

## **C Methodology, Assumptions, and Multipliers**

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## **Introduction**

This appendix describes the methodology, assumptions, and multipliers used to develop the construction cost, economic impact, full build-out employment, population and tax revenue projections provided in Section 4.2 – Socioeconomic Environmental Consequences. In addition, similar details are provided for the water supply, wastewater, stormwater, and utility projections presented in Section 4.8 – Infrastructure.

In order to provide a concise and easy-to-follow discussion of the potential impacts of implementing Alternative 1, Alternative 2, Alternative 3 or the No Action Alternative on these resource areas, only the summary tables and results were provided in the text of the EIS. The balance of the information is provided in this appendix, which is organized into the following sections:

- **C-1 Methodology and Assumptions for Socioeconomic Environmental Consequences**
  - Construction Cost Projections
  - Economic Impact Projections
  - Full Build-Out Employment Projections
  - Population Projections
  - Tax Revenue Impacts
  
- **C-2 Methodology and Assumptions for Infrastructure and Utilities Environmental Consequences**
  - Water Supply and Wastewater Projections
  - Impervious Surface Area Projections
  - Energy Usage Projections
  
- **C-3 References**

In each of these sections, the methodology and assumptions utilized are discussed. The terms and definitions used in the analysis are presented, and detailed tables showing calculations and results are provided.

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## C-1 Methodology and Assumptions for Socioeconomic Environmental Consequences

### Construction Cost Projections

The construction cost estimates are the sum of estimated structure construction and infrastructure costs.

Structure construction costs were estimated by multiplying the assumed square footage for each type of development by a "cost-per-square-foot" multiplier. For the residential structures, the estimated total square footage was calculated by multiplying the number of units (e.g., of large-lot, single-family homes) contained in the Redevelopment Plan by an assumed square footage per unit<sup>1</sup>. For the other structures, the assumed total square footage assumptions were taken from the Redevelopment Plan. The majority of the cost per square foot multipliers were adapted from an Excel workbook, entitled "FINAL IMPACTS.xlsx" created by RKG Associates, Inc.<sup>2,3</sup>

Infrastructure costs were adapted from Table 11-3 in RKG Associates, Inc.'s report<sup>4</sup> (RKG 2012).

### Economic Impact Projections

The construction expenditures associated with the potential redevelopment scenarios would create a direct economic impact on the regional economy in the form of increased output, employment and employee earnings, as firms and workers located in the region are hired to undertake the construction activities. Indirect economic impacts would occur when local suppliers provide materials for the construction activities and induced economic impacts would occur when the construction workers spend a portion of their incomes in the regional economy.

To estimate the total impact (i.e., the sum of the direct, indirect and induced impacts) on regional output, employment and employee earnings use was made of multipliers, relating to the construction industry in Montgomery and Bucks Counties in Pennsylvania, derived from the U.S. Bureau of Economic Analysis' economic modeling system known as the Regional Input-Output Modeling System or "RIMS II" (U.S. Bureau of Economic Analysis 2013). The estimates for the total change in regional output and employee earnings were calculated by multiplying construction expenditures by the appropriate multipliers. The estimates of the total change in employment were calculated by dividing the construction expenditures by a million, re-expressing them in 2010 prices and then multiplying the result by the appropriate multiplier. The multipliers used in these calculations are reported in Table C-1.

**Table C-1 Total Impacts Multipliers for Construction Expenditures**

Multiplier	Value
Regional Output	1.9023
Employee Earnings	0.4872
Employment (jobs)	11.2245

Source: RIMS II Multipliers (2010/2010), Table 2.5 Total Multipliers for Output, Earnings, Employment, and Value Added by Industry Aggregation, Willow Grove (Type II).

<sup>1</sup> Since RKG Associates, Inc.'s report did not consider ¼ Acre Lot, Single-Family homes, E & E supplied this square footage assumption for Alternative 2.

<sup>2</sup> E & E supplied the assumed square footage cost for the ¼ Acre Lot Single Family homes and Homeless Housing.

<sup>3</sup> RKG Associates Inc.'s assumed square footage cost assumptions were in 2012 prices. ENR's Construction Cost Index was used to escalate them from 2012 to 2013 prices (using the annual average value for 2012 and the average value for the first six months of 2013) (ENR 2013).

<sup>4</sup> Infrastructure costs were also escalated from 2012 to 2013 prices using ENR's Construction Cost Index.

## Full Build-Out Employment Projections

During the operations phase (i.e., employment at full build-out), workers would be permanently employed at the former installation property. To estimate the number of on-site jobs for each of the alternatives, RKG Associates, Inc.'s methodology was utilized. For most types of development this involved applying "employees per square foot estimates from the Urban Land Institute (ULI) and the U.S. Energy Information Administration (EIA)" to the assumed square footage for each type of development (RKG 2012). However, for the Housing for Homeless, Regional Recreation Center and Aviation Museum, RKG Associates, Inc. simply assumed a certain total number of employees<sup>5</sup>. Table C-2 contains the employees per square foot estimates and the assumed total number of employees used in estimating direct employment for each type of development<sup>6</sup>.

**Table C-2 Employees Per Thousand Square Feet Estimates and Total Number Of Employees Assumptions by Type of Development**

Type of Development	Employees per Thousand Square Feet	Assumed Number of Employees
<b>Residential</b>		
Housing for Homeless	-	5
<b>Commercial</b>		
CCRC Med Office/Amenities	0.25	-
Hotel/Conference	0.70	-
Town Center Office/Retail/Service	3.17	-
Office Park	4.00	-
Retail	5.00	-
<b>Community Services and Recreation</b>		
Regional Recreation Center	-	30
School	1.43	-
Aviation Museum	-	10

For Alternative 3 that included reuse of the airfield, in addition to the direct employment estimated in the manner described above, an estimate of direct employment at the potential general aviation airport was also calculated using a correlation between data on employment and the number of takeoffs and landings at Pennsylvanian airports. (Wilbur Smith and Associates, Inc. 2011)<sup>7</sup>. Combining the observed numerical relationship between employment and the number of takeoffs and landings with the estimated number of annual aircraft operations at the general aviation airport yielded the airfield direct employment estimate.

The increased business activity caused by on-site employment would lead to additional indirect and induced employment in the regional economy. Indirect and induced employment estimates were developed using the estimated number of direct jobs and multiplier values from the RIMS II economic modeling system (U.S. Bureau of Economic Analysis 2013). The multiplier values used for this purpose are called "direct effect employment multipliers" and differ between industrial categories. The multiplier for the most appropriate industrial category was used for each type of development (e.g., the multiplier

<sup>5</sup> The employees per square foot estimates and total number of employees assumptions were adapted from the Excel workbook, entitled "FINAL IMPACTS.xlsx" created by RKG Associates, Inc.

<sup>6</sup> The table contains the assumed number of employees for Housing for Homeless, Regional Recreation Center and Aviation Museum for Alternative 1. These numbers were scaled according to the square footage of each type of development for Alternatives 2 and 3.

<sup>7</sup> It was estimated, using this data, that every 1,000 annual take-offs and landings at an airport was associated with an additional 7.25 employees.

for the retail trade industry was used for retail structures). Multiplying the direct employment estimates by the appropriate multiplier (minus one so as to not double count direct employment) calculated the indirect and induced employment estimates.

### Population Projections

The population estimates were produced using the number and types of residential structures detailed in the Redevelopment Plan (RKG 2012) in combination with data on the average household size by type of housing unit for Horsham Township. Table C-3 shows how residential structures were categorized by occupier type.

