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System for Valuing Changes to Environmental and Historic Amenities

Final Report
for the
Academy for Community & Transportation Innovation

Center for Business and Economic Research
Gatton College of Business and Economics
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System for Valuing Changes to Historic and Environmental Amenities.

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This report provides a model for estimating the impact of highway projects on the environment and cultural amenities. The model was developed by the University of Kentucky Center for Business and Economic Research and was supported by funding from the Academy for Community & Transportation Innovation, a venture between the University of Kentucky, The University of Louisville, and the Kentucky Transportation Cabinet. This model provides a tool that transportation officials can use to examine any project's impact on historic or environmental amenities.

The model allows transportation officials to design their analysis for a particular highway project. Officials simply select the environmental or historic amenity impacted, the size of the impact (e.g., the number of acres impacted), the setting (rural versus urban), and the model will provide an estimated value and range of values for the amenity. This flexibility and transparency also makes the model useful for transportation officials as a tool for explaining amenity impacts to communities. An extended bibliography is also provided to cover additional areas relevant to the topic but not used directly in development of the model.
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Introduction

The impact of highway projects on the environment or cultural amenities such as historic properties can be a significant source of concern. Yet, these impacts are not as readily modeled as other features such as project costs, impacts on traffic flows or accident rates. A major barrier is often the lack of a market price for impacts on environmental or historic amenities. The sale value of the property is often known, or at least can be determined. However, environmentally sensitive or historically important properties often have a public amenity value beyond their private purchase price.

This lack of an existing model for the evaluation of the impact of highway projects on environmental and historic amenity value provided the impetus for the development of this model. The following paper describes how this model was developed by the University of Kentucky Center for Business and Economic Research, and how to use the model. Development of the modeling system was supported by funding from the Academy for Community & Transportation Innovation, a venture between the University of Kentucky, the University of Louisville, and the Kentucky Transportation Cabinet. Part of the Academy’s mission is to develop new tools through both basic and applied research to meet its goals to “ensure the compatibility, sustainability, safety, and efficiency of transportation systems.” These tools should be of use to help transportation officials evaluate the impact of transportation projects on communities and to explain these impacts.

The modeling system developed through this project was designed to help the Academy meet its mission. This model provides a tool that transportation officials can use to examine any project’s impact on historic or environmental amenities. Further, the model allows transportation officials to design their analysis for a particular highway project. Officials simply select the environmental or historic amenity impacted, the size of the impact (e.g., the number of acres impacted), the setting (rural versus urban), and the model will provide an estimated value and range of values for the amenity. This flexibility and transparency also makes the model useful for transportation officials as a tool for explaining amenity impacts to communities.

The remainder of the report is divided into two sections and three appendices. Section II describes the data and results and Section III describes the attributes of the modeling software. Appendix 1 provides examples of how to use the software. Appendix 2 gives full citations for the articles used to calculate the values and Appendix 3 is an extended bibliography that includes additional articles that were analyzed but not used for purposes of calculation in this study.
II. Methodology for Estimating Values

The result of this study is the development of a research tool designed to help project administrators identify the economic benefit of environmental and cultural impacts of a particular highway project. Such information is a helpful addition to the traditional cost-benefit analysis of highway projects, which often does not include these factors. Amenity valuations are also useful when assessing and explaining the impact of a project on a community.

This tool allows the user to describe a certain environmental impact. For example, if a project requires building a road through a wetland, this tool can measure the amenity cost of the lost wetland, or similarly, the economic benefit of preserving or developing wetlands elsewhere. Thus, this tool can be used to measure the cost of a lost amenity, or the economic benefit of preserving or developing an amenity. The model reflects the fact that values for amenities may vary greatly depending on the specific amenity, the affected population (local residents versus statewide), and the setting (rural versus urban). Therefore, the model allows the user to obtain not just the value of interest, but also to obtain a value for a particular setting. While the model was developed for use in Kentucky, the model also could be used for projects anywhere in the country.

To identify amenity values, UK-CBER reviewed a large number of environmental and cultural amenity studies during the research project. We identified a wide variety of studies that have analyzed the value of amenities that are sometimes impacted by transportation projects including the following: Wetlands, Forests/Parks, Endangered Species, Historic Sites, and Farmland. These studies were used to calculate a range of values for each of these amenities based on the affected population and the setting. Great effort was made to determine which articles were appropriate for use. Articles that valued amenities outside of the United States were typically rejected, with some rare exceptions relating to historical and cultural amenities, as were studies that only determined the value of amenities to certain groups (such as studies that only considered the value of a national park to park visitors). In all but one amenity, Views, amenity values per acre per household were determined for each article. Per acre per household values were sometimes reported directly by the authors, but frequently needed to be calculated by the project team based on information in the article. In the case of views, values were not calculated by acre per household, however, but were calculated by multiplying the value by the number of households with an unobstructed view of the area affected by the transportation project. When articles reported an amenity value on an annual
basis, the amenity value was placed in present value terms. Thus, the amount derived by the model should not be viewed as a cost or benefit that is incurred every year, but rather, a total project value. All values were put in terms of the most recent year (2003).

A list of articles used to calculate the amenity values can be found in Appendix 2 of this article. Appendix 3 contains an extended bibliography of articles analyzed during the course of completing this project. We were unable to include the vast majority of these articles in our calculations because of a variety of statistical and topical reasons. However, many of the articles may provide additional guidance for research in areas included in and beyond the scope of this project.

Very few studies were available in the case of cultural amenities impacted by transportation projects such as historical settlements or historic neighborhoods. The lack of information on these kinds of cultural amenities suggests a potential future area of research for the Transportation Academy. There is a need for original research to develop estimates of values.

