



PENN STATE WORKFORCE EDUCATION AND DEVELOPMENT INITIATIVE

**Forecast of Economic,
Population, & Employment
Consequences of the Closing
of the Willow Grove Naval Air
Station Joint Reserve Base**

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Abstract Of This Report

The Willow Grove Naval Air Station Joint Reserve Base in Montgomery County, Pennsylvania, is scheduled to close by 2010. The Base closing is anticipated to have broad effects on the economy, population, and labor market of Montgomery County. This report contains a forecast of the potential impacts of the Base closing on the economy, population, and workforce of Montgomery County and on assessing a variety of industrial development opportunities afforded Montgomery County by use of the surplus land that becomes available after the property is transferred from the U.S. Department of Defense to its new owners. A team of researchers from Penn State's Workforce Education and Development Initiative applied state-of-the-art information, forecasting, and modeling tools to assess the economic, population, and workforce impact of losses of jobs, spending, and reservists' visits as a result of the Base closing. In brief, the closing of the Willow Grove Naval Air Station Joint Reserve Base is forecasted to have a minimal effect on the economy, population, and workforce of Montgomery County. At the same time, development opportunities exist for use of surplus Base land. These findings imply that targeting additional workforce development efforts to mitigate the impact of the Base closing beyond those already available through PA CareerLink might not yield substantial additional benefits for the economy of Montgomery County and for the well-being of its workers and employers.

Background

The Willow Grove Naval Air Station Joint Reserve Base is scheduled to close. The Base closing is anticipated to have broad effects on the economy, population, and labor market of Montgomery County.

The mission of Willow Grove Naval Air Station Joint Reserve Base is to provide, train, and maintain a ready reserve military force. The Base is located in Horsham Township,

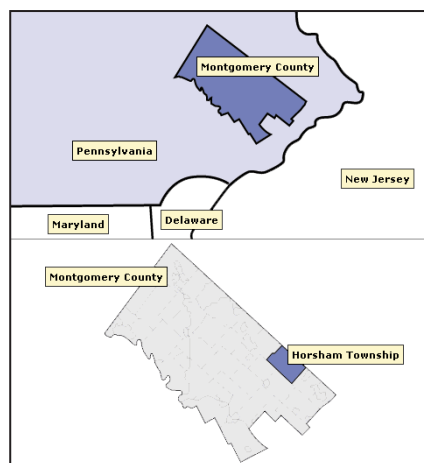


Figure 1. *Montgomery County & Horsham Township*

Montgomery County, approximately 20 miles north of Philadelphia (see Figure 1). The primary tenant of Willow Grove is Navy patrol squadron VP-66. Other tenants at the installation include the Air National Guard, Air Force Reserve, and one Marine Corps Helicopter Squadron.

In 2005, the independent Base Realignment and Closure Commission voted to concur with a U.S. Department of Defense proposal to shut or shrink 800 Bases across the country, including the Willow Grove facility. The Commission calculated that the one-time cost closing of the Willow Grove Base is equal to \$239.5 million, with estimated annual savings of \$79.3 million.

Estimates of the impact of the closing of the Willow Grove Naval Air Station Joint Reserve Base vary remarkably. The Base Realignment and Closure Commission anticipated the loss of



approximately 1,700 military and civilian jobs from the Base and its affected supplying and supporting industries. One controversial assessment provided by Econsult Corporation, a Philadelphia-based consulting firm, prior to the announcement of the Base closing by the Commission asserted that the Willow Grove Base's economic impact on the community was \$378 million in business activity and 10,724 jobs. No matter which of these estimates is preferred, the Base closing is anticipated to have broad effects on the economy, population, and labor market of Montgomery County.

Focus Of This Report

This report focuses on forecasting the potential impacts of the closing of the Willow Grove Naval Air Station Joint Reserve Base on the economy, population, and workforce of Montgomery County and on assessing a variety of industrial development opportunities afforded Montgomery County by use of the surplus land that becomes available after the property is transferred from the U.S. Department of Defense to its new owners.

Montgomery County forms one of the most vigorous, active, and high performing economies in the Commonwealth of Pennsylvania. According to the U.S. Bureau of Economic Analysis, Montgomery County in 2004 had the third largest population among Pennsylvania's 67 counties, the highest per capita income in Pennsylvania (156% of the state average and 158% of the national average), and accounted, by itself, for almost 10% of the personal income earned in Pennsylvania. The closing of the Base could have important effects on the Montgomery County economy and the well-being of its residents. Comprehensive forecasts of the total economic, population, and employment impacts of the closing of the Willow Grove Naval Air Station Joint Reserve Base are required to assess and mitigate the closing's particular impact on employment and training in Montgomery County. Moreover, an assessment is needed of the opportunities for reallocating the workers displaced by the Base closing to reduce the disruption of personal income streams and to optimize allocation of human capital assets in Montgomery County.

Research by the Penn State Workforce Education and Development (WED) Initiative reported in this document addresses Montgomery County's needs for information about the potential impacts of the Base closing by:

- Describing the status of the Montgomery County economy, population, and labor market;
- Forecasting the economy, population, and employment of Montgomery County;
- Specifying and conducting policy simulations of the economic, population, and workforce effects of the staged closing of the Willow Grove Naval Air Station Joint Reserve Base on Montgomery County; and
- Identifying potential impacts of opportunities for development of economic sectors other than the federal military sector.

