Compensation Analysis
Estimating the Loss of Use and Adverse Effect of Well Sites & Access Roads

Prepared For

The Client

Prepared By

Serecon Inc.

March, 2018

March 20, 2018

The Client

Dear Sir:

RE: ESTIMATE OF LOSS OF USE AND ADVERSE EFFECT FOR WELL SITES AND ACCESS ROADS ON OUR FILE #

As requested, we have estimated the annual loss of use and adverse effect related to multiple well sites and access roads located on the above described property. The purpose of this report is to assist in determining annual compensation, considering Section 26(1) of the *Surface Rights Act,* Province of Manitoba.

To the best of our knowledge and belief, all statements contained herein are true and correct. Employment in and compensation for making this report are in no way contingent on the values reported. We have no financial or other interest which would in any way affect the values reported.

Our findings and conclusions relative to the estimates of loss of use and adverse effect on the subject property are included in the following report.

Yours truly,
SERECON INC.

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1.0 Summary of Salient Facts and Conclusions

Legal Description

Area

Ownership

The Client

Wellsite and Access Road Area

LSD	Well Site Area (acres)	Access Road Area (acres)	Total Area (acres)
1	2.99	0.67	3.66
2	2.99	1.07	4.06
3	2.99	0.54	3.53
4	2.99	0.54	3.53
5	2.99	1.09	4.08
6	2.99	0.53	3.52
6	2.59	0	2.59
7	2.99	1.04	4.03
8	2.99	0.54	3.53
8	3.00	0.27	3.27
9	2.99	0.55	3.54
10	2.99	1.09	4.08
11	2.99	0	2.99
12	2.99	0.54	3.53
13	2.99	0.54	3.53
14	2.99	0	2.99
15	2.99	0.54	3.53
16	2.99	0.54	3.53

Total Annual Compensation

Loss of Use =	$24,556.86/year
Tangible Adverse Effect =	14,663.50/year
Intangible Adverse Effect =	18,000.00/year
Total (rounded)	**$57,200.00/year**

2.0 Purpose of the Report

2.1 Purpose

The purpose of this report is to address items, which we are able to assess, as set forth in Section 26(1) of the *Surface Rights Act* of, concerning multiple well sites and access roads located on the subject property.

The intended use of this analysis is to assist in determining the annual compensation rate payable to the landowner, pursuant to a *Surface Rights Act*, Section 26(1).

2.2 Definitions

The *Surface Rights Act, Province of,* Section 26(1) sets out the Heads of Compensation, specifying that:

> *In determining the compensation to be paid for surface rights acquired by an operator, the board shall consider the following matters:*
>
> *a) the value of the land having regard to its present use before allowance of surface rights;*
>
> *b) the loss of use of the land or of an interest therein as a result of granting surface rights;*
>
> *c) the area of land that is or may be permanently or temporarily damaged by the operations of the operator;*
>
> *d) the increased costs to the owner and occupant, if any, by reason of the works and operations of the operator;*
>
> *e) the adverse effect caused by the right of entry to the remaining land by reason of severance, if any;*
>
> *f) the nuisance, inconvenience, disturbance or noise, to the owner and occupant, if any, or to the remaining land, that might be caused by, arise from or is likely to arise from or in connection with the operations of the operator, and the damage, if any, to any adjoining land of the owner, including damage to or loss of crop, pasture, fence or livestock and like or similar matters;*
>
> *g) where applicable in the opinion of the board, the application of interest payable in addition to the amount awarded as compensation; and*
>
> *h) any other relevant matter that may be peculiar to each case including*
>
> *(i) the cumulative effect, if any, of surface rights previously acquired by the operator or by other operators under a lease, agreement or right of entry existing at the time the surface rights were acquired with respect to the subject lands, and*
>
> *(ii) the terms of a comparable lease agreement that a party may submit to the board for consideration.*

Therefore, the appraisers have considered Section 26(1)(b), (d), (e), (f) and (h)(i) as the provisions for the review of the annual compensation rate for the subject property.

3.0 Statement of Limiting Conditions and Scope of Report

3.1 Limiting Conditions

It is assumed that:

- the legal descriptions of the titles are correct.
- the land survey is correct. No legal survey on our part was made and we assume no responsibility in this connection.
- the wellsite and access road locations and area as shown on the survey plans are correct.
- there are no hidden or unapparent conditions of the property, subsoil, or structures that would render them more or less valuable. No responsibility is assumed for such conditions or engineering that might be required to discover these factors.
- the appraisers are not qualified to test or detect the existence of potentially toxic and/or hazardous materials located on the subject property or abutting lands. We have not retained experts or other qualified persons to ascertain whether any potentially toxic or hazardous materials exist, or the costs associated with removal, correction or treatment of same. Therefore, the appraisal report does not address the potential impacts that such materials could have on the market value of the subject property.

Information furnished by others and contained in this report has been cross-checked wherever possible during the course of the report and is assumed to be accurate.

Certain information has been provided by the landowner in this report. Serecon has relied upon this information, which is assumed accurate.

The aerial photograph, maps, and survey plans are included in the report only as an aid for interpretation.

The damage estimates do not include the Goods and Services Tax (GST) or Provincial Sales Tax (PST).

Use of this appraisal is reserved for the main recipient, and its use shall be for the specific purposes outlined.

3.2 Scope

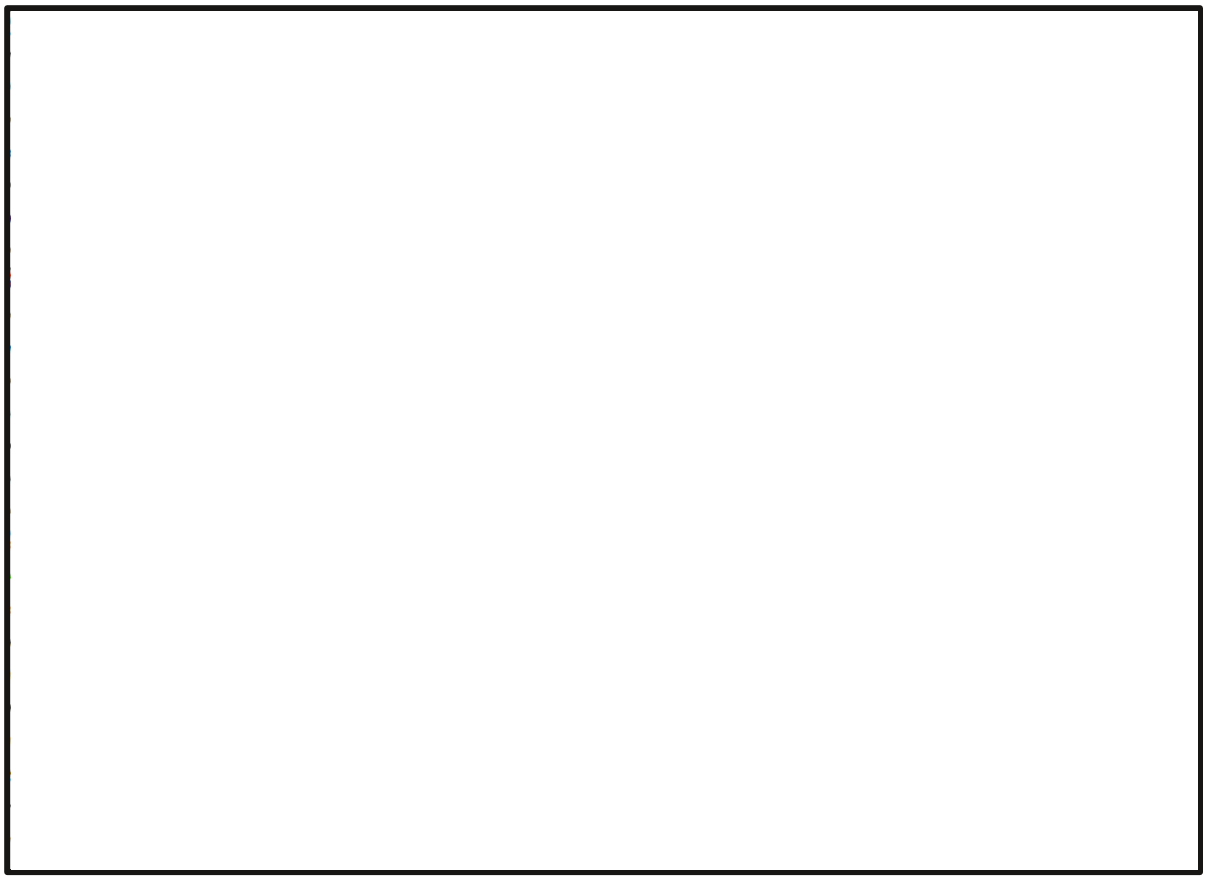
The following consulting report is to address the annual loss of use within the wellsite and access road areas and any adverse effect on the remaining land within the subject titled property.

