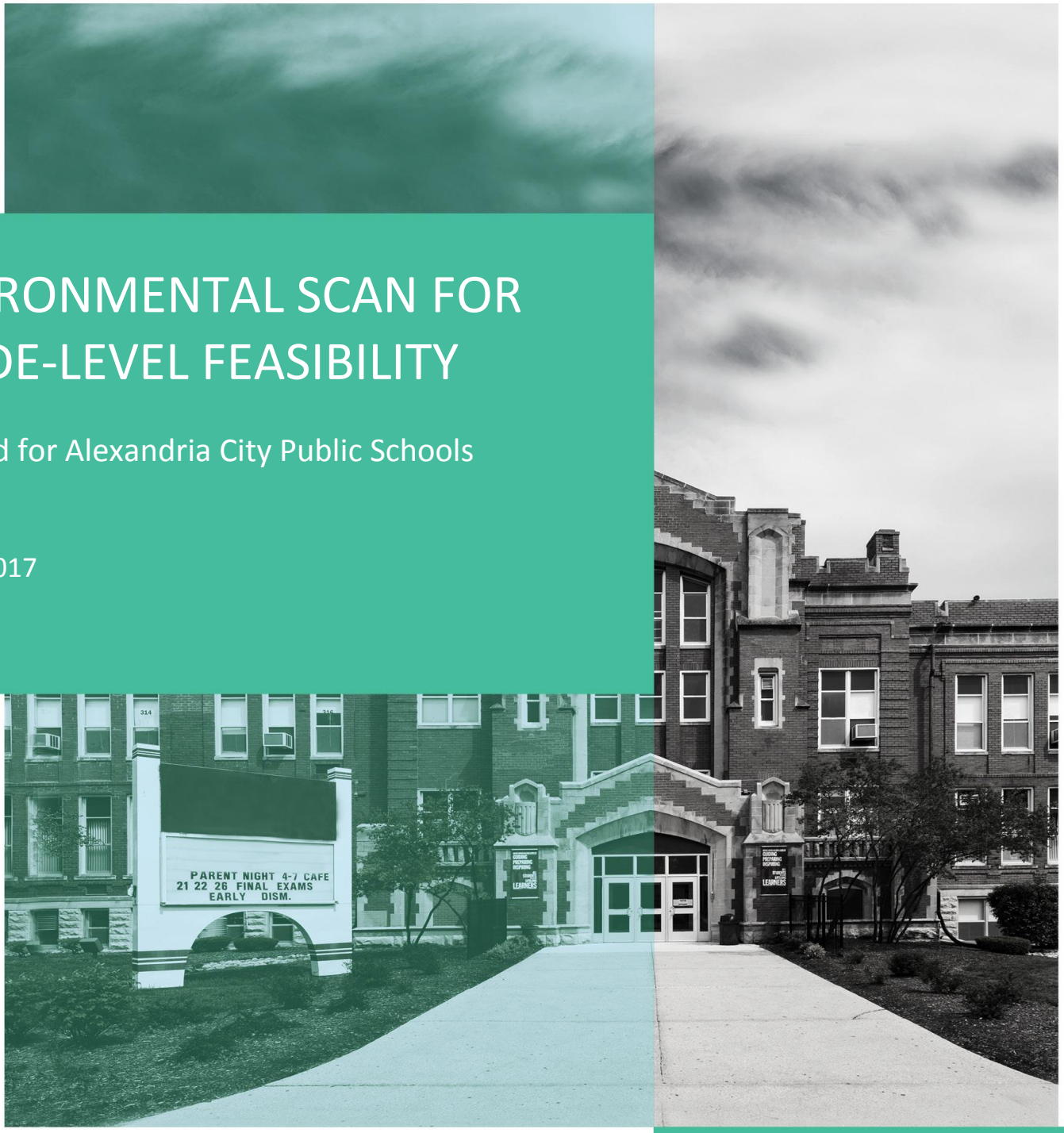
ENVIRONMENTAL SCAN FOR GRADE-LEVEL FEASIBILITY

Prepared for Alexandria City Public Schools

August 2017



The following report consists of the third phase of Hanover Research's ongoing investigation of grade-level reconfiguration. This document explores demographic trends in Alexandria City, identifying the local neighborhoods that may experience increases in student enrollment in the near future. The report also explores practical considerations for grade-level reconfiguration should the division implement this strategy to address pressure to school capacity and overcrowding.

Finally, this updated report examines current division-level enrollments and the impact of existing and potential grade configurations on overall capacity and over-enrollments.

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EXECUTIVE SUMMARY AND KEY FINDINGS

INTRODUCTION

Alexandria City Public Schools (ACPS) is currently facing overcrowding and space constraints among many of its schools due to student over-enrollment. In response to these challenges, administrators have considered reconfiguring grade levels across the Division's schools and/or building an additional facility. With these considerations in mind, ACPS aims to identify solutions to increasing student populations by establishing a long-term plan for grade-level feasibility and sustainability. ACPS has requested the assistance of Hanover Research (Hanover) to help determine best practices for grade-level reconfiguration and next steps to accommodate growth in enrollment.

To support ACPS's efforts, Hanover is conducting a series of projects made up of several methodological phases (Figure ES.1). The current study consists of the third phase of this ongoing research and examines data reported by the U.S. Census Bureau, among other sources, to identify recent trends in population growth in Alexandria City. This scan has been performed in an effort to help answer two of ACPS's key research questions: *what grade-level configuration would maximize the division's ability to accommodate increased student enrollment while maintaining academic excellence, and do current buildings have the capacity to accommodate different grade-level configurations?* Findings from this environmental scan are organized into two sections:

- **Section I: Population Trends Analysis** explores growth in family residence and fertility, student-aged populations, household income, and mobility over time based on demographic estimates released by the U.S. Census Bureau. Findings from this analysis as well as those from supplementary sources are used to gauge potential increases in the local population in the years to come.
- **Section II: Implications Moving Forward** identifies key areas within Alexandria City with large population growth based on results from the demographic analysis. Findings from previous phases of Hanover's ongoing study, including the literature review and the benchmarking analysis, are used to examine the implications of these high-growth areas for grade-level reconfiguration and feasibility across ACPS's schools.

The current iteration of the report adds an additional component to assist ACPS in examining how different grade configurations may impact enrollment and over-enrollment throughout the district: a simulation tool that offers different grade configuration scenarios for Grades PK through 8. This simulation tool draws information from ACPS's Long-Range Educational Facilities Plan and the National Center for Education Statistics, and is discussed in a final section:

- **Section III: Current Enrollment and Grade Configuration Scenarios** examines how new enrollment configurations for different combinations of elementary and middle schools impact over-enrollment at each school level. These scenarios include the

transition of existing elementary and middle school sites into a Pre-K Center and/or into PK or K-8 schools.

Figure ES.1: Summary of Proposed Work in Series

TITLE	TYPE	DATE COMPLETED
Analysis of Elementary and Secondary Grade Span Configurations	Literature Review	November 2016
Benchmarking Study of Grade-Level Feasibility	Mixed Methods: In-Depth Interviews; Synthesis of Supplementary Articles	February 2017
Environmental Scan of ACPS Service Area – First Iteration	**Mixed Methods: Data Analysis; Synthesis of Supplementary Articles**	**February 2017**
Community Survey	Survey	Pending
Capstone Report	Synthesis	Pending
Update to Environmental Scan of ACPS Service Area	**Updated Data Analysis simulates current enrollment data under different grade configuration scenarios**	**July 2017**

KEY FINDINGS

GENERAL DEMOGRAPHIC TRENDS IN ALEXANDRIA CITY

- **Alexandria City experienced growth in family residency as well as sizable increases in student-aged populations from 2011 to 2015; though, this growth was unevenly experienced across different geographies within the city**. Alexandria City's six Zip Code Tabulation Areas (ZCTAs) grew by a total of over 3,000 families from 28,311 in 2011 to 31,375 in 2015. During the same period, the population ages 0 to 17 increased from a total of 22,128 to 25,557 persons, an increase of 15.5 percent. Area 22311 (Alexandria West) witnessed some of the largest percent increases in total families from 2011 to 2013 but experienced a sharp decline in families between 2013 and 2014 prior to experiencing positive growth again by 2015. Area 22305 in Potomac West experienced the most consistent and positive growth in family residency. At the same time, area 22304 in Van Dorn made large gains in those ages 0 to 4 and 12 to 17, with increases of 588 and 524 persons, respectively.
- **The racial composition of Alexandria City's ZCTAs among those ages 0 to 17 drastically differ and have grown even more segregated during the 2011 to 2015 period; such segregation is likely to increase the difficulty of maintaining racial balance and equity among ACPS's schools**. In 2015, 42.3 percent of persons ages 0 to 17 residing within all six of Alexandria City ZCTAs identified as white, 25.5 percent as black, 22.6 percent as Hispanic, 4.6 percent as Asian, and 5.0 percent as another race. This same year, 72, 58, and 55 percent of area 22301 (Del Ray), 22302 (central Alexandria), and 22314's (Old Town) population was majority white, respectively. Approximately 44 and 41 percent of area 22305 (Potomac West) and 22311's (Alexandria West) population was majority Hispanic. Only area 22304 (Van Dorn) has continued to maintain racial balance. Beyond these recent trends, white residents are expected to continually make up a smaller portion of Alexandria City's residents between 2020 and 2040 according to projection estimates released by the Virginia Employment Commission (VEC). Given these

projections and the current patterns in the racial composition of the student-aged population, ACPS is likely to witness increases in students of color yet may encounter racial segregation across schools as a reflection of neighborhood segregation.

- **Disparities in the median household income of Alexandria City's ZCTAs have grown wider over time, which may impact inequalities in student access to resources across neighborhoods and schools**. In 2011, ZCTA 22311 (Alexandria City West) had the lowest median household income at $65,700 while ZCTA 22301 (Del Ray) had the highest at $115,739. The gap in median household income spanning these areas widened through 2015. By this year, the median household income in area 22311 lowered to $61,829 while the median income rose to $125,347 in area 22301. Inequalities in household income are even more apparent at the neighborhood level, in which low-income census tracts saw reductions in median incomes while high-income tracts saw increases in median income.
- **Mobility among the student-aged population has remained high yet consistent from 2011 to 2015; Alexandria City may anticipate this mobility to persist when calculating projections in enrollment**. Between 2011 and 2015, approximately 79.7 and 80.1 percent of those ages 1 to 17 lived in the same household within the last year. The remainder of the population these ages indicated that they had moved to a community within Alexandria City from within the county, state, country, or abroad. According to the Long Range Educational Facilities Work Plan (LREFWP) made available by the City of Alexandria, this mobility makes it difficult to determine about how many students are expected to enroll in ACPS. Because rates of mobility have not changed significantly each year from 2011 to 2015, however, ACPS can reasonably expect similar rates of mobility among the student-aged population in the future.

HIGH-GROWTH COMMUNITIES

- **ZCTA 22304 in Van Dorn is a highly populated and largely growing area within Alexandria City**. Between 2011 and 2015, family residency grew by over 10 percent with an increase of 929 more families. The birth rate has also steadily increased during this period as has the population ages 0 to 4 and 12 to 17. Census tracts 200301 and 200302 in the eastern part of Van Dorn (which overlap with Francis C. Hammond Middle, James K. Polk Elementary, and Patrick Henry Elementary) both witnessed large increases in families of five or more persons. Meanwhile, census tracts 200404 (which overlaps with Samuel W. Tucker Elementary) and 200303 in the southwestern part of Van Dorn experienced considerable gains in the population ages 0 to 17. Should these high-growth trends persist in the years to come, schools in this area may face pressure to enrollment, particularly in those neighborhoods most proximate to ACPS elementary schools.
- **ZCTA 22305 in Potomac West, while smaller in size than ZCTA 22304, experienced large growth between 2011 and 2015**. Family residency grew by over 20 percent with an increase of 593 families. In addition to large family growth, the birth rate continued to rise. This community was also the only ZCTA out of all six to experience positive population increases in each of three student-aged subgroups (populations ages 0 to 4,

5 to 11, and 12 to 17). More specifically, tract 201203 (which overlaps with Cora Kelly Magnet Elementary) experienced the largest numeric increase in total families (at 401) while tract 201100 (located near Charles Barrett Elementary and George Mason Elementary) experienced the largest average annual birth rate (at 148.2 births per 1,000 women ages 15 to 50) out of all the neighborhoods in Alexandria City. Thus, despite the area's small population size compared to area 22304, 22305's robust growth in family residency and student-aged populations indicate that this community may likely face greater pressure to enrollment in the near future.

- **Aside from ZCTAs 22304 and 22305, ZCTA 22311 in Alexandria West consists of yet another area with persistent growth**. Overall, this area increased by about 400 families during the years spanning 2011 to 2015, with large increases in family residency in tracts 200107 and 200106 in the northern part of the community. Tract 200104, where a new school is planned for construction, as well as tracts 200102 (which overlaps with William Ramsay Elementary and John Adams Elementary), 200107, and 200103 have shown large year-to-year increases in families of five or more persons. At the same time, tracts 200102, 200103, and 200106 showed large average year-to-year increases in the population ages 0 to 17.

GRADE CONFIGURATION SCENARIOS

- **Overall, 2015 student enrollments in Grades PK through 8 exceed total 2020 capacity by more than 200 students.** Increasing school-age population growth in many Alexandria neighborhoods suggest that over-crowding will increase in the next several years, reinforcing the need for added capacity and/or re-organization at the elementary and middle school levels.
- **Creating a specialized Pre-K Center would allow the district to free some space in existing K-8 and K-5 schools to accommodate a larger number of older students.** For instance, this analysis examines the possibility of transitioning one small elementary school into a Pre-K Center—in this case Matthew Maury Elementary—to help alleviate over-enrollment at the upper elementary and middle school levels by creating additional space in some elementary and K-8 schools that previously housed Pre-K classes. In particular, adding the Pre-K Center offers additional space at existing and potential K-8 school sites for middle school students.
- **Furthermore, varying grade configurations for schools that serve students in grades PK-8 may allow the division to concentrate over-enrollments at either the elementary or middle school levels, depending on which level can best accommodate over-enrollments.** For instance, the simulations created for this report suggest that adding one to three additional PK- or K-8 schools—including one at the George Washington Middle School site—concentrates over-enrollment at the middle school level. In contrast, transforming six to eight elementary and middle school sites into PK- or K-8 schools concentrates over-enrollment at the elementary school level, when grade-level cohorts in K-8 schools are approximately equal in each grade.

SECTION I: POPULATION TRENDS ANALYSIS

In the following section, Hanover assesses demographic trends in family residence, student-aged populations, household income, and mobility over time in Alexandria City's communities. These trends are used to gain a broader understanding of the population growth occurring in the local region and what implications this growth may have for future enrollment at ACPS's schools. This environmental scan's methodology—including a description of the data, the geographic units of analysis, the demographic variables of interest, and the analytic strategy—is reviewed first prior to exploring these trends in detail.

METHODOLOGY

AMERICAN COMMUNITY SURVEY (ACS) DATA DESCRIPTION

All demographic data used to assess trends in population growth in Alexandria City are derived from the American Community Survey (ACS).[1] The ACS is a survey administered by the U.S. Census Bureau to a subpopulation of residents every month, containing a range of questions that focus on age, sex, race, education, income, occupation, and many other personal characteristics.[2] Once all responses to the ACS are collected by the Census Bureau, they are:[3]

- Assigned to specific geographic locations;
- Weighted according to how representative they are of the population residing in those locations; and
- Aggregated into distinct geographic entities representative of the population over a period of time.

In total, the Census Bureau produces ACS 1-Year and 5-Year data files made publicly available through the American Factfinder database.[4] In Hanover's analysis, estimates are taken from ACS responses collected and reported in 5-Year data files. These population estimates are derived from responses collected over specified five-year periods. While the most recent 5-Year file (the 2015 ACS 5-Year dataset) may not be as current as the most recent 1-Year file (the 2015 ACS 1-Year dataset), 5-Year files have smaller margins of error. This is of particular importance when assessing demographic information for small geographic areas, such as counties, Zip Code Tabulation Areas (ZCTAs), census tracts, or even block groups. As such, ACS 5-Year data allow Hanover to report information about community demographics and population change with greater statistical confidence.