**Table C-3      Categorization of Residential Structures by Occupier Type**

Occupier Type	Type of Development
Owner	Large-Lot, Single-Family
	¼ Acre Lot, Single-Family
	Small Lot, Single-Family
	Townhomes
Renter	Apartments/Condos
	Town Center Apartment/Condos
	Housing for Homeless
	CCRC Independent Living
	CCRC Assisted Living/Nursing

The data on average household sizes for owner-occupied and renter-occupied housing units were taken from the 2007-2011 American Community Survey 5-Year Estimates<sup>8</sup> (U.S. Census Bureau 2011a).

### Tax Revenue Projections

Estimates were made of the revenues from the real estate tax, the school district tax, the earned income tax and all other taxes. Each source of tax revenues is discussed in turn below.

#### *Real Estate and School District Taxes*

Real estate and school district tax revenues were estimated by multiplying assessed property values by the Township and School District millage rates<sup>9</sup>. Assessed property values were estimated by summing the value of the structure and the value of the land and multiplying the result by the Common Level Ratio for Montgomery County<sup>10</sup>. Structure values were calculated in the manner described in Construction Cost Projections and land values were estimated using RKG Associates Inc.’s methodology. For residential structures, land values were assumed to be equal to a percentage of structure values. For commercial, community services and recreation development, a value per acre of land was assumed for each development type and multiplied by the number of acres used by each development type.

<sup>8</sup> The average household size for owner-occupied housing units was 2.89 persons, and for renter-occupied units was 1.96 persons.

<sup>9</sup> 1.0 mill and 24.992 mills, respectively (Horsham Township 2013a)

<sup>10</sup> 0.62 in 2012/2013 (Evans 2013)

### ***Earned Income Tax***

Horsham Township levies a 1 percent tax on the local incomes of those who reside in Horsham and on the local incomes of non-resident workers who do not pay earned income tax to their town of residence<sup>11</sup>.

Following RKG Associates, Inc.'s methodology, total local incomes were estimated for each type of development. For the residential development types, total local incomes were estimated by multiplying the number of units by the median household income for Horsham Township<sup>12</sup>. For commercial, community services and recreation developments, total local incomes were estimated by multiplying the number of workers eligible to pay earned income tax by average annual pay in the most appropriate industrial category for each type of development (e.g., average annual pay for the retail trade industry was used for retail structures)<sup>13</sup>.

### ***Other Taxes***

In accordance with RKG Associates, Inc.'s methodology, the estimate for other taxes was calculated by dividing the 2012 total for all other taxes (Horsham Township 2013c) by the total assessed value for all properties to obtain the equivalent of a tax rate which was then applied to the estimated assessed value of the proposed developments.

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<sup>11</sup> RKG Associates, Inc. assumed that 94.0 percent of direct jobs create would be filled by non-residents and that only 10 percent of non-residents would be eligible to pay earned income tax to Horsham Township.

<sup>12</sup> The median household income for Horsham Township was taken from the American Community Survey (US Census Bureau 2011b) and was updated to a 2013 value using the consumer price index (Bureau of Labor Statistics 2013a)

<sup>13</sup> Average annual pay data relating to Montgomery County, Pennsylvania were taken from the Quarterly Census of Employment and Wages (Bureau of Labor Statistics 2013b).

## C-2 Methodology and Assumptions for Infrastructure and Utility Environmental Consequences

### Water Supply and Wastewater Projections

The assumptions used in determining the land use-specific multipliers for water and wastewater projections were obtained from Nelson 2004. Nelson adapted these multipliers from *Environmental Health Planning Guide and Environmental Health Practice in Recreational Areas* (U.S. Public Health Service n.d. (a), n.d. (b)), and it is noted in the text book that “No warranty is made that the figures reported ... reflect the consumption characteristics of any given local government” (Nelson 2004, pp. 105 and 106).

### *Commercial and Mixed Use*

Commercial land use was assumed to be similar to Office land use in terms of water demand and wastewater generation. It was assumed that average water usage and wastewater generation would be similar to that of an office building. Office water demand and wastewater generation is generally more constant than the intermittent high/low demands at, for example, a conference center which would be expected to experience high and low demands depending on the presence of an event. However, looking on average across a long period of time, it is assumed the two different land uses would use similar amounts of water and generate similar amounts of wastewater.

The multiplier for the Commercial land use water demand and wastewater generation is in average gallons per day (gpd) per 1,000 square feet of space. It was assumed that this would be 125 gpd per 1,000 square feet (or 0.125 gpd per square foot) for water consumption, and 119 gpd per 1,000 square feet (or 0.119 gpd per square foot) for wastewater generation.

To project water demand and wastewater generation under Alternative 1, 2 and 3, the Commercial land use multiplier was multiplied by the number of square feet of Commercial land use within each specified land use category at full build-out.

### **Example: Use of Water Demand Multiplier for Commercial and Mixed Land Use\*.**

Under Alternative 1, in the Hotel/Conference land use area it is expected that 137,000 square feet of Commercial land use will be available at full build-out. As shown by Equation 1 below, multiplying the Commercial land use water demand multiplier (0.125 gpd per square foot) to the number of square feet projected (137,000 square feet) gives an estimate of 17,125 gpd of water demand for Hotel/Conference land use in the Commercial land use area at full build out under Alternative 1.

$$\text{Equation 1: } 137,000 \text{ ft}^2 \times 0.125 \text{ gpd /ft}^2 = 17,125 \text{ gpd **}$$

\* The same methodology was used to project wastewater generation; substituting in 0.119 gpd per square foot for the multiplier.

\*\* Note: Numbers may not match directly with table due to rounding in the build-out analysis for number of square feet of non-residential space.

### *Community Services and Recreation*

The Community Services and Recreation land use was assumed to be similar to the Commercial land use in terms of water demand and wastewater generation. It was assumed that average water usage and wastewater generation would be comparable to that of an office building. For example; in an education facility there could be classes, events, or faculty offices that might create high and low water demands. However, looking on average across a long period of time, it is assumed that offices and education facilities would require similar quantities of water and generate similar quantities of wastewater.

The multiplier for the Community Services and Recreation water demand and wastewater generation is in terms of average gallons per day (gpd) per 1,000 square feet of space. It was assumed that this would be 125 gpd per 1,000 square feet (or 0.125 gpd per square foot) for water demand, and 119 gpd per 1,000 square feet (or 0.119 gpd per square foot) for wastewater generation.

To project water demand and wastewater generation under Alternative 1, Alternative 2 and Alternative 3, the multiplier was multiplied by the number of square feet of Commercial Services and Recreation land use within each specified land use category. The same is true for estimated water consumption and wastewater generation.

**Example: Use of Water Consumption Multiplier for School Facility Land Use\*.**

Under Alternative 1, in the Community Services and Recreation land use district, it is expected that there will be 152,727 square feet of School facility land use at full build-out. As shown in Equation 2 below, multiplying the School facility land use water consumption multiplier (0.125 gpd per square foot) to the projected number of square feet (152,727 square feet) gives an estimate of 19,091 gpd of water demand for School facility land use at full build-out under Alternative 1.

**Equation 2:  $152,727 \text{ ft}^2 \times 0.125 \text{ gpd/ft}^2 = 19,091 \text{ gpd}^{**}$**

\* The same methodology was used to project wastewater generation; substitute in 0.119 gpd per square foot for the multiplier.

\*\* Note: Numbers may not match directly with table due to rounding in the build-out analysis for number of square feet of non-residential space.

**Residential**

All residential unit water demand and wastewater generation multipliers are in gpd per housing unit. The following assumptions and water demand and wastewater multipliers were used for residential units. For large and small lot single family units a Single Family multiplier of 280 gpd/unit was used. Although it is likely that a 5-bedroom home would use more water and create more wastewater than a single-family home with 2 bedrooms; the multiplier is assumed to be an average; therefore, is applicable to all single family homes regardless of the number of bedrooms. However, for quarter acre single family lots a smaller multiplier of 180 gpd/unit was used based on the assumption that these quarter acre lots would have significantly less occupancy and yard space resulting in less water demand and wastewater generation.

