Pathways to the Future

SCENARIO PLANNING PROCESS FOR THE RICHMOND REGION

EXECUTIVE SUMMARY

Richmond Regional Transportation Planning Organization

PlanRVA
Where the region comes together to look ahead.

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The RRTPO is the brand of the federally designated Richmond Area Metropolitan Planning Organization.

Railroad and bridges along the James River (Richmond)

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SCENARIO PLANNING PROCESS FOR THE RICHMOND REGION

INTRODUCTION

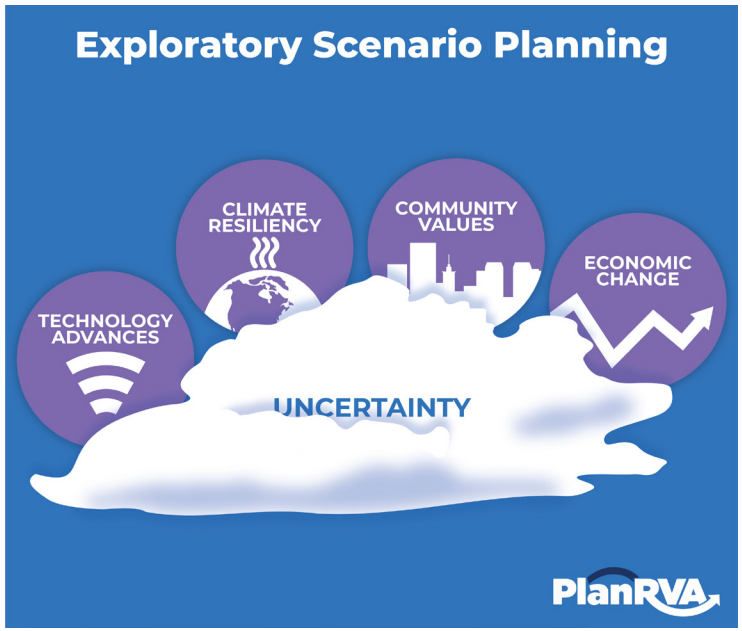
Long Range Planning, by design, looks far enough ahead to capture substantive regional change in land use, economics, and other regional dynamics that can shift future outcomes. This allows regional leaders to anticipate and plan for potentially significant changes and to consider how to avoid undesirable outcomes with enough time to manage the ripple effects of near-term decisions.

There are two primary models of scenario planning: normative scenario planning and exploratory scenario planning. The primary purpose of normative scenario planning is to reach a specific target whereas the primary purpose of exploratory scenario planning is to navigate uncertainty.

Long Range Planning benefits from using exploratory scenario planning to examine a range of plausible futures. Identified futures vary based on key regional drivers of change including land use, housing, economics, climate resiliency, and technology.

PlanRVA's ***Pathways to the Future*** (P2F) is a regional exploratory scenario planning project which developed the Richmond region's first cross-discipline scenario planning tool to assist in planning for uncertain futures. The primary purpose of the P2F process is to be prepared. The future is uncertain – but like a sporting opponent's offense, we can imagine what may happen in order to envision our actions in each scenario. These insights can inform policy directions and investment strategies. P2F can also identify positive outcomes that we can aim for through planning and design.

In the P2F process, we first identified all the factors that cause challenges in the present as well as those likely to cause challenges in the future. Then, we combined these "disruptors" or "driving forces of change" into plausible future end states at a certain point in the future (2050). These combinations became scenarios: sets of reasonably possible but structurally different futures. Demographic and other related scenario-specific data were developed based on scenario descriptions. These future scenarios were then modeled. The process of modeling these future scenarios comprised an integrated suite of eleven predictive models. The model results provided a variety of information, which would help us to make informed decisions for the future— for example, benefits of alternative transportation investments considering future trends.



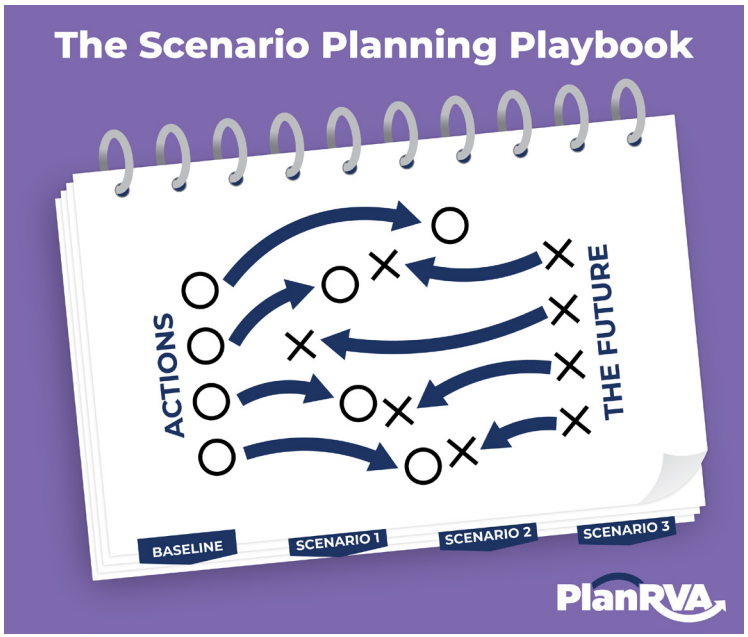
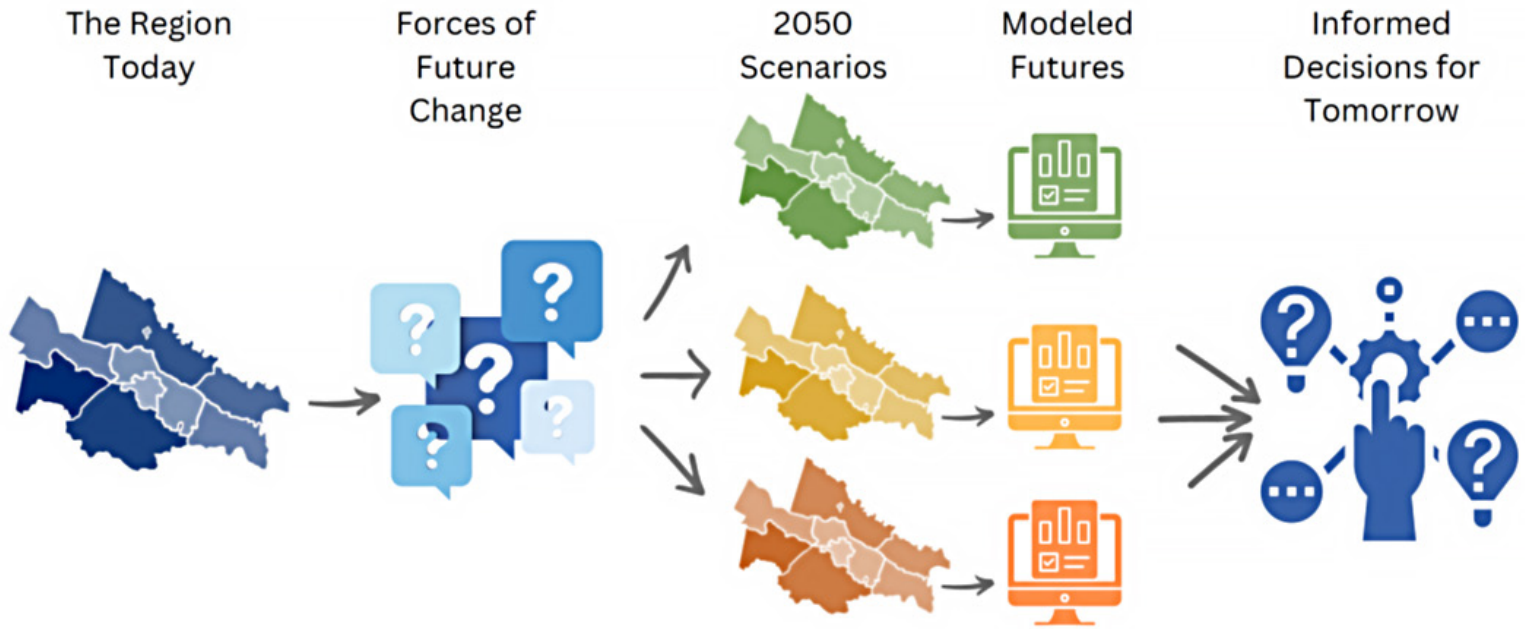


Exhibit 1 - Pathways to the Future Framework



PlanRVA conducted a significant public engagement process to complement the technical P2F process. Community members and subject matter experts provided valuable feedback through regional charrettes, public surveys, and a scenario-matchmaking exercise.

PlanRVA will use the outcome of the P2F process to illustrate the risks and opportunities of each scenario for our planning program areas: community development, housing, economic development, environment, emergency management, and transportation, and drive the region's strategic plan. In general, depending on the program area, the P2F process can result in three levels of applicability: education and awareness, strategic direction (vision setting or exploration), and action identification (in the form of policy recommendations and project identification and selection).

Charrette 1 - April 21, 2023 (left) and Charrette 2 - April 15, 2025 (right)

PATHWAYS TO THE FUTURE PROCESS

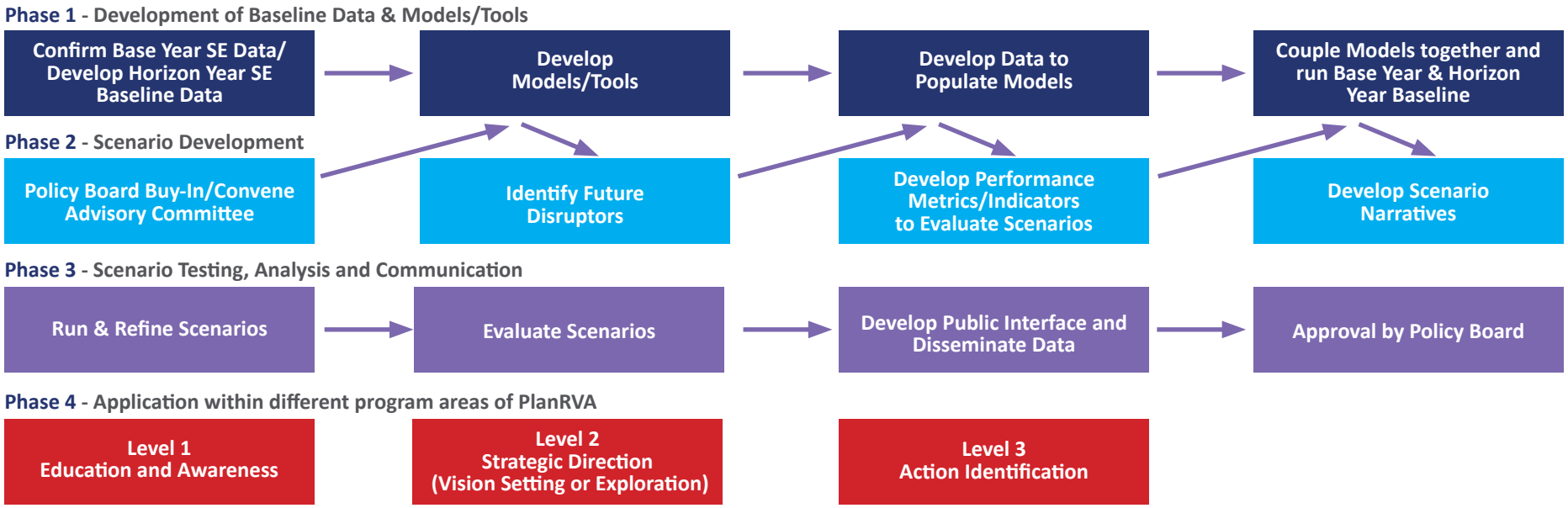
The process is divided into four main phases:

- **Phase 1 Development of Baseline Data & Models/Tools,**
- **Phase 2 Scenario Development,**
- **Phase 3 Scenario Testing, Analysis and Communication, and**
- **Phase 4 Application within PlanRVA's different program areas.**

This report summarizes the work completed in Phases 1-3.

Railroad looking into the horizon over agricultural land (Hanover)

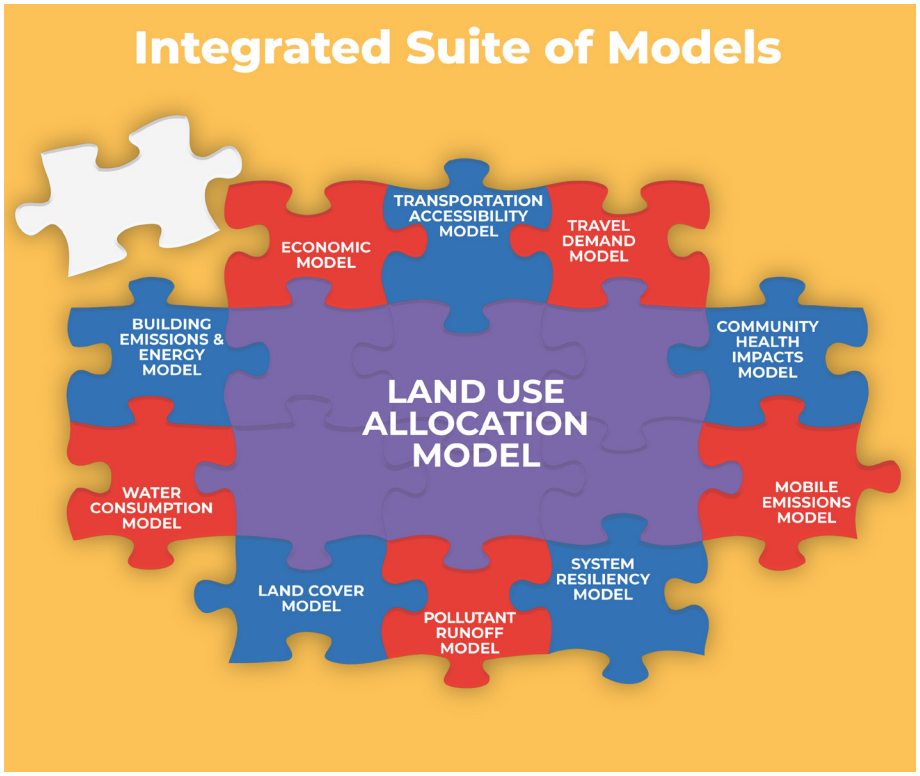
Exhibit 2 - Pathways to the Future - Process Flow



Pathways to the Future Process Flow across the different phases and steps.

PHASE 1: DEVELOPMENT OF DATA & MODELS

Phase 1 of the P2F primarily involved identifying data sources, compiling data, and conducting final checks on the data. This phase set the groundwork for the project ensuring accurate and comprehensive data. Once the data were developed, various models and tools were created to test the relationships between different variables and validate the P2F model. This process is crucial for understanding the dynamics of the region and predicting future scenarios. By thoroughly vetting the data and developing robust models, Phase 1 sets the stage for subsequent project phases, providing a solid foundation for informed decision-making and planning.



The Land Use Allocation Model is the key to providing data to all the other models

Each model used Land Use data from the scenarios along with additional model-specific inputs. For example:

- The Land Use Allocation Model projected a greater concentration of population in urban areas in two scenarios.
- The Travel Demand Model then projected greater use of transit in urban areas as a result of the land use pattern.
- Results from the combination of these inputs resulted in a lowering of vehicle miles traveled across the Richmond region.

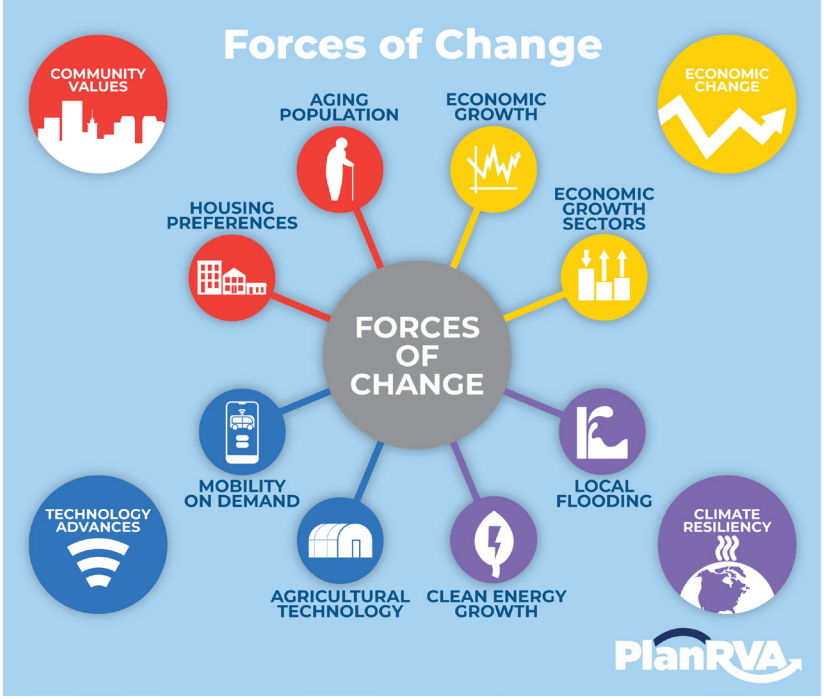
Canal Walk with expressway ramps and elevated rail line (Richmond)

PHASE 2: SCENARIO DEVELOPMENT

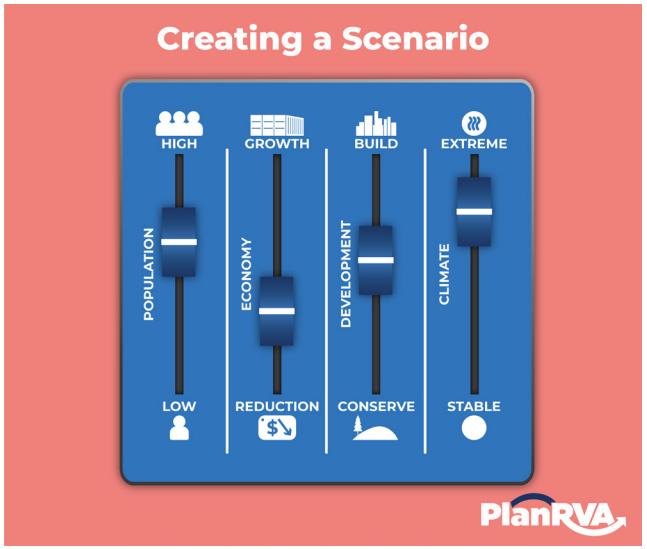
DRIVERS OF CHANGE

The P2F process identified driving forces of change that are both highly uncertain and highly impactful. In this process, the study team researched forces of change and engaged experts, stakeholders, and the public to determine which change drivers are the most important to consider and could also reasonably be evaluated in the projects' scenario modeling framework.

The engagement process provided the set of drivers of change in categories of Community, Technology, Economy, and Resiliency. PlanRVA incorporated them into the scenarios by altering the assumptions about each one for each scenario.



Forces of change that impact a scenario



This illustrates the concept of altering the driver of change assumptions (by using sliding bars) to develop different scenarios.

Exhibit 3 - P2F Scenario Drivers

COMMUNITY	ECONOMY	TECHNOLOGY	RESILIENCY
Settlement Demand	External Economy	Transportation Mode Dynamics	Climate/Planet Dynamics
Settlement Supply	Regional Economy	Other Technologies	Environment Policy
Political Dynnamics	Employment and Workforce		Local/Individual Responses

STAKEHOLDERS, REGIONAL EXPERTS AND PUBLIC ENGAGEMENT

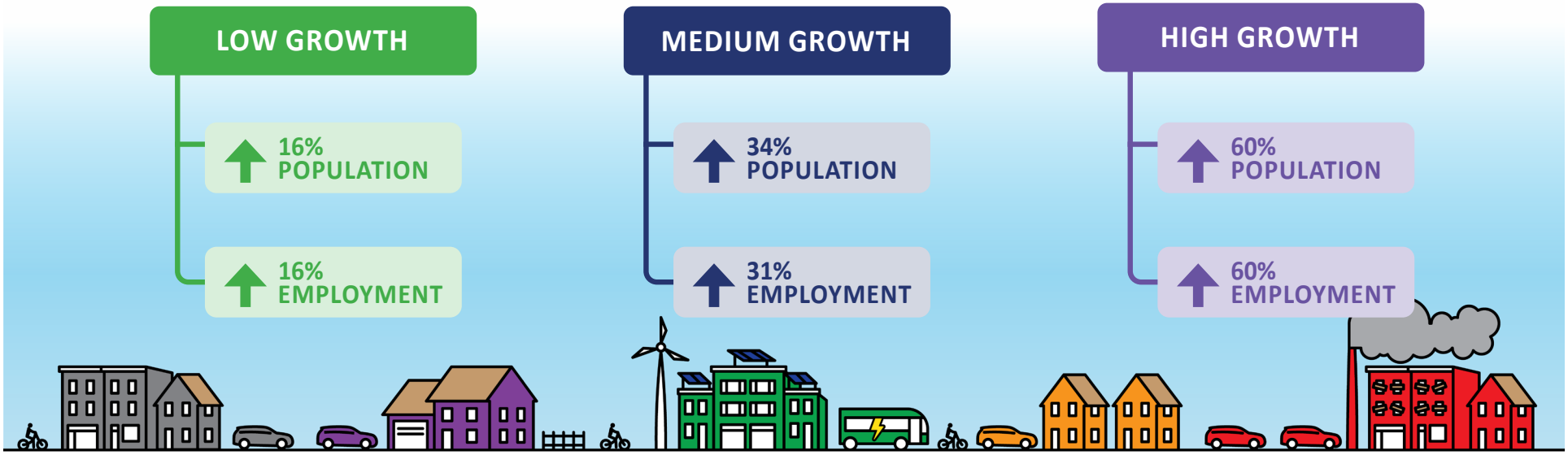
P2F examined the risks and opportunities posed by future uncertainty and included robust engagement of public and regional stakeholders. Benchmarks in the engagement process included:

- The formation of a stakeholder committee called the Scenario Planning Advisory Committee (or SPAC) that met six times throughout the process to shape and guide the development of the scenarios and the modeling of the results.
- Surveys of the general public that asked for their input on the potential drivers of future change in the region and their ideas or thoughts on the scenario modeling results.
- Participatory charettes that brought together a cross-section of regional stakeholders, subject matter experts, and influencers to help affirm the scenario narratives and review the results of the modeling.

PlanRVA developed a set of five scenario descriptions based on public and stakeholder input. The scenarios reflected three alternative levels of growth forecasted for 2050 and incorporated drivers of change in each of the areas of Community, Technology, Economy, and Resiliency. Each scenario narrative reflects a theme, developed through the engagement process. Collectively, the scenarios provide a wide range of plausible regional futures for which we can plan.

REGIONAL GROWTH FORECASTS

The scenarios use three levels of growth for population, employment, and associated land use to create varied possible futures. The medium level of growth matched the 2050 baseline forecast for population and employment growth from 2017 to 2050. This forecast was developed by PlanRVA staff, vetted by the localities, and approved by the Richmond Regional Transportation Planning Organization (RRTPO) Policy Board on July 6, 2023. The low growth forecast has approximately half of the baseline growth based on scenario narratives. The high growth scenario assumes a doubling of regional in-migration plus an increase in natural population growth (births minus deaths), and a slightly higher ratio of workers in the population, resulting in approximately two times the baseline growth.



Virginia Capital Trail (Henrico)

CSX Elevated Rail (Richmond)

Farmhouse and field (Goochland)

FINAL SCENARIO NARRATIVES

MEDIUM GROWTH

BASELINE

The Baseline Scenario is built on the idea that currently projected growth patterns will continue into the future. This means that there will be significant regional growth in suburban areas, more dense development in urban cores, and growth in rural areas as well. In the Baseline Scenario, Health care dominates employment sectors, and the share of professional service jobs grows. Clean energy and technology are adopted based on national trends. Settlement patterns are guided by the currently adopted Comprehensive Plans of our nine jurisdictions.

HIGH GROWTH

ECOTOPIA

This scenario depicts a region that is actively mitigating the impacts of climate change. Under the Ecotopia Scenario, the region is experiencing considerable growth – attracting climate refugees and digital nomads seeking high-quality communities. Ecotopia's future is multimodal, meaning people can travel throughout the region without relying solely on automobiles. Lifestyle shifts in this scenario lead to no/low carbon footprints. The economy shifts to one based on technology and entrepreneurship.

HIGH GROWTH

BACK TO THE FUTURE

The Back to the Future Scenario sees a return to lower-density development patterns. In this scenario, growth mainly occurs in the suburbs and rural areas. Professional and service industry jobs take a larger share of employment. Single-income families become more common, and most households are car-centric. The region does not attempt to mitigate the impacts of climate change and instead reacts to climate events and disasters after they occur.

MEDIUM GROWTH

MEH & SAFE

The Meh and Safe Scenario depicts a future that matches the growth levels of the Baseline Scenario but with widely varied development patterns based on each locality's preference. Meh and Safe means adopting some proactive strategies for climate resilience but also reacting to climate events and disasters after they occur. The Meh and Safe Scenario incorporates more varied technology adoption and a shift towards a more transit-oriented culture.

LOW GROWTH

RVA SINKS

This scenario represents the doomsday alternative – a sort of worst-case scenario. For RVA Sinks to become a reality, both man-made and natural disasters would result in a stalled recovery. These disasters are worsened by a lack of affordable housing and jobs. The result of the RVA Sinks scenario is low population and economic growth, with businesses and residents leaving the region in favor of better working and living conditions elsewhere.

PHASE 3: MODELING THE SCENARIOS

The P2F process went beyond asking "what if" questions by supporting “what ifs” with data analysis. When we try to predict what might happen in the future based on changes to individual elements, it is called “modeling.” In Phases 1 and 2 of the P2F process, PlanRVA developed the modeling tools, growth assumptions, and the basis for scenario testing. Staff prepared alternative land use scenarios in the land use allocation model, feeding those outputs to the downstream models, and applying modifications to the baseline assumptions in each model to reflect the technology, resiliency, and economic assumptions of the scenario narratives.

The scenario outcomes were analyzed via performance measures: quantitative metrics used to assess the models and to report the unique results of each set of assumptions applied in the models. These measures were used to objectively compare different scenarios. First, staff gauged the level of differentiation between scenarios to determine if the models and scenarios fulfilled the project objectives. Then, after final model adjustments, the performance measures were used to compare and evaluate the scenario outcomes.

In Phase 2 of the P2F process, stakeholders provided input on the most desired performance measures and outcomes to compare in the scenario analysis. Based on this input and the modeling framework, staff combined various direct performance measures of the individual models developed into eight indices (singular: index). The indices can best describe the results of the scenarios in relation to the baseline results in a simplified dashboard.

Bed & Breakfast in the Courthouse area (New Kent)

Exhibit 5 - Scenario Performance Indices

Healthy Living Index	Human health measures, food insecurity, transportation safety.
Smart Growth Index	Total area (acres) in use for housing and jobs, households in high density land use.
Environmental Protection Index	Pollution measures, wildfire potential, water inundation potential.
Access to Markets Index	Markets within 45 minutes away.
Business Impacts Index	Regional productivity (Gross Regional Product).
Technology Index	Amount of vehicle miles traveled by CAV, changes in energy use and emissions.
Cost of Living Index	Household cost, travel cost.
Accessibility for Equity Emphasis Areas Index	Access to key destinations, access to employment.

SCENARIO DASHBOARD

The scenario dashboard illustrates how each scenario ranks on the performance index, shown in terms of the percent difference relative to the baseline scenario results. This facilitates easy comparison of the performance measures (across rows) and the strengths and weaknesses of each scenario (down columns). Key insights of the scenario results for each index are summarized below.

Exhibit 6 - Scenario Dashboard

	ECOTOPIA	BACK TO THE FUTURE	MEH & SAFE	RVA SINKS
Healthy Living	146	-44	64	-115
Smart Growth	21	16	10	-2
Equitable Access	17	-14	12	3
Environmental Protection	17	-10	9	-20
Cost of Living	25	-7	12	-15
Business Impacts	94	-68	160	15
Access to Markets	16	-3	2	-11
Technology	27	-9	10	-25

All numbers are expressed in the percent difference from the Baseline Scenario

LOVEwork sign in the Courthouse area (Powhatan)

Healthy Living Index: This index shows the best results in Ecotopia, positive results in Meh & Safe, and negative results for Back to the Future and RVA Sinks, which rates the lowest. Some of the assumptions driving these results in Ecotopia and Meh & Safe are more connected/autonomous electric vehicles improving air quality and more compact development patterns improving the outcomes for food security measures.

Smart Growth Index: The Smart Growth results show improvements over the Baseline for all scenarios except RVA sinks, with Ecotopia rated the highest. Ecotopia and Meh & Safe show improvements due to more compact development patterns. Back to the Future's higher rating results from a greater amount of higher-density development in this scenario's higher growth rate, despite the overall greater land use consumption in acres.

Accessibility for Equity Emphasis Areas Index: Accessibility for Equity Emphasis Areas is improved over the Baseline in all but the Back to the Future scenario. The Ecotopia and Meh & Safe scenarios rate best largely due to their more compact development patterns.

Environmental Protection Index: Ecotopia and Meh & Safe score better than the Baseline for this measure, largely because these scenarios assume improved household and commercial conservation of electricity, water, and water pollutants. The Back to the Future and RVA Sinks scenarios have worse-than-baseline results partly due to reduced measures to mitigate climate change and sea-level rise.

Cost of Living Index: The household conservation assumptions and travel cost efficiencies in Ecotopia and Meh & Safe drive the improved cost of living. RVA Sinks and the Back to The Future scenarios negatively impact the cost of living.

Business Impacts Index: The Meh & Safe scenario scores the highest in Business Impacts, representing overall regional productivity. This is partly because this scenario has improved efficiency in development patterns without the impacts of higher traffic congestion in the two high-growth scenarios (Ecotopia and Back to the Future). Ecotopia scores the second highest in this category due to the efficiencies in travel automation and subsequent reductions in travel costs, fuel costs, and costs associated with accidents/fatalities/injuries.

Access to Markets Index: Due to high efficiency in travel time/cost measures resulting from assumed high connected and automated vehicle (CAV) implementation, the Ecotopia and the Meh & Safe scenarios show positive accessibility to the Central Business District (i.e. downtown Richmond). The RVA Sinks and Back to the Future scenarios show negative impacts. Population growth is also a contributing factor in this measure, leading to relatively higher accessibility in Ecotopia and the Meh & Safe than in the RVA Sinks scenario.

Technology Index: The two scenarios with higher connected and autonomous vehicle use assumptions, Ecotopia and Meh & Safe, rate best in the technology measure. The less environmentally favorable scenarios, Back to the Future and RVA Sinks, rate poorly because they have higher per capita energy use than the Baseline and other scenarios.

Restaurant and entertainment venue in historic 19th century building (Charles City)

SCENARIO IMPLICATIONS

In the final stakeholder engagement activity of the study, small groups of stakeholders discussed the following aspects of each scenario, looking at the dashboard results both vertically (by scenario) and horizontally (comparing scenarios): strengths/positive outcomes, risks/negative outcomes, investments to support more positive outcomes or avert negative ones, and policies to do the same. The themes that emerged in each area from these small group discussions are summarized below.

Exhibit 7 - Scenario Themes

ECOTOPIA

- Positive for the environment and multimodal travel
- Risks for housing affordability
- Invest in transit, affordable housing, green infrastructure.
- **Policies –** rent control, complete streets.

BACK TO THE FUTURE

- Something for everyone (less opposition)
- **Risks –** car dependence, obstacles to affordable & accessible housing, high cost of living, exacerbating climate change.
- Invest in land preservation and equitable transportation.
- **Policies –** inclusive zoning, mixed-use centers

MEH & SAFE

- **Balanced outcomes, positive for quality of life –** congestion, accessibility, health
- Risks from concentrated development patterns (market access, growth have/have-nots)
- Invest in transit and neighborhood resiliency grants.
- **Policies –** inclusive zoning, ADUs, revenue-sharing, investment hubs.

RVA SINKS

- Less congestion & more economic efficiency
- **Risks –** health and environment
- Invest less in infrastructure, more in environmental resiliency, and reinvest in existing housing.
- **Policies –** resiliency requirements for development, green space and social distancing, normalize green transportation.

PlanRVA's innovative P2F framework is plausible and useful for various planning purposes. The scenario planning tools and performance measures designed in P2F Phases 1 through 3 have laid a foundation that will enable regional stakeholders to refine and apply the scenario narratives and tools effectively in upcoming long-range planning projects (Phase 4).

Bike sculpture at Four Mile Creek Park (Henrico)

PATHWAYS TO THE FUTURE PROJECT TEAM

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ACKNOWLEDGMENTS

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