

# Buckingham County and the Atlantic Coast Pipeline: Summary of Economic Effects

Key-Log Economics for  
Friends of Buckingham and  
Yogaville Environmental  
Solutions

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*“Buckingham is a beautiful place and  
it is our home. Family and friends  
come from far and near to visit.”*

–Friends of Buckingham

## Buckingham County’s Economy: What’s at Risk

Buckingham County, a destination for tranquility, has a robust and growing economy thanks in part to its clean and healthy environment and high quality of life. The Atlantic Coast Pipeline, which would run 27.1 miles in Buckingham and include a compressor station in the Union Hill section, has triggered widespread concern over what the pipeline would do to the local community, land, and economy. This report describes the assets and trends that may be at risk if the Atlantic Coast Pipeline were built and summarizes research on the potential economic impacts on land value, natural benefits, and key economic sectors in Buckingham County.

Left to Right:  
Union Hill Baptist  
Church;  
Mt. Rush Farm;  
Historic Buckingham  
County Courthouse



## **At a Glance:**

### **The Atlantic Coast Pipeline in Buckingham County**

- Miles of Pipeline: 27.1
- Acres in the construction corridor and permanent right-of-way (ROW): 410 and 246
- Most impacted land cover type (ROW only): Forest (178 acres lost)
- Parcels touched by ROW: 116
- Parcels in the 1.4-mile-wide evacuation zone: 776
- Residents and housing units in the evacuation zone: 1,548 people and 815 homes
- Parcels from which the pipeline would be visible: 7,637, or 54% of all parcels in Buckingham County
- Baseline property value at risk (and expected one-time cost due to the ACP):
  - In the ROW: \$23.7 million (\$1.0 to \$3.1 million)
  - In the evacuation zone: \$75.9 million (\$2.9 million)
  - Near the compressor station: \$4.9 million (\$1.2 million)
  - In the viewshed: \$1.17 billion (to avoid double counting with lost aesthetic value under ecosystem services, this effect is not separately estimated)
- Total property value effect lost: Between \$5.1 and \$7.2 million
- Resulting loss in property tax revenue (annual): \$28,500 to \$40,200
- Lost ecosystem service value, such as for water and air purification, recreational benefits, and others:
  - Over the two-year construction period: between \$3.7 and \$13.6 million (a one-time cost)
  - Annually for the life of the ACP: between \$1.1 and \$4.0 million
- Lost economic development opportunities due to the erosion of Buckingham County's comparative advantages as an attractive place to visit, reside, and do business. Under the scenarios described below, these could include:
  - Annual loss of recreation tourism expenditures of \$1.2 million that would support 12 jobs, \$240,000 in payroll, and generate \$54,000 in state and \$33,000 in local taxes
  - Annual loss of personal income of \$544,000 due to slower growth in the number of retirees
  - An annual loss of \$202,000 in personal income due to slower growth in sole proprietorships
- One-time costs (property value and ecosystem services during construction) would total between \$8.8 and \$20.8 million
- Annual costs (all other costs above) would range from \$3.0 to \$5.9 million

Note: For a number of reasons, these estimates are conservative and the actual economic cost of the ACP, if built, would likely be much higher. For further explanation of the concepts, methods, data, and assumptions behind these numbers, please see the technical report, "Economic Costs of the Atlantic Coast Pipeline to Property Value, Ecosystem Services, and Economic Development in Western and Central Virginia," available for download at [keylogeconomics.com](http://keylogeconomics.com).

Located in the geographic center of Virginia, Buckingham is a historic and growing county with much to offer. Many natural areas such as James River State Park, Buckingham-Appomattox State Forest, and Horsepen Lake Management Area offer an array of recreational opportunities in thousands of acres of forests (Buckingham County 2014). These features benefit from Buckingham’s beautiful, clean environment. They are also an important part of the county’s economic success, including faster population, employment, and income growth than the average for Virginia’s rural counties.

Buckingham exhibits what some researchers have termed “the rural growth trifecta”—a combination of outdoor amenities, creative workers, and entrepreneurship (McGranahan, Wojan, and Lambert 2010). Together, these factors attract people who create economic opportunity that fits with the landscape and culture of the area.