Two multiplier categories were used for residential unit types designated as townhomes, condos, and apartments. The multiplier categories were split between apartments with less than (<) 3 bedrooms and those with 3 or more (≥) bedrooms. To project water consumption and wastewater generation under Alternative 1, Alternative 2 and Alternative 3, the specific residential unit multiplier was multiplied by the number of residential units for each residential type.

Under Alternative 1, it is expected that there will be 90 large lot single family residences. As shown in Equation 3 below; applying the single family multiplier (280 gpd/unit) to the number of units projected (90 units) gives an estimate of 25,200 gpd of water demand for large lot single family residences and full build out.

**Equation 3:  $90 \text{ units} \times 280 \text{ gpd/unit} = 25,200 \text{ gpd}^{**}$**

\* The same methodology was used to project wastewater generation; substitute in 162 gpd per unit for the multiplier.

\*\* Note: Numbers may not match directly with table due to rounding in the build-out analysis for number of units.

**Total Water Consumption and Wastewater Generation.** Upon calculating water consumption and wastewater generation by each land use type or residential unit, the subtotals by land use district were summed to achieve a grand total under Alternatives 1, 2, and 3 at full build out, which are shown in summary in Section 4.8 and shown in detail by alternative below (see Tables C-4 to C-6).

### **Impervious Surface Area Projections**

The total impervious surface areas that would result from the implementation of Alternative 1, Alternative 2, or Alternative 3 were projected utilizing the final build-out projections identified in Section 2 and applying local zoning dimension requirements. The total impervious surface area includes existing and the potential new surface areas (i.e., buildings, structures, parking lots, roadways, and sidewalks) resulting from the maximum build-out of Alternative 1, Alternative 2 or Alternative 3. Alternatives 1 and 2 include removal of the existing runway and Alternative 3 accounts for the runway being reused and remaining in-place.

The impervious surface area projections are used only for planning and assessment purposes and should not be interpreted as an absolute definition of future conditions upon full build-out of any of the redevelopment alternatives. The final build-out of the installation is subject to many variables outside of the Navy's and developer's control, including future market conditions, changes to local and state land use regulations, and other development factors.

The projected lot area was derived from the size and extent of the proposed land use districts under each of the three redevelopment alternatives. This figure was then applied to the maximum land coverage for the corresponding zoning district according to the Town of Horsham regulations. This provided a worst-case amount of impervious surface by land use type, which was then summed to obtain a total amount of impervious surfaces under Alternatives 1, 2, and 3.

The projected total impervious surface area for each alternative is presented in Tables C-7 to C-9.

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**Table C-4 WATER/WASTEWATER- ALTERNATIVE 1**

Land Use	Units/Building Square Feet*	Water Demand		Wastewater Generation		
		Multiplier	Quantity	Multiplier	Quantity	
<b>Residential</b>						
Large Lot Single Family	90 units	280. gpd/unit	25,200 gpd	224. gpd/unit	20,160 gpd	
Small Lot Single Family	250 units	280. gpd/unit	70,000 gpd	224. gpd/unit	56,000 gpd	
1/4 Acre Singles	--	--	--	--	--	
Townhomes	350 units	280. gpd/unit	98,000 gpd	224. gpd/unit	78,400 gpd	
Apartments/Condos	300 units	280. gpd/unit	84,000 gpd	224. gpd/unit	67,200 gpd	
Town Center Apartment/Condos	100 units	280. gpd/unit	28,000 gpd	224. gpd/unit	22,400 gpd	
CCRC Independent Living	141 units	180. gpd/unit	25,380 gpd	162. gpd/unit	22,842 gpd	
Housing for Homeless (units)	70 units	180. gpd/unit	12,600 gpd	162. gpd/unit	11,340 gpd	
CCRC Assisted Living / Nursing	185 units	180. gpd/unit	33,300 gpd	162. gpd/unit	29,970 gpd	
<b>TOTAL RESIDENTIAL</b>	<b>1,486</b>		<b>376,480 gpd</b>		<b>308,312 gpd</b>	
<b>Commercial and Mixed Use</b>						
CCRC Med Office/Amenities	25,000 sqft	0.125 gpd/sqft	3,125 gpd	0.119 gpd/sqft	2,975 gpd	
Hotel/Conference	137,000 sqft	0.125 gpd/sqft	17,125 gpd	0.119 gpd/sqft	16,303 gpd	
Town Center Retail/Service/Restaurants	239,580 sqft	0.125 gpd/sqft	29,948 gpd	0.119 gpd/sqft	28,510 gpd	
Town Center Office	65,340 sqft	0.125 gpd/sqft	8,168 gpd	0.119 gpd/sqft	7,775 gpd	
Movies/Entertainment	54,450 sqft	0.125 gpd/sqft	6,806 gpd	0.119 gpd/sqft	6,480 gpd	
Office Park	1,163,052 sqft	0.125 gpd/sqft	145,382 gpd	0.119 gpd/sqft	138,403 gpd	
Retail	200,200 sqft	0.125 gpd/sqft	25,025 gpd	0.119 gpd/sqft	23,824 gpd	
<b>TOTAL COMMERCIAL</b>	<b>1,884,622 sqft</b>		<b>235,578 gpd</b>		<b>224,270 gpd</b>	
<b>Community Services and Recreation</b>						
Regional Recreation Center	100,000 sqft	0.125 gpd/sqft	12,500 gpd	0.119 gpd/sqft	11,900 gpd	
School	152,727 sqft	0.125 gpd/sqft	19,091 gpd	0.119 gpd/sqft	18,175 gpd	
Aviation Museum	200,000 sqft	0.125 gpd/sqft	25,000 gpd	0.119 gpd/sqft	23,800 gpd	
Park/Open Space	--	--	--	--	--	
Roads, Sidewalks, Paths, Etc	--	--	--	--	--	
<b>TOTAL OTHER USES</b>			<b>56,591 gpd</b>		<b>53,875 gpd</b>	
		<b>Water Consumption</b>	<b>668,649 gpd</b>	<b>WW Generation</b>	<b>586,457 gpd</b>	

