Appendix C

REMI Model

SOCIOECONOMIC IMPACT ASSESSMENT

Introduction

The purpose of this socioeconomic impact analysis is to assess the potential effects of the Greers Ferry Lake Shoreline Management Plan on the regional economy. This analysis differs from most NEPA economic impact analyses in that it does not assess alternative proposals involving specific construction projects or the start-up or closure of a business or industrial facility. Economic impacts of these types of activities are easily quantified because of the clear relationship between the proposed action and changes in economic indicators such as employment and level of spending. For example, a typical construction project has estimates of total costs of project, allocation of costs between capital and labor, number of workers, and duration of construction activity. Both direct and indirect economic impacts of such a project can be traced through the regional economy using standard economic models and project data.

The proposed alternative Greers Ferry Shoreline Management Plans are not so directly linked to the local economy. The proposed alternatives provide for different degrees of development in terms of the number of private docks that would be permitted by the Army Corps of Engineers and are not tied to any specific construction project or changes in the levels of industrial or business activities. In fact, because private boating docks do not directly generate quantifiable economic activity beyond their construction phase, the proposed alternatives would appear to generate few if any economic impacts beyond baseline conditions.

The development of private boating docks, however, could potentially stimulate new residential development that would not occur in the absence of these docks. Although the relationship between new docks and future housing development is somewhat speculative, it is reasonable to assume that the availability of private docks will increase demand for residential development along the shore. New residential development and its attendant population would affect the economy of the ROI through increases in demand for goods and services, both public and private. Depending on the size and rapidity of such development and the ability of the regional economy to assimilate the added population, the socioeconomic impacts could be both positive and negative. Using the assumption that dock development would stimulate residential growth along the Greers Ferry Lake shoreline, the socioeconomic impact analysis projected the economic impacts of the additional population growth on the region of influence (ROI), which has been defined to encompass Cleburne and Van Buren Counties in Arkansas. Projected economic impacts would be the indirect effects of different levels of private dock development. The primary source of economic growth would be additional consumer spending by the new residents. The additional spending would in turn generate some job growth and affect overall levels of regional employment and income.

The size and demographic composition of the new residents used in the analysis was based on the number of permitted docks and associated slips, and the existing demographics of the ROI. As described in section 3, the ROI has a somewhat higher percentage of retirees than the percentage in the state or the nation. Consequently, the ROI also has a slightly smaller average household size than that for the rest of the country. These factors were used when projected new housing units were converted into population estimates. These assumptions affect the modeling results because an older and smaller in-migrating population would have a smaller impact on labor markets than would a population more representative of the United States' demographics (younger and larger households).

As described below and in Section 4, these assumptions were used in a regional economic model to estimate impacts during the period 2003 to 2010. As noted in Section 4.0, the analysis assumes the residential construction and associated population migration occur during the years 2003 to 2007.

Model Description and Results

The Regional Economic Models, Inc. (REMI) Policy Insight Model was chosen to evaluate the impact of each of the four alternatives on economic growth in the ROI. REMI was established in 1980. The REMI Policy Insight Model has been evaluated by MIT and other peer reviewers and has been used by the Environmental Protection Agency, the Federal Highway Administration, twenty-six state governments (including Arkansas'), city governments, universities, nonprofit organizations, public utilities, and private consulting firms throughout the country. REMI Policy Insight integrates key aspects of three types of economic models: Input/Output (I/O) models Computer-Generated Equilibrium (CGE) models, and econometric models. The Policy Insight Model is a dynamic model that forecasts how changes in the economy and adjustments to those changes will occur on a year-by-year basis. The dynamic aspect of REMI provides insight into the long-term impact considerations of a policy change to an economic region.

The REMI model is a structural model, meaning that it clearly includes cause-and-effect relationships. The model shares two key underlying assumptions with mainstream economic theory: *households maximize utility* and *producers maximize profits.* In the model, businesses produce goods to sell to other firms, consumers, investors, governments, and purchasers outside the region. The output is produced using labor, capital, fuel, and intermediate inputs. The demand for labor, capital, and fuel per unit of output depends on their relative costs because an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The supply of labor in the model depends on the number of people in the population and the proportion of those people who participate in the labor force. Economic migration affects the population size. More people will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

Supply and demand for labor in the model determine the wage rates. These wage rates, along with other prices and productivity, determine the cost of doing business for every industry in the model. An increase in the cost of doing business causes either an increase in price or a cut in profits, depending on the market for the product. In either case, an increase in cost would decrease the share of the local and U.S. market supplied by local firms. This market share, combined with the demand described previously, determines the amount of local output. Of course, the model has many other feedbacks. For example, changes in wages and employment affect income and consumption, while economic expansion changes investment and population growth affects government spending.