[1] "American Community Survey: Methodology." U.S. Census. https://www.census.gov/programs-surveys/acs/methodology.html
[2] "ACS Information Guide." U.S. Census Bureau. https://www.census.gov/programs-surveys/acs/about/information-guide.html
[3] "Programs, Datasets and Tables." U.S. Census Bureau. http://factfinder.census.gov/help/en/programs_datasets_tables.htm
[4] "American FactFinder." U.S. Census Bureau. http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

In this study, Hanover evaluates population changes over five consecutive years using the following ACS datasets:

- **2011 ACS 5-Year estimates**, representing data from years 2007 to 2011
- **2012 ACS 5-Year estimates**, representing data from years 2008 to 2012
- **2013 ACS 5-Year estimates**, representing data from years 2009 to 2013
- **2014 ACS 5-Year estimates**, representing data from years 2010 to 2014
- **2015 ACS 5-Year estimates**, representing data from years 2011 to 2015

GEOGRAPHIC SCOPE

To provide ACPS with the most detailed analysis of regional population change, Hanover analyzes data that reflect two geographic levels: ZCTA and census tract estimates. ZCTAs are only produced in 5-Year ACS files and are closely related to the U.S. Postal Service's ZIP Code service areas; however, because the Postal Service uses ZIP Codes to inform mail delivery routes—not to define population features—ZCTAs allow the Census Bureau to segment population and housing data into more clearly-demarcated geographic zones. The methodology for creating the ZCTAs is as follows:

> The Census Bureau first examined all of the addresses within each census block to define the list of ZIP Codes by block. Next, the most frequently occurring ZIP Code within each block was assigned to the entire census block as a preliminary ZCTA code. After all of the census blocks with addresses were assigned a preliminary ZCTA code, blocks were aggregated by code to create larger areas […] **In most instances, the ZCTA code is the same as the ZIP Code for an area.**[5]

Unfortunately, the American FactFinder does not match a state's ZCTAs to other geographic units, including Virginia's counties or school divisions. To determine which ZCTAs correspond with ACPS's geographic domain, Hanover consulted the Missouri Census Data Center's (MCDC) Geographic Correspondence Engine, a database that allows users to match geocodes.[6] The six ZCTAs that correspond with ACPS as reported by the MCDC are illustrated in a map provided in Panel A in Figure 1.1 on the next page. It should be noted that the boundaries of two ZCTAs, areas 22206 in Shirlington and 22312 in Lincolnia, overlap with ACPS but are excluded from this list. These areas are excluded because the proportion of their boundaries that lie within ACPS are relatively small.

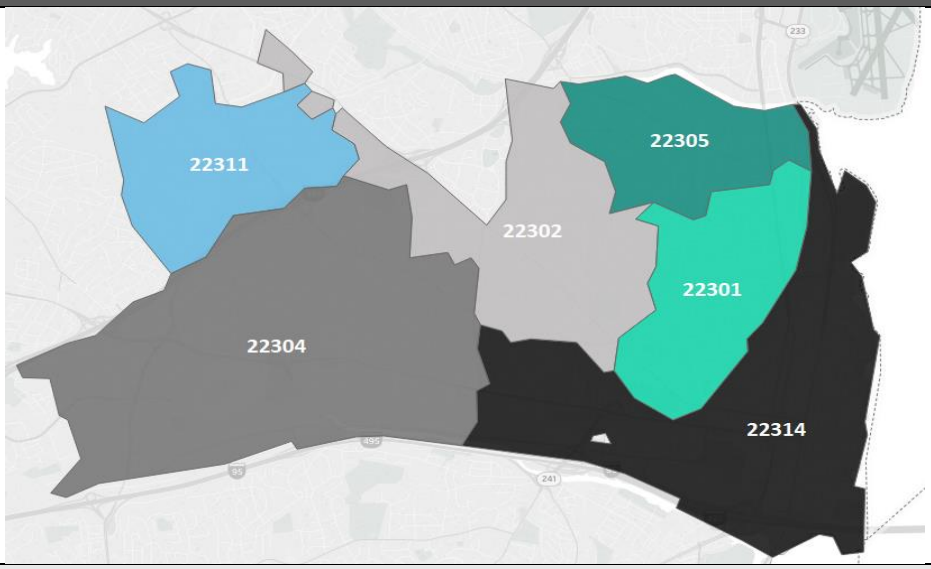
Census tracts are "small, relatively permanent statistical subdivisions of a county or equivalent entity that […] have a population size between 1,200 and 8,000 people."[7] Census tracts are typically embedded within ZCTAs and are often bordered by "visible or identifiable

[5] "ZIP Code Tabulation Areas (ZCTAs)." U.S. Census Bureau. https://www.census.gov/geo/reference/zctas.html
[6] "Geographic Correspondence Engine." Missouri Census Data Center. http://mcdc.missouri.edu/websas/geocorr12.html
[7] "Geographic Terms and Concepts - Census Tract." U.S. Census Bureau. https://www.census.gov/geo/reference/gtc/gtc_ct.html

features."[8] Census tracts are regularly understood as neighborhood-level communities that range in geospatial size depending on the density of their resident populations.[9] Census tracts within Alexandria City enable Hanover to identify a subset of smaller communities within the division with the fastest and greatest growth in population size. In total, 38 census tracts, otherwise referred to as neighborhoods, lie within Alexandria City (Panel B in Figure 1.1). A map of these census tracts can be found **here**.

Figure 1.1: ZCTAs and Census Tracts in Alexandria City Public Schools

PANEL A: MAP OF ZCTAS



Panel B: Tract Codes			
200102	200302	200701	201204
200103	200303	200702	201300
200104	200403	200703	201400
200105	200404	200801	201500
200106	200405	200802	201600
200107	200406	200900	201801
200201	200407	201000	201802
200202	200500	201100	201900
200301	200600	201202	202001
		201203	202002

Source: Missouri Census Data Center,[10] map made using Tableau software.

VARIABLES OF INTEREST AND ANALYTICAL STRATEGY

Using the American Factfinder, Hanover collected multiple ACS data files that contain demographic measures relevant to ACPS's interest in grade-level feasibility and potential reconfiguration. All references to these files are included in the Appendix. In total, the data reported in this document reflect five-year trends in family residency and fertility estimates,

[8] Ibid.
[9] Ibid.
[10] Ibid.

student-aged population and race estimates, income estimates, and mobility estimates. These demographic variables are available in preset ACS data files, and consequently, cannot be cross-tabulated for further analysis.

For every ACS measure, Hanover discusses population change over time, citing how these rates of change, if held constant, can be used to understand population growth in the years to come. This discussion is formatted as "Key Takeaways" in an effort to highlight major trends. A series of graphs and charts plotting these trends are included as well to help illustrate population change over the five-year period across Alexandria City's communities. For a more in-depth examination, Hanover identifies top areas (ZCTAs and census tracts, where appropriate) with large and fast growth. Aside from an analysis of this data, information obtained from secondary sources about population change and projected growth in the region are included in the discussion to help contextualize findings.

TRENDS IN FAMILY RESIDENCY AND FERTILITY

KEY TAKEAWAYS

- ***As illustrated in Panel A in Figure 1.2, each of the six ZCTAs in Alexandria City experienced disparate rates of growth in the residency of families from 2011 to 2015. Though, most ZCTAs experienced positive rates of change with slight decreases at certain points in time***. Most notably, area 22311 (Alexandria West) witnessed large and positive increases in total families from 2011 to 2013 but experienced a sharp decline in families between 2013 and 2014 prior to experiencing positive growth again by 2015. Much less erratic, area 22305 (northern Potomac West) experienced the most consistent and positive growth in family residency. While families may consist of any combination of adults and children, from a broader perspective, these rates of change indicate that Alexandria City has largely experienced positive growth in the last several years.
  - ***Unlike trends in family residency, total population growth in Alexandria City has remained steady and positive***. Since the 2010 Decennial Census, Alexandria City increased in its population size from 139,966 persons to 149,315 persons (based on 2015 ACS 5-Year data), or roughly 6.7 percent.[11] This rate of growth is even higher than the growth of the Washington-Arlington-Alexandria Metropolitan Statistical Area (MAS) at 6.2 percent (using census estimates taken from the same surveys).[12]
- ***In 2015, area 22304 (Van Dorn) boasted the largest number of families at 10,078 in total, comprising nearly one-third of Alexandria City's total family residency*** (Figure 1.2, Panel B). This community experienced substantial growth as well from 2011 to 2012 and again from 2014 to 2015. At the neighborhood level, Panel C in Figure 1.2

[11] See estimates reported in Alexandria City's Community Profile: "Alexandria City, Virginia." U.S. Census Bureau. https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

[12] See estimates reported in the Washington-Arlington-Alexandria Metropolitan Statistical Area Age & Sex tables: "Washington-Arlington-Alexandria Metropolitan Statistical Area." U.S. Census Bureau. https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t&keepList=t

reveals that several census tracts in eastern and northern Van Dorn (tracts 200107 and 200301) and the upper region of Potomac West (tract 201203) saw substantial increases in total families. During the entire five-year period, these neighborhoods grew by 401, 348, and 274 families, respectively. These trends reveal that communities in the northeastern region of Potomac West and western Alexandria in Van Dorn are fairly consistent in their growth.

- ***In many cases, growth in these areas is due to redevelopment and residential expansion***. According to online reports, Alexandria City "is one of Virginia's cities where population growth has accelerated in recent years. Though Alexandria began growing again in the early 1990s, the redevelopment of underused lots in the city, such as Potomac Yard […] has helped make Alexandria one of the fastest growing localities in Virginia."[13] In another example, the Alexandria Chamber of Commerce (ACC) announced a new initiative, entitled *Tomorrow's Alexandria*, set to host panel discussions concerning the future of the area's urban and economic growth. It is the central aim of the ACC's initiative to adequately plan for growing diversity while supporting local businesses for a vibrant and robust economy. Initiatives such as *Tomorrow's Alexandria* may help to attract and retain new families, contributing to sustained urban growth.

- ***Families that are small in size (three to four persons) make up the vast majority of all families in Alexandria City*** (Figure 1.3). In 2015, for instance, three- to four-person families outnumbered families of five or more by roughly 4:1, or 12,680 to 3,215 in total (Figure 1.3, Panel B). While each of the six ZCTAs in Alexandria City experienced some declines in the total number of families made up of three to four persons, as is illustrated in Panel A in this figure, families of this size overwhelming grew during the years spanning 2011 to 2015. The greatest growth in three- to four-person families occurred in area 22304 (Van Dorn) between 2014 and 2015 with an increase of 338. Families of five or more, while fewer than three- to four-person families, also increased in residency over the years. This is particularly the case in ZCTA 22304. ZCTA 22314 (near Old Town), however, experienced a decline in these larger families each year, from 475 in 2011 to 275 in 2015.
- ***While growth in families of five or more persons is smaller than that of families made up of three or more, some neighborhoods stand apart in their increases of this family size*** (Figure 1.3, Panel C). Census tracts 200103 (near Lincolnia), 201203 (in northern Potomac West), and 200104 (in lower Alexandria West) increased in families of five or more by 71.3, 57.5, and 30.3 each year on average. Nonetheless, given the overall patterns in family size, increases over the years in the number of smaller families with ostensibly fewer children are more likely to be driving growth in enrollment at ACPS than growth in larger families.
- ***At large, births among women of childbearing age have remained fairly stable in the last five years***. ***In fact, the number of births to women ages 15 to 50 slightly***

[13] Lombard, H. "Population Growth in Virginia Is Reversing Decades-Old Trend, Estimates Show." Stat Chat, Weldon Cooper Center for Public Service, University of Virginia, Demographics Research Group, January 27, 2016. http://statchatva.org/2016/01/27/population-growth-in-virginia-is-reversing-decades-old-trend-estimates-show/

increased each consecutive year in Alexandria City, from 2,198 total births in 2011 to 2,759 births in 2015 (Figure 1.4, Panels A and B). The number of births increased most notably in all of Alexandria City's ZCTAs between the years 2013 and 2014 (Figure 1.4, Panel A). Birth rates (births per 1,000 women ages 15 to 50), on the other hand, have increased and decreased at various points in time across Alexandria's ZCTAs (Figure 1.4, Panel B). When simply observing these estimates during the five-year period, it appears that, for the most part, Alexandria City's ZCTAs have increased in their rates of births. ZCTA 22302 near Rosemont, however, remains the exception. This area decreased by 20 births per 1,000 women from 2011 to 2015.

- ***When rates of fertility, mortality, and mobility are taken into consideration, the Virginia Employment Commission (VEC) projects an estimated population increase of 3.68 percent between 2010 and 2020***.[14] The population counts used to make these projections, however, are markedly more conservative than estimates released by the U.S. Census Bureau.[15] For instance, the VEC projects an estimated 147,706 residents by 2030 (1.78 percent growth), and by 2040, 149,195 residents (1.01 percent growth) in Alexandria City. With these conservative estimates, the VEC predicts that Alexandria City's total population will grow at smaller rates with each decade.[16]

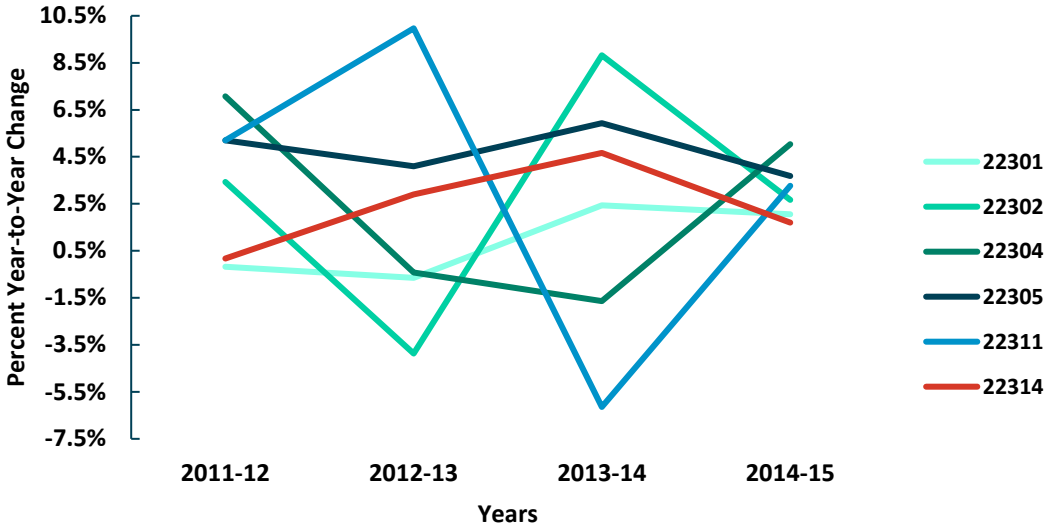
[14] "Virginia Community Profile: Alexandria City." Virginia Employment Commission, December 30, 2016. p. 8. http://virginialmi.com/report_center/community_profiles/5104000510.pdf

[15] For further discussion on the difference between U.S. Census Bureau estimates and estimates released by Alexandria City's Department of Planning and Zoning, see *Population and Housing Estimates* in: "Population Characteristics." City of Alexandria, Virginia. https://www.alexandriava.gov/planning/statistics/default.aspx?id=76738

[16] "Virginia Community Profile: Alexandria City," Op. cit., p. 8.

Figure 1.2: Five-Year Trends in the Total Number of Families in Alexandria City

PANEL A: YEAR-TO-YEAR PERCENT CHANGE IN TOTAL NUMBER OF FAMILIES BY ZCTA



PANEL B: TOTAL NUMBER OF FAMILIES BY ZCTA

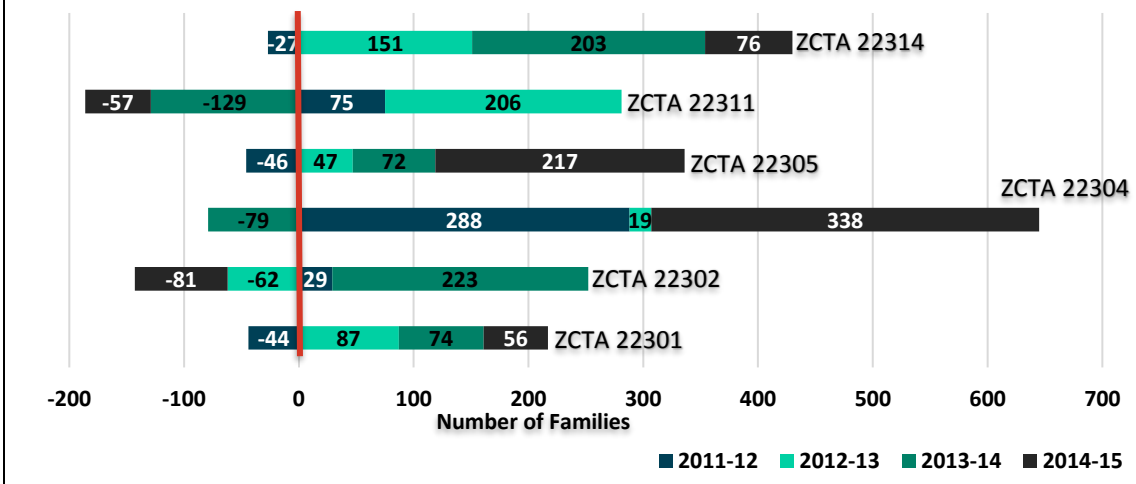
ZCTA	2011	2012	2013	2014	2015
22301	2,775	2,770	2,752	2,819	2,877
22302	3,672	3,798	3,651	3,973	4,079
22304	9,149	9,796	9,755	9,595	10,078
22305	2,926	3,078	3,204	3,394	3,519
22311	3,405	3,582	3,939	3,697	3,818
22314	6,384	6,395	6,580	6,887	7,004
Total	**28,311**	**29,419**	**29,881**	**30,365**	**31,375**