The economic, populations, and workforce impacts resulting from the closing of the Willow Grove Naval Air Station Joint Reserve Base are anticipated to be generated primarily by: losses of military and civilian jobs at the Base; loss of spending by the Base on local Montgomery County goods and services; and loss of visits for short-term—often weekend—duty to the Base by members of the armed forces reserve. The analytical approach applied in this research



does not include estimation of anticipated losses to adjoining Pennsylvania counties or to the Commonwealth as a whole which could accumulate as a consequence of the Base closing.

Contained in the next section of this report is a description of the analytical methods applied by the WED Initiative to weigh the impacts of the Base closing in the Montgomery County economy, population, and workforce as well as to identify potential sectoral development opportunities for the County. Then, findings of this research are grouped and presented in four sections: economy, population, workforce, and opportunities. To simplify the presentation of findings of this research, separate sections of the report related to the economy, population, and workforce contain descriptions and forecasts for Montgomery County, along with impacts of the Base closing. Opportunities for Montgomery County economic development are presented separately in the last major section of this report.

Methods

The Penn State WED Initiative used state-of-the-art information, forecasting, and modeling tools to assess the economic, population, and workforce impact of losses of jobs, spending, and reservists' visits as a result of the closing of the Willow Grove Naval Air Station Joint Reserve Base. Each of the tools presented briefly in this section is described in much more detail at <http://WDICapabilities.notlong.com>.

Information Sources

REMI 70–Sector Policy Insight Model

A major portion of the information about the economy, population, and workforce of Montgomery County was derived from REMI *Policy Insight* (see <http://www.remi.com>). The REMI *Policy Insight* model is a structural economic/demographic/employment forecasting and policy analysis model that the Penn State WED Initiative leases from Regional Economic Models, Inc, from Amherst, Massachusetts (see <http://www.remi.com>). *Policy Insight* is organized around the North American Industrial Coding System (NAICS; see <http://naics.notlong.com>). The REMI *Policy Insight* model leased by the Penn State WED Initiative for this research contains 70 NAICS sectors and focuses solely on Montgomery County (Regional Economic Models Inc., 2007). The REMI *Policy Insight* model is documented completely by Treyz (1993).

Strategic Advantage

Strategic Advantage (<http://www.economicmodeling.com>) is both a database and an analysis tool that provides economic, workforce, and demographic information. Main modules of *Strategic Advantage* include: Economic Forecaster; Economic Impact; and Career Pathways. The Penn State WED Initiative leases a version of *Strategic Advantage* that allows economic and demographic analysis, modeling, and forecasting for the entire Commonwealth of Pennsylvania, with capabilities to drill this information down to county, county group, and zip code levels of geographic detail.



Of pertinence to this research is that *Strategic Advantage* is a tool that, among other things, provides information about worker characteristics for each occupation in an economy. *Strategic Advantage* states the knowledge, skills, and abilities required for performance in each occupation. Also, it provides an indication of the nature of work performed in each occupation by providing detail about work tasks, interests of workers in the occupation, and worker needs that can be satisfied in the occupation. In addition, *Strategic Advantage* provides a numerical scoring of occupations for which workers in a particular occupation have compatible knowledge, skills, and abilities. The Penn State WED Initiative leases *Strategic Advantage* information for all of Pennsylvania, including Montgomery County.

IMPLAN

An economic model called IMPLAN (IMPact for PLanning and ANalysis) is used to describe the structure of opportunities in the Montgomery County economy. IMPLAN originally was developed by the USDA Forest Service, but now a firm, Minnesota IMPLAN Group, Inc. sells IMPLAN tools, data, and support for the IMPLAN model (see <http://www.implan.com>). For Pennsylvania, economic data is available in IMPLAN for the entire Commonwealth as well as for all Pennsylvania counties. The Penn State WED Initiative owns the IMPLAN model and used the most recent IMPLAN data available for analyses of Montgomery County economic activity.

Analysis

The economic, population, and workforce analysis of the consequences of the Base closing was conducted in the following steps:

- The REMI *Policy Insight* model was used to describe and forecast the economy and population of Montgomery County from 2004 (in the historical period, this is the last year of complete data due to reporting lags that affect all government statistical programs) through 2007, 2010, 2012, and 2015 (selected dates in the forecast period). Perhaps “status quo” is the best description of the forecast conducted at this step of the analysis because this forecast operates under the assumption that the Montgomery County economy will be structured and will grow and change in the same ways and rates as it has done in the past.
- Next, a REMI *Policy Insight* forecast was conducted through 2015 that simulated the permanent removal of Montgomery County jobs, spending, and reservists’ visits that are likely to be the direct effects of the Base closing. Perhaps this forecast is best described as a “policy forecast” because it describes the Montgomery County economy under the conditions resulting from the Base closing policy. Rather than providing a simple estimate of the impact of the base closing, we provided a range of estimates between a high and low scenarios for jobs, spending, and reservists’ visits. This range reflects uncertainty about the exact values and amounts of direct reductions that the closing of the Base will produce. The direct impact of the Base closing was modeled using the following changes in the Montgomery County economy:
 - ❑ *Civilian employment*—The reduction modeled at the low end of the range was 100 jobs, and at the high end of the range was 300 jobs.
 - ❑ *Military employment*—Reduction modeled at the low end of the range was 750 jobs, and at the high end of the range was 1,500 jobs.
 - ❑ *Local spending*—Six million dollars (2006\$) in annual local spending was removed from the economy. This figure was estimated from interviews with Base logistic and support personnel and is not entered into the modeling as a range. That is, local spending was valued at \$6 million. Much of the Base spending occurs outside the Montgomery County economy, but the local spending in the following categories was included—
 - > Utilities
 - > Construction
 - > Retail and wholesale purchasing
 - > Transportation and warehousing