**Recent Trends.** Although Buckingham is one of the lesser populated counties in Virginia,

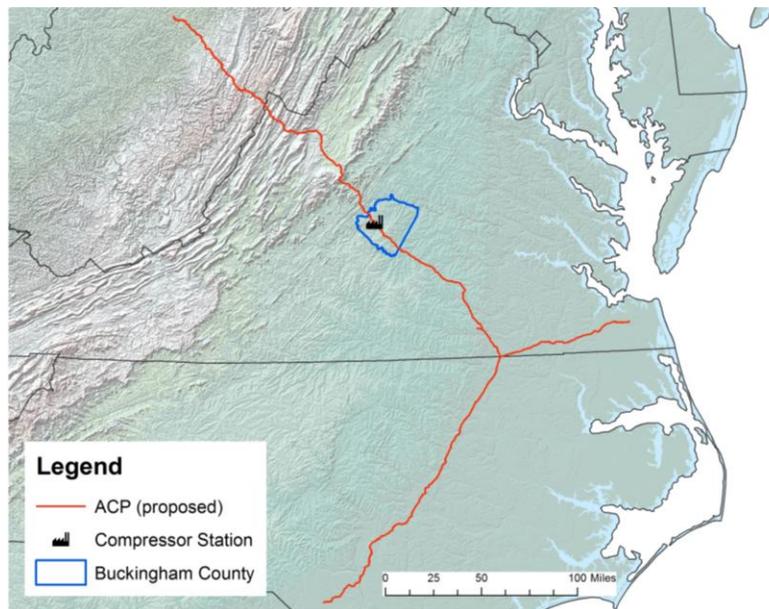


Figure 1: The route of the proposed Atlantic Coast Pipeline, which would bisect Buckingham County

standing at 16,913 residents in 2014, its population grew by 8.2% since 2000.<sup>1</sup> This population change is driven almost entirely by in-migration, including people of retirement age. Between 2000 and 2014, Buckingham experienced an average annual net in-migration of 39 people, which reflects the county’s attractiveness. Through 2013, the population over the age of 65—often retirees who can choose where to live—grew from 13.6% to 14.8%.<sup>2</sup> Retirees bring their incomes and when they spend it they create opportunities for economic development, including in the higher-end services (health care, financial services, etc.).

Besides labor income (one’s earnings from a wage-and-salary job and/or self-employment), Buckingham residents also receive “non-labor income” in the form of earnings on investments (dividends, interest, and rent) and transfer payments, such as Social Security and Medicare. As a share of the total, non-labor income now accounts for 43 out of every 100 dollars earned or received by Buckingham residents. Since 2000, non-labor income has grown by 46.6%.

<sup>1</sup> Unless otherwise noted, all employment, income, and population figures are Headwaters Economics’ Economic Profile System (2015), which draws data from the US Bureau of Economic Analysis (2015) and US Bureau of the Census (2015a).

<sup>2</sup> Age distribution data is the most recent available from the US Census Bureau.

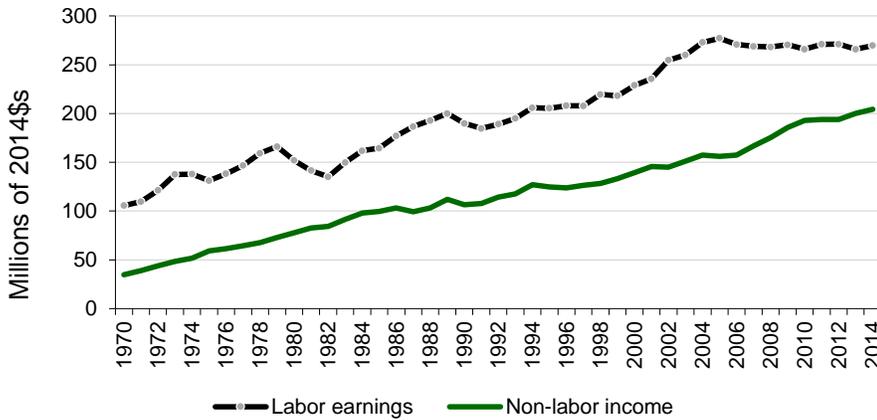


Figure 2: Components of Personal Income, Buckingham County (Source: Headwaters Economics 2015, US Bureau of Economic Analysis 2015)

This does not mean labor earnings are unimportant. Wages, salaries, benefits, and self-employment income still make up 56.9% of personal income in the county, and labor income has increased by 17.8% since 2000.

Like retirees, entrepreneurs and small business owners in a variety of industries choose where they locate, basing their decisions on amenities and quality of life, rather than on access to input or output markets or other traditional business concerns

(Rasker and Glick 1994). One indicator of this phenomenon in the county is the growth in the number of sole proprietorships. By 2014, the county’s 2,832 sole proprietors accounted for nearly half of Buckingham jobs, and their ranks had grown by 21% since 2000. Statistics such as these illustrate the extent to which the creative activity of the county’s new and long-time residents drives economic development.

Travel and tourism are also important and growing parts of

## Forgone Economic Development: Yogaville

Satchidananda Ashram is a spiritual community as well as an important economic engine in western Buckingham County. With a 750-acre campus overlooking the James River, the training and retreat center hosts thousands of visitors each year. In 2014, some 5,642 visitors stayed for an average of a week or more and spent a total of \$1.86 million on lodging, programs, and products. These revenues support local and regional economic activity through more than 50 full and part-time jobs, contracts with local companies, food purchased from local farms and wholesalers, as well as hundreds of trips to regional airports and bus and train stations.