PANEL C: TOP 10 CENSUS TRACTS WITH GREATEST NUMERIC INCREASE IN TOTAL FAMILIES

Census Tract	Year-to-Year Change				Total Change 2011-2015
	2011-12	2012-13	2013-14	2014-15	
201203	90	94	78	139	**401 (40.2%)**
200107	94	-47	246	55	**348 (39.1%)**
200301	73	139	84	-22	**274 (49.5%)**
200106	-80	50	187	36	**193 (31.8%)**
200201	108	-25	51	55	**189 (32.5%)**
200703	-68	109	41	96	**178 (29.5%)**
200302	93	-21	-2	100	**170 (18.1%)**
200406	127	11	-34	52	**156 (16.8%)**
201600	66	-63	43	106	**152 (16.8%)**
202001	47	-4	32	66	**141 (25.6%)**
Average	**25.7**	**11.8**	**12.9**	**27.4**	**77.7(10.9%)**

Figure 1.3: Five-Year Trends in the Number of Families by Family Size in Alexandria City

PANEL A: YEAR-TO-YEAR NUMERIC GROWTH IN FAMILES WITH 3 TO 4 PERSONS BY ZCTA



PANEL B: TOTAL NUMBER OF FAMILIES BY SIZE BY ZCTA

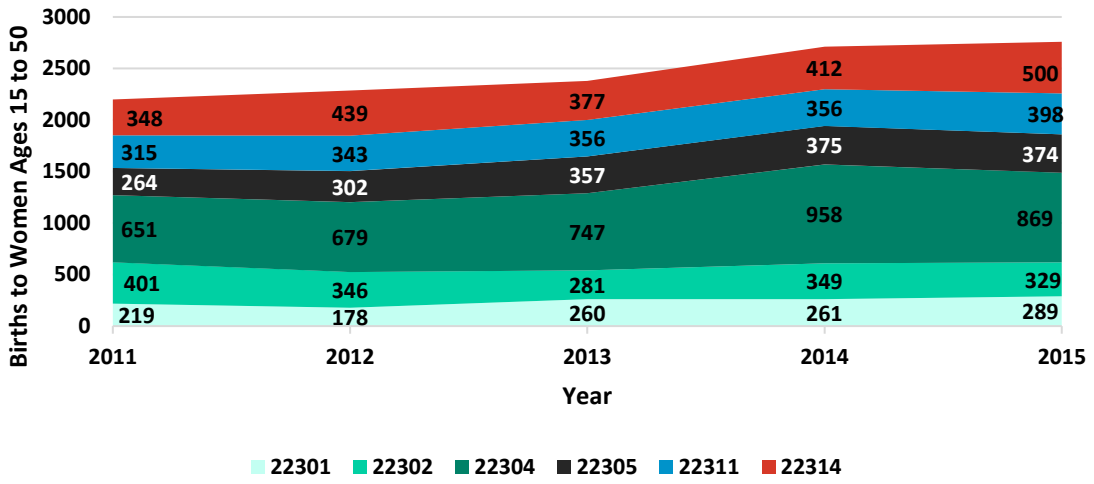
ZCTA	Families with 3 to 4 Persons					Families with 5 or More Persons				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
22301	1,149	1,105	1,192	1,266	1,322	241	310	338	324	282
22302	1,531	1,560	1,498	1,721	1,640	360	385	346	322	400
22304	3,868	4,156	4,175	4,096	4,434	753	836	1058	1159	1183
22305	1,302	1,256	1,303	1,375	1,592	278	365	557	575	536
22311	1,509	1,584	1,790	1,661	1,604	249	395	509	464	539
22314	1,694	1,667	1,818	2,021	2,097	475	434	390	340	275
Total	**11,053**	**11,328**	**11,776**	**12,140**	**12,689**	**2,356**	**2,725**	**3,198**	**3,184**	**3,215**

PANEL C: TOP 10 CENSUS TRACTS WITH LARGEST AVERAGE ANNUAL GROWTH IN FAMILIES WITH 5 OR MORE PERSONS

Census Tract	Year-to-Year Change									
	Families with 3 to 4 Persons					Families with 5 or More Persons				
	2011-12	2012-13	2013-14	2014-15	Average Year-to-Year Growth	2011-12	2012-13	2013-14	2014-15	Average Year-to-Year Growth
200103	-210	-14	20	-129	-83.3	78	1	59	147	**71.3**
201203	-4	11	-47	158	29.5	36	130	41	23	**57.5**
200406	-20	17	-103	74	-8.0	42	27	25	27	**30.3**
200104	64	-12	-62	-60	-17.5	33	29	-21	44	**21.3**
200900	-67	-32	4	9	-21.5	10	26	26	17	**19.8**
200302	64	-102	59	70	22.8	18	79	6	-25	**19.5**
200107	44	-48	102	-88	2.5	32	-23	2	58	**17.3**
200102	28	48	-88	40	7.0	19	51	-12	8	**16.5**
200301	-5	63	2	-37	5.8	16	12	40	-10	**14.5**
200405	32	20	-85	29	-1.0	24	8	46	-22	**14.0**
Average	**2.0**	**11.4**	**6.8**	**11.1**	**7.8**	**9.2**	**11.3**	**2.3**	**4.3**	**6.8**

Figure 1.4: Five-Year Trends in the Number of Births and Birth Rates in Alexandria City

PANEL A: YEAR-TO-YEAR TOTAL BIRTHS TO WOMEN AGES 15 TO 50 BY ZCTA



PANEL B: TOTAL NUMBER OF BIRTHS AND BIRTH RATE BY ZCTA

ZCTA	Births to Women Ages 15 to 50 in the Last Year					Births Per 1,000 Women Ages 15 to 50 in the Last Year				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
22301	219	178	260	261	289	67	54	79	77	81
22302	401	346	281	349	329	78	63	52	62	58
22304	651	679	747	958	869	46	47	51	65	59
22305	264	302	357	375	374	65	67	77	75	71
22311	315	343	356	356	398	62	65	62	71	78
22314	348	439	377	412	500	41	52	44	47	54
Total	**2,198**	**2,287**	**2,378**	**2,711**	**2,759**	--	--	--	--	--

PANEL C: TOP 10 CENSUS TRACTS WITH LARGEST AVERAGE ANNUAL BIRTH RATE

Census Tract	Total Women Ages 15 to 50		Births Per 1,000 Women Ages 15 to 50 in the Last Year					Average Annual Birth Rate
	2011	2015	2011	2012	2013	2014	2015	
201100	717	829	137	106	146	190	162	**148.2**
200302	1,482	1,280	28	54	99	197	223	**120.2**
200104	1,283	1,355	113	154	146	98	75	**117.2**
200703	886	984	104	102	79	94	107	**97.2**
201202	1,005	1,033	133	121	96	80	49	**95.8**
200301	963	1288	114	86	106	91	57	**90.8**
201500	942	851	65	66	108	98	98	**87.0**
200106	804	955	80	46	75	107	119	**85.4**
201400	1,212	1,289	89	71	74	86	87	**81.4**
Average	**1101.0**	**1183.1**	**57.5**	**57.5**	**58.4**	**65.6**	**64.6**	**60.7**

TRENDS IN STUDENT-AGED POPULATION GROWTH AND RACIAL COMPOSITION

KEY TAKEAWAYS

- ***The population ages 0 to 17 in Alexandria City has steadily increased between the years 2011 and 2015, with the largest increases occurring among those ages 0 to 4*** (Figure 1.5). Among all six ZCTAs combined, those ages 0 to 17 increased from a total of 22,128 to 25,557 persons from 2011 to 2015, or an increase of 15.5 percent (Figure 1.5, Panel A). As illustrated in Panel A in this figure, the youngest of this age group—those ages 0 to 4—make up the largest proportion of the student-aged population and has grown the most over the years. In total, those ages 0 to 4 increased from 9,228 persons in 2011 to 10,910 in 2015, a growth rate of 18.2 percent. Should an equal proportion of Alexandria City's youngest student-aged cohorts enroll in ACPS in the years to come as the current proportion of the youngest-aged students, and should rates of attrition hold constant, ACPS is likely to experience an increase in student attendance in the near future.
    - ***According to enrollment trends and forecasting data released in the Long Range Educational Facilities Work Plan (LREFWP) by the City of Alexandria, historically, trends in enrollment at ACPS have not matched trends in Alexandria's population growth***.[17] However, recent estimates show a converging of these trends, with steady increases in both enrollment and population growth. Should patterns in enrollment continue to resemble patterns in population growth, ACPS may likely experience a moderate increase in enrollment, at least in the short term.
    - ***In the long term, the VEC predicts small and positive increases in the number of males and females between the ages of 0 and 19 in the years spanning 2020 through 2040***.[18] The exception to these positive projections are those aged 10 to 19 between the years 2020 and 2030, in which the VED predicts slight decreases in total count.[19] Should population trends match these projections, ACPS may face marginally reduced enrollment during this decade.
- ***Some of the largest gains in student-aged populations from 2011 to 2015 in Alexandria City occurred among residents ages 5 to 11; these gains were offset by declines in this population in specific ZCTAs, however*** (Figure 1.5, Panel B). Three ZCTAs—areas 22301 (near Del Ray in Potomac West), 22305 (northern Potomac West), and 22311 (Alexandria West)—witnessed the largest increases in student-aged populations within the 5- to 11-age range, with increases of 325, 439, and 493 persons during the five-year period. This growth, however, is offset by declines in this age group in ZCTAs 22304 (Van Dorn) and 22314 (near Old Town). Thus, growth in

[17] "Chapter 2: Enrollment Trends and Forecasting." In *Long Range Educational Facilities Work Plan*, City of Alexandria, 2015. p. 2.2. https://www.alexandriava.gov/uploadedFiles/planning/info/LREFP/LREFP%20Chapter%202_Enrollmment_04%2021%202015.pdf

[18] "Virginia Community Profile: Alexandria City," Op. cit., p. 9.

[19] Ibid.

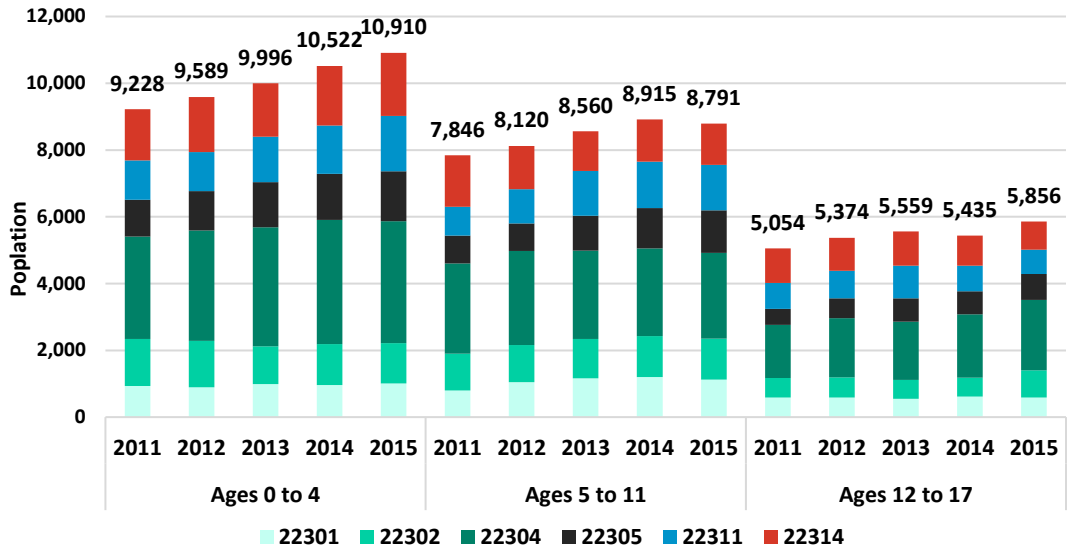
student-aged populations is uneven across geographies within Alexandria City, adding to the complexity of planning for grade-level feasibility. Only ZCTA 22305 experienced positive growth in every student age group (ranging from ages 0 to 17) between 2011 and 2015.

- ***Neighborhoods within Alexandria City drastically differ in their year-to-year change in student-aged populations*** (Figure 1.5, Panel C). In some instances, census tracts with large average year-to-year change declined in those ages 0 to 17 between 2011 and 2012 but increased in these populations from 2014 to 2015 (as is the case in tract 200103 near Lincolnia, for example). In other cases, census tracts with large average year-to-year change made large gains early on before experiencing declines in those aged 0 to 17, such as tract 200301 in northern Van Dorn. Census tract 201203 (in northern Potomac West), however, witnessed large and consistent growth in persons ages 0 to 17 from 718 persons in 2011 to 1,696 in 2015 for an average year-to-year increase of 244.5 persons. While other neighborhoods have larger student-aged populations than 201203, this neighborhood's consistent growth should be considered when planning for grade-level feasibility.
- ***The racial composition of Alexandria City's ZCTAs significantly differ, and several have grown more racially homogenous in their student-aged populations between 2011 and 2015; ensuring educational equity when planning for grade-level feasibility may be more complex due to these changes*** (Figure 1.6, Panel A). Based on the population estimates provided in Panel B in Figure 1.6, in 2011, the racial composition of the population ages 0 to 17 across all six ZCTAs was as follows: 42.3 percent white, 25.5 percent black, 22.6 percent Hispanic, 4.6 percent Asian, and 5.0 percent other race. Notably, the illustrations for each ZCTA provided in Panel A in this figure do not proportionally reflect the racial composition of Alexandria City's overall population in 2011. In fact, several large or majority racial groups in ZCTAs 22301 (near Del Ray), 22305 (in northern Potomac West), 22311 (Alexandria West), and 22314 (near Old Town) grew proportionally between the years 2011 and 2015. For example, in area 22301, white persons grew from 62 percent of the population ages 0 to 17 in 2011 to 72 percent in 2015. The racial composition of the student-aged population in ZCTA 22304 (Van Dorn), however, has remained the most diverse and representative of Alexandria City's population these ages.
    - ***Based on projection estimates released by the VEC, white residents are expected to continually make up a smaller portion of Alexandria City's residents between 2020 and 2040***.[20] By 2040, for instance, white residents (including those that identify ethnically as Hispanic) are expected to comprise 47.9 percent of the city's total population, while the remaining residents identify with another racial group.[21] Given these projections and the current patterns in the racial composition of the student-aged population highlighted in Figure 1.6, ACPS is likely to witness increases in students of color yet may encounter racial segregation across schools as a reflection of neighborhood segregation.

[20] Ibid.
[21] Ibid.

Figure 1.5: Five-Year Trends in Population Growth by Age in Alexandria City

PANEL A: YEAR-TO-YEAR TOTAL POPULATION BY AGE BY ZCTA



PANEL B: CHANGE IN POPULATION BY AGE FROM 2011 TO 2015 BY ZCTA

ZCTA	Ages 0 to 4			Ages 5 to 11			Ages 12 to 17		
	2011	2015	Change	2011	2015	Change	2011	2015	Change
22301	932	1,012	80	799	1,124	325	585	582	-3
22302	1,412	1,201	-211	1,105	1,224	119	590	819	229
22304	3,069	3,657	588	2,698	2,573	-125	1,588	2,112	524
22305	1,096	1,494	398	835	1,274	439	476	773	297
22311	1,177	1,657	480	863	1,356	493	781	732	-49
22314	1,542	1,889	347	1,546	1,240	-306	1,034	838	-196
Total	**9,228**	**10,910**	**1,682**	**7,846**	**8,791**	**945**	**5,054**	**5,856**	**802**

