Section 1
Estimating the Use Value of Agricultural Land

The State Land Evaluation Advisory Council (SLEAC) is required to base its estimates of the use value of agricultural and horticultural lands on productive earning power determined by the capitalization of cash rents or by capitalization of net incomes of like real estate (Section 58.1–3239 of the Code of Virginia). Reliable cash rents were unavailable or very thin in many jurisdictions and SLEAC elected to base its use-value estimates on the capitalization of net income. However, in calendar year 2009, published rental rates became available from NASS for tax year (TY) 2010. This section describes the methodology SLEAC uses in estimating the use value of agricultural land and provides clarification, when necessary. Prince Edward County is used as an example for TY2008.

The Composite Farm

The agricultural sector in Virginia is very heterogeneous. A typical agricultural operation located along the Eastern Shore is very different from an operation in the Southwest. For this reason, an accurate estimation of agricultural use values required developing a composite (i.e. typical) farm for each jurisdiction participating in the use-value program. County level data on the total number of farms and acreage harvested for each crop are obtained from the most recent Census of Agriculture. To calculate the composite farm acreage for a crop within a county, the acreage for each crop is divided by the total number of farms in the county. If this division results in a value greater than or equal to 1, the crop is included in the composite farm. It is also necessary to calculate a county’s double-cropped acreage because it is assumed that only one crop is grown annually on agriculture land. Winter annuals, e.g., winter wheat, barely, and rye crops, are assumed to always be followed by another crop, e.g., corn or soybeans. Therefore, they are considered double-crop acreage. Summing the total acreage of winter annuals and dividing by the number of farms, results in double-crop composite farm acres. The double-crop composite acreage is subtracted from the total, reflecting true crop rotation acreage within a jurisdiction.

For example, in TY2008, Prince Edward County had 395 farms and 1,430 corn acres harvested (Table 2, Appendix C). Therefore, Prince Edward County has 4 acres of corn in its composite farm. This process is continued for each single and double-cropped crop acreage yielding a composite farm having a mixture of corn, alfalfa, hay, wheat, and barley, with a total of 39 acres.

Net Farm Income

Net Return Budgets

The next step in the use-value estimation procedure is to determine net return budgets for each crop grown on the composite farm. Net returns are calculated by developing an enterprise budget for each primary crop grown. In TY2008, the primary crops used in the use-value estimation of agricultural land were corn, alfalfa, hay, wheat, barley, soybeans, potatoes, and cotton. By basing net return budgets on all primary crops, crop rotations are implicitly incorporated.

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3Annual jurisdictional capitalized rental rates and a description of the methods used in calculating the these rates for cropland and pastureland are available at: http://usevalue.agecon.vt.edu/RentalRates.htm. Historical (5 to 7 years of data) capitalized rental rates may provide a second data source for jurisdictions in setting values when approved by SLEAC.

4County or city.

5Crop acreages for TY2008 are from the 2002 Ag Census. The census is updated every 5 years and lags the tax year in which it is initiated by 3 years (e.g., 2002 Ag Census initiated in TY2005; and the 2007 Ag Census initiated in TY2010).

6Acreage calculations from a census include:
Corn acreage = corn-grain acres + corn-silage acres; and
Hay acreage = (all hay + all haylage, grass silage, greenchop) - (alfalfa hay + haylage or greenchop from alfalfa or alfalfa mixtures).

7Composite crop acreages are rounded to the nearest whole number, e.g., 3.6202 is rounded to 4.

8Total composite farm acres sometimes do not add exactly due to rounding; and, some crop acres are not listed due to NASS disclosure rules.