- > Information services
- > Printing services
- > Finance and insurance
- > Professional/technical services (legal, accounting, computer systems design and services, advertising)
- > Accommodations and food service
- > Other services such as repair and maintenance of vehicles and personal and other services
- > Leasing of real estate, autos, and commercial and industrial machinery
- > Health care and social assistance
- > Arts and entertainment
- > Local government services
- *Reservists' visits*—A range of dollar values for reservist's visits was modeled to reflect a variety of reservist staffing and cost patterns. The dollar value of visits included accommodations, meals, fuel purchased locally, and incidentals. The low end of the range of values modeled included \$7.41 million (2006\$) for 1,300 reservists visiting 38 days (two days per month plus 14-day per year extended training) at \$150 per day. The high end of the range of values modeled included \$30.4 million (2006\$) for 3,200 reservists for 38 days annually at \$250 per day.
- The impacts of the Base closing are identified by subtracting economic and population indicators calculated from the policy forecast from the indicators calculated in the status quo forecast. The difference between the policy forecast and the status quo forecast between 2010 and 2015 describes the impacts of the Base closing. Differences tabulated include—
 - Output, contribution to gross Montgomery County product, labor productivity, regional purchases of Montgomery County products, employment, and income per capita;
 - Employment in Montgomery County by source of demand for Montgomery County goods and services;
 - Prices, costs, labor access, , labor intensity, and industry mix in Montgomery County relative to the entire U.S. economy; and
 - The stock and flow of population in Montgomery County.
- The final step in the impact analysis focuses on occupational employment of the Base closing. First, changes in total employment counts identified in the difference between the policy forecast and the status quo forecast are disaggregated by occupation. The ten occupations most affected by the Base closing are tabulated based on estimates from *Strategic Advantage*.

The Willow Grove Naval Air Station Joint Reserve Base will close. Most regional economies are robust and resilient. Therefore, there is good reason to believe that the Montgomery County will adjust. The Department of Defense recognized Horsham Land Reuse Authority as a Pennsylvania non-profit corporation charged officially with writing a reuse plan for the 1,100 acre property. To aid the Authority, a section the findings in this report contains an analysis of the potential jobs and income impacts that growth and development in a variety of industrial sectors could yield for Montgomery County.





Findings

Findings of the impact analysis are organized around the effects of the Base closing on the economy, population, and workforce of Montgomery County. In addition, the potential impacts of growth and development in Montgomery County on jobs and income are described. In brief, the closing of the Willow Grove Naval Air Station Joint Reserve Base is forecasted to have a minimal effect on the economy, population, and workforce of Montgomery County. These findings imply that targeting additional workforce development efforts to mitigate the impact of the Base closing beyond those already available through PA CareerLink might not yield substantial additional benefits for the economy of Montgomery County and for the well-being of its workers and employers.

Economy

Economic indicators for Montgomery County are strong and point upward in the future. The shock of losing the economic activity of the Willow Grove Naval Air Station Joint Reserve Base is forecasted to have minimal effects on the performance and competitiveness of the Montgomery County economy.

Description and Forecast

Shown in Table 1 are indicators of the performance of the Montgomery County economy from 2004 through 2015. After adjustment for inflation, Montgomery County industry total output (the value of all industry production, including sales to other industries), contribution to gross regional product (direct sales to households, to governments, and to investment within Montgomery County and to exports—net of import—outside the County), labor productivity, employment, and income per person are forecast to increase between 2004 and 2015. The proportion of Montgomery County demand for goods and services met by Montgomery County production is forecast to remain approximately constant.

Table 1. *Performance of the Montgomery County, Pennsylvania, Economy, 2004–2015, and Range of Impacts Due to Base Closing, 2010–2015*

Source	2004	2007	2010	2012	2015
Total Economic Output (bill 2006\$)	104.25	117.01	132.13	143.52	160.32
% Δ Due to Base Closing			-0.14% to -0.25%	-0.14% to -0.24%	-0.12% to -0.22%
Gross Regional Product (bill 2006\$)	61.38	67.51	74.64	79.90	87.25
% Δ Due to Base Closing			-0.33% to -0.61%	-0.32% to -0.59%	-0.29% to -0.54%
Labor Productivity (thous 2006\$)	187.50	198.71	215.57	229.01	249.42
% Δ Due to Base Closing			0.04% to 0.06%	0.04% to 0.06%	0.04% to 0.06%
Proportion local Products Demand	0.593	0.593	0.594	0.595	0.596
% Δ in % Due to Base Closing			negligible to -0.01%	negligible to -0.01%	negligible to -0.01%
Total Employment	596,087	629,591	654,408	668,923	685,966
% Δ Due to Base Closing			-0.42% to -0.77%	-0.42% to -0.76%	-0.41% to -0.74%
Disposable Personal Income/Capita (thous 2006\$)	48.11	50.45	52.69	53.96	55.54
% Δ Due to Base Closing			-0.18% to -0.34%	-0.16% to -0.30%	-0.13% to -0.25%

Source: Analysis of Pennsylvania REMI Policy Insight model (2007).



