

AUGUST 25, 2020



GREEN RIDGE

RECYCLING AND DISPOSAL FACILITY

ECONOMIC AND FISCAL CONTRIBUTION TO CUMBERLAND COUNTY & VIRGINIA

PREPARED BY



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About Mangum Economics, LLC

Founded in 2003, Mangum Economics has become known as a leader in industry analysis, economic impact assessment, policy and program evaluation, and economic and workforce strategy development. The Mangum Team specializes in producing objective and actionable quantitative economic research that our clients use for strategic decision making.

Since 2003, we have produced over 300 reports for a variety of private and public sector clients, including the American Petroleum Institute; Apex Clean Energy; Brookfield Renewables; Clearway Energy; GO Virginia; Illinois Chamber of Commerce; Maryland Chamber of Commerce; Mid-Atlantic Broadband Communities Corporation; Newport News Shipbuilding; Next Era Energy; Northern Virginia Technology Council; Open Road Renewables; sPower; SunPower; Verizon; Virginia Cable Telecommunications Association; Virginia Chamber of Commerce; Virginia Economic Development Partnership; Virginia Manufacturers Association; Volvo Group North America; and Walmart.

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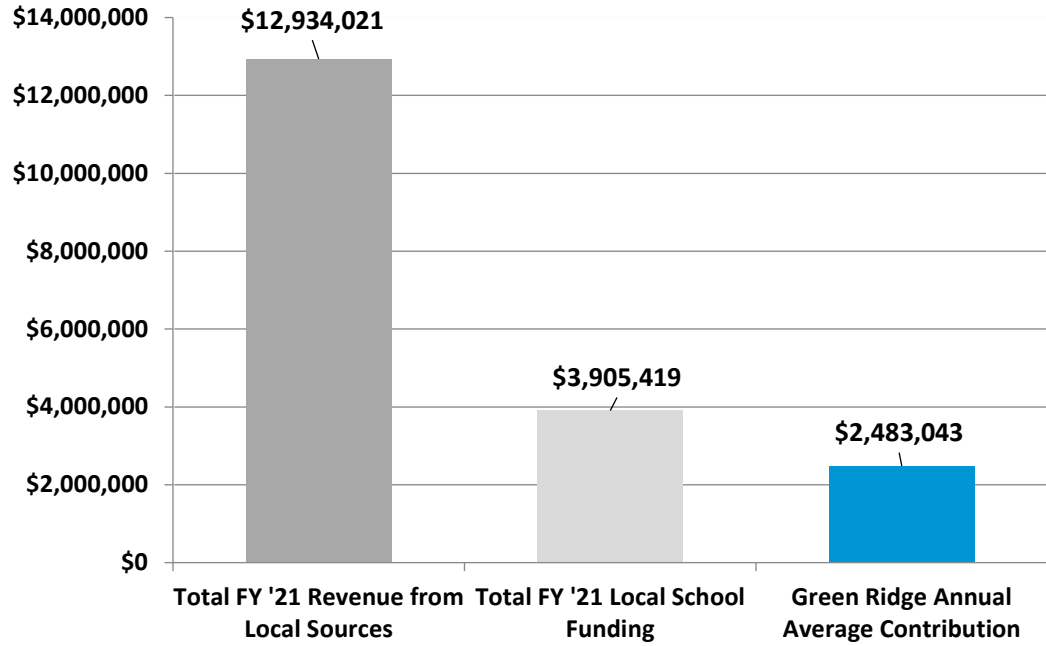


Executive Summary

This report assesses the economic and fiscal contribution that the proposed Green Ridge Recycling and Disposal Facility, LLC (“Green Ridge”) would make to Cumberland County and the Commonwealth of Virginia. The primary findings from that assessment are as follows:

- 1) Green Ridge is a proposed recycling and waste management facility in Cumberland County, Virginia. Green Ridge would be located in Cumberland County just west of the boundary between Cumberland and Powhatan counties and just north of US Highway 60. The entire facility would occupy a total of 1,200 acres, including a recycling center and an approximately 240-acre disposal area.
- 2) The proposed Green Ridge facility would also make a significant fiscal contribution to Cumberland County. We estimate that the proposed project would generate approximately:
 - \$74.49 million in cumulative county revenue, or an annual average of \$2.48 million, over the facility’s anticipated 30-year operational life.
 - This is the equivalent of a 19 percent increase over current total local revenue sources and 64 percent of total local school funding.
 - \$307,321 in state and local tax revenue from the one-time pulse of economic activity associated with the project’s construction.

Impact of Green Ridge Annual Fiscal Contribution on Cumberland County¹



¹ Data Source: Cumberland County FY '21 Adopted Budget

3) The proposed Green Ridge facility would make a significant economic contribution to Cumberland County:

- The proposed Green Ridge facility would provide an estimated one-time pulse of economic activity to Cumberland County during its initial construction phase supporting approximately:
 - 92 jobs.
 - \$4.98 million in associated labor income.
 - \$10.27 million in economic output.
- The proposed Green Ridge facility would provide an estimated annual economic impact to Cumberland County during its ongoing operational phase supporting approximately:
 - 51 jobs.
 - \$3.82 million in associated labor income.
 - \$10.34 million in economic output.

4) The proposed Green Ridge facility would also make a significant economic contribution to the Commonwealth of Virginia:

- The proposed Green Ridge facility would provide an estimated one-time pulse of economic activity to the Commonwealth of Virginia during its initial construction phase supporting approximately:
 - 134 jobs.
 - \$8.87 million in associated labor income.
 - \$21.38 million in economic output.
- The proposed Green Ridge facility would provide an estimated annual economic impact to the Commonwealth of Virginia during its ongoing operational phase supporting approximately:
 - 59 jobs.
 - \$4.28 million in associated labor income.
 - \$11.73 million in economic output.

5) The proposed Green Ridge facility would provide a boost to Cumberland County's construction sector:

- At 141 jobs, construction is Cumberland's 2nd largest industry sector. It also pays above average wages (\$704/week) compared to the county-wide average (\$661/week).
- However, it posted the largest job loss of any major industry sector in Cumberland County between 2018 and 2019 (a loss of 23 jobs).
- We estimate that the proposed Green Ridge facility would directly support approximately 78 jobs and \$4.5 million in wages in Cumberland County's construction sector during construction of the facility and on average approximately 15 jobs and \$883,579 in wages annually because of the cell construction expansions over the life of the project.

6) Recycling and waste facilities in Virginia:

- Private landfill facilities in Virginia have successfully contributed to their host communities:
 - The Waste Management landfill in Charles City County has provided the county with a steady revenue stream enabling it to fund essential services for its citizens. In FY '19, host fees made up 22 percent of Charles City County's total local revenue that year or the equivalent of 58 percent of its local education expenditures or 18 percent of the county's total expenditures.²
 - The Maplewood Recycling and Waste Disposal Facility in Amelia County has had a similar impact on the county. The county has received approximately \$27.0 million in host fees since the facility's opening 25 years ago. Additionally, county revenues include personal property and real estate taxes, a monitoring fee and the free disposal of waste for county government offices, schools, and charitable institutions saving the county over \$200,000 in monthly deferred costs.³
- The private landfill market in Virginia is currently characterized by a high degree of concentration:
 - Four companies (Waste Management, Republic, Shoosmith, and CFS) account for 100 percent of the available private landfill capacity in Virginia, and just two of those companies – Waste Management and Republic – account for 88 percent of that total.
 - One of the other two operators, Shoosmith, has been the subject of efforts by its host community to preclude its expansion. If that facility were to be forced to stop accepting solid waste, the percent of the available private landfill capacity controlled by Waste Management and Republic would increase to 99 percent.
 - The addition of the Green Ridge Recycling and Disposal facility would increase available private landfill capacity and aid in providing increased competition in Virginia's private landfill market.