9A complete listing of the enterprise budgets and data sources is available at http://pubs.ext.vt.edu/

9Structural changes in production agriculture necessitate occasional changes in the primary crops. For TY2011, the primary crops were: corn, alfalfa, hay, wheat, barley, soybeans, potatoes, cotton, pasture, peanuts, tobacco, beans (green limas), cucumbers, pumpkins, sweet corn, tomatoes, and watermelons.
In TY2010, pasture was included as a crop within the use-value model. The use-value Technical Advisory Committee (TAC) approved the inclusion. Pasture yield is converted from hay (all) yield using the following formula:

\[
\text{Pasture Yield} = \left( \frac{\text{Hay All Yield}}{0.75} \right) \times 0.44
\]

Also, pastureland use values are imputed from net returns on lower productive lands in each jurisdiction. Use values for both cropland and pastureland are reported in Table 1a (Appendix B).

In determining the net return for a crop budget, an annual per acre net return budget is derived for each crop grown on the composite farm. Enterprise budgets, largely derived from Virginia Farm Management crop budgets, and input costs from numerous government and industry sources are used to determine annual crop net return budgets. Much of the data lags the tax year by two years due to the availability of crop yields and prices reported by the Virginia Field Office of the National Agricultural Statistics Service (VASS).

In TY2010, a process for merging annual per acre crop net return budgets together was initiated. Currently, for some crops there is only one crop budget (e.g., alfalfa, hay, and cotton). However, for others (e.g. corn, soybeans, and tobacco) there can be two or more crop budgets which are combined. For example, a jurisdiction’s corn budget is a merger of its corn-minimum tillage budget and corn-conventional tillage budget.

Jurisdictional annual per acre crop net return budgets for the previous 7 years (each budget lags its corresponding tax year by 2 years) are averaged using a moving 7-year Olympic average. A moving Olympic average is defined as an arithmetic mean calculated after first dropping the highest and lowest values within a data series. The average is moving in that the data series used is relative to a given tax-year. For example, for TY2008 the use-value net return budget data series is from data year (DY) 2000 to data year (DY) 2006, for TY2007 the data series is from DY1999 to DY2005, and so on.

The Olympic averaging process helps mitigate fluctuations in the annual use-value estimates caused by unusually good or poor years. In the event a net return budget is negative, its value is set to zero. For example, the net return budgets for alfalfa in Prince Edward County were (see that negative values are set to zero and for 7-year Olympic Averaging, high and low values are dropped):

<table>
<thead>
<tr>
<th>Data Year</th>
<th>$/acre</th>
<th>7-year Olympic Averaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>DY2000</td>
<td>39.07</td>
<td>39.07</td>
</tr>
<tr>
<td>DY2001</td>
<td>0.00*</td>
<td>Dropped</td>
</tr>
<tr>
<td>DY2002</td>
<td>0.00*</td>
<td>0.00</td>
</tr>
<tr>
<td>DY2003</td>
<td>135.21</td>
<td>135.21</td>
</tr>
<tr>
<td>DY2004</td>
<td>191.94</td>
<td>Dropped</td>
</tr>
<tr>
<td>DY2005</td>
<td>52.79</td>
<td>52.79</td>
</tr>
<tr>
<td>DY2006</td>
<td>55.54</td>
<td>55.54</td>
</tr>
</tbody>
</table>

Olympic Average $56.52

Dropping the highest ($191.94) and lowest ($0.00) values and averaging the remaining five years, provides an estimated per acre average net return budget for alfalfa of $56.52 (Appendix C, Table 2 – line 3).

**Federal Direct and Counter-Cyclical Program Payments (Federal Payments)**

In the absence of federal payments, the above process for estimating a net return from a crop enterprise is sufficient. However, when federal payments are made to farms in a county, they must be included as a source of