\* Values provided from HLRA, Table 11-2

**Table C-5 WATER/WASTEWATER- ALTERNATIVE 2**

Land Use	Units/Building Square Feet*	Water Demand		Wastewater Generation		
		Multiplier	Quantity	Multiplier	Quantity	
<b>Residential</b>						
Large Lot Single Family	--	280. gpd/unit	--	224. gpd/unit	--	
Small Lot Single Family	227 units	280. gpd/unit	63,560 gpd	224. gpd/unit	50,848 gpd	
1/4-acre singles	169 units	180. gpd/unit	30,420 gpd	162. gpd/unit	27,378 gpd	
Townhomes	396 units	280. gpd/unit	110,880 gpd	224. gpd/unit	88,704 gpd	
Apartments/Condos	645 units	280. gpd/unit	180,600 gpd	224. gpd/unit	144,480 gpd	
Town Center Apartment/Condos	114 units	280. gpd/unit	31,920 gpd	224. gpd/unit	25,536 gpd	
CCRC Independent Living	126 units	180. gpd/unit	22,680 gpd	162. gpd/unit	20,412 gpd	
Housing for Homeless	70 units	180. gpd/unit	12,600 gpd	162. gpd/unit	11,340 gpd	
CCRC Assisted Living / Nursing	252 units	180. gpd/unit	45,360 gpd	162. gpd/unit	40,824 gpd	
<b>TOTAL RESIDENTIAL</b>	<b>1999 units</b>		<b>498,020 gpd</b>		<b>409,522 gpd</b>	
<b>Commercial and Mixed Use</b>						
CCRC Med Office/Amenities	58,500 sqft	0.125 gpd/sqft	7,313 gpd	0.119 gpd/sqft	6,962 gpd	
Hotel/Conference	163,400 sqft	0.125 gpd/sqft	20,425 gpd	0.119 gpd/sqft	19,445 gpd	
Town Center Retail/Service/Restaurants	342,154 sqft	0.125 gpd/sqft	42,769 gpd	0.119 gpd/sqft	40,716 gpd	
Town Center Office	included in Town Cent	n/a	n/a	n/a	n/a	
Movies/Entertainment	included in Town Cent	n/a	n/a	n/a	n/a	
Office Park	1,130,818 sqft	0.125 gpd/sqft	141,352 gpd	0.119 gpd/sqft	134,567 gpd	
Retail	139,100 sqft	0.125 gpd/sqft	17,388 gpd	0.119 gpd/sqft	16,553 gpd	
<b>TOTAL COMMERCIAL</b>	<b>1,833,972 sqft</b>		<b>229,247 gpd</b>		<b>218,243 gpd</b>	
<b>Community Services and Recreation</b>						
Regional Recreation Center	96,522 sqft	0.125 gpd/sqft	12,065 gpd	0.119 gpd/sqft	11,486 gpd	
School	152,727 sqft	0.125 gpd/sqft	19,091 gpd	0.119 gpd/sqft	18,175 gpd	
Aviation Museum	55,000 sqft	0.125 gpd/sqft	6,875 gpd	0.119 gpd/sqft	6,545 gpd	
Park/Open Space	--	--	--	--	--	
Roads, Sidewalks, Paths, Etc	--	--	--	--	--	
<b>TOTAL OTHER USES</b>	<b>304,249</b>		<b>38,031 gpd</b>		<b>36,206 gpd</b>	
			<b>Water Consumption</b>	<b>765,298 gpd</b>	<b>WW Generation</b>	<b>663,970 gpd</b>

\*Values adapted from HLRA Option D PowerPoint Presentation from November 16, 2011.

**Table C-6 WATER/WASTEWATER- ALTERNATIVE 3**

Land Use	Units/Building Square Feet*	Water Demand		Wastewater Generation		
		Multiplier	Quantity	Multiplier	Quantity	
<b>Residential</b>						
Large Lot Single Family	--	280. gpd/unit	--	224. gpd/unit	--	
Small Lot Single Family	0 units	280. gpd/unit	0,000 gpd	224. gpd/unit	0,000 gpd	
1/4-acre singles	0 units	180. gpd/unit	0,000 gpd	162. gpd/unit	0,000 gpd	
Townhomes	0 units	280. gpd/unit	0,000 gpd	224. gpd/unit	0,000 gpd	
Apartments/Condos	0 units	280. gpd/unit	0,000 gpd	224. gpd/unit	0,000 gpd	
Town Center Apartment/Condos	0 units	280. gpd/unit	0,000 gpd	224. gpd/unit	0,000 gpd	
CCRC Independent Living	0 units	180. gpd/unit	0,000 gpd	162. gpd/unit	0,000 gpd	
Housing for Homeless	70 units	180. gpd/unit	12,600 gpd	162. gpd/unit	11,340 gpd	
CCRC Assisted Living / Nursing	0 units	180. gpd/unit	0,000 gpd	162. gpd/unit	0,000 gpd	
<b>TOTAL RESIDENTIAL</b>	<b>70 units</b>		<b>12,600 gpd</b>		<b>11,340 gpd</b>	
<b>Commercial and Mixed Use</b>						
CCRC Med Office/Amenities	0,000 sqft	0.125 gpd/sqft	0,000 gpd	0.119 gpd/sqft	0,000 gpd	
Hotel/Conference	120,882 sqft	0.125 gpd/sqft	15,110 gpd	0.119 gpd/sqft	14,385 gpd	
Town Center Retail/Service/Restaurants	0,000 sqft	0.125 gpd/sqft	0,000 gpd	0.119 gpd/sqft	0,000 gpd	
Town Center Office	0,000 sqft	0.125 gpd/sqft	0,000 gpd	0.119 gpd/sqft	0,000 gpd	
Movies/Entertainment	0,000 sqft	0.125 gpd/sqft	0,000 gpd	0.119 gpd/sqft	0,000 gpd	
Office Park	666,718 sqft	0.125 gpd/sqft	83,340 gpd	0.119 gpd/sqft	79,339 gpd	
Retail	427,093 sqft	0.125 gpd/sqft	53,387 gpd	0.119 gpd/sqft	50,824 gpd	
<b>TOTAL COMMERCIAL</b>	<b>1,214,693 sqft</b>		<b>151,837 gpd</b>		<b>144,548 gpd</b>	
<b>Community Services and Recreation</b>						
Regional Recreation Center	100,000 sqft	0.125 gpd/sqft	12,500 gpd	0.119 gpd/sqft	11,900 gpd	
School	0,000 sqft	0.125 gpd/sqft	0,000 gpd	0.119 gpd/sqft	0,000 gpd	
Aviation Museum	200,000 sqft	0.125 gpd/sqft	25,000 gpd	0.119 gpd/sqft	23,800 gpd	
Park/Open Space	--	--	--	--	--	
Roads, Sidewalks, Paths, Etc	--	--	--	--	--	
<b>TOTAL OTHER USES</b>	<b>300,000</b>		<b>37,500 gpd</b>		<b>35,700 gpd</b>	
			<b>Water Consumption</b>	<b>201,937 gpd</b>	<b>WW Generation</b>	<b>191,588 gpd</b>

\*Values based upon a proportional calculation of Units (Sqft) to Acres presented in Alternative 1 and applied to the acreage for Alternative 3.

Table C-7 IMPERVIOUS SURFACE AREA - ALTERNATIVE 1

Land Use	Acres	Units/Building Square Feet*	Applicable Zoning Districts*	Lot Area (HLRA Estimate)	Projected Lot Area	Max. Coverage Impervious (%)**	Max. Impervious Surface Area per Lot	Projected number of Lots	Total Impervious Surface Area Per Land Use	Percent of Total Impervious Area
<b>Residential</b>										
Large Lot Single Family	86	90 units	--	23,000 sqft	41,624 sqft	20%	8,325 sqft	90	749,232 sqft	4.9%
Small Lot Single Family	53	250 units	--	7,000 sqft	9,235 sqft	50%	4,617 sqft	250	1,154,340 sqft	7.5%
1/4 Acre Singles	--	--	--	--	--	--	--	--	--	--
Townhomes	53	350 units	--	4,100 sqft	6,596 sqft	50%	3,298 sqft	350	1,154,340 sqft	7.5%
Apartments/Condos	19	300 units	--	--	827,640 sqft	50%	413,820 sqft	1	413,820 sqft	2.7%
Town Center Apartment/Condos	(a)	100 units	--	--	--	50%	--	1	--	--
Housing for Homeless (units)	11	70 units	--	--	479,160 sqft	50%	239,580 sqft	1	239,580 sqft	1.6%
CCRC Independent Living	(b)	141 units	O-1	--	--	65%	--	1	--	--
CCRC Assisted Living / Nursing	(b)	185 units	O-1	--	--	65%	--	1	--	--
<b>TOTAL RESIDENTIAL</b>	<b>222</b>	<b>1,486</b>							<b>3,711,312 sqft</b>	<b>24.2%</b>
<b>Commercial and Mixed Use</b>										
CCRC Med Office/Amenities	39	25,000 sqft	O-1	25000	1,698,840 sqft	65%	1,104,246 sqft	1	1,104,246 sqft	7.2%
Hotel/Conference	17	137,000 sqft	I-1, I-2, I-3	137000	740,520 sqft	65%	481,338 sqft	1	481,338 sqft	3.1%
Town Center Retail/Service/Office	29	359,370 sqft	--	359370	1,263,240 sqft	80%	1,010,592 sqft	1	1,010,592 sqft	6.6%
Office Park	158	1,163,052 sqft	BC		6,882,480 sqft	65%	4,473,612 sqft	1	4,473,612 sqft	29.2%
Retail	15	200,200 sqft	C-1, SC-1, SC-2, C-2, GC-2		653,400 sqft	80%	522,720 sqft	1	522,720 sqft	3.4%
<b>TOTAL COMMERCIAL</b>	<b>258</b>	<b>1,884,622 sqft</b>							<b>7,592,508 sqft</b>	<b>49.5%</b>
<b>Community Services and Recreation</b>										
Regional Recreation Center	12	100,000 sqft	R-1, R-2, R-2A, R-3, R-4		522,720 sqft	25%	130,680 sqft	1	130,680 sqft	0.9%
School	43	152,727 sqft	R-2, R-2A		1,873,080 sqft	20%	374,616 sqft	1	374,616 sqft	2.4%
Aviation Museum	14	200,000 sqft	--		609,840 sqft	65%	396,396 sqft	1	396,396 sqft	2.6%
Shared Lot	7	--	--		304,920 sqft	65%	198,198 sqft	1	198,198 sqft	1.3%
Park/Open Space	241	--	R-1, R-2, R-2A, R-3, R-4, FF		10,497,960 sqft	1%	104,980 sqft	1	104,980 sqft	0.7%
Roads, Sidewalks, Paths, Etc.	65	--	--		2,831,400 sqft	100%	2,831,400 sqft	1	2,831,400 sqft	18.5%
Airfield and Air Ops	--	--	--							
<b>TOTAL OTHER USES</b>	<b>382</b>	<b>452,727</b>							<b>4,036,270 sqft</b>	<b>26.3%</b>
									<b>TOTAL IMPERVIOUS AREA</b>	<b>15,340,090 sqft</b>
									<b>TOTAL IMPERVIOUS AREA</b>	<b>352 acres</b>
									<b>Percent of Total Area</b>	<b>40.9%</b>
<b>TOTAL AREA</b>	<b>862 acres</b>	* note, sum may not be exact due to rounding.								59.1%