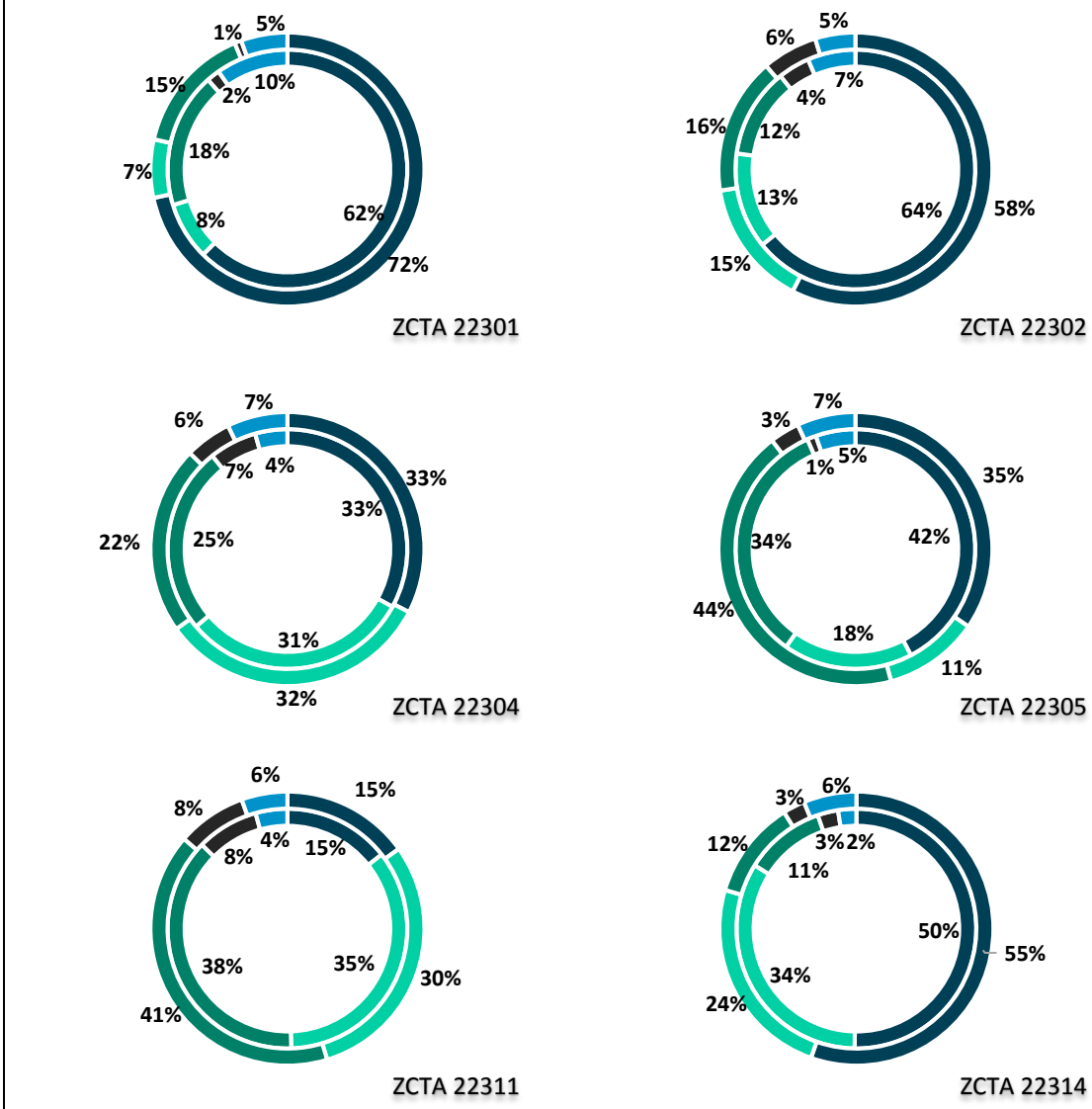
PANEL C: TOP 10 CENSUS TRACTS WITH LARGEST AVERAGE ANNUAL GROWTH IN POPULATION AGES 0 TO 17

Census Tract	Total Population Ages 0 to 17		Year-to-Year Change in Population Ages 0 to 17				Average Year-to-Year Growth
	2011	2015	2011-12	2012-13	2013-14	2014-15	
201203	718	1,696	258	255	136	329	**244.5**
200302	976	1,336	188	60	-24	136	**90.0**
200102	678	1,011	76	161	-19	115	**83.3**
200106	344	629	-99	123	180	81	**71.3**
200103	1,697	1,955	-114	8	56	308	**64.5**
200404	665	838	25	130	10	8	**43.3**
201500	632	805	129	16	13	15	**43.3**
200303	451	616	-119	-64	34	314	**41.3**
201100	809	971	18	189	-75	30	**40.5**
200301	460	605	57	164	10	-86	**36.3**
Average	**612.2**	**695.4**	**19.6**	**22.7**	**19.1**	**21.9**	**20.8**

Figure 1.6: Five-Year Trends in the Racial Composition of the Population Ages 0 to 17 in Alexandria City's ZCTAs

PANEL A: PROPORTION OF POPULATION AGES 0 TO 17 BY RACE IN 2011 AND 2015 BY ZCTA

Inner Estimates: 2011; Outer Estimates: 2015



PANEL: B: CHANGE IN POPULATION AGES 0 TO 17 BY RACE FROM 2011 TO 2015 BY ZCTA

ZCTA	White		Black		Hispanic		Asian		Other	
	2011	2015	2011	2015	2011	2015	2011	2015	2011	2015
22301	1,446	1,948	180	187	423	412	41	22	226	149
22302	1,994	1,868	403	485	376	524	133	213	201	154
22304	2,427	2,721	2,267	2,708	1,867	1,860	475	457	319	596
22305	1,019	1,224	421	398	809	1,550	29	124	129	245
22311	406	566	990	1,131	1,068	1,538	236	307	121	203
22314	2,071	2,197	1,386	959	450	460	114	103	101	248

TRENDS IN THE DISTRIBUTION OF INCOME

KEY TAKEAWAYS

- ***While the median household incomes of Alexandria City's ZCTAs have mostly increased from 2011 to 2015, wide discrepancies in median income have persisted across these communities over time*** (Figure 1.7, Panel A). In 2011, ZCTA 22311 (Alexandria City West) had the lowest median household income at $65,700 while ZCTA 22301 (near Del Ray) had the highest at $115,739. The gap in median household income spanning these areas widened through 2015. By this year, the median household income in area 22311 lowered to $61,829 while the median income rose to $125,347 in area 22301. Thus, the area in Alexandria City where household incomes are highest have a median income twice that of the area in which the median income is the lowest.
    - ***Such variance in incomes will likely have implications as ACPS considers alternate grade level configurations***. Students from wealthier or higher income homes enroll in private school at greater rates than those from households with less financial resources. For instance, an article published in City Lab in 2014 wrote that students from households earning incomes of $200,000 or more were over four-times more likely to enroll in a private school than those from households earning incomes less than $50,000.[22]
- ***Area 22304 (Van Dorn, where the largest proportion of families and student-aged populations reside) has a considerably large number of households that earn incomes less than $50,000*** (Figure 1.7, Panel B). Nearly 30 percent of all 20,642 households in ZCTA 22304 earned incomes under $50,000 in 2011 while just over 15 percent earned incomes of $150,000 or more. In 2015, roughly the same proportion of households earned incomes under $50,000 while 17.7 percent of households earned incomes of $150,000 or more. Unfortunately, the Census Bureau does not disaggregate these estimates among households with and without children. Nonetheless, given that ZCTA 22304 contains a relatively large number of persons ages 0 to 17, it is likely that a proportional number of those enrolled in ACPS from this area live in households with low incomes. Areas 22311 (Alexandria West) and 22305 (northern Potomac West), which boast fewer persons of school age, had even larger proportions of households with low incomes in 2015 at 39.1 and 29.6 percent, respectively. Thus, many students living in these communities may have less access to resources, which can play a role in student success.
- ***Most neighborhoods display similar proportions of households earning incomes in the lower ranges; differences in the proportion of households by income, however, sharpen across neighborhoods above a $35,000-income level*** (Figure 1.8, Panel A). As illustrated in Panel A in Figure 1.8, in both the years 2011 and 2015, census tracts tend to cluster in the percent of households earning annual incomes less than

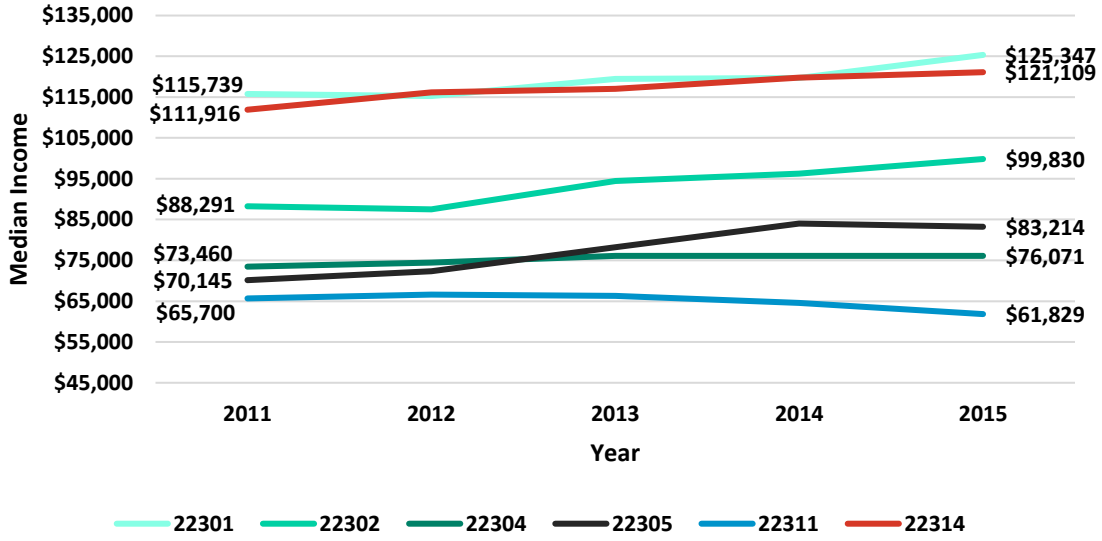
[22] Kolko, J. "Where Private School Enrollment Is Highest and Lowest Across the U.S." CityLab, August 13, 2014. http://www.citylab.com/housing/2014/08/where-private-school-enrollment-is-highest-and-lowest-across-the-us/375993/

$35,000. After this point, neighborhoods display greater variation in their dispersion of household income, with large inequalities in the percent of households with incomes of $200,000 or more. Nearly 50 percent of households in tract 200202 (in eastern Van Dorn) in 2011, for example, earned incomes of $200,000 or more, while no households reported incomes in this range in tract 200303 (in western Van Dorn). While household income varies considerably within and across census tracts, as estimates in Panel B in this figure reveal, neighborhoods with the lowest and highest median incomes have remained consistent over time.

- ***Compared to all households in Virginia, most census tracts in Alexandria City contain a smaller proportion of households earning low incomes and a greater proportion of households earning high incomes*** (Figure 1.9). Yet because the proportional distribution of household income varies considerably across neighborhoods within Alexandria City, planning for grade-level feasibility and equity as it relates to students' socioeconomic backgrounds is likely to be challenging.

Figure 1.7: Five-Year Trends in the Median and Annual Incomes of Alexandria City's ZCTAs

PANEL A: YEAR-TO-YEAR TRENDS IN MEDIAN INCOME BY ZCTA



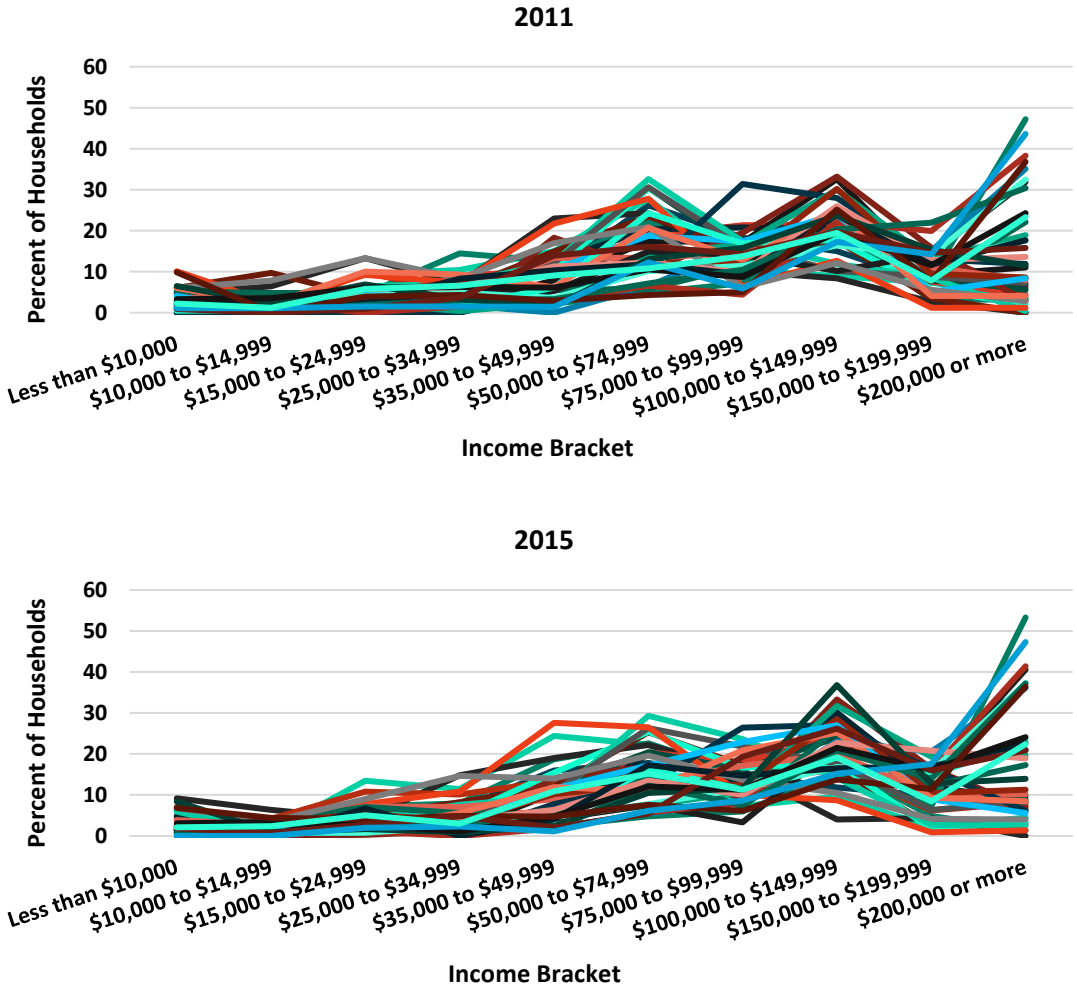
PANEL B: PERCENT OF HOUSEHOLDS IN LOWER AND UPPER INCOME BRACKETS BY ZCTA

ZCTA	Total Number of Households				
	2011	2012	2013	2014	2015
22301	4,900	4,838	4,861	5,012	5,218
22302	8,088	8,336	8,303	8,489	8,456
22304	20,642	20,838	20,974	20,829	20,988
22305	5,819	5,992	6,063	6,127	6,196
22311	7,531	7,418	7,612	7,527	7,679
22314	14,888	14,931	15,330	15,716	16,214

ZCTA	Percent of Households Earning Incomes Less than $50,000 (Low) and Percent Earning Incomes $150,000 or More (High)									
	2011		2012		2013		2014		2015	
	Low	High	Low	High	Low	High	Low	High	Low	High
22301	20.6	35.8	19.5	36.9	18.4	37.7	15.1	39.4	12.7	41.8
22302	25.4	23.9	27.4	23	26.2	23.8	24.4	25.1	20.8	26.4
22304	27.9	15.5	28.4	17.2	27	16.8	28.1	17.9	27.6	17.7
22305	33.4	18.8	32.7	18.9	31.2	21.4	29.7	22.7	29.6	23.3
22311	34	13.4	33.7	15.5	35	14.4	38	13.9	39.1	12.1
22314	19.6	33.2	16.4	35.2	16.8	36.2	16.2	37.5	15.5	36.9

Figure 1.8: Five-Year Trends in the Median and Annual Incomes of Alexandria City's Census Tracts

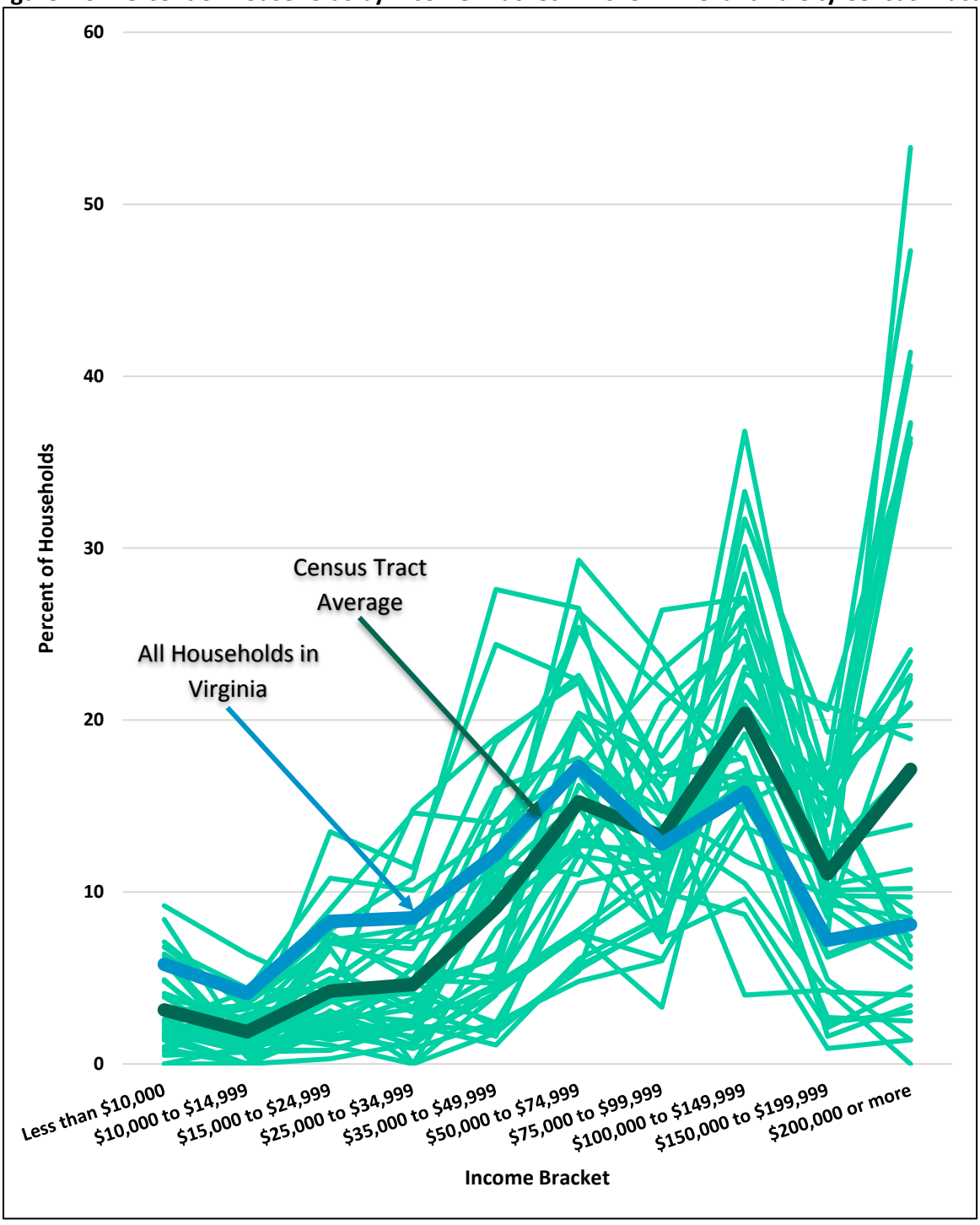
PANEL A: PERCENT OF HOUSEHOLDS BY INCOME BRACKET IN 2011 AND 2015 BY CENSUS TRACT