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10Pasture acreage is calculated from the Ag Census 2007. It is the sum of acreages for:
- Cropland used only for pasture and grazing;
- Pastureland and rangeland, other than cropland and woodland pastured; and
- Woodland pastured.
12Annual per acre crop budgets lag a given tax year by 2 years (e.g., TY2008’s annual per acre crop budget data is from data year (DY) 2006).
14Merging weights for crop budgets are calculated for some crops from annual acreages reported by NASS. In TY2010, Tobacco and Potato budget merging weights were calculated. Merging other crops budgets (e.g., corn and soybeans), use historical tillage weights (percentages) which were updated in TY2007 by the Conservation Technology Information Center (CTIC).
farm revenue. Currently, federal program payments exist for corn, wheat, barley, cotton, and soybeans. The federal payments received by a county for each program crop are divided by the number of crop acres grown, resulting in per acre payments. Since federal payments can vary from year to year, this calculation is made for each of the previous 7 years. Federal payment data also lag the current tax year by two years and are also estimated using a moving 7-year Olympic average. The averages of federal payment for crops in a county’s composite farm are added to the average of the net return budgets to arrive at a county’s total crop net returns.

For example, per acre federal payments for wheat in Prince Edward County were:

<table>
<thead>
<tr>
<th>Data Year</th>
<th>$/acre</th>
<th>7-year Olympic Averaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>DY2000</td>
<td>155.17</td>
<td>155.17</td>
</tr>
<tr>
<td>DY2001</td>
<td>153.83</td>
<td>Dropped</td>
</tr>
<tr>
<td>DY2002</td>
<td>123.58</td>
<td>Dropped</td>
</tr>
<tr>
<td>DY2003</td>
<td>150.51</td>
<td>150.51</td>
</tr>
<tr>
<td>DY2004</td>
<td>150.51</td>
<td>150.51</td>
</tr>
<tr>
<td>DY2005</td>
<td>150.51</td>
<td>150.51</td>
</tr>
<tr>
<td>DY2006</td>
<td>150.51</td>
<td>150.51</td>
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</tbody>
</table>

Olympic Average $151.17

The average for Prince Edward County’s wheat net return budgets is $1.30. Adding the average wheat federal payment of $151.17 to the average wheat net return of $1.30, results in total crop net returns of $152.48 (Appendix C, Table 2 – line 5). This procedure is performed for each primary crop comprising at least one or more acre of cropland harvested on the county’s composite farm.

**Final Estimated Net Return**

To calculate a single final estimated net return for the crops grown on a county’s composite farm, a weighted average is calculated using the crop net returns and its corresponding composite farm acreages as weights. The result is a per acre final Estimated Net Return of harvested cropland for a jurisdiction. For TY2008, in Prince Edward County, the Estimated Net Return from cropland harvested is $18.20 per acre (Appendix C, Table 2 – line 11).

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15 The rationale for including federal payments is that this stream of revenue is capitalized into the value of the land. It is implicitly assumed that the past flow of these payments is an indicator of future payments.

16 Federal program payments for individual crops by county were unavailable for TY2011. However, county-level federal program payments are available from Farm Service Agency (FSA). The county-level payment is divided by the total acreage of program crops providing an average federal acreage payment. This average payment is added to each crop’s average net return budget, i.e., composite farm crops receiving a federal payment. This change in FSA data resulted in a new price series (7-year Olympic Averaging) for federal program payments.

17 Crop acreages are taken from latest Census of Agriculture.

18 Due to limitation in the software, Olympic averaging uses data from the current census only.

19 Cropland harvested acreage is a subset of total agricultural acreage that does not include planted acreage that is not harvested.

20 A complete listing of recent net returns applicable to participating jurisdictions is provided at [http://usevalue.agecon.vt.edu/](http://usevalue.agecon.vt.edu/).