The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing that information. However, because these estimates attempt to foresee circumstances that have not yet occurred, it is not possible to provide any assurance that they will be representative of actual events. These estimates are intended to provide a general indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.

² Data Source: Charles City County [FY '19 Annual Financial Report](#).

³ Data Source: Amelia County. [Getting to Know Your Maplewood Landfill](#), March 16, 2018.

Introduction

This report assesses the economic and fiscal contribution that the proposed Green Ridge Recycling and Disposal Facility, LLC (“Green Ridge”) would make to Cumberland County and the Commonwealth of Virginia. This report was commissioned by Wood Rogers PLC and produced by Mangum Economics.

The Project

Green Ridge is a proposed recycling and waste management facility in Cumberland County, Virginia. Green Ridge would be located in Cumberland County just west of the boundary between Cumberland and Powhatan counties and just north of US Highway 60. The entire facility would occupy a total of 1,200 acres, including a recycling center and an approximately 240-acre disposal area.

Local Economic Profile

In this section, we provide context for the economic and fiscal impact assessments to follow by profiling the local economy of Cumberland County.

Total Employment

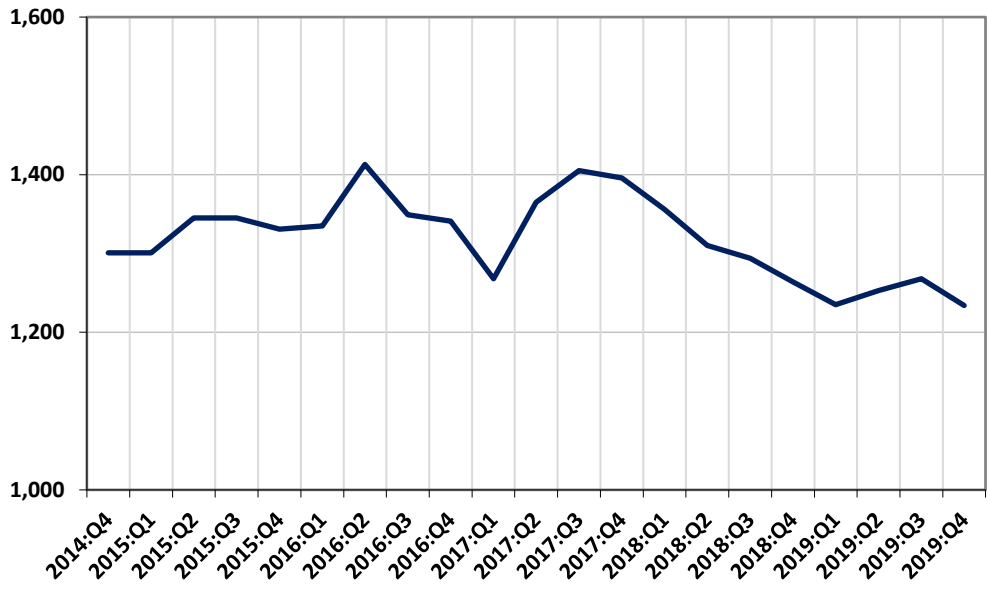
Figure 1 depicts the trend in total employment in Cumberland County from the fourth quarter of 2014 to the fourth quarter of 2019 (county-level employment data for the first quarter of 2020 are not yet available). As these data show, aside from seasonal fluctuations, employment in Cumberland County remained steady until a period of decreasing employment beginning in late 2017. As of the fourth quarter of 2019, county employment stood at 1,234 jobs. This represents a 67 job, or negative 5.1 percent, decrease in employment over the period as a whole. To put this number in perspective, over this same period total statewide employment in Virginia increased by 7.8 percent.⁴

It is important to note, however, that these data do not reflect the dramatic employment loss that occurred in the first quarter of 2020 because of statewide lockdowns imposed as a result of the covid19 virus. For example, although county-level data for 2020 are not yet available, we do know at the statewide level Virginia suffered a loss of 438,100 jobs, or an 11 percent drop in total employment, between February of 2020 and April of 2020. Under the circumstances, it is reasonable to assume that Cumberland County was adversely impacted in a similar and equally dramatic manner.

⁴ Data Source: Virginia Employment Commission, Quarterly Census of Employment and Wages.



Figure 1: Total Employment in Cumberland County –
4th Quarter 2014 to 4th Quarter 2019⁵

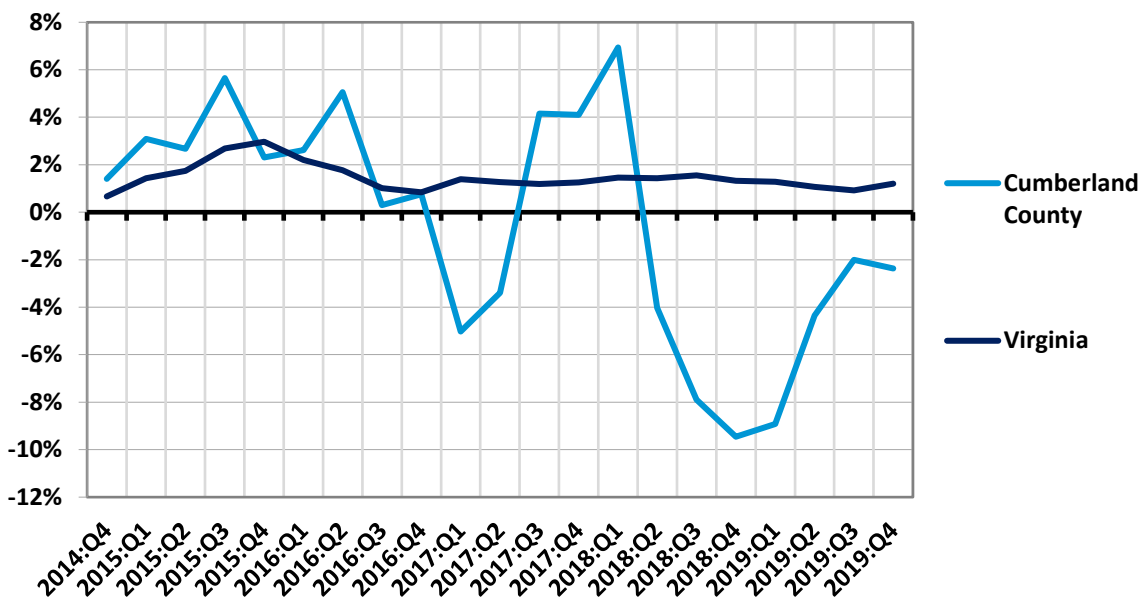


To control for seasonality and provide a point of reference, Figure 2 compares the year-over-year change in total employment in Cumberland County to that of the Commonwealth of Virginia over the same five-year period. Any point above the zero line in this graph indicates an increase in employment, while any point below the zero line indicates a decline in employment. As these data show, Cumberland County initially experienced positive year-over-year growth above the statewide average but it has endured periods of negative year-over-year growth since 2018. In contrast, Virginia experienced steady, positive growth over the entire period. As of the fourth quarter of 2019, the year-over-year change in total employment in Cumberland County was negative 2.4 percent as compared to positive 1.2 percent statewide in Virginia.