PANEL B: CENSUS TRACTS WITH THE LOWEST AND HIGHEST MEDIAN HOUSEHOLD INCOMES IN 2011 AND 2015

2011 Median Incomes				2015 Median Incomes			
Lowest		Highest		Lowest		Highest	
Tract	Estimate	Tract	Estimate	Tract	2015	Tract	2015
200105	$46,183	202001	$185,536	200105	$43,904	200202	$204,318
201203	$47,123	200202	$182,250	200103	$46,019	202001	$184,038
200500	$49,349	200900	$166,667	200500	$48,838	200900	$180,893
200103	$55,615	201500	$152,024	201203	$51,095	200801	$173,646
200303	$61,108	200404	$150,375	200104	$58,409	200404	$164,094
200406	$61,867	201802	$135,852	200106	$65,294	201500	$157,250
200104	$62,380	201100	$135,156	200405	$66,456	201100	$157,031
200405	$65,179	200701	$129,667	200102	$66,567	201802	$142,000
201204	$65,475	200801	$120,294	200303	$66,769	200702	$127,375
200407	$67,758	200702	$118,718	200406	$71,272	201300	$123,750
Tract Average Median Income			**$98,288**	**Tract Average Median Income**			**$106,543**

Figure 1.9: Percent of Households by Income Bracket in 2015 in Alexandria City Census Tracts



TRENDS IN MOBILITY PATTERNS

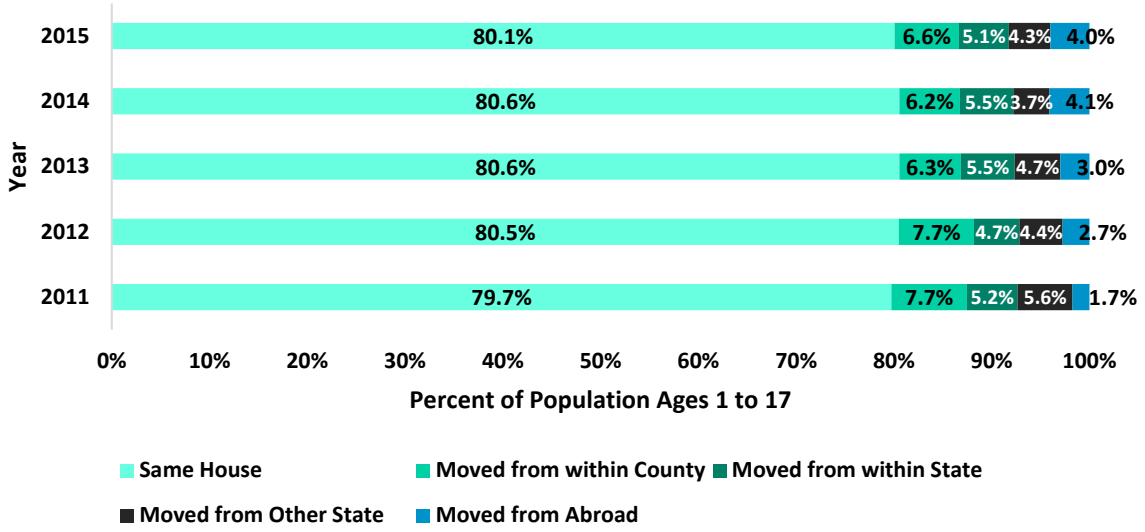
KEY TAKEAWAYS

- ***Roughly four-fifths of the population ages 1 to 17 in Alexandria City's ZCTAs indicated that they lived in the same home within the last year, a pattern that has remained consistent from 2011 to 2015*** (Figure 1.10, Panel A). Between 2011 and 2015, approximately 79.7 and 80.1 percent of those ages 1 to 17 lived in the same household within the last year. The remainder of the population these ages indicated that they had moved to a community within Alexandria City from within the county, state, country, or abroad.
    - ***While high, it appears that the mobility of student-aged populations has remained stable during the five-year period—a consistency that may minimize the difficulty of making enrollment projections***. As noted in the LREFWP, "Alexandria's close-in urban location, demographics and housing stock combine to make future changes in enrollment difficult to anticipate. Of the current population of the city, more than 15% has moved into the city in the past year, and about 15% of those who lived here a year ago have moved out."[23] Uneven density across Alexandria City's neighborhoods as well high rates of in- and out-migration can make it difficult to project future enrollment.[24] Given that rates of mobility among those aged 1 to 17 have not changed significantly each year from 2011 to 2015, however, ACPS can reasonably expect similar rates of mobility among the student-aged population in the future.
- ***Very few persons aged 1 to 17 moved to Alexandria City's ZCTAs from abroad during the years spanning 2011 to 2015*** (Figure 1.10, Panel B). ZCTAs 22304 (Van Dorn) and 22311 (Alexandria City West) did experience slight increases in the number of persons these ages that moved from abroad between the years 2011 and 2015, with increases of 270 and 211 persons, respectively. These areas aside, relatively small segments of the student-aged population moved to one of the six ZCTAs from another country within a year's time span.
- ***Roughly 12.0 percent of the population in 2015 ages 1 to 17 in each census tract on average moved to their current homes from another county, state, or country within a year's time span*** (Figure 1.10, Panel C). Neighborhoods with markedly higher rates of mobility among this population include tracts 200500 (in central Van Dorn), 200405 (in southern Van Dorn), and 200302 (in northern Van Dorn). These high rates of mobility can pose challenges to reconfiguration or other plans for grade-level feasibility as they make it difficult to gauge student enrollment.

[23] "Chapter 2: Enrollment Trends and Forecasting," Op. cit., p. 2.3.
[24] Ibid.

Figure 1.10: Five-Year Trends in the Mobility Status of the Population Ages 1 to 17 in Alexandria City

PANEL A: PERCENT OF THE POPULATION AGES 1 TO 17 BY MOBILITY STATUS WITHIN THE LAST YEAR IN ALL ZCTAS



PANEL B: CHANGE IN POPULATION AGES 1 TO 17 FROM 2011 TO 2015 BY MOBILITY STATUS BY ZCTA

ZCTA	Lived in the Same House Last Year			Moved from Abroad within the Last Year		
	2011	2015	Change	2011	2015	Change
22301	1,927	2,381	454	12	12	0
22302	2,450	2,390	-60	30	77	47
22304	5,031	5,455	424	107	377	270
22305	1,686	2,635	949	23	69	46
22311	2,031	2,620	589	110	321	211
22314	2,959	2,779	-180	62	48	-14
Total	**16,084**	**18,260**	**2,176**	**344**	**904**	**560**

PANEL A: TOP 10 CENSUS TRACTS WITH THE LARGEST PERCENT OF THE POPULATION AGES 1 TO 17 THAT MOVED FROM ANOTHER COUNTY, STATE, OR COUNTRY WITHIN THE LAST YEAR

Census Tract	2011		2012		2013		2014		2015	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
200500	40	6.1%	15	3.0%	238	40.8%	244	33.1%	340	**44.7%**
200405	418	42.4%	468	47.2%	533	56.3%	449	47.8%	360	**43.4%**
200302	106	10.8%	168	15.3%	272	24.1%	342	32.9%	460	**39.2%**
202002	41	22.7%	0	0.0%	0	0.0%	39	23.8%	34	**33.3%**
200104	79	11.1%	92	12.3%	72	9.7%	120	18.9%	188	**26.9%**
200107	131	26.6%	146	23.0%	174	36.7%	172	32.4%	138	**24.9%**
200105	27	4.4%	14	2.2%	90	11.1%	111	15.1%	145	**23.7%**
200303	171	45.8%	86	38.2%	78	58.6%	46	27.1%	99	**23.2%**
200102	26	4.4%	57	8.8%	91	11.0%	171	20.7%	192	**20.5%**
201600	139	14.9%	150	17.5%	55	7.9%	67	10.4%	93	**17.3%**
Average	**67.6**	**13.4%**	**68.8**	**12.5%**	**81.7**	**14.9%**	**87.1**	**13.2%**	**86.1**	**12.0%**

SECTION II: IMPLICATIONS MOVING FORWARD

In the following section, Hanover identifies prominent trends in each geographic area within Alexandria City based on results from the above demographic analysis and the implications these trends may have for local schools. Findings from previous phases of Hanover's ongoing study, including the literature review and the benchmarking analysis, are then used to explore the implications of high-growth areas for possible grade-level reconfiguration and feasibility within ACPS's schools.

NOTABLE DEMOGRAPHIC TRENDS BY ZIP CODE

As revealed in the demographic analysis of Alexandria City above, population growth from 2011 to 2015 has been uneven across ZCTAs as well as census tracts within those ZCTAs. Should these trends persist, ACPS is likely to face greater pressure to enrollment at some schools over others. Below, Hanover summarizes key demographic trends in each ZCTA and the implications these trends could have for enrollment at nearby schools.

AREA 22301 (DEL RAY)

SCHOOLS LOCATED IN AREA 22301

SCHOOL NAME	STREET ADDRESS	ZIP	GRADES
George Washington Middle	1005 Mount Vernon Avenue	22301	06-08
Maury Elementary	600 Russell Road	22301	KG-05

PROMINENT TRENDS FOR CONSIDERATION

Area 22301 near Del Ray boasts the fewest number of families than all other ZCTAs and experienced very small increases in the residency of three- to four-person and five- or more-person families from 2011 to 2015. Indeed, none of the neighborhoods located within this area—tracts 201500, 201400, and 201300—ranked among those with large increases in family residency. Though, tract 201500, a neighborhoods proximate to Maury Elementary School, has experienced increases in the number of births to women ages 15 to 50 over the five-year period. Thus, Maury Elementary may experience some increases in enrollment in the near future should these rates continue to increase. Given the area's relatively small number of families, however, pressure to enrollment is likely to be greater elsewhere than this community.

Just as few families live in area 22301, the growth of the student-aged population residing within this community remained relatively modest from 2011 to 2015 when compared to other areas in Alexandria City. At most, area 22301 saw a sizeable increase in the population ages 5 to 11 from 2011 to 2015 (325 persons), yet it witnessed much less growth in the population ages 0 to 4 (80 persons) during this period of time. Likewise, tract 201500 ranked among those neighborhoods with high average growth in the population ages 0 to 17 from 2011 to 2015; however, trends show a decline in year-to-year, consecutive growth.

As of 2015, area 22301's student-aged population was overwhelmingly white at about 72 percent—more than any other community in the area and much larger than Alexandria City's white student-aged population at 42.3 percent. Indeed, racial diversity declined in this community between 2011 and 2015. The area also boasts greater wealth as measured by annual income. At large, over 40 percent of the households in the community in 2015 earned annual incomes of $150,000 or higher, up from 35.8 percent in 2011. Should ACPS reconfigure grade levels at schools overlapping this ZCTA boundary, racial and socioeconomic factors may be prioritized to ensure equity and inclusion. Nonetheless, given area 22301's relatively small population increases among persons ages 0 to 17 from 2011 to 2015, it is unlikely that area 22301 should experience an influx of students in the near future requiring grade-level reconfiguration.

AREA 22302 (CENTRAL ALEXANDRIA)

SCHOOLS LOCATED IN AREA 22302

SCHOOL NAME	STREET ADDRESS	ZIP	GRADES
Charles Barrett Elementary	1115 Martha Custis Drive	22302	PK-05
Douglas MacArthur Elementary	1101 Janneys Lane	22302	KG-05
George Mason Elementary	2601 Cameron Mills Road	22302	KG-05
TC Williams High	3330 King Street	22302	09-12

PROMINENT TRENDS FOR CONSIDERATION

Area 22302 in the central region of Alexandria City intersects with the boundaries of several elementary schools, each of which primarily overlap with three contiguous census tracts: 201000 (overlapping with Charles Barrett Elementary), 200900 (overlapping with George Mason Elementary), and 200801 (overlapping with Douglas MacArthur Elementary). As illustrated in Section I, none of these neighborhoods are among the top tracts with the greatest numeric growth in family residency, and while area 22302 has grown by roughly 1,000 families from 2011 to 2015, the community's growth rates have been inconsistent in recent years. In a similar vein, the number of births to women ages 15 to 50 have declined as have the area's birth rates from 2011 to 2015.

Overall, trends in area 22302's family growth parallel the community's small growth among those aged 0 to 17. Not only does a small proportion of Alexandria City's student-age residents live in this community, but ZCTA 22302 was the only area to decline in its population ages 0 to 4 between 2011 and 2015. Altogether, the evidence suggests that the enrollment of students from this area is unlikely to surge with incoming cohorts, and therefore, may not necessarily require grade-level reconfiguration to address overcrowding.

While the size of the student-aged population has remained rather constant in this community, contrary to trends experienced by other ZCTAs, area 22302's racial homogeneity declined between 2011 and 2015. That is, black, Hispanic, and Asian subgroups ages 0 to 17

increased in their proportional size from 2011 to 2015 relative to white persons in the same age group. The distribution of high and low annual incomes across area 22302's households has also remained fairly even and constant during this period of time. Taken together, the community appears to be more equitable than others in its representation of different racial and socioeconomic subgroups.

AREA 22304 (VAN DORN)

SCHOOLS LOCATED IN AREA 22304

SCHOOL NAME	STREET ADDRESS	ZIP	GRADES
Francis C. Hammond Middle	4646 Seminary Road	22304	06-08
James K Polk Elementary	5000 Polk Avenue	22304	KG-05
Patrick Henry Elementary	4643 Taney Avenue	22304	PK-05
Samuel W Tucker Elementary	435 Ferdinand Day Drive	22304	KG-05

PROMINENT TRENDS FOR CONSIDERATION

Area 22304 in Van Dorn is the most populated area in Alexandria City and is made up of 12 census tracts. Within this community, James K. Polk Elementary and Patrick Henry Elementary overlap with tract 200302, Samuel W. Tucker Elementary overlaps with tract 200404, and Francis C. Hammond Middle overlaps with tract 200301, each of which have experienced relatively large increases in family residency, births, and/or student-aged populations in recent years. Census tracts 200301 and 200302, for instance, ranked among the top neighborhoods with the greatest numeric increase in total families from 2011 to 2015 at 274 and 170 families, respectively. These neighborhoods account for large increases in family residency among area 22304, which made its greatest gains in family residency between the years 2014 and 2015. In fact, tracts 200301 and 200302 ranked among those neighborhoods in Alexandria City with the largest year-to-year growth in families of five or more persons and average annual birth rates. Perhaps even more relevant to ACPS's interests, both of these census tracts, tract 200404, and tract 200303 (which overlaps with the newly proposed boundaries of James K. Polk Elementary and Patrick Henry Elementary schools), ranked among the top neighborhoods with average year-to-year growth among residents ages 0 to 17. Should these high-growth trends persist in the years to come, schools in this area may face pressure to enrollment, particularly in those neighborhoods most proximate to ACPS elementary schools.

Should the division reconfigure grade levels in area 22304, ACPS should take into account the community's racial composition, which displays the greatest racial balance compared to other ZCTAs in Alexandria City. Notably, about one-third of residents of school age are white, another third is black, and about 22 percent are Hispanic, the remainder of which identify with other racial groups. Just as area 22304's racial composition has remained balanced over time, the community's median household income has remained fairly stable from $70,145 in 2011 to $76,071 in 2015; although, this median income is much lower compared to the median incomes of Alexandria City's other communities. A closer look at the median incomes

of the neighborhoods within area 22304 reveal wide discrepancies across census tracts. Tracts 200405, 200303, and 200406 ranked among Alexandria City's neighborhoods with the lowest median household incomes in 2011 and in 2015 while tracts 200202 and 200404 ranked among those with the highest median household incomes each of these years. Thus, maintaining equity in student socioeconomic status across the community's schools may prove challenging should these patterns persist.