21 A complete listing of the capitalization rate components applicable in each jurisdiction is available for public inspection at the Virginia Department of Taxation.
**Capitalization Rate**

A basic capitalization rate is the sum of a property tax component and an interest rate component. In some jurisdictions, the capitalization rate can include a risk of flood component. Capitalization rate components are listed in Table 3 (Appendix C, Section 2).21

**Interest-rate component**

The interest-rate component of the capitalization rate is a weighted average of the long-term interest rates charged by Agricultural Credit Associations (ACA) serving Virginia. These data lag the tax year by 2 years. To reduce the variability of the annual use-value estimates, SLEAC elected to take a straight moving average of the weighted long-term interest rates over the 10-year period prior to a given tax year. For example, for TY2008 data for long-term interest rates are from 1997 to 2006. Therefore, the moving straight 10-year average of the long-term rate is 7.61 percent (Appendix C, Table 3 – line 2a). The same rate is used for all jurisdictions. This long-term interest rate average reflects an alternative return to owning agricultural land over an extended period of time. The same long-term interest-rate component used for agricultural land is also used for horticultural land.

**Property-tax component**

The property-tax component, also a moving straight 10-year average, is an average of the effective true real property tax rate published annually by the Virginia Department of Taxation. Property tax data lags the interest rate and net income data by three years. Therefore, the estimated property tax component applicable to TY2008 relies on data from the years 1996 to 2005. The property tax component used for agricultural land is also used for horticultural land. The sum of the interest rate and property tax rate equals the basic capitalization rate. For example, Prince Edward County’s property-tax component is 0.0043 which, when added to the long-term interest rate component, results in a capitalization rate of 0.0895 (Appendix C, Table 3 – line 2c).

**Risk component**

Agricultural enterprises are subject to numerous risks. However, the risks associated with input costs, crop yields, and prices received are adequately accounted for by the net return component since these risks occur on an across-the-board basis and do not reflect individual land risk situations. The two primary types of risks explicitly considered in the use-value methodology are related to rainfall, either a shortage or an excessive amount. An important difference between the two is that the risk associated with drought is not land-related while the risk associated with excessive rainfall is land-related. The risk of drought is assumed to be distributed uniformly within a jurisdiction and, therefore, does not warrant special attention.

Because the risk associated with an excessive rainfall is land-related, it can vary within a jurisdiction. The risk associated with excessive rainfall is lower crop yields caused by flooding. This situation mainly occurs in the southeastern part of the state but also occurs in other regions, usually to a lesser extent. Because this risk is borne by specific areas of land within a jurisdiction, a special use-value estimate based on a capitalization rate reflecting the risk of flooding is calculated.

The size of the risk component will vary depending on the period over which a total crop loss is expected on lands subject to the effects of flooding. Use-value methodology assumes that a total crop loss will occur on land at risk of flooding once every 20 years. Therefore, the land’s capitalization rate is increased by 5%. For example in Prince Edward County, the risk component is calculated to be 0.0040 (Appendix C, Table 3 – line 2d). Adding this component to the without-risk capitalization rate results in a with-risk capitalization rate of 0.0845 (Appendix C, Table 3 – line 2e).

The estimated use values of agricultural land are provided in Table 1a. The with-risk estimates should only be used when an individual land tract is known to have poor drainage which cannot be remedied by tiling or drainage ditches. Land devoted to horticultural use will rarely be subject to these conditions. For this reason, SLEAC elected not to consider the risk of flooding in the use-value estimates for horticultural crops.

**Calculating Use values**

Once a per-acre net return and capitalization rate for a jurisdiction have been estimated, calculating its use value is straightforward. The basic formula is

\[
\text{Use value} = \frac{\text{Net Return}}{\text{Capitalization Rate}}
\]

From this formula, changes in a use-value estimate are obvious. An increase in a jurisdiction’s use value is caused either by an increase in net return and/or a decrease in the capitalization rate. A decrease in use value is caused either by a decrease in the net return and/or an increase in the capitalization rate.
For example in Prince Edward County, the without-risk capitalization rate is 0.0805 (Appendix C, Table 3 – line 2c). Therefore, the initial use value for without-risk cropland harvested is:

\[ \text{Use value} = \frac{18.20}{0.0805} = 226.17 \]

This calculation is referred to as an unadjusted without-risk value because it has not yet been adjusted for variations in soil capability (Appendix C, Table 3 – line 3). The unadjusted with-risk value is simply a jurisdiction’s net return divided by its with-risk capitalization rate.

