

# MONTANA STATEWIDE LAND EVALUATION AND SITE ASSESSMENT SYSTEM

## What is A Land Evaluation and Site Assessment (LESA) System?

The Land Evaluation and Site Assessment (LESA) system is an analytical tool to help decisionmakers systematically assess and identify prime agricultural lands through the use of a consistent rating scheme. Land classification systems have been in use since the 1930's in the United States. The current model LESA system was developed in 1971. Nationally, over 200 LESA systems are in use by various state and local governments. Locally, Lewis and Clark County and Flathead County have each developed a localized LESA system.

## Uses of LESA

A LESA system can provide useful information to:

- Identify important farmland.
- Implement national, state, and local farmland protection policies.
- Prepare and update comprehensive land-use plans.
- Guide the appropriate use of state, local, or federal funds.
- Implement a program to purchase or transfer development rights.
- Prepare environmental impact statements as they relate to agricultural land.
- Plan water and natural resource projects.
- Plan sewage, water, and transportation systems.
- Determine the minimum size of farm units to be included in agricultural districts.

Assessments can help communities make more enduring land-use decisions by basing local planning decisions on natural resource attributes, as well as on cultural, social, and economic community values. Montana's Statewide LESA system has two overall objectives:

- Facilitate identification and protection of important agricultural land.
- Assist in implementing farmland protection policies such as the Farm and Ranchland Protection Program (FRPP).

## Statewide LESA Components

The Statewide LESA system consists of two components: the Land Evaluation (LE) component and the Site Assessment (SA) component. The design of this system is only applicable to cropland agriculture. It is not appropriate for evaluation of purely range or forested land types. When the LESA system is applied, the LE rating is combined with the SA rating to determine the total score of a specific parcel. The higher the total score, the more likely the parcel is suited to FRPP objectives.

Factors are used to label a group of attributes such as soil potential, agricultural productivity, or environmental benefit. Factor scale refers to the way points are assigned to a factor, i.e. 0 to 100 points. A factor rating is the value assigned to a particular parcel. Weight refers to the relative importance of the factor in the LESA system, i.e. a multiplier applied to a factor rating (for example, 0.0 to 1.0). Score is used to denote the total of all weighted factor ratings, i.e. a LESA score.

## Land Evaluation for Cropland

Land Evaluation (LE) factors are designed to evaluate parcels based on the physical characteristics of the soils present within any particular parcel. The LE component is used to rate soils based on their suitability for a specific agricultural use, such as cropland, forestland, or rangeland. The LE factors in the Statewide LESA are based on cropland land use. The Statewide LESA system integrates three soil factors to determine the LE score.

**LE Factors**

1. *Important Farmlands Factor.* The soils' important farmlands classification, as defined in NRCS's General Manual, Part 401.20, Appendix A., is used to determine ratings for this factor. Prime, unique, statewide, and local importance are categories of important farmland used for this criterion. Important farmland designations for each county in Montana are listed in the Field Office Technical Guide (FOTG), Section II-Cropland Interpretations. Soils classified "prime, if irrigated", must currently be irrigated in order to receive the maximum scale factor of 100.

Weight = 0.25

<i>Factor Description</i>	<i>Factor Scale</i>
Prime	100
Unique	90
Statewide	75
Local	55
None of the above	0

2. *Soil Productivity Factor.* This factor is based on soil productivity indexes using data from the National Cooperative Soil Survey. Soil productivity indexes indicate the relative productivity of a soil map unit for a specific crop. For example, the most productive soil (for a given crop at the county level) has been assigned an index of 100, while other soils are assigned lower relative index values. Montana productivity indexes for cropland are based on potential spring wheat yields. County level indexes can be accessed via the World Wide Web through the electronic FOTG at <http://www.nrcs.usda.gov/technical/efotg/> under Section II-Natural Resource Information, Part A-Soils Information.

Weight = 0.15

SAMPLE MAP UNIT PRODUCTIVITY INDEX		
Soil Survey Area ID No.	Map Unit Symbol	Productivity Index
USANG008	2F	0
USANG008	3F	0
USANG008	5F	0
USANG008	14E	0
USANG008	1E	1
USANG008	6E	1
USANG008	15E	2
USANG008	12E	8
USANG008	4D	15
USANG008	11E	18
USANG008	13D	22
USANG008	8D	26
USANG008	7D	30
USANG008	10D	49
USANG008	16C	100

3. *Capability Classification Factor.* The capability classification system shows, in a general way, the suitability of soils for cropland. It is a three-tier interpretive system. The highest category, class, gives a perspective of the suitability of map units for the broad kinds of uses commonly found on farms and ranches. There are eight classes designated by Roman numerals I through VIII. Classes I, II, III, and IV are suitable for mechanized production of common field crops if properly managed and for production of pasture and woodland. Classes V, VI, and VII are generally not suited to mechanized production of common field crops without special management, but are suitable for permanent cover such as grasses and trees. Areas in Class VIII are generally not suitable for crops, pasture or wood products without management that may be impractical. Class VIII areas may have potential for other uses such as wildlife habitat or recreation.