The following section discusses the results of the research in each of these amenity groups. The research articles and the approach used to identify the values are discussed amenity by amenity. Several concepts should be understood when examining the valuation data:

**Geographic Setting** – This pertains to the location of the affected amenity. Two categories are listed. The urban category implies that the amenity is located within the limits of a town or city. Non-urban refers to amenities located in rural areas, outside of towns or cities. This distinction is important since some amenities, such as a vacant lot, could be of much greater value in an urban neighborhood than in a rural area. Finally, note that urban refers to a city or town regardless of whether it is located within a metropolitan area, as urban areas can be located in non-metropolitan regions as well. Prominent Kentucky examples include the cities of Somerset and Pikeville.

**Geographic Scope** – This pertains to the population which places a value on an amenity. Some amenities are primarily valued by the local population, where others are valued by persons throughout the state, whether or not they live in proximity to the amenity. There are three designations: local, nearby local, and statewide. The definition of statewide is evident. The local designation refers to the entire local community. It is proposed that the number of households in the

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1 The present value is calculated from an annual value by multiplying the annual value by $1/r$, where $r$ is the discount rate (assumed to 7 percent). This is the formula for an infinite series with discounting.
county where the amenity is located should be used. The nearby local designation refers to amenities that are primarily of value to that subset of local residents who live nearest to the amenity.

Amenity Groups

A. Wetlands

The amenity value of wetlands has been the subject of a large body of literature in economics over the last several decades. The UK-CBER research team was able to identify dozens of articles providing valuations for wetlands. These articles provide a good basis to estimate a range of appropriate values for an acre of wetlands taken by a transportation project. Articles used for the determination of the amenity values for wetlands include the following (see Appendix 2 for full citations): Beran, 1995; Blomquist and Whitehead, 1998; De Zoysa, 1995; Hanemann et al., 1991; Hoehn and Randall, 2002; Lupi et al., 1991; and Mahan et al., 2000.

A single range of values was calculated for all wetlands; we did not distinguish by “type” of wetland. Studies such as Beran et al. (1995) found very little difference in the estimated value of different classifications of wetland. For example, floodplain swamps, bottomland, hardwood forests, and pine plantations had similar values across the studies, so a single estimate range was developed for wetlands of all kinds. However, we did differentiate based on the geographic setting of the valuation. Value estimates were made for wetlands located in urban areas versus non-urban areas.

Table 2.1 below shows the range of values developed for Wetlands. The values in Table 2.1 are meant to provide a suggested range of values per use. Two concepts of a middle value are present: mean and median. High and low values are presented to give the full range. Note that the value of non-urban wetland varies between $0.0419 and $0.1992 per acre per household. Mean and median values are $0.0956 and $0.0609 per acre per household.

Amenity values for urban wetlands are restricted to nearby local residents within the urban area who may utilize the wetlands for recreation or aesthetics. Mahan et al. (2000) and Lupi et al. (1991) provide estimates for the value of an acre of the nearest wetland area to household residents (at the mean distance from the wetland). The mean value for such an urban wetland is $51.66 per household per acre. This value should be applied to all households residing within 3,000 feet of the wetland. A statewide value was not determined for urban wetlands, nor was a local value determined for non-urban wetlands.
Table 2.1: Wetlands

Amenity Values of Wetlands Per Acre Per Household

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Geographic Setting</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>$0.0954</td>
<td>$0.0609</td>
<td>$0.0419</td>
<td>$0.1992</td>
</tr>
<tr>
<td>Wetland</td>
<td>Urban</td>
<td>Nearby Local</td>
<td>$51.661</td>
<td>$51.661</td>
<td>$36.667</td>
<td>$66.656</td>
</tr>
</tbody>
</table>

Example: Wetlands

To yield the value of wetlands affected by a transportation project, simply select the appropriate geographic setting and geographic scope (Non-Urban - Statewide or Urban - Nearby Local) in which the transportation project is going to occur. Select a value type (mean, median, low, or high) as determined by the geographic designation and multiply it by the number of acres of wetlands affected and the number of households affected. The number of households will also be determined by geographic setting and scope, with statewide referring to all households in the state and nearby local defined as all households located within 3,000 feet of the wetland.

Take the example of a transportation project that would need to bear the cost of permanently protecting 10 acres of wetland to compensate for locating a new highway adjacent to an existing wetland. Additionally, assume this will occur in a non-urban region and will have no impact on the adjacent wetland. This project would essentially protect 10 acres of wetland on net. What value would that have for the state? Assuming a mean value of $0.0954 per acre per household statewide for protecting wetlands, the typical household in the state would value protecting 10 acres at $0.954. Using Kentucky as an example, and given that there are 1.6 million households in Kentucky, the total amenity value would be 1.6 million multiplied by $0.954 or $1,526,000. Thus, the transportation project would create an amenity benefit of $1,526,000 in the case of wetland preservation. Note that this would be the full value for a one-time payment, not the value for an annual payment.

A range of values can be created by multiplying the low and high values of $0.0419 and $0.1992, respectively, per acre per household in the state by the relevant number of acres (10) and the number of households in the state (1.6
million). Based on the above example, this would show an amenity benefit for the project of between $670,000 and $3,187,200.

B. Farmland

The amenity value of farmland has also been the subject of a large body of literature in economics over the last several decades. The UK-CBER research team was able to identify a number of articles providing valuations for farmland. These articles provide a good basis to estimate a range of appropriate values for an acre of farmland taken or preserved by a transportation project (Beasley, 1986; Halstead, 1984; and Ready et. al., 1997; Bergstrom et al., 1985). All values were put in terms of the most recent year (2003).

A single range of values was calculated for all farmland located outside of urban areas (non-urban). Estimates were based on local valuations by residents located near the farmland to be preserved from development. Valuations should be applied only to local households (here local household is defined as county households) and not to households statewide.