Shown in Table 2 is historical and forecasted employment in Montgomery County private nonfarm industry that is created by each source of demand for goods and services produced in Montgomery County. Over the years tabulated, approximately one-third of employment in Montgomery County is dependent on net exports of County goods and services to the rest of the Pennsylvania, the nation, and, the rest of the world. Another one-third of Montgomery County jobs are created as a result of demand for good and services that are purchased by County households. Sales of products of Montgomery County industries to other

Table 2. Montgomery County, Pennsylvania, Private Nonfarm Employment by Source of Demand, 2004–2015, and Range of Impacts Due to Base Closing, 2010–2015

Source	2004	2007	2010	2012	2015
Intermediate Demand for Inputs to the Production of Final Goods	124,277	134,077	143,117	149,218	155,962
% Δ Due to Base Closing			-0.32% to -0.59%	-0.31% to -0.57%	-0.28% to -0.52%
Sales to Households as Personal Consumption Expenditures	179,430	189,177	194,118	195,832	197,985
% Δ Due to Base Closing			-0.22% to -0.40%	-0.21% to -0.40%	-0.21% to -0.39%
Government Purchases	2,647	3,205	3,287	3,349	3,413
% Δ Due to Base Closing			-0.39% to -0.42%	-0.40% to -0.44%	-0.41% to -0.46%
Investment in Capital Goods Such as Equipment or Residential and Nonresidential Structures	22,358	23,795	24,732	25,394	26,194
% Δ Due to Base Closing			-0.19% to -0.35%	-0.30% to -0.55%	-0.28% to -0.51%
Net Exports to Rest of Nation	211,527	221,646	228,819	232,919	238,123
% Δ Due to Base Closing			0.02% to 0.03%	0.03% to 0.05%	0.04% to 0.06%
Net Exports to Rest of World	15,733	16,970	18,851	19,993	21,097
% Δ Due to Base Closing			negligible to 0.01%	0.01% to 0.02%	0.02% to 0.04%

Source: Analysis of Pennsylvania REMI Policy Insight model (2007).

Montgomery County industries as input to their own production create approximately one of every five jobs in the County. Purchases of goods and services by governments and for investment account for only a small portion of historical and forecasted employment in Montgomery County.

Unique to the Montgomery County REMI Policy Insight model is the availability of historical and forecast information about relative economic competitiveness of industries. Presented in Table 3 are comparisons of indicators of the relative economic competitiveness of Montgomery County industries with U.S. industries. Comparisons are made about Montgomery County delivered prices, costs of production, labor access, labor intensity, and industry mix relative to the entire nation.

The relative delivered price of goods and services produced in Montgomery County demonstrate in 2004, and are forecasted for 2007 through 2015, to be slightly lower than the delivered price for the entire nation. This regional advantage might reflect the proximity of Montgomery County to markets for goods and services.



Labor intensity, an indication of the amount of labor needed to produce goods and services, is about 8% lower in Montgomery County than in the entire United States. By this measure, Montgomery County workers are relatively productive, which probably reveals why they earn a premium in the labor market and why the regional economy remains robust. This interpretation of the competitiveness indicator data in Table 3 as a percentage is derived by taking the deviation from 1.00 of an indicator, multiplying the deviation by 100, and expressing the result as a percentage. For instance, the labor intensity indicator for 2004 is 0.921, $0.921 - 1.00 = -0.079$, and $0.079 \times 100 = 7.9\%$ expressed as a percentage. Indicators less than 1.00 demonstrate lower values for Montgomery County than the entire U.S. value. Indicators greater than 1.00 demonstrate higher values for Montgomery County than the entire U.S. value. An indicator of 1.00 reveals that no difference between Montgomery County and the entire U.S. value.

The overall cost of production, combining many factors, in Montgomery County is, and is forecasted to be, slightly lower than the U.S. cost. Focusing solely on the costs of three specific factors of production, the Montgomery County economy exhibits now and in the future higher fuel costs (approximately 1.3% higher), higher capital costs (approximately 3% higher, and much higher labor costs (approximately 27%) than the entire U.S. economy. The relative cost of production is not the simple average of costs for labor, fuel, and capital. Rather, the indicator for the overall cost of production is a more complex calculation that is influenced by changes in the productivity-adjusted compensation rate, the costs of structures, equipment, and land, fuel, and the delivered price of intermediate inputs to Montgomery County production processes.

Table 3. Ratio of Competitiveness Indicators Between Montgomery County, Pennsylvania, and U.S. Private Nonfarm Industries, 2004–2017, and Range of Impacts Due to Base Closing, 2010–2015

Competitiveness Indicator	2004	2007	2010	2012	2015
<i>Relative Delivered Price</i>					
is based on the cost of the commodity in Montgomery County and the distance cost of providing the commodity to the place of destination, is calculated relative to delivered prices in the nation, and weighs the delivered price from all locations that ship to Montgomery County.					
Ratio between County & U.S.	0.995	0.995	0.994	0.995	0.995
% Δ Due to Base Closing			negligible to -0.01%	-0.01% to -0.02%	-0.01% to -0.02%
<i>Relative Costs of Production</i>					
is the cost of Montgomery County production based on the cost of factors used in the production of final goods relative to the nation.					
Ratio between County & U.S.	0.995	0.995	0.995	0.995	0.995
Labor	1.277	1.273	1.271	1.270	1.270
Fuel	1.013	1.013	1.013	1.013	1.013
Capital	1.030	1.029	1.028	1.028	1.028
% Δ Due to Base Closing			-0.01% to -0.02%	-0.02% to -0.03%	-0.02% to -0.03%
Labor			-0.01% to -0.02%	-0.02% to -0.04%	-0.02% to -0.03%
Fuel			negligible	negligible	negligible
Capital			negligible	-0.03% to -0.04%	-0.03% to -0.05%