Capability subclass identifies the relative degree and kinds of limitations for these uses. In general, the fewer the limitations, the more suitable the soil is for mechanized farming systems to produce commonly grown crops, and the lower the costs of overcoming limitations. Subclass symbols include risk of erosion (e), wetness (w), shallow soil depth, droughty, or stony (s) and climate (c). Capability classifications are available in Section II-Cropland Interpretations of the

FOTG, published soil survey reports, and electronically through the Soil Data Viewer (NRIS at <http://nr.is.state.mt.us/nrcs/soils/sdvhome.html>). The third tier, capability unit is not applied uniformly in all soil survey areas. Therefore it will not be used in the LE rating.

Weight = 0.10

<i>Factor Description</i>	<i>Factor Scale</i>	<i>Factor Description</i>	<i>Factor Scale</i>
I	100	IVe	62
IIw	95	IVs	60
IIe	92	IVc	60
IIs	90	V	40
IIc	90	VIw	25
IIw	85	VIe	22
IIIe	82	VI s	20
IIIs	80	VIc	20
IIc	80	VII	10
IVw	65	VIII	0

### Site Assessment for Cropland

The site assessment (SA) component involves three major areas: non-soil factors related to agricultural use of a site, factors related to development pressures, and other factors related to other public values of a site or area. Each rating factor is assigned a range of possible values according to relative attributes of the parcel. This process provides a rational, sound basis for making land-use decisions.

#### SA Factors

The following SA factors are used to assess the relative suitability of the proposed parcel for protection as farmland. SA factors are grouped into three categories:

- SA-1 factors measure non-soil site characteristics related to potential agricultural productivity or practices.
- SA-2 factors measure development or conversion pressures on a site.
- SA-3 factors measure other public values of a site, such as historic, cultural, scenic, or environmental values.

Each factor will be given a rating based on the context of the proposed site or area by examining characteristics of the parcel, surrounding area, and the programs and policies of the State or local unit of government in which the parcel is located. Where more than one alternative is provided for a parcel, each alternative should be evaluated and rated separately. Following are SA factors and scales selected to be used in Montana’s Statewide LESA model.

#### SA-1 Factors

1. *Compatibility of Adjacent Uses Factor.* This factor measures how much of the perimeter of the proposed project site or area borders on agricultural (nonurban) land. Compatibility is defined as conditions that are capable of existing next to agriculture without causing conflict. It gauges the potential for land use conflicts between surrounding parcels. The scale of this factor is distributed so that a farm with a high percentage of adjacent land uses compatible with agriculture receives high values while areas with lower percentages of adjacent land uses compatible with agriculture will receive lower values. Urban lands are defined as lands occupied by buildings and related facilities used for residences, industrial sites, institutional sites, public highways, airports, and similar uses associated with towns and cities.

Weight = 0.075

<b>Factor description</b>	<b>Factor Scale</b>
Greater than 90%	100
75 to 89%	80
50 to 74%	40
20 to 49%	20
Less than 20%	0

2. *Percent in Agricultural Use Factor.* This factor measures the agricultural viability of a parcel. The factor is scaled to increase the rating as the percentage of land in agricultural uses within the parcel increases. Calculate the percentage of the parcel that has been farmed (managed for a scheduled harvest to include grazing) more than 5 of the last 10 years?

Weight = 0.0625

<b>Factor Description</b>	<b>Factor Scale</b>
Greater than 90%	100
50 to 90%	75
20 to 49%	50
Less than 20%	0

3. *Average Size Factor.* This factor compares the size of the parcel to the county average farm size from the most recent Census of Agriculture (see Appendix A). Size of operation relates to agricultural viability based on local farming practices, productivity, and economics. The ratings are scaled so that a parcel as large as or larger than the average farm size receives maximum points. As parcel size decreases relative to county average farm size, the rating is reduced, indicating less potential for sustainable operations.

Weight = 0.0625

<b>Factor Description</b>	<b>Factor Scale</b>
As larger or larger than avg.	100
50 to 95% of average	75
Less than 50% of avg.	50

### SA-2 Factors

4. *Proximity to Protected Agricultural Land Factor.* This factor measures the degree to which a given parcel meshes with local plans or efforts to protect agricultural lands. It also gauges the likelihood that additional nearby parcels will convert to non-agricultural land uses. Protected is defined as agricultural land subject to state or local government ordinances, regulations, and programs, or other easement instruments serving to limit development and protect agricultural uses. The factor is measured from the outside boundary of the parcel to the nearest protected agricultural land.