4.0 Subject Property Data

4.1 Property Location

The subject property is located approximately 5.6 km north of the Town of, within the R.M. of. The property is accessed by way of municipal roads on all four sides.

Area Map



Aerial Photograph

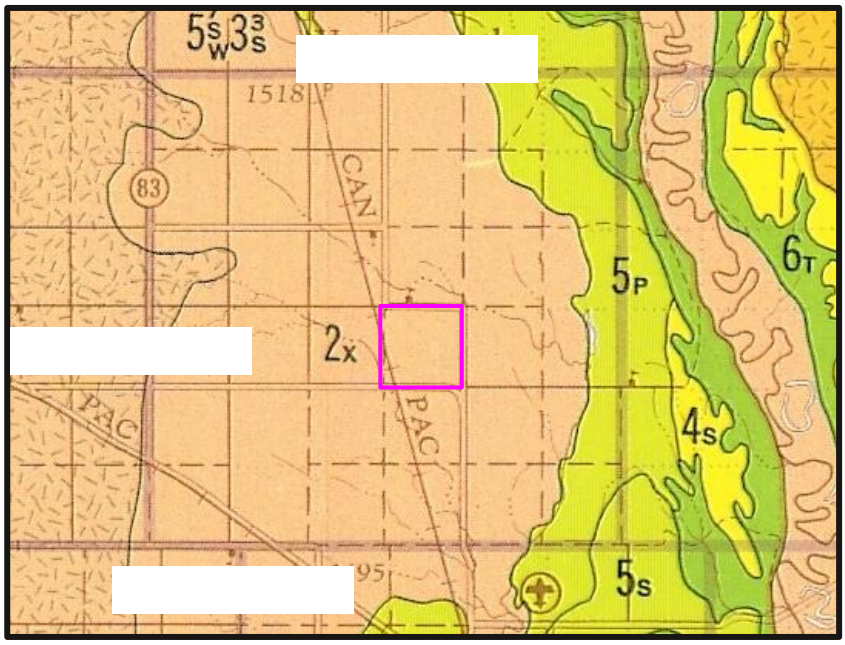
4.2 Physical Characteristics

The subject property consists of four adjoining quarters. The land is predominantly cultivated with some treed areas as well as some low creek area. There is a building site in the south west corner and a railroad right of way running diagonally through portions of the property. There are well sites located in each of the 16 LSDs on the subject property.

4.3 Soil and Topography

The Canada Land Inventory Soil Capability for Agriculture Map, Sheet F, rates the soil on the subject property as Class 2X.

CLI Soil Capability for Agriculture Map,



Class 2 soils have moderate limitations that restrict the range of crops or require moderate conservation practices. Under good management these soils are moderately high to high in productivity for a fairly wide range of crops.

Subclass "X" refers to minor cumulative limitations which have a moderate limiting effect on the soil capability.

The topography of the subject area is gently undulating to undulating.

4.4 Well Sites and Access Roads

The subject well sites are fairly consistent in size and shape, primarily measuring 110m x 110 m and totaling 2.99 acres. The access roads range in area from 0.53 acres to 1.09 acres and are generally 15m in width. There are well sites in each of the 16 LSDs, with two sites located in LSD 6 and LSD 8. The well sites and access roads are primarily located within the cultivated area of the property.

5.0 Methodology to Assess Annual Compensation Rates

As indicated previously, the *Surface Rights Act* outlines the statutory heads of compensation the landowner is entitled to. The acquisition of the surface area for the wellsites is required for the exploration, development and production of the hydrocarbons within the mineral title. These rights to enter are acquired either through private negotiation, or a Right of Entry Order from the Surface Rights Board (SRB). Either process will determine the first year consideration, as well as an annual compensation rate for based on the components outlined in the *Surface Rights Act*.

The subject lands are currently used primarily for agricultural purposes and will likely continue to be used for farming for the foreseeable future. Therefore, loss of use and adverse effect are based on that use.

5.1 Loss of Use Methodology

As indicated previously, Section 26 of the *Act* addresses the review of rate of compensation, which refers to Section 26(1).

The *Surface Rights Act*, Section 26(1)(b), provides for a payment of compensation for *"the loss of use of the land or of an interest therein as a result of granting surface rights"* which would be as a result of the well sites and access roads on the subject property.

- The premise behind the loss of use provision of the *Act* is to reimburse the owner/occupant for the probable financial loss from unusable land within the well site and access road surface lease area.
- The loss of use calculation is based on a gross revenue basis. Although gross revenue is considered to provide compensation for expenses that would not actually be incurred, it is acknowledged that loss of use is frequently paid based on gross revenue. Therefore, we have included loss of use based on a gross revenue basis.

5.2 Adverse Effect Methodology

The *Surface Rights Act*, Section 26(1)(e), provides for a payment of compensation for *"the adverse effect caused by the right of entry to the remaining land by reason of severance, if any"*. Section 26(1)(d) considers "*the increased costs to the owner and occupant, if any, by reason of the works and operations of the operator"*, Section 26(1)(f) considers *"the nuisance, inconvenience, disturbance or noise, to the owner and occupant, if any, or to the remaining land, that might be caused by, arise from or is likely to arise from or in connection with the operations of the operator, and the damage, if any, to any adjoining land of the owner, including damage to or loss of crop, pasture, fence or livestock and like or similar matters*" and Section 26(1)(h)(i) considers *" any other relevant matter that may be peculiar to each case, including the cumulative effect, if any, of surface rights previously acquired by the operator or by the operators under lease, agreement or right of entry existing at the time the surface*

rights were acquired with respect to the subject lands". All of these are considered to encompass adverse effect as a result of the wellsites on the subject property.

Adverse effect is defined as the impact on the ongoing operations when farming the land outside the boundaries of the surface lease area. There are two key components to consider under the adverse effect section as it relates to first year or annual losses. The first part of the annual impact is the objective component that relates to the continued operation of the balance of the land by the farm operator. In other words, there are measurable additional costs to continue to operate the remainder of the land after the wellsites are in place that were not there prior to their installation. The second part is assessing the subjective impacts to adverse effect of nuisance, other inconveniences, or noise, on an annual basis, which are difficult to quantify. These impacts which are also a result of the wellsites and access roads, are deemed to be intangible or non-measurable with empirical measurements.

The details regarding the estimates of the tangible and intangible adverse effects resulting from the multiple well sites and access roads are described in subsequent sections of this report. The following section is an outline for the general methodology for tangible adverse effect.