Source

\*HLRA 2012, Willow Grove Redevelopment Plan, Pg. 11-33

\*\*Horsham 2013, Summary of Zoning Code Dimension Requirements, <http://www.horsham.org/departments/code/dimensions.aspx>,

(a) Acreage for all Town Center components (including apartment/condos), retail/service/restaurants, and office) have been included in one total acreage under the Commercial category. The number of residential unit has been broken out and is listed under the Residential category.

(b) Acreage for all Continuing Care Retirement Community (CCRC) components (including independent living, assisted living/nursing, and medical office/amenities) have been included in one total acreage under the Commercial category. The number of residential units has been broken out and is listed under the Residential category.

(c) Maximum Coverage Impervious for the Aviation Museum, and Shared Lot assumed to be 65% as per Horsham Zoning Code Dimension Requirements under the category of "Office and Industrial Districts."

Baseline Impervious Surface Area	Area (acres)	Percentage of Total	Difference in Impervious Surface Area (Acres)	Net Change (%)
Impervious Surface Area	250.23	28.52	101.9	0.407361703
Willow Grove Base Boundary	861.73	100.00		

Table C-8 IMPERVIOUS SURFACE AREA - ALTERNATIVE 1

Land Use	Acres	Units/Building Square Feet*	Applicable Zoning Districts*	Lot Area (HLRA Estimate)	Projected Lot Area	Max. Coverage Impervious (%)	Max. Impervious Surface Area per Lot	Projected number of Lots	Total Impervious Surface Area Per Land Use	Percent of Total Impervious Area
<b>Residential</b>										
Large Lot Single Family	0	--	--	--	--	--	--	--	--	--
Small Lot Single Family	41	227 units	--	--	7,868 sqft	50%	3,934 sqft	227	892,980 sqft	5.8%
1/4 Acrea Singels	50	169 units	--	--	12,888 sqft	50%	6,444 sqft	169	1,089,000 sqft	7.1%
Townhomes	39	396 units	--	--	4,290 sqft	50%	2,145 sqft	396	849,420 sqft	5.5%
Apartments/Condos	24	645 units	--	--	1,045,440 sqft	50%	522,720 sqft	1	522,720 sqft	3.4%
Town Center Apartment/Condos	(a)	114 units	--	--	--	50%	--	1	--	--
Housing for Homeless (units)	12	70 units	--	--	522,720 sqft	50%	261,360 sqft	1	261,360 sqft	1.7%
CCRC Independent Living	(b)	126 units	O-1	--	--	65%	--	1	--	--
CCRC Assisted Living / Nursing	(b)	252 units	O-1	--	--	65%	--	1	--	--
<b>TOTAL RESIDENTIAL</b>	<b>166</b>	<b>1,999</b>							<b>3,615,480 sqft</b>	<b>23.6%</b>
<b>Commercial and Mixed Use</b>										
CCRC Med Office/Amenities	37	58,500 sqft	O-1		1,611,720 sqft	65%	1,047,618 sqft	1	1,047,618 sqft	6.8%
Hotel/Conference	20	163,400 sqft	I-1, I-2, I-3		871,200 sqft	65%	566,280 sqft	1	566,280 sqft	3.7%
Town Center Office/Retail/Service	29	342,154 sqft	--		1,263,240 sqft	80%	1,010,592 sqft	1	1,010,592 sqft	6.6%
Office Park	144	1,130,818 sqft	BC		6,272,640 sqft	65%	4,077,216 sqft	1	4,077,216 sqft	26.6%
Retail	12	139,100 sqft	C-1, SC-1, SC-2, C-2, GC-2		522,720 sqft	80%	418,176 sqft	1	418,176 sqft	2.7%
<b>TOTAL COMMERCIAL</b>	<b>242</b>	<b>1,833,972 sqft</b>							<b>7,119,882 sqft</b>	<b>46.5%</b>
<b>Community Services and Recreation</b>										
Regional Recreation Center	22	96,522 sqft	R-1, R-2, R-2A, R-3, R-4		958,320 sqft	25%	239,580 sqft	1	239,580 sqft	1.6%
School	15	152,727 sqft	R-2, R-2A		653,400 sqft	20%	130,680 sqft	1	130,680 sqft	0.9%
Aviation Museum	15	55,000 sqft	--		653,400 sqft	65%	424,710 sqft	1	424,710 sqft	2.8%
Shared Lot	0	--	--	--	--	--	--	--	--	--
Park/Open Space	317	--	R-1, R-2, R-2A, R-3, R-4, FF		13,808,520 sqft	1%	138,085 sqft	1	138,085 sqft	0.9%
Roads, Sidewalks, Paths, Etc	84	--	--		3,659,040 sqft	100%	3,659,040 sqft	1	3,659,040 sqft	23.9%
Airfield and Airfield Ops										
<b>TOTAL OTHER USES</b>	<b>453</b>	<b>304,249</b>							<b>4,592,095 sqft</b>	<b>30.0%</b>
									<b>TOTAL IMPERVIOUS AREA</b>	<b>15,327,457 sqft</b>
									<b>TOTAL IMPERVIOUS AREA</b>	<b>352 acres</b>
									<b>Percent of Total Area</b>	<b>40.8%</b>
										59.2%
<b>TOTAL AREA</b>	<b>862 acres</b>	* note, sum may not be exact due to rounding.								

Source

\*HLRA 2012, Willow Grove Redevelopment Plan, Pg. 11-33

\*\*Horsham 2013, Summary of Zoning Code Dimension Requirements, <http://www.horsham.org/departments/code/dimensions.aspx>,

(a) Acreage for all Town Center components (including partment/condos), retail/service/restaurants, and office) have been included in one total acreage under the Commercial category. The number of residential unit has been broken out and is listed under the Residential category.

(b) Acreage for all Continuing Care Retirement Community (CCRC) components (including independent living, assisted living/nursing, and medical office/amenities) have been included in one total acreage under the Commercial category. The number of residential units has been broken out and is listed under the Residential category.