Yogaville officials are concerned the pipeline corridor, which will be visible from several key locations on the campus, will diminish the quality of the experience and, consequently, reduce both the economic benefits to its visitors and its economic contributions in Buckingham County. Through its own survey conducted in the summer of 2015, Yogaville found that 95% of guests would visit less often if the pipeline were to be built. Such a drop-off in visits would affect employment, spending, and other facets of Yogaville’s current economic impact.



Light of Truth Universal Shrine on the Yogaville campus, just down river from where the ACP would cross the James River (Photo: Yogaville Environmental Solutions)

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Buckingham’s economy. Jobs in the industry—composed primarily of passenger transportation, arts, entertainment, recreation services, accommodation, food services, and portions of the retail sector—make up 10.5% of total private employment in the county.

Between 2010 and 2014, Buckingham saw a \$720,000 dollar increase in traveler expenditures, a 4.4% increase in traveler generated employment, and a \$72,000 dollar increase in travel related payroll (Virginia Tourism Corporation 2015).<sup>3</sup>

In addition to tourism, timber and agriculture are important natural resource-using industries in the county. Timber accounts for a much larger share of private employment in Buckingham than the average for non-metro Virginia, 7.6% vs 3.9%.<sup>4</sup> Similarly, agriculture accounts for 6.6% of all employment in the county.<sup>5</sup> The average for non-metro Virginia, by contrast, is 4.2%. Both timber and agriculture rely on and contribute to the county’s healthy

natural landscapes.

A relatively low unemployment rate, rapid personal income growth, and a high per-capita personal income (PCPI) further indicate Buckingham’s overall economic health. The unemployment rate was 6.6% in 2014 compared to 6.9% for all of non-metro Virginia. Personal income increased by 19% between 2000 and 2014, nearly one and a half times as fast as the 13.1% increase for all of non-metro Virginia. The county’s PCPI was \$28,038 in 2014, or 83% of the average of \$33,923 for non-metro Virginia. Thus, while below the average by this measure, Buckingham’s faster rate of increase means it is closing the gap.

In the context of the proposed Atlantic Coast Pipeline, it is worth emphasizing that Buckingham County’s healthy economic performance has occurred without energy infrastructure of the ACP’s type or scale. While the pipeline promises some benefits (Atlantic Coast Pipeline, LLC, n.d.) and Governor McAuliffe has called such infrastructure “a game changer,”<sup>6</sup> local, state, and federal officials must consider *how* the ACP would change Buckingham’s current conditions and whether such change would really be for the better. Our research, summarized in this report, shows some of the ways in which the ACP could make things much worse.

## Impacts of the ACP

### Property Values

The proposed ACP would affect property values in three ways: from loss of use and enjoyment of the property, from safety risks, and from diminished views from one’s property. With some overlap, these effects would be most prominent in three zones: in the right-of-way (ROW), in the evacuation zone (including a narrower “high consequence area”), and within sight, or in the viewshed, of the pipeline.

Loss of use and enjoyment of properties would be felt most acutely by

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<sup>3</sup> All dollar values have been adjusted for inflation.

<sup>4</sup> Timber is comprised of forestry/logging, lumber and wood products manufacturing, and paper and allied products manufacturing. The “private employment” base for this percentage does not include government, agricultural, or self-employment. Those categories are not included in the primary data source that also provides details on timber employment (Headwaters Economics 2015; US Census Bureau 2015b).

<sup>5</sup> For agriculture, a different data source that includes all employment is used (Headwaters Economics 2015; US Bureau of Economic Analysis 2015).

<sup>6</sup> Quoted in Stewart (2015).

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*"It's going to bisect all three parcels of land, literally cutting off the back section.... The pipeline is sited to come just on this side of the creek and we were going to build just on the other side of the creek. So, it totally changes our whole future, our whole plans, everything we were going to do."*

*- Beverly McQuary,  
Owner of Creasy Hill Farm*

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owners of parcels the proposed 75-foot-wide ROW crosses or touches. Forestland in the ROW will be stripped and converted to shrub or grassland, eliminating the prospect of future timber income (Williams 2015). Construction will harm crop and forage productivity due to soil compaction, soil temperature changes, and alteration of drainage patterns (Fitzgerald 2015). Cropland in the ROW also cannot be managed in the same way due to restrictions on the landowner's ability to cross the pipeline with heavier farm equipment (Monroe and Monroe 2015; Leech 2015). For the same reason, farm and forestland adjacent to the ROW would become less valuable if it becomes more expensive to reach woodlots or fields on the far side of the ROW.

For some properties, like Michael Huntley's, a Marine veteran with post-traumatic stress disorder, the pipeline would be a "devastating"

invasion of privacy. For him, the construction, operation, and presence of the pipeline would eliminate up to 100% of the value of his property (Huntley 2015).