The REMI Policy Insight Model has been customized for the ROI defined in this EIS. For this study, the 53-sector Policy Insight Model is used. In the 53-sector model, industries are defined at their 2-digit Standard Industrial Classification (SIC) code level, which provides sufficient industry detail for the policy questions analyzed in this EIS. The model has a complete economic history of the ROI from 1969 to the present. Data for the model are obtained from the Bureau of

Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, the Census Bureau, and other public sources. Based on these data, a control, or baseline, forecast was

generated for the ROI to the year 2035.[1] This forecast simulates the expected long-term growth of the ROI based on past and current trends and conditions. An alternative forecast is then developed for each alternative action proposed in the EIS. (These alternatives are defined in Section 2.0.) Alternative forecasts are created by altering the value of policy variables in the model from their value in the control forecast. The deviation of the alternative forecast from the control forecast is the effect of the policy on the regional economy.

The REMI baseline results for population and employment in the ROI are presented in Table C-1. The REMI baseline model equates to Alternative 3 (No Growth Alternative) of the EIS. Total population is expected to increase by 13.6 percent between 2000 and 2010. Total employment is projected to increase by 8.6 percent, with the creation of 1,500 new jobs during this period. This is the most restrictive alternative and would seek to maintain the Corps land around the lake as it currently exists. Rezoning applications would not be accepted, no new permits would be granted, and no new shoreline use permits would be allowed.

Table C-1
Baseline (Alternative 3: No Growth Alternative) REMI Model Results for the ROI

	2000	2005	2010	Difference, 2000 to 2010	Percent Change, 2000 to 2010
Gross Regional Product	$725,000,000	$860,000,000	$979,000,000	$254,000,000	35.0%
Total Employment	17,567	18,476	19,078	1,511	8.6%
Personal Income per Capita	$19,356	$20,515	$21,513	$2,157	11.1%
Total Population	39,778	42,792	45,172	5,394	13.6%

The results of the REMI forecast for the alternatives are presented below. The tables present projected differences from the baseline forecast for major economic indicators. Three alternative forecasts were run. The first forecast (Table C-2) projects the economic output for the No Action Alternative. The second forecast (Table C-3) projects the economic output for Alternative 2 (80 Percent Rezoning Criteria Alternative). The third forecast (Table C-4) projects economic output changes under Alternative 5 (Maximum Modification). No forecast was generated for Alternative 4 (90 Percent Rezoning Criteria Alternative) because the economic impacts differed only slightly (less than 1 percent) from the No Action Alternative (Table C-2). In addition, no forecast was generated for Alternative 6 (the Preferred Alternative) because the economic impacts were anticipated to differ only slightly from Alternative 4. The table for each alternative forecast first shows the change over baseline as a difference and then shows the change over baseline as a percentage. As shown in the tables, with the exception of the Maximum Modification Alternative, annual changes in economic indicators are quite modest. That is, deviations from the projected baseline forecast would have only minor impacts on the local economy, and for the most part these impacts would be positive. The only economic indicator projected to be negative is the real personal income per capita indicator. The likely reason for this is the fact that a relatively high percentage of the new population would be retirees who would not generate direct income through employment. Nonetheless, the decreases are very small and of no economic consequence.

[1] The economic impact analysis is limited to the period 2003 to 2010.

The only large annual changes in economic indicators are projected for the Maximum Modification Alternative. If such growth were actually to take place, changes to the economy would be significant. Such rapid growth also could have significant impacts on public services and other social indicators. Given that the region is highly rural in character, the local economy would likely have difficulty in assimilating a population increase of more than 16 percent over 5 years. In reality, such rapid growth is extremely unlikely and would be unprecedented. Regulatory, economic, and other social factors would certainly put constraints on annual growth, holding it at levels far below that assumed in the analysis. By simply doubling the time frame for residential construction, annual changes in economic indicators would become far more modest. Increasing the build-out time frame to 20 or more years would bring projected growth down to historical levels. Although it is not possible to accurately predict the actual time frame in which full build-out would take place, it is reasonable to assume, based on historical trends, that the maximum build-out scenario would almost certainly take place over a time frame greater than 5 years and that the resulting economic impacts would be much smaller than those forecast in the analysis.