⁵ Data Source: Virginia Employment Commission, Quarterly Census of Employment and Wages.



Figure 2: Year-Over-Year Change in Total Employment – 4th Quarter 2014 to 4th Quarter 2019⁶



Employment and Wages by Major Industry Sector

To provide a better understanding of the underlying factors motivating the total employment trends depicted in Figures 1 and 2, Figures 3 through 5 provide data on private employment and wages by major industry sector in Cumberland County.

Figure 3 depicts the distribution of private sector employment across major industry categories in Cumberland County in 2019. The largest employment sector that year was Trade, Transportation, and Utilities (204 jobs), followed by Construction (141 jobs), and Manufacturing (119 jobs).⁷

Figure 4 provides a similar ranking for private sector average weekly wages by major industry category. The highest paying industry sector in 2019 was Professional and Business Services (\$1,190 per week), followed by Financial Activities (\$854 per week), and Natural Resources and Mining (\$769 per week). To provide a point of reference, the average private sector weekly wages across all industries in Cumberland County in 2019 were \$661 per week.⁸

Lastly, Figure 5 details the year-over-year change in private sector employment between 2018 and 2019 by major industry sector in Cumberland County. Over this period, only minimal employment gain occurred with the largest increase in the Natural Resources and Mining sector (up 5 jobs). Employment losses occurred in multiple sectors with the largest loss in the Construction sector (down 23 jobs).⁹

⁶ Data Source: Virginia Employment Commission, Quarterly Census of Employment and Wages.

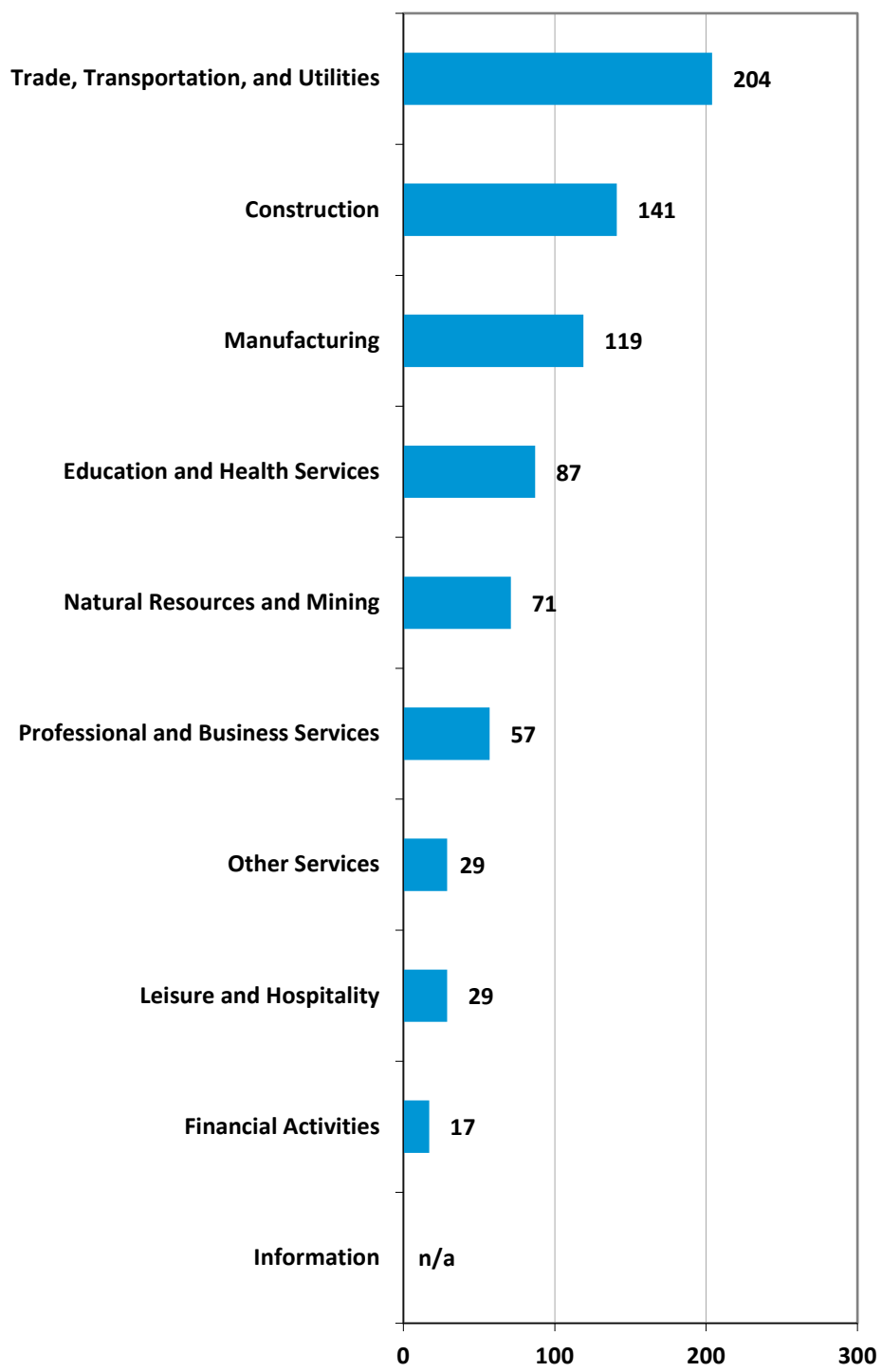
⁷ Data Source: Virginia Employment Commission, Quarterly Census of Employment and Wages.

⁸ Data for the Information sector are suppressed due to data confidentiality.

⁹ Data for the Information and Leisure and Hospitality sectors are suppressed due to data confidentiality.