Table 2.2 below shows the range of values for farmland to be developed based on the surveyed research. The values in Table 2.2 include a mean, median, low and high value, and range from a present value of $0.0016 per household per acre to $0.516, with a mean value of $0.1854 per household per acre.

**Table 2.2: Farm Land**

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Geographic Setting</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Land</td>
<td>Non-Urban</td>
<td>Local</td>
<td>$0.1854</td>
<td>$0.0754</td>
<td>$0.0016</td>
<td>$0.5160</td>
</tr>
</tbody>
</table>

**Example: Farmland**

To yield the value of farmland affected by a transportation project, simply multiply a value type (mean, median, low, or high) by the number of acres of farmland affected and the number of households in the geographic setting and scope (non-urban, local which is defined for farmland as total households in the county). Take the example of a transportation project that would utilize 50 acres of farmland in Pulaski County, KY for highway right-of-way. What amenity value would that represent for the local area? Assuming a median value of
$0.0754 per acre per household in the county for the lost farm land, the typical household in Pulaski County would value the loss of 50 acres at $3.77. Given that there are approximately 25,000 households in Pulaski County, the total amenity value would be 25,000 multiplied by $3.77 or $94,250. Thus, the transportation project would have an amenity cost of $94,250.

C. Habitat of Endangered Species

Transportation projects occasionally pass through habitat for endangered animals. This loss of habitat has a potential amenity cost as it may diminish the potential for preservation of the species, or its emergence from endangered status. The exact amenity value of the habitat loss, however, is difficult to value, and is subject to variation by type of species. For example, the public may place a greater value on the survival of large animals such as the condor or the grey wolf than on an insect species. This section reviews estimates of valuation that the public places on the protection of habitat for various species.

Existing literature on public valuations regarding endangered species was thoroughly reviewed (Adamowicz & Condon, 1997; Berrens et al., 1996; Loomis & Ekstrand, 1997; Schkade & Payne, 1994; Reaves, et al., 1999). The review focused on those studies that produced valuations of preservation of the habitat of endangered species. Studies that estimated valuations on avoiding extinction entirely were not used since a transportation project would be unlikely to affect enough of the habitat to cause extinction. Studies that use methods to protect species other than preserving or improving habitat were not used.

As habitat for endangered species is a predominantly rural occurrence, values have only been calculated for non-urban areas. Values are also statewide in scope since households that value endangered species typically value species in multiple areas, not just local areas. There is substantial variation, however, by type of species. Values for mean, median, low and high are listed based on birds, fish, large mammals, and overall (excluding fish) in Table 2.3. It should be pointed out that while birds and large mammals have been calculated on an acre basis, river fish have been calculated on a per mile of stream basis. On a per acre basis, the mean value for the habitat of all endangered species (excluding fish) is $0.00142 per household per acre. The range is from $0.0000001 to $0.00614. For river fish, where stream habitat is measured on a per mile basis, the mean value is $0.20411 per mile.
Table 2.3: Endangered Species

Amenity Value of Habitat for Endangered Species Per Household Per Acre (or Per Mile of Stream)

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Geographic Setting</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>$0.00284</td>
<td>$0.00212</td>
<td>$0.00026</td>
<td>$0.00614</td>
</tr>
<tr>
<td>Birds</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>$0.00284</td>
<td>$0.00212</td>
<td>$0.00026</td>
<td>$0.00614</td>
</tr>
<tr>
<td>River Fish</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>$0.20411</td>
<td>$0.20411</td>
<td>$0.20411</td>
<td>$0.20411</td>
</tr>
<tr>
<td>Large Mammals</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>$0.000004</td>
<td>$0.000002</td>
<td>$0.000009</td>
<td>$0.000001</td>
</tr>
<tr>
<td>Large Mammals</td>
<td>Non-Urban</td>
<td>Local</td>
<td>$0.000002</td>
<td>$0.000002</td>
<td>$0.000002</td>
<td>$0.000002</td>
</tr>
</tbody>
</table>

Example: Endangered Species

A new highway project, which also is designed to create a recreation lake would require the construction of a bridge and dam over a stream that is a habitat for endangered fish. The fish have other habitat elsewhere in the state; so the project would not cause extinction, but would remove 3 miles of habitat. What amenity value would that lost habitat for the fish hold for households in the state? The mean value for preserving a stream habitat is $0.20411 per household per mile. The average household would value 3 miles of stream at $0.61233. Given 1.6 million Kentucky households, the lost habitat would be valued at $980,000.

D. Vacant Lot

Transportation projects sometimes utilize vacant land that has not been developed previously (residential property, commercial property, park land, farm land or as a golf course). This land is essentially vacant. Such vacant lots often have an amenity value in an urban area both because the land can be used for recreation or can be left as a natural area with trees or grass growing. Studies
have found that nearby homeowners value these vacant lots. Though, an interesting feature of these amenities is that the amenity is quite localized, only felt by nearby homes rather than the community at large.

There are a relatively small number of articles that have estimated values for these vacant lots (Breffeke et al., 1998; Smith et al., 2002). The articles have focused on urban areas since there is typically a large supply of open land in a rural area, even if that land is involved in agriculture or forestry. The geographic focus on the vacant land amenity is always urban. As mentioned above, the geographic scope is always nearby local communities since the amenity is enjoyed by households nearest to the lot rather than households throughout the local community.

The “nearby local” geographic scope implies that estimating the amenity value will require specific information about the neighborhoods near the affected vacant lots. Specifically, the transportation planners will need to determine the number of properties which are closer to the affected vacant lot than to any other vacant lot. The per household per acre valuation should be applied only to these households.

Table 2.4 below shows the range of values for urban vacant lots based on the surveyed research. The values in Table 2.4 include the mean, median, high and low value, and range from a present value of $216.91 per household per acre to $594.27, with a mean value of $405.59 per household per acre.

