per season.

[2] Labor and equipment costs are the same for weed control whether the area is the tower footprint or a full acre. The increase in cost of spraying a full acre ($150 versus $132) is from the extra chemical required, estimated at $18.00.

Additional Cost Estimate Due to Compaction

11.4 cwt x $7.75 = $88.35 loss per acre
4 fungicide applications required at a cost of $113

$88.35 + $113 = $201.35 additional cost of ground spraying plus yield reduction

On a 3-year rotation, the annual cost of ground spraying potatoes would be 1/3 of $201.35, or $67.12 per acre sprayed. This amount would be an added annual per acre cost associated with only the additional acreage required to be ground sprayed within the 100 to 200 foot power line corridor.

Dryland Pasture

Reliable economic information pertaining to dry land pasture is scarce. Various sources for animal unit month (AUM) rates vary from $1.35 to $35.00. The County Task Force members and report author agreed upon a $20/AUM and 0.5/acre/AUM. Nearby pasture is often difficult to secure, which would often necessitate replacing lost feed with hay. Land disturbed with the construction of a tower would remove pasture from production for two years, one for construction and one for re-establishing a forage crop.

One-Time Cost Estimate

Pasture yield of 0.5 AUM per acre
One cow consumes 900 lbs of feed per month
One acre produces 450 lbs of forage

Replacement hay @ $120 per ton = $27 to replace feed lost from one acre.

2 years lost production = $54/acre (2 x $27)
Re-vegetation cost @ $75/ acre

Ownership costs would be less than the dry land farming budget, but were not determined for this report.

Annual Costs

Annual costs would at least include ownership costs, $27/acre for lost feed and $150 per acre weed control. Roadway maintenance, erosion control and drainage costs could be very significant on pastureland because of the steeper and rougher terrain that exists in those areas. These would have to be addressed on an individual basis.

Roadways

Where permanent access roadways are needed, annual maintenance may be required. Every one half mile of roadway that is 16.5 feet wide will equal one acre. **Per acre** costs are estimated as follows (from Table 2):

		Irrigated	Dry land (average of safflower and wheat)
Ownership Costs		777	65
Lost Profit		(-6)	7
Weed Control		150	150
	Total	**$921**	**$222**

Grading and other maintenance costs may occur. Not all roads needed for tower construction would be permanent. Generally, permanent access roads would not be needed in flat agricultural land because the utility company would be able to quickly reestablish access across the field to reach a tower in the event repairs are needed.

Conservation Reserve Program (CRP)

CRP programs on affected acres will require special attention. Every situation will require individual scrutiny. Possible costs could include all rental payments plus interest, all cost share payments plus interest, CRP-Signing Incentive Payment (SIP) plus interest, Practice Incentive Payment (PIP) plus interest, CP23 Wetland Restoration, one time WRI payment, plus interest and liquidated damages, if applicable, according to paragraph 577 of 2-CPR. The total impact could be substantial and each contract would be handled on an individual basis (Yokom 2011; USDA 2010-2011).

Insurance

One comment surfaced during the Gateway West Draft EIS public comment period stating that farm insurance premiums would increase with the installation of a power line on their property. Three insurance agencies were contacted and none had ever heard of that happening. Power company representatives also reported that they had never heard of such an event occurring (Carpenter 2011; Dalton 2011; Kimball 2011; Ybarguen 2011).

Soil Erosion

The placement of towers and the construction of access roadways on farmland could create an erosion hazard that would necessitate an investment in various types of erosion control structures to minimize damage. Re-vegetation may also be required. This will vary greatly depending on the terrain and type of vegetation on the site and will need to be handled on an individual basis.

Intangibles

There are many potential scenarios that could occur regarding the possible impact on the various crops produced in the area, but calculating the actual damages is problematic due to the variance in nature and frequency of the occurrence. Most of these situations involve some type of either a plant disease, such as late blight on potatoes, stripe rust on wheat, or an insect outbreak, and can be very destructive. The placement of a tower in a field will affect aerial applications which may be necessary to combat various problems such as presented in the soil compaction section. Ground spraying would be considered in lieu of aerial spraying but may not be possible on short notice due to the field being too wet, particularly under wheel line systems. Tillage such as disking specific isolated areas of an infected crop may be considered in some extreme situations.

These types of occurrences will vary within the project area and would have to be handled individually (Povey 2011; Gehring 2011; Mathews 2011; Meadows 2011).

SUMMARY

Construction of power lines in agricultural areas causes a tremendous amount of disruption to producers on whose property the lines are constructed. The tangent single-circuit 500 k-V lattice steel towers proposed for this project pose particular problems due to the 41 ft x 46 ft base. This creates a lot of inconvenience and loss of efficiency, particularly by requiring maneuvering around the towers for the large row crop equipment common in the study area. Towers located in the field interior are much more disruptive, and thus more costly, than those on the field edge.

This report presents an analysis of the agricultural economic impact that would be created by the installation of a high voltage power line in Segment 7 of the Project. Both one- time and recurring annual costs were included in the analysis to reflect the total economic long- term consequences resulting from the construction of such a line. This analysis is general in nature. Individuals may present differing information but should have the proper records to substantiate their claim. The addition of another power line to the existing matrix would compound the problems landowners already face. This would particularly be true with aerial spraying, which would be very significant in some cases. Also, irrigation systems will have to be modified on an individual basis to accommodate additional field obstructions. If installed, great care should be taken to place the towers to minimize these negative impacts as much as possible.

The costs and returns associated with this analysis were estimated in December, 2011. It should be noted that costs and returns are constantly changing and their future levels cannot be accurately predicted. Consequently any economic considerations made in the future that refer to the economic data in this report should be carefully scrutinized and then adjusted accordingly using the proper indexes published by the National Agricultural Statistics Service to reflect changes that occur during the intervening period.

In assessing the total economic impact on a specific property, all of the following components need to be included:

1. One-time costs **per disturbed/impacted acre,** including roadways and the actual transmission line construction area. These costs would include ownership, operating and lost profit as detailed in Table 1.
2. Annual costs including the ownership, lost profit and weed control in the tower footprint area plus the duplication of operations for the extra costs of farming around the tower(s). These are listed in Tables 2 and 3 on a **per tower** basis.
3. Annual **per acre** costs including ownership, lost profit and weed control on roadways and other areas such as the wedge created in center pivots.
4. Soil compaction costs for spraying and yield loss on a **per acre** basis in the area requiring ground spraying only within the power line corridor.
5. All costs associated with the disruption of CRP programs where applicable.
6. The costs of reorganizing irrigation systems including the added investment and extra labor. These would be on a **per pivot acre** basis and possibly **per wedge acre** where the wedge would continue to be irrigated with an additional system.

7. Soil erosion and various intangibles may occur on a sporadic basis and each situation would have to be handled individually.

APPENDIX

Overlap example: Making one entire trip around the circumference of the tower with a 60-foot fertilizer spreader calculates to 0.59 of an acre actually applied, while maintaining a 10-foot buffer strip around the tower base. The crop budget for irrigated wheat calls for a fertilizer cost of $123/acre; multiplying $123 by 0.59 of an acre results in an approximate $72 per tower overlap cost for fertilizer, as shown in Table 3. This process is repeated for all of the operations performed on that particular crop, and then they are added together to arrive at the total duplication cost per tower. The amount of land duplicated for each crop is dependent on the width of the equipment utilization in each operation. This same process is followed for each crop and each type of tower location.

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