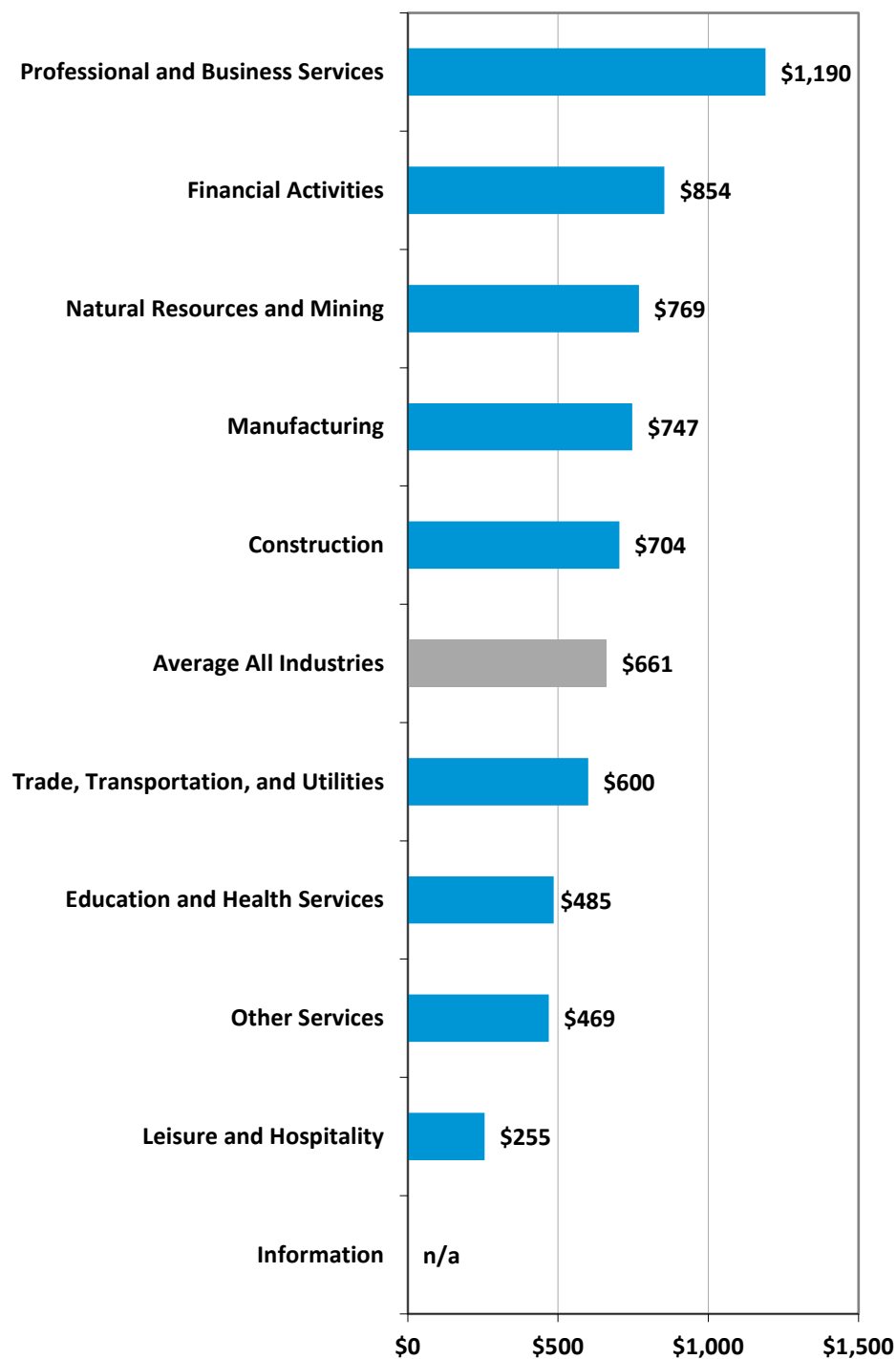
Figure 3: Private Employment by Major Industry Sector in Cumberland County – 2019¹⁰



¹⁰ Data Source: Virginia Employment Commission. Data for the Information sector are suppressed due to data confidentiality.



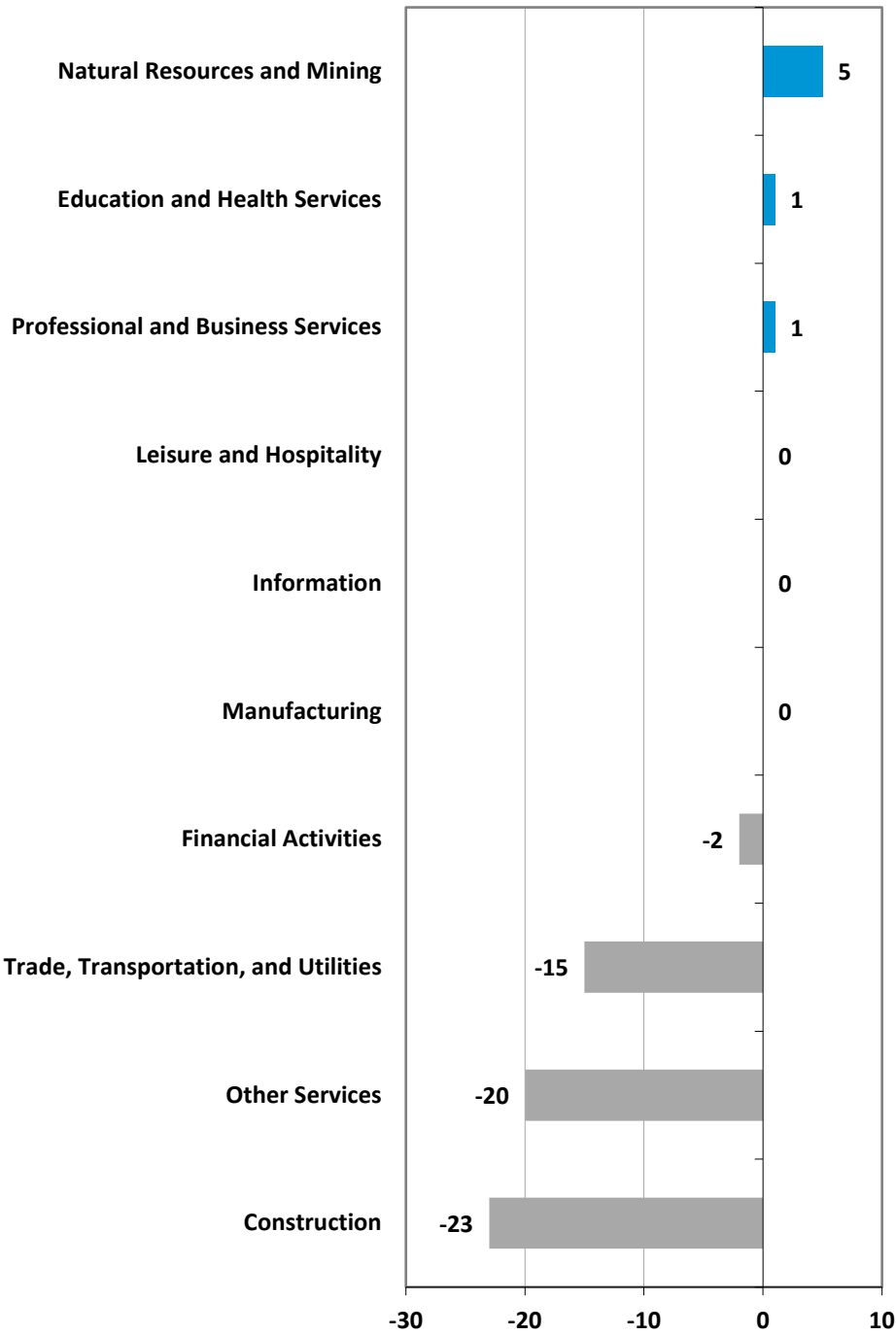
Figure 4: Average Private Weekly Wages by Major Industry Sector in Cumberland County – 2019¹¹



¹¹ Data Source: Virginia Employment Commission. Data for the Information sector are suppressed due to data confidentiality.