(c) Maximum Coverage Impervious for the Aviation Museum, and Shared Lot assumed to be 65% as per Horsham Zoning Code Dimension Requirements under the category of "Office and Industrial Districts."

Baseline Impervious Surface Area				
	Area (acres)	Percentage of Total	Difference in Impervious Surface Area (Acres)	Net Change (%)
Impervious Surface Area	250.23	28.52	101.6	0.406202756
Willow Grove Base Boundary	861.73	100.00		

Table C-9 IMPERVIOUS SURFACE AREA - ALTERNATIVE 3

Land Use	Acres	Units/Building Square Feet*	Applicable Zoning Districts*	Lot Area (HLRA Estimate)	Projected Lot Area	Max. Coverage Impervious (%)	Max. Impervious Surface Area per Lot	Projected number of Lots	Total Impervious Surface Area Per Land Use	Percent of Total Impervious Area
<b>Residential</b>										
Large Lot Single Family	0	--	--	--	--	--	--	--	--	--
Small Lot Single Family	--	--	--	--	--	--	--	--	--	--
1/4 Acrea Singels	--	--	--	--	--	--	--	--	--	--
Townhomes	--	--	--	--	--	--	--	--	--	--
Apartments/Condos	--	--	--	--	--	--	--	--	--	--
Town Center Apartment/Condos	--	--	--	--	--	--	--	--	--	--
Housing for Homeless (units)	11	70 units	--	--	479,160 sqft	50%	239,580 sqft	1	239,580 sqft	1.8%
CCRC Independent Living	--	--	--	--	--	--	--	--	--	--
CCRC Assisted Living / Nursing	--	--	--	--	--	--	--	--	--	--
<b>TOTAL RESIDENTIAL</b>	<b>11</b>	<b>70</b>							<b>239,580 sqft</b>	<b>1.8%</b>
<b>Commercial and Mixed Use</b>										
CCRC Med Office/Amenities	--	--	O-1	--	--	65%	--	1	--	--
Hotel/Conference	15	120,882 sqft	I-1, I-2, I-3	--	653,400 sqft	65%	424,710 sqft	1	424,710 sqft	3.2%
Town Center Office/Retail/Service	--	--	--	--	--	80%	--	1	--	--
Office Park	90	666,718 sqft	BC	--	3,920,400 sqft	65%	2,548,260 sqft	1	2,548,260 sqft	19.5%
Retail	32	427,093 sqft	C-1, SC-1, SC-2, C-2, GC-2	--	1,393,920 sqft	80%	1,115,136 sqft	1	1,115,136 sqft	8.5%
<b>TOTAL COMMERCIAL</b>	<b>137</b>	<b>1,214,693 sqft</b>							<b>4,088,106 sqft</b>	<b>31.2%</b>
<b>Community Services and Recreation</b>										
Regional Recreation Center	12	100,000 sqft	R-1, R-2, R-2A, R-3, R-4	--	522,720 sqft	25%	130,680 sqft	1	130,680 sqft	1.0%
School	--	--	R-2, R-2A	--	--	20%	--	1	--	--
Aviation Museum	14	200,000 sqft	--	--	609,840 sqft	65%	396,396 sqft	1	396,396 sqft	3.0%
Shared Lot	7	--	--	--	304,920 sqft	65%	198,198	1	198,198 sqft	1.5%
Park/Open Space	296	--	R-1, R-2, R-2A, R-3, R-4, FP	--	12,893,760 sqft	1%	128,938 sqft	1	128,938 sqft	1.0%
Roads, Sidewalks, Paths, Etc	32	--	--	--	1,393,920 sqft	100%	1,393,920 sqft	1	1,393,920 sqft	10.6%
Airfield	276	--	--	--	12,022,560 sqft	26%	3,125,866 sqft	1	3,125,866 sqft	23.9%
Airfield Ops	78	--	--	--	3,397,680 sqft	100%	3,397,680 sqft	1	3,397,680 sqft	25.9%
<b>TOTAL OTHER USES</b>	<b>715</b>								<b>8,771,677 sqft</b>	<b>67.0%</b>
							<b>TOTAL IMPERVIOUS AREA</b>		<b>13,099,363 sqft</b>	
<b>TOTAL AREA</b>	<b>862 acres</b>	* note, sum may not be exact due to rounding.					<b>TOTAL IMPERVIOUS AREA</b>		<b>301 acres</b>	
							<b>Percent of Total Area</b>		<b>34.9%</b>	

Source

\*HLRA 2012, Willow Grove Redevelopment Plan, Pg. 11-33

\*\*Horsham 2013, Summary of Zoning Code Dimension Requirements, <http://www.horsham.org/departments/code/dimensions.aspx>,

- (a) Acreage for all Town Center components (including partment/condos), retail/service/restaurants, and office) have been included in one total acreage under the Commercial category. The number of residential unit has been broken out and is listed under the Residential category.
- (b) Acreage for all Continuing Care Retirement Community (CCRC) components (including independent living, assisted living/nursing, and medical office/amenities) have been included in one total acreage under the Commercial category. The number of residential units has been broken out and is listed under the Residential category
- (c) Maximum Coverage Impervious for the Aviation Museum, and Shared Lot assumed to be 65% as per Horsham Zoning Code Dimension Requirements under the category of "Office and Industrial Districts."

Baseline Impervious Surface Area				
	Area (acres)	Percentage of Total	Difference in Impervious Surface Area (Acres)	Net Change (%)
Impervious Surface Area	250.23	28.52	50.5	0.201788424
Willow Grove Base Boundary	861.73	100.00		

65.1%

## Energy Usage Projections

Energy infrastructure at the NAS JRB Willow Grove property includes the supply of electricity and natural gas. To assess the impacts to these energy supply infrastructures, existing 2010 electricity and natural gas usages were determined, and compared to the projected usage of these energies at full build out for all three alternatives.

Existing natural gas usage was found in the 2010 Air Emissions Inventory Report compiled for compliance with NAS JRB Willow Grove's Title V permit (AECOM 2011). The facility reported the use of 92,211,409 cubic feet (cf) of natural gas in 2010, primarily used in various boilers, furnaces, and hot water heaters (AECOM 2011). Electricity usage at the installation is not included in the site's emission report. Existing building square footage and U.S. averages for energy use per square foot (energy intensity) obtained from the U.S. Department of Energy's Energy Information Agency (EIA) for specific types of building use (EIA 2003) were used to estimate total annual electricity usage in the existing buildings (See Table C-10).

**Table C-10 Existing Building Stock and Estimated Electricity Use (2010)**

Building Category	Building Sq Ft <sup>1</sup>	Number of Buildings <sup>1</sup>	Estimated Annual Electricity (kWh) per sq ft <sup>2</sup>	Estimated Annual Electricity (kWh) use total
Automotive	10,624	3	10.86	115,421
Automotive/Recreation	11,687	1	10.86	126,970
Aviation	365,294	6	10.86	3,968,626
Hospitality	34,060	2	38.09	1,297,328
Housing (barracks)	136,689	4	13.54	1,850,773
Miscellaneous	10,080	3	22.44	226,191
Office	22,828	2	17.28	394,553
Office/Education	200,671	5	11.04	2,215,226
Public Safety	21,084	2	15.60	328,833
Recreation	67,383	6	38.09	2,566,583
Residential (Single Family)	7,214	4	13.54	97,678
Retail	20,240	2	14.36	290,683
Unknown	17,890	4	22.44	401,444
Utilities	24,118	31	10.86	262,023
Warehouse	71,732	6	7.14	512,473
<b>Total - Existing Buildings</b>	<b>1,021,594</b>	<b>81</b>		<b>14,654,806</b>

<sup>1</sup> NAS JRB Willow Grove Base Command, Environmental Conditions Property Report, 2011

<sup>2</sup> Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

The need for electricity and natural gas infrastructure and supply would be associated with the typical operation of the proposed residential and commercial buildings under each of the three redevelopment alternatives. To estimate the electricity and natural gas energy usage that are projected to be needed for the new buildings, U.S. averages for energy use per square foot from the EIA for specific building types were applied (EIA 2003, EIA 2009). These averages were used to estimate total energy use by the proposed new building spaces, based on the type and size of buildings indicated in, or adapted from the

Redevelopment Plan. It was assumed that commercial emission factors would remain the same and that new residential buildings would be 30% more efficient, based on the Redevelopment Plan, which recommends energy efficient housing. The U.S. Department of Energy's Energy Star program suggests that homes can be 30% more efficient if minimum guidelines are followed (Energy Star 2013).