Current and future residential housing is another productive use of land potentially suffering an economic loss from the ACP. People now living on parcels in the ROW will feel less safe, may be at risk of losing wells during or after construction, and will be deprived of the peace, quiet, and scenic views paid for when properties were purchased. There would also be a loss for potential subdivision and development depending on how and where the pipeline crosses unimproved properties.

These economic losses translate into financial losses when current owners attempt to sell their properties and find, as landowners and realtors in the ACP's proposed path already have, buyers are far less interested in their properties (Smith 2015a).

Based on the current value of

## **Diminished Property Value, Lost Revenue, Higher Costs: Mt. Rush Farm**

Mt. Rush Farm located in Buckingham County is a 1,000-acre family farm that has been operated by the Ellis family for over 100 years. About half the farm is in managed forests, with the remainder in Angus cattle and crop production. It is one of the largest remaining active farms in the country. The farm typically employs 3 full-time workers, and 4 families live on the property.

The pipeline will bisect the property, mainly through the un-wooded portion, which is in daily use. The pipeline will be directly in the way of bringing the cattle in from pasture, a monthly activity. To simply feed their cattle they would need to cross the pipeline twice daily. With restrictions on where they could cross the pipeline, these trips would be more time consuming and costly, creating a serious burden on the farm.

"We do not make a lot of money; margins are tight. The pipeline could make it so that we cannot continue farming." If farming is no longer viable, the family worries that the pipeline will also hurt its value for other uses such as housing.

-Irene Ellis Leech,  
Owner of Mt. Rush Farm

Buckingham County properties, as well as surveys of buyers, realtors, and appraisers (Kielisch 2015),<sup>7</sup> the total loss of property value for the 116 parcels touched by the proposed pipeline ROW in Buckingham ranges from \$1.0 to \$3.1 million.

Properties outside the ROW, but still near the pipeline, would also suffer a loss in value. First there is a “high consequence area,” within which one’s survival of an explosion would be unlikely. The high consequence area would be 0.4 miles wide (1,092 feet on either side) for a pipeline of this size. There is also a 1.4-mile-wide evacuation zone (3,583 feet on either side), defined as the area an unprotected human would need to move beyond in order to avoid burn injury in the event of an explosion or a fire following a leak. Living with the 24/7/365 possibility of having to evacuate one’s home or business at a moment’s notice, if notice is even possible, diminishes the value of the property to its owner.

As with the effects within the ROW, the loss of value to owners within the high consequence area and

the larger evacuation zone translates into lower prices if and when current owners choose to sell. The effect in the high consequence area arguably would be greater than in the evacuation zone, but due to lack of studies estimating such a difference, we are conservatively assuming that the effects within the entire evacuation zone, including within the high consequence area, are the same.

The evacuation zone through Buckingham would touch 776 parcels, not counting those already affected by the ROW. Based on the current value of these properties and research on the decrease in property value due to a risk of evacuation (Boxall, Chan, and McMillan 2005), the ACP would induce an additional loss of \$2.9 million in property value.



**James River Overlook from which approximately 5 miles of the proposed ACP would be visible. (Photo: Satchidananda Ashram)**

Depending on topography, the pipeline will also be visible for many miles in all directions. In Buckingham, 7,637 parcels will have their viewshed affected by the pipeline. Homebuyers, realtors, and commercial property owners know the importance of the proverbial “million-dollar view”. While the pipeline might not erase quite that much value from a given property, it is likely a property with a view that suddenly includes a pipeline right-of-way where there was once an unbroken view of woodlands or farm fields will experience a real loss in value. This lost value would be reflected in the loss of

<sup>7</sup> Some of our estimates based on the survey of prospective home buyers reported in Kielisch (2015) are conservative. Some 62.2% of the survey respondents said they would not purchase a property with a pipeline (smaller than the ACP would be) at any price. The remaining survey respondents were split between those who would offer 21% less and those who would offer the same amount. In our estimates we use the average price reduction for just those buyers who stay in the market – that is, an average reduction in offer price of 10.5%. If one considers that 62% of buyers are effectively reducing their offer prices by 100%, the average reduction in offer price would be 66.2%.

aesthetic value included with other effects on ecosystem services described in the next section.

In addition to the 27 miles of pipeline, the county is also the proposed site of a 40,645 horsepower compressor station (one of three compressor stations along the ACP). Due to noise and air pollution, compressor stations elsewhere have been associated with poor health outcomes (See Box: Additional Effects of the Proposed Compressor Station) as well as with significantly diminished property values. The town of Hancock, New York, recently reduced the assessed value of two homes within one half mile of a 15,000 horsepower compressor station by 25% and of another property by 50% (“Proximity of Compressor Station Devalues Homes by as Much as 50%” 2015). Taking the smaller of these reductions as a guide and applying it only to those 87 parcels whose center is within half a mile of the proposed compressor station property, we estimate a reduction in property value of \$1.2 million.<sup>8</sup>

Leaving aside the value lost in the

viewshed and counting only the impacts in the right-of-way, in the evacuation zone, and of the compressor station, the ACP could cause between \$5.1 and \$7.2 million in lost property value in Buckingham.<sup>9</sup> Applying the median property tax rate for the county, this one-time loss in property value translates into an annual loss of property tax revenue between \$28,500 and \$40,200.