Competitiveness Indicator	2004	2007	2010	2012	2015
<i>Labor Access Index</i>					
estimates the effect of access to labor choice and individual characteristics by occupation and industry on labor productivity, relative to the nation.					
Ratio between County & U.S.	1.000	1.000	1.000	1.000	1.000
Δ Due to Base Closing			negligible	negligible	negligible
<i>Relative Labor Intensity</i>					
is a measure of the amount of labor used for production (versus capital and fuel), relative to the nation. It takes into account an industry's relative factor costs and their respective share of industry output, as well as the fact that new factor shares are introduced as old capital is replaced by new capital.					
Ratio between County & U.S.	0.921	0.921	0.922	0.922	0.922
Δ Due to Base Closing			negligible	negligible	negligible
<i>Industry Mix</i>					
is a measure of the difference in a Montgomery County's growth due to its industrial composition, relative to the nation.					
Ratio between County & U.S.	1.000	1.007	1.015	1.020	1.026
% Δ Due to Base Closing			negligible	negligible	negligible

Source: Analysis of Pennsylvania REMI Policy Insight model (2007)

Note: Numbers displayed in the cells of this table are the ratio between Montgomery County and U.S. figures. An indicator number < 1 reveals that the Montgomery value is lower than the U.S. value. An indicator number > 1 signifies that the Montgomery value is higher than the U.S. value. A number = 1 indicates that the U.S. value and the Montgomery County value are equal.

Relatively high labor costs for the County probably do not reflect any concentration of especially high growth industries or by any particular mix of labor accessible in the region. The industry mix indicator in Table 3 reveals similar industry growth patterns and rates as the entire U.S. experiences. The labor mix indicator shows that Montgomery County does not have access to an especially different pool of labor than the entire U.S. does. Rather, relatively high labor costs might indicate a relatively greater concentration of high wage, high demand occupations in Montgomery County industries than in U.S. industries. Also, the relatively high productivity of labor in the Montgomery County economy might drive the relatively high cost of labor in the County economy as employers seek to capture the added value offered by Montgomery County workers. Moreover, Montgomery County workers might have access to technology or management that spurs especially high productivity compared with workers in the entire U.S. workforce.

Impacts of the Base Closing

Evidence of the potential economic impacts of the Base closing is offered in Table 1, Table 2, and Table 3 from simulations consequences of losses of civilian and military jobs on the Base, purchases by the Base of locally-sold goods and services, and visits to Montgomery County for reserve duty. The economic impact of the loss of the Base is forecasted to be minimal.

For instance, information in Table 1 forecasts a loss of between 2,749 and 5,039 jobs in Montgomery County in 2010 as a result of the Base closing. Although a loss of a job can exert great pecuniary and non-pecuniary hardship to an individual and a household, the amount of job loss forecasted due to the Base closing represents between 0.42% and 0.77% of the



workforce of 654 thousand workers forecasted for Montgomery County during 2010. In fact, in a dynamic economic such as Montgomery County's, substantial churning of jobs lost and of jobs gained probably occurs continually.

Conclusions similar to those drawn about employment are possible from evidence presented in Table 1, Table 2, and Table 3. The effects of the Base closing on the overall macroeconomic performance and competitiveness of Montgomery County are anticipated to be discernible, but small. The shock of the Base closing is not likely to be large in a vibrant, high performing economy such as Montgomery County's.

Population

Description and Forecast

Loss of economic activity can affect the population of a region. These effects can occur when people migrate from a region because they must pursue employment and income elsewhere due to job loss. Entire households—workers and dependents—can leave a region to find other opportunities, taking consumers as well as workers with them. Estimating the population impacts of the Base closing helps planners forecast the demand for public goods and services necessary in Montgomery County.

Contained in Table 4 is a description and forecast of the population of Montgomery County from 2004 through 2015. The population of Montgomery County is forecasted to grow by 9.7% over this period. Population increases due to net migration into Montgomery County are likely to be approximately 1.5 times greater than natural population growth (births – deaths). The components of migration into and out of the County include international migrants, retirees, and economic migrants who decide to move based on relative employment and income opportunities in the County compared with other U.S. regions.

Impacts of the Base Closing

The population of Montgomery County is forecasted to dip only slightly over 2010 through 2015 as a result of the closing of the Willow Grove Naval Air Station Joint Reserve Base. In 2010, the Base closing is forecasted to reduce the population of Montgomery County by between 326 and 652 people (between 0.04% and 0.08%) in a total population comprised of 814,513 people. Notable in calculations necessary to create Table 4 is that most of the reduction of special populations in Montgomery County (which includes military, college students, and prisoners) was among military personnel.

As was forecasted for the performance and competitiveness of the Montgomery County economy, the closing of the Willow Grove Naval Air Station Joint Reserve Base is likely to produce minimal effects on the population of the County. And, as with the economic impacts forecasted, the small reduction in population is probably within the band of natural periodic fluctuations that occur in the population of Montgomery County.