Weight = 0.0750

<b>Factor Description</b>	<b>Factor Scale</b>
Adjacent	100
Within 1/8 mile	90
Within ¼ mile	80
Within ½ mile	70
Within 1 mile	60
Within 1 to 2 miles	50
Beyond 2 miles	0

5. *Distance to Services Factor.* This factor measures the availability of services such as centralized water or sewer lines or other local facilities and services such as improved roads whose capacity and design would promote nonagricultural use. The economies of scale associated with infrastructure connections and extensions make this factor an important

indicator of development pressure for conversion of agricultural land. This indicates decreased viability for sustained agricultural land uses. Those parcels located more distant from service features receive higher ratings. The factor is measured from the outside boundary of the parcel to the nearest services. Do not consider services from which access is legally excluded.

Weight = 0.075

<b><i>Factor Description</i></b>	<b><i>Factor Scale</i></b>
Services greater than 2 miles	100
Services between 1 and 2 miles	75
Services between ½ mile and 1 mile	50
Services less than ½ mile	0

**SA-3 Factors**

6. *Open Space Strategic Value Factor.* This factor evaluates the impact of the parcel on open space objectives for the community. Lands identified within a strategic open space plan have more community value in addition to the agricultural value. An open space plan is defined as an ordinance, regulation or planning document adopted or authorized by a local government entity. Open space plans developed by non-governmental organizations must be concurred in by the appropriate local government entity to be considered under this factor.

Weight = 0.06

<b><i>Factor Description</i></b>	<b><i>Factor Scale</i></b>
Identified in plan	100
Not identified in plan	0

7. *Historic Buildings or Archeological Sites Factor.* This factor evaluates the historical attributes of a parcel. It assumes that the presence of eligible historical or archeological features add to the agricultural preservation value. Significant historical or archeological sites are those listed on the National Register of Historic Places or have received a consensus determination through the State Historic Preservation Office. Qualified professional cultural resource consultants will perform inventory and documentation. NRCS submits the report to the State Historic Preservation Office and consults on the eligibility of historical or archaeological sites.

Weight = 0.04

<b><i>Factor Description</i></b>	<b><i>Factor Scale</i></b>
Features significant	100
Features not significant	0

8. *Water Resource Protection Factor.* This factor measures the relative extent of features related to the protection of water resources on the parcel. The logic for this factor assumes that agricultural land uses have beneficial impacts on adjacent water resources when compared to other land uses (with utilization of appropriate Agricultural Best Management Practices). Two categories of water resources are identified in the system, either (whichever is larger in area, but not both): the proportional area within the FEMA designated 100-year floodplain; or within a 200-foot wide buffer along perennial waterbodies where no floodplain delineation has been made. The proportion of the parcel fitting the factor description is used to determine the factor scale. Perennial waterbodies are designated by solid blue lines on U.S. Geological Survey topographic maps.

Weight = 0.05

<b><i>Factor Description</i></b>	<b><i>Factor Scale</i></b>
50 to 100%	100
25 to 49%	70
10 to 25%	50
0 to 10%	0

### Combining LE Factors

For proposals with a single soil, the Important Farmland, Soil Suitability and Soil Productivity factor ratings will be combined to generate a total LE rating. For proposals with multiple soils, the rating for each factor will be based on the relative percentage of area occupied by that soil within the area of the proposal. Weighted ratings are then summed for the total LE rating. The example below shows LE weighted factor ratings for sites with more than one soil using land capability, soil productivity and important farmland groups.

<i>Soil Name</i>	<i>Factor Rating (0-100)</i>	<i>X</i>	<i>Factor weight</i>	<i>=</i>	<i>Weighted factor rating</i>	<i>X</i>	<i>% of site/ area (fraction)</i>	<i>=</i>	<i>Site partial rating</i>
Soil A									
Land capability	65	X	0.10	=	6.5				
Soil productivity	60	X	0.15	=	9.0				
Important farmland	75	X	0.25	=	18.75				
Soil A subtotal					34.25	X	0.50	=	17.12
Soil B									
Land capability	92	X	0.10	=	9.2				
Soil productivity	90	X	0.15	=	13.5				
Important farmland	100	X	0.25	=	25.0				
Soil B subtotal					47.7	X	0.50	=	23.85
<b>LE subtotal</b>									<b>40.97</b>

### Combining SA Factors

Individual SA factor ratings are weighted (multiplied by the weight fractions) and added together to generate the total SA rating as shown in the tables below.