5.2.1 Tangible Adverse Effects – Economic Impacts of Farming Around the Wellsites

- The adverse effect is based on the current agricultural use of the subject land. It is an estimate of the impact of the surface lease areas on the ongoing farming operations.
- The economic impacts are all affected by:
  - the size, shape or configuration of the obstructions;
  - the location of the well sites and access roads within the field (corner, on field boundary or in the middle of field);
  - field size and shape;
  - equipment size; and
  - the number of field operations or times required to farm around the obstruction in a crop season.
- Serecon has developed a "Mapping Tool" program, which has been used to estimate these impacts. This program measures the exact area of extra coverage with equipment, the size of the areas missed, the extra equipment costs, the extra weed control costs, and the crop losses due to the extra working of the land, compaction, and the multi-application of seed, fertilizer and chemicals. The program is designed to digitize the aerial photographs of the subject property and to then outline, in detail, the obstruction in the case of the well sites and access roads.
- The Mapping Tool then calculates the areas of overlap based on the new farming pattern created by the obstruction.
- We then adjust the average costs by a coefficient to account for the higher costs resulting from turning, slowing down to make tight turns, etc. This coefficient is subjective, based on the appraisers' experience and personal knowledge of

farming. Normal field operations have an efficiency factor of 80%, or a coefficient of 1.2, which allows for corners, turns at the end, etc. Based on personal experience, we have added an additional 20% inefficiency to account for the necessary farming around the obstructions. Utilizing this approach is, in our opinion, more accurate than estimating the impact that can be generated by any other methodology.

- In addition to the overlapping impacts addressed within the Mapping Tool, there is added time. This factor is addressed separately as a lost opportunity factor relative to the various farming operations.

5.2.2 Loss of Use and Tangible Adverse Effect

The subject property is leased to a local farm operator who grows primarily canola, wheat and soybeans, with some lentils. For the purpose of this analysis we have considered canola, wheat and soybeans.

All the variables utilized to estimate gross revenue and variable costs are based on the tenant's actual revenue and costs for 2015, 2016 and 2017. Following are the variables utilized.

Gross Income

- Canola (2015) = 41 bu/ac x $10.80/bu = $442.80/ac
- Red Spring Wheat (2016) = 50 bu/ac x $7.50/bu = $375.00/ac
- Soybeans (2017) = 34 bu/ac x $12.00/bu = $408.00/ac

Average = $408.60/ac

Average Variable Costs for Adverse Effect

- Seed (Canola) = $65.00/ac
- Seed (Wheat) = $25.00/ac
- Seed (Soybeans) = $125.00/ac
- Fertilizer (Canola) = $90.00/ac
- Fertilizer (Wheat) = $75.00/ac
- Fertilizer (Soybeans) = $32.00/ac
- Chemical (Canola) = $46.00/ac
- Chemical (Wheat) = $45.00/ac
- Chemical (Soybeans) = $38.00/ac
- Equipment Operating Costs (Canola) = $68.78/ac
- Equipment Operating Costs (Wheat) = $60.31/ac
- Equipment Operating Costs (Soybeans) = $60.73/ac

Additional Time

- In order to calculate the additional travel time, we have taken the total distance traveled to complete one field operation and divided it by the total area covered. This calculation is done in the before and after scenario to determine the change in time efficiency. From this calculation we get a time efficiency of 0.26km/acre before and 0.28km/acre after considering the well sites and access roads. A 0.02km/acre inefficiency is then applied to the acreage with well sites to get an additional travel distance of 5.1 miles. Assuming an average

speed for seeding and harvest of 4m/hr and 8m/hr for spraying we get an additional time factor of approximately 5.5 hrs per year.

- 5.5 hrs x $200.00/hr (average custom rate) = $1,100.00/year or $60.00 per site.

Total Tangible Adverse Effects

Canola

Additional Annual Costs & Losses	Seeding	Harvesting	Spraying	Total Tangible Adverse Effects ($)
Additional Equipment Operating Cost	**$504.05**	**$1,903.39**	**$716.65**	**$3,124.09**
Equipment Operating Cost Due to Overlaps	$504.05	$1,903.39	$716.65	$3,124.09
Crop Loss & Weed Control	**$27,688.28**		**$3,600.00**	**$31,288.28**
Crop Loss (Missed Area Not Seeded)	$27,688.28			$27,688.28
Weed Control Cost (Missed Spraying)			$3,600.00	$3,600.00
Crop/Revenue Loss	**$978.14**		**$3,939.37**	**$4,917.51**
Crop/Revenue Loss Due to One Overlap	$702.28		$2,225.73	$2,928.01
Crop/Revenue Loss Due to Two Overlaps	$245.75		$1,623.97	$1,869.72
Crop/Revenue Loss Due to Three Overlaps	$28.78		$89.67	$118.45
Crop/Revenue Loss Due to Four Overlaps	$1.33		$0.00	$1.33
Additional Input Costs	**$657.21**		**$1,163.34**	**$1,820.55**
Additional Input Costs Due to One Overlap	$654.88		$1,144.71	$1,799.59
Additional Input Costs Due to Two Overlaps	$2.33		$18.63	$20.96
Additional Input Costs Due to Three Overlaps	$0.00		$0.00	$0.00
Additional Input Costs Due to Four Overlaps	$0.00		$0.00	$0.00
Total Additional Annual Costs & Losses	**$29,827.68**	**$1,903.39**	**$9,419.36**	**$41,150.43**

Total Tangible Adverse Effects

HRS Wheat

Additional Annual Costs & Losses	Seeding	Harvesting	Spraying	Total Tangible Adverse Effects
Additional Equipment Operating Cost	**$504.05**	**$1,533.12**	**$716.65**	**$2,753.82**
Equipment Operating Cost Due to Overlaps	$504.05	$1,533.12	$716.65	$2,753.82
Crop Loss & Weed Control	**$23,448.75**		**$3,600.00**	**$27,048.75**
Crop Loss (Missed Area Not Seeded)	$23,448.75			$23,448.75
Weed Control Cost (Missed Spraying)			$3,600.00	$3,600.00
Crop/Revenue Loss	**$828.39**		**$3,939.37**	**$4,767.76**
Crop/Revenue Loss Due to One Overlap	$594.75		$2,225.73	$2,820.48
Crop/Revenue Loss Due to Two Overlaps	$208.13		$1,623.97	$1,832.10
Crop/Revenue Loss Due to Three Overlaps	$24.38		$89.67	$114.05
Crop/Revenue Loss Due to Four Overlaps	$1.13		$0.00	$1.13
Additional Input Costs	**$424.00**		**$1,163.34**	**$1,587.34**
Additional Input Costs Due to One Overlap	$422.50		$1,144.71	$1,567.21
Additional Input Costs Due to Two Overlaps	$1.50		$18.63	$20.13
Additional Input Costs Due to Three Overlaps	$0.00		$0.00	$0.00
Additional Input Costs Due to Four Overlaps	$0.00		$0.00	$0.00
Total Additional Annual Costs & Losses	**$25,205.19**	**$1,533.12**	**$9,419.36**	**$36,157.67**