Table 4. Components of Population of Montgomery County, Pennsylvania, 2004–2017, and Range of Impacts Due to Base Closing, 2010–2015

Component	2004	2007	2010	2012	2015
Previous Year's Population	770,538	787,646	807,889	821,132	841,415
% Δ Due to Base Closing			negligible	-0.06% to -0.10%	-0.09% to -0.16%
Total Births	9,705	9,682	10,010	10,305	10,862
% Δ Due to Base Closing			-0.12%	-0.12%	-0.17%
Total Deaths	6,814	7,146	7,563	7,805	8,115
% Δ Due to Base Closing			negligible	-0.01% to -0.02%	-0.02% to -0.03%
Natural Growth (Births – Deaths)	2,891	2,537	2,448	2,500	2,747
% Δ Due to Base Closing			-0.15% to -0.23%	-0.79% to -1.36%	-0.94% to -1.59%
This Year's Populations, Without Migrants (Previous Year + Natural Growth)	773,430	790,183	810,336	823,632	844,162
% Δ Due to Base Closing			negligible	-0.06% to -0.11%	-0.09% to -0.16%
Migrants (Retired, International, Economic)	169	4,284	4,177	4,190	3,992
% Δ Due to Base Closing			negligible	negligible	negligible
Special Populations (Military, College Students, Prisoners)	49,348	49,428	49,448	49,468	49,477
% Δ Due to Base Closing			-0.34% to -0.69%	-0.34% to -0.69%	-0.34% to -0.69%
Unexplained Growth	-223	0	0	0	0
Total Population (This Year's Population + Migrants + Special Populations + Unexplained Growth)	773,375	794,467	814,513	827,822	848,153
% Δ Due to Base Closing			-0.04% to -0.08%	-0.07% to -0.12%	-0.10% to -0.17%

Source: Analysis of Pennsylvania REMI Policy Insight model (2007)

Workforce

Industries and Occupations Most Likely to be Affected by the Base Closing

Minimal employment impacts of the closing of the Willow Grove Naval Air Station Joint Reserve Base are forecasted. Most job losses are forecast to occur in occupations in the federal government sector. Anticipated job losses are widely distributed among Montgomery County industries, with professional and technical service, retail trade, health care and social service, and administrative and support service industries bearing the brunt of job losses beyond the federal civilian and military sectors of government.

Approximately one-third of the total job losses forecasted are in military-related occupations. Listed in the left-hand column of Table 5 are the top 20 occupations in Montgomery County that are likely to be most affected by the Base closing. These occupations represent about 15% of the job reductions that could occur as a result of the Base closing. The impact on other occupations is quite diffuse. Quite small impacts are evident in a wide variety of other occupations. The normal growth and change for each of the top 20 occupations are shown



in Table 5. These changes do not represent the job losses forecasted to result from the Base closing.

Table 5. *Forecasted Employment in Top 20 Occupations Most Likely to be Affected by the Willow Grove Naval Air Station Joint Reserve Base Closing in Montgomery County, 2010–2015*

Occupation ^a	2010 Jobs	2015 Jobs	Job Change 2010–2015	% Job Change 2010–2015
Retail sales workers	36,479	37,303	824	2%
Information and record clerks	26,582	27,015	433	2%
Computer specialists	24,769	27,017	2,249	9%
Business operations specialists	24,589	26,046	1,456	6%
Health diagnosing and treating practitioners	22,262	23,182	919	4%
Other office and administrative support workers	21,956	21,076	-881	-4%
Financial specialists	20,144	21,361	1,217	6%
Construction trades and related workers	19,986	19,999	13	0%
Food and beverage serving workers	19,669	20,426	757	4%
Primary, secondary, and special education teachers	18,851	19,742	890	5%
Other management occupations	17,837	18,571	734	4%
Financial clerks	17,338	17,263	-75	0%
Building cleaning and pest control workers	17,227	18,279	1,051	6%
Secretaries and administrative assistants	15,430	15,279	-151	-1%
Other sales and related workers	14,956	15,249	293	2%
Motor vehicle operators	14,212	14,753	541	4%
Material moving occupations	14,190	14,113	-77	-1%
Material recording, scheduling, dispatching, and distributing occupations	14,145	13,658	-486	-3%
Sales representatives, wholesale and manufacturing	12,617	12,801	184	1%
Nursing, psychiatric, and home health aides	12,390	13,139	749	6%

Sources: Most affected occupations identified through analysis of Pennsylvania REMI *Policy Insight* model (2007). Employment forecasts developed with September 2007 base data provided by Economic Modeling Specialists, Inc. through *Strategic Advantage* (<http://www.economicmodeling.com>).

^aOccupational titles are based on three-digit Standard Occupational Classification System codes (<http://www.bls.gov/soc/>), which is used by Federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into one of over 820 occupations according to their occupational definition. To facilitate classification, occupations are combined to form 23 major groups, 96 minor groups, and 449 broad occupations. Each broad occupation includes detailed occupations requiring similar job duties, skills, education, or experience.

**A Significant Workforce Development Implication: Additional Resources Might Not Be Necessary**

Information presented in this report leads to the conclusion that the potential impact on the Montgomery County workforce of the closing of the Willow Grove Naval Air Station Joint Reserve Base is likely to be minimal compared with the size of the County workforce. Impacts are mainly felt by federal government and civilian workers who work at the Base and who work in Montgomery County to support the Base. PA CareerLink for Montgomery County already has opened an office on the Base and has initiated training and placement services for furloughed workers from the Base. Targeting additional workforce development efforts to mitigate the impact of the Base closing beyond those already available through PA CareerLink might not yield substantial additional benefits for the economy of Montgomery County and for the well-being of its workers and employers. There always is the possibility that synergy of the Base closing with a potential recession, a debt repayment crisis, failure of mortgage lenders, federal budget strain, and state revenue downturns might create a disaster for the Montgomery County economy as well many other economies, big and small. However, in the context of a vigorous Montgomery County economy, the wound that is created by the Base closing actually might be self-healing.