Figure 5: Change in Private Employment by Major Industry Sector in Cumberland County from 2018 to 2019¹²



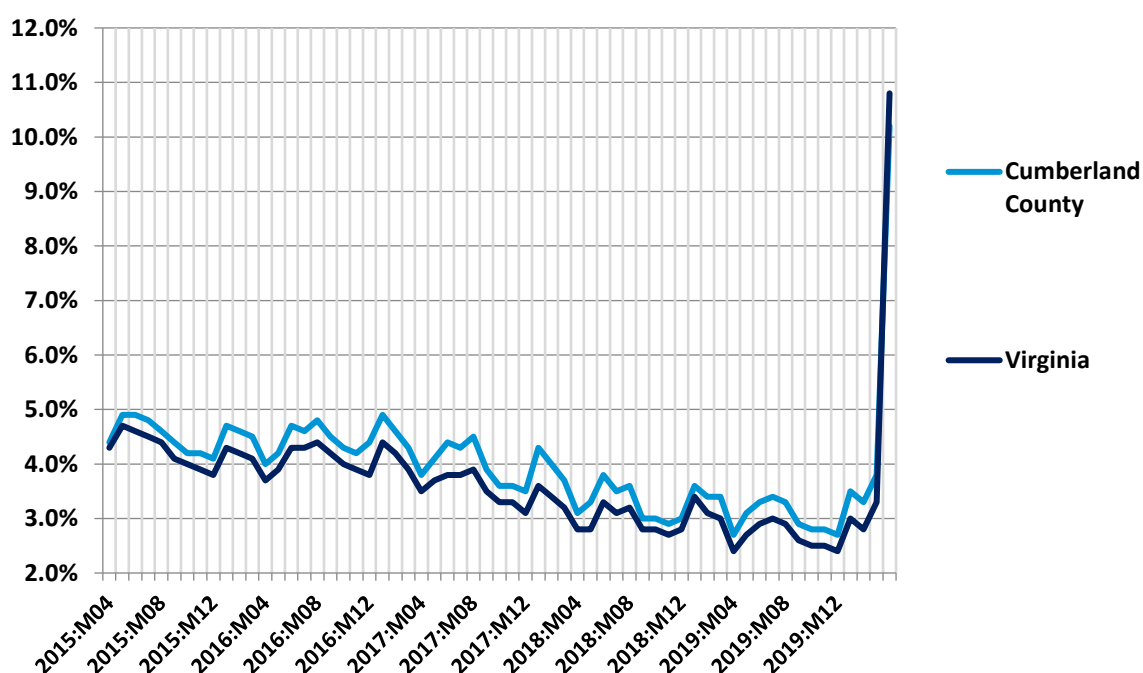
¹² Data Source: Virginia Employment Commission. Data for the Information and Leisure and Hospitality sectors are suppressed in Cumberland County due to data confidentiality.



Unemployment

Figure 9 illustrates the unemployment trend in Cumberland County over the five-year period from April 2015 through April 2020 and benchmarks those data against the statewide trend for Virginia. As these data show, unemployment rates in Cumberland County generally tracked closely with the statewide trends throughout the period but with rates on average 0.4 percentage points above the statewide norm. As of March 2020, unemployment stood at 3.8 percent in Cumberland County compared to 3.3 percent in Virginia as a whole. However, as a result of economic dislocations caused by the Covid-19 virus, in April 2020 unemployment in Cumberland County, as it did throughout Virginia and the rest of the United States, rose to levels not seen since the Great Depression of the 1930s.

Figure 10: Unemployment Rate – April 2015 to April 2020¹³



¹³ Data Source: Virginia Employment Commission, Local Area and Unemployment Statistics.

Economic and Fiscal Impact

In this section, we quantify the economic and fiscal contribution that the proposed Green Ridge facility would make to Cumberland County and the entire state. Our analysis separately evaluates the one-time pulse of economic activity that would occur during the initial construction phase of the project as well as the annual economic activity that the project would generate during its ongoing operational phase.

Method

To empirically evaluate the likely local economic impact attributable to the proposed Green Ridge facility, we employ a regional economic impact model called IMPLAN.¹⁴ The IMPLAN model is one of the most commonly used economic impact simulation models in the U.S., and in Virginia is used by UVA's Weldon Cooper Center, the Virginia Department of Planning and Budget, the Virginia Employment Commission, and other state agencies and research institutes. Like all economic impact models, the IMPLAN model uses economic multipliers to quantify economic impact.

Economic multipliers measure the ripple effects that an expenditure generates as it makes its way through the economy. For example, as when the Green Ridge facility purchases goods and services – or when employees hired by the facility use their salaries and wages to make household purchases – thereby generating income for someone else, which is in turn spent, thereby becoming income for yet someone else, and so on, and so on. Through this process, one dollar in expenditures generates multiple dollars of income. The mathematical relationship between the initial expenditure and the total income generated is the economic multiplier.

One of the primary advantages of the IMPLAN model is that it uses regional and national production and trade flow data to construct region-specific and industry-specific economic multipliers, which are then further adjusted to reflect anticipated actual spending patterns within the specific geographic study area that is being evaluated. As a result, the economic impact estimates produced by IMPLAN are not generic. They reflect, as precisely as possible, the economic realities of the specific industry and specific study area being evaluated.

In the analysis that follows, these impact estimates are divided into three categories. First round direct impact measures the direct economic contribution of the entity being evaluated (e.g., own employment, wages paid, goods and services purchased by the Green Ridge facility). Second round indirect and induced impact measures the economic ripple effects of this direct impact in terms of business to business, and household (employee) to business, transactions. Total impact is simply the sum of the preceding two. These categories of impact are then further defined in terms of employment (the jobs that are created), labor income (the wages and benefits associated with those jobs), and economic output (the total amount of economic activity that is created in the economy).

¹⁴ IMPLAN is produced by IMPLAN Group, LLC.

Construction Phase

In this portion of the section, we assess the economic and fiscal impact that the one-time pulse of activity associated with construction of the proposed Green Ridge project would have on Cumberland County and the entire state.

Assumptions

In conducting our analysis, we employ the following assumptions:

- For ease of analysis, all construction expenditures are assumed to take place in a single year.
- Initial capital investment in the Green Ridge facility is estimated to be \$26.4 million.¹⁵ Of that total:
 - Architecture, engineering, site preparation, and other construction costs are estimated to be \$16.2 million.¹⁶ It is estimated that approximately 51 percent of that total would be spent with vendors in the Cumberland County, and 99 percent would be spent with vendors in Virginia.¹⁷
 - Capital equipment costs are estimated to be \$10.2 million.¹⁸ It is anticipated that no capital equipment will be purchased from vendors in Cumberland County or with vendors in Virginia.¹⁹

Results Cumberland County

By feeding these assumptions into the IMPLAN model, we obtain the following estimates of one-time economic and fiscal impact. As shown in Table 1, construction of the proposed Green Ridge facility would directly provide a one-time pulse supporting approximately: 1) 78 jobs, 2) \$4.5 million in labor income, and 3) \$8.3 million in economic output to Cumberland County (in 2020 dollars).²⁰

Taking into account the economic ripple effects that direct investment would generate, we estimate that the total one-time impact on Cumberland County would be supporting approximately: 1) 92 jobs, 2) \$5.0 million in labor income, 3) \$10.3 million in economic output, and 4) \$307,321 in state and local tax revenue (in 2020 dollars).