Total Tangible Adverse Effects

Soybeans

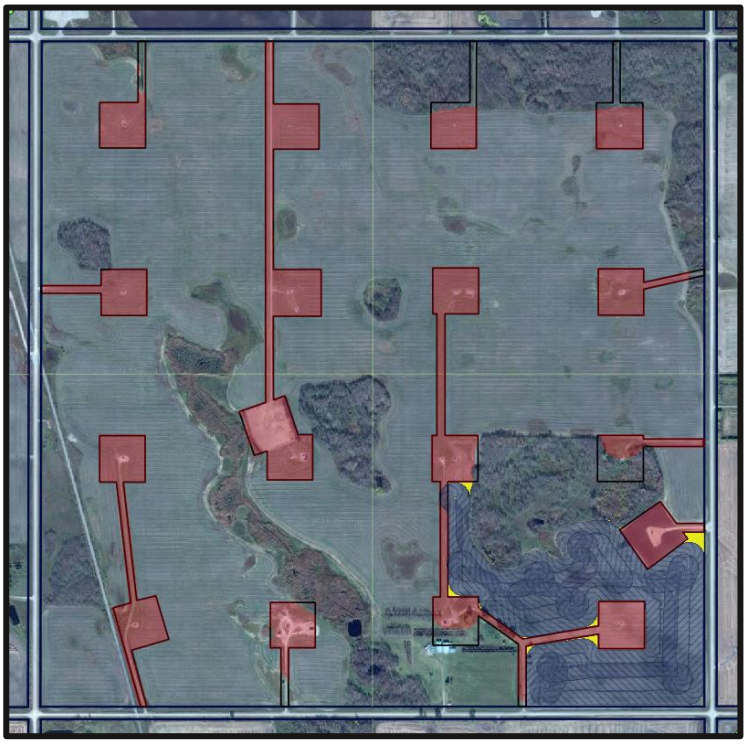
Additional Annual Costs & Losses	Seeding	Harvesting	Spraying	Rolling	Total Tangible Adverse Effects
Additional Equipment Operating Cost	**$504.05**	**$1,533.12**	**$716.65**	**$218.14**	**$2,971.96**
Equipment Operating Cost Due to Overlaps	$504.05	$1,533.12	$716.65	$218.14	$2,971.96
Crop Loss & Weed Control	**$25,512.24**		**$3,600.00**		**$29,112.24**
Crop Loss (Missed Area Not Seeded)	$25,512.24				$25,512.24
Weed Control Cost (Missed Spraying)			$3,600.00		$3,600.00
Crop/Revenue Loss	**$901.27**		**$2,626.25**		**$3,527.52**
Crop/Revenue Loss Due to One Overlap	$647.09		$1,483.82		$2,130.91
Crop/Revenue Loss Due to Two Overlaps	$226.44		$1,082.65		$1,309.09
Crop/Revenue Loss Due to Three Overlaps	$26.52		$59.78		$86.30
Crop/Revenue Loss Due to Four Overlaps	$1.22		$0.00		$1.22
Additional Input Costs	**$665.69**		**$775.56**		**$1,441.25**
Additional Input Costs Due to One Overlap	$663.33		$763.14		$1,426.47
Additional Input Costs Due to Two Overlaps	$2.36		$12.42		$14.78
Additional Input Costs Due to Three Overlaps	$0.00		$0.00		$0.00
Additional Input Costs Due to Four Overlaps	$0.00		$0.00		$0.00
Total Additional Annual Costs & Losses	**$27,583.25**	**$1,533.12**	**$7,718.46**	**$218.14**	**$37,052.97**

Total Tangible Adverse Effects

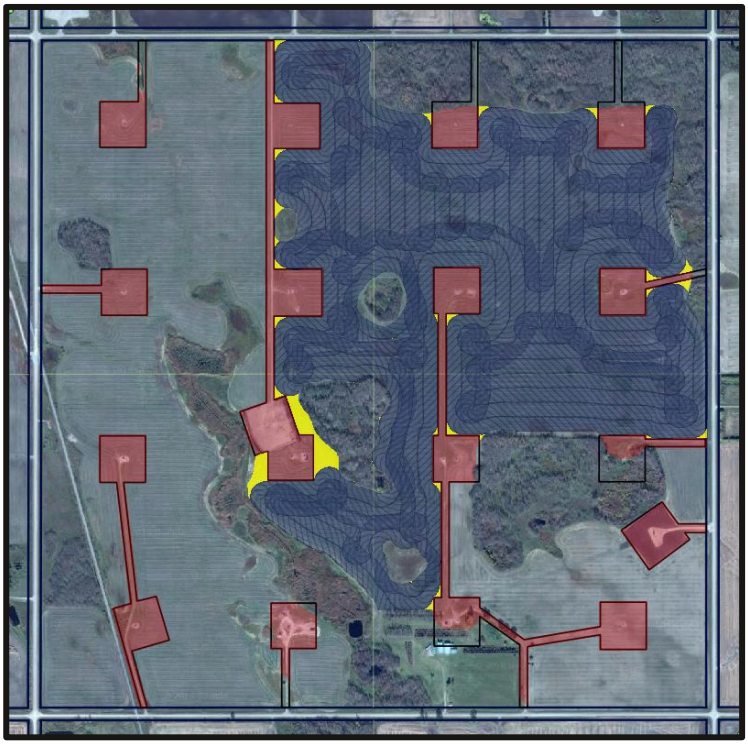
Additional Annual Costs & Losses	Canola	HRS Wheat	Soybeans	Average Annual Adverse Affect
Additional Equipment Operating Cost	**$3,124.09**	**$2,753.82**	**$2,971.96**	**$8,849.87**
Equipment Operating Cost Due to Overlaps	$3,124.09	$2,753.82	$2,971.96	$8,849.87
Crop Loss & Weed Control	**$31,288.28**	**$27,048.75**	**$29,112.24**	**$87,449.27**
Crop Loss (Missed Area Not Seeded)	$27,688.28	$23,448.75	$25,512.24	$76,649.27
Weed Control Cost (Missed Spraying)	$3,600.00	$3,600.00	$3,600.00	$10,800.00
Crop/Revenue Loss	**$4,917.51**	**$4,767.76**	**$3,527.52**	**$13,212.79**
Crop/Revenue Loss Due to One Overlap	$2,928.01	$2,820.48	$2,130.91	$7,879.40
Crop/Revenue Loss Due to Two Overlaps	$1,869.72	$1,832.10	$1,309.09	$5,010.91
Crop/Revenue Loss Due to Three Overlaps	$118.45	$114.05	$86.30	$318.80
Crop/Revenue Loss Due to Four Overlaps	$1.33	$1.13	$1.22	$3.68
Additional Input Costs	**$1,820.55**	**$1,587.34**	**$1,441.25**	**$4,849.14**
Additional Input Costs Due to One Overlap	$1,799.59	$1,567.21	$1,426.47	$4,793.27
Additional Input Costs Due to Two Overlaps	$20.96	$20.13	$14.78	$55.87
Additional Input Costs Due to Three Overlaps	$0.00	$0.00	$0.00	$0.00
Additional Input Costs Due to Four Overlaps	$0.00	$0.00	$0.00	$0.00
Total Additional Annual Costs & Losses	**$41,150.43**	**$36,157.67**	**$37,052.97**	**$38,120.36**