Table C-2
No Action Alternative and Alternative 4 (90 Percent Rezoning Criteria) REMI Model Results

	Projected Changes (Differences) from Baseline							
Variable	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Emp (Thous)	0.03885	0.07719	0.1167	0.1569	0.1979	0.2153	0.2328	0.2502
Priv Non-Farm Emp (Thous)	0.02891	0.05805	0.08873	0.1206	0.1536	0.1651	0.1774	0.19
GRP (Bil Fixed 92$)	0.001576	0.003106	0.004682	0.006301	0.007967	0.008736	0.009479	0.01027
Pers Inc (Bil Nom $)	0.003342	0.006804	0.01048	0.01437	0.01853	0.02023	0.02194	0.02367
Disp Pers Inc (Bil Nom $)	0.003059	0.006238	0.009619	0.0132	0.01703	0.0186	0.02018	0.02177
PCE-Price Index (Fixed 92$)	-0.03166	-0.05594	-0.08229	-0.1087	-0.1336	-0.1666	-0.2032	-0.2406
Real Disp Pers Inc (Bil Fixed 92$)	0.003543	0.007013	0.01057	0.0142	0.01791	0.01938	0.0208	0.02217
Real Disp Pers Inc Per Cap (Thous Fixed 92$)	-0.04676	-0.08556	-0.1171	-0.1422	-0.162	-0.2042	-0.2405	-0.2729
Population (Thous)	0.275	0.5266	0.764	0.9887	1.202	1.355	1.496	1.624

	Projected Percentage Changes from Baseline							
Variable	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Emp	0.21%	0.42%	0.63%	0.84%	1.06%	1.14%	1.23%	1.31%
Priv Non-Farm Emp	0.19%	0.38%	0.58%	0.78%	0.99%	1.05%	1.13%	1.20%
GRP (Bil Fixed 92$)	0.20%	0.37%	0.54%	0.71%	0.87%	0.93%	0.99%	1.05%
Pers Inc (Bil Nom $)	0.38%	0.73%	1.07%	1.41%	1.74%	1.82%	1.90%	1.97%
Disp Pers Inc (Bil Nom $)	0.39%	0.76%	1.12%	1.47%	1.82%	1.90%	1.98%	2.06%
PCE-Price Index (Fixed 92$)	-0.03%	-0.06%	-0.08%	-0.11%	-0.13%	-0.16%	-0.19%	-0.22%
Real Disp Pers Inc (Bil Fixed 92$)	0.43%	0.82%	1.20%	1.58%	1.95%	2.07%	2.18%	2.28%
Real Disp Pers Inc Per Cap (92$)	-0.23%	-0.42%	-0.57%	-0.69%	-0.77%	-0.96%	-1.13%	-1.27%
Population)	0.66%	1.25%	1.79%	2.28%	2.74%	3.06%	3.34%	3.60%

Table C-3
Alternative 2 (80 Percent Rezoning Criteria) REMI Model Results

	Projected Changes (Differences) from Baseline							
Variable	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Emp (Thous)	0.04486	0.089	0.1341	0.1799	0.2264	0.2432	0.2602	0.2772
Priv Non-Farm Emp (Thous)	0.03428	0.06857	0.1043	0.1409	0.1787	0.1894	0.201	0.213
GRP (Bil Fixed 92$)	0.001802	0.003551	0.005344	0.007176	0.009055	0.009805	0.01053	0.0113
Pers Inc (Bil Nom $)	0.0039	0.00796	0.01228	0.01685	0.02173	0.02353	0.02534	0.02716
Disp Pers Inc (Bil Nom $)	0.00357	0.007298	0.01127	0.01548	0.01997	0.02164	0.02331	0.02498
PCE-Price Index (Fixed 92$)	-0.03044	-0.05199	-0.07512	-0.09797	-0.1189	-0.1502	-0.1864	-0.224
Real Disp Pers Inc (Bil Fixed 92$)	0.004077	0.008084	0.01219	0.01638	0.02067	0.02215	0.02359	0.02498
Real Disp Pers Inc Per Cap (Thous Fixed 92$)	-0.04249	-0.07729	-0.105	-0.1264	-0.1426	-0.1877	-0.2265	-0.2612
Population (Thous)	0.2928	0.5622	0.8176	1.06	1.292	1.452	1.597	1.73