The following tables present the energy intensity factors (Table C-11) for residential and commercial uses, as well as how those factors apply to the three redevelopment alternatives (Tables C-12 to C-14).

**Table C-11 Energy Intensity Factors**

**Energy Intensity by Building Use: Commercial**

Building Use	Existing Averages <sup>1</sup>		
	Electricity intensity (kWh/sq ft)	Natural Gas Energy Intensity (cubic feet/square foot)	Fuel Oil Energy Intensity (gallons/square foot)
Education	11.039	36.9	0.18
Food Sales	48.606	50.2	Q
Food Service	38.089	141.2	Q
Health Care	23.079	92.5	0.04
Inpatient	27.297	109.8	0.04
Outpatient	15.898	50.2	Q
Lodging	13.540	48.9	0.12
Mercantile	0.000	32.5	Q
Enclosed and Strip Malls	0.000	30.9	Q
Retail (Other Than Mall)	14.362	33.4	Q
Office	17.284	31.8	0.03
Public Assembly	12.440	36.4	0.22
Public Order and Safety	15.596	43.7	Q
Religious Worship	4.795	30.3	0.29
Service	10.864	54.1	Q
Warehouse and Storage	7.144	23.4	0.05
Other	22.440	67.6	Q
Vacant	1.558	23.0	Q

<sup>1</sup>Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

[http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed\\_tables\\_2003/detailed\\_tables\\_2003.html#enduse03](http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/detailed_tables_2003.html#enduse03)

**Energy Intensity by Use: Residential**

	Annual Fuels Used (physical units of consumption per household using the fuel)			
	Northeast Households (Millions)	Electricity (kWh)	Natural Gas (thousand cf)	Fuel Oil (gallons)
<b>Existing Homes<sup>1</sup></b>	<b>20.8</b>			
Single-Family Detached	10.9	10,133	97	672
Single-Family Attached	1.8	8,451	74	612
Apartments in 2-4 Unit Buildings	3.1	5,736	74	431
Apartments in 5 or More Unit Buildings	4.4	4,504	41	372
<b>New Homes (30% more efficient than Existing Average)<sup>2</sup></b>				
Single-Family Detached		7,093	68	470
Single-Family Attached		5,916	52	428
Apartments in 2-4 Unit Buildings		4,015	52	302
Apartments in 5 or More Unit Buildings		3,153	29	260

<sup>1</sup>Energy Information Administration, 2009 Residential Energy Consumption Survey, Northeast Region, Table CE2.2

<http://www.eia.gov/consumption/residential/data/2009/index.cfm?view=consumption#fuel-consumption>

<sup>2</sup>US EPA Energy Star Residential Brochure "Your Certified New Home: Better is Better"

[http://www.energystar.gov/ia/partners/downloads/consumer\\_brochure.pdf?18fc-698b](http://www.energystar.gov/ia/partners/downloads/consumer_brochure.pdf?18fc-698b)

**Table C-12 Alternative 1: Building Energy Use**  
**Residential Building Energy Use: Alternative 1**

Type	Units	Annual Fuel Use By Unit <sup>1</sup>			Total Annual Fuel Use		
		Natural			Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil <sup>2</sup> (gallons)
		Electricity (kwh)	Gas (1000 cf)	Fuel Oil (gallons)			
Single Family - Large Lot	90	7,093	68	470	638,379	6,111	
Single Family - Small Lot	250	7,093	68	470	1,773,275	16,975	
Townhomes	350	5,916	52	428	2,070,495	18,130	
Apartments/Condos	300	4,015	52	302	1,204,560	15,540	
Town center: Apartments/Condos	100	4,015	52	302	401,520	5,180	
CCRC Independent	141	4,015	52	302	566,143	7,304	
CCRC Assisting Living/Nursing Home	185				0	0	
Homeless Housing	70	4,015	52	302	281,064	3,626	
<b>Total Housing</b>	<b>1486</b>				<b>6,935,436</b>	<b>72,866</b>	
<b>Total Fuel Use, Housing</b>					<b>6,935,436</b>	<b>72,866</b>	

<sup>1</sup> 30% more efficient than Average household energy use, Energy Information Administration, 2005 Residential Energy Consumption Survey

<sup>2</sup> Natural gas is available, it is assumed that all new residences will be heated with Natural Gas

**Commercial and Industrial Building Energy Use: Alternative 1**

Buildings	Sq ft	Annual Fuel Use per Sq Ft			Total Annual Fuel Use		
		Natural			Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)
		Electricity (kwh)	Gas (cf)	Fuel Oil (gallons)			
<b>Commercial Buildings</b>							
CCRC Med Office/Amenities	25,000	15.90	50.20	0.00	397,456	1,255,000	0
Hotel/Conference	137,000	13.54	48.90	0.12	1,854,984	6,699,300	16,440
Town Center Retail/Service/Restaurants	239,580	38.09	141.20	0.00	9,125,478	33,828,696	0
Town Center Office	65,340	17.28	31.80	0.03	1,129,320	2,077,812	1,960
Movies/Entertainment	54,450	12.44	36.40	0.22	677,342	1,981,980	11,979
Office Park	1,163,052	17.28	31.80	0.03	20,101,898	36,985,054	34,892
Retail	200,200	14.36	33.40	0.00	2,875,237	6,686,680	0
<b>Total Commercial Buildings</b>	<b>1,884,622</b>				<b>36,161,716</b>	<b>89,514,522</b>	<b>65,271</b>
<b>Other Uses</b>							
Regional Recreation Center	100,000	12.44	36.40	0.22	1,243,971	3,640,000	22,000
					0	0	0
School	152,727	11.04	36.90	0.18	1,685,967	5,635,626	27,491
Aviation Museum	200,000	12.44	36.40	0.22	2,487,941	7,280,000	44,000
FAA Tower		15.60	43.70	0.00	0	0	0
Airfield/Airport facilities		22.44	67.60	0.00	0	0	0
<b>Total Other Uses</b>	<b>452,727</b>				<b>5,417,879</b>	<b>16,555,626</b>	<b>93,491</b>
<b>Total Non Residential Building Energy Use</b>					<b>41,579,595</b>	<b>106,070,148</b>	<b>158,762</b>
<b>Total Building Energy Use</b>					<b>48,515,031</b>	<b>178,935,948</b>	<b>158,762</b>

<sup>1</sup> Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

**Table C-13 Alternative 2: Building Energy Use**  
**Residential Building Energy Use: Alternative 2**

Type	Units	Annual Fuel Use By Unit <sup>1</sup>			Total Annual Fuel Use		
		Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)
Single Family - Large Lot	169	7,093	68	470	1,198,734	11,475	
Single Family - Small Lot	227	7,093	68	470	1,610,134	15,413	
Townhomes	396	5,916	52	428	2,342,617	20,513	
Apartments/Condos	645	4,015	52	302	2,589,804	33,411	
Town center: Apartments/Condos	114	4,015	52	302	457,733	5,905	
CCRC Independent	126	4,015	52	302	505,915	6,527	
CCRC Assisting Living/Nursing Home	252				0	0	
Homeless Housing	70	4,015	52	302	281,064	3,626	
<b>Total Housing</b>	<b>1999</b>				<b>8,986,001</b>	<b>96,870</b>	
<b>Total Fuel Use, Housing</b>					<b>8,986,001</b>	<b>96,870</b>	