Before Scenario – Spraying

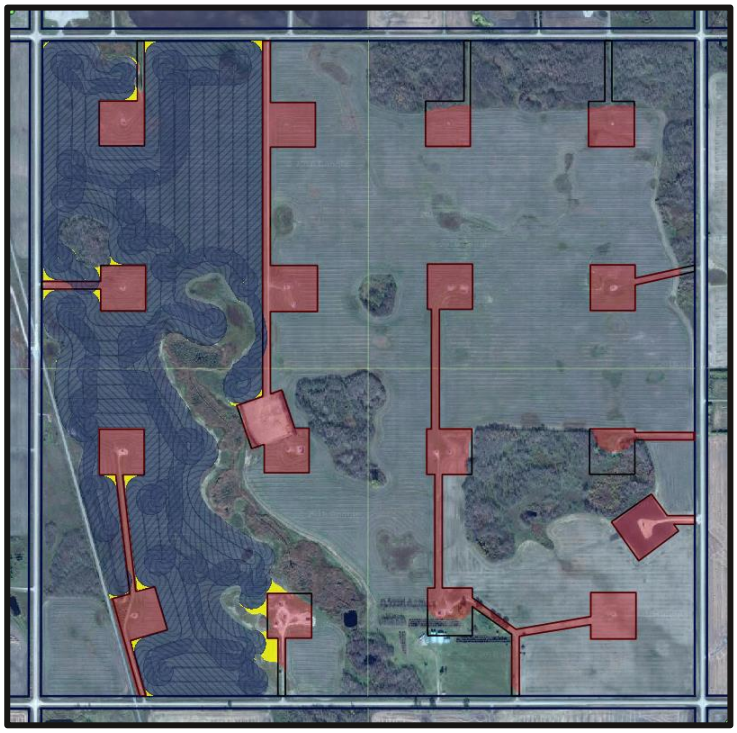
South East Portion After Scenario – Spraying



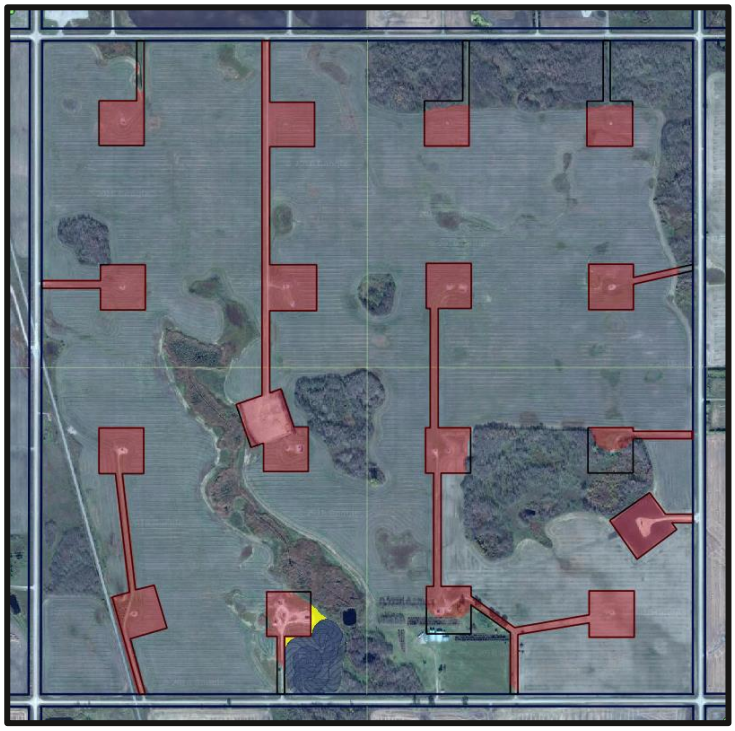
North East Portion After Scenario – Spraying