While the amenity values for vacant lots appear relatively high compared to other amenities in this report, it should be noted that such lots are relatively small compared to rural areas and that green space in an urban area is also relatively rare, compounding the effect.

Table 2.4: Vacant Lot

Amenity Value of a Vacant Lot Per Acre Per Household

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Geographic Setting</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacant Lot</td>
<td>Urban</td>
<td>Nearby Local</td>
<td>$405.59</td>
<td>$405.59</td>
<td>$216.91</td>
<td>$594.27</td>
</tr>
</tbody>
</table>

Example: Vacant Lot

To yield the value of the loss of a vacant lot, simply multiply a value type (mean, median, low or high) by the number of acres of vacant lot taken by the
project and the number of local households (defined as households that are closer to that vacant lot than any other vacant lot) near the vacant lot. Take the example of building a new on-ramp onto Route 4 (New Circle Road) in Lexington, KY. The project would take a 6-acre vacant lot. What amenity value would that represent for nearby households? Assuming a mean value of $405.59 per acre per household for the lost land, the typical nearby household would value the loss of 6 acres at $2,433.54. Given that there are 20 households located closer to the affected vacant lot than to any other, the total amenity value would be 20 multiplied by $2,433.54 or $48,700. Thus, the transportation project would have an amenity cost of $48,700.

E. Parks

Parks and wilderness areas are sometimes affected by highway development. In an urban area, the widening of a main road may require the taking of park land for right-of-way (this might even be preferable to taking homeowner property across the street). In non-urban areas, a new or widened route between two places may need to be located through a national park or wilderness area, requiring such property to be used for right-of-way.

A substantial literature has been developed to assess the value of parks located in both urban and non-urban areas. In non-urban areas, this research has typically utilized contingent value survey methods to investigate household willingness to pay to support the preservation or expansion of parkland (Correll et al.; Keith et al., 1996; Kimmel, 1985; McFadden et. al., 1994; Richer, 1995; Walsh et al., 1984; and Walsh et al., 1990). These studies have estimated the amenities for all state residents, including both households that utilize the park and those that do not. A large body of literature also exists that estimates values for park users on a per trip basis, but this research was not utilized given a desire to consider the amenity benefit for all households. Valuations for the parks located in a non-urban geographic setting are illustrated in Table 2.5. For non-urban parks, valuations are available only for a statewide geographic scope. Values range between a present value of $0.000285 per household per acre to $0.001157, with a mean value of $0.000585 per household per acre.

The literature on the amenity value of urban parks (Correll, 1978; and Kimmel, 1985) has utilized hedonic regression techniques to isolate the value of a park on the value of nearby local residents. The “nearby local” geographic scope implies that estimating the amenity value will require specific information about the neighborhoods near the park/urban green space taken as part of the transportation project. Specifically, the transportation planners will need to determine the number of properties located within 3,000 feet of the park/urban

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green space. The per household per acre valuation should be applied only to these households. The mean value estimate is $45.94 per household per acre of park land for nearby local residents who reside within 3,000 feet of the park/urban green space.

**Table 2.5: Park Land**

*Amenity Value of Park Land Per Acre Per Household*

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Geographic Setting</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parks</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>$0.000585</td>
<td>$0.000449</td>
<td>$0.000285</td>
<td>$0.001157</td>
</tr>
<tr>
<td>Parks</td>
<td>Urban</td>
<td>Nearby Local</td>
<td>$45.942</td>
<td>$45.942</td>
<td>$42.030</td>
<td>$49.853</td>
</tr>
</tbody>
</table>

**Example: Park Land**

A new or expanded highway passing through a national forest could require hundreds of acres of national forest for right-of-way. What amenity value would that lost park land hold for households in the state? Take the example of a route running through a national forest that would require the taking of 500 acres of land. Assuming a mean value of $.000585 per acre per household for the lost land, the typical household statewide would value the loss of 500 acres at $0.2925. Given 1.6 million Kentucky households, the value of the lost park acreage would be calculated by multiplying 1.6 million by $0.2925 for a total of $468,000. Thus, the transportation project would have an amenity cost of $468,000.

**F. View**

Transportation projects on occasion will impact the view of homes with an unobstructed view of undeveloped land. This section assesses the potential value of the loss of “view.” The valuation should only apply to homeowners with an unobstructed view. Analysis should not be applied to persons who travel to the area for recreation or other reasons. Thus, this analysis clearly has a nearby local geographic scope for applying amenity values. The studies also have focused on valuations of views in urban settings (Do and Sirmans, 1994; Gillard, 1981; Weicher and Zerbst, 1973; and Darling, 1973), so results only apply to an urban geographic setting.
The studies used focused on views of parks or landscapes, but avoided literature valuing the more highly priced views such as ocean views. One difficulty with calculating any loss of view amenity is to ascertain how many households are affected. On the other hand, there is no need to determine the acreage of the “view” as there is a fixed value (here determined by number of households with an unobstructed view) rather than a per acre value. Although, naturally, there will be a tendency for more houses to have their view influenced by a transportation project when the project impacts more acres.

Valuations for a view amenity in an urban geographic setting are illustrated in Table 2.6. Values range between $7,546 per household to $18,429, with a mean value of $12,174 per household. These values appear to be relatively large as they are calculated on a per household, rather than, per acre, basis. The view amenity should be considered only when a loss of view has become a major concern among local residents and there is broad agreement that a valuable view has been affected.