<i>Factor</i>	<i>Factor Rating</i>	<i>X</i>	<i>Weight Factor</i>	<i>=</i>	<i>Weighted Factor</i>	<i>Site/Area Rating</i>
SA -1						
1	80	X	0.0750	=	6.0	
2	75	X	0.0625	=	4.7	
3	60	X	0.0625	=	3.8	
SA-1 Subtotal			0.2000			14.5
SA-2						
4	70	X	0.0750	=	5.2	
5	80	X	0.0750	=	6.0	
	<i>Factor Rating</i>	<i>X</i>	<i>Weight Factor</i>	<i>=</i>	<i>Weighted Factor</i>	<i>Site/Area Rating</i>
SA-2 Subtotal			0.1500			11.2
SA-3						
6	0	X	0.0600	=	0	
7	100	X	0.0400	=	4.0	
8	50	X	0.0500	=	2.5	
SA-3 Subtotal			0.1500			6.5
<b>SA Subtotal</b>			<b>0.5</b>			<b>32.2</b>

### Combining LE and SA Ratings

LE and SA weighted ratings are added to provide a total LESA score for the parcel. A spreadsheet is attached for use in applying the Statewide LESA system. Users may wish to further separate SA scores to provide a perspective on relative values expressed by the individual factors.

<i>Factor</i>		<i>Weighted factor rating</i>	<i>Total Rating</i>
LE	Land capability	7.85	
	Soil productivity	11.25	
	Important farmland	21.87	
	LE Subtotal		41.0
SA	SA-1	14.5	
	SA-2	11.2	
	SA-3	6.5	
	SA Subtotal		32.2
<b>Total LESA Score</b>			<b>73.2</b>

### Example LESA Worksheet

Montana Statewide Land Evaluation and Site Assessment Worksheet							
Land Evaluation Factors	Factor	Factor Rating	Factor Weight	Weighted factor rating	% of site/area (fraction)	Partial Rating	Total Score
		Important Farmland	80	0.25	20.00	0.50	10
	Soil Productivity	90	0.15	13.50	0.50	6.75	
	Land Capability	75	0.10	7.50	0.50	3.75	
	Important Farmland	100	0.25	25.00	0.50	12.5	
	Soil Productivity	90	0.15	13.50	0.50	6.75	
	Land Capability	75	0.10	7.50	0.50	3.75	
LE Subtotal							43.50
Site Assessment Factors	1 Compability of Adjacent Uses	80	0.0750	6			
	2 Percent in Agricultural Use	100	0.0625	6.25			
	3 Average Size	75	0.0625	4.6875			
	SA-1 Subtotal			16.9375			
	4 Proximity to Protected Ag Land	70	0.0750	5.25			
	5 Distance to Services	100	0.0750	7.5			
	SA-2 Subtotal			12.75			
	6 Open Space Strategic Value	100	0.0600	6			
	7 Historic Buildings/Arch. Sites	0	0.0400	0			
8 Water Resource Protection	75	0.0500	3.75				
SA-3 Subtotal			9.75				
SA Subtotal							39.44
Total LESA Score							82.94
<p>Enter scale values for the parcel in light yellow blocks from LESA scoresheet. Enter LE relative % area fraction in dark blue blocks. Spaces provided for two soil units. Ratings and scores will be calculated in rose blocks. Final scores in gold blocks.</p>							

**APPENDIX A.** County average farm sizes from the 1997 and 1992 Census of Agriculture, USDA, National Agricultural Statistics Service, Montana Data. The 1997 value is used to calculate the average size factor rating.

<b>County</b>	<b>1997 Avg. Farm Size (acres)</b>	<b>1992 Avg. Farm Size (acres)</b>
Carbon	1181	999
Garfield	8866	7606
Treasure	5505	5301
Golden Valley	5407	5260
Gallatin	910	886
Rosebud	7406	7243
Valley	2728	2705
Musselshell	4106	4079
Richland	2127	2126
Wheatland	5790	5826
Fergus	2756	2777
Carter	5211	5258
Fallon	3084	3127
Missoula	544	552
Phillips	4045	4110
Sweetgrass	2789	2840
McCone	3053	3109
Powell	2824	2899
Meagher	6620	6807
Petroleum	6152	6376
Toole	2856	2970
Pondera	1853	1931
Judith Basin	2537	2647
Dawson	2823	2958
Choteau	2949	3091
Stillwater	1896	1994
Yellowstone	1391	1463
Powder River	5250	5523
Teton	2005	2120
Broadwater	2067	2195
Sheridan	1723	1830
Liberty	3269	3474
Prairie	3879	4140
Hill	2374	2565
Montana	2414	2613
Blaine	4173	4550
Silver Bow	864	950
Sanders	995	1095
Granite	2294	2536
Daniels	2106	2343
Wibaux	2671	2976
Cascade	1596	1798
Lake	590	666
Park	1784	2020
Jefferson	1369	1557
Roosevelt	2348	2694
Custer	4685	5487
Big Horn	5227	6190
Glacier	3818	4602
Beaverhead	3200	3891
Lewis and Clark	1638	2017
Mineral	230	286
Lincoln	183	229
Madison	2347	3041
Flathead	241	341
Ravalli	170	258
Deer Lodge	1225	1930