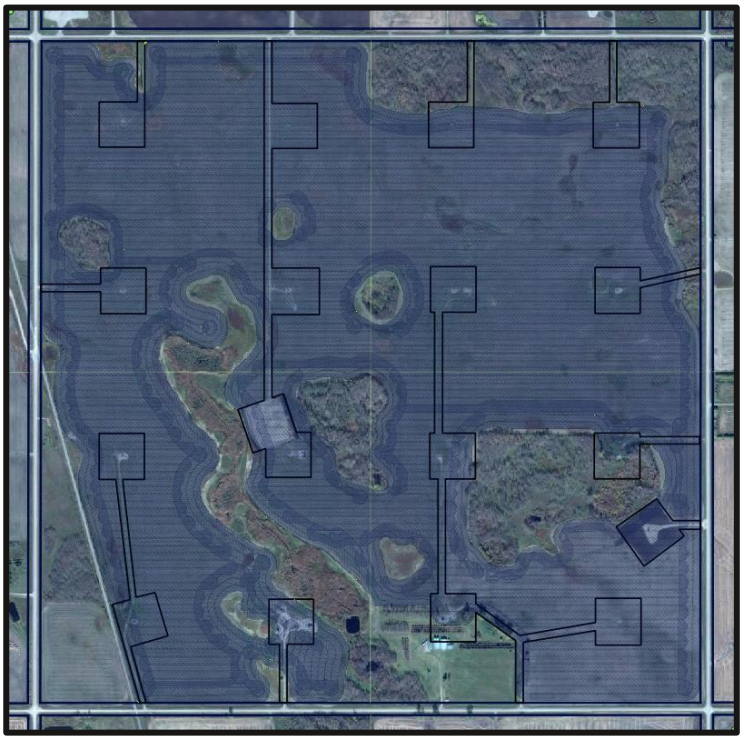
West Portion After Scenario – Spraying



South Portion After Scenario – Spraying

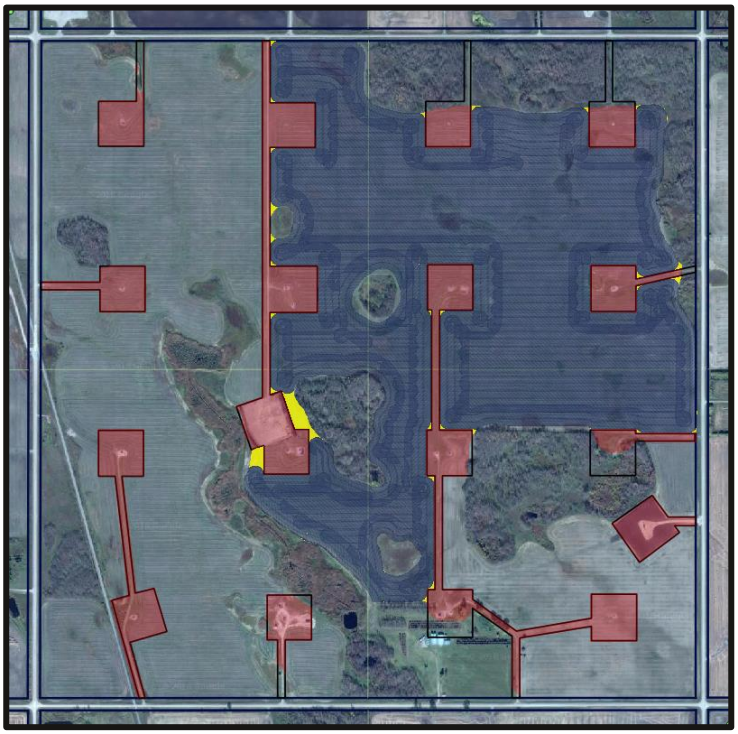


Before Scenario – Seeding

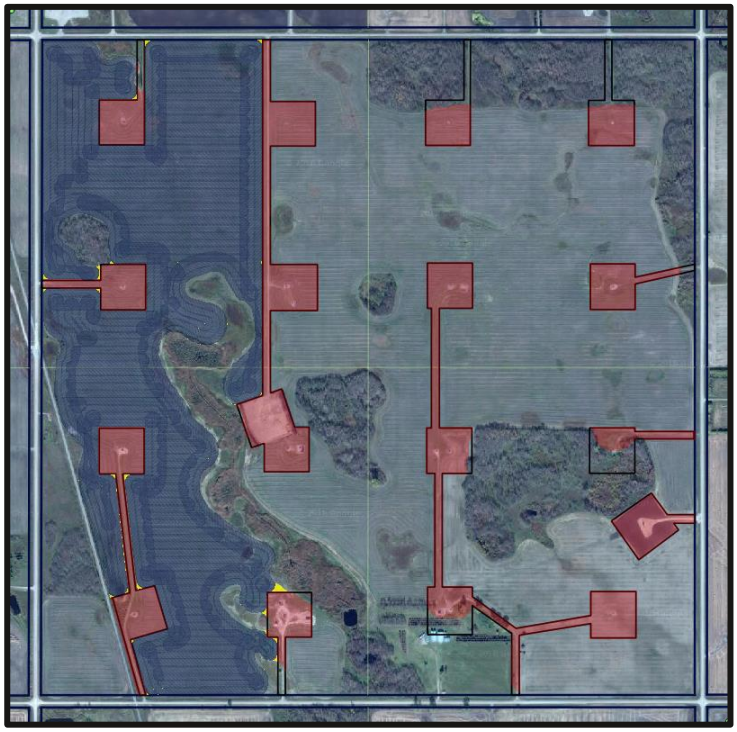


South East Portion After Scenario – Seeding

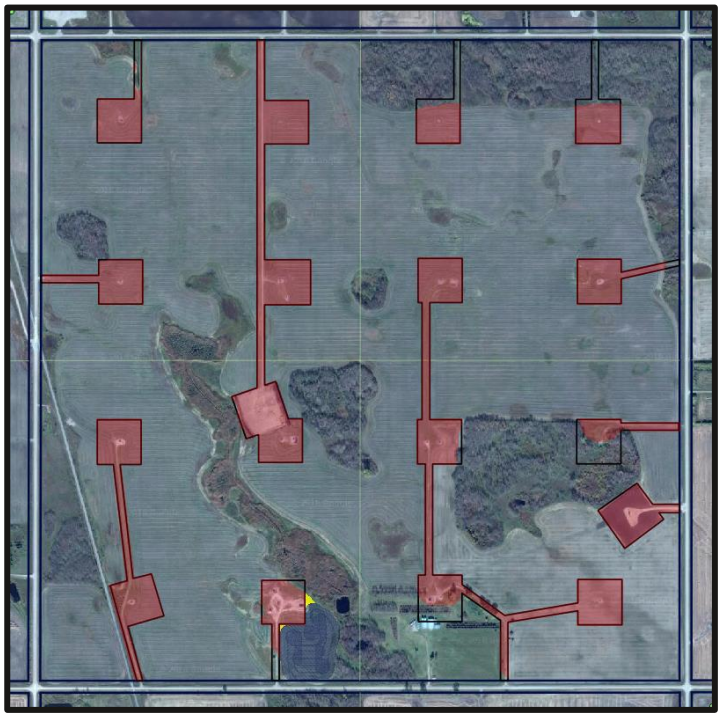
North East Portion After Scenario – Seeding



West Portion After Scenario – Seeding



South Portion After Scenario – Seeding



5.2.3 Summary of Estimated Loss of Use and Tangible Adverse Effect

Total Tangible Adverse Effect and Loss of Use – Obstruction Mapping:

- $38,120.36/year

Loss of Use Component within Obstruction Mapping:

- 60.10 ac x $408.60/ac = $24,556.86/year

Total Tangible Adverse Effect:

- $38,120.36 - $24,556.86 (loss of use) = $13,563.50/year

Additional Time:

- $1,100.00/year

Summary

Total Loss of Use		$24,556.86/year
Total Tangible Adverse Effect Estimate:		
▪ Tangible	$13,563.50/year	
▪ Additional Time	$1,100.00/year	
Total Tangible Adverse Effect		$14,663.50/year

5.3 Intangible Adverse Effect

As previously outlined, the *Surface Rights Act*, Section 26(1)(d), (e), (f) and (h)(i), address adverse effect. In addition to tangible factors as a result of added farming costs and reduction in revenue, there are less quantifiable factors; nuisance, inconvenience and noise.

As indicated previously, we have concluded that the subject land is and will continue to be utilized for agricultural production purposes. Intangible adverse effect, by definition, does not directly relate to agricultural production in terms of reduced revenues or increased costs.

Any issues affecting production are evaluated and quantified in the loss of use and tangible adverse effects portion of this report. Therefore, the only intangible effects that would be of concern on these income producing properties would be those which affect the well-being of the landowners, property management, and their enjoyment of the property. The following categories encompass those factors.

- Nuisance/Reduced Enjoyment/Inconvenience
- Risk/Fear/Stress

Intangible adverse effect has been described in past decisions to include items such as nuisance and inconvenience, including a need for extra surveillance of the property; dealing with the operator's employees and contractors; additional noise, dust and safety concerns caused by extra traffic; garbage on and off site and the time spent developing strategies to mitigate impacts posed by operator's operations and facilities.

In the past, decisions from surface rights boards across Western Canada on similar agricultural lands have typically grouped the tangible and intangible components of adverse effect together. However, in the Court of Queen's Bench of Alberta appeal of an Alberta Surface Rights Board decision (Conocophillips v. Lemay), the court did break out tangible and intangible adverse effect. In that case an amount of $1,000.00 per well site was awarded for intangible adverse effect.

In a more recent decision by the Manitoba Surface Rights Board, Jorgensen v. Tundra Oil and Gas Partnership, the Board awarded an amount of $800.00 for intangible adverse effect.

Based on the above two decisions, as well as the specifics in the case of the subject properties (multiple well sites and access roads), it is estimated that an intangible adverse effect of $1,000.00 per well site is reasonable.

5.4 Overall Summary

Section

▪ Loss of use =	$24,556.86/year
▪ Tangible Adverse Effect =	$14,663.50/year
▪ Intangible Adverse Effect =	$18,000.00/year
Total (rounded)	$57,200.00/year

6.0 Certification

I certify that, to the best of my knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, unbiased professional analyses, opinions, and conclusions.
- I have no present or contemplated interest in the property that is the subject of this report, and I have no personal interest or bias with respect to the parties involved.
- My compensation is not contingent upon the reporting of a predetermined value or direction in value that favours the cause of the client, the amount of the value estimate, the attainment of a stipulated result, or the occurrence of a subsequent event.

7.0 Appraiser's Qualifications

Appendix – Obstruction Mapper Analysis

Obstruction Mapper Analysis

Legal Land Location:	Crop:	*Canola*	Operation:	*Seeding*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Additional Missed Areas	0.04	2.47	2.43
Total Area Missed due to Obstruction			**62.53**
Machinery Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	71.97	94.52	31.72
Two Overlaps	5.56	9.29	4.44
Three Overlaps	0.17	0.41	0.26
Four Overlaps	0.00	0.01	0.01
Total Area of Machinery Overlaps			**36.43**
Input Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	22.99	28.51	8.45
Two Overlaps	0.11	0.13	0.03
Three Overlaps	0.00	0.00	0.00
Four Overlaps	0.00	0.00	0.00
Total Area of Input Overlaps			**8.48**

Annual Operating Costs and Losses Due to Obstruction

Crop Losses - Area Not Cropped	Area	Gross Margin ($/ac)	Gross Margin Losses	Gross Revenue ($/ac)	Gross Revenue Losses
Obstruction Footprint	60.10	$173.02	$10,398.50	$442.80	$26,612.28
Additional Missed Area	2.43	$173.02	$420.44	$442.80	$1,076.00
Total Loss From Areas Not Cropped			**$10,818.94**		**$27,688.28**

Crop Losses - Area Overlapped	Area	Gross Revenue ($/ac)	Yield Impact Zone (%)	Yield Loss (%)	Losses
One Overlap	31.72	$442.80	50%	10%	$702.28
Two Overlaps	4.44	$442.80	50%	25%	$245.75
Three Overlaps	0.26	$442.80	50%	50%	$28.78
Four Overlaps	0.01	$442.80	50%	60%	$1.33
Total Crop Losses from Area Overlapped					**$978.14**