Opportunities**Jobs and Income Multipliers for Major Industries**

The most significant consequence of the closing of the Willow Grove Naval Air Station Joint Reserve Base probably will not result for workers and their employers. Rather, control and use of the land on which the Base stands might become the real prize of the Base closing.

Land declared surplus and transferred from the Department of Defense to new owners as a result of the closing of the Willow Grove Naval Air Station Joint Reserve Base has potential for many other uses. The spectrum of possible land uses depends on many economic, technical, political, and environmental factors. A diverse mix of decision-makers at various levels of government and stakeholders pursuing a variety of interests are involved in considerations of post-closing Base land use. Questions remain about the exact nature of the transfer of the Base land from the U.S. Department of Defense to other authorities. The final development decision about whether and how to use the land is complex. Provided in this section of the report is economic information that could contribute to decisions about using any land made available.

To assess the potential economic impact of economic development efforts in Montgomery County, staff of the Penn State WED Initiative constructed macroeconomic models of the County and calculated economic multipliers for industrial sectors for the region. Multipliers were calculated by the WED Initiative team using IMPLAN, a regional economic database and input-output analysis system that is applied extensively through the United States for estimation of economic impact. These multipliers benchmark the total potential job and labor income impact of every 100 jobs in each of the County's major industrial sectors.



A multiplier is a number that describes the “ripple effect” of economic activity in a region. In a nutshell, three types of multiplier effects are tabulated in this report:

- ❑ *Direct effect.* Economic activity within an industry has a direct economic effect by itself. For instance, 100 jobs at a construction site are the construction project’s direct job effect.
- ❑ *Indirect effect.* Economic activity in an industry stimulates additional economic activity in many other industries that supply it. This is described as an “indirect effect” of economic activity. For example, a construction site purchases supplies from other regional industries. A site might purchase, among other things, fuel, concrete, accounting services, tools, and lubricants from local industries. In this way, jobs are created indirectly in these other industries due to the need to supply the construction site.
- ❑ *Induced effect.* In addition, workers within the industry and the industries that supply it spend their income in the region on consumer items, which generates additional employment throughout the region. For example, construction workers and the workers in industries who supply the construction site spend their pay on such goods and services as automobiles, groceries, tickets to ball games, medical diagnosis and treatment, refrigerators, gasoline, and a myriad of other consumer items. Jobs are created in stores, hospitals, and other local establishments because of this spending. The economic spin-off from this spending is called an “induced effect.”

The economic impacts displayed in Table 6 are parsed into direct, indirect, and induced components. The sum of direct, indirect, and induced components is the estimated total effect of every 100 jobs in each industrial sector in Montgomery County. Based upon total jobs and income impacts, development of every 100 jobs in manufacturing, utilities, and information industries could produce the largest impacts on the Montgomery County economy. Industries with the smallest jobs and income impacts per 100 jobs include: agriculture; arts, entertainment, and recreation; and accommodation and food services.

Table 6. *Benchmark Annual Potential Impact of Every 100 Major Industry Sector Jobs on Total Jobs and Labor Income in Montgomery County, Pennsylvania*

Industrial Sector	Jobs ^a	Labor Income ^b (mill 2006\$ ^c)
Agriculture		
Direct	100	\$2.05
Indirect	9	\$0.60
Induced	17	\$0.81
Total	126	\$3.46
Mining		
Direct	100	\$7.75
Indirect	33	\$2.25
Induced	62	\$3.00
Total	195	\$13.00
Utilities		
Direct	100	\$15.32
Indirect	27	\$1.63
Induced	101	\$4.89
Total	228	\$21.84
Construction		
Direct	100	\$5.78
Indirect	35	\$2.25
Induced	50	\$2.41
Total	185	\$10.44



Industrial Sector	Jobs ^a	Labor Income ^b (mill 2006\$ ^c)
Manufacturing		
Direct	100	\$10.51
Indirect	122	\$9.22
Induced	120	\$5.84
<i>Total</i>	342	\$25.57
Wholesale Trade		
Direct	100	\$9.01
Indirect	47	\$2.88
Induced	71	\$3.45
<i>Total</i>	218	\$15.34
Retail Trade		
Direct	100	\$3.19
Indirect	16	\$0.98
Induced	25	\$1.21
<i>Total</i>	144	\$5.28
Transportation & Warehousing		
Direct	100	\$5.08
Indirect	24	\$1.47
Induced	40	\$1.94
<i>Total</i>	164	\$8.49
Information		
Direct	100	\$9.44
Indirect	70	\$4.42
Induced	84	\$4.09
<i>Total</i>	254	\$17.95
Finance & Insurance		
Direct	100	\$7.76
Indirect	52	\$3.49
Induced	67	\$2.27
<i>Total</i>	219	\$13.52
Real Estate & Rental		
Direct	100	\$4.30
Indirect	65	\$3.55
Induced	49	\$2.37
<i>Total</i>	214	\$9.92
Professional & Scientific Services		
Direct	100	\$8.99
Indirect	44	\$2.49
Induced	70	\$3.37
<i>Total</i>	214	\$13.95
Management of Companies		
Direct	100	\$9.44
Indirect	43	\$3.01
Induced	74	\$3.59
<i>Total</i>	217	\$15.04



Industrial Sector	Jobs ^a	Labor Income ^b (mill 2006\$ ^c)
Administrative & Waste Management		
Direct	100	\$3.90
Indirect	17	\$0.94
Induced	29	\$1.40
<i>Total</i>	146	\$5.24
Educational Services		
Direct	100	\$2.87
Indirect	13	\$0.67
Induced	21	\$1.03
<i>Total</i>	134	\$4.57
Health & Social Services		
Direct	100	\$5.16
Indirect	21	\$1.22
Induced	39	\$1.91
<i>Total</i>	160	\$8.29
Arts, Entertainment, & Recreation		
Direct	100	\$2.00
Indirect	17	\$0.80
Induced	17	\$0.81
<i>Total</i>	144	\$3.61
Accommodation & Food Services		
Direct	100	\$1.96
Indirect	13	\$0.84
Induced	17	\$0.81
<i>Total</i>	130	\$3.61

Source: Calculated for two-digit North American Industrial Classification System codes (see <http://naics.notlong.com>) using IMPLAN (see <http://www.implan.com>), a macroeconomic model of Montgomery County applied by Penn State's WED Initiative team.