¹⁵ Data Source: Woods Rogers PLC.

¹⁶ Data Source: Woods Rogers PLC.

¹⁷ Data Source: IMPLAN Group, LLC. Construction employment in the IMPLAN software is site-based. Total direct construction spending and employment is therefore reported in Cumberland County. However, given the size of Powhatan County's construction sector, it is possible that some of the direct construction employment will be filled by neighboring Powhatan County construction employees.

¹⁸ Data Source: Woods Rogers PLC.

¹⁹ Data Source: IMPLAN Group LLC.

²⁰ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support a job during the construction of the project.

Table 1: Estimated One-Time Economic and Fiscal Impact on Cumberland County from Construction of the Green Ridge Facility (2020 Dollars)²¹

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	78	\$4,543,291	\$8,300,000
2nd Round Indirect and Induced Economic Activity	14	\$432,672	\$1,968,003
Total Economic Activity	92	\$4,975,963	\$10,268,003
Fiscal Impact			
State and Local Tax Revenue			\$307,321

**Totals may not sum due to rounding.*

Results Commonwealth of Virginia

By feeding these assumptions into the IMPLAN model, we obtain the following estimates of one-time economic and fiscal impact. As shown in Table 2, construction of the proposed Green Ridge facility would directly provide a one-time pulse supporting approximately: 1) 103 jobs, 2) \$7.4 million in labor income, and 3) \$16.2 million in economic output to the Commonwealth of Virginia (in 2020 dollars).²²

Taking into account the economic ripple effects that direct investment would generate, we estimate that the total one-time impact on the Commonwealth of Virginia would be supporting approximately: 1) 134 jobs, 2) \$8.9 million in labor income, 3) \$21.4 million in economic output, and 4) \$992,477 in state and local tax revenue (in 2020 dollars).

Table 2: Estimated One-Time Economic and Fiscal Impact on the Commonwealth of Virginia from Construction of the Green Ridge Facility (2020 Dollars)²³

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	103	\$7,411,277	\$16,173,000
2nd Round Indirect and Induced Economic Activity	31	\$1,460,163	\$5,204,602
Total Economic Activity	134	\$8,871,440	\$21,377,602
Fiscal Impact			
State and Local Tax Revenue			\$992,477

**Totals may not sum due to rounding.*

²¹ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

²² It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support a job during the construction of the project.

²³ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

Ongoing Operations Phase

In this portion of the section, we assess the annual economic and fiscal impact that the proposed Green Ridge facility would have on Cumberland County and the Commonwealth of Virginia during its anticipated 30-year operational phase.

Assumptions

In conducting our analysis, we employ the following assumptions:

- The Green Ridge facility would spend approximately \$6.3 million annually in 2021 through 2024 for salaries and other operational expenditures, increasing to approximately \$6.4 million in 2025 and thereafter (in 2020 dollars).²⁴
- The Green Ridge facility would initially hire approximately 17 employees and would add one employee in 2025, increasing total company employment to approximately 18.²⁵
- The Green Ridge facility would reimburse Cumberland County for the employment of one Landfill Monitor employee with up to \$100,000 annually.²⁶
- The Green Ridge facility would contribute approximately \$25,000 annually for the Cumberland County “Public School Recycling Education” program.²⁷
- Initial capital investment in equipment is estimated at \$10.2 million.²⁸
- Equipment is considered “Heavy Machinery and Equipment” and taxed at 20 percent of the original capitalized equipment cost at a rate of \$3.75 per \$100.²⁹
- Real property remains in its current agricultural use and real estate tax revenues would remain unchanged.
- Additional capital investment consists of equipment upgrades and new cell construction.
 - Equipment would be upgraded in 2025, replacing the initial compactors with newer ones, estimated at \$3.9 million, resulting in a total original capitalized equipment cost of \$11.8 million.³⁰
 - 17 Additional cells are expected to be added over time, each estimated at a construction cost of approximately \$2.4 million, resulting in a total of \$40.8 million (in 2020 dollars).³¹

²⁴ Data Source: Woods Rogers PLC.

²⁵ Data Source: Woods Rogers PLC. *Subject to tonnage being 5,000 tons per day (tpd).*

²⁶ Data Source: Woods Rogers PLC and Host Community Agreement.

²⁷ Data Source: Woods Rogers PLC and Host Community Agreement.

²⁸ Data Source: Woods Rogers PLC.

²⁹ Data Source: Cumberland County Commissioner of Revenue website and Return of Business Tangible Personal Property form.

³⁰ Data Source: Woods Rogers PLC. *Subject to tonnage being 5,000 tons per day (tpd).*

³¹ Data Source: Woods Rogers PLC.



- Host community royalty:
 - The Green Ridge facility would operate 286 days per year and the host fee would be \$1.50 per ton for the first 3,500 tons and \$2.75 per ton for each ton between 3,500 to 5,000 tons per day (tpd).³²
 - The Green Ridge facility would accept approximately 168 tons per day (tpd) in 2021; 2,665 tpd in 2022; 2,990 tpd in both 2023 and 2024; 4,927 tpd in 2025 to 2048; and 3,224 tpd in 2049.³³

Results Cumberland County

Economic Impact: Ongoing Operations

By feeding these assumptions into the IMPLAN model, we obtain the following estimates of annual economic impact once the facility is fully staffed and operational. As shown in Table 3, annual operation of the proposed Green Ridge facility would directly support approximately: 1) 19 jobs, 2) \$2.2 million in labor income, and 3) \$6.5 million in economic output to Cumberland County (in 2020 dollars). Taking into account the economic ripple effects that direct impact would generate, we estimate that the total annually supported impact on Cumberland County would be approximately: 1) 33 jobs, 2) \$2.8 million in labor income, and 3) \$8.6 million in economic output (in 2020 dollars).

Table 3: Estimated Annual Economic Impact on Cumberland County from the Ongoing Operation of the Green Ridge Facility (2020 Dollars)

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	19	\$2,237,560	\$6,547,370
2nd Round Indirect and Induced Economic Activity	14	\$610,712	\$2,044,931
Total Economic Activity	33	\$2,848,272	\$8,592,301

**Totals may not sum due to rounding.*

Economic Impact: Additional Cell Construction

As stated in the assumptions, 17 additional cells are expected to be constructed over the life of the project. Feeding the assumptions into the IMPLAN model, we obtain the following estimates of annual economic impact that the construction of these cells would provide. As shown in Table 4, construction of the cells directly supports approximately: 1) 15 jobs, 2) \$883,579 in labor income, and 3) \$1.4 million in economic output to Cumberland County (in 2020 dollars). Taking into account the economic ripple effects that direct impact would generate, we estimate that the total supported impact of additional cell

³² Data Source: Woods Rogers PLC.