These estimates of lost property value and tax revenue are conservative

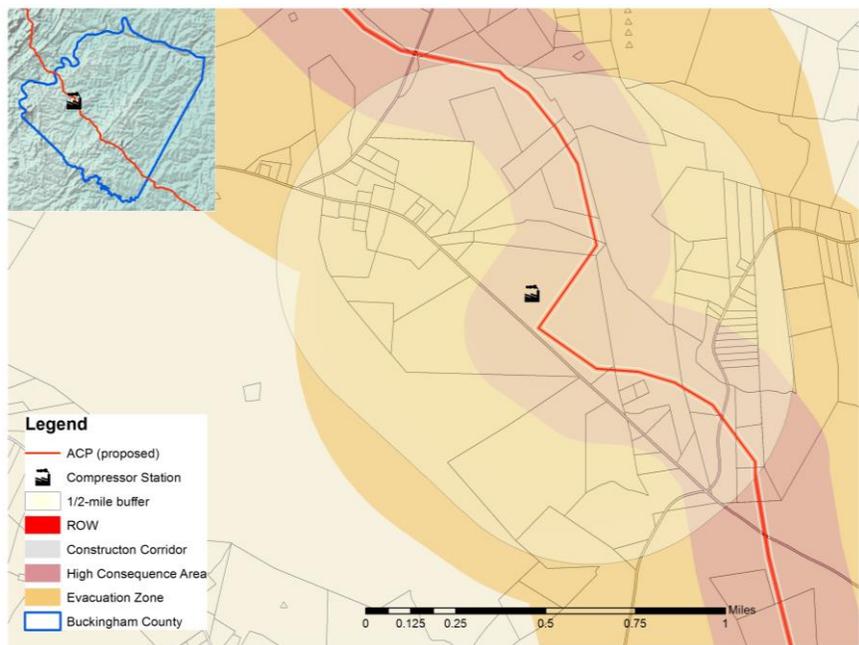


Figure 3: Proposed compressor station in Buckingham County’s Union Hill section, with ½-mile buffer around the compressor station parcel.

for five reasons. First and as explained in footnote seven,<sup>7</sup> estimated impacts on sale prices for properties in the ROW do not take into account the fact that more than 3 out of 5 prospective buyers would not buy such properties at any price. Second, our estimates treat properties in the (higher risk) high consequence areas as if they are affected only to the same degree that properties in the evacuation zone would be affected. Third, they do not take into account the disproportionate effect the ACP would have on the assessed value of developable, but currently unimproved, parcels for which the ACP could impede subdivision. Buckingham has 70 unimproved parcels in the right-of-way whose assessed value includes the value of a house site. Depending on

<sup>8</sup> The parcel on which the compressor station would sit is not included in the land value analysis because Dominion Transmission Inc. has already purchased it. The presence of the compressor station on that property would not further affect its own value.

<sup>9</sup> For properties affected by the compressor station, we do not count the effects on some of them of being in the ROW or on others of being in the evacuation zone. Only one price effect, in other words, is applied to any one property.

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where and how the ROW crosses these properties, it is likely that some will lose their potential for future development and the assessed value and associated property tax revenue will fall. Fourth, we have not quantified the effect of additional surface infrastructure, such as access roads, that would take up land outside the right-of-way. Fifth and finally, the estimated impacts on tax revenue do not reflect lost value for properties with pipeline-damaged views. If the ACP is permitted, a property-by-property reappraisal of all parcels affected in any of these ways and in all areas—along the ROW, in the evacuation zone, and throughout the viewshed—should be undertaken to determine the full impact on landowners and local tax revenues.

### Ecosystem Services

The construction and presence of the ACP will alter the flow of natural benefits people receive from well-functioning, healthy ecosystems. Known as “ecosystem services” and defined as benefits people obtain from ecosystems, these natural benefits include services such as clean

water for drinking and for industrial processes, food grown on cropland, raw materials in the form of timber, and the aesthetic value of beautiful views from residential and commercial properties as well as from areas used for recreation.

Ecosystems also protect people and property from extreme events like floods and wildfire, regulate local and global climate, clean the air, support food production through natural pest control and pollination, provide wildlife to hunt, fish to catch, and spaces for other forms of recreation.

Because these ecosystem benefits are benefits to people, they convey economic value. To the extent the ACP would reduce the flow of these benefits, the reduction must be counted among the ACP’s economic costs. Beyond this economic rationale, there is a growing legal and regulatory imperative to consider ecosystem services effects, particularly where federal land and federal actions are involved (USDA Forest Service 2012; Donovan, Goldfuss, and Holdren 2015).