**Table 2.6: View**

*Amenity Value of a View Per Household*

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Geographic Setting</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>View</td>
<td>Urban</td>
<td>Nearby Local</td>
<td>$12,174</td>
<td>$11,360</td>
<td>$7,546</td>
<td>$18,429</td>
</tr>
</tbody>
</table>

**Example: View**

A proposed bypass route would run along the edge of a town in central Kentucky, near an area where new developments have recently been built. The road would cut through a previously unobstructed view of the first foothills of the Appalachian Mountains. Residents of the subdivision complain about the potential loss of view and that the loss of view would impact the values of the property they had recently purchased. There were 25 homes at the edge of the subdivision that had this unobstructed view. What amenity value would the view hold for these households? Assuming a mean value of $12,174 for a view in 2003 dollars, the lost view would be valued at 25 (number of households with and unobstructed view) multiplied by $12,174 or $304,400.
G. Historic Sites or Buildings

Road construction or widening sometimes requires the taking of historic properties. The most obvious examples of this occur in the case of road widening, or upgrade. Historic buildings frequently would have been placed adjacent to the original roadway. This section considers historic buildings, whether in a rural setting, or in the “Main Street” area (in the case of widening a road in town), that would need to be taken as the road is expanded to meet modern safety standards and levels of traffic flow.

As described above, historic buildings affected by road projects can be found in both an urban and non-urban geographic setting. While these buildings could affect the property values of their immediate neighbors, we will focus on the effect on the broader community. The geographic scope of historic properties is therefore local rather than nearby local in nature.

Cultural and historic amenities have not been as much a focus in economic research as environmental amenities. While, there have been several recent studies, only one was applicable for the purposes of this model (Chambers et al., 1998). That study valued the preservation of an historic school building. The mean value to preserve the building was $7.27. Thus, our estimate of the mean value per building per household for historic structures was $7.27. This value must be used with some caution, obviously, given the need for more studies to identify a range of values.

Table 2.7: Historic Property

Amenity Value of a Historic Property Per Household Per Preserved/Restored Building

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Geographic Setting</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic Building</td>
<td>Urban</td>
<td>Local</td>
<td>$7.2667</td>
<td>$7.2667</td>
<td>$7.2667</td>
<td>$7.2667</td>
</tr>
<tr>
<td>Historic Building</td>
<td>Non-Urban</td>
<td>Local</td>
<td>$7.2667</td>
<td>$7.2667</td>
<td>$7.2667</td>
<td>$7.2667</td>
</tr>
</tbody>
</table>
Example: Historic Property

The proposed expansion of a two-lane road to a four-lane road in London, Kentucky would require the taking of a historic building located on the edge of the existing two-lane road as it leaves town and enters the countryside. What amenity value would the taking of this building hold for households in London/Laurel County? There are 20,400 households in Laurel County. Utilizing the median value from the range, multiply $7.27 by 20,400 households to estimate an amenity value of $148,300.
III. Amenity Value Model

A software model was developed to aid transportation planners in using the results of this study to estimate amenity values (both positive and negative) resulting from transportation projects. The software package allows the planner to select the relevant amenity, indicate the size of the affected amenity, the number of households effected, and the geographic setting of the amenity (in an urban versus non-urban area), in order to estimate the value of the amenity affected by the transportation project. Essentially, this will allow a transportation planner to run the types of simulations given in Chapter II as examples.

This chapter provides a description of the model and its capabilities. Appendix 1 provides examples of how to use the model for estimation. The model is organized as an excel workbook, or a single excel file containing multiple worksheet pages where the sections of the model are found. This design organizes data in such a way that retrieval of specific data is simplified through the use of pivot tables. Pivot tables are simply a way to extract data from an excel file.

There are several worksheet pages, including the following:

- **Instructional Page** – contains detailed instructions as to how to use the model as well as an interactive example.

- **Source Data** – this page holds all of the data used in the model. A sample piece of the source data is below:

  Table 3.1: Source Data

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>0.005004544</td>
<td>$0.00</td>
<td>0.0025</td>
<td>0.0106347</td>
</tr>
<tr>
<td>Wetland</td>
<td>Non-Urban</td>
<td>Local</td>
<td>0.003859959</td>
<td>$0.00</td>
<td>0.001</td>
<td>0.0068623</td>
</tr>
<tr>
<td>Farmland</td>
<td>Non-Urban</td>
<td>Local</td>
<td>0.2314</td>
<td>$0.17</td>
<td>0.0662</td>
<td>0.516</td>
</tr>
</tbody>
</table>

- **Pivot Table** – contains a pivot table and other calculators to retrieve data from the source data page. The pivot table contains several pull down menus to narrow down this data. The following is an example of how two of these pull down menus look:
**Table 3.2: Pivot Table**

- Bibliography Page – lists all sources used in the calculations of values used in the pivot table. Also lists sources that were not used directly in calculations but could be used in further investigations of specific topics.
Appendix 1: Detailed Examples

Farmland

In order to retrieve information, go to the amenities worksheet. There are seven headings in the pivot table including: Amenity Name, Geographic Setting, Geographic Scope, Mean Value, Median Value, High Value, and Low Value. The first three headings are the only ones that need to be manipulated and the final four are output data. Going from left to right, the headings become more specific. That is, Amenity Name is a broad category which is narrowed down by Geographic Scope and Setting. Each heading has a built-in pull down menu that lists all of the possibilities for that heading.

Begin by choosing the Amenity Name heading. Pull down the category menu under Amenity Name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices.\(^4.1\) Click on the box next to the show all category. A check mark should appear in all of the category boxes.\(^4.2\)

Table 4.1: Farmland, Amenity Name

<table>
<thead>
<tr>
<th>Amenity Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
</tr>
<tr>
<td>Farmland</td>
</tr>
<tr>
<td>Vacant Lot</td>
</tr>
<tr>
<td>Park</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>View</td>
</tr>
<tr>
<td>Historic Buildings</td>
</tr>
</tbody>
</table>

Table 4.2: Farmland, Show All

- (Show All)
- Wetland
- Farmland
- Vacant Lot
- Park
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- View

We can now choose the type of amenity for which we want to find a value. In this example, we will choose wetland. All of the information available about farmland is shown. Below is an example of the type of information extracted by the pivot table.\(^4.3\)
Table 4.3: Farmland, Pivot

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmland</td>
<td>Non-Urban</td>
<td>Local</td>
<td>0.185447429</td>
<td>0.08</td>
<td>0.516</td>
<td>0.001637</td>
</tr>
</tbody>
</table>

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - non-urban - and therefore can be left alone. Geographic scope also has only one category - local - and therefore this amenity has been narrowed as much as it can be.

Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: 4.4

Table 4.4: Farmland, Form

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Acres:</td>
<td>???</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of Acres:</td>
<td>???</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Households:</td>
<td>???</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Value:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 1,000 acres of farmland that is non-urban and locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that the 1,000 acres of farmland is worth $185.45 per household in the area. It is also known that there are 1,000 relevant households. This
information is put into the calculator and a total value of $185,450.00 is determined. Below is an example of what this output would look like:  

**Table 4.5: Farmland, Calculator**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Acres:</td>
<td>1,000</td>
</tr>
<tr>
<td>Value of Acres:</td>
<td>$185.45</td>
</tr>
<tr>
<td>No. of Households:</td>
<td>1,000</td>
</tr>
<tr>
<td>Total Value:</td>
<td>$185,450.00</td>
</tr>
</tbody>
</table>

Thus, the 1,000 acres of farmland is valued $185,450.

**Wetlands**

As with the farmland example, go first to the amenities worksheet. Note that there are seven headings and that the first three headings are the only ones that need to be manipulated and the final four are output data. Going from left to right, the headings become more specific. Begin by choosing the amenity name heading – wetland. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. Click on the box next to the show all category. A check mark should appear in all of the category boxes.
Table 4.6: Wetlands, Amenity Name

<table>
<thead>
<tr>
<th>Amenity Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
</tr>
<tr>
<td>Farmland</td>
</tr>
<tr>
<td>Vacant Lot</td>
</tr>
<tr>
<td>Park</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>View</td>
</tr>
<tr>
<td>Historic Buildings</td>
</tr>
</tbody>
</table>

We can now choose which type of amenity we want to value. In this example, we will choose wetlands. All the information available about farmland is shown. On the next page there is an example of the type of information extracted by the pivot table. 48

Table 4.7: Wetlands, Show All

<table>
<thead>
<tr>
<th>(Show All)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
</tr>
<tr>
<td>Farmland</td>
</tr>
<tr>
<td>Vacant Lot</td>
</tr>
<tr>
<td>Park</td>
</tr>
<tr>
<td>Habitat of Endangered Species</td>
</tr>
<tr>
<td>Habitat of Endangered Species</td>
</tr>
<tr>
<td>Habitat of Endangered Species</td>
</tr>
<tr>
<td>Habitat of Endangered Species</td>
</tr>
<tr>
<td>View</td>
</tr>
</tbody>
</table>

Table 4.8: Wetlands, Pivot A

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>0.0953794</td>
<td>0.060875</td>
<td>0.199243</td>
<td>0.0419404</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>Nearby Local</td>
<td>51.66124</td>
<td>51.66124</td>
<td>66.65568</td>
<td>36.6668</td>
</tr>
</tbody>
</table>

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only two types of data - non-urban and urban and therefore must be narrowed down. To do this, choose one type of geographic setting from the pull down menu. We will choose non-urban for this example. Below is an example of the pivot table narrowed down to one row of data. 49

Table 4.9: Wetlands, Pivot B

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>0.0953794</td>
<td>0.060875</td>
<td>0.199243</td>
<td>0.0419404</td>
</tr>
</tbody>
</table>
Geographic scope also has only one category - statewide - and therefore this amenity has been narrowed as much as it can be. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: 4.10

**Table 4.10: Wetlands, Form**

<table>
<thead>
<tr>
<th>No. of Acres:</th>
<th>???</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Acres:</td>
<td></td>
</tr>
<tr>
<td>No. of Households:</td>
<td>???</td>
</tr>
<tr>
<td>Total Value:</td>
<td></td>
</tr>
</tbody>
</table>

To determine the value of the amenity per household, enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 1,000 acres of wetland that is non-urban and valued statewide. This is entered into the calculator. The calculator queries the pivot table and determines that 1,000 acres of wetland is worth $95.38 to a single household in the area. It is also known that there are 1,000 relevant households. This information is put into the calculator and a total value of $95,379.44 is determined. Below is an example of what this output would look like: 4.11
**Table 4.11: Wetlands, Calculator**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Acres:</strong></td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Value of Acres:</strong></td>
<td>$95.38</td>
</tr>
<tr>
<td><strong>No. of Households:</strong></td>
<td>1,000</td>
</tr>
<tr>
<td><strong>Total Value:</strong></td>
<td>$95,379.44</td>
</tr>
</tbody>
</table>

This means that 1,000 acres of wetland is valued at $95,379.

**Vacant Lot**

Begin by choosing the amenity name heading – Vacant Lot. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. \(^{4.12}\) Click on the box next to the Vacant Lot Category. \(^{4.13}\)

**Table 4.12: Vacant Lot, Amenity Name**

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td></td>
</tr>
<tr>
<td>Farmland</td>
<td></td>
</tr>
<tr>
<td>Vacant Lot</td>
<td></td>
</tr>
<tr>
<td>Park</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>View</td>
<td></td>
</tr>
<tr>
<td>Historic Buildings</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4.13: Vacant Lot, Show All**

- (Show All)
- Wetland
- Farmland
- Vacant Lot
- Park
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- View
All of the information available about vacant lots is shown. Below is an example of the type of information extracted by the pivot table. 4.14

Table 4.14: Vacant Lot, Pivot

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacant Lot</td>
<td>Urban</td>
<td>Nearby Local</td>
<td>405.589601</td>
<td>405.59</td>
<td>216.90667</td>
<td>594.2727</td>
</tr>
</tbody>
</table>

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - urban - and therefore can be left alone. Geographic scope also has only one category - nearby local - and therefore this amenity has been narrowed as much as it can be.

Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: 4.15

Table 4.15: Vacant Lot, Form

<table>
<thead>
<tr>
<th>No. of Acres:</th>
<th>???</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Acres:</td>
<td></td>
</tr>
<tr>
<td>No. of Households:</td>
<td>???</td>
</tr>
<tr>
<td>Total Value:</td>
<td></td>
</tr>
</tbody>
</table>

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. In the case of a vacant lot, this input will most likely be a small number as lot availability in urban areas is limited. One acre is used in this example. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.
For example, one is valuing a 1-acre vacant lot that is urban and valued by nearby local households. This is entered into the calculator. The calculator queries the pivot table and determines that a 1-acre vacant lot is worth $405.59 to a single household in the area. It is also known that there are 10 relevant households. This information is put into the calculator and a total value of $4,055.90 is determined. Below is an example of what this output would look like. 4.16 This means that a 1-acre vacant lot is valued at $4,055.90.

**Table 4.16: Vacant Lot, Calculator**

<table>
<thead>
<tr>
<th>No. of Acres:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Acres:</td>
<td>$405.59</td>
</tr>
<tr>
<td>No. of Households:</td>
<td>10</td>
</tr>
<tr>
<td>Total Value:</td>
<td>$4,055.90</td>
</tr>
</tbody>
</table>

**Park**

First go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. 4.17 Click on the box for Park for this example. 4.18

**Table 4.17: Park, Amenity Name**

<table>
<thead>
<tr>
<th>Amenity Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
</tr>
<tr>
<td>Farmland</td>
</tr>
<tr>
<td>Vacant Lot</td>
</tr>
<tr>
<td>Park</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
</tr>
<tr>
<td>View</td>
</tr>
<tr>
<td>Historic Buildings</td>
</tr>
</tbody>
</table>

**Table 4.18: Park, Show All**

- (Show All)
- Wetland
- Farmland
- Vacant Lot
- Park
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- Habitat of Endangered Species
- View

Center for Business and Economic Research
University of Kentucky
What is shown is all the information available about farmland. Below is an example of the type of information extracted by the pivot table. 4.19

**Table 4.19: Park, Pivot A**

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>0.00058508</td>
<td>0.000</td>
<td>0.001571</td>
<td>0.0000285</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
<td>Nearby Local</td>
<td>45.94168113</td>
<td>45.94</td>
<td>49.853362</td>
<td>42.03</td>
</tr>
</tbody>
</table>

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only two types of data - non-urban and urban and therefore must be narrowed down. To do this, choose one type of geographic setting from the pull down menu. We will choose non-urban for this example. Below is an example of the pivot table narrowed down to one row of data. 4.20

**Table 4.20: Park, Pivot B**

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park</td>
<td>Urban</td>
<td>Nearby Local</td>
<td>45.94168113</td>
<td>45.94</td>
<td>45.853362</td>
<td>42.03</td>
</tr>
</tbody>
</table>

Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: 4.21

**Table 4.21: Park, Form**

- No. of Acres: ???
- Value of Acres: 
- No. of Households: ???
- Total Value: 

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is
then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 10 acres of park that is non-urban and nearby locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that 10 acres of park is worth $459.42 to a single household in the area. It is also known that there are 100 relevant households. This information is put into the calculator and a total value of $45,941.68 is determined. Below is an example of what this output would look like: 4.22

**Table 4.22: Park, Calculator**

<table>
<thead>
<tr>
<th>No. of Acres:</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Acres:</td>
<td>$459.42</td>
</tr>
<tr>
<td>No. of Households:</td>
<td>100</td>
</tr>
<tr>
<td>Total Value:</td>
<td>$45,941.68</td>
</tr>
</tbody>
</table>

This means that 10 acres of park is valued at $45,941.

**Habitat of Endangered Species**

First, go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. 4.23 Click on the box for one of the endangered species for this example. 4.24
Notice that there are five types of habitats for endangered species. For this example we will choose “Habitat of Endangered Species - All (Birds/Mammals).” All the information available about this habitat is shown. Below is an example of the type of information extracted by the pivot table. 4.25

**Table 4.25: Habitat of Endangered Species, Pivot**

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat of Endangered</td>
<td>Non-Urban</td>
<td>Statewide</td>
<td>0.001422087</td>
<td>0.00</td>
<td>0.0061429</td>
<td>0.000001</td>
</tr>
</tbody>
</table>

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - non-urban - and does not need to be narrowed down. Geographic scope only has one row of data as well - statewide. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: 4.26
Table 4.26: Habitat of Endangered Species, Form

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity.

For example, one has 1,000 acres of habitat that is non-urban and valued statewide. This is entered into the calculator. The calculator queries the pivot table and determines that 1,000 acres of habitat is worth $1.42 to a single household in the area. It is also known that there are 10,000 relevant households. This information is put into the calculator and a total value of $14,220.87 is determined. Below is an example of what this output would look like; 4.27

Table 4.27: Habitat of Endangered Species, Calculator

This means that 1,000 acres of habitat is valued at $14,220.
View

First go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. 4.28 Click on the box for View for this example. 4.29

Table 4.28: View, Amenity Name

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td></td>
</tr>
<tr>
<td>Farmland</td>
<td></td>
</tr>
<tr>
<td>Vacant Lot</td>
<td></td>
</tr>
<tr>
<td>Park</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
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<tr>
<td>Habitat of Endangered</td>
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<td>Habitat of Endangered</td>
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<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
</tr>
<tr>
<td>View</td>
<td></td>
</tr>
<tr>
<td>Historic Buildings</td>
<td></td>
</tr>
</tbody>
</table>

All the information available about views is shown. Below is an example of the type of information extracted by the pivot table. 4.30