^aJobs include full- and part-time jobs, including self-employment. Jobs actually refer to positions, not workers. One worker could be a multiple jobholder.

^bLabor income = Employee compensation + proprietor's income. Employee compensation is the sum of employee wages and salaries and supplements to wages and salaries. Wages and salaries are measured on an accrual, or "when earned" basis, which may be different from the measure of wages and salaries measured on a disbursement, or "when paid" basis. Supplements to wages and salaries include employer contributions for employee pension and insurance funds and of employer contributions for government social insurance. Proprietor's income is current-production income (including income-in-kind) of sole proprietorships and partnerships and of tax-exempt cooperatives. Fees of corporate directors are included in income of proprietors.

^cDollar values provided in Table 6 are stated as millions of 2006 dollars. That is, each dollar has the purchasing power for the types and amounts of goods and services that a dollar could buy in 2006. Since 2006, modest inflation has degraded the purchasing power of the dollar. As a result, for example, \$6.82 million in labor income in 2006 dollars earned in Montgomery County for every 100 accommodation and food service workers employed actually would purchase fewer goods and services in 2008 than in 2006.

Several examples might help with interpretation of detailed data contained in Table 6. For instance, every 100 construction jobs creates other County jobs indirectly. Due to the need to supply the construction industry, other industries in Montgomery County could employ an additional 35 workers. Other jobs are induced by spending of income earned in construction and its supplying industries. Spending of income earned by construction employees in Montgomery County and by workers in Montgomery County industries that supply the construction industry on such items as housing, food, health care, and other retail goods and services could generate an additional 50 jobs in the County. In short, every 100 jobs in the Montgomery construction industry are associated with 185 total jobs in the County (100 direct + 35 indirect + 50 induced).

For another example, reference is made to Table 6, again. Every 100 finance and insurance industry workers in Montgomery County earn a total of \$7.76 million annually. This is the



total is the income earned by workers at all occupational levels in the industry. For every 100 Montgomery County finance and insurance workers employed, workers in Montgomery County industries that supply the County's construction industry earn \$3.49 million. When Montgomery County finance and insurance workers—and the workers in industries that supply the finance and insurance industry—spend the income they earn, an additional \$2.27 million is earned by Montgomery County workers. In sum, employment of every 100 workers in the finance and insurance industry in Montgomery County adds \$13.52 million in total labor income annually to the County.

Implications of Economic Multipliers for Development Decisions

Care is needed to draw valid implications from Table 6. For instance, the mining industry has the potential for substantial jobs and income impacts in Montgomery County. However, is mining of natural resources actually an opportunity on the Base land? Also, can preparation of the Base land and remediation of any environmental impediments that might exist to land use make the property attractive to enterprises specializing in such activity as: accommodation and food services; health and social services; arts, entertainment, and recreation; educational services; or real estate or rentals?

Another matter to consider is the relative scale of industries that could make use of available Base land. For example, manufacturing presents the highest jobs and income multipliers for Montgomery County. A 100-worker corporate headquarters (in management of companies, which is a major industry classification with multipliers that are not as large as manufacturing's) would produce an impact many times greater than the impact of a small, 10-worker manufacturing establishment. Land use planners must take into account the scale of potential projects to assess final land development impacts.

Still another factor to consider when applying information from Table 6 to decisions about the use of Base land is that the industry supply structure must exist already or must be built for industries that are targeted for development. For instance, attempting to locate a cement manufacturing facility on available Base land probably would require sufficient roads and transportation, proximity to cement product resources, and adjacent markets for cement products. Additional industrial or infrastructure development might need to occur to indirectly support some industries targeted directly for development.

Additional analyses, of course, are required to target opportunities for use of available Base land beyond information about jobs and income impacts displayed in Table 6. Developers do not attempt to site "manufacturing" firms in a region. Instead, an opportunity to locate a "Motor Vehicle Seating and Interior Trim Manufacturing" (a more specific manufacturing concern), might be considered. The size of multipliers for specific industrial classifications with more restricted scope within manufacturing vary. Some multipliers are higher than the major industry average. Some are lower. Multiplier analysis of more detailed industrial classification should occur as specific development opportunities are encountered. The multipliers in Table 6 are a starting point, along with other site selection criteria (e.g., workforce quality, infrastructure quality, proximity to markets, or relative costs of production).



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About This Report

Penn State Workforce Education and Development Initiative

This report was prepared using the resources and expertise of the Penn State WED Initiative, which is an alliance between Penn State’s College of Education and Penn State Outreach. The mission of the WED Initiative is to support the development of the workforce in Pennsylvania primarily through the application of Penn State resources to conduct economic and workforce analyses for employers, industry partnerships, nonprofit organizations, and government entities. For additional information about the WED Initiative, see <http://PSU-WEDI-Guide.notlong.com>.

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