³³ Data Source: Woods Rogers PLC.

construction on Cumberland County would be approximately: 1) 18 jobs, 2) \$968,151 in labor income, and 3) \$1.7 million in economic output (in 2020 dollars).³⁴

Table 4: Estimated Annual Economic Impact on Cumberland County from the Construction of the Additional Cells at the Green Ridge Facility (2020 Dollars)³⁵

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	15	\$883,579	\$1,360,000
2nd Round Indirect and Induced Economic Activity	3	\$84,573	\$384,148
Total Economic Activity	18	\$968,151	\$1,744,148

**Totals may not sum due to rounding.*

Table 5 combines the results from the calculations depicted in Tables 3 and 4 to provide an estimate of the total annual economic impact of the ongoing operations and expansions of the proposed Green Ridge facility. As shown in Table 5, Green Ridge would directly support approximately: 1) 34 jobs, 2) \$3.1 million in labor income, and 3) \$7.9 million in economic output to Cumberland County (in 2020 dollars). Taking into account the economic ripple effects that direct impact would generate, we estimate that the total annually supported impact of Green Ridge on Cumberland County would be approximately: 1) 51 jobs, 2) \$3.8 million in labor income, and 3) \$10.3 million in economic output (in 2020 dollars).³⁶

Table 5: Total Estimated Annual Economic Impact on Cumberland County from the Operation and Construction Expansions of the Green Ridge Facility (2020 Dollars)³⁷

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	34	\$3,121,139	\$7,907,370
2nd Round Indirect and Induced Economic Activity	17	\$695,285	\$2,429,079
Total Economic Activity	51	\$3,816,424	\$10,336,449

**Totals may not sum due to rounding.*

Fiscal Impact

In this portion of the section, we quantify the direct fiscal contribution that the proposed Green Ridge facility would make to Cumberland County. Our analysis considers the additional tax revenue generated

³⁴ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

³⁵ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

³⁶ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

³⁷ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

from the local property tax on the machinery and equipment as well as the direct payments made by the Green Ridge facility including host fees and contributions to the community, over a 30-year period.

Taxation of Equipment

Table 6 details the additional business personal property tax revenue collected from taxation of the machinery and equipment located at the Green Ridge facility. As the data in Table 6 indicate, based on a total original capitalized cost of approximately \$10.2 million, we estimate that the additional county revenue from taxation of the machinery and equipment would be approximately \$76,575 in each of the project’s first four years of operation. That figure is projected to increase to approximately \$88,425 annually as the equipment is upgraded in the fifth year of operation to a total of approximately \$11.8 million original capitalized cost. Over a 30-year period, the Green Ridge facility would provide a cumulative additional revenue of approximately \$2.6 million in heavy equipment and machinery taxes (in 2020 dollars).

Table 6: Estimated Heavy Machinery and Equipment Tax County Revenue Generated by the Proposed Green Ridge Facility over 30-Years (2020 Dollars)

	Total Original Capitalized Cost ³⁸	Assessment Ratio ³⁹	Heavy Machinery & Equipment Tax Rate ⁴⁰	Annual Property Tax
Annual Tax: 2021 – 2024	\$10,210,000	20%	0.0375	\$76,575
Annual Tax: 2025 – 2050	\$11,790,000	20%	0.0375	\$88,425
Cumulative Heavy Machinery & Equipment Tax over 30 years				\$2,605,350

**Totals may not sum due to rounding.*

Host Fees

Table 7 details the estimated host fees that the Green Ridge facility is expected to pay to Cumberland County over a 30-year period. As the data in Table 7 indicate, the calculations are based on the anticipated tons of compensable solid waste accepted at the Green Ridge facility per operating day. Revenues from the host fees are estimated at approximately \$72,072 in 2021 and are expected to increase to approximately \$2.6 million per year beginning in 2025 as the amount of solid waste increases, for a cumulative total of approximately \$68.1 million over 30 years (in 2020 dollars).

³⁸ Data Source: Woods Rogers PLC.

³⁹ Data Source: Cumberland County Business Personal Property Return form.

⁴⁰ Data Source: Cumberland County Commissioner of Revenue.

Table 7: Estimated Host Fees to be Paid to Cumberland County by the Proposed Green Ridge Facility over 30-Years (2020 Dollars)

Year	Estimated tons per day (tpd) ⁴¹	Host Fee ⁴²
2021	168	\$72,072
2022	2,665	\$1,143,285
2023 and 2024	2,990	\$1,282,710
2025 to 2048	4,927	\$2,623,836
2049	3,224	\$1,383,096
Cumulative Host Fees over 30 years		\$68,135,925

Additional Community Contributions

Table 8 summarizes the additional contributions Green Ridge is expected to provide to Cumberland County. Green Ridge would reimburse Cumberland County for the employment of one Landfill Monitor employee with up to \$100,000 annually and would also contribute approximately \$25,000 annually to the Cumberland County “Public School Recycling Education” program, for a cumulative total of approximately \$3.8 million over 30 years (in 2020 dollars).⁴³

Table 8: Estimated Additional Contributions to Cumberland County by the Proposed Green Ridge Facility over 30-Years (2020 Dollars)

	Estimated Annual Payment ⁴⁴	Cumulative Total over 30 years
Reimbursement for Landfill Monitor Employee	Up to \$100,000	\$3,000,000
Public School Recycling Education Program	\$25,000	\$750,000
Cumulative Additional Contribution over 30 years		\$3,750,000

Table 9 combines the results from the calculations depicted in Tables 6 through 8 to provide an estimate of the cumulative fiscal contribution that the proposed Green Ridge facility would make to Cumberland County over its 30-year anticipated operational life. As these data indicate, that cumulative total is approximately \$74.5 million (in 2020 dollars).

⁴¹ Data Source: Woods Rogers PLC.

⁴² The host fee is calculated based on an assumed 286 operational days per year and a fee of \$1.50 per ton for the first 3,500 tons and \$2.75 per ton for each additional ton. The host fee schedule shows annual and cumulative host fees based on estimated tons per day. It does not take into account the \$400,000 in host fees that were prepaid to Cumberland County.

⁴³ Data Source: Woods Rogers PLC and Host Community Agreement.

⁴⁴ Data Source: Woods Rogers PLC.

Table 9: Estimated County Revenue Generated by the Proposed Green Ridge Facility over 30-Years (2020 Dollars)

Heavy Machinery & Equipment Tax	\$2,605,350
Host Fees	\$68,135,925
Additional Contributions	\$3,750,000
Cumulative Revenue over 35 years	\$74,491,275

Results Commonwealth of Virginia

Economic Impact: Ongoing Operations

By feeding the assumptions stated on pages 15-16 into the IMPLAN model, we obtain the following estimates of annual economic impact once Green Ridge is fully operational. As shown in Table 10, annual operation of the proposed Green Ridge facility would directly support approximately: 1) 19 jobs, 2) \$2.2 million in labor income, and 3) \$6.5 million in economic output to the Commonwealth of Virginia (in 2020 dollars). Taking into account the economic ripple effects that direct impact would generate, we estimate that the total annually supported impact on the Commonwealth of Virginia would be approximately: 1) 38 jobs, 2) \$3.1 million in labor income, and 3) \$9.4 million in economic output (in 2020 dollars).