	Projected Percentage Changes from Baseline							
Variable	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Emp	0.25%	0.49%	0.73%	0.97%	1.21%	1.29%	1.37%	1.45%
Priv Non-Farm Emp	0.23%	0.45%	0.68%	0.91%	1.15%	1.21%	1.28%	1.34%
GRP (Bil Fixed 92$)	0.22%	0.43%	0.62%	0.81%	0.99%	1.05%	1.10%	1.15%
Pers Inc (Bil Nom $)	0.44%	0.85%	1.26%	1.65%	2.04%	2.12%	2.20%	2.26%
Disp Pers Inc (Bil Nom $)	0.46%	0.89%	1.31%	1.72%	2.13%	2.21%	2.29%	2.36%
PCE-Price Index (Fixed 92$)	-0.03%	-0.05%	-0.08%	-0.10%	-0.12%	-0.14%	-0.18%	-0.21%
Real Disp Pers Inc (Bil Fixed 92$)	0.49%	0.95%	1.39%	1.82%	2.25%	2.36%	2.47%	2.57%
Real Disp Pers Inc Per Cap (Thous Fixed 92$)	-0.21%	-0.38%	-0.51%	-0.61%	-0.68%	-0.89%	-1.06%	-1.21%
Population	0.70%	1.33%	1.91%	2.45%	2.95%	3.28%	3.57%	3.83%

Table C-4
Alternative 5 (Maximum Modification) REMI Model Results

	Projected Changes (Differences) from Baseline							
Variable	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Emp (Thous)	0.2199	0.4402	0.6694	0.9051	1.147	1.262	1.378	1.494
Priv Non-Farm Emp (Thous)	0.1623	0.328	0.5043	0.6886	0.8808	0.9573	1.039	1.123
GRP (Bil Fixed 92$)	0.008946	0.01774	0.02689	0.03635	0.04613	0.05108	0.05589	0.06096
Pers Inc (Bil Nom $)	0.01886	0.03861	0.05978	0.08234	0.1066	0.1175	0.1286	0.1399
Disp Pers Inc (Bil Nom $)	0.01726	0.03539	0.05485	0.0756	0.09789	0.1079	0.1182	0.1285
PCE-Price Index (Fixed 92$)	-0.1814	-0.3184	-0.4658	-0.6133	-0.752	-0.9356	-1.137	-1.341
Real Disp Pers Inc (Bil Fixed 92$)	0.02005	0.03991	0.0605	0.08165	0.1035	0.113	0.1224	0.1316
Real Disp Pers Inc Per Cap (Thous Fixed 92$)	-0.274	-0.499	-0.6804	-0.8247	-0.9396	-1.162	-1.351	-1.518
Population (Thous)	1.594	3.085	4.518	5.895	7.221	8.22	9.148	10.01

	Projected Percentage Changes from Baseline							
Variable	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Total Emp	1.21%	2.41%	3.62%	4.86%	6.12%	6.69%	7.27%	7.83%
Priv Non-Farm Emp)	1.09%	2.17%	3.30%	4.47%	5.66%	6.11%	6.60%	7.08%
GRP (Bil Fixed 92$)	1.11%	2.13%	3.13%	4.10%	5.06%	5.46%	5.85%	6.23%
Pers Inc (Bil Nom $)	2.12%	4.14%	6.12%	8.08%	10.01%	10.59%	11.15%	11.66%
Disp Pers Inc (Bil Nom $)	2.21%	4.32%	6.38%	8.42%	10.43%	11.04%	11.61%	12.14%
PCE-Price Index (Fixed 92$)	-0.19%	-0.33%	-0.48%	-0.61%	-0.74%	-0.90%	-1.07%	-1.23%
Real Disp Pers Inc (Bil Fixed 92$)	2.41%	4.67%	6.89%	9.09%	11.25%	12.04%	12.82%	13.54%
Real Disp Pers Inc Per Cap (Thous Fixed 92$)	-1.37%	-2.46%	-3.32%	-3.98%	-4.48%	-5.49%	-6.33%	-7.06%
Population	3.83%	7.31%	10.56%	13.60%	16.47%	18.55%	20.44%	22.16%