To estimate these costs, we use the well-established “benefit transfer method” in which different land uses are associated with different rates of delivery of various ecosystem services. For example, each acre of forest produces a certain number of dollars’ worth of aesthetic value, recreational opportunity, water and water flow regulation, among others each year. Similarly, cropland produces food and other natural benefits at its particular rate. Urban open space makes its own contribution to aesthetics and other values. These rates of delivery are transferred to the study region from previous research on areas that are reasonably similar to the study region.

Acreage converted from a more productive to a less productive land use results in lower ecosystem service values. During construction, the ACP would convert all acreage in the 125-foot-wide construction zone to barren land, which has no ecosystem service value. After construction, we assume acreage in the construction zone but outside the 75-foot-wide ROW would return to its previous land use/land cover. Within the ROW, we assume previous forestland would return to shrub/scrub and that cropland would return as pasture/forage.<sup>10</sup> All other acreage, including those beginning as shrub/scrub

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<sup>10</sup> We recognize that some land in the ROW could technically be used for crop production again after construction. However, restrictions on the weight of machinery that can cross the pipeline itself may make such production uneconomic. Moreover, the

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or pasture/forage, is assumed to return to its pre-pipeline use or cover type.

The other driver of change in ecosystem service value is the difference in per-acre productivity for land that returns to its previous use after construction. For example, post-construction differences in soil structure, compaction, and other factors may render pasture/forage less valuable for food production, water purification, and producing other benefits once a pipeline runs through it. As Fitzgerald (2015) concludes, "It is my professional opinion that the productivity for row crops and alfalfa will never be regenerated to its existing present 'healthy' and productive condition [after installation of the pipeline]." Similarly, urban open space might become less suitable as a place for children to play or people to relax once it becomes open space occupied by a high-pressure gas transmission line. While we are aware of one proposed study focused on

agricultural productivity,<sup>11</sup> there are not yet data indicating how severe the changes would be. Our estimates assume, therefore, that acreage in the ROW is as productive after construction as any other acreage in the same land use/land cover.

In Buckingham, ecosystem service value lost in the temporary conversion from forest, cropland, urban open space, and other areas to a 125-foot-wide construction zone ranges from \$1.9 to \$6.8 million in each of the two years of construction.<sup>12</sup> Ecosystem service value lost in the ROW each and every year thereafter is estimated to be between \$1.1 and \$4.0 million. Lost aesthetic value represents the largest share of this total. Disruptions to water supply and water flows, the related category of protection from extreme events, and recreation make up much of the remainder.

We regard these as conservative estimates because we only count the loss of value that would otherwise emanate from the ROW and construction corridors themselves. Additional losses would occur due to the conversion of forest and other areas to barren or urban land (both of which have relatively low ecosystem service productivity) that would serve as access roads and other pipeline-related infrastructure.

In addition, the ROW would serve as a pathway by which invasive species or wildfire could more quickly penetrate areas of interior forest habitat, thereby reducing the natural productivity of an even larger area. During construction, the construction corridor itself could be a source of air and water pollution that may over-burden the ability of surrounding areas to absorb sediment, particulates, and other pollutants. If that is the case, the ecosystem service value of the construction corridor during construction would not be zero, it would be negative.

Finally, these estimates reflect only changes in natural benefits that occur due to changes on the surface of the land. Particularly because the proposed

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presence of the pipeline and restrictions on activities that can occur within the ROW can have spillover effects on the crop fields through which the ROW passes. As Augusta County farmer Harry Crosby has testified, the ROW would take an entire field of 30-40 acres out of crop production (Crosby 2015a; Crosby 2015b). Our assumption that ONLY the acreage in the ROW itself would be lost to crop production is therefore a conservative one.

<sup>11</sup> Once funded, this Ohio State study would use field-level data to examine the anecdotal evidence gathered over the course of decades that fields with pipelines have lower crop and forage yields than those without (Culman 2015).

<sup>12</sup> While construction at any given point along the pipeline would not take two years, we assume that it would be two years before the construction zone is fully revegetated and functioning as the land use or ecosystem type in which it will stay during operation of the pipeline.

pipeline would traverse areas of karst topography, there is concern subsurface hydrology could be affected during construction and throughout the lifetime of the pipeline (Pyles 2015). Blasting and other activities during construction could alter existing underground waterways and disrupt water supply. There is also a risk sediment and other contaminants could reach groundwater supplies if sinkholes form near the pipeline during construction or afterwards. These scenarios would entail further loss of ecosystem service value and, for the homeowners or municipalities affected, major expenditures. Officials in nearby Augusta County estimate it would cost at least \$2.1 million to establish a new municipal well, for example (Hoover 2015).