<sup>1</sup>30% more efficient than Average household energy use, Energy Information Administration, 2005 Residential Energy Consumption Survey

<sup>2</sup> Natural gas is available, it is assumed that all new residences will be heated with Natural Gas

**Commercial and Industrial Building Energy Use: Alternative 2**

Buildings	Sq ft	Annual Fuel Use per Sq Ft			Total Annual Fuel Use		
		Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)
<b>Commercial Buildings</b>							
CCRC Med Office/Amenities	58,500	15.90	50.20	0.00	930,048	2,936,700	0
Hotel/Conference	163,400	13.54	48.90	0.12	2,212,441	7,990,260	19,608
Town Center Retail/Service/Restaurants	236,095	38.09	141.20	0.00	8,992,736	33,336,614	0
Town Center Office	70,829	17.28	31.80	0.03	1,224,191	2,252,362	2,125
Movies/Entertainment	35,230	12.44	36.40	0.22	438,251	1,282,372	7,751
Office Park	1,130,818	17.28	31.80	0.03	19,544,774	35,960,012	33,925
Retail	139,100	14.36	33.40	0.00	1,997,730	4,645,940	0
<b>Total Commercial Buildings</b>	<b>1,833,972</b>				<b>35,340,170</b>	<b>88,404,261</b>	<b>63,408</b>
<b>Other Uses</b>							
Regional Recreation Center	96,522	12.44	36.40	0.22	1,200,705	3,513,401	21,235
					0	0	0
School	152,727	11.04	36.90	0.18	1,685,967	5,635,626	27,491
Aviation Museum	55,000	12.44	36.40	0.22	684,184	2,002,000	12,100
FAA Tower		15.60	43.70	0.00	0	0	0
Airfield/Airport facilities		22.44	67.60	0.00	0	0	0
<b>Total Other Uses</b>	<b>304,249</b>				<b>3,570,857</b>	<b>11,151,027</b>	<b>60,826</b>
<b>Total Non Residential Building Energy Use</b>					<b>38,911,026</b>	<b>99,555,288</b>	<b>124,234</b>
<b>Total Building Energy Use</b>					<b>47,897,027</b>	<b>196,425,488</b>	<b>124,234</b>

<sup>1</sup>Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

**Table C-14 Alternative 3: Building Energy Use**  
**Residential Building Energy Use: Alternative 3**

Type	Units	Annual Fuel Use By Unit <sup>1</sup>			Total Annual Fuel Use		
		Electricity (kwh)	Gas (1000 cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)
Single Family - Large Lot	-	7,093	68	470	0	0	0
Single Family - Small Lot	-	7,093	68	470	0	0	0
Townhomes	-	5,916	52	428	0	0	0
Apartments/Condos	-	4,015	52	302	0	0	0
Town center: Apartments/Condos	-	4,015	52	302	0	0	0
CCRC Independent	-	4,015	52	302	0	0	0
CCRC Assisting Living/Nursing Home	-				0	0	0
Homeless Housing	70	4,015	52	302	281,064	3,626	0
<b>Total Housing</b>	<b>70</b>				<b>281,064</b>	<b>3,626</b>	<b>0</b>
<b>Total Fuel Use, Housing</b>					<b>281,064</b>	<b>3,626</b>	<b>0</b>

<sup>1</sup>30% more efficient than Average household energy use, Energy Information Administration, 2005 Residential Energy Consumption Survey

<sup>2</sup> Natural gas is available, it is assumed that all new residences will be heated with Natural Gas

**Commercial and Industrial Building Energy Use: Alternative 3**

Buildings	Sq ft	Annual Fuel Use per Sq Ft			Total Annual Fuel Use		
		Electricity (kwh)	Gas (cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)
<b>Commercial Buildings</b>							
CCRC Med Office/Amenities	-	15.90	50.20	0.00	0	0	0
Hotel/Conference	120,882	13.54	48.90	0.12	1,636,746	5,911,130	14,506
Town Center Retail/Service/Restaurants	-	38.09	141.20	0.00	0	0	0
Town Center Office	-	17.28	31.80	0.03	0	0	0
Movies/Entertainment	-	12.44	36.40	0.22	0	0	0
Office Park	666,718	17.28	31.80	0.03	11,523,386	21,201,632	20,002
Retail	427,093	14.36	33.40	0.00	6,133,835	14,264,906	0
<b>Total Commercial Buildings</b>	<b>1,214,693</b>				<b>19,293,967</b>	<b>41,377,668</b>	<b>34,507</b>
<b>Other Uses</b>							
Regional Recreation Center	100,000	12.44	36.40	0.22	1,243,971	3,640,000	22,000
					0	0	0
School	-	11.04	36.90	0.18	0	0	0
Aviation Museum	200,000	12.44	36.40	0.22	2,487,941	7,280,000	44,000
FAA Tower	-	15.60	43.70	0.00	0	0	0
Airfield/Airport facilities	-	22.44	67.60	0.00	0	0	0
<b>Total Other Uses</b>	<b>300,000</b>				<b>3,731,912</b>	<b>10,920,000</b>	<b>66,000</b>
<b>Total Non Residential Building Energy Use</b>					<b>23,025,879</b>	<b>52,297,668</b>	<b>100,507</b>
<b>Total Building Energy Use</b>					<b>23,306,943</b>	<b>55,923,668</b>	<b>100,507</b>

<sup>1</sup>Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

### C-3 References

Bureau of Labor Statistics. 2013a. Consumer Price Index - All Urban Consumers. Available online. Accessed at: <http://data.bls.gov/cgi-bin/surveymost> Accessed on: Friday, June 21, 2013

Bureau of Labor Statistics. 2013b. Quarterly Census of Employment and Wages. Available online. Accessed at: <http://data.bls.gov/cgi-bin/dsrv>. Accessed on: Friday, June 21, 2013

ENR. 2013. Construction Cost Index. Available online at: [http://enr.construction.com/economics/historical\\_indices/construction\\_cost\\_index\\_history.asp](http://enr.construction.com/economics/historical_indices/construction_cost_index_history.asp). Available online. Accessed on: Thursday, 13<sup>th</sup> June, 2013. (Subscription required).

Evans, Daniel. 2013. Common Level Ratios for Pennsylvania Realty Transfer Tax. Available online. Accessed at: <http://evans-legal.com/dan/comlevel.html> Accessed on: Friday, 21 June, 2013

Horsham Township. 2013a. Township Real Estate Tax Bill Information. Available online. Accessed at: <http://www.horsham.org/departments/finance/tax-information.aspx> Accessed on: Friday, June 21, 2013

Horsham Township. 2013b. Earned Income Tax Information. Available online. Accessed at: <http://www.horsham.org/departments/finance/eit.aspx> Accessed on: Friday, June 21, 2013

Horsham Township. 2013c. General Fund Budget Revenues 2012. Available online. Accessed at: <http://www.horsham.org/departments/finance/budget/general-fund-budget-revenues.aspx> Accessed on: Thursday, June 20, 2013

US Census Bureau. 2011a. DP04: SELECTED HOUSING CHARACTERISTICS 2007-2011 American Community Survey 5-Year Estimates. Available online. Accessed at: <http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?ftp=table> Accessed on: Thursday, July 11, 2013

US Census Bureau. 2011b. DP03: SELECTED ECONOMIC CHARACTERISTICS 2007-2011 American Community Survey 5-Year Estimates. Available online. Accessed at: [http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_11\\_5YR\\_DP03](http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_DP03) Accessed on: Friday, June 21, 2013

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