**Adjusting for Variations in Capability**

The initial unadjusted use-value estimate does not reflect different land characteristics within a jurisdiction. Section 58.1–3239 of the Code directs that SLEAC annually publish use-value estimates for each of the eight Natural Resources Conservation Service (NRCS) land capability classifications.22

Agricultural professionals generally agree that Land Capability Classes I through III are most capable of producing cultivated annual crops. Land Capability Class IV is also capable of producing cultivated annual crops, but intensive conservation treatment is required. Land Capability Classes V through VII are generally suited for pasture and in some instances orchard. Land Capability Class VIII has practically no agricultural value. Therefore, land Capability Classes I through IV are designated as suitable for harvested crops (i.e. cropland harvested). Land Capability Classes V through VII are designated as suitable for other agricultural uses, primarily pasture.

The most direct way to adjust for differences in land capability would be to develop a set of enterprise budgets for each land class. Unfortunately, much of the data is not reported at this level. Therefore, SLEAC approved the use of an index to adjust use values for the various land capability classifications.

Class III land was chosen as the base class and assigned an index of 1.23 The use value of agricultural land in other classes is adjusted based on its income generating potential relative to the base class. SLEAC approved the following indices for each Land Capability Class to adjust use-value estimates relative to the base class.

<table>
<thead>
<tr>
<th>Virginia Land Capability Class Index (Agricultural Land)</th>
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</thead>
<tbody>
<tr>
<td>Class I</td>
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<tr>
<td>Class II</td>
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<tr>
<td>Class III</td>
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<tr>
<td>Class IV</td>
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<td>Class V</td>
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<tr>
<td>Class VI</td>
</tr>
<tr>
<td>Class VII</td>
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<tr>
<td>Class VIII</td>
</tr>
</tbody>
</table>

**Statewide Land Capability Classifications**

- **Class I**: Soils have few limitations that restrict use.
- **Class II**: Soils have some limitations that reduce the choice of plants or require moderate conservation practices.
- **Class III**: Soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.
- **Class IV**: Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.
- **Class V**: Soils are subject to little or no erosion but have other limitations impractical to remove that limit their use largely to pasture, range, woodland, or wildlife food and cover.
- **Class VI**: Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.
- **Class VII**: Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.
- **Class VIII**: Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply or to aesthetic purposes.

23The decision to make Class III the base is arbitrary and has no impact on the final use-value estimates.
The scale implies that the expected net income from Class I is 1.5 times that of Class III; the expected net income from Class II is 1.35 times that of Class III land; the expected net income from Class IV is only .80 times that of Class III land; the expected net income from Class V is only 0.60 times that of Class III land, and so on.

**Soil index factor**

Since the mix of land classes differs among jurisdictions, it is not appropriate to simply use an unadjusted without-risk (or with-risk) use-value estimate (Appendix 3, Table 3 – Section 3) which would be used as the use-value estimate for Class III land. An adjustment is made by calculating a soil index factor. The factor which is the weighted average of the land capability (productivity) indices (Classes I – IV) in each jurisdiction where cropland acreage of classes I – IV in the jurisdiction provides the weights.

In Prince Edward County, the soil index factor is calculated as 1.149 (Appendix 3, Table 3 – Section 4). This value means that a typical acre of land in Prince Edward County is between Class II (1.35) and Class III (1.00). Since the unadjusted without-risk use value of cropland harvested for Prince Edward County was $226.17 (Appendix 3, Table 3 – line 3), that value is divided by the soil index factor of 1.149. This yields a without-risk use-value estimate for Class III land of $196.93 per acre. Multiplying this value by each of the other land class indices provides the remaining without-risk use-value estimates (Appendix C, Table 3 - Section 5). The same process is used in calculating a jurisdiction’s with-risk use-value estimates, by using the unadjusted with-risk use value. Note that the final estimated values are rounded to the nearest $10, e.g., the use-value estimate for Class III of $196.93 is reported as $200 (Appendix B – Table 1a).