Table 10: Estimated Annual Economic Impact on the Commonwealth of Virginia from the Ongoing Operation of the Green Ridge Facility (2020 Dollars)

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	19	\$2,237,560	\$6,547,370
2nd Round Indirect and Induced Economic Activity	19	\$883,253	\$2,842,781
Total Economic Activity	38	\$3,120,813	\$9,390,151

**Totals may not sum due to rounding.*

Economic Impact: Additional Cell Construction

As stated in the assumptions, 17 additional cells are expected to be constructed over the life of the project. Feeding the assumptions into the IMPLAN model, we obtain the following estimates of annual economic impact that the construction of these cells would provide. As shown in Table 11, construction of the cells directly supports approximately: 1) 15 jobs, 2) \$883,579 in labor income, and 3) \$1.4 million in economic output to the Commonwealth of Virginia (in 2020 dollars). Taking into account the economic ripple effects that direct impact would generate, we estimate that the total supported impact of additional cell construction on the Commonwealth of Virginia would be approximately: 1) 21 jobs, 2) \$1.2 million in labor income, and 3) \$2.3 million in economic output (in 2020 dollars).

Table 11: Estimated Annual Economic Impact on the Commonwealth of Virginia from the Construction of the Additional Cells at the Green Ridge Facility (2020 Dollars)

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	15	\$883,579	\$1,360,000
2nd Round Indirect and Induced Economic Activity	6	\$277,042	\$982,874
Total Economic Activity	21	\$1,160,620	\$2,342,874

**Totals may not sum due to rounding.*

Table 12 combines the results from the calculations depicted in Tables 10 and 11 to provide an estimate of the total annual economic impact of the ongoing operations and expansions of the proposed Green Ridge facility on the Commonwealth of Virginia. As shown in Table 12, Green Ridge would directly support approximately: 1) 34 jobs, 2) \$3.1 million in labor income, and 3) \$7.9 million in economic output to the Commonwealth of Virginia (in 2020 dollars). Taking into account the economic ripple effects that direct impact would generate, we estimate that the total annually supported impact of Green Ridge on the Commonwealth of Virginia would be approximately: 1) 59 jobs, 2) \$4.3 million in labor income, and 3) \$11.7 million in economic output (in 2020 dollars).⁴⁵

Table 12: Total Estimated Annual Economic Impact on the Commonwealth of Virginia from the Operation and Construction Expansions of the Green Ridge Facility (2020 Dollars)⁴⁶

Economic Impact	Employment	Labor Income	Output
1st Round Direct Economic Activity	34	\$3,121,139	\$7,907,370
2nd Round Indirect and Induced Economic Activity	24	\$1,160,295	\$3,825,655
Total Economic Activity	59	\$4,281,434	\$11,733,025

**Totals may not sum due to rounding.*

⁴⁵ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

⁴⁶ It is important to note that construction sector jobs are not necessarily new jobs but the investments made can also support an existing job during the construction of the project.

Recycling and Waste Disposal Facilities in Virginia

Private Waste Disposal Facilities have Successfully Contributed to their Host Communities

Recycling and waste facilities can also provide significant benefits to their host communities. In Virginia, two such facilities are the Waste Management landfill in Charles City County and the Maplewood Recycling and Waste Disposal Facility in Amelia County, both of which have had positive impacts on their host communities.

The Waste Management landfill in Charles City County was opened in 1990 and has provided the county with a steady revenue stream. According to the county, actual revenues from the landfill have often exceeded projections enabling the county to fund essential services for its citizens.⁴⁷ In FY '19, the county collected approximately \$3.6 million in host fees. These fees made up 22 percent of Charles City County's total local revenue that year or the equivalent of 58 percent of its local education expenditures or 18 percent of the county's total expenditures in FY '19.⁴⁸

The Maplewood Recycling and Waste Disposal Facility in Amelia County was opened in 1993 and has had a similar impact on the county. According to a 2018 summary prepared by the Amelia County Department of Environmental Management, the county has received approximately \$27.0 million in host fees since the opening, or an average of about \$1,080,000 per year for the last 25 years. Additionally, the company paid \$135,091 in personal property and real estate taxes in FY '17. Similar to the proposed Green Ridge facility, the Maplewood facility also provides a monitoring fee to the county for two county employees overseeing the landfill operations and employs 11 people, most of which are Amelia County residents. Furthermore, the free disposal of waste (including collection, pick-up etc.) for the county government offices, schools, and charitable institutions saves the county over \$200,000 in monthly deferred costs.⁴⁹

High Degree of Concentration in the Virginia Market for Private Waste Disposal

According to the Virginia Department of Environmental Quality (VDEQ), private landfills account for the largest proportion, nearly 70 percent, of all existing landfill capacity in Virginia, while public landfills account for the remaining 30 percent. Within that private landfill market, eleven solid waste management facilities currently accept solid waste and those eleven facilities are operated by only four companies (Waste Management, Republic, Shoosmith, and CFS).

⁴⁷ Data Source: Charles City County FY '20 Budget.

⁴⁸ Data Source: Charles City County [FY '19 Annual Financial Report](#).

⁴⁹ Data Source: Amelia County. [Getting to Know Your Maplewood Landfill](#), March 16, 2018.

Moreover, according to VDEQ just two of those companies – Waste Management and Republic – currently control about 88 percent of the available private landfill capacity in Virginia.⁵⁰ One of the other two operators, Shoosmith, has been the subject of efforts by its host community to preclude its expansion.⁵¹ If that facility were to be forced to stop accepting solid waste, the percent of the available private landfill capacity controlled by Waste Management and Republic would then increase from 88 percent to 99 percent.

In assessing the impact that mergers will have on private markets, the U.S. Department of Justice uses a metric called the Herfindahl-Hirschman (H-H) Index to assess market concentration – the extent to which market share is concentrated in a small number of firms.⁵² The idea being that the more concentrated a market is, the less competitive it is, and the less competitive it is, the more likely it is to be characterized by uncompetitive pricing. The H-H Index ranges from zero to 10,000, with zero representing perfect competition where all firms have identical market shares, and 10,000 representing a completely monopolized market where one firm controls the entire market.

Federal agencies generally consider a H-H Index between 1,500 and 2,500 to indicate moderate market concentration, and a H-H Index above 2,500 to indicate a high degree of market concentration. Based on data from VDEQ, the H-H Index for available private landfill capacity in Virginia is currently 5,562. If the Shoosmith waste facility were to be forced to stop accepting solid waste and no other changes occurred in the private landfill market in Virginia, that H-H Index would increase to 7,049.

Although a comprehensive analysis of market concentration in the private landfill market in Virginia would assess a large number of other indicators, all else equal, these very high H-H Index numbers point to a high degree of concentration in that market. The addition of the Green Ridge Recycling and Disposal facility would increase available private landfill capacity in Virginia, thereby lessening that concentration, and, all else equal, provide increased competitive pressure.

The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing that information. However, because these estimates attempt to foresee circumstances that have not yet occurred, it is not possible to provide any assurance that they will be representative of actual events. These estimates are intended to provide a general indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.

⁵⁰ Data Source: Virginia Department of Environmental Quality “[2020 Annual Solid Waste Report for CY 2019](#)”

⁵¹ Data Source: Richmond Times Dispatch, “[Chesterfield leaders reject landfill operators plans for expansion](#),” August 3, 2018.

⁵² The Herfindahl-Hirschman (H-H) Index is calculated as the sum of the squared market shares of each firm competing in a market.