While not directly quantified in this study, the economic costs of the compressor station proposed for the Union Hill section of the county would impose additional ecosystem service costs through noise and air pollution from the station that would tax the natural capacity of the surrounding landscape to absorb, filter, or process those biophysical effects (See Box: “Additional Effects of the Proposed Compressor Station”).

## **Additional Effects of the Proposed Compressor Station**

The negative effects of the compressor station include noise and air pollution from everyday operations, plus periodic “blowdowns,” or venting of gas in the system to reduce pressure. As a recent study by the New York Department of Environmental Conservation indicates, pollution around compressor stations is common and severe. The five-state study found that “more than 40% of the air samples from compressor stations exceeded federal regulations for certain chemicals like methane, benzene, and hydrogen sulfide” (Lucas 2015). The study also found high rates of illnesses such as nosebleeds and respiratory difficulties among people living near the stations.

While more definitive epidemiological studies are needed to determine the extent to which natural gas compressor stations add to background rates of various illnesses, these stations are implicated as contributing to a long list of maladies. According to Subra (2015), individuals living within 2 miles of compressor stations and metering stations experience respiratory impacts (71% of residents), sinus problems (58%), throat irritation (55%), eye irritation (52%), nasal irritation (48%), breathing difficulties (42%), vision impairment (42%), sleep disturbances (39%) and severe headaches (39%). In addition compressors emit constant low-frequency noise, which can cause negative physical and mental health effects (Lockett, Buppert, and Margolis 2015).

In Buckingham, 471 people live within 2 miles of the proposed compressor station (US Census Bureau, 2015b). Translating the Subra study’s implications to Buckingham, 334 people would experience respiratory impacts, 273 sinus problems, and 184 additional people would experience sleep disturbances and/or severe headaches. The full cost of the ACP would include the direct cost of treating these cases, the cost of missed work due to those illnesses, and the cost of premature death due to illnesses caused or exacerbated by air emissions from the compressor station.

Yogaville, an ashram, teaching, and retreat center located approximately five miles from the proposed compressor station, is especially concerned about these impacts on its thousands of annual visitors and on the peace, tranquility, and air quality available at its center. Officials there worry that the air and noise pollution may entirely destroy Yogaville’s ability to serve as a place of silent prayer, meditation, and healing (Yogaville 2015).

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## Economic Development

### Opportunity

Buckingham County is “a model of planned residential and business development that ensures sufficient managed economic growth to enhance the quality of life of its residents”; it also attracts “desired socially responsible new businesses” (Buckingham County 2014).

The ACP would undermine progress toward these goals if the loss of scenic and recreational amenities, the perception and reality of physical danger, and environmental and property damage were to discourage people from visiting, relocating to, or staying in the county. Workers, businesses, and retirees who might otherwise choose to locate along the ACP’s proposed route will instead pick locations retaining their rural character, productive and healthy landscapes, and the promise for a higher quality of life.

This is already occurring in the region. With the possibility of the ACP looming, business plans have stalled and the real estate market has slowed (Smith 2015b; Smith 2015a).

Buckingham residents are also concerned the ACP could have broad, negative impacts on the economy. Of the commenters in Buckingham who

mentioned the economy in written comments to the Federal Energy Regulatory Commission during the scoping phase of its environmental review, 98% (all but one commenter) expressed a belief that the ACP would have a negative effect. All of those who mentioned agriculture thought the effect would be negative and 111 out of 113 residents who mentioned tourism said the effect would be negative.

These fears are consistent with research results from this region and around the country demonstrating that quality of life is often of primary importance when people choose places to visit, live, or do business. As Niemi and Whitelaw (1999, 54) state, “as in the rest of the Nation, natural-resource amenities exert an influence on the location, structure, and rate of economic growth in the southern Appalachians. This influence occurs through the so-called people-first-then-jobs mechanism, in which households move to (or stay in) an area because they want to live there, thereby triggering the development of businesses seeking to take advantage of the households’ labor supply and consumptive demand”. They note that decisions affecting the supply of amenities “have ripple effects throughout local and regional economies”.

Along similar lines, Johnson and Rasker (1995) found that quality of life is important to business owners deciding where to locate a new facility or enterprise and whether to stay in a location already chosen. This is not surprising. Business owners value safety, scenery, recreational opportunities, and quality of life factors as much as residents, vacationers, and retirees.

It is difficult to predict just how large an effect the ACP would have on decisions about visiting, locating, or staying in the county. Even so, based on information provided by business owners to FERC and as part of this research, we can consider reasonable scenarios for how the ACP might affect key portions of Buckingham’s overall economy.