**Using average use-value estimates**

When the soil capability classes of an individual real estate tract are known, using the adjusted use-value estimates could improve equity. However, in many jurisdictions, these data do not exist. Therefore, Appendix B Table 1a lists the weighted average use-value estimates for cropland harvested (land classes I through IV), pastureland (land classes V through VII), and total agricultural land (land classes I through VII). At the discretion of the assessing officer, the pastureland use value may be applied to land in any class that is strictly used for grazing.

**Transfer-in data**

The data used for estimating the use value of agricultural land are not published for all towns and for only a few of Virginia’s independent cities. When data do not exist for a town or city participating in the use-value taxation program, data from an adjacent county are used. The process is referred to as “transferring-in data.” For example, Chesterfield County uses transfer-in data from Amelia County (Appendix B, Table 1a).

**Split Counties: Census and Net Returns**

Transfer-in data are also used for jurisdictions that are split by the “Fall Line.” These split-counties are unique because their western side is comprised of Piedmont soils and crops and their eastern side is comprised of Coastal Plain soils and crops. Currently, Dinwiddie, Hanover, and Henrico counties are split counties and data are transferred in from adjacent counties with similar soil. For example, Dinwiddie County’s Coastal Plain region uses transfer-in data from Prince George County, while its Piedmont region uses transfer-in data from Nottaway County.

In a split-county, the county’s own census data is used in calculating composite farm acreage. As a result, there are identical composite farm acreages for both regions within a split-county. As with other transfer-in counties, a split-county’s crop net return budgets are transferred-in from an adjacent county. However, a split-county does not transfer-in federal payments. Rather, federal payments paid to the split-county are used for both regions. For example, both of Dinwiddie’s Coastal Plain and Piedmont regions use federal payments paid to Dinwiddie County.

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25Not adjusting use-value estimates in jurisdictions with high concentrations of land in classes I and II would overestimate Class III estimates while underestimating Class III estimates in jurisdictions with low concentrations of land in classes I and II.

26Data on land acreage in each land class is available in the Virginia Conservation Needs Inventory (1967).

27These data can be generated by using soil surveys and tax map overlays or through self-reporting but the process is costly and difficult to verify.

28When a transfer-in county designation changes, a jurisdiction’s historical annual budget data for the previous 7 years must be adjusted to include annual budgets from all transfer-in counties within the previous 7 years. Calculations are performed outside the use-value system with all jurisdictional reporting updated (i.e., Brochure, Table 1a, Table 1b, Table 2, Table 3, and Table 5).
Transfer-in Jurisdictions: Effective Tax Rates

When a jurisdiction is not split and uses transfer-in data, the transfer-in county’s composite farm and average net returns are identical to the receiving jurisdiction. But, the final use-value estimates for a receiving county and its transfer-in county will differ because each jurisdiction uses its own effective tax rate to arrive at the capitalization rate.

For example, Buena Vista City transfers-in data from Rockbridge County. Therefore, both Buena Vista and Rockbridge County have identical census data, composite farm acreages, crop net returns, and final Estimated Net Return. Thus, Buena Vista’s unadjusted use-value estimates will differ from Rockbridge only because the moving straight 10-year average effective property tax rates are different (An explanation of these rates is provided in Section I – Capitalization Rate).

Transfer-in Jurisdictions: Soil Index

When a county uses transfer-in data (including split-counties), its unadjusted use-value estimates are divided by the transfer-in county’s soil index factor to calculate its adjusted use-value estimates. For example, Buena Vista transfers-in data from Rockbridge County and uses Rockbridge County’s soil index factor in calculating its adjusted use-value estimates.