

City of Richmond Department of Public Utilities

Financial Capability Assessment and Household Affordability Evaluation

February 27, 2024

February 6, 2024

Mr. John "Billy" Vaughan
Utilities Comptroller
730 East Broad St.
Richmond, VA 23219

Subject: City of Richmond Affordability Evaluation

Dear Mr. Vaughan,

Raftelis Financial Consultants, Inc. (Raftelis) is pleased to provide this Financial Capability Assessment which is part of the Affordability Evaluation Study (Study) performed for the City of Richmond (City) Department of Public Utilities (DPU). This report presents a comprehensive review of the affordability methodologies evaluated according to the most recent EPA guidance as it applies to the City's wastewater system and customers. The Study focused on multiple tools to capture various City affordability challenges, not only to produce the FCA, but also provide a tool to inform long-term comprehensive plans and potential impacts of the Combined Sewer Overflow Long-term Control Plan.

The major objectives of the Study include the following:

- To evaluate the City's results under the EPA's most recent affordability framework and guidance
- To evaluate alternative measures of community financial capability and household affordability based on updated methodologies and frameworks.

It has been a pleasure working with you, and we thank you and the City staff for the collaborative effort to ensure the study reflects the local challenges and unique characteristics of the City system.

Sincerely,

Bart Kreps

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Executive Summary

The City of Richmond (City) Department of Public Utilities (DPU) engaged Raftelis Financial Consultants, Inc. (Raftelis) to conduct an affordability assessment of the City's wastewater utility system considering the additional financial and rate impacts associated with the Combined Sewer Overflow Long-term Control Plan (CSO Plan). The CSO Plan includes both an interim plan of approximately \$300 million in capital and other improvements and an additional \$625 million for full compliance by 2035.

The affordability analysis was developed based on the Environmental Protection Agency's (EPA) Financial Capability Assessment (FCA) Guidance, which originated in 1997 and was most recently updated in 2023. The FCA provides a framework to assess the affordability of wastewater services, which was augmented by a more detailed analysis of the City's demographics and census-tract level data, to provide a granular examination of both the current affordability of services and long-term impacts associated with the CSO Plan.

The following summarizes the results of the analysis.

- Historically, the City has generated sufficient revenue to support needed capital investments in its wastewater system while preserving the financial sustainability of the utility fund. However, the resulting rates have placed significant strain on a large portion of the customer base and the impact of funding additional CSO improvements will increase the burden.
- The City has lower household income and higher rates of poverty compared to the national average.
- About 25% of residential customers currently live in census tracts considered high-burden based on the prevalence of poverty.
- Nearly 28,100, or about 59%, of residential customers currently live in census tracts labeled high burden when comparing average wastewater bills to the Lowest Quintile Income (LQI) in those census tracts¹. Even with grant assistance, additional CSO compliance costs will increase this number to around 32,400, or about 68% of residential customers².
- The rate increases required to support the CSO program and address DPU's other wastewater capital needs will increase customer monthly bills significantly and the related affordability challenges will worsen. A typical customer's monthly wastewater bill is projected to increase from around \$76 to between \$160 and \$180 dollars over the next 16 years (depending on grant funding scenario). The cumulative impact on customers equates to an annual average rate increase between 5.4% under a high grant scenario to 6.0% under a low-grant scenario.
- Over the past decade plus, the City's wastewater rates have increased by approximately 5.2% annually while income has increased around 4.0% annually. The cost of providing wastewater utility services in the City will likely continue to outpace income growth and the

¹ Includes only active residential wastewater accounts in the City's billing database.

² High grant assistance scenario.

City will need to keep rate increases at or near 4.0% to not exacerbate its affordability challenges.

- The City has implemented several programs to support low-income customers and is currently evaluating additional ways to provide assistance with utility bills within the construct of State law. However, significant funding from the State level will be necessary to not further worsen the affordability of wastewater services for a meaningful portion of the City's customer base.

1. Introduction

1.1. Background of the Study

The City engaged Raftelis to conduct an affordability assessment of the wastewater utility system considering the additional financial and rate impacts associated with the CSO Plan. The framework used to assess the affordability of the CSO Plan followed the Environmental Protection Agency's FCA Guidance. This report documents the results of the analysis.

1.1.1. Financial Capability Assessment Guidance

CSO Guidance for Financial Capability Assessment and Schedule Development was published by the EPA in 1997 and provided a framework for utilities to evaluate their ability to finance capital improvements related to CSO consent orders. The document, known as the 1997 Guidance, builds on previous EPA publications and indicates that, for regulatory and compliance scheduling purposes, financial capability can be assessed with a two-phase evaluation of a municipality. The first phase determines the Residential Indicator (RI), and the second phase is an assessment of six additional parameters indicative of overall financial strength of the community.

Phase 1 RI reflects the residential share of the total costs of the CSO program and any other existing operational costs and existing debt obligations of the wastewater system. The RI is reported as the average cost per customer as a percent of median household income in the service area. A low financial impact is expected for this ratio to be less than 1.0%, a mid-range impact occurs when this metric is between 1.0% and 2.0%, and a high financial impact is expected with this metric greater than 2.0%. According to the 1997 Guidance, this evaluation should be performed with consideration for wastewater and stormwater costs; however, recently some utilities have expanded this analysis to include drinking water costs and doubled the thresholds.

Phase 2 examines six parameters intended to measure the underlying financial strength of the community, collectively called the Permittee Financial Capability Indicator (FCI). Two of these indicators address existing debt obligations, two consider socio-economic conditions, and two relate to property tax data. These six parameters are compared with benchmark figures (nationwide data, for example) or against specific criteria provided by the EPA. Thus, the RI is intended to represent a prospective household affordability, and the FCI is intended to represent existing financial capacity of the community to accommodate the financial burden.

Table 1

Table 1 below summarizes the financial capability matrix scoring.

Table 1. 1997 FCA Guidance Matrix

Financial Capability Indicator	Residential Indicator		
	Low Impact (Below 1%)	Mid-Range (1.0% to 2.0%)	High Impact (Above 2%)
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden
Mid-Range (1.5 to 2.5)	Low Burden	Medium Burden	High Burden
Weak (Below 1.5)	Medium Burden	High Burden	High Burden

Several groups have published critiques of the 1997 Guidance, including the US Conference of Mayors, the National Academy of Public Administration, water industry organizations, and municipalities themselves. The primary critique is that using a singular data point (MHI) as the metric upon which a community’s financial capability pivots does not consider the myriad of local financial and demographic situations that significantly alter this evaluation. For example, even if the RI for the City is determined to be above 2%, they would still only show a “Medium Burden” result because the City’s FCI is strong. Despite the addition in January of 2019 of formal guidelines for Integrated Planning into the Clean Water Act (CWA) legislation, the EPA continued to point to the 1997 Guidance as the baseline for financial capability assessment. The EPA also released the 2014 *Financial Capability Assessment Framework for Municipal Clean Water Act Requirements* (2014 FCA Framework) to add more flexibility to the 1997 Guidance. The 2014 FCA Framework encouraged communities to submit additional financial and demographic information relevant to the community’s ability to fund CWA control measures and programs.

In February 2023, EPA released *Clean Water Act Financial Capability Assessment Guidance* (2023 Guidance) as an update to the 1997 FCA Guidance. This 2023 Guidance combines aspects of the 1997 Guidance and 2014 FCA Framework and describes options that communities can use when assessing financial capability to meet CWA requirements, while also improving upon the EPA’s ability to consistently apply FCA methodologies across the country. Specifically, the 2023 Guidance expands on the previous 1997 Guidance with the inclusion of two alternative approaches for assessing the financial capability to implement CWA control measures.

Under Alternative 1, the 1997 FCA methodology remains as a foundation, but it is expanded to better consider impacts on the low-income population within the service area in a new critical metric called the Lowest Quintile Poverty Indicator (LQPI) Score. It also includes further analysis to consider other feasible alternatives to reduce cost and impacts on low-income households, called the Financial Alternatives Assessment. Alternative 2 allows permittees to develop financial planning models that analyze the impacts of rate increases on utility customer bills over time, while evaluating the LQPI Score and performing a Financial Alternatives Analysis similar to Alternative 1.

Alternative 1 as described in the 2023 Guidance maintains the two-phase approach of the 1997 FCA methodology, continuing to direct the calculation of the RI and the FCI. As noted above, the 2023 Guidance further builds on the previous methodology by adding an additional metric called the LQPI. The LQPI combines the results of six indicators to benchmark the prevalence of poverty, building a more thorough estimation of the number and severity of low-income households and

economic pressures in the service area. The six poverty metrics calculated to determine the LQPI are:

1. Upper Limit of Lowest Quintile Income (Weighted 50%)
2. Percent of Population with Income Below 200% of Federal Poverty Level (FPL) (Weighted 10%)
3. Percentage of Population Receiving Food / SNAP Benefits (Weighted 10%)
4. Percent of Vacant Households (Weighted 10%)
5. Trend in household Growth (Weighted 10%)
6. Percentage of Unemployed Population 16 and Over in Civilian Labor Force (Weighted 10%)

The local values for these metrics are compared to the national values as a benchmark. When the local values are more than 25% better than the national metric, the result is a strong rating. A local value 25% worse than the national average is considered weak. Values within 25% of the national metric are considered mid-range. The individual ratings are averaged by assigning a value of 3 for a strong result, 2 for mid-range, and 1 for weak. This composite score is the LQPI.

As with the FCA evaluation, the RI and LQPI values are combined in a matrix to evaluate the burden on low-income households in the service area. This represents an improvement to the 1997 Guidance since there is recognition of the prevalence of poverty in the community. Table 2 presents the evaluation matrix for the RI and LQPI.

Table 2. 2023 FCA Guidance Matrix

FCA Score	LQPI Score		
	Low Impact	Medium Impact	High Impact
Low Impact	Low Impact	Low Impact	Medium Impact
Medium Impact	Low Impact	Medium Impact	High Impact
High Impact	Medium Impact	High Impact	High Impact

Alternative 2 of the 2023 Guidance allows a municipality to develop a long-term forecasting model that projects system cashflow throughout a potential compliance schedule and identifies the future rate increase adjustments that support implementation of a capital program, ongoing O&M costs, other capital needs, and considerations for financial policies. These models are then used to forecast the typical bill that a residential customer would receive and compare these bills to household income at the median and lowest quintile levels. These results are depicted over time and similar thresholds are established as indicators of high burden. Alternative 2 provides a more granular examination of affordability and is more reflective of actual impacts on customers.

2. City of Richmond Characteristics and Demographics and Study Data

This section documents the findings of customer and demographic analytics. Data used in the demographic analysis were obtained from the US Census Bureau's 2022 American Community Survey (ACS) five-year estimates. The US Census Bureau publishes multiple surveys and programs nearly every year. The decennial 2022 Census is the most commonly known dataset as the survey is intended to be completed by every household in the US. However, the data collected is limited to only a few questions about age, occupancy, rental status, race, etc. The ACS data is a much more comprehensive survey conducted each year. The ACS is sent to roughly 3.5 million addresses and asks about many topics not in the 2022 Census, including income, employment, transportation, etc. The ACS data is used to inform decisions at the national and local level related to specific programs to serve communities. The ACS five-year estimates are data collected over 60 months and normalized to a single year resulting in smaller margins of error and less volatility year-to-year. At the time this analysis was performed, the 2022 information was the most recently published by the US Census Bureau.

2.1. Community Characteristics

The City is the fifth largest metropolitan city in the State of Virginia in terms of population. It has seen approximately 11% growth in population over a ten-year span since 2012, which is about 3% higher than the average growth for the State of Virginia and 4% higher than the National average. Figure 1 presents the population growth for the City alongside the State and National trends over the same period of time. Figure 2 presents the City's population since 2012, which shows a sustained growth of about 1.0% per year.

Figure 1. Population Change, 2012-2022

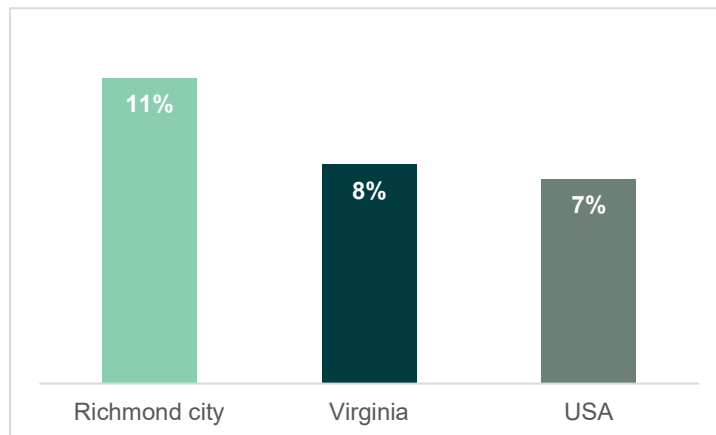
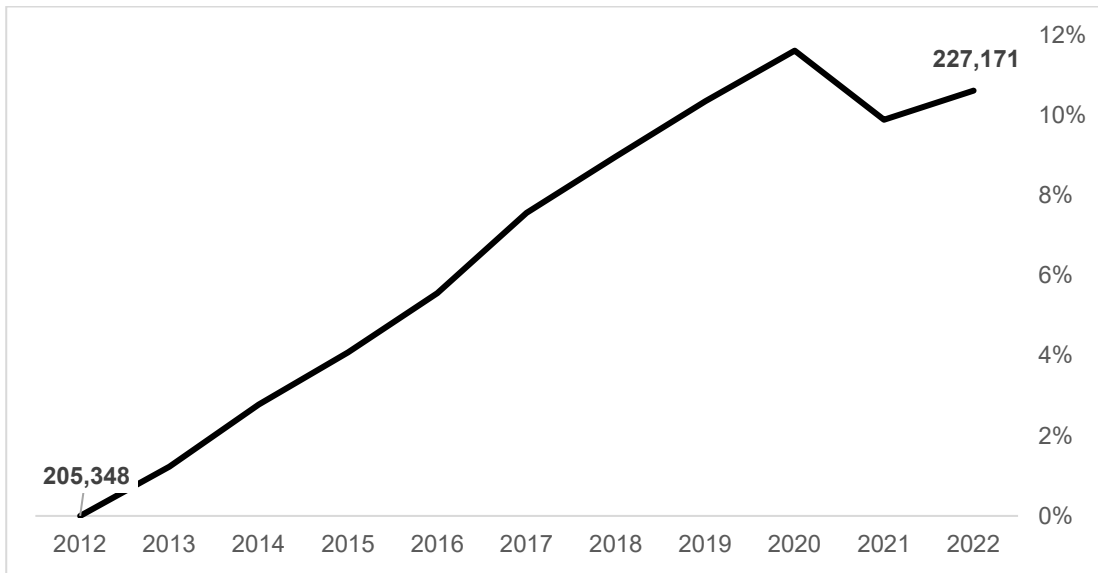
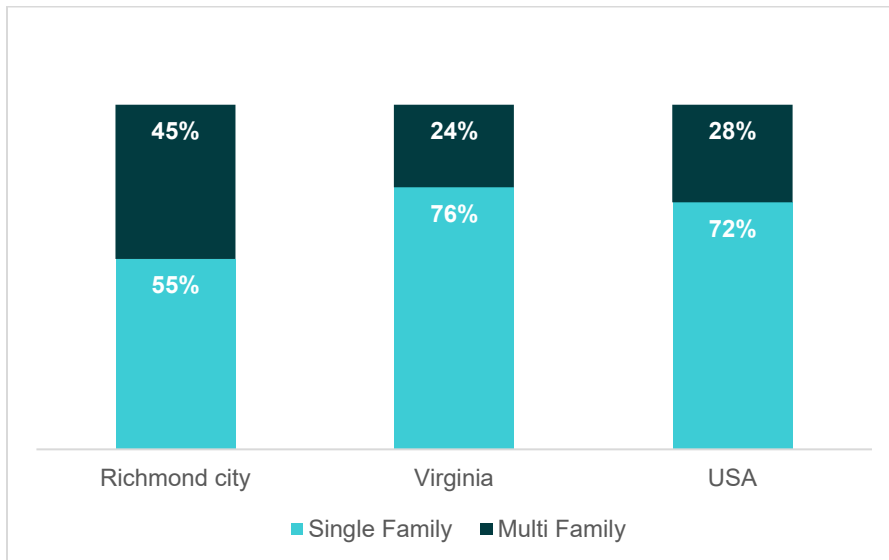


Figure 2. Richmond city Population Since 2012



The figures above show moderate year-over-year growth for the City over a ten-year period. In addition to population, housing statistics were also examined. The first consideration was the breakdown of single-family homes (one unit attached and detached) vs. multi-family housing units (for two units or greater)³. This information can be relevant since, in many cases, renters receiving utility services may not be direct customers of the utility as these costs are included within their rent. Figure 3 shows the breakdown of single family vs. multi-family housing units for the City as well as the State and National statistics. As shown, the City has a significantly higher proportion of multi-family housing units than the State or National average.

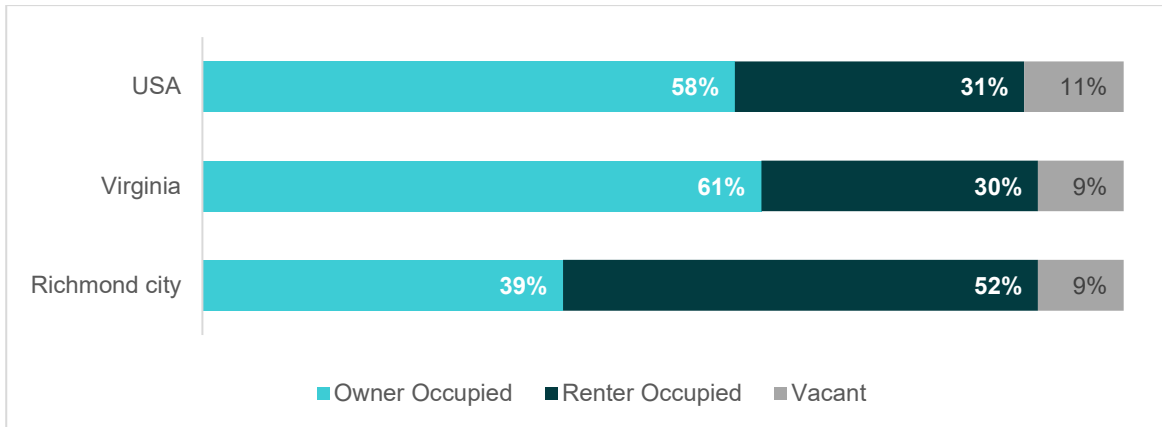
Figure 3. Single-Family vs Multi-Family Housing Units



³ Census data on Mobile homes, boat, RV, van, etc. were excluded from these statistics.

The City's total housing has increased 20.8% since 2012, with owner occupied housing increasing by an average compound rate of 1.7% per year and renter-occupied housing increasing by 2.1% a year. Figure 4 shows the occupancy characteristics for the City relative to the State and National statistics. As shown, renter-occupied housing is more prevalent in the City and has seen increased growth as well.

Figure 4. Type of Occupancy



In addition to occupancy type, household size and age of structure were also analyzed (see Figure 5 and Figure 6). As shown, the City has a much lower average household size and higher structural age compared to the State and National average in both owner-occupied and renter-occupied structures.

**Figure 5. Average Household Size
(Persons per Household)**

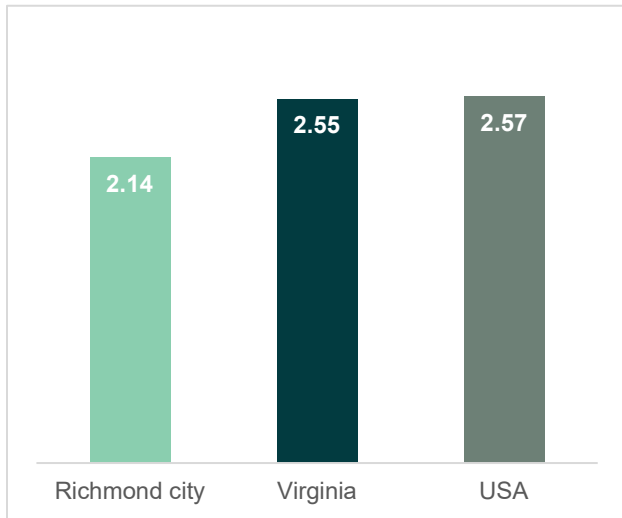
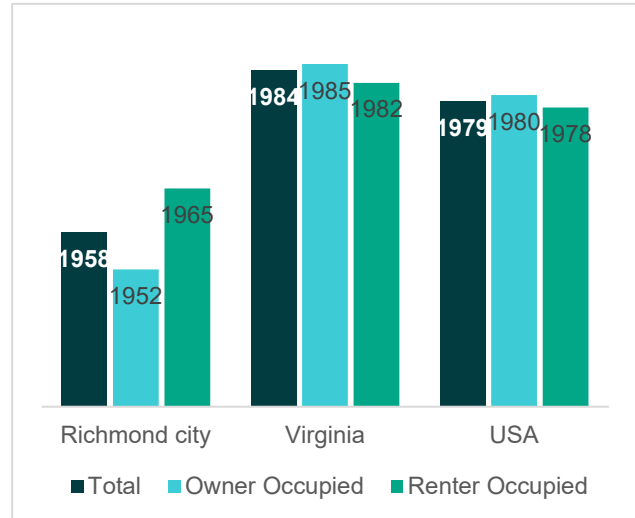


Figure 6. Median Year of Housing Structures Built



This high-level demographic assessment provides insights into the affordability of wastewater service for City customers. As it relates to affordability, key takeaways include:

- Customers are more likely to live in multi-family housing and, therefore, may be an indirect customer of the system (master-metered property).
- Customers are more likely to be renters and may not directly pay their own wastewater bills.
- The higher age of housing structures may correlate to less efficient fixtures for both owner- and renter-occupied households.
- There are fewer persons per household, which should result in lower wastewater usage.

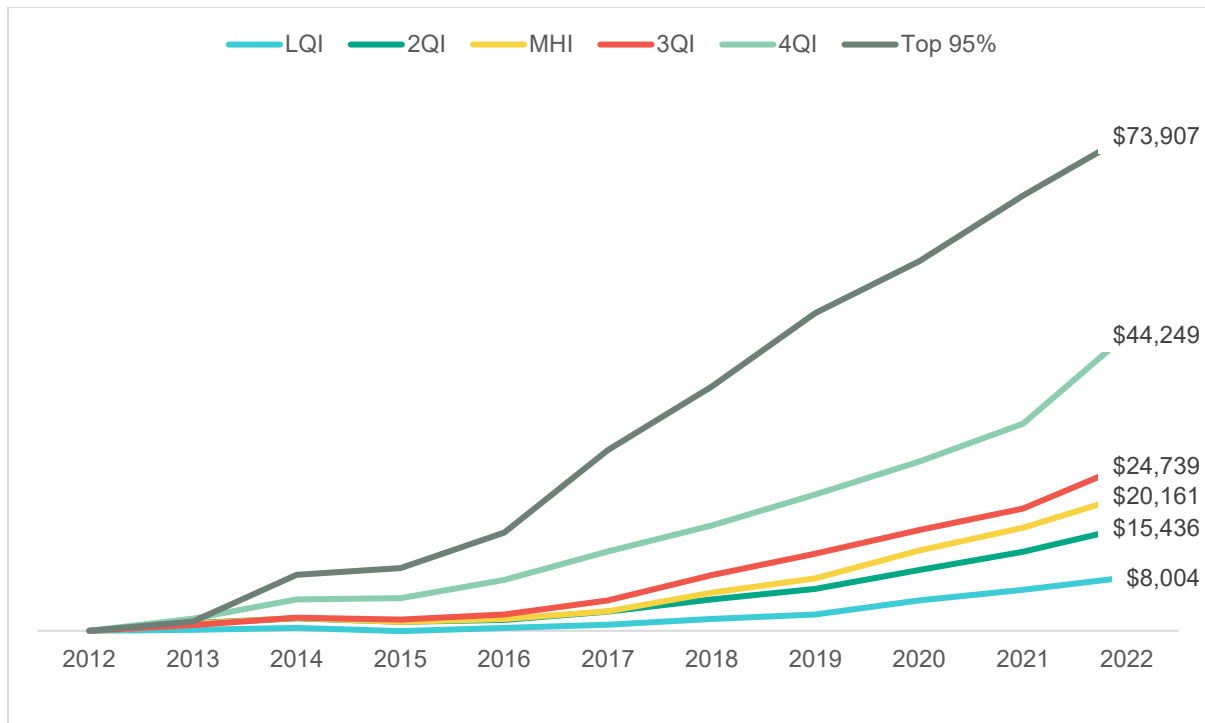
2.2. Household Income Considerations

The ACS reports household income at varying intervals, one of the most common being income quintiles where data reflect the upper limit of the 20th, 40th, 60th, and 80th percentiles of household income. Household income at each of these quintiles, and the median (50th percentile), are presented in Table 3 and demonstrate an income gap that continues to widen. The data clearly show that income for high-earners is increasing more rapidly than lower-income households. This trend is shown in Figure 7 where the \$44,249 increase in the fourth quintile income far outweighs the \$8,004 increase for the lowest quintile from 2012-2022. The ACS does not report the fifth quintile (this would be the maximum income by definition), but instead reports income at the 95th percentile with a cap of \$250,000. The 95th percentile capped at \$250,000 in 2022, but the increase of \$73,907 far exceeds any of the other quintiles.

Table 3. Richmond city Household Income, 2012 v. 2022

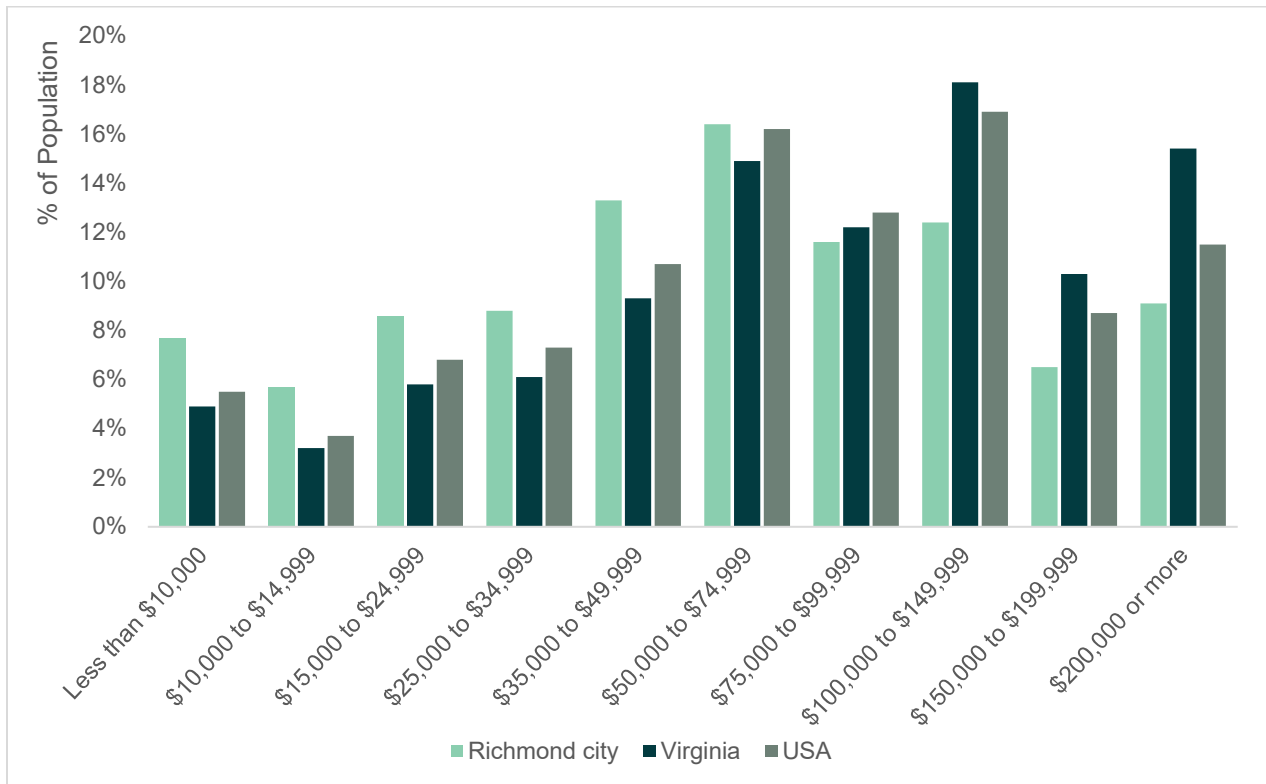
Income Level	2012 Household Income	2022 Household Income	\$ Change
20 th Percentile Lowest Quintile Income (LQI)	\$ 14,417	\$ 22,421	\$ 8,004
40 th Percentile Second Quintile Income (2QI)	\$ 30,009	\$ 45,445	\$ 15,436
50 th Percentile Median Household Income (MHI)	\$ 39,445	\$ 59,606	\$ 20,161
60 th Percentile Third Quintile Income (3QI)	\$ 49,556	\$ 74,295	\$ 24,739
80 th Percentile Fourth Quintile Income (4QI)	\$ 83,910	\$ 128,159	\$ 44,249
95 th Percentile Lower Limit of Top 5%	\$ 176,093	Greater than \$ 250,000	\$ 73,907

Figure 7. Income Growth Since 2012



The income inequality present in the City is significant, and the gap continues to widen. Furthermore, comparing the income distribution to the State and National average highlights the disparity and pronounced lower levels of income. Figure 8 below shows income distribution for the City compared to the State and National averages.

Figure 8. Income Distribution in 2022



The City's income distribution compared to the State and National average paired with lower income growth results in a significant burden for the households that are already at risk. An unexpectedly large bill for households near the 20th percentile of income can be financially devastating. Some of these households are on a fixed income such as social security or disability. They are often referred to as the "working poor" as they are typically not eligible for social services assistance and, as such, they are a key population when monitoring affordability concerns.

2.3. Localized Data

When examining household affordability in the City, the overall characteristics of the City may point to an aggregate financial capacity to support significant capital needs. However, this approach does not identify underlying household affordability concerns, so the analysis is performed at both a macro (City-wide) and micro (census tract) level to provide insights into the affordability of service for all customers.

Using census tract level data allows for a more thorough evaluation of customer income and poverty. Figure 9 and Figure 10, for example, show the difference in income between the lowest quintile and median household income.

Figure 9. Lowest Quintile Income

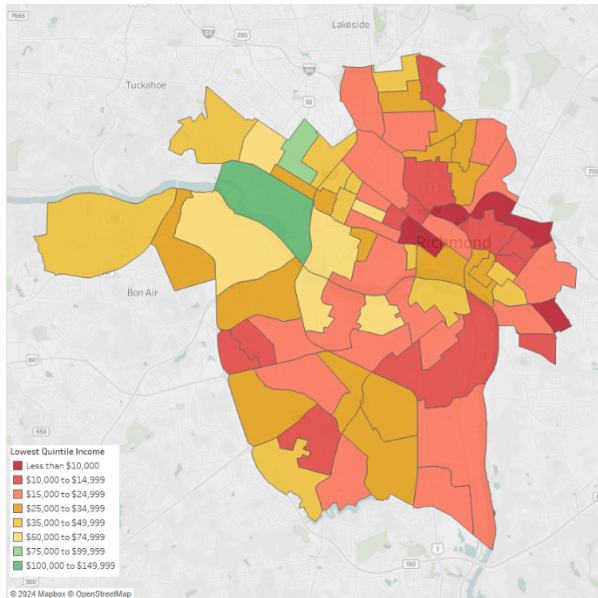
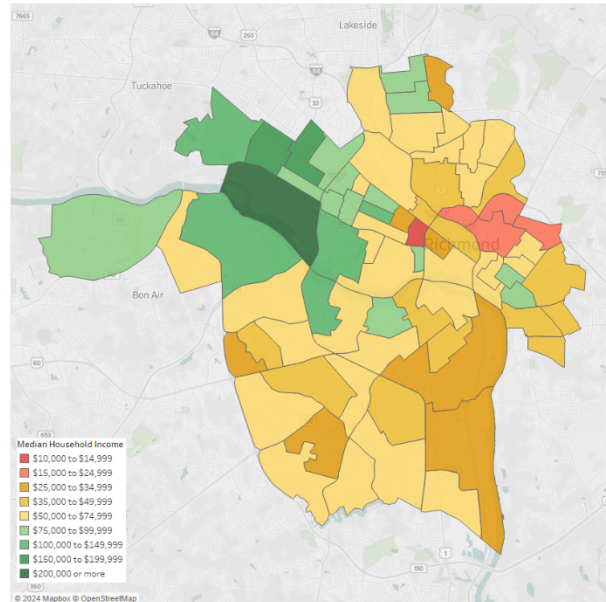


Figure 10. Median Household Income



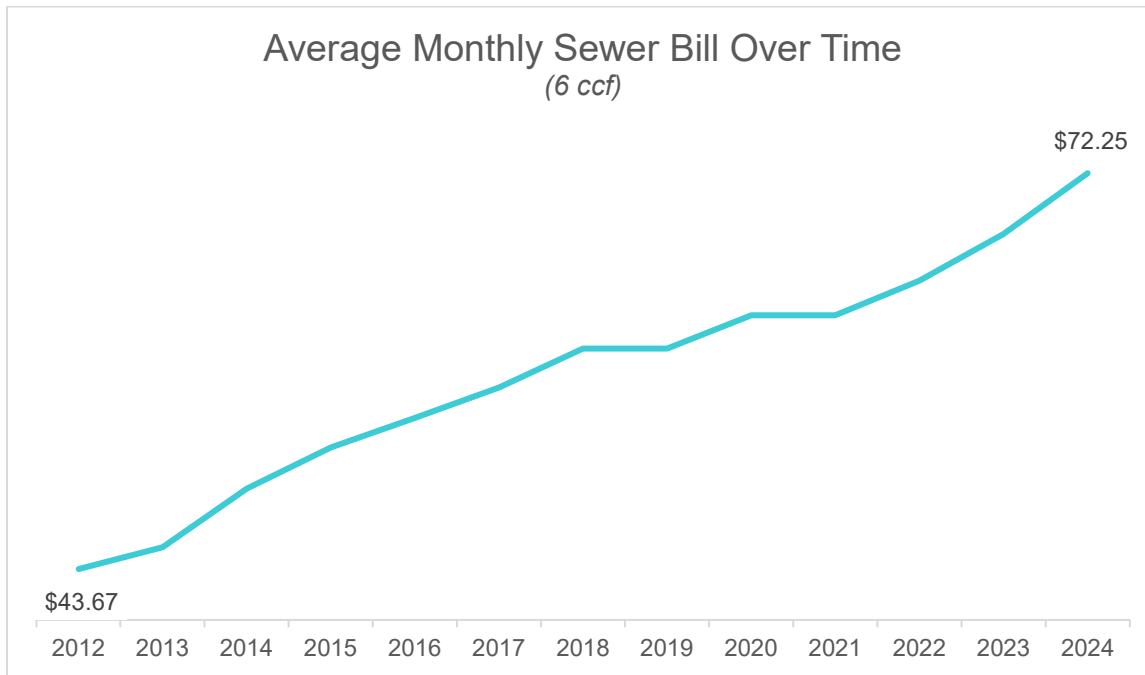
As seen above, the City has a wide distribution of income and numerous census tracts where the lowest quintile income is less than \$25,000 annually. Given the City's income profile, it is important to consider the impact of additional costs both City-wide and at a localized level to provide a more comprehensive perspective on affordability. For example, while the City-wide MHI is \$59,606, half the census tracts fall below this median income.

2.4. Historical Wastewater Costs

As an Enterprise Fund, the DPU operates on a self-sustaining basis and must increase revenue to cover increased costs. The costs of operating the wastewater system and making capital improvements to maintain its level of service, reduce overflows, and reinvest in aging infrastructure have increased significantly over the past decade. The increases in capital and operating costs, despite accompanying population growth, have required rate increases to support reinvestment in the aging system and ensure the DPU remains in a strong financial position. As seen in Figure 11, a typical customer's monthly wastewater bill (6 Ccf) has increased from \$43.67 to \$72.25, or approximately 5.2% annually over since FY 2012.

With a growing income gap, as presented in Table 3, the cumulative effect of the increasing rate is that paying for treated wastewater requires a larger portion of household incomes, particularly for low-income households. The financial burden placed on these households will be explored further in the next section.

Figure 11. Historical Residential Wastewater Monthly Bill (6 Ccf)



2.5 CSO Plan Costs

The City's CSO Plan includes both near-term costs associated with its interim plan as well as additional costs associated with meeting full CSO compliance by 2035. For this analysis, the CSO interim plan is approximately \$300 million in capital and other improvements and the additional cost of CSO compliance is an additional \$625 million by 2035. Further detail on the CSO Program costs and funding scenarios is provided in Section 3.

2.6 Additional Study Data

The DPU provided the latest detailed billing data (at the time) for FY 2022. The billing data allowed Raftelis to use actual customer bills to show the direct cost to customers. Furthermore, Raftelis was able to determine account locations within census tracts.

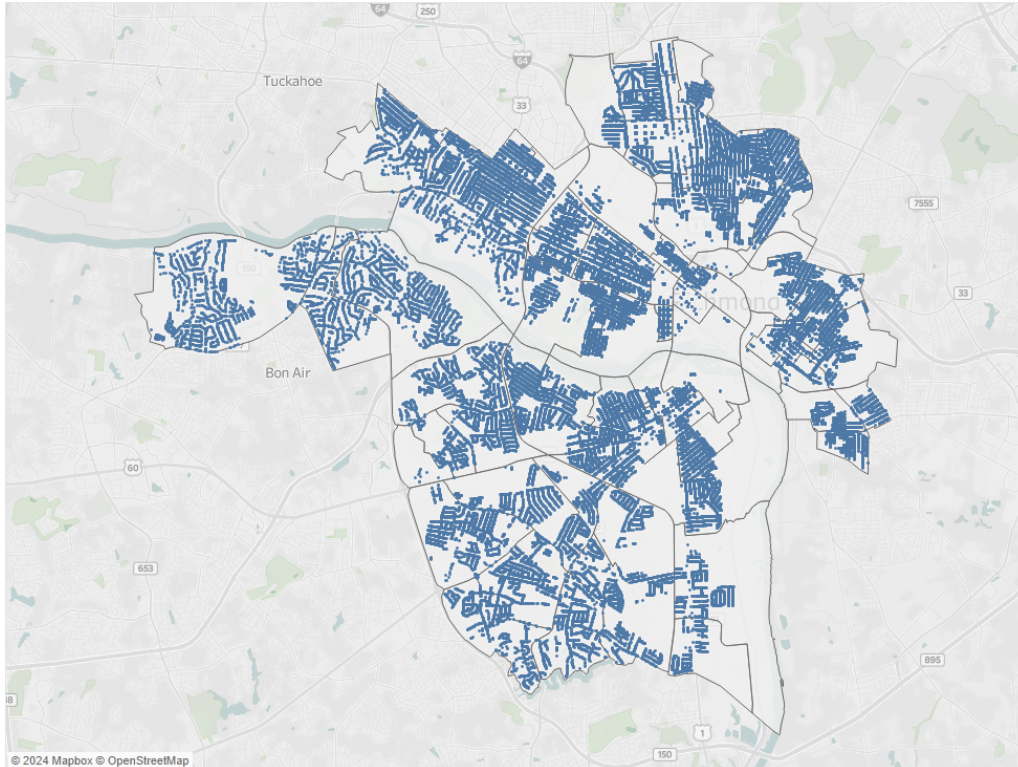
The following steps were taken to perform this analysis:

1. Comprehensive customer billing information was compiled for FY 2022, which included an account number as well as account address.
2. Raftelis used GIS software to geocode account addresses and determine account locations within DPU's service area. This also allowed Raftelis to assign each account a census tract which served as a proxy for income information.

3. Census-tract level ACS data was then pulled for all census tracts within the City.

For the purposes of this analysis, Raftelis focused on single-family residential customers with a 5/8" or 3/4" meter to avoid the issues of master meter usage associated with multi-family residential accounts. Figure 12 shows the how these accounts were related to each census tract, which was the basis of the analysis.

Figure 12. Customer Locations within Census Tracts



3. Financial Capability Assessment

Evaluating the City’s financial capability and household affordability for the overall service area requires a multi-faceted approach. Using a single approach (i.e. the 2023 Guidance Alternative 1) would fail to provide complete or appropriate resolution given the broad spectrum of customers. This analysis explores the 2023 Guidance and other metrics such as the LQRI. Unless indicated otherwise, the results of this assessment have been developed based on the capital improvement costs and timing to achieve the CSO obligations by 2035.

3.1. 2023 Guidance – Alternative 1 Framework

As discussed previously, in February 2023, the EPA released the 2023 Guidance which documents options that communities can use when assessing financial capability to meet CWA requirements through investments in and expansions of existing treatment systems. The 2023 Guidance expands on the previous guidance documents through the inclusion of two alternative approaches for assessing the financial capability to carry CWA control measures in addition to modifying the 1997 FCA methodology. Under Alternative 1, the 1997 FCA methodology has been expanded to better consider costs, poverty, and impacts on the service area population with incomes in the lowest quintile.

Alternative 1 as described in the 2023 Guidance maintains the two-phase approach of the 1997 FCA methodology, continuing to direct the calculation of the RI and the FCI. The 2023 Guidance further builds on the previous methodology by adding an additional critical metric, the LQPI, which combines the results of six indicators to benchmark the prevalence of poverty.

The analysis performed for the City generally utilized this framework but at a more granular level across the City’s service area.

3.1.1. Residential Indicator (RI)

The RI measures operating and capital costs for the median income household. As noted previously, the DPU provided detailed customer billing data for FY 2022. The billing data allowed Raftelis to use actual customer bills as the cost portion of the RI calculation to represent the direct cost to customers. Income information was obtained from the 2022 US Census and assigned to the customers in each census tract.

The following steps were taken to assess the RI.

1. Comprehensive customer billing information was compiled for FY 2022. This information included customer characteristics such as customer type, meter size, monthly usage, monthly charges, and other defining statistics for every customer account. Unique customer account

information was associated with each of the City’s census tracts to determine average water usage and actual billings for wastewater services. Figure 14 shows the average wastewater bill by census tract.

2. Census-tract level ACS data are then used to develop unique RI metrics for each of the census tracts to better understand where there may be affordability issues currently that do not appear with a City-wide perspective. Figure 13 again shows the MHI by census tract.

Figure 14. Average Customer Bill

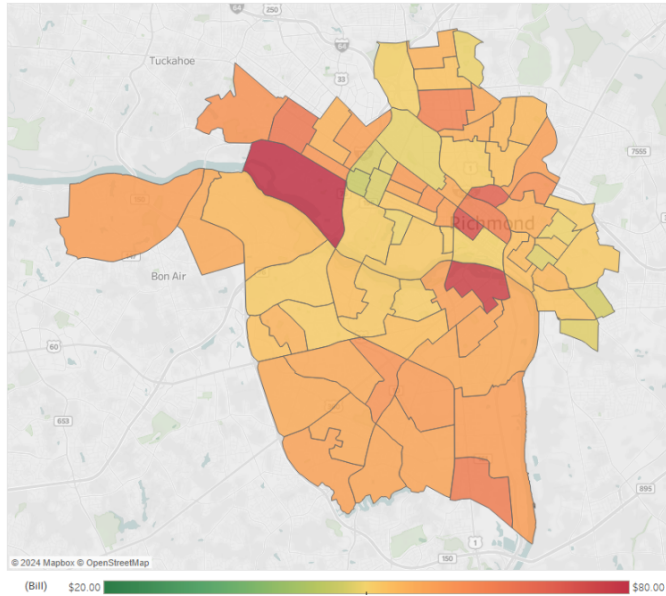
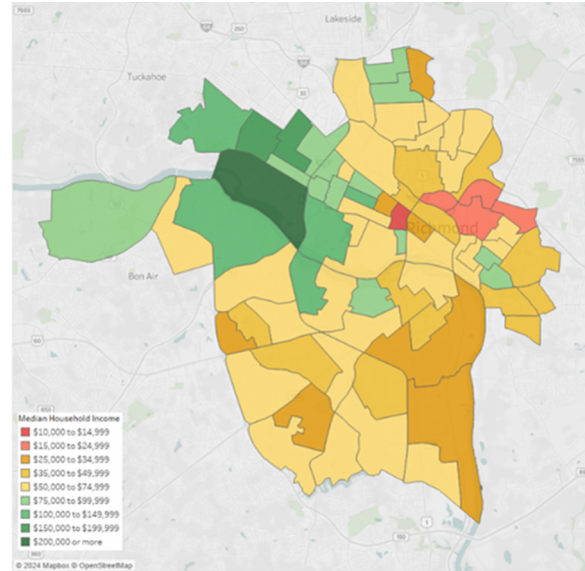
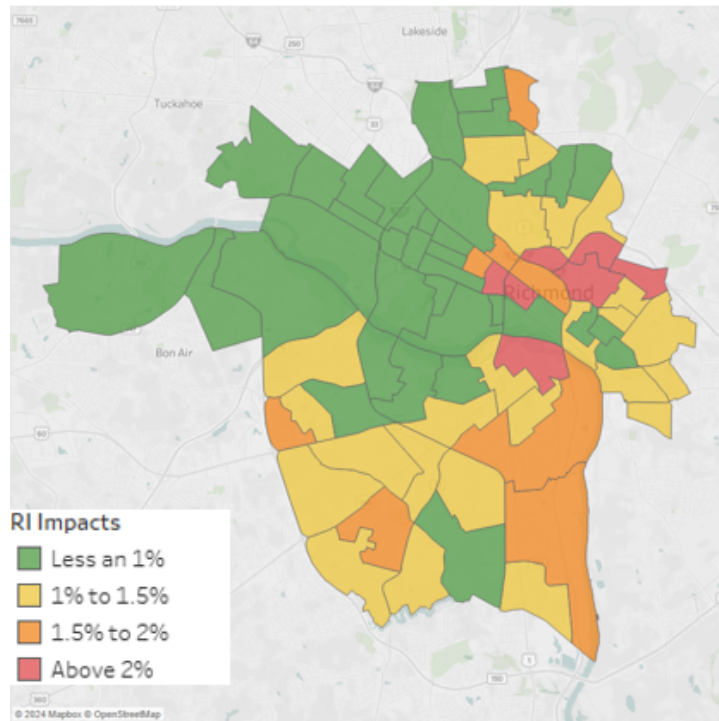


Figure 13. Median Household Income



Wastewater billings (average bill within a census tract) were paired with income data and the resulting RI by census tract is shown in Figure 15. Per the 2023 Guidance, RI’s less than 1% represent a “Low Impact”, 1-2% represent a “Mid-Range Impact”, and “High Impact” is categorized as above 2%. Approximately 1,230 residential customers reside in census tracts designated as “High Impact”.

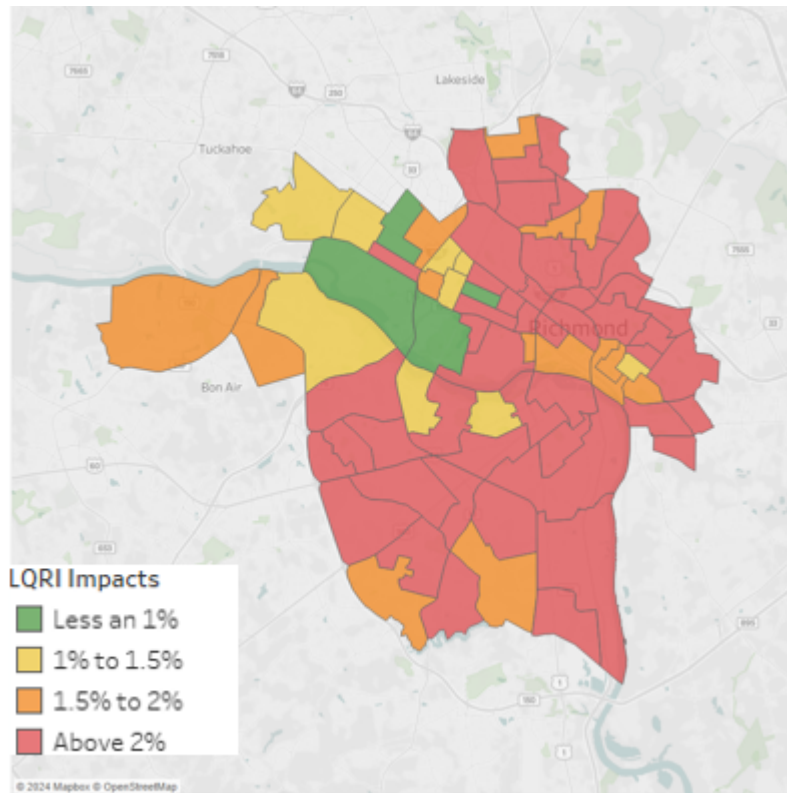
Figure 15. Customer RI by Census Tract



3.1.2. Lowest Quintile Residential Indicator

As mentioned previously, the income distribution within the City highlights the need to explore the impact of additional costs on lower income levels, as the MHI fails to represent those who are living in poverty or likely classified as the “working poor”. Figure 16 shows the resulting LQRI by pairing billing data (average bill within a census tract) with income data shown in Figure 13.

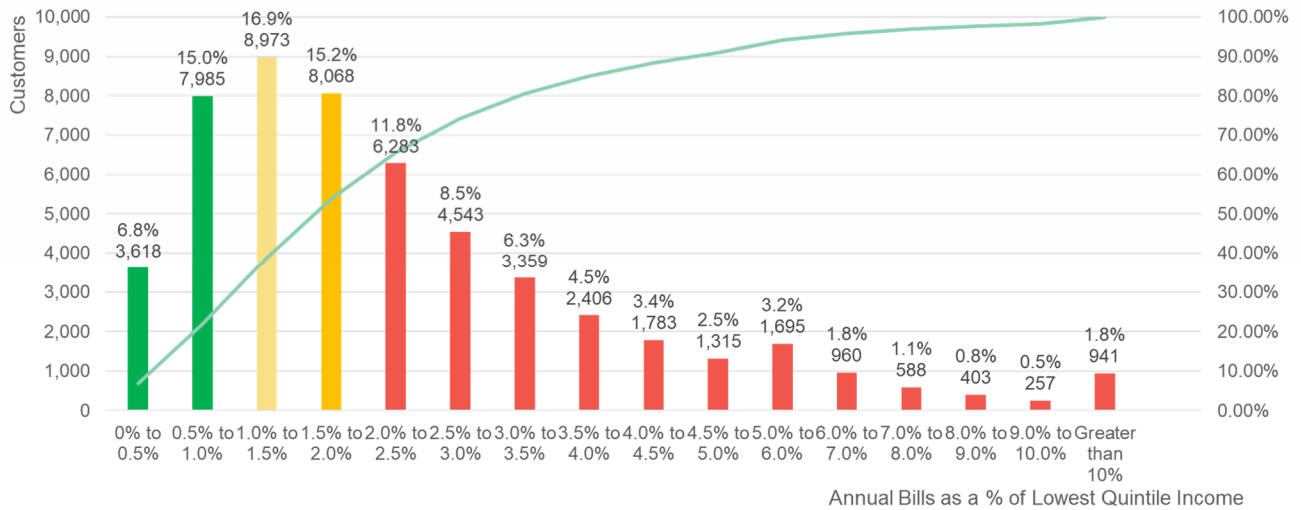
Figure 16. LQRI by Census Tract



Under the LQRI metric, about 28,100, or approximately 59%, of residential customers reside in census tracts designated “High Impact” using the same 2% threshold⁴. To provide a more granular assessment, Raftelis also examined the LQRI for individual customer bills by assigning income levels to customers according to what census tract they reside in. This step is necessary since specific income data for individual households are not available in the census. Figure 17 shows all customer bills as a percentage of LQI in each customer’s respective census tract. As seen below, almost 8,000 residential wastewater bills exceed 4.0% (double the 2.0% threshold) of the LQI using this approach. About 1,000 residential accounts exceed 10%.

⁴ Includes only active residential wastewater customers in the City’s billing database.

Figure 17. Distribution of LQRI



3.1.3. Lowest Quintile Poverty Indicator

The 2023 Guidance also identifies the Lowest Quintile Poverty Indicator (LQPI) metric, which combines the results of six indicators to benchmark the prevalence of poverty, building a more thorough estimation of the number and severity of low-income households in the service area. The six poverty metrics calculated to determine the LQPI are:

1. Upper Limit of Lowest Quintile Income (Weighted 50%)
2. Percent of Population with Income Below 200% of Federal Poverty Level (FPL) (Weighted 10%)
3. Percentage of Population Receiving Food / SNAP Benefits (Weighted 10%)
4. Percent of Vacant Households (Weighted 10%)
5. Trend in household Growth (Weighted 10%)
6. Percentage of Unemployed Population 16 and Over in Civilian Labor Force (Weighted 10%)

The local values for these metrics are compared to the national values as a benchmark. When the local values are 25% better than the national metric, the result is a strong rating. A local value 25% worse than the national average is considered weak. Values within 25% of the national metric are considered mid-range. The individual ratings are averaged by assigning a value of 3 for a strong result, 2 for mid-range, and 1 for weak. This composite score is the LQPI.

3.1.3.1. Overall LQPI Output

Data was compiled for the City as well as at the national level as directed by the 2023 Guidance. The data came from the 2022 American Community Survey (five-year estimates), to mitigate the likelihood of a one-year anomaly. The data is summarized in Table 4.

Table 4. Lowest Quintile Poverty Indicator Results

	Indicator	Richmond	U.S.	% Diff	Score
LQPI #1	Upper Limit of Lowest Quintile Income	\$20,743	\$30,623	-32%	1.0
LQPI #2	Percentage of Population with Income Below 200% of FPL	37%	29%	29%	1.0
LQPI #3	Percentage of Households Receiving Food Stamps/SNAP Benefits	14.3%	10.8%	24%	2.0
LQPI #4	Percentage of Vacant Housing	9.3%	12.2%	-14%	2.0
LQPI #5	Trend in Household Growth	2.5%			3.0
LQPI #6	Percentage of Unemployed Population 16+ in Civilian Labor Force	4.1%	3.4%	21%	2.0
Score of LQPI #1					1.0
Average Score of LQPI #2 to #6 (Sum of 2 through 6 divided by 5)					2.0
Lowest Quintile Poverty Indicator Score (Sum of two lines above divided by 2)					1.5

Benchmarks:

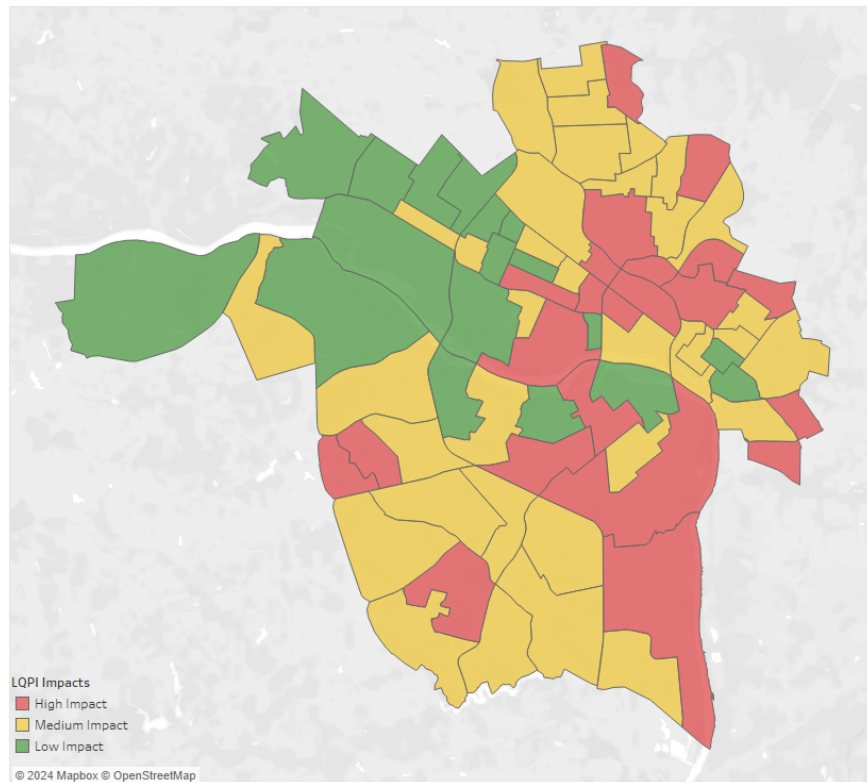
- Low Impact (Above 2.5)
- Medium Impact (1.5 to 2.5)
- High Impact (Below 1.5)

The overall LQPI for the City borders between High and Medium Impact. However, several of the contributing metrics are also on the border of High and Medium impact, such as LQPI #3, which could easily drop the overall score into “High Impact.” Therefore, it was important to also look at LQPI at the census tract level as well.

3.1.3.2. Localized LQPI Outputs

In addition to the systemwide LQPI analysis, localized results were also explored by calculating the LQPI for each census tract. Based on this analysis about 11,900 residential customers fall into High Burden census tracts, as shown in Figure 18.

Figure 18. LQPI by Census Tract



3.2. 2023 Guidance – Alternative 2 (Financial Model)

The 2023 Guidance introduces a second alternative to evaluate financial capability. This alternative considers projected residential customer impacts based on the results of a comprehensive financial planning model. The DPU maintains a robust financial planning and rate model that forecasts operating expenses, identifies capital financing mechanisms and annual cashflow requirements, monitors key financial metrics, and identifies the wastewater rates required to support those needs.

3.2.1. Financial Planning Overview

One of the major criticisms of the 1997 Guidance is that it only provides for a point-in-time analysis of the financial capability of a utility and its customers. The City maintains a comprehensive financial plan that considers the impact of potential capital improvement needs over time and in relation to the operational and financial policy considerations it must make when managing the systems. The financial plan is a long-term decision support tool and is based on the most recently available customer, cost, and capital needs information with the final result being an indication of the rate adjustments needed to provide revenues to support the systems.

The financial plan expenditures are based on the current operating budget and projected inflationary cost increases in the future, existing debt service and proposed debt service needed to fund the

capital improvement needs of the system, and rate-funded capital expenditures. Additionally, as an Enterprise Fund of the City, the DPU has guidelines for financial policies and metrics that support the pace of capital investment and rate increases. The utility must maintain a healthy fiscal position by maintaining cash reserves and debt service coverage, limiting fluctuations in annual rate increases, and limiting their exposure to long-term debt obligations (relative to system assets).

3.2.2. Financial Plan Projections and Future Rates

The financial planning model projects future operating costs, capital investment, and financial metrics which are all supported by a future level of annual revenues. Future revenues are driven by the anticipated number of customers and related demand that will be paying the projected wastewater rates.

3.2.2.1 Key Assumptions

The following provides an overview of several key assumptions used to develop the rate and financial forecast:

- Operating and maintenance (O&M) expenses based on the FY 2024 wastewater budget with 3.0% escalation through FY 2040 (forecast period).
- O&M expenses do not include any incremental costs associated with CSO capital investments.
- Debt service is based on current outstanding obligations and future debt to finance capital needs.
- Near-term, non-CSO capital projects tied to DPU's five year Capital Improvement Plan.
- Long-term, non-CSO capital projects estimated based on normalized spending adjusted for inflation.
- Non-CSO projects assumed to be financed with a mix of debt (revenue bonds and cash). Revenue bonds for non-CSO projects assume a 5.0% interest rate, 30-year term, and 1% issuance cost.

As noted previously, the City's CSO program includes both costs associated with its interim plan as well as the additional cost of full CSO compliance by 2035. For this analysis, the additional cost of compliance beyond the interim plan is estimated to be \$625 million. The City wished to examine several scenarios to finance the \$625 million, which included a low grant, medium grant, and high grant alternatives. In each alternative, it is assumed the balance of funding needs are addressed through the Virginia Clean Water Revolving Loan Fund (VCWRLF), Water Infrastructure Finance and Innovation Act (WIFIA), and revenue bonds. Specific assumptions on these debt financing alternatives are provided below.

- VCWRLF – 3.35% interest rate for 30 years with 2 years of interest only and ongoing repayment of both principal and interest by 2038.
- WIFIA – 4.81% interest rate for 30 years with 5 years interest only and ongoing repayment of both principal and interest by 2038.

- Revenue bonds – 5.0% interest rate for 30 years, 1% issuance cost, and ongoing repayment of both principal and interest by 2038.

A summary of the additional CSO projects and funding alternatives is provided in Table 5.

Table 5. CSO Program Summary and Financing Scenarios

GRANT SCENARIO	GRANTS	VCWRLF 0%	WIFIA	UTIL REV BOND	TOTAL
2035 Completion					
Low Grant	\$ 100,000,000	\$ 200,000,000	\$ 200,000,000	\$ 125,000,000	\$ 625,000,000
Med Grant	\$ 250,000,000	\$ 150,000,000	\$ 175,000,000	\$ 50,000,000	\$ 625,000,000
High Grant	\$ 400,000,000	\$ 100,000,000	\$ 75,000,000	\$ 50,000,000	\$ 625,000,000
No Grant	0%	40%	40%	20%	100%
Low Grant	16%	32%	32%	20%	100%
Med Grant	40%	24%	28%	8%	100%
High Grant	64%	16%	12%	8%	100%

	Shockoe Disinfection	Gillies Creek	Southside 1	Total 2024 Cost	6.4%	Inflated Cost	Cumulative Inflated
2024				\$ -	106.4%	\$ -	\$ -
2025				\$ -	112.8%	\$ -	\$ -
2026	\$ 6,000,000			\$ 6,000,000	119.2%	\$ 7,149,470	\$ 7,149,470
2027	\$ 9,000,000			\$ 9,000,000	125.5%	\$ 11,298,940	\$ 18,448,410
2028	\$ 8,000,000	\$ 1,500,000		\$ 9,500,000	131.9%	\$ 12,533,324	\$ 30,981,735
2029	\$ 1,000,000	\$ 3,500,000		\$ 4,500,000	138.3%	\$ 6,224,205	\$ 37,205,940
2030	\$ 48,000,000	\$ 2,000,000	\$ 2,000,000	\$ 52,000,000	144.7%	\$ 75,244,841	\$ 112,450,781
2031	\$ 76,000,000	\$ 3,000,000	\$ 1,000,000	\$ 80,000,000	151.1%	\$ 120,870,050	\$ 233,320,831
2032	\$ 65,000,000	\$ 2,500,000	\$ 14,000,000	\$ 81,500,000	157.5%	\$ 128,340,909	\$ 361,661,740
2033	\$ 28,000,000	\$ 500,000	\$ 28,000,000	\$ 56,500,000	163.9%	\$ 92,580,591	\$ 454,242,331
2034	\$ 17,000,000	\$ 18,000,000		\$ 35,000,000	170.2%	\$ 59,585,890	\$ 513,828,221
2035	\$ 36,000,000	\$ 2,000,000		\$ 38,000,000	176.6%	\$ 67,119,911	\$ 580,948,132
2036	\$ 22,000,000			\$ 22,000,000	183.0%	\$ 40,263,804	\$ 621,211,935
2037	\$ 2,000,000			\$ 2,000,000	189.4%	\$ 3,788,065	\$ 625,000,000
TOTAL	\$ 241,000,000	\$ 85,000,000	\$ 70,000,000	\$ 396,000,000		\$ 625,000,000	

The financial forecast also considered financial metrics for debt service coverage and liquidity that are aligned with DPU’s broader policy goals. Specifically, it was assumed the wastewater utility fund would maintain total debt service coverage of approximately 1.50 times and liquidity of approximately 300 days O&M expenses.

3.2.2.2 Projected Rates and Customer Impacts

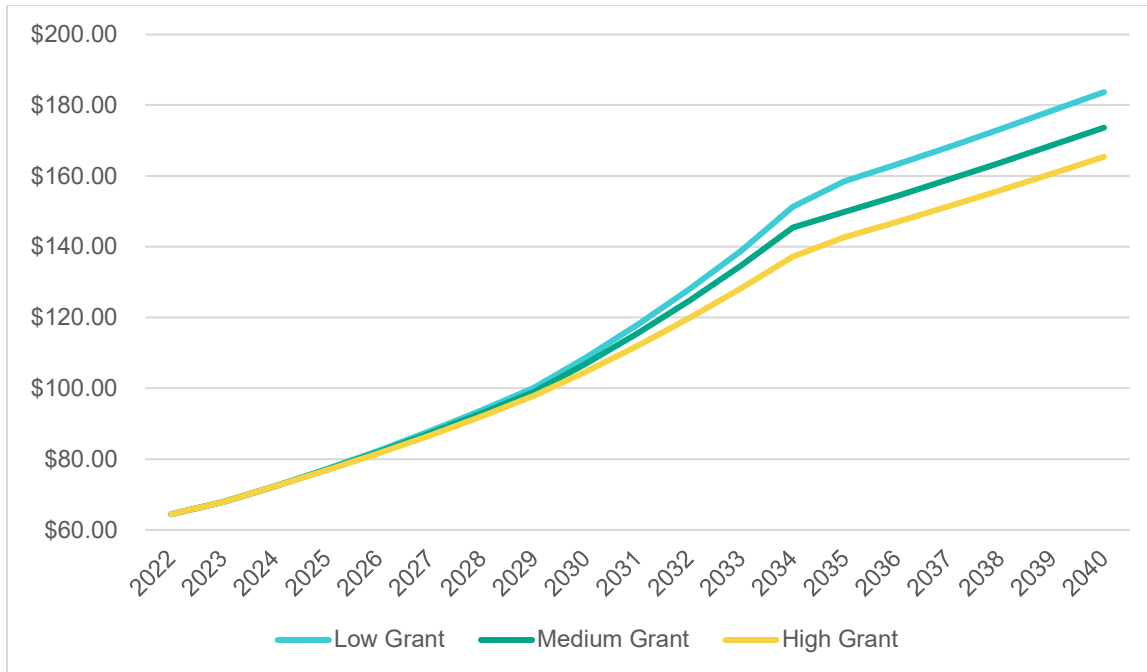
The projected rates to support the three CSO Program alternatives (low-grant, medium-grant, and high-grant) and financial policy metrics are summarized in Table 6. Projected customer impacts are based on a typical residential customer using 6 Ccf per month.

Table 6. FCA Scenario Outputs

Rate Increases and Resulting Financial Metrics		FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038	FY 2039	FY 2040	
Low Grant																		
Rate Increases		6.75%	6.75%	6.75%	6.75%	6.75%	8.50%	8.50%	8.50%	8.50%	9.00%	4.75%	3.00%	3.00%	3.00%	3.00%	3.00%	
Total DSCR		1.58	1.56	1.47	1.44	1.51	1.55	1.48	1.53	1.48	1.42	1.45	1.48	1.55	1.53	1.58	1.57	
Combined Operating and Capital Days C		697	303	305	304	309	309	304	300	302	300	302	306	308	305	307	307	
Medium Grant																		
Rate Increases		6.50%	6.50%	6.50%	6.50%	6.50%	8.00%	8.00%	8.00%	8.00%	8.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Total DSCR		1.57	1.55	1.45	1.42	1.49	1.51	1.49	1.52	1.52	1.42	1.44	1.46	1.55	1.52	1.58	1.55	
Combined Operating and Capital Days C		683	304	301	301	304	303	307	302	301	301	301	302	302	301	303	317	
High Grant																		
Rate Increases		6.25%	6.25%	6.25%	6.25%	6.25%	7.00%	7.00%	7.00%	7.00%	7.00%	4.00%	3.00%	3.00%	3.00%	3.00%	3.00%	
Total DSCR		1.59	1.56	1.47	1.42	1.49	1.48	1.49	1.49	1.53	1.38	1.46	1.49	1.59	1.58	1.64	1.61	
Combined Operating and Capital Days C		703	307	299	305	302	305	304	298	303	303	294	297	296	303	307	318	
Customer Bills		FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038	FY 2039	FY 2040
		<i>Current</i>																
Customer Bill																		
Low Grant	\$	72.25	\$ 77.13	\$ 82.33	\$ 87.89	\$ 93.82	\$ 100.16	\$ 108.67	\$ 117.91	\$ 127.93	\$ 138.80	\$ 151.29	\$ 158.48	\$ 163.24	\$ 168.13	\$ 173.18	\$ 178.37	\$ 183.72
Medium Grant	\$	72.25	\$ 76.95	\$ 81.95	\$ 87.27	\$ 92.95	\$ 98.99	\$ 106.91	\$ 115.46	\$ 124.70	\$ 134.67	\$ 145.45	\$ 149.81	\$ 154.30	\$ 158.93	\$ 163.70	\$ 168.61	\$ 173.67
High Grant	\$	72.25	\$ 76.77	\$ 81.56	\$ 86.66	\$ 92.08	\$ 97.83	\$ 104.68	\$ 112.01	\$ 119.85	\$ 128.24	\$ 137.21	\$ 142.70	\$ 146.98	\$ 151.39	\$ 155.94	\$ 160.61	\$ 165.43

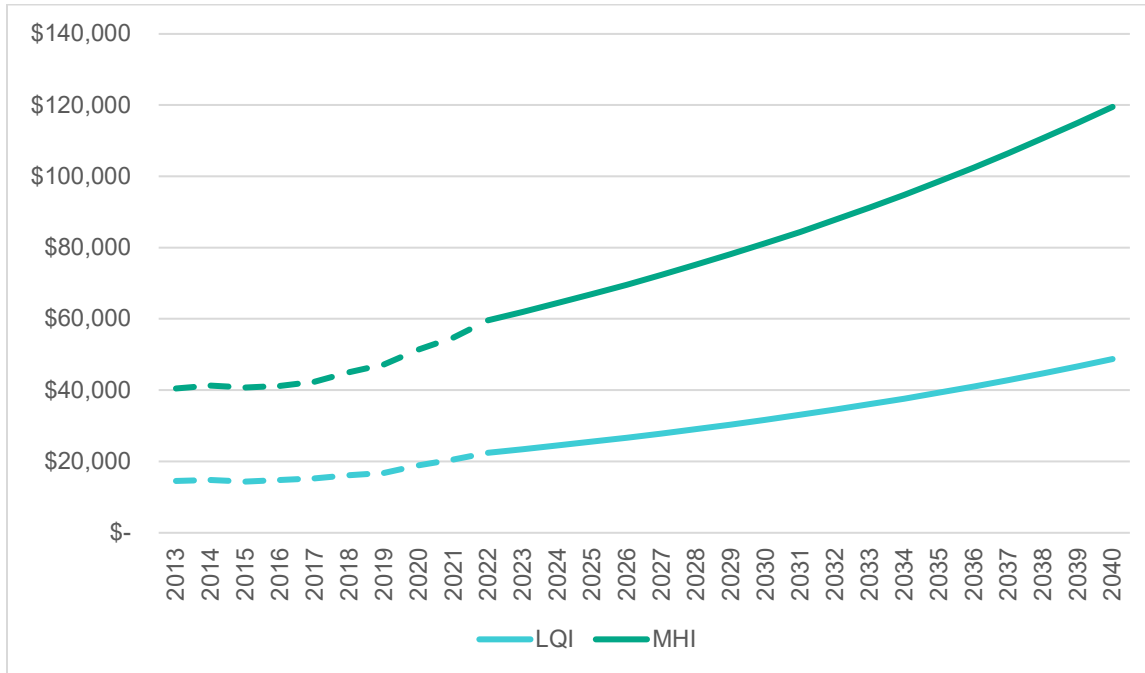
The rate increases required to support the CSO Plan and address DPU’s other wastewater capital needs will increase customer monthly bills significantly and the related affordability challenges will worsen. As seen in Figure 19, a typical customer’s monthly wastewater bill is projected to increase from around \$76 to between \$160 and \$180 dollars over the next 16 years (depending on grant funding scenario). The cumulative impact on customers equates to an annual average rate increase between 5.4% under a high grant scenario to 6.0% under a low-grant scenario.

Figure 19. Projected Monthly Residential Bill (6 Ccf)



To further examine the future impacts on the City’s wastewater customers, Raftelis developed a projection of income over the same period of time (through 2040). The income projections were based on historical U.S. Census data and considered the annual change of both LQI and MHI from 2012 to 2022, shown in Figure 20 below.

Figure 20. Projected Growth in Income



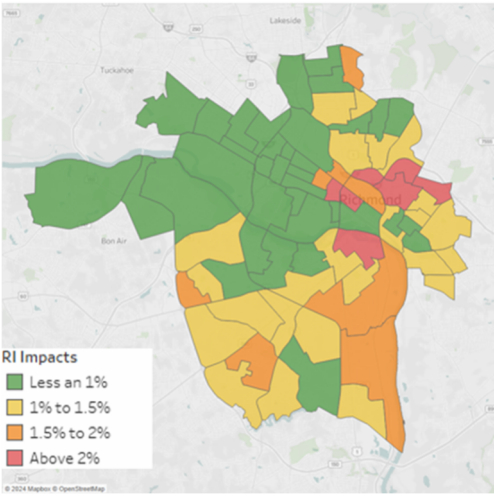
Over this period of time (2012 – 2022), the City of Richmond’s ten-year average increase in LQI and MHI was 4.4% and 3.9%, respectively. Wastewater customers’ assumed incomes, discussed in the sections above, were then escalated by these growth factors over the forecast period. The income data used in this analysis came from the US Census Bureau and used 5-year estimates to normalize inflation. However, given the above-trend rates of inflation in 2021 and 2022, it is worth noting that the average increase in LQI and MHI from 2010 to 2020 was 3.1% and 3.0%, respectively, which is more consistent with longer-term inflationary trends. Regardless, this analysis used the most recent ten-year average from 2012 to 2022.

Using the forecasted customer bills and assumed income growth, the analysis for RI and LQRI was performed again to determine the affordability burden on customers by FY 2040.

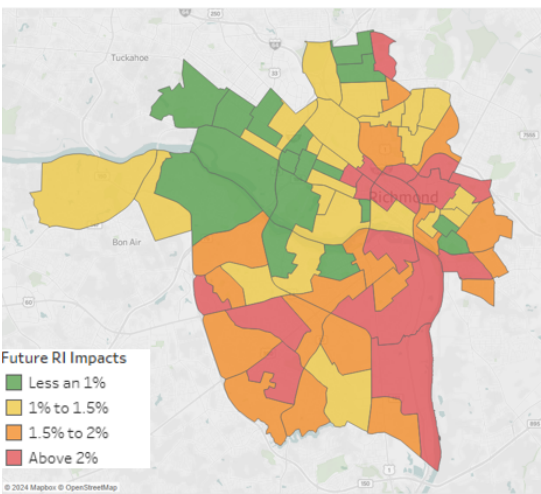
Figure 21 shows the change in RI from current year to 2040 for each of the three scenarios.

Figure 21. Projected RI (2040)

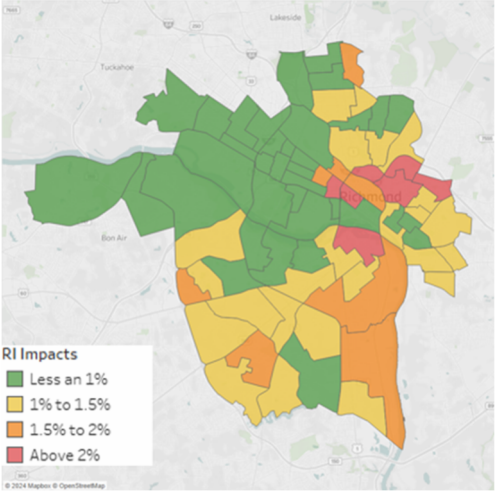
Current RI



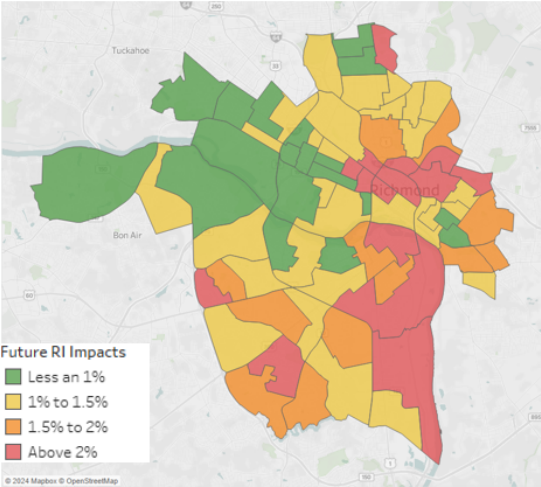
2040 RI: Low Grant



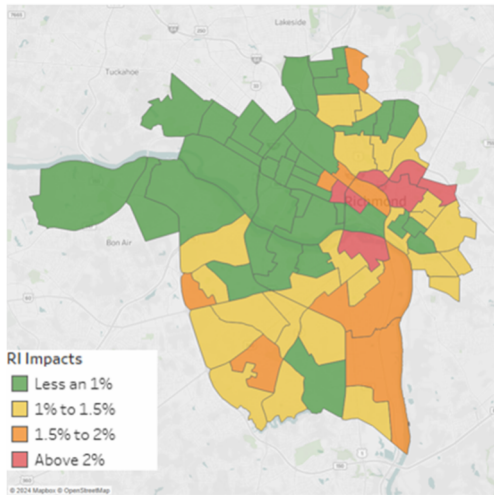
Current RI



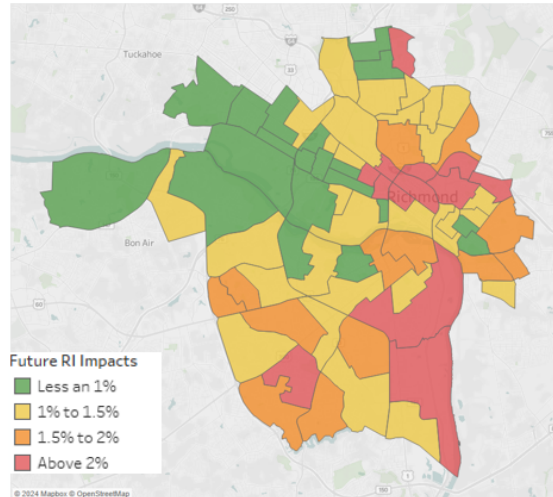
2040 RI: Medium Grant



Current RI



2040 RI: High Grant



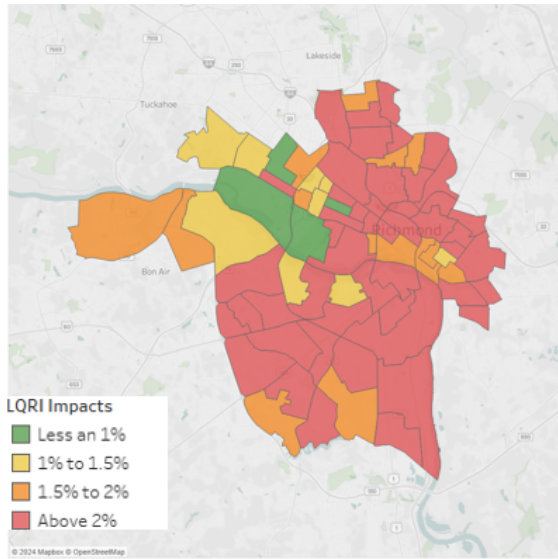
At current rates, the RI identifies 7 census tracts with average customer bills being over 2% of the median household income of that census tract, which accounts for about 1,200 customers. Based on projected rates (high-grant scenario) and incomes, the number of census tracts with average customer bills being over 2% of the medium household income of that census tract increases to 13 and jumps to nearly 5,200 customers by 2040. If less grants are awarded, the number of high-burdened customers will increase.

A similar analysis was conducted based on the projected LQRI. The results of this analysis are shown in

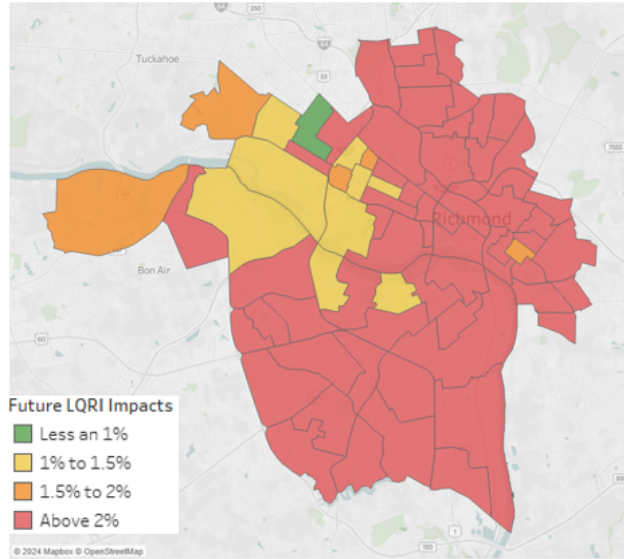
Figure 22.

Figure 22. Projected LQRI (2040)

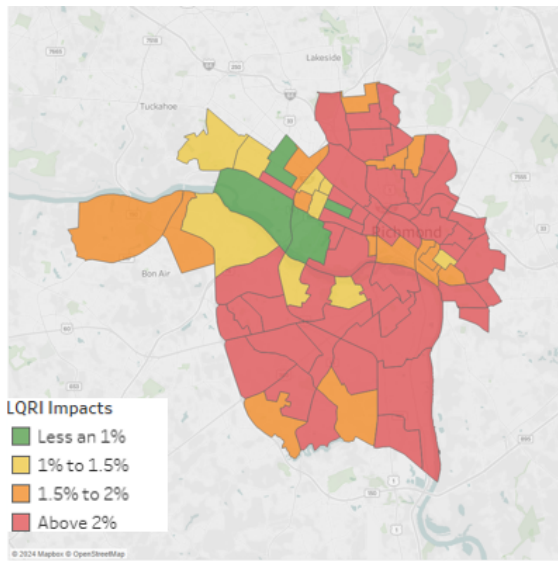
Current LQRI



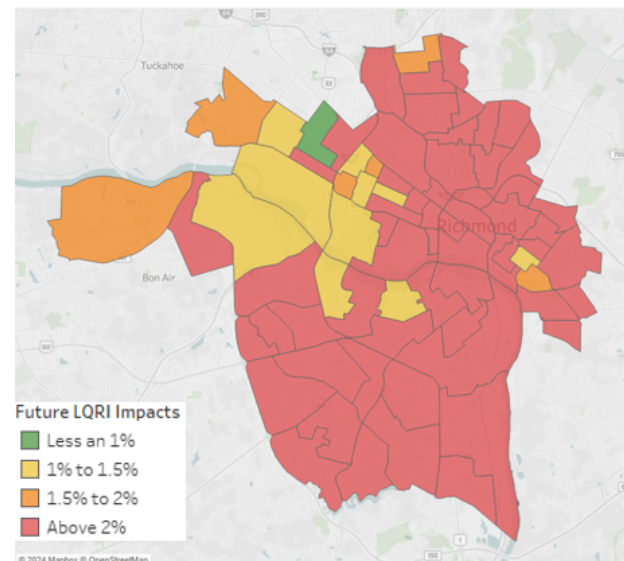
2040 LQRI: Low Grant



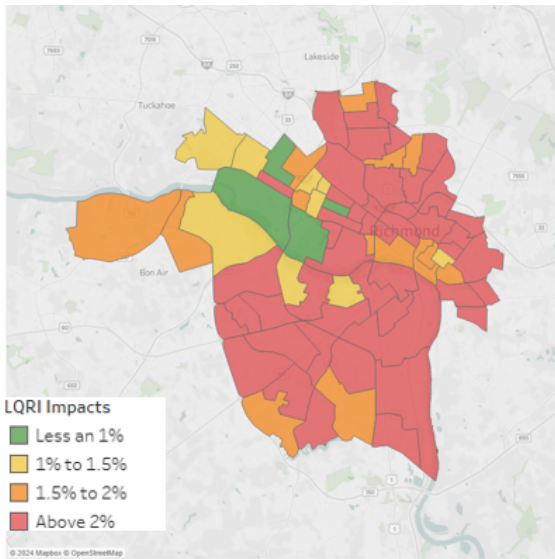
Current LQRI



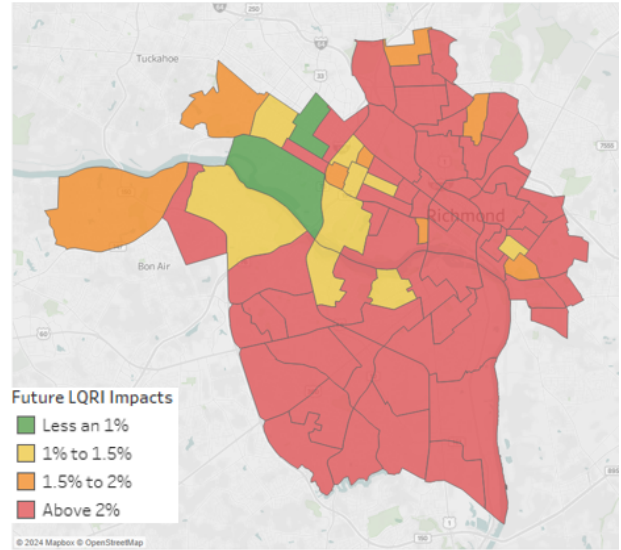
2040 LQRI: Medium Grant



Current LQRI



2040 LQRI: High Grant



At current rates, there are approximately 28,100 customers living within 48 census tracts with a LQRI signaling high burden, or an average customer bill being over 2% of the lowest quintile income. Based on projected rates (high-grant scenario) and incomes, the number of census tracts with an average customer bill being over 2.0% of the LQI in that census tract increases to 56 and adds nearly 4,300 customers by 2040. If less grants are awarded, the number of high-burden customers will increase.

4. Summary

The City has generated sufficient revenue to support needed capital investments in its wastewater system while preserving the financial sustainability of the utility fund. However, the resulting rates have placed significant strain on a large portion of the customer base and the impact of funding additional CSO improvements will increase the burden. The Financial Capability Assessment and Affordability Analysis highlights the City's challenges, which are summarized below.

- The City has lower household income and higher rates of poverty compared to the national average.
- About 25% of residential customers currently live in census tracts considered high-burden based on the prevalence of poverty.
- Nearly 28,100, or about 59%, of residential customers currently live in census tracts labeled high burden when comparing average wastewater bills to the Lowest Quintile Income (LQI) in those census tracts. Even with grant assistance (high grant scenario), additional CSO compliance costs will increase this number to around 32,400, or about 68% of residential customers.
- The rate increases required to support the CSO program and address DPU's other wastewater capital needs will increase customer monthly bills significantly and the related affordability challenges will worsen. A typical customer's monthly wastewater bill is projected to increase from around \$76 to between \$160 and \$180 dollars over the next 16 years (depending on grant funding scenario). The cumulative impact on customers equates to an annual average rate increase between 5.4% under a high grant scenario to 6.0% under a low-grant scenario.
- Over the past decade, the City's wastewater rates have increased by approximately 5.2% annually while income has increased around 4.0% annually. The cost of providing wastewater utility services in the City will likely continue to outpace income growth and the City will need to keep rate increases at or near 4.0% to not exacerbate its affordability challenges.
- The City has implemented several programs to support low-income customers and is currently evaluating additional ways to provide assistance with utility bills within the construct of State law. However, significant funding from the State level will be necessary to not further worsen the affordability of wastewater services for a meaningful portion of the City's customer base.