Over Application of Inputs	Area	Input Costs	Input Coverage (%)	Losses
One Overlap	8.45	$155.00	50%	$654.88
Two Overlaps	0.03	$155.00	50%	$2.33
Three Overlaps	0.00	$155.00	50%	$0.00
Four Overlaps	0.00	$155.00	50%	$0.00
Total Loss from Over Application of Inputs				**$657.21**

Additional Machinery Operating Costs	Area	Costs ($/ac)	Efficiency Loss (%)	Losses
Seeding	36.43	$11.53	20%	$504.05
Total Additional Machinery Costs				**$504.05**
Total Annual Operating Costs and Losses Due to Obstruction				**$29,827.68**

Obstruction Mapper Analysis

Legal Land Location:	Crop:	*Canola*	Operation:	*Spraying*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Additional Missed Areas	0.07	6.64	6.57
Total Area Missed due to Obstruction			**66.67**

Machinery Overlaps	Before Obstruction	After Obstruction	Area Affected
One Overlap	109.46	129.02	33.51
Two Overlaps	11.05	19.42	9.78
Three Overlaps	0.17	0.42	0.27
Four Overlaps	0.00	0.00	0.00
Total Area of Machinery Overlaps			**43.56**

Input Overlaps	Before Obstruction	After Obstruction	Area Affected
One Overlap	39.31	50.89	16.59
Two Overlaps	0.08	0.34	0.27
Three Overlaps	0.00	0.00	0.00
Four Overlaps	0.00	0.00	0.00
Total Area of Input Overlaps			**16.86**

Annual Operating Costs and Losses Due to Obstruction

Weed Control Cost - Missed Spraying	Area	Weed Control Cost	Weed Control Cost ($/ac)	Gross Revenue
Additional Missed Spray Area	6.57	$3,600.00		$3,600.00
Weed Control Cost				**$3,600.00**

Crop Losses - Area Overlapped	Area	Gross Revenue	Passes/yr	Yield Impact Zone (%)	Yield Loss (%)	Losses
One Overlap	33.51	$442.80	3	50%	10%	$2,225.73
Two Overlaps	9.78	$442.80	3	50%	25%	$1,623.97
Three Overlaps	0.27	$442.80	3	50%	50%	$89.67
Four Overlaps	0.00	$442.80	3	50%	60%	$0.00
Total Crop Losses from Area Overlapped						**$3,939.37**

Over Application of Inputs	Area	Input Costs ($/ac)	Passes/yr	Input Coverage	Losses
One Overlap	16.59	$46.00	3	50%	$1,144.71
Two Overlaps	0.27	$46.00	3	50%	$18.63
Three Overlaps	0.00	$46.00	3	50%	$0.00
Four Overlaps	0.00	$46.00	3	50%	$0.00
Total Loss from Over Application of Inputs					**$1,163.34**

Additional Machinery Operating Costs	Area	Passes/yr	Costs ($/ac)	Efficiency Loss (%)	Losses
Spraying	43.56	3	$4.57	20%	$716.65
Total Additional Machinery Costs					**$716.65**

Total Annual Operating Costs and Losses Due to Obstruction	**$9,419.36**

Obstruction Mapper Analysis

Legal Land Location:	Crop:	*Canola*	Operation:	*Swathing*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Machinery Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	71.97	94.52	31.72
Two Overlaps	5.56	9.29	4.44
Three Overlaps	0.17	0.41	0.26
Four Overlaps	0.00	0.01	0.01
Total Area of Machinery Overlaps			**36.43**

Annual Operating Costs and Losses Due to Obstruction

Additional Machinery Operating Costs	Area	Costs ($/ac)	Efficiency Loss (%)	Losses
Swathing	36.43	$8.47	20%	$370.27
Total Additional Machinery Costs				**$370.27**
Total Annual Operating Costs and Losses Due to Obstruction				**$370.27**

Obstruction Mapper Analysis

Legal Land Location:	Crop:	*Various*	Operation:	*Combining*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Machinery Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	71.97	94.52	31.72
Two Overlaps	5.56	9.29	4.44
Three Overlaps	0.17	0.41	0.26
Four Overlaps	0.00	0.01	0.01
Total Area of Machinery Overlaps			**36.43**

Annual Operating Costs and Losses Due to Obstruction

Additional Machinery Operating Costs	Area	Costs ($/ac)	Efficiency Loss (%)	Losses
Combining	36.43	$35.07	20%	$1,533.12
Total Additional Machinery Costs				**$1,533.12**
Total Annual Operating Costs and Losses Due to Obstruction				**$1,533.12**

Obstruction Mapper Analysis

Legal Land Location:	Crop:	*HRS Wheat*	Operation:	*Seeding*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Additional Missed Areas	0.04	2.47	2.43
Total Area Missed due to Obstruction			**62.53**
Machinery Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	71.97	94.52	31.72
Two Overlaps	5.56	9.29	4.44
Three Overlaps	0.17	0.41	0.26
Four Overlaps	0.00	0.01	0.01
Total Area of Machinery Overlaps			**36.43**
Input Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	22.99	28.51	8.45
Two Overlaps	0.11	0.13	0.03
Three Overlaps	0.00	0.00	0.00
Four Overlaps	0.00	0.00	0.00
Total Area of Input Overlaps			**8.48**

Annual Operating Costs and Losses Due to Obstruction

Crop Losses - Area Not Cropped	Area	Gross Margin ($/ac)	Gross Margin Losses	Gross Revenue ($/ac)	Gross Revenue Losses
Obstruction Footprint	60.10	$169.69	$10,198.37	$375.00	$22,537.50
Additional Missed Area	2.43	$169.69	$412.35	$375.00	$911.25
Total Loss From Areas Not Cropped			**$10,610.72**		**$23,448.75**

Crop Losses - Area Overlapped	Area	Gross Revenue ($/ac)	Yield Impact Zone (%)	Yield Loss (%)	Losses
One Overlap	31.72	$375.00	50%	10%	$594.75
Two Overlaps	4.44	$375.00	50%	25%	$208.13
Three Overlaps	0.26	$375.00	50%	50%	$24.38
Four Overlaps	0.01	$375.00	50%	60%	$1.13
Total Crop Losses from Area Overlapped					**$828.39**

Over Application of Inputs	Area	Input Costs	Input Coverage (%)	Losses
One Overlap	8.45	$100.00	50%	$422.50
Two Overlaps	0.03	$100.00	50%	$1.50
Three Overlaps	0.00	$100.00	50%	$0.00
Four Overlaps	0.00	$100.00	50%	$0.00
Total Loss from Over Application of Inputs				**$424.00**

Additional Machinery Operating Costs	Area	Costs ($/ac)	Efficiency Loss (%)	Losses
Seeding	36.43	$11.53	20%	$504.05
Total Additional Machinery Costs				**$504.05**

Total Annual Operating Costs and Losses Due to Obstruction	**$25,205.19**

Obstruction Mapper Analysis

Legal Land Location:	Crop:	*HRS Wheat*	Operation:	*Spraying*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Additional Missed Areas	0.07	6.64	6.57
Total Area Missed due to Obstruction			**66.67**

Machinery Overlaps	Before Obstruction	After Obstruction	Area Affected
One Overlap	109.46	129.02	33.51
Two Overlaps	11.05	19.42	9.78
Three Overlaps	0.17	0.42	0.27
Four Overlaps	0.00	0.00	0.00
Total Area of Machinery Overlaps			**43.56**