Table 4.29: View, Show All

| (Show All)             |   |
| Wetland                |   |
| Farmland               |   |
| Vacant Lot             |   |
| Park                   |   |
| Habitat of Endangered Species |   |
| Habitat of Endangered Species |   |
| Habitat of Endangered Species |   |
| Habitat of Endangered Species |   |
| Habitat of Endangered Species |   |
| View                   |   |

Table 4.30: View, Pivot

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Geography setting</th>
<th>Geographic scope</th>
<th>Mean value</th>
<th>Median value</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>View</td>
<td>Urban</td>
<td>Nearby Local</td>
<td>12,173.74</td>
<td>11,360.21</td>
<td>18,428.63</td>
<td>7,545.95</td>
</tr>
</tbody>
</table>

In order to use this data we must narrow it down further wherever there is more than one row of data. Geographic setting has only one type of data - urban - and does not need to be narrowed down. Geographic scope only has one row of data as well - nearby local. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found: 4.31
Table 4.31: View, Form

<table>
<thead>
<tr>
<th>No. of Acres:</th>
<th>???</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Acres:</td>
<td>???</td>
</tr>
<tr>
<td>No. of Households:</td>
<td>???</td>
</tr>
<tr>
<td>Total Value:</td>
<td></td>
</tr>
</tbody>
</table>

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity. In the case of views, this is not expressed in acres but in total number of views.

For example, one has a view that is urban and nearby locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that the view is worth $12,173.75 to a single household in the area. It is also known that there are 10 households with an unobstructed view. This information is put into the calculator and a total value of $121,737.47 is determined. Below is an example of what this output would look like: 4.32

Table 4.32: View, Calculator

| No. of Acres: | 1 |
| Value of Acres: | $12,173.75 |
| No. of Households: | 10 |
| Total Value: | $121,737.47 |

This means the view is valued at $121,737.
**Historic Buildings**

First, go to the amenities worksheet. Pull down the category menu under amenity name. To do this, click on the downward pointing triangle to the right of the column title to reveal the category choices. Click on the box for Historic Buildings for this example.

**Table 4.33: Historic Buildings, Amenity Name**

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Non-Urban</th>
<th>Urban</th>
<th>Geographic Scope</th>
<th>Mean</th>
<th>Median</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetland</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Farmland</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Vacant Lot</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Park</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Habitat of Endangered</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
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<tr>
<td>Habitat of Endangered</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>View</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
<tr>
<td>Historic Buildings</td>
<td></td>
<td></td>
<td>Local</td>
<td>7.2666667</td>
<td>7.27</td>
<td>7.2666667</td>
<td>7.2666667</td>
</tr>
</tbody>
</table>

All the information available about historic buildings is shown. Below is an example of the type of information extracted by the pivot table.

**Table 4.34: Historic Buildings, Show All**

<table>
<thead>
<tr>
<th>Amenity Name</th>
<th>Show All</th>
<th>Wetland</th>
<th>Farmland</th>
<th>Vacant Lot</th>
<th>Park</th>
<th>Habitat of Endangered</th>
<th>Habitat of Endangered</th>
<th>Habitat of Endangered</th>
<th>Habitat of Endangered</th>
<th>Habitat of Endangered</th>
<th>Habitat of Endangered</th>
<th>Habitat of Endangered</th>
<th>View</th>
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</thead>
<tbody>
<tr>
<td>(Show All)</td>
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<td></td>
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</tr>
</tbody>
</table>

In order to use this data we must narrow it down further wherever there is more than one row of data. In this case, although there is more than one row of data, the data is the same in both categories. Therefore, we do not have to narrow down the data any further. Once we have reached this desired level of specificity, we can determine the total value of the amenity in question using the built-in calculator. Above the pivot table, the following form is found.
Table 4.36: Historic Buildings, Form

<table>
<thead>
<tr>
<th>No. of Acres:</th>
<th>???</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Acres:</td>
<td></td>
</tr>
<tr>
<td>No. of Households:</td>
<td>???</td>
</tr>
<tr>
<td>Total Value:</td>
<td></td>
</tr>
</tbody>
</table>

To determine the value of the amenity per household, simply enter the number of acres in question into the appropriate box. A dollar figure will appear that indicates the total value of the amenity per household given the specific parameters. In order to determine the total value of the amenity, the total number of households must be entered. The total value of the amenity is then calculated. These values are based on the pre-determined mean value of the amenity. In this case, we are working with number of buildings instead of acres.

For example, one has a historic building that is either non-urban or urban and locally valued. This is entered into the calculator. The calculator queries the pivot table and determines that a historic building is worth $7.27 to a single household in the area. It is also known that there are 10,000 relevant households. This information is put into the calculator and a total value of $72,666.67 is determined. Below is an example of what this output would look like:

Table 4.37: Historic Buildings, Calculator

| No. of Acres: | 1 |
| Value of Acres: | $7.27 |
| No. of Households: | 10,000 |
| Total Value: | $72,666.67 |

This means that one historic building is valued at $72,666.67.
Appendix 1
Sources for Amenity Value Estimates

Wetlands


**Farm Land**


**Habitat of Endangered Species**


**Open spaces/Vacant Land**


**Parkland**


**View**


**Historic Buildings**


Appendix 2: Extended Bibliography


Cangelosi, A., R. Wiher, J. Taverna, and P. Cicero, "Wetlands Restoration in Saginaw Bay" in the Revealing the Economic Value of Protecting the Great Lakes,


http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6VDY-3Y5FD33-G-3&_cdi=5995&_orig=browse&_coverDate=04%2f30%2f1995&_sk=999869998&view=c&wchp=dGLbVtb-zSkWW&_acct=C00001898&_version=1&_userid=16764&md5=efc7510b52727f25008c4d7d434d3097&ie=f.pdf


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