Buckingham residents believe the ACP will harm the travel and tourism industry. Nearby Wintergreen Resort expects a 40% drop in business relative to a planned expansion (Theiss 2015). Similarly, the Fenton Inn projects it “will be losing at least 10% of projected income for [the life of the pipeline]” and that insurance and other costs will further impact its bottom line (Fenton and Fenton 2015). In one widely reported case, a planned resort in Nelson County

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will never be built if the ACP is constructed—effectively a 100% loss for a business that would supply 50 full-time and 50 part time jobs (Averitt 2015). Finally, as noted in the “Additional Effects of the Proposed Compressor Station” box, Buckingham’s own Satchidananda Ashram Yogaville has found that 95% of surveyed guests would visit less often if the pipeline were constructed.

While more systematic research could provide refined estimates of the impact of natural gas transmission pipelines on recreation and tourism spending, one plausible scenario is that the impact is at least as high as the minimum of these business owners’ reported expectations. If the ACP were to cause a 10% drop in recreation and tourism spending from the 2014 baseline, the ACP could mean \$1.2 million less in travel expenditures each year in Buckingham. Those missing revenues would otherwise support roughly \$240,000 in payroll, \$32,600 in local tax revenue, \$53,900 in state tax revenue, and 12 jobs in the county’s recreation and tourism industry each

year.<sup>13</sup> In the short run, these changes multiply through the broader economy as recreation and tourism businesses buy less from local suppliers and fewer employees spend their paychecks in the local economy.

Along similar lines, another important economic engine affected by the ACP is retirement income. In county-level statistics from the US Department of Commerce, retirement income shows up in investment income and as age-related transfer payments, including Social Security and Medicare payments. In Buckingham, investment income grew by 1.5% per year from 2000 through 2014 and age-related transfer payments grew by 5.3% per year. During roughly the same time period (through 2013), the number of residents age 65 and older grew by 20.2% (1.6% per year), and this age cohort now represents 14.8% of Buckingham residents.<sup>2</sup>

Although it is difficult to precisely quantify the effect of the ACP on retirement income, given the strong expression of concern from residents about changes in quality of life, safety, and other factors influencing retirees’ location decisions, it is important to consider that some change is likely. Here, we consider what just a 10% slowing of the rate of increase might entail. For the county, such a scenario would mean an annual decrease in investment and age-related transfer payments of approximately \$544,000. That loss would ripple through the economy as the missing income is not spent on groceries, health care, and other services, such as restaurant meals, etc.

The same phenomenon also applies to people starting new businesses or moving existing businesses to Buckingham. This may be particularly true of sole proprietorships and other small businesses who are most able to choose where to locate. As noted, sole proprietors account for a large and growing share of jobs in the county. If proprietors’ enthusiasm for starting businesses in Buckingham were dampened to the same degree as retirees’ enthusiasm for moving there—a 10% drop in the rate of growth—the effect would be 4 fewer jobs and \$202,000 less in added proprietors’ income each year.

For “bottom line” reasons (e.g., cost of insurance) or due to the owners’ own personal concerns, other businesses besides sole proprietorships might

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<sup>13</sup> Raw data on travel expenditures is from the Virginia Tourism Corporation (2015). This reduction in economic activity would be in addition to the lost recreation benefits (the value to the visitors themselves over and above their expenditures on recreational activity) that are included with ecosystem service costs.

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choose locations where the pipeline is not an issue. If so, further opportunities for local job and income growth will be missed.

These are simple scenarios and the actual magnitude of these impacts of the ACP will not be known unless and until the pipeline is built. Even so, and especially because the pipeline is promoted by supporters as bringing some jobs and other economic benefits to the region, it is important to consider the potential for loss.

## Conclusion

The full costs of the proposed Atlantic Coast Pipeline in Buckingham County are wide-ranging. They include one-time costs like reductions

in property value and lost ecosystem services during pipeline construction, which we estimate to be between \$8.8 and \$20.8 million. Plus there are ongoing costs like lost property tax revenue, diminished ecosystem service value, and dampened economic growth that recur year after year for the life of the pipeline and compressor station. These annual costs would range from \$3.0 to \$5.9 million per year. Most of these costs would be borne by Buckingham County residents, businesses, and institutions. By contrast, the ACP's one local benefit would be much smaller. It is an estimated average tax payment of \$809,632 per year through 2025 (Natural Resource Group 2015, 5–31). Other ACP-promoted benefits, such as jobs from the ACP's construction and operation and those stemming from lower energy costs, would accrue primarily in other places (Atlantic Coast Pipeline, LLC, n.d.).<sup>14</sup>

The decision to approve or to not approve the ACP does not hinge on a simple comparison of estimated benefits and estimated costs. The scope and magnitude of the costs outlined here, however, reflect and are an important component of the full environmental effects that must be considered in making that decision. Impacts on human well-being, including those that can be expressed in dollars-and-cents, must be taken into account by the Federal Energy Regulatory Commission and others weighing the societal value of the Atlantic Coast Pipeline.

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<sup>14</sup> Due to issues with the methods and assumptions used in the ACP-sponsored studies, the benefit estimates they present may be inflated. See Stanton, et al. (2015) and Phillips (2015) for a review.

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