Input Overlaps	Before Obstruction	After Obstruction	Area Affected
One Overlap	39.31	50.89	16.59
Two Overlaps	0.08	0.34	0.27
Three Overlaps	0.00	0.00	0.00
Four Overlaps	0.00	0.00	0.00
Total Area of Input Overlaps			**16.86**

Annual Operating Costs and Losses Due to Obstruction

Weed Control Cost - Missed Spraying	Area	Weed Control Cost	Weed Control Cost ($/ac)	Gross Revenue Losses
Additional Missed Spray Area	6.57	$3,600.00		$3,600.00
Weed Control Cost				**$3,600.00**

Crop Losses - Area Overlapped	Area	Gross Revenue	Passes /yr	Yield Impact Zone (%)	Yield Loss (%)	Losses
One Overlap	33.51	$442.80	3	50%	10%	$2,225.73
Two Overlaps	9.78	$442.80	3	50%	25%	$1,623.97
Three Overlaps	0.27	$442.80	3	50%	50%	$89.67
Four Overlaps	0.00	$442.80	3	50%	60%	$0.00
Total Crop Losses from Area Overlapped						**$3,939.37**

Over Application of Inputs	Area	Input Costs	Passes/yr	Input	Losses
One Overlap	16.59	$46.00	3	50%	$1,144.71
Two Overlaps	0.27	$46.00	3	50%	$18.63
Three Overlaps	0.00	$46.00	3	50%	$0.00
Four Overlaps	0.00	$46.00	3	50%	$0.00
Total Loss from Over Application of Inputs					**$1,163.34**

Additional Machinery Operating Costs	Area	Passes /yr	Costs ($/ac)	Efficiency Loss (%)	Losses
Spraying	43.56	3	$4.57	20%	$716.65
Total Additional Machinery Costs					**$716.65**

Total Annual Operating Costs and Losses Due to Obstruction	**$9,419.36**

Obstruction Mapper Analysis

Legal Land Location:		Crop:	*Soybeans*	Operation:	*Seeding*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Additional Missed Areas	0.04	2.47	2.43
Total Area Missed due to Obstruction			**62.53**
Machinery Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	71.97	94.52	31.72
Two Overlaps	5.56	9.29	4.44
Three Overlaps	0.17	0.41	0.26
Four Overlaps	0.00	0.01	0.01
Total Area of Machinery Overlaps			**36.43**
Input Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	22.99	28.51	8.45
Two Overlaps	0.11	0.13	0.03
Three Overlaps	0.00	0.00	0.00
Four Overlaps	0.00	0.00	0.00
Total Area of Input Overlaps			**8.48**

Annual Operating Costs and Losses Due to Obstruction

Crop Losses - Area Not Cropped	Area	Gross Margin ($/ac)	Gross Margin Losses	Gross Revenue ($/ac)	Gross Revenue Losses
Obstruction Footprint	60.10	$152.27	$9,151.43	$408.00	$24,520.80
Additional Missed Area	2.43	$152.27	$370.02	$408.00	$991.44
Total Loss From Areas Not Cropped			**$9,521.45**		**$25,512.24**

Crop Losses - Area Overlapped	Area	Gross Revenue ($/ac)	Yield Impact Zone (%)	Yield Loss (%)	Losses
One Overlap	31.72	$408.00	50%	10%	$647.09
Two Overlaps	4.44	$408.00	50%	25%	$226.44
Three Overlaps	0.26	$408.00	50%	50%	$26.52
Four Overlaps	0.01	$408.00	50%	60%	$1.22
Total Crop Losses from Area Overlapped					**$901.27**

Over Application of Inputs	Area	Input Costs	Input Coverage (%)	Losses
One Overlap	8.45	$157.00	50%	$663.33
Two Overlaps	0.03	$157.00	50%	$2.36
Three Overlaps	0.00	$157.00	50%	$0.00
Four Overlaps	0.00	$157.00	50%	$0.00
Total Loss from Over Application of Inputs				**$665.69**

Additional Machinery Operating Costs	Area	Costs ($/ac)	Efficiency Loss (%)	Losses
Seeding	36.43	$11.53	20%	$504.05
Total Additional Machinery Costs				**$504.05**
Total Annual Operating Costs and Losses Due to Obstruction				**$27,583.25**

Obstruction Mapper Analysis

Legal Land Location:	Crop:	*Soybeans*	Operation:	*Spraying*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Additional Missed Areas	0.07	6.64	6.57
Total Area Missed due to Obstruction			**66.67**

Machinery Overlaps	Before Obstruction	After Obstruction	Area Affected
One Overlap	109.46	129.02	33.51
Two Overlaps	11.05	19.42	9.78
Three Overlaps	0.17	0.42	0.27
Four Overlaps	0.00	0.00	0.00
Total Area of Machinery Overlaps			**43.56**

Input Overlaps	Before Obstruction	After Obstruction	Area Affected
One Overlap	39.31	50.89	16.59
Two Overlaps	0.08	0.34	0.27
Three Overlaps	0.00	0.00	0.00
Four Overlaps	0.00	0.00	0.00
Total Area of Input Overlaps			**16.86**

Annual Operating Costs and Losses Due to Obstruction

Weed Control Cost - Missed Spraying	Area	Weed Control Cost	Weed Control Cost ($/ac)	Gross Revenue Losses
Additional Missed Spray Area	6.57	$3,600.00		$3,600.00
Weed Control Cost				**$3,600.00**

Crop Losses - Area Overlapped	Area	Gross Revenue	Passes/yr	Yield Impact Zone (%)	Yield Loss (%)	Losses
One Overlap	33.51	$442.80	2	50%	10%	$1,483.82
Two Overlaps	9.78	$442.80	2	50%	25%	$1,082.65
Three Overlaps	0.27	$442.80	2	50%	50%	$59.78
Four Overlaps	0.00	$442.80	2	50%	60%	$0.00
Total Crop Losses from Area Overlapped						**$2,626.25**

Over Application of Inputs	Area	Input Costs ($/ac)	Passes/yr	Input	Losses
One Overlap	16.59	$46.00	2	50%	$763.14
Two Overlaps	0.27	$46.00	2	50%	$12.42
Three Overlaps	0.00	$46.00	2	50%	$0.00
Four Overlaps	0.00	$46.00	2	50%	$0.00
Total Loss from Over Application of Inputs					**$775.56**

Additional Machinery Operating Costs	Area	Passes/yr	Costs ($/ac)	Efficiency Loss (%)	Losses
Spraying	43.56	3	$4.57	20%	$716.65
Total Additional Machinery Costs					**$716.65**

Total Annual Operating Costs and Losses Due to Obstruction	**$7,718.46**

Obstruction Mapper Analysis

Legal Land Location:		Crop:	*Soybeans*	Operation:	*Rolling*

Acres Mapped

Field Areas	Before Obstruction	After Obstruction	Area Affected
Field Size	471.74	411.64	
Footprint of Obstruction	-	60.10	60.10
Machinery Overlaps	**Before Obstruction**	**After Obstruction**	**Area Affected**
One Overlap	71.97	94.52	31.72
Two Overlaps	5.56	9.29	4.44
Three Overlaps	0.17	0.41	0.26
Four Overlaps	0.00	0.01	0.01
Total Area of Machinery Overlaps			**36.43**

Annual Operating Costs and Losses Due to Obstruction

Additional Machinery Operating Costs	Area	Costs ($/ac)	Efficiency Loss (%)	Losses
Rolling	36.43	$4.99	20%	$218.14
Total Additional Machinery Costs				**$218.14**
Total Annual Operating Costs and Losses Due to Obstruction				**$218.14**

Individual Ownership Plans