Aside from socioeconomic inequalities, another trend with potential implications for grade-level reconfiguration is area 22304's high rates of mobility among those ages 1 to 17. The percent of students these ages in 2015 that had moved from another county, state, or country within the last year in tracts 200405, 200302, and 200303 in 2015 was 43.4, 39.2, and 23.2 percent, respectively. These mobility rates are much higher than the tract average of 12.0 percent that year. Such moves may have effects on students' transitions to new schools and could be amplified should these same students switch schools again as a result of reconfiguration.

AREA 22305 (POTOMAC WEST)

SCHOOLS LOCATED IN AREA 22305

SCHOOL NAME	STREET ADDRESS	ZIP	GRADES
Cora Kelly Magnet Elementary	3600 Commonwealth Avenue	22305	PK-05
Mount Vernon Elementary	2601 Commonwealth Avenue	22305	PK-05

PROMINENT TRENDS FOR CONSIDERATION

Area 22305 in Potomac West is primarily made up of four census tracts: 201203 (overlapping with Cora Kelly Magnet Elementary), 201202 (overlapping with Mount Vernon Elementary), 201100, and 201204. At large, this community experienced steady and positive growth in family residency between 2011 and 2015 as well as increases in the birth rate. In fact, tract 201203 had the largest numeric increase in total families (at 401 families) while tract 201100 had the largest average annual birth rate (148.2 births per 1,000 women ages 15 to 50) during this five-year period out of all the neighborhoods in Alexandria City. Area 22305 was also the only ZCTA to show positive increases in every student-aged subpopulation ages 0 to 4, 5 to 11, and 12 to 17 between 2011 and 2015. Much of this growth occurred in census tracts 201203 and 201100, which ranked highly in average year-to-year growth among the population ages 0 to 17. Thus, despite the area's small population size compared to area 22304, 22305's robust growth in family residency, birth rates, and student-aged populations from 2011 and 2015 indicate that this community may likely face greater pressure to enrollment in the near future.

From 2011 to 2015, the racial composition of area 22305 shifted from a white-majority to a Hispanic-majority population ages 0 to 17. The black and Asian student-aged populations saw a proportional decline during these years as did those that identify with other racial groups. At the same time, the community declined in the percent of households earning annual incomes less than $50,000 while increased in the proportion of households with incomes of

$150,000 or more. At the neighborhood level, tract 201203 had a low median household income in 2015 (at $51,095) while tract 201100 boasted a high median household income (at $157,031). Overall, these trends suggest that a considerable amount of demographic change has occurred in Potomac West while the community has grown. Such change may make it difficult to ensure equitable racial and socioeconomic representation should ACPS reconfigure grade levels across schools. Though, the community has had low residential mobility among the population ages 1 to 17 in recent years—a trend that, if remains constant, will make it easier for the division to project enrollment in the future.

AREA 22311 (ALEXANDRIA WEST)

SCHOOLS LOCATED IN AREA 22311

SCHOOL NAME	STREET ADDRESS	ZIP	GRADES
John Adams Elementary	5651 Rayburn Avenue	22311	PK-05
William Ramsay Elementary	5700 Sanger Avenue	22311	PK-05

PROMINENT TRENDS FOR CONSIDERATION

Area 22311 in Alexandria West is primarily made up of five census tracts with a sixth (tract 200103) located just outside of its borders near Lincolnia. William Ramsay Elementary and John Adams Elementary are both located in just one of these neighborhoods (tract 200102), however, according to the approved redistricting plan, the boundaries of a third elementary school will overlap with census tracts 200104 and 200105 along Route 395. Indeed, findings from Section I's demographic analysis reveal an increase of about 400 families in the 22311 area from 2011 to 2015, with large increases in family residency in tracts 200107 and 200106 in the northern part of the community. Tract 200104, where the new school is to be built, as well as tracts 200107, 200102, and 200103 have shown large year-to-year increases in families of five or more persons. Growth in family size in tract 200104 in particular was likely sustained with large increases in births to women ages 15 to 50 from 2011 to 2015. Growth in family size aside, the area showed substantial average year-to-year increases in student-aged populations, specifically in tracts 200102, 200106, and 200103 with increases of 333, 285, and 258 persons ages 0 to 17, respectively.

While plans for a new elementary school will undoubtedly curb pressure to enrollment as a result of this growth, other racial, socioeconomic, and mobility factors may impact potential grade-level reconfiguration should ACPS decide to rearrange grade spans across schools. Approximately 85 percent of the those aged 0 to 17 residing within area 22311 are non-white, a majority of whom are Hispanic (41 percent as of 2015). The community's median household income has remained the lowest of all six ZCTAs from $65,700 in 2011 to $61,829 in 2015, a reduction of $3,871 and the only ZCTA estimate to decline during this five-year period. In fact, five census tracts in area 22311 ranked among those with the lowest median incomes in 2015of all the neighborhoods in the city. In addition to these demographic trends, four of the area's census tracts—200104, 200107, 200105, and 200102—exhibited a persistently large proportion of students that had moved from another county, state, or country each year.

Thus, many children residing within this community are likely to face racial and socioeconomic disadvantages than those in Alexandria City's other communities.

AREA 22314 (OLD TOWN)

SCHOOLS LOCATED IN AREA 22314

SCHOOL NAME	STREET ADDRESS	ZIP	GRADES
Jefferson-Houston Elementary	1501 Cameron Street	22314	PK-08
Lyles-Crouch Elementary	530 S St Asaph Street	22314	KG-05

PROMINENT TRENDS FOR CONSIDERATION

Area 22314 in Old Town primarily consists of 10 separate neighborhoods, two of which overlap with Lyles-Crouch Elementary (tract 202001) and Jefferson-Houston Elementary (tract 201600). At large, the community has witnessed steady growth in family residency in recent years, much of which is attributable to increases in small three- to four-person families. Just as the area witnessed modest increases in family residency, only one neighborhood within this community (tract 200703 in the southern part of Old Town) ranked among those in Alexandria City with the highest average annual birth rates from 2011 to 2015 (with an estimate of 97.2 births per 1,000 women ages 15 to 50 on average). The area also consists of a relatively small student-aged population and saw declines in residents ages 5 to 11 and 12 to 17 during this period. At the same time, the median household income rose considerably, from $111,916 in 2011 to $121,109 in 2015. Given these trends and the area's low rates of mobility among those ages 1 to 17, the evidence suggests that this community is less likely to face overwhelming pressure to enrollment in the future.

PRACTICAL CONSIDERATIONS FOR GRADE-LEVEL RECONFIGURATION

Based on the demographic trends discussed above, areas 22304 in Van Dorn, 22305 in Potomac West, and 22311 in Alexandria West are the most likely to face pressure to enrollment and overcrowding at several of ACPS's schools. While reconfiguring grade levels across schools may help to organize the student body and maximize the efficiency with which the division uses facilities space, as explored in earlier phases of Hanover's ongoing investigation, there are other practical considerations to grade-level reconfiguration. These implications include how grade-level reconfiguration impacts student achievement and wellbeing; how resources are managed across schools and whether or not alternative strategies to overcrowding should be considered; and how to best prepare for stakeholder feedback.

STUDENT ACHIEVEMENT, WELLBEING, AND SCHOOL TRANSITIONS

To briefly summarize, the most traditional grade configuration model across U.S. schools follows students from kindergarten to at least Grade 4 in elementary schools.[25] After Grade

[25] Renchler, R. "Grade Span." *National Association of Elementary School Principals*, 16:3, Spring 2000. p.2. http://files.eric.ed.gov/fulltext/ED440471.pdf

4, grade configuration varies, with some students transitioning to middle school (Grades 5 to 8 or Grades 6 to 8) or junior high (Grades 7 to 8). Other models may combine junior and senior high schools, which can span from Grades 6 to 12. However, students commonly enter high school in Grade 9.[26] While there is an array of possible grade span options, in all, the National Center for Education Statistics (NCES) finds that the most common elementary school configuration is Pre-K/Kindergarten through Grade 5, while the most common secondary school configuration is Grades 9 through 12.[27]

School overcrowding is just one reason a district may consider reconfiguration; sometimes districts reconfigure these grade-level models in response to new pedagogical theories aligned with the educational and developmental needs of students.[28] Foremost, many school districts across the nation have transitioned from middle or junior high schools into more comprehensive K-8 schools. As of 2014, there were over 6,500 K-8 schools in the United States, a significant increase from around 2,500 K-8 schools just decades earlier in 1994.[29] Minimizing the number of transitions students make from school to school is a key benefit to K-8 reconfiguration as students no longer have to transition to a middle school prior to high school entrance. Indeed, research shows that such transitions are linked with a wide range of academic and behavioral problems, such as decreased self-esteem, grades, test scores, engagement, attendance, and increased disciplinary infractions and suspensions.[30] As noted in a paper released by the Harvard University Institute for Economic Research, for example, "structural school transitions lower student achievement but […] middle schools in particular have adverse consequences for American students."[31] The K-8 model, therefore, eliminates these transitions, which otherwise hinder student performance and adjustment.

In Hanover's benchmarking analysis, two school districts combined traditional K-5 elementary and 6-8 middle schools into single K-8 schools: Aurora Joint District 28 in Colorado (referred to as Aurora Public Schools; APS) and Charlotte-Mecklenburg Schools in North Carolina (CMS). ***While both districts reconfigured schools to include this grade span for a more efficient use of space, APS also cited academic reasons for making this change as well***. APS's Planning Coordinator, Josh Hensley (Hensley), stated that K-8 schools were created to eliminate school

[26] "The Structure of Education in the United States." National Center for Education Statistics. https://nces.ed.gov/programs/digest/d13/figures/fig_01.asp?referrer=figures

[27] "Table 216.75: Public Elementary Schools, by Grade Span, Average School Enrollment, and State or Jurisdiction: 2013-14." National Center for Education Statistics, 2015. https://nces.ed.gov/programs/digest/d15/tables/dt15_216.75.asp?current=yes

[28] Schwerdt, G. "The Impact of Alternative Grade Configurations on Student Outcomes through Middle and High School." Harvard University Institute for Economic Research, September 2011. p.1. http://www.edweek.org/media/gradeconfiguration-13structure.pdf

[29] [1] "Table 216.80: Public secondary schools, by grade span, average school enrollment, and state or jurisdiction: 2013-14," Op. cit., p. 26. [2] "Table 216.10. Public Elementary and Secondary Schools, by Level of School: Selected Years, 1967-68 through 2011-12." National Center for Education Statistics, 2013. p. 216. http://nces.ed.gov/programs/digest/d13/tables/dt13_216.10.asp

[30] [1] Benner, A.D. "The Transition to High School: Current Knowledge, Future Directions." *Educational Psychology Review*, 23:3, April 2011. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3182155/ [2] Cook, P.J. et al., Op. cit. p. 106. http://dx.doi.org/10.1002/pam.20309 [3] Juvonen, J. et al. "Focus on the Wonder Years - Challenges Facing the American Middle School." RAND Corporation, 2004. pp. 13–15. http://www.rand.org/content/dam/rand/pubs/monographs/2004/RAND_MG139.pdf

[31] Schwerdt, G., Op. cit., p. 23.

transitions. Hensley also noted that the K-8 model helps to build closeness between students and teachers.[32] Alternatively, Scottsdale Unified School District (SUSD) in Hanover's benchmarking study separated K-8 schools into distinct elementary and middle schools. Terry Worcester (Worcester), the district's Director of Planning and Design, explained that this was done to enhance instruction at both levels, improve elementary and middle grade academic performance, and better prepare students in 6-8 schools for the transition to high school.[33]

Just as districts in Hanover's benchmarking study considered the use of facilities in combination with academic factors to reconfiguration, ACPS should incorporate these factors into decision making as well when determining the best approach to overcrowding. Overall, the body of evidence highlights that no single grade span configuration across schools works best for all districts' needs, nor do researchers unanimously agree on a "best" configuration model.[34] ACPS may reflect on answers to the following key questions when considering different grade-level models:[35]

- Will the grade configuration increase or decrease parent involvement?
- How many students will be enrolled at each grade level and what implication does this have on course offerings and instructional grouping?
- How many transition points will occur? How will these be addressed?
- How will the presence or absence of older students affect younger students?
- Is the design of the school building suited to this grade configuration?
- What is the cost and length of student travel?
- What are the opportunities for interaction between age groups?
- What are the effects of the grade configuration on curriculum? Is there better continuity and articulation in curriculum with fewer gaps and overlaps?
- Are there stronger ties among schools, students, and parents?

Resource Management and Alternative Strategies to Address Crowding

Operating costs and the management of resources are key issues for consideration when reconfiguring. Grade-level reconfiguration often entails added costs to a district for new materials, classroom items, facilities space, and student transportation.[36] Though,

[32] Hensley, Josh. Planning Coordinator, Aurora Joint District 28, Phone interview. December 14, 2016.
[33] Worcester, Terry. Director of Planning and Design, Scottsdale Unified District, Phone interview. December 16, 2016.
[34] Seller, W. "Configuring Schools: A Review of the Literature." Ontario Institute for Studies in Education, August 2004. p.2. http://www.hpedsb.on.ca/ec/directorsOffice/arc/documents/Configuringschools.pdf
[35] List of bulleted information taken from: Barton, R. and J. Klump. "Figuring Out Grade Configurations." *Principal's Research Review*, 7:3, May 2012. pp.4–5. http://educationnorthwest.org/sites/default/files/resources/PRR-Figuring-Out-Grade-Configurations.pdf
[36] Paglin, C. and J. Fager. "Grade Configuration: Who Goes Where?" Northwest Regional Educational Laboratory, July 1997. p. 10. http://www.cityofportsmouth.com/school/centraloffice/eefc/4g.pdf

researchers have found that such costs vary by district.[37] For example, a report published by the Brookings Institute estimated that the costs of reconfiguring from K-5/6-8 to K-8 schools ranges from about $50 to $250 per student based on national data and data reported by specific districts that have undertaken these efforts.[38] Of course, the costs of grade-level reconfiguration ultimately depend on the resources already available to the district and how much change is needed to accommodate the needs of new grades. In Hanover's benchmarking study, for example, Worcester noted that when reconfiguring grades at CMS, elementary school buildings often lacked amenities needed for older students, such as lockers or gymnasium facilities. As these observations would imply, ACPS's decisions to reconfiguration will likely impact how much financial support will be needed to accommodate instruction and program implementation.

With the costs of reconfiguration in mind, a district may turn to alternative strategies to reduce pressure to the use of facilities space. As benchmarked in earlier phases of Hanover's ongoing study, several school districts implemented a number of strategies to address overcrowding. One such strategy is altering the structure of existing spaces across classes and other rooms in a school to maximize the use of space.[39] Another strategy to address enrollment growth is the use of mobile or portable units to expand facilities. According to Community and Environmental Defense Services (CEDS), a network of professionals that help solve the environmental concerns of private, nonprofit, and public entities, nearly one-third of all U.S. schools during the 2012-2013 school year relied on the use of mobile units to house classrooms.[40] Adding portable units to a school is not the only structural solution to overcrowding and enrollment growth, however. Two districts Hanover interviewed in the benchmarking study have, or have considered, renovating existing or replacement schools in an effort to expand space. By doing so, students are provided with options for enrollment, which can ease overcrowding at a single school.

Altering school zone boundaries, restructuring the class schedule, and offering more online learning opportunities comprise three non-capital strategies for curbing pressure to enrollment. As noted by CEDS, adjusting school boundaries makes sense if one school is above enrollment capacity while another has excess space.[41] Restructuring the class schedule and offering more online learning opportunities, moreover, shift the focus of strategic enrollment planning from facilities space to instructional practice.[42] In these cases, districts may offer

[37] Jacob, B.A. and J.E. Rockoff. "Organizing Schools to Improve Student Achievement: Start Times, Grade Configurations, and Teacher Assignments." Hamilton Project, Brookings Institution, September 2011. p. 16. https://www0.gsb.columbia.edu/faculty/jrockoff/papers/092011_organize_jacob_rockoff_paper.pdf

[38] Jacob and Rockoff, Op. cit., pp. 5-6.

[39] Respondent 1. Anonymous District 1, Phone interview. December 7, 2016.

[40] "Preventing School Overcrowding & Other Development Impacts." Community and Environmental Defense Services. http://ceds.org/school.html

[41] Ibid.

[42] [1] "Year-Round Education Program Guide - Multitrack Year-Round Education." California Department of Education. http://www.cde.ca.gov/ls/fa/yr/guide.asp [2] "Research Spotlight on Year-Round Education." National Education Association. http://www.nea.org//tools/17057.htm

year-round or extended learning so that classrooms are shared for greater periods of time. Likewise, online learning opportunities create flexible use of learning spaces.[43]

STAKEHOLDER FEEDBACK

Strategies to address increasing enrollment should be informed by their implications for parents, educators, and feedback from the community at large. Several respondents in Hanover's benchmarking analysis, for example, noted that parents often express concern about the wellbeing of students during and after grade-level reconfiguration. At schools where elementary and middle grades were combined, parents expressed some apprehension about the mixing of younger and older students. Some also felt that Grade 8 students' preparation for the transition to high school would be negatively impacted when attending a school with much younger children.[44] At schools where elementary and middle grades were separated, parents expressed displeasure at the fact that siblings close in age would be attending separate schools. Rather, these parents preferred the continuity that K-8 schools offered.[45] Such pushback has been received at districts other than those included in Hanover's benchmarking study. A news article describing transitions taking place in Florence School District One in South Carolina, for instance, recounts such sentiment in which community members felt as though they had little input in the decision making process.[46]

In addition, educators will want to ensure alignment across grade reconfiguration, and like other community members, will want to have input in assignments and transitions between schools.[47] As in the case of APS, licensing requirements for elementary and secondary teaching certification presented challenges when reconfiguring to K-8 schools. Making teacher assignments to the new K-8 schools was difficult for administrators because separate certification is needed to instruct Grades K-6 and 7-8.[48] Thus, feedback from educators, particularly those who will be directly affected by reconfiguration, should be incorporated into district decision making practices.

[43] [1] "Year-Round Education Program Guide - Multitrack Year-Round Education," Op. cit. [2] "Research Spotlight on Year-Round Education," Op. cit.
[44] Hensley, Op. cit.
[45] Worcester, Op. cit.
[46] Rollins, M. "Parents Raise Concern About Florence School District One Boundary Maps." *SCNOW*, December 8, 2016. http://www.scnow.com/news/education/article_e45c36f2-bdc2-11e6-9dfb-1b750e1d67ac.html
[47] [1] "Supporting Students in Their Transition to Middle School." National Middle School Association and the National Association of Elementary School Principals, 2002. [2] Lorain, P. "Transition to Middle School." National Education Association. http://www.nea.org/tools/16657.htm [3] "Successful K-12 Transitions through Vertical and Horizontal Articulation." American Institutes for Research, October 25, 2011. http://www.ccrscenter.org/blog/successful-k-12-transitions-through-vertical-and-horizontal-articulation [4] Parrish, T. et al. "Making the Move: Transition Strategies at California Schools with High Graduation Rates." WestEd, October 2011. pp. 8–9.
[48] Hensley, Op. cit.

SECTION III: CURRENT ENROLLMENT & GRADE CONFIGURATIONS

In addition to exploring demographic trends in the region overall, ACPS has expressed interest in examining how grade configurations at different school sites may impact school capacity and over-enrollments. In order to simulate how different grade configuration scenarios impact district enrollment, Hanover uses current enrollment data to create and manipulate several different grade configuration scenarios for Grades PK-8 and examine their impact on over-enrollments. The major research questions addressed by this update are as follows:

- How does grade configuration interact with school capacity to determine over-enrollments throughout the school division?
- How can changes to grade configuration minimize over-enrollment, based on current enrollment figures?

The accompanying Tableau Dashboard allows users to explore additional grade configuration scenarios for Grades PK through 8, including the potential transition of one elementary school site into a Pre-K Center and the transition of more elementary and middle school sites to a K-8 grade configuration.

METHODOLOGY

DATA AND METHODS

This analysis and the accompanying Dashboard use data from the National Center for Education Statistics (NCES) Elementary and Secondary Information System (ElSi). ElSi provides information on every public school and local education agency (LEA) in the United States, including division-level enrollment by grade level. For the purposes of this update, Hanover employs the ACPS grade-level enrollment data from the most recently available year (2014-2015) to examine how students during this year could be re-distributed across schools under different grade configuration scenarios.

Capacity and square footage estimates for each school are drawn from the most recently available ACPS Long-Range Facilities Planning documents.[49] **The analysis relies on school capacity estimates for 2020,** in order to include current, ongoing, and near-term construction projects that allow selected schools to accommodate more students.

[49] "Long Range Educational Facilities Plan." Joint Alexandria City Public Schools/City of Alexandria, June 2015, pp. 49-50 and 52-120. https://www.acps.k12.va.us/cms/lib/VA01918616/Centricity/Domain/1026/lrefp/Long-Range-Educational-Facilities-Plan.pdf

PK/K-8 Schools

In order to create multiple configuration scenarios, Hanover adds additional PK- or K-8 schools in intervals of two from two through eight school sites. **Schools are transitioned to PK- or K-8 by size, beginning with the largest available schools**, but excluding the district's larger middle school (Hammond MS). Specific schools included in each scenario are provided in the figure below.

Figure 3.1: Summary of Schools by Configuration Scenario

School	Current Configuration	2020 Capacity
1 PK/K-8 School (Status Quo)		
Jefferson-Houston School	PK-8	800
Total PK/K-8 Capacity		**800**
2 PK/K-8 Schools		
Jefferson-Houston School	PK-8	800
George Washington Middle School	6-9	1,150
Total PK/K-8 Capacity		**1,950**
4 PK/K-8 Schools		
Jefferson-Houston School	PK-8	800
George Washington Middle School	6-9	1,150
John Adams Elementary School	PK-5	858
Patrick Henry Elementary School	PK-5	790
Total PK/K-8 Capacity		**1,950**
6 PK/K-8 Schools		
Jefferson-Houston School	PK-8	800
George Washington Middle School	6-9	1,150
John Adams Elementary School	PK-5	858
Patrick Henry Elementary School	PK-5	790
James K. Polk Elementary School	K-5	756
Mount Vernon Community School	PK-5	755
Total PK/K-8 Capacity		**4,354**
8 PK/K-8 Schools		
Jefferson-Houston School	PK-8	800
George Washington Middle School	6-9	1,150
John Adams Elementary School	PK-5	858
Patrick Henry Elementary School	PK-5	790
James K. Polk Elementary School	K-5	756
Mount Vernon Community School	PK-5	755
William Ramsay Elementary School	PK-5	748
Samuel W. Tucker Elementary School	K-5	620
Total PK/K-8 Capacity		**7,555**
All PK/K-8 Schools		
Total PK/K-8 Capacity*		**10,473**

*Note: This estimate includes *all* division elementary and middle schools; the capacity estimate is *without* a division Pre-K Center.

As K-8 schools are added, Hanover "fills" each school to its capacity with an equal number of students per grade level. Thus, the remainder of "over-enrolled" PK-5 students appears under K-5 Schools, while the remainder of "over-enrolled" 6-8 students appears under 6-8 middle

schools, except when all schools are PK/K-8. Under the no Pre-K Center scenario, PK students are "placed" in the largest schools until no Pre-K students remain. Under the Pre-K Center scenario, all Pre-K students are placed in the proposed Pre-K Center school site (Maury Elementary, see notes in the following subsection).

PRE-K CENTER

Given the relatively small size of the division's Pre-K program, Hanover selected the smallest-capacity elementary school—Matthew Maury Elementary (Maury ES)—as the potential site for a Pre-K Center. Maury ES is somewhat centrally located in southeast Alexandria and thus, presents a realistic potential site for the Pre-K program (see Figure 3.2 below). Other small schools in the division that may be viable options for a Pre-K Center include George Mason Elementary, which is also located in a somewhat central location. Two magnet schools also fit the size expectations of a potential Pre-K Center: Lyles-Crouch Tradition, which is located in the far southeast corner of the City, and Cora Kelly Elementary, which is located in the far northeast of the City. However, these additional options were not included in this analysis due to the better fit of Matthew Maury's current size and location, as well as its lack of magnet school status.

Figure 3.2: Potential Pre-K Center Locations Considered for Analysis

SCHOOL	LOCATION	2020 CAPACITY	MAGNET STATUS
Matthew Maury Elementary School	**600 Russell Rd Alexandria, VA**	**350**	✘
George Mason Elementary School	2601 Cameron Mills Rd Alexandria, VA	368	✘
Lyles-Crouch Traditional School	530 St. Asaph St Alexandria, VA	375	✓
Cora Kelly Elementary School	3600 Commonwealth Ave Alexandria, VA	429	✓

LIMITATIONS

This analysis has several limitations. First, the methodology assumes that students can be transferred easily across the school division and that schools can be enrolled evenly across schools. Furthermore, this analysis does not employ specific data on school boundaries, available classrooms in each school, or target class sizes. Thus, configuration scenarios consider potential over-enrollments in the district overall, rather than at the individual school level and does not consider that the number of students in each grade per school may mean available space is used less efficiently.

Finally, this analysis does not address the varying building and space needs of different age groups or student subpopulations in different school buildings. For instance, the analysis assumes that middle schools can be transitioned into PK-8 schools, and that elementary schools can be transitioned into either PK-8 or Pre-K only schools. Likewise, the analysis does not consider the specific space or location needs of special education students or other special programs. In practice, transitions such as these may require significant renovation to

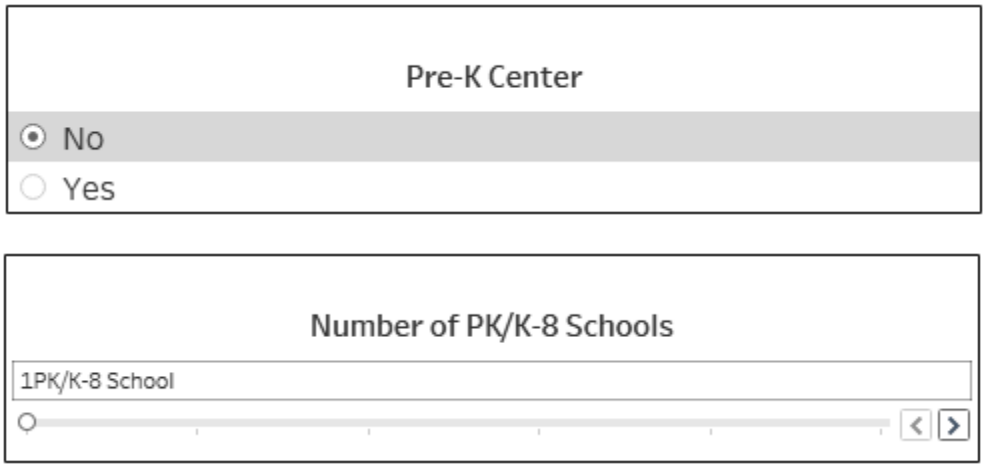
individual buildings to make spaces suitable for different student groups. Thus, the simulation tool shows an estimate of how students may be distributed based on current capacity only, rather than specific needs of different student ages or subgroups.

DASHBOARD INSTRUCTIONS

The accompanying Tableau Dashboard allows the user to simulate several different school configuration scenarios using provided filters to examine the effect of grade configuration on over-enrollments at various school levels. The Dashboard provides two filters, displayed in Figures 3.3 below. The first allows the user to select whether or not the district operates a Pre-K Center at the current site of Matthew Maury Elementary School. The second filter allows the user to select the number of PK/K-8 schools throughout the district. As previously noted, schools are transitioned to a PK/K-8 structure beginning first with George Washington Middle School, followed by district elementary schools from largest to smallest. Within the dashboard, the user can select:

- 1 PK/K-8 School (status quo scenario)
- 2 PK/K-8 Schools
- 4 PK/K-8 Schools
- 6 PK/K-8 Schools
- 8 PK/K-8 Schools
- All PK/K-8 Schools

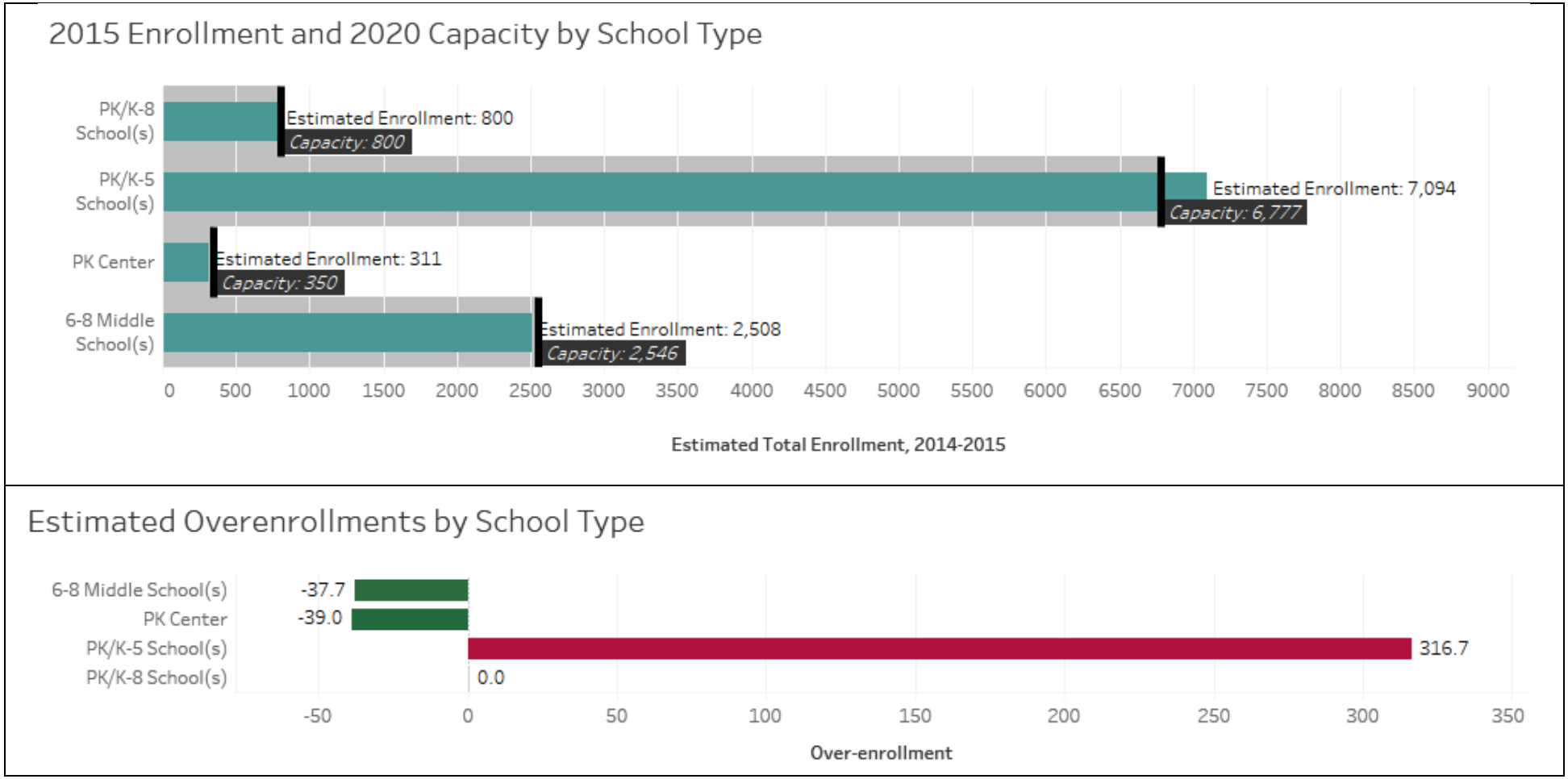
Figure 3.3: Tableau Dashboard Filter Options: Pre-K Center and Number of PK/K-8 Schools



Source: Tableau

Figure 3.4 on the following page provides a sample of one scenario: the conversion of one elementary school to a Pre-K Center. As shown in the figure, the first graph displays the simulated enrollment of each school level; those school levels where the blue bar exceeds capacity are considered over-enrolled, while those school levels where the blue bar falls below capacity are considered under-enrolled. The second graph provides a summary of the projected over-enrollment or under-enrollment by school level. Positive numbers, provided in shades of red, indicate over-enrollments beyond school capacity, while negative numbers, provided in shades of green, indicate under-enrollments.

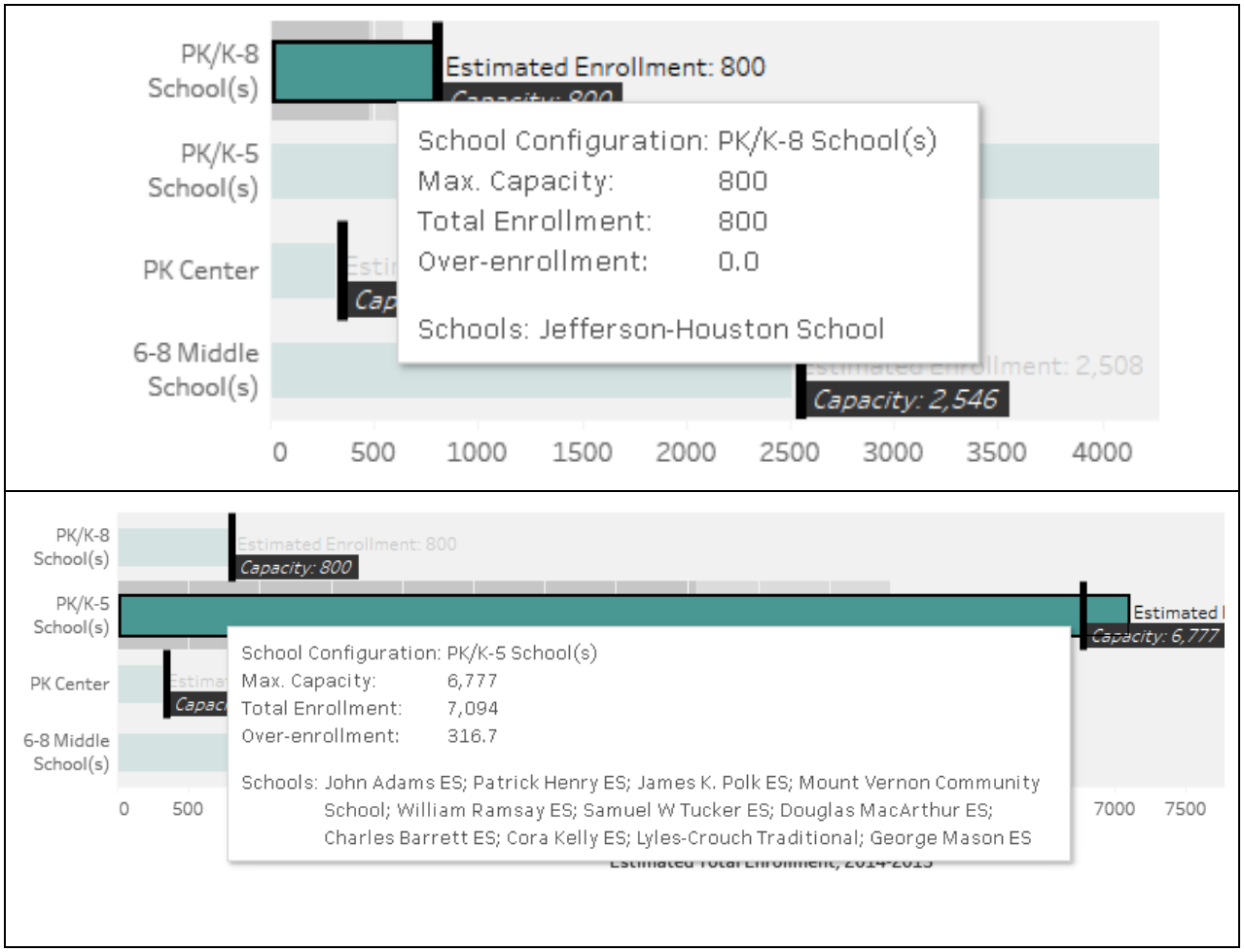
Figure 3.4: Sample of Dashboard Graphs – Pre-K Center Scenario



Source: Tableau

Hovering over or selecting a given school level, such as PK/K-5 schools or PK/K-8 Schools provides the user with a detailed label for that category. Each label offers a summary of school configuration, maximum capacity, simulated enrollment (2015 estimates), over-enrollment, and a list of the schools included in each group. For instance, Figure 3.6 below displays two sample labels for PK/K-8 and PK/K-5 Schools for the scenario listed on the previous page (1 PK/K-8 school, and a Pre-K Center).

Figure 3.5: Sample Detail Labels, PK/K-8 Schools and PK/K-5 Schools



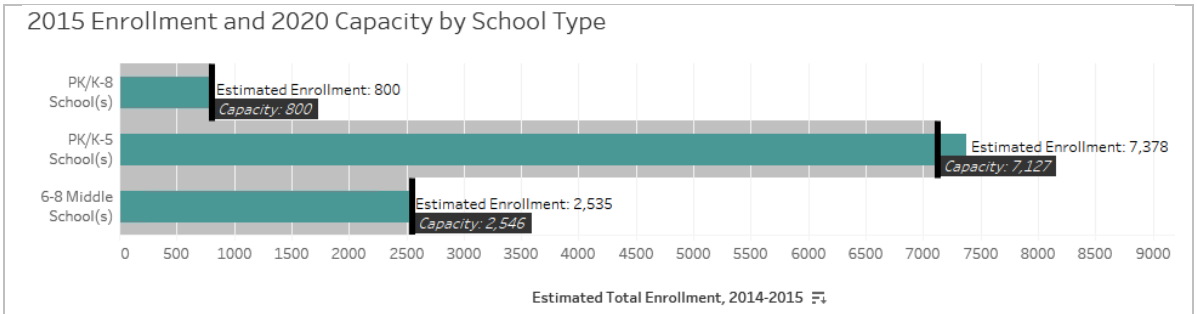
Source: Tableau

OVERVIEW OF CONFIGURATION SCENARIOS

STATUS QUO

Considering 2014-2015 enrollment data, the district's current grade configuration concentrates over-enrollments at the elementary level (Grades K-5) if the current PK-8 school and two 6-8 middle schools are filled to capacity and grade-level cohorts at the PK-8 site (Jefferson-Houston) are roughly equal to each other. However, as student groups progress through each grade level in the coming years, the larger cohorts observed in the elementary grades will increasingly shift the burden of over-enrollment to the middle school level.

Figure 3.6: Current Grade Configuration Scenario (1 PK/K-8 School)



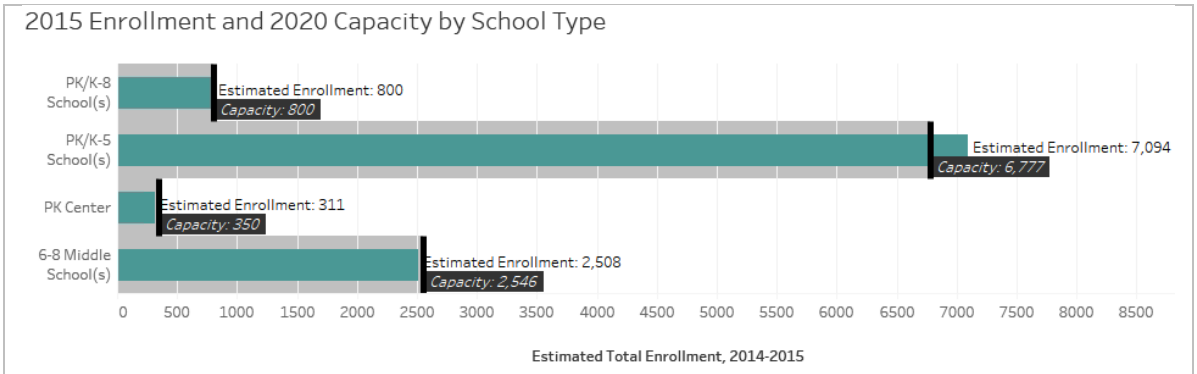
SCHOOL TYPE	NUMBER OF SCHOOLS	2020 CAPACITY	SCENARIO OVER-ENROLLMENT*
PK/K-8	1	800	--
PK/K-5	13	7,127	251
Middle Schools (6-8)	2	2,546	-11

*As previously noted, the simulation "fills" each K-8 school to capacity before placing remaining students at the other PK/K-5 and 6-8 schools. Thus, PK/K-8 schools do not display over-enrollment in mixed school scenarios.
Source: Tableau

PRE-K CENTER

As shown in Figure 3.7 below, introducing a Pre-K Center at the current Matthew Maury Elementary School site has the potential to create more space at the middle school level, because existing space in K-8 schools can be used for more elementary and secondary students. However, turning an elementary school into a Pre-K Center takes away some of the existing capacity for K-5 students and increases over-enrollment at this level. In order to address the increased over-enrollment at the elementary level, ACPS may consider housing the Pre-K Center at a new site altogether and/or considering alternative grade configurations that make more efficient use of space.

Figure 3.7: Pre-K Center Scenario



School Type	Number of Schools	2020 Capacity	Scenario Over-Enrollment*
PK/K-8	1	800	--
Pre-K Center	1	350	-39
PK/K-5	13	6,777	317
Middle Schools (6-8)	2	2,546	-38

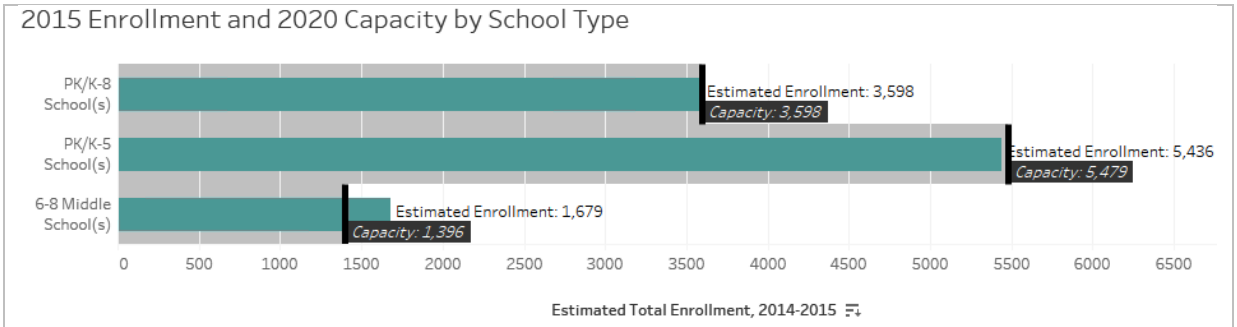
*As previously noted, the simulation "fills" each K-8 school to capacity before placing remaining students at the other PK/K-5 and 6-8 schools. Thus, PK/K-8 schools do not display over-enrollment in mixed school scenarios.
Source: Tableau

Moderate Introduction of K-8 Schools

The accompanying Dashboard allows the user to "add" PK/K-8 schools to the district in intervals of two (2, 4, 6, or 8), or transition all existing elementary and middle school sites to PK/K-8. Figures 3.8 and 3.9 on the following page provide a snapshot of two scenarios (four PK/K-8 schools and six PK/K-8 schools, respectively). As shown in the figures, transitioning operating four PK/K-8 school sites produces significantly different results than operating six or more such schools.

When examining these two potential scenarios, ACPS should consider which school buildings are best equipped to handle over-enrollment. For instance, the scenario "four PK/K-8 schools" concentrates over-enrollment at the middle school level, while the scenario "six PK/K-8 schools" concentrates over-enrollment at the elementary school level. If certain buildings can be more easily expanded, adjusted, or accommodate portable classroom units, larger class sizes, or other methods of incorporating additional students beyond intended building capacity, ACPS should consider choosing a scenario that shifts over-enrollments to these sites, rather than sites where accommodating extra students may be more difficult.

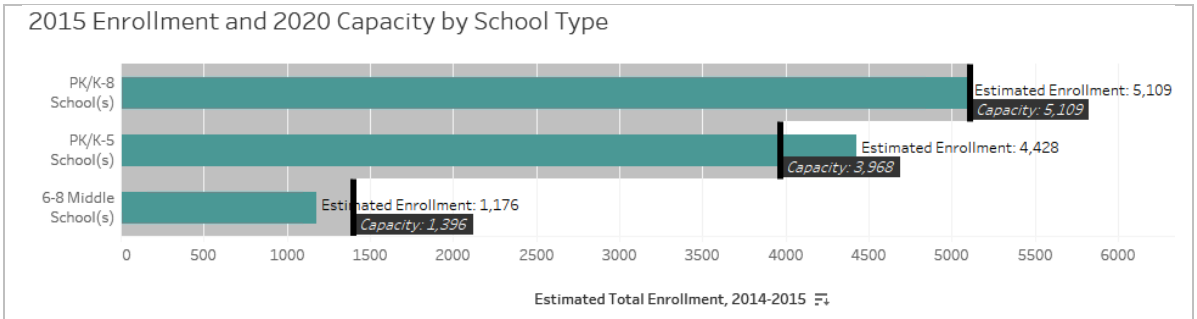
Figure 3.8: Four PK/K-8 Schools Scenario



School Type	Number of Schools	2020 Capacity	Scenario Over-Enrollment*
PK/K-8	4	3,598	--
PK/K-5	10	5,479	-43
Middle Schools (6-8)	1	1,396	283

*As previously noted, the simulation "fills" each K-8 school to capacity before placing remaining students at the other PK/K-5 and 6-8 schools. Thus, PK/K-8 schools do not display over-enrollment in mixed school scenarios.
Source: Tableau

Figure 3.9: Six PK/K-8 Schools Scenario



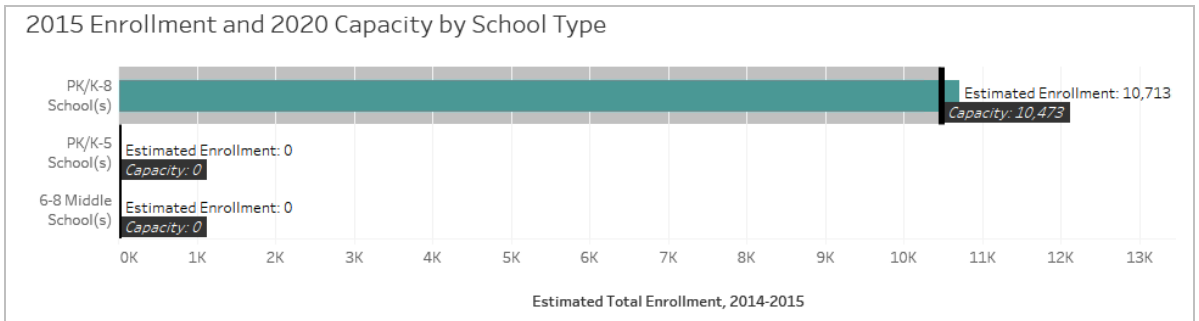
School Type	Number of Schools	2020 Capacity	Scenario Over-Enrollment*
PK/K-8	6	5,109	--
PK/K-5	8	3,968	460
Middle Schools (6-8)	1	1,396	-220

*As previously noted, the simulation "fills" each K-8 school to capacity before placing remaining students at the other PK/K-5 and 6-8 schools. Thus, PK/K-8 schools do not display over-enrollment in mixed school scenarios.
Source: Tableau

ALL K-8 SCHOOLS

Finally, the Dashboard allows the user to simulate a scenario in which all elementary and middle schools are transitioned to a PK/K-8 configuration, with or without the presence of a Pre-K Center. As shown in the figure below, total over-enrollment using the 2014-2015 simulation is 240 students, the minimum total over-enrollment among all scenarios used for this report. However, although the use of a consistent grade configuration minimizes theoretical over-enrollments, ACPS must consider the logistical challenges of shifting to an entirely PK/K-8 configuration. Students and their families in a K-8 school likely expect to stay in the same school through all nine years, potentially making redrawing school boundaries to accommodate growing neighborhoods difficult. Furthermore, this scenario would likely require the most renovation and investment in existing facilities to prepare existing elementary and middle schools to accommodate a wider range of student ages.

Figure 3.10: All PK/K-8 Schools Scenario



SCHOOL TYPE	NUMBER OF SCHOOLS	2020 CAPACITY	SCENARIO OVER-ENROLLMENT*
PK/K-8	15	800	240
PK/K-5	--	--	--
Middle Schools (6-8)	--	--	--

*As previously noted, the simulation "fills" each K-8 school to capacity before placing remaining students at the other PK/K-5 and 6-8 schools. Thus, PK/K-8 schools do not display over-enrollment in mixed school scenarios.
Source: Tableau

APPENDIX: ACS VARIABLE DESCRIPTION

Figure A.1: ACS Variable References

ACS Dataset Code	File Name	Measures Used
Trends in Family Residency and Fertility		
S1101	Households and Families	**Figure 1.2; Panels A-C** ▪ Total Families
B11016	Household Type by Household Size	**Figure 1.3; Panels A-C** ▪ Family Households: ○ 3- to 4-Person Households ○ 5- or More-Person Households
S1301	Fertility	**Figure 1.4; Panels A-C** ▪ Women with Births in the Past 12 Months Ages 15 to 50
Trends in Student-Aged Population Growth and Racial Composition		
B09001	Population Under 18 Years by Age	**Figure 1.5; Panels A-C** ▪ Total Population Living in Households: ○ Ages 0 to 4 ○ Ages 5 to 11 ○ Ages 12 to 17
B01001H B01001B B01001D B01001I	Sex by Age (White Alone Non-Hispanic, Black Alone, Asian Alone, Hispanic or Latino)	**Figure 1.6, Panels A-B** ▪ Total Population Living in Households: ○ Ages 0 to 17
Trends in the Distribution of Income		
S1901	Income in the Past 12 Months (in 2015 Inflation Adjusted Dollars)	**Figure 1.7; Panels A-B** **Figure 1.8; Panels A-B** **Figure 1.9** ▪ Median Income ▪ Percent Households with Incomes of: ○ Less than $50,000 and $150,000 or more ○ Less than $10,000 through $200,000 or more
Trends in Mobility Patterns		
B07001	Geographical Mobility in the Past Year by Age for Current Residence in the United States	**Figure 1.10; Panels A-C** ▪ Moved to Current Residence from Within the Same County; Within the Same State; from Different State; From Abroad ○ Ages 1 to 17
All ACS files can be found using file code names through American FactFinder: "American Factfinder." U.S. Census Bureau. https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml		

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