

# Aquidneck Island

## Development Impact Analysis

DECEMBER 2019



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# 1

# Introduction

# Introduction

*The goal of this study is to understand the potential impacts of future development on Aquidneck Island*

Aquidneck Island is beloved for its diversity of scenic open spaces, rolling farmland, beaches, and iconic water views. These assets are a defining feature of the quality of life that its residents enjoy and a big reason why the Island continues to be a major draw for tourism and newcomers. However, over the last several decades, the Island's farmland and open spaces have been steadily developing into new suburban subdivisions and shopping centers. This trend shows no sign of slowing down, and once these assets are lost, they are lost permanently.

Protecting open space is not just about preserving scenery. Aquidneck Island's farms, parks, trails, beaches, and natural areas are critical to the Island's economy, ecology, water quality, history, and recreation. In addition, as these spaces are built out, additional issues emerge related to traffic, fiscal health, carbon emissions, and other concerns.

While some degree of development is inevitable and even desirable, questions about its location, character, and intensity are critical. This study presents the historic and current development trends on the Island, a snapshot of the Island's geography and land use today, two future 2050 development scenarios—a trend development scenario and an alternative development scenario—and a detailed analysis of the potential impacts of future development. It is our hope that this work will inspire conservation action, inform land planning policy, and catalyze citizen engagement, since the future of the Island ultimately rests in the hands of its residents.





# Demographic and Development Trends

# Demographic and Development Trends

## Significant new development despite flat population

The population of Aquidneck Island has remained flat over the last several decades. As seen in the left chart on the opposite page, after minor population growth towards the end of the 1980s, a subsequent decline in the early 1990s has left the Island’s population today similar to that of 1980. At the municipal level, Middletown reflects the same pattern as the Island at large, with a small increase in the late 1980s followed by a decline in the early 1990s. Portsmouth, meanwhile, has experienced slow but steady population growth over the past 30 years, while Newport’s population has been steadily dropping over that same period. Rhode Island state planners expect local population to remain flat for the foreseeable future<sup>1</sup>.

Despite flat population growth, Aquidneck Island has been developing rapidly. The right chart on the opposite page shows the cumulative housing units permitted across the Island. This data<sup>2</sup> measures the number of units permitted for new construction in each municipality, where single family structures are recorded as one unit, 2-unit structures are recorded as two units, 3-4 unit structures are recorded as 3 units, and 5+ unit structures are recorded as 5 units. Therefore, cumulative unit counts likely underestimate the true total number of units permitted. With that in mind, a conservative Island-wide estimate shows an average of 165 new units were permitted each year over the past 30 years, resulting in a total of 6,200 new units over that period, despite the aforementioned stagnant population.

For the purposes of this study, housing permits—not overall population—is the important metric for assessing development impacts, since construction and physical

<sup>1</sup> Statewide Planning Program, Division of Planning, Rhode Island Department of Administration, “Rhode Island Population Projections 2010-2040” (Technical Paper 162, 2013)

<sup>2</sup> United States Census Bureau. (2018). *Building Permit Survey* [Data file]. Retrieved from <https://www.census.gov/construction/bps/>

development are the forces that consume open space. The steady trend of new construction over the last several decades, summarized by the permit data, reflects the on-the-ground reality that open space is being rapidly consumed for development, which is obvious to long-time residents and even new visitors to the Island. Anyone driving through the Island’s communities, especially Portsmouth and Middletown, is bound to encounter numerous construction sites and recently built residential subdivisions, gas stations, and strip malls.

In order to assess potential future development impacts, this study must assume a certain rate of construction going forward. Since the actual rate has remained fairly consistent over the last 30+ years, we have extended this trend to the scenarios, which is 165 new units per year. The distribution of these units across the 3 jurisdictions matches the proportions reflected in the data, which has been historically consistent across our sample period.

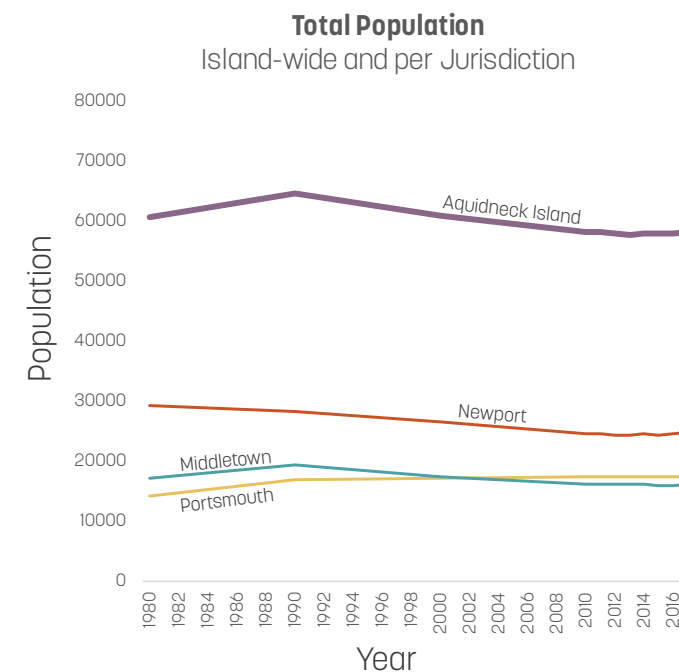
An obvious question raised by this data is the following: how can the population remain flat if the Island is developing so rapidly? Although data on this phenomenon in particular is not available, several factors are likely. Chief among them is the growth of the second home market, leading to new construction for seasonal residents that go uncounted in the annual population figures. A second likely contributor is the decrease in average household size, which has fallen nationwide from 2.76 to 2.53 since 1980<sup>3</sup>. With shrinking household size, an equivalent population takes up a greater number of housing units. Real estate churn is yet another likely factor: households upsizing or downsizing move around the Island, some of whom seek

<sup>3</sup> United States Census Bureau. (2018). *Table HH-6 Average Population Per Household and Family: 1940 to Present* [Data file]. Retrieved from <https://www.census.gov/data/tables/time-series/demo/families/households.html>

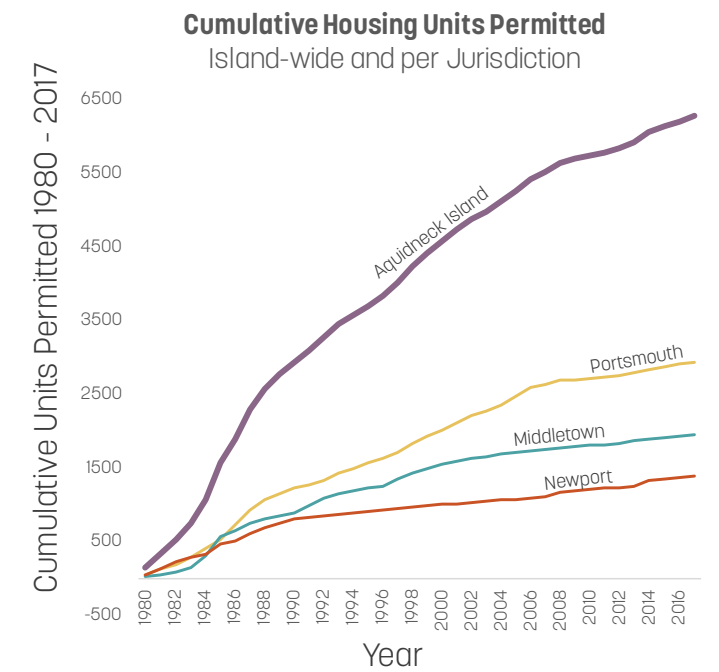
newer construction or unit types that have not previously existed, which leaves behind older or less desirable units that could be subject to higher vacancy rates. Another contributor is the Airbnb effect, whereby housing units are taken out of circulation and reserved for short-term rentals. All of these factors likely contribute to the mismatch between population and development rates.

The scenarios detailed throughout this report reflect these current and recent rates of development. While these rates are unlikely to decrease in the foreseeable future, they may, in reality, be much higher than what is shown

depending on structural changes to regional economics and infrastructure. For example, the completion of the South Coast Rail extension to Fall River would increase pressure on Aquidneck Island’s housing market and likely lead to significantly more development beyond what is shown in the scenarios. Any impacts would be accordingly and directionally amplified depending on the magnitude of the disruption to the status quo.



Source: U.S. Census and American Community Survey



Source: U.S. Census Building Permit Survey (Residential) Annual Data: 1980 - 2017 - Standard Error <0.5%

# 3

## Aquidneck Island Today

# Aquidneck Island Today

*Aquidneck Island is beloved for its historic towns, ocean vistas, rolling farmland, meadows, forests, and beaches*

This section provides a current snapshot of the geographic, physical, and regulatory context on Aquidneck Island as it relates to development. This includes:

- ▶ Land use: how is land being used today?
- ▶ Zoning: how can land be used in the future under current regulations?
- ▶ Open space: what are the types, locations, and conservation status of the Island's open space?

These three factors taken together provide the context for considering future development scenarios and their potential impacts.

## Land Use

### Island Summary

Aquidneck Island is where suburbanization meets New England coastal and agricultural landscapes. It is strikingly diverse in terms of its urban and landscape character, despite being just slightly under 40 square miles in size and drivable from corner-to-corner in 30 to 40 minutes. Comprised of three towns - Portsmouth, Middletown, and Newport - the Island is accessed via three bridges: the Mt. Hope Bridge and the Sakonnet River Bridge in the north and the Claiborne Pell Newport Bridge in the south. Traversing the Island are two major arterials which serve as connective corridors: East Main Road (Rhode Island Route 138) and West Main Road (Rhode Island Route 114).

One of Aquidneck Island's most well-known areas is that of Newport's Ocean Drive, with its palatial estates sprawling over the rocky southwestern coastline. Further north, the historic core of Newport retains the appearance of a traditional New England oceanside downtown.

North of Newport, Middletown is marked by suburban residential developments and auto-oriented retail along East Main Road and West Main Road, giving way to the expansive farmlands that occupy the center of the Island. This agricultural character extends into Portsmouth, which takes on a more suburban residential character further towards the north.

Extending along the western coast of the Island is a collection of parcels owned by the U.S. Navy. Containing both operational (e.g. Naval Station Newport) and non-operational elements including land to be excessed (e.g. former Naval Hospital), these parcels represent the lion's share of institutional land use on the Island.

### Land Use Classification

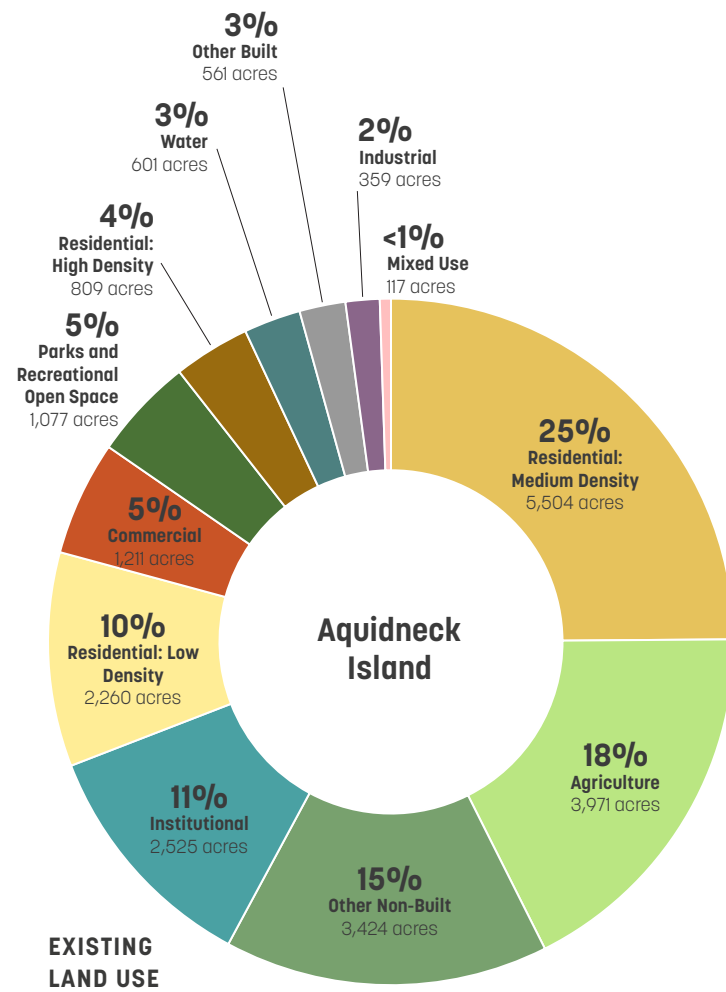
Land use is recorded by parcel at the municipal level. While some municipalities use statewide land use categories, there is no standardized method for classifying land uses across Aquidneck Island. Therefore, for the purposes of this study, the myriad uses present in the Island's three municipalities were aggregated into the following 12 categories:

- ▶ **Residential: Low Density** - estates and large-lot suburban residential (minimum 60,000 square foot lot)
- ▶ **Residential: Medium Density** - suburban residential (1/8-acre to 60,000 square foot lots)
- ▶ **Residential: High Density** - multi-family, mobile homes, and small lots (minimum 8 units per acre)
- ▶ **Mixed Use** - any mix of residential and non-residential uses on the same parcel
- ▶ **Commercial** - retail, dining, office, and related uses
- ▶ **Industrial** - manufacturing, resource extraction, processing, distribution, and related uses
- ▶ **Institutional** - governmental, educational, military, and related uses
- ▶ **Other Built** - utilities, transportation, storage, and related uses as well as vacant developed lots
- ▶ **Agriculture** - farmland, pastures, vineyards, nurseries, hayfields, fallow lands, and related uses
- ▶ **Parks and Recreational Open Spaces** - publicly or privately owned open space parcels open to the public for recreation or enjoyment
- ▶ **Other Non-Built** - any non-agricultural vegetated land not explicitly open to the public (e.g. forests, fields, golf courses, cemeteries, vacant lots)
- ▶ **Water** - Island water bodies consuming an entire parcel

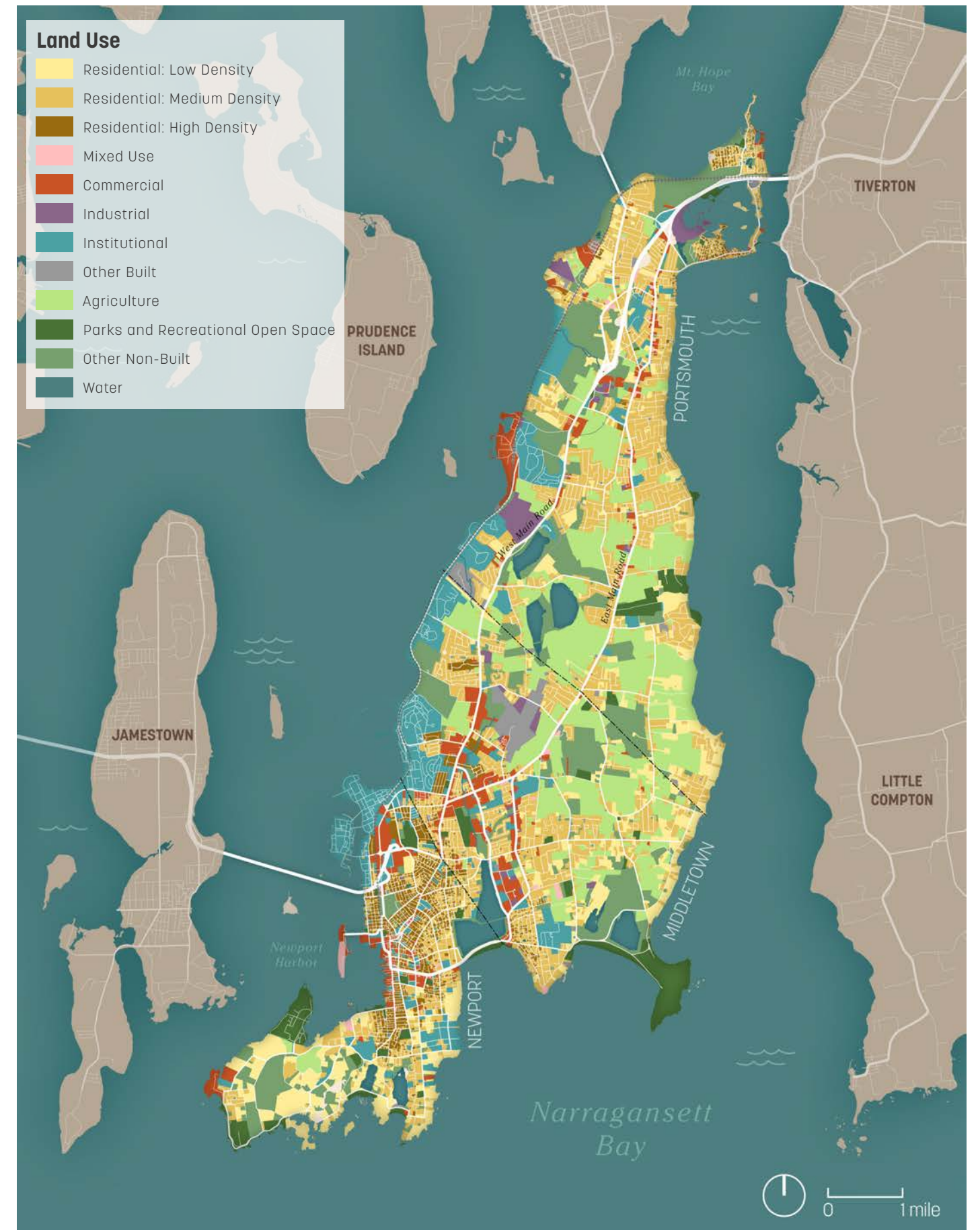
### Island-wide Land Use Summary

Nearly 40% of Aquidneck Island acreage is currently open space, owing to its agricultural heritage (18%), natural areas (15%), and public parks (5%). Of the 12 land uses categories established for this study, Residential: Medium Density is the best represented on the Island (25%), highlighting the prevalence of suburban housing on the Island, with larger lot estates (Residential: Low Density) representing an additional 10%.

Institutional uses comprise 11% of the Island and consist of the Naval land along the western coast, Salve Regina University in eastern Newport, and local K-12 schools. The remainder of the Island's land uses include commercial and industrial parcels along major corridors and in downtown Newport, high-density residential in historic Newport, Middletown, and parts of Portsmouth around Blue Bill Cove, and a smattering of Mixed Use, transportation-related (e.g. Newport State Airport), and vacant parcels.



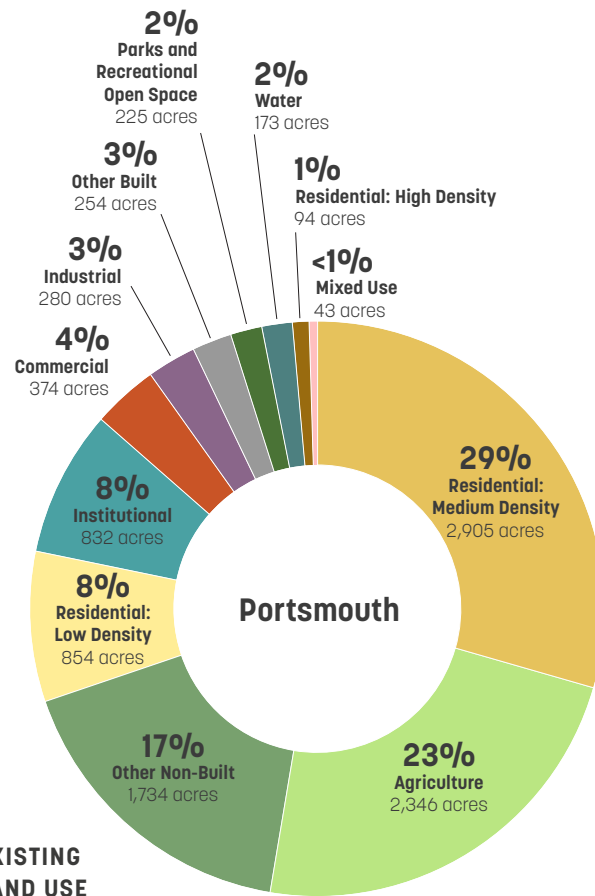
EXISTING LAND USE



EXISTING LAND USE: AQUIDNECK ISLAND

### Portsmouth Land Use Summary

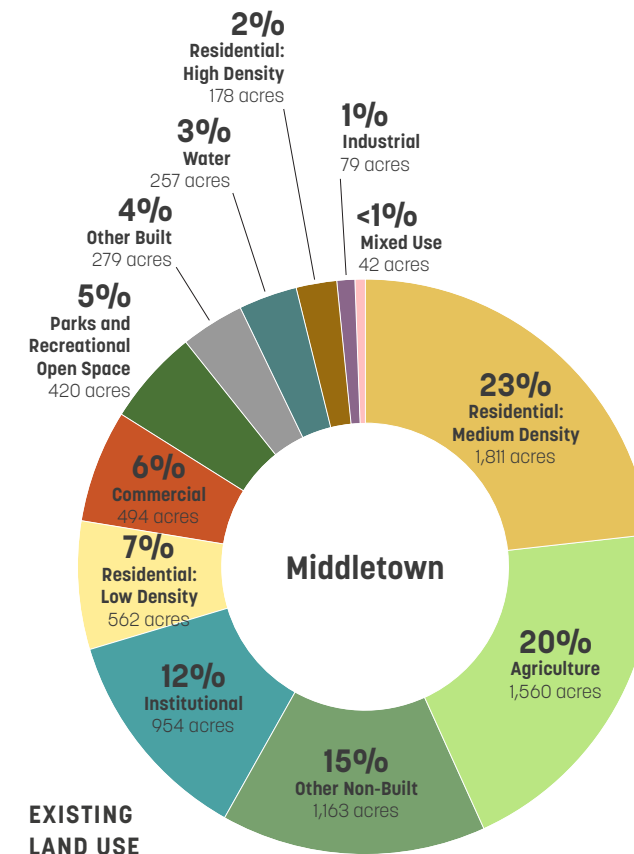
Portsmouth's land use closely resembles that of the Island as a whole, with over 40% open space (23% Agriculture, 17% Other Non-Built, and 2% Parks and Recreational Open Space). Medium density residential (29%) represents the single largest land use, with low density lots comprising another 8%. Naval and publicly-owned parcels (Institutional) represent an additional 8%, with Commercial (4%) and Industrial (3%) uses concentrated along East Main Road, West Main Road, and along the coastlines where the legacy of shipworks-related industries lives on. Prudence Island, Hog Island, Patience Island, and Hope Island, while part of the Town of Portsmouth, were not included in this study.



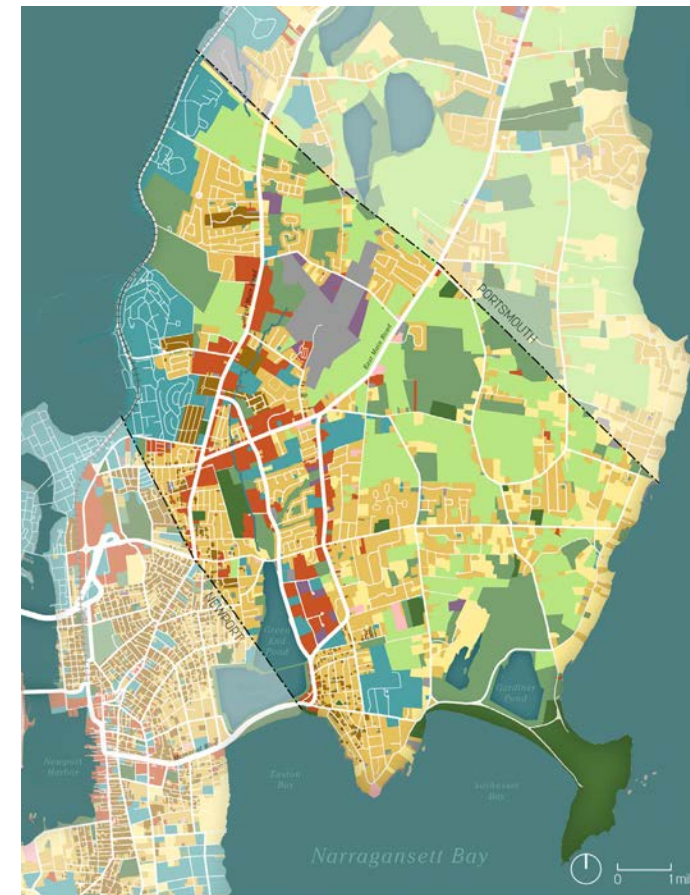
EXISTING LAND USE



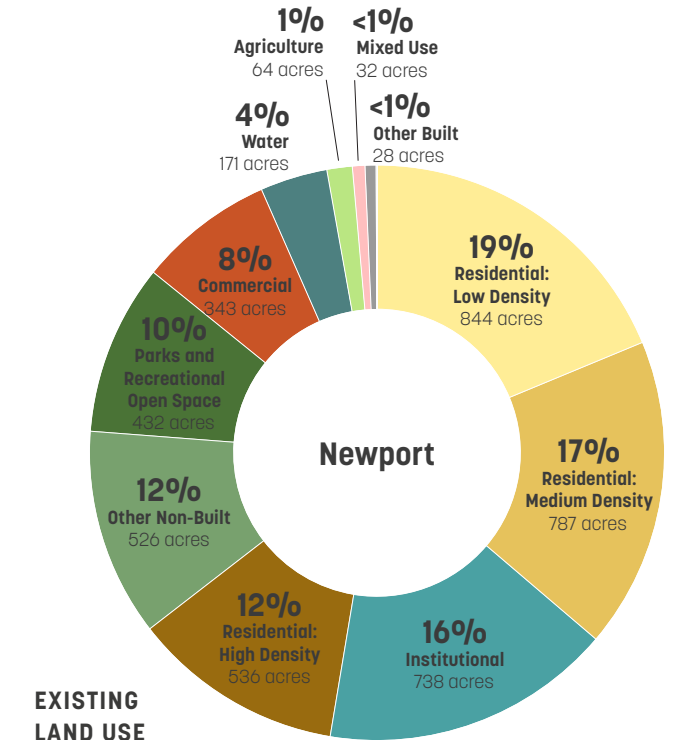
EXISTING LAND USE: PORTSMOUTH



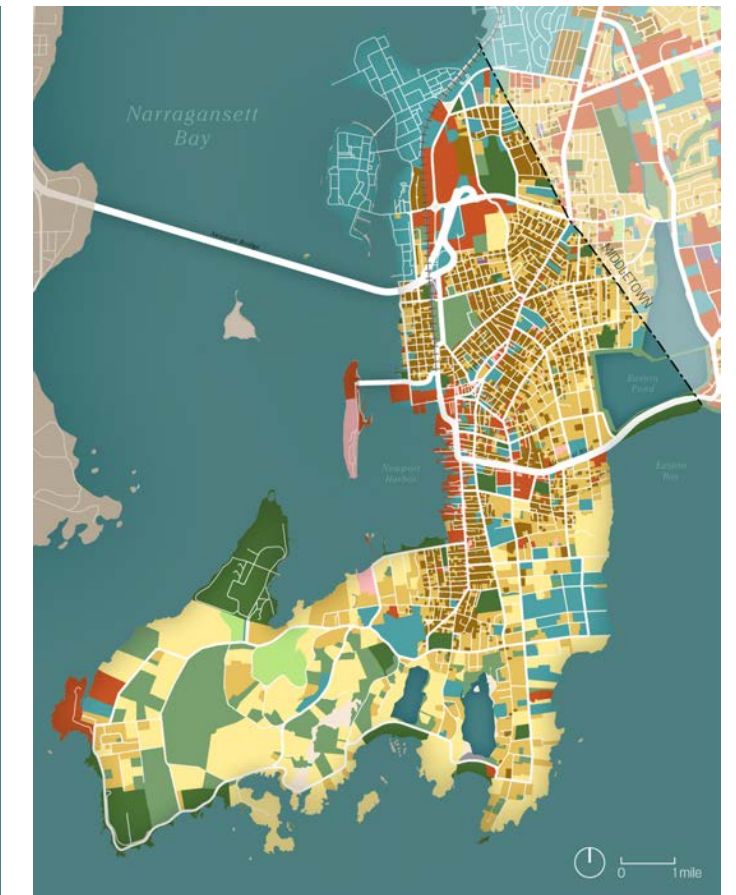
EXISTING LAND USE



EXISTING LAND USE: MIDDLETOWN



EXISTING LAND USE



EXISTING LAND USE: NEWPORT

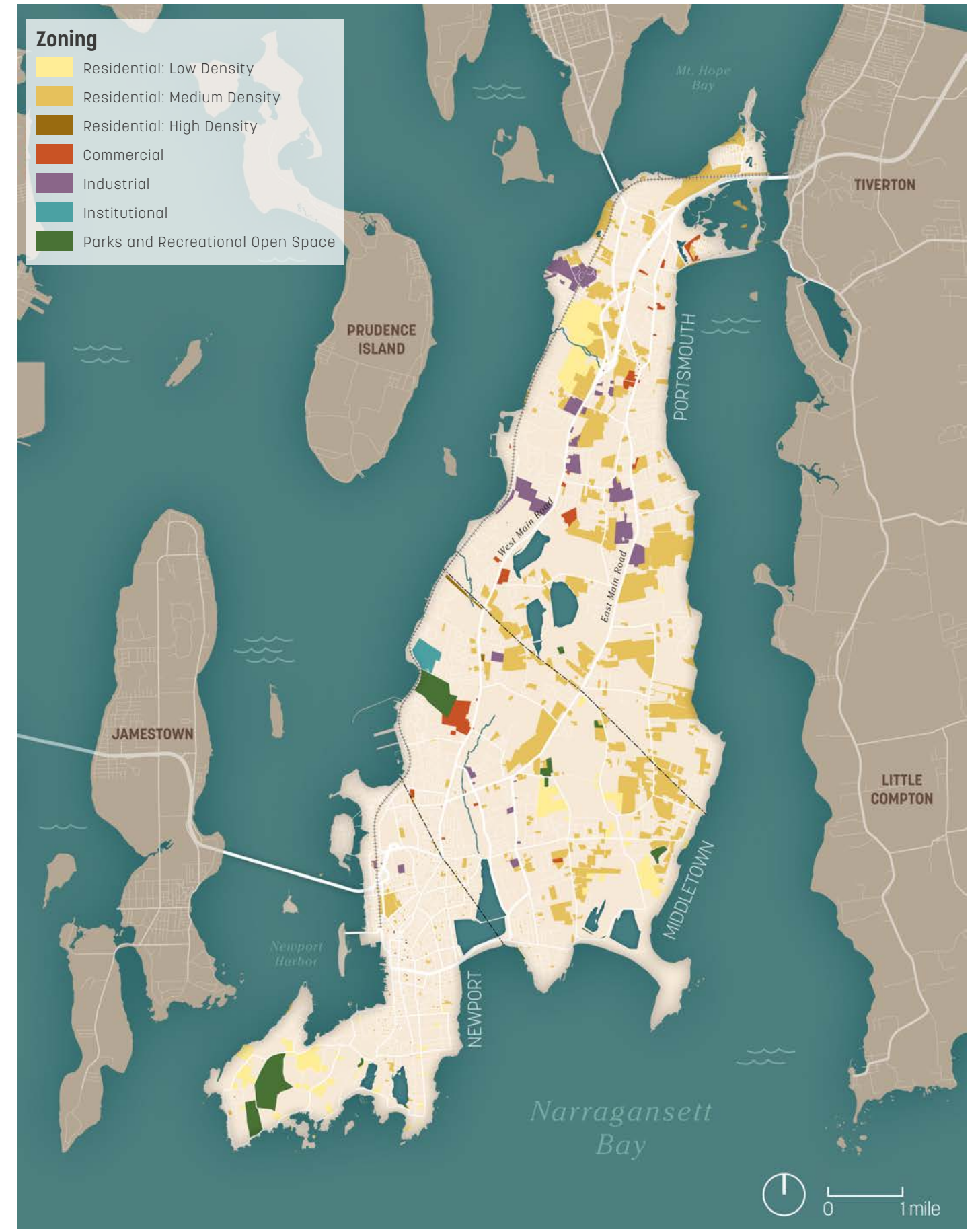
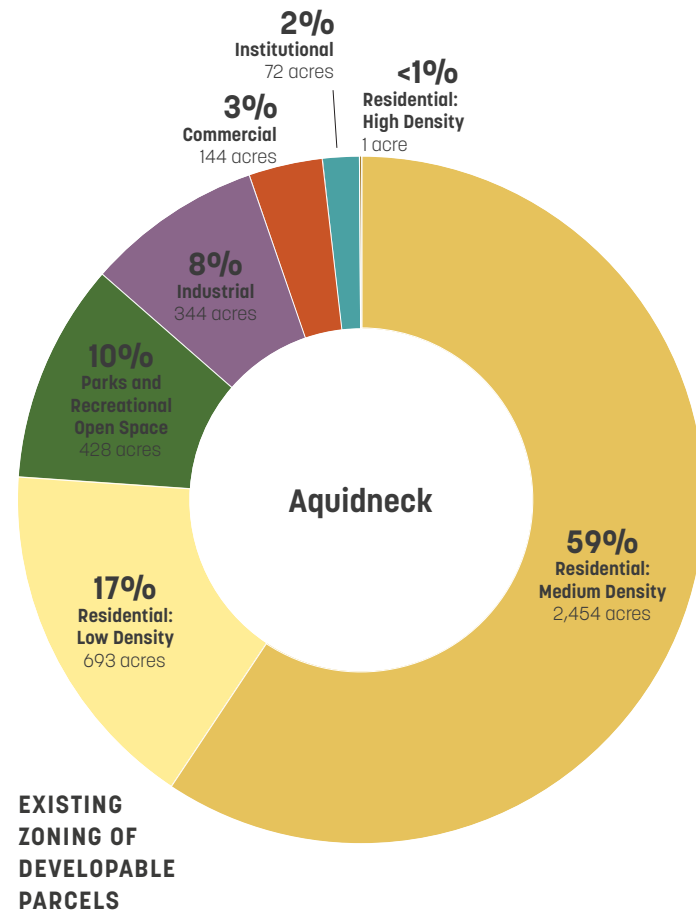
## Zoning

In order to control the character of their built environment and preserve the health, safety, and welfare of their citizens, cities and towns enact zoning ordinances, which are regulatory tools that dictate elements like land use, density, and building form. In this way, zoning represents the future land use of a parcel and reflects a municipality's vision for its built form.

Zoning categories, like land-use classifications, are not standardized across the Island's municipalities. Therefore, the same list of categories used in the land use classification was applied to the Island's various zoning classes.

The map and chart shown here summarize the current zoning of developable parcels on the Island. That is, parcels that are either currently heavily developed or conserved have been excluded, leaving only non-conserved parcels whose land use is currently classified as open space (Agriculture, Other Non-Built, Parks and Recreational Open Space) or Residential: Low Density.

Of these parcels, 59% are zoned Residential: Medium Density. At nearly 2,500 acres, this represents 11% of the Island's total acreage, indicating considerable potential for existing undeveloped or lightly developed land to convert to suburban residential. Other potential development on these properties include low density residential (17%), industrial (8%), commercial (3%), and institutional (2%). Only 10% of these parcels are zoned as Parks and Recreational Open Space, highlighting the limited protection existing land use regulations provide against the development of the Island's open space.



EXISTING ZONING, DEVELOPABLE PARCELS: AQUIDNECK ISLAND

## Open Space

Aquidneck Island’s open space is beloved by residents and visitors alike. While many areas of the Island have a rural, open character, including the large residential estates in parts of Newport and Middletown, open space for this study has been defined as parcels whose land use is classified as Parks and Recreational Open Space, Agriculture, and Other Non-Built.

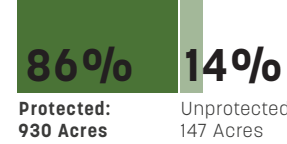
Parks and Recreational Open Space includes local and state parks, recreational facilities, and other natural areas open to the public. Agriculture includes active farmland, pastures, vineyards, nurseries, hayfields, fallow lands, and related landscapes. Other Non-Built uses include vegetated areas that are not explicitly open to the public, such as privately-owned natural areas, golf courses, cemeteries, and vacant, unbuilt parcels.

Just over half of the open space on the Island is conserved, meaning it is legally protected from future development through deed restrictions or conservation easements. The other 49% is vulnerable to being converted to residential, commercial, or industrial buildings, based on the underlying zoning of the parcel. Of the 4,334 conserved acres of open space on the Island, nearly 60% is protected by the Aquidneck Land Trust. The remaining land is protected by a combination of the Island municipalities, the State of Rhode Island, the US Fish and Wildlife Service, and various preservation societies.

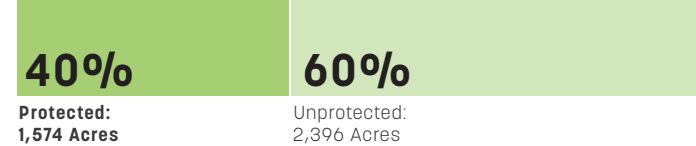
The chart shown here illustrates the relative acreage of each open space type, differentiating between protected (conserved) and unprotected lands. While agriculture represents the largest share of total open space, only 40% of these lands are protected, whereas 86% of the Island’s Parks and Recreational Open Spaces are conserved.

The adjacent map highlights the location of each open space parcel, with a overlaid hatch to represent those that are conserved, most of which are located in northern Middletown and southern Portsmouth.

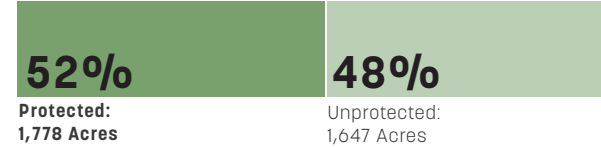
### PARKS AND RECREATIONAL OPEN SPACE: 1,077 acres



### AGRICULTURE: 3,970 acres



### OTHER NON-BUILT: 3,425 acres



### EXISTING OPEN SPACE: AQUIDNECK ISLAND - 8,471 acres

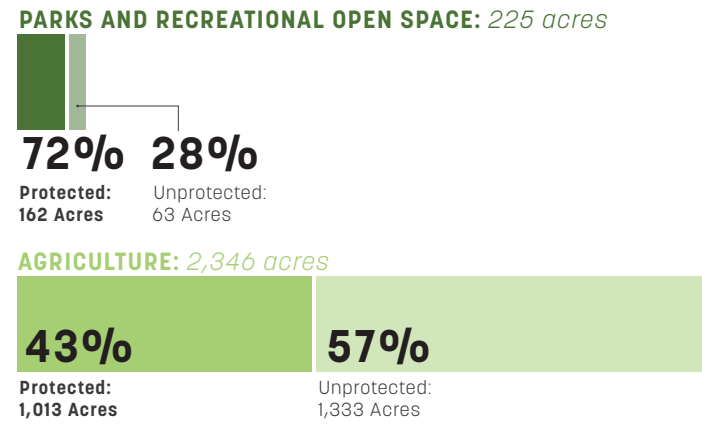
51% Protected: 4,334 Acres | 49% Unprotected: 4,137 Acres



EXISTING OPEN SPACE: AQUIDNECK ISLAND

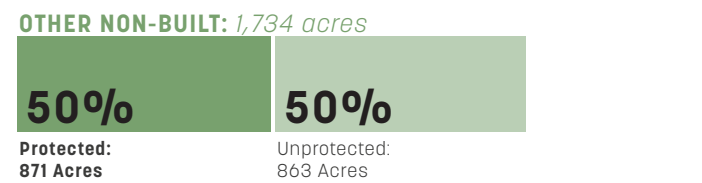
### Portsmouth

Much like the Island as a whole, Portsmouth's open space largely consists of agricultural land (54%), with an additional 40% taking the form of Other Non-Built. Again, these lands are more vulnerable to development as only 43% of agricultural acreage and 50% of Other Non-Built acreage is conserved. While Parks and Recreational Open Spaces are but a small component of Portsmouth's overall open space, the majority (72%) of this acreage is conserved.



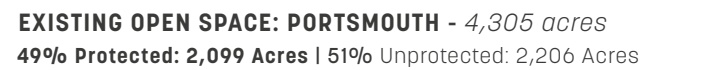
### Middletown

Though Middletown has fewer acres of agricultural land, a larger share (64%) is vulnerable to development, while more of the town's Other Non-Built acreage is protected (70%). 95% of the town's 420 acres of Parks and Recreational Open Spaces are conserved.

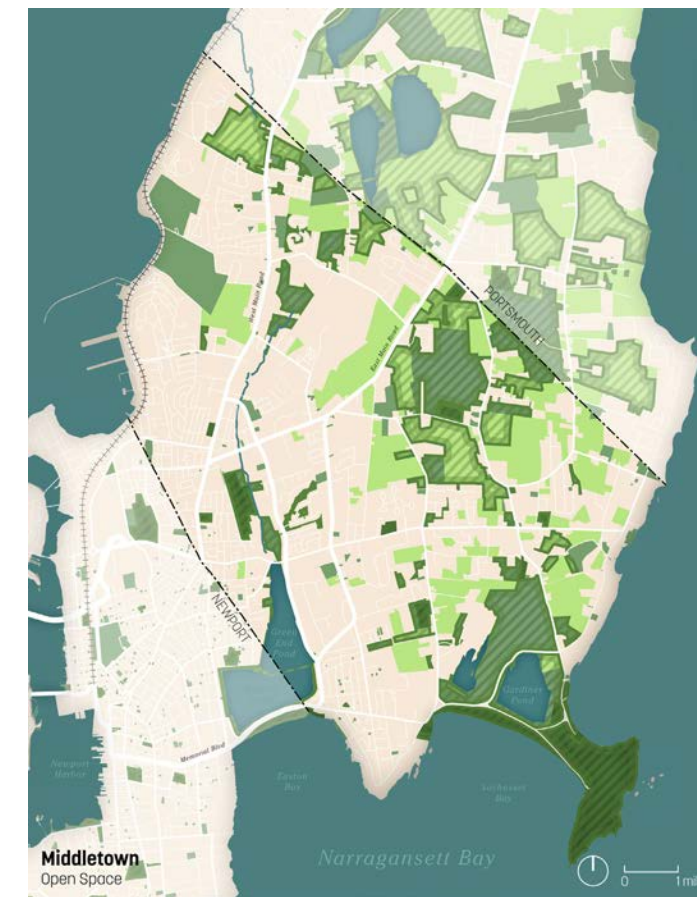
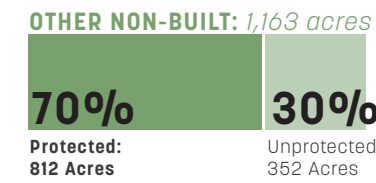
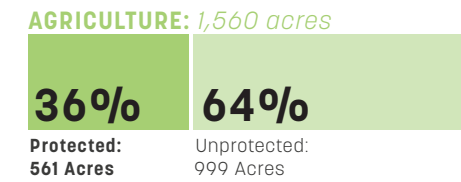
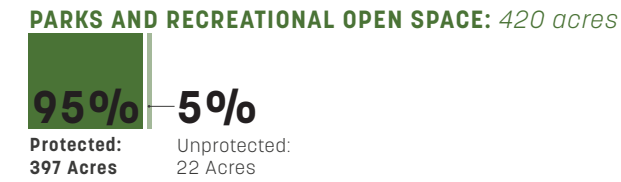


### Newport

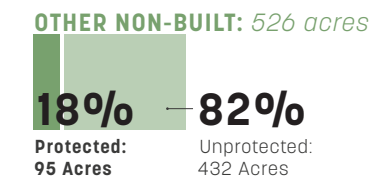
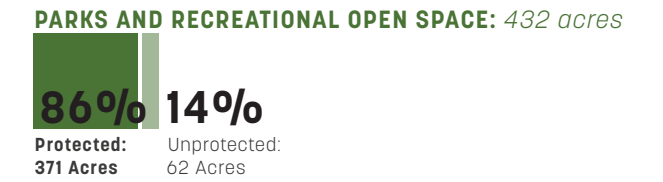
While Newport has by far the least amount of open space among the Island's municipalities with almost no agricultural land, it actually possesses the most Parks and Recreational Open Space, 86% of which is conserved. Additional large open spaces include the Newport Country Club and the Common Burying Ground and Island Cemetery.



**EXISTING OPEN SPACE: PORTSMOUTH**



**EXISTING OPEN SPACE: MIDDLETOWN**



**EXISTING OPEN SPACE: NEWPORT**

#### Open Space

- Agriculture
- Parks and Recreational Open Space
- Other Non-Built
- Conserved

# 4

## Aquidneck Island 2050

# Aquidneck Island 2050

## Two futures for Aquidneck Island

This study takes a scenario-based approach to understanding the potential impacts of future development on Aquidneck Island. Specifically, it explores two possible future scenarios:

- ▶ **Scenario 1: Trends Continue** - what does Aquidneck Island look like in 2050 if current development trends continue?
- ▶ **Scenario 2: Plan & Protect** - what if the Island chooses a different path, where conservation is prioritized and development pressures are redirected in a different way?

The current development trends reflected in Scenario 1 largely consist of suburban-style residential subdivisions. The alternative development envisioned in Scenario 2 consists of a mix of housing types that offers greater consumer choice and the transformation of underutilized urban areas into walkable town centers, sometimes called “Smart Growth,” along with a more robust conservation program. Subsequent sections will detail the assumptions and storylines of each scenario in much greater detail.

The creation of the scenarios was accomplished by a combination of computer algorithms and expert judgment. The diagram below outlines the major steps of this process. The first step was determining the types and amounts of future development, which we call “demand.” This includes the numbers of new residential units, their densities, and acres of new commercial development. It is important to note that the number of housing units and commercial acreage is the same in both scenarios. This was done so that we can isolate the impacts of different policies when analyzing the differences between the scenario outputs. As detailed in the prior Demographics and Development Trends section, future demand was benchmarked based on current and recent development trajectories. This amounts

to 165 new housing units per year, allocated across the 3 jurisdictions in proportion with current trends, as well as a proportional amount of additional commercial acreage to preserve existing land use ratios, all projected out to 2050.

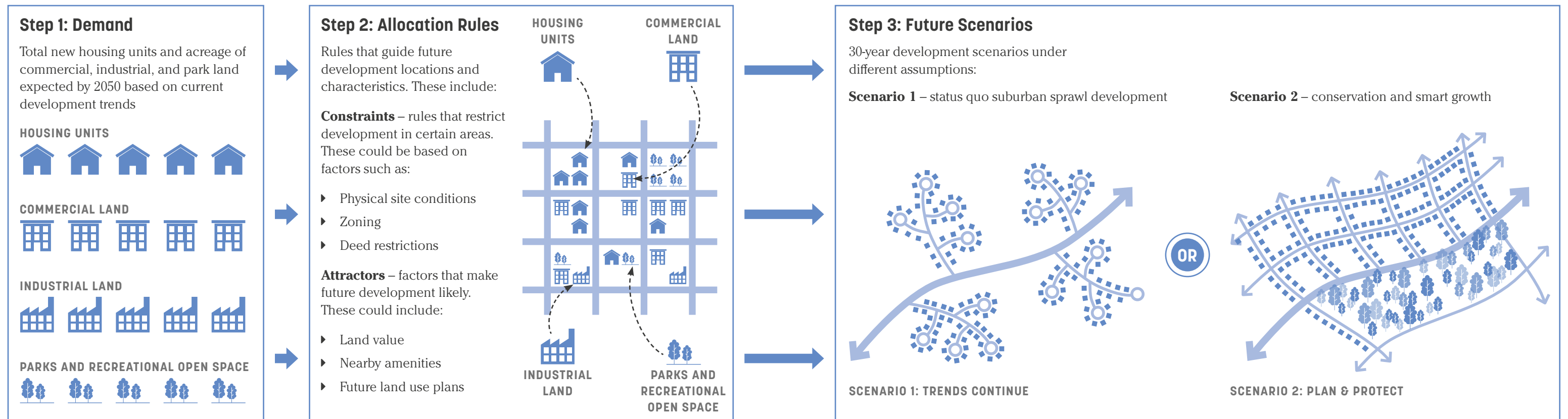
The second step was defining allocation rules, which has two parts. The first part was identifying constraints. Constraints indicate areas where new development is not permitted to occur. This could be due to a physical barrier—like surface water—or a regulatory barrier, like zoning. The second part was defining attractors. Attractors indicate areas where development is likely to occur, which could include proximity to amenities, infrastructure, zoning, and future growth areas identified in existing comprehensive plans. Full details about the constraints and attractors for each scenario can be found in the subsequent sections and the Technical Appendix.

Once all inputs were determined, they were combined in a GIS model and allocation was checked on a parcel-by-parcel basis to ensure that model allocations followed scenario rules and were responsive to any site specific variations that might affect allocation. More information about the technical aspects of the scenario model can be found in the Technical Appendix.

Navy land received special treatment, both because of its unique disposition and development considerations, as well as its significant spatial extent. Allocation on Navy-owned parcels matched the intent reflected in the “Redevelopment Plan for Surplus Properties at NAVSTA Newport” released by the Aquidneck Island Reuse Planning Authority on July 6, 2011.

The raw output of the scenario modeling process were GIS vector files of all the land parcels on the Island that indicated future 2050 use, conservation status, and additional housing units for each of the two scenarios. This raw data file was then visualized with an extensive series of 2D maps and 3D visualizations to illustrate the massing, density, and on-the-ground character of the scenarios. After being visualized, the scenarios were analyzed to understand impacts on several critical indicators addressing topics such as loss of open space, impacts on agriculture, water quality, fiscal impacts, transportation, and much more. Finally, all of these outputs were considered collectively to derive insights and conclusions that can be used for future conservation and land planning decisions. All of these results are documented throughout the remainder of this report.

## SCENARIO OVERVIEW



# Aquidneck Island 2050:

## SCENARIO 1 - TRENDS CONTINUE

Scenario 1 is what Aquidneck Island will look like in 30 years if the status quo is maintained and the Island continues to develop on its current trajectory. Most of the housing development in this scenario is Residential: Medium Density, i.e., suburban-style subdivisions. Smaller amounts of Residential: High Density, Residential: Low Density, and Mixed-Use development are also included. The commercial development is primarily comprised of new suburban office parks, strip mall retail, and a limited amount of new light industrial. See the table to the right for a summary of the development inputs.

On a technical level, the scenarios were created by a computer model with inputs, rules, and outputs. Inputs include assumptions about the drivers that will shape the future of Aquidneck Island, such as future conservation and real estate demand (summarized by the table to the right). Rules describe how the inputs interact within the model: for example, where is new development permitted to go? What densities does it take? If conservation and development both want the same parcel of land, who wins? The model was calibrated with these rules and incorporated the inputs to create an output scenario, which is a spatial data file showing the future status of each land parcel on Aquidneck Island in 2050. Throughout this process, each model component was monitored by members of the research team for quality control and to ensure that the model was operating as intended. A much more detailed discussion of the technical aspects of the modeling process can be found in the Appendix. All of the aspects of the scenarios—the inputs, rules, and outputs—are described in narrative form throughout the main body of the report.

Consistent with current trends, most of the development in this scenario occurs on greenfields, which are areas that have not had prior development. This primarily means farms, forests, and fields. Redevelopment only occurred once all available greenfield sites had already been developed, but this was limited in quantity (see Technical Appendix for more details).









*Based on current trends, all of Aquidneck Island's unprotected open space will be developed by 2050*

The approach to conservation in this scenario was to imagine the lower-end range of what would be likely for the future, which in this case was half the current rate of 30 acres per year, or 15 acres per year, adding up to 450 acres of new conservation over a 30 year period. In the modeling process, development and conservation took turns being allocated to the parcels that were most attractive to them.

In terms of constraints, Scenario 1 did not allow development on wetlands, cemeteries, conserved land, or surface water (creek, rivers, ponds, lakes, etc.). Zoning was generally treated as a constraint in terms of allowable uses and densities. One way to think about Scenario 1 is that it represents an Island-wide build-out under current zoning.

While a more thorough discussion of the impacts of this scenario is reserved for later sections, one finding that deserves mention in this overview is that 100% of the unprotected open space on Aquidneck Island is developed by 2050 in Scenario 1. Remember, this is not a scenario that imagines a higher rate of development than what is currently happening—this is merely the extension of the existing rate of development out to 2050 using current zoning. The pressure on Aquidneck Island's open space is real and urgent, and if nothing changes, it will all be developed within a single generation.

### Scenario 1 Inputs

|  | Portsmouth            | Middletown            | Newport               |
|--|-----------------------|-----------------------|-----------------------|
|  <b>Total Housing Units</b>                 | <b>2,310</b><br>units | <b>1,530</b><br>units | <b>1,110</b><br>units |
|  <b>High Density</b>                        | <b>10%</b>            | <b>30%</b>            | <b>50%</b>            |
|  <b>Medium Density</b>                      | <b>85%</b>            | <b>60%</b>            | <b>40%</b>            |
|  <b>Low Density</b>                         | <b>5%</b>             | <b>5%</b>             | <b>5%</b>             |
|  <b>Mixed-Use</b>                           | <b>0%</b>             | <b>5%</b>             | <b>5%</b>             |
|  <b>Commercial Land</b>                    | <b>119</b><br>acres   | <b>116</b><br>acres   | <b>36</b><br>acres    |
|  <b>Industrial Land</b>                   | <b>18</b><br>acres    | <b>4</b><br>acres     | <b>0</b><br>acres     |
|  <b>Parks and Recreational Open Space</b> | <b>29</b><br>acres    | <b>56</b><br>acres    | <b>5</b><br>acres     |

### Scenario 1 Rules / Constraints

|  |   |  |  |  |
|--|---|--|--|--|
| <b>1</b><br><b>Zoning Uses Followed</b><br>(When Possible) | <b>2</b><br><b>Zoning Densities Followed</b><br>(When Possible) | <b>3</b><br><b>Redevelopment Limited</b> | <b>4</b><br><b>Wetlands &amp; Water Bodies Avoided</b> | <b>5</b><br><b>All Unprotected Open Space is Developable</b> |
|--|---|--|--|--|

# Island-wide Development

## Trends Continue: full build-out

The images to the right communicate the results of Scenario 1 with birds-eye renderings. The observation point is in Middletown near West Main Road looking north toward the reservoirs. The top-right image shows what Aquidneck Island looks like today. The white leaf icons show properties that are currently conserved. The bottom-right image shows Scenario 1, which is what the Island will look like in 2050 if current development trends continue. The red buildings show new development, and the bright green leaf icons show new conservation.

First, the extent of the build-out happening in Scenario 1 is vast and obvious from these images. New development blankets the landscape everywhere except places that are already conserved. Second, notice the development around the reservoirs in particular, in the background of the image. These areas drain into the drinking water source for the Island and will impose a significant additional burden on its water supply. More information detailing the quantities, types, and extent of development, as well as its impacts on water, can be found in later sections of this report.

### Island Development

- Existing Development
- New Development
- 🌿 Existing Conservation
- 🌿 New Conservation



DEVELOPMENT PATTERNS - EXISTING CONDITIONS



DEVELOPMENT PATTERNS - SCENARIO 1

## Example Site 1: Portsmouth Farmland

The images shown here zoom in from the birds-eye to provide an on-the-ground feel for Scenario 1. The first site is in Portsmouth looking north from West Passage Drive near West Main Road. Currently, there is a suburban subdivision abutting two parcels of farmland in the background. In a trend scenario, by 2050, these parcels will be completely covered by additional suburban development.



**EXAMPLE SITE 1 - EXISTING CONDITIONS**



**EXAMPLES SITE 1 - SCENARIO 1**

## Example Site 2: Portsmouth Roadside Farm

These images show an iconic view heading north on East Main Road in Portsmouth and looking out to the horizon on the right. Today this site is a road side farm, allowing an uninterrupted vista out to the Sakonnet River. By 2050, in Scenario 1, this site is developed into a suburban subdivision, blocking the existing viewshed.



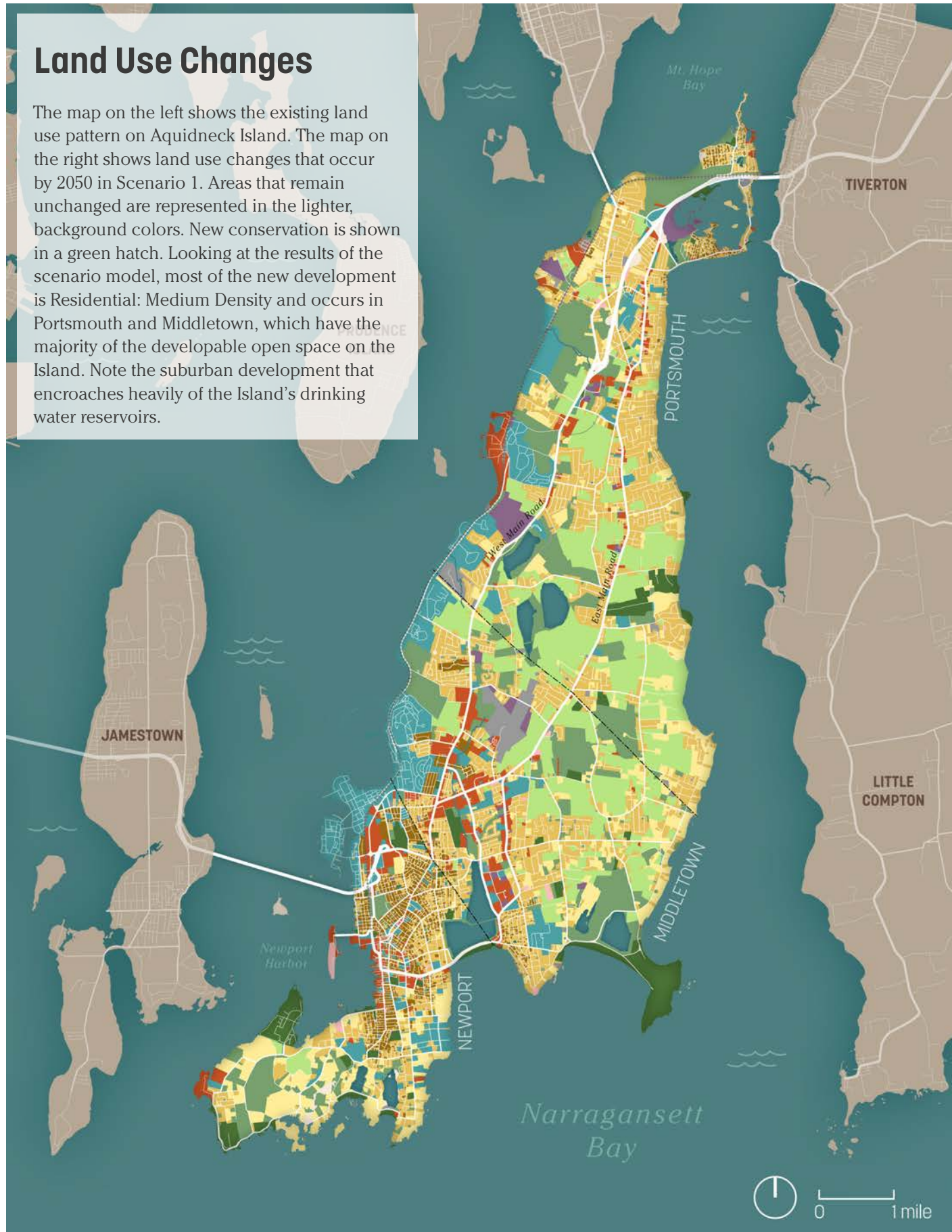
**EXAMPLE SITE 2 - EXISTING CONDITIONS**



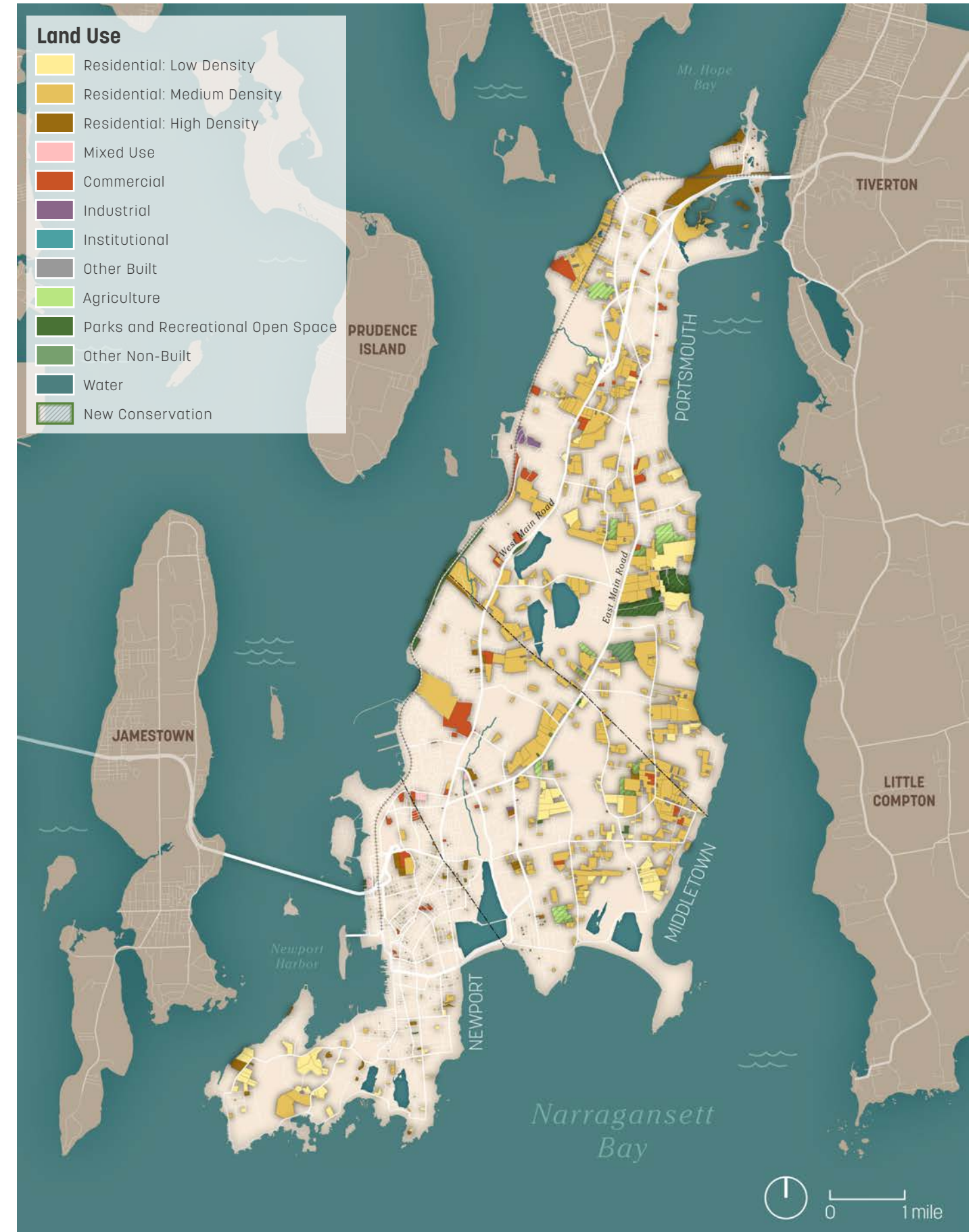
**EXAMPLE SITE 2 - SCENARIO 1**

### Land Use Changes

The map on the left shows the existing land use pattern on Aquidneck Island. The map on the right shows land use changes that occur by 2050 in Scenario 1. Areas that remain unchanged are represented in the lighter, background colors. New conservation is shown in a green hatch. Looking at the results of the scenario model, most of the new development is Residential: Medium Density and occurs in Portsmouth and Middletown, which have the majority of the developable open space on the Island. Note the suburban development that encroaches heavily of the Island's drinking water reservoirs.



LAND USE - EXISTING



LAND USE CHANGES - SCENARIO 1

# Aquidneck Island 2050:

## SCENARIO 2 - PLAN & PROTECT

The continuation of existing trends as illustrated in Scenario 1 is not the only possible future for Aquidneck Island. Scenario 2 was created to test an alternative set of policies and assumptions to see how they would affect outcomes and provide a point of comparison with the trend analysis.

Scenario 2 envisions a future with a more robust land conservation program, a greater diversity of housing types, and planning policies that encourage redevelopment and mixed-use town centers. It assumes the same overall number of housing units and acres of commercial and industrial development as Scenario 1, but it allocates the housing units with a higher proportion of Residential: High Density and Mixed-Use—see the table to the right for a full summary of the inputs.

Unlike Scenario 1, which sought greenfields like farms, fields, and forests for development, Scenario 2 had a much greater emphasis on redevelopment and filling in gaps in existing urban areas, while leaving a much greater percentage of open space undeveloped. It channeled new growth into existing nodes of development and expanded the number of town centers across the island. The mixed-use category is a prominent aspect of Scenario 2 and is comprised of high density residential units mixed with commercial or retail. It is important to note that Scenario 2 still has suburban-style development, just at a lower rate as compared with Scenario 1.

The approach to conservation in this scenario was to imagine the higher-end range of what would be likely for the future, which in this case was double the current rate of 30 acres per year, or 60 acres per year, adding up to 1,800 acres of new conservation over a 30 year period. In the modeling process, conservation was permitted to “go first” and protect all of the high-value conservation areas, with development occurring second.

In terms of constraints, Scenario 2 was more restrictive relative to environmental factors but less restrictive relative to zoning. It applied the same environmental restrictions as Scenario 1 and added buffers around wetlands and surface water to simulate ecological planning policies designed to protect water quality. In terms of use and density, zoning was used as a guide but was not treated as a constraint, as it was in Scenario 1. The comprehensive plans of the 3 communities served as a more important input for determining the desired vision for future land use patterns—the determination of new and densified town centers largely followed the guidance of these plans.

Unlike Scenario 1, where all developable open space was consumed, Scenario 2 was able to meet its demand targets while still leaving some open space undeveloped. Scenario 2 also performed better along many of the metrics used to analyze the scenarios. Further description of Scenario 2 and comparisons of the impacts of both scenarios are documented in subsequent sections.

| Scenario 2 Inputs                 |             |             |             |
|-----------------------------------|-------------|-------------|-------------|
|                                   | Portsmouth  | Middletown  | Newport     |
| Total Housing Units               | 2,310 units | 1,530 units | 1,110 units |
| High Density                      | 30%         | 40%         | 55%         |
| Medium Density                    | 55%         | 40%         | 20%         |
| Low Density                       | 5%          | 5%          | 5%          |
| Mixed-Use                         | 10%         | 15%         | 20%         |
| Commercial Land                   | 119 acres   | 116 acres   | 36 acres    |
| Industrial Land                   | 18 acres    | 4 acres     | 0 acres     |
| Parks and Recreational Open Space | 72 acres    | 94 acres    | 46 acres    |

| Scenario 2 Rules / Constraints  |   |   |   |   |
|---|---|---|---|---|
| <b>1</b>  | <b>2</b>  | <b>3</b>  | <b>4</b>  | <b>5</b>                                |
| <b>Zoning Uses &amp; Densities Adjusted</b><br><small>(When Needed)</small> | <b>Redevelopment Permitted</b><br><small>(Commercial, Industrial, High-Density Residential)</small> | <b>Water Resources Protected</b><br><small>(Wetlands + Buffers, Water Bodies + Buffers)</small> | <b>Cultural Resources Protected</b><br><small>(Parks, Historic Districts)</small> | <b>Coastal Flood-risk Areas Avoided</b> |

## SCENARIOS COMPARISON - INPUTS AND RULES / CONSTRAINTS

| Scenario 1 Inputs                        |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|
|  | Portsmouth            | Middletown            | Newport               |
| <b>Total Housing Units</b>               | <b>2,310</b><br>units | <b>1,530</b><br>units | <b>1,110</b><br>units |
| <b>High Density</b>                      | 10%                   | 30%                   | 50%                   |
| <b>Medium Density</b>                    | 85%                   | 60%                   | 40%                   |
| <b>Low Density</b>                       | 5%                    | 5%                    | 5%                    |
| <b>Mixed-Use</b>                         | 0%                    | 5%                    | 5%                    |
| <b>Commercial Land</b>                   | <b>119</b><br>acres   | <b>116</b><br>acres   | <b>36</b><br>acres    |
| <b>Industrial Land</b>                   | <b>18</b><br>acres    | <b>4</b><br>acres     | <b>0</b><br>acres     |
| <b>Parks and Recreational Open Space</b> | <b>29</b><br>acres    | <b>56</b><br>acres    | <b>5</b><br>acres     |

| Scenario 2 Inputs                        |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|
|  | Portsmouth            | Middletown            | Newport               |
| <b>Total Housing Units</b>               | <b>2,310</b><br>units | <b>1,530</b><br>units | <b>1,110</b><br>units |
| <b>High Density</b>                      | 30%                   | 40%                   | 55%                   |
| <b>Medium Density</b>                    | 55%                   | 40%                   | 20%                   |
| <b>Low Density</b>                       | 5%                    | 5%                    | 5%                    |
| <b>Mixed-Use</b>                         | 10%                   | 15%                   | 20%                   |
| <b>Commercial Land</b>                   | <b>119</b><br>acres   | <b>116</b><br>acres   | <b>36</b><br>acres    |
| <b>Industrial Land</b>                   | <b>18</b><br>acres    | <b>4</b><br>acres     | <b>0</b><br>acres     |
| <b>Parks and Recreational Open Space</b> | <b>72</b><br>acres    | <b>94</b><br>acres    | <b>46</b><br>acres    |

| Scenario 1 Rules / Constraints                 |   |                              |  |  |
|--|---|------------------------------|--|--|
| <b>1</b>                                       | <b>2</b>  | <b>3</b>                     | <b>4</b>                                   | <b>5</b>   |
| <b>Zoning Uses Followed</b><br>(When Possible) | <b>Zoning Densities Followed</b><br>(When Possible) | <b>Redevelopment Limited</b> | <b>Wetlands &amp; Water Bodies Avoided</b> | <b>All Unprotected Open Space is Developable</b> |

| Scenario 2 Rules / Constraints                               |  |  |  |   |
|--|--|--|--|---|
| <b>1</b>   | <b>2</b>   | <b>3</b>   | <b>4</b>   | <b>5</b>                                |
| <b>Zoning Uses &amp; Densities Adjusted</b><br>(When Needed) | <b>Redevelopment Permitted</b><br>(Commercial, Industrial, High-Density Residential) | <b>Water Resources Protected</b><br>(Wetlands + Buffers, Water Bodies + Buffers) | <b>Cultural Resources Protected</b><br>(Parks, Historic Districts) | <b>Coastal Flood-risk Areas Avoided</b> |

## Elements of Smart Growth

Many of the inputs to Scenario 2 reflect the principles of “smart growth,” which is an urban planning term describing strategies for accommodating economic growth and development while mitigating environmental damage and the negative impacts of sprawl. Given how important this concept is for understanding Scenario 2 and explaining the differences between the two scenarios, this section details some of the key aspects of smart growth.

### Town Centers

Town centers are the core of smart growth planning. These walkable, mixed-use environments reflect the character of the communities in which they are developed while providing for a traditional “main street” feel. When desirable, town centers can be located at civic centers to include key public uses. Regardless of location, town centers generally include neighborhood retail and residential uses. This mix can help reduce a dependence on vehicular travel for daily activities.

### Urban Infill

In addition to promoting a mixed-use and walkable style of development, smart growth planning also encourages urban infill development, which is the development of vacant parcels within already built up areas or the redevelopment of auto-oriented parcels like strip malls and big box stores. By focusing development on close-in and previously developed parcels, smart growth makes more efficient use of public resources like existing roads and infrastructure and prevents the development of undisturbed greenfield parcels.

### Water Body Buffers

Smart growth also recognizes the sensitivity of existing water bodies, establishing buffers around lakes, ponds, streams, rivers, and marshes where no development can occur. These buffers prevent erosion and protect water bodies and their surrounding ecosystems from disturbance and pollution.

### Flood Risk Avoidance

Smart growth also mitigates flooding risk by avoiding development within the floodplain, which are the areas surrounding water bodies that are at risk of flooding during storm events. With the growing threat of sea level rise and associated coastal flooding, smart growth also avoids development within at-risk coastal zones, reducing the chance for catastrophic property damage.



TOWN CENTER STREETScape



TOWN CENTER CENTRAL GREEN

## Island-wide Development

This spread shows the full set of birds-eye renderings, including current conditions, Scenario 1, and Scenario 2. The extent of development in Scenario 2 is much more limited and the open space conservation network is much more robust compared with Scenario 1. The development that does occur in Scenario 2 is more tightly clustered. One the town centers described in the previous section can be seen in the foreground of the Scenario 2 rendering. Also note that the areas around the reservoirs have much less development near them in Scenario 2 compared with Scenario 1.

### Island Development

- Existing Development
- New Development
- ✱ Existing Conservation
- ✱ New Conservation



DEVELOPMENT PATTERNS - SCENARIO 1



DEVELOPMENT PATTERNS - EXISTING



DEVELOPMENT PATTERNS - SCENARIO 2

## Example Site 1: Portsmouth Farmland

Looking north from West Passage Drive near West Main Road, the farmland in the background becomes a suburban subdivision in Scenario 1, while in Scenario 2, these properties are conserved and remain active agriculture.



EXAMPLE SITE 1 - SCENARIO 1



EXAMPLE SITE 1 - EXISTING



EXAMPLE SITE 1 - SCENARIO 2

## Example Site 2: Portsmouth Roadside Farm

Building on the earlier sequence in this same location, these images represent one of the iconic views out to the Sakonnet River while driving north on East Main Road in Portsmouth. In Scenario 1, the farmland is developed into suburban housing and the view is obstructed; in Scenario 2, the farm and viewshed are preserved. The rendering proposes a potential hiking trail near the stone wall separating the property from the road.



EXAMPLE SITE 2 - SCENARIO 1



EXAMPLE SITE 2 - EXISTING



EXAMPLE SITE 2 - SCENARIO 2

## Example Site 3: Middletown Redevelopment

This site in Middletown on West Main Road is currently a shopping center with a large parking lot. In Scenario 1, this area is only moderately improved with the addition of a small retail bank. In Scenario 2, this site is completely redeveloped into one of the town centers described earlier in the Elements of Smart Growth section. It is envisioned to be 2 – 3 story buildings with street level commercial and retail with residential units above. The street design would be more pedestrian oriented and reminiscent of a traditional New England town center.



EXAMPLE SITE 3 - SCENARIO 1



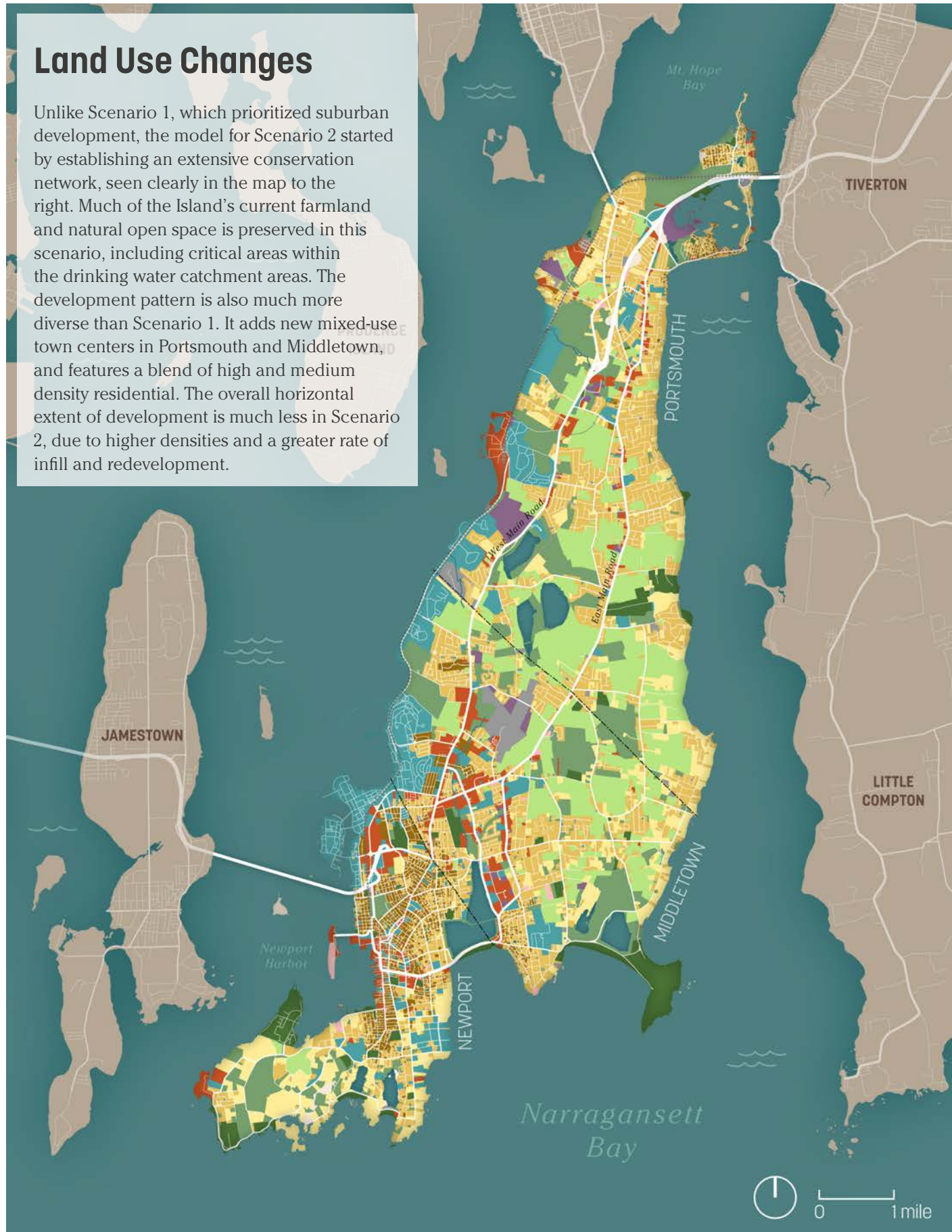
EXAMPLE SITE 3 - EXISTING



EXAMPLE SITE 3 - SCENARIO 2

## Land Use Changes

Unlike Scenario 1, which prioritized suburban development, the model for Scenario 2 started by establishing an extensive conservation network, seen clearly in the map to the right. Much of the Island's current farmland and natural open space is preserved in this scenario, including critical areas within the drinking water catchment areas. The development pattern is also much more diverse than Scenario 1. It adds new mixed-use town centers in Portsmouth and Middletown, and features a blend of high and medium density residential. The overall horizontal extent of development is much less in Scenario 2, due to higher densities and a greater rate of infill and redevelopment.



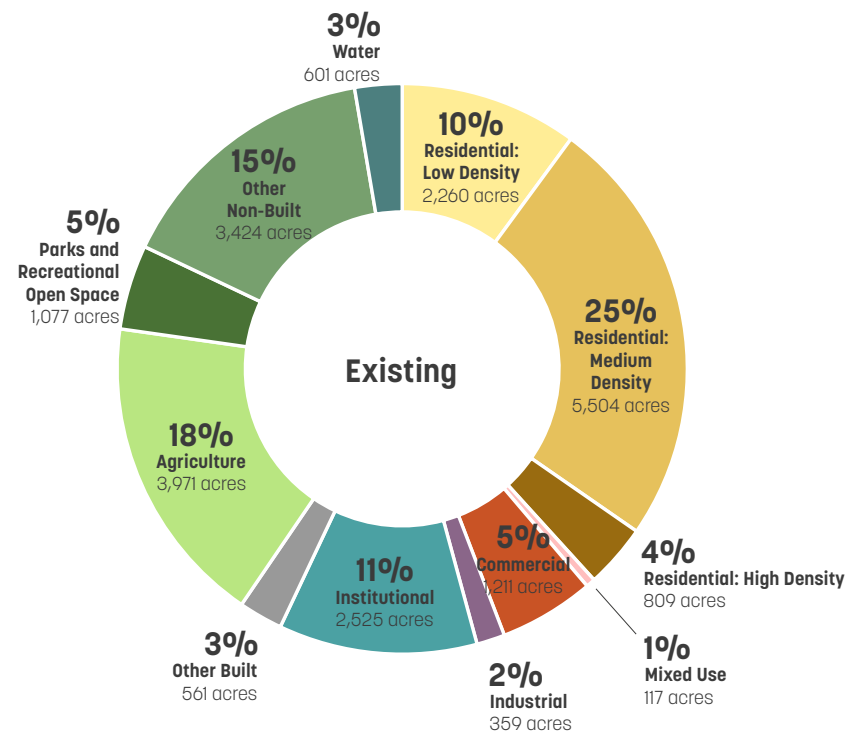
LAND USE - EXISTING



LAND USE CHANGES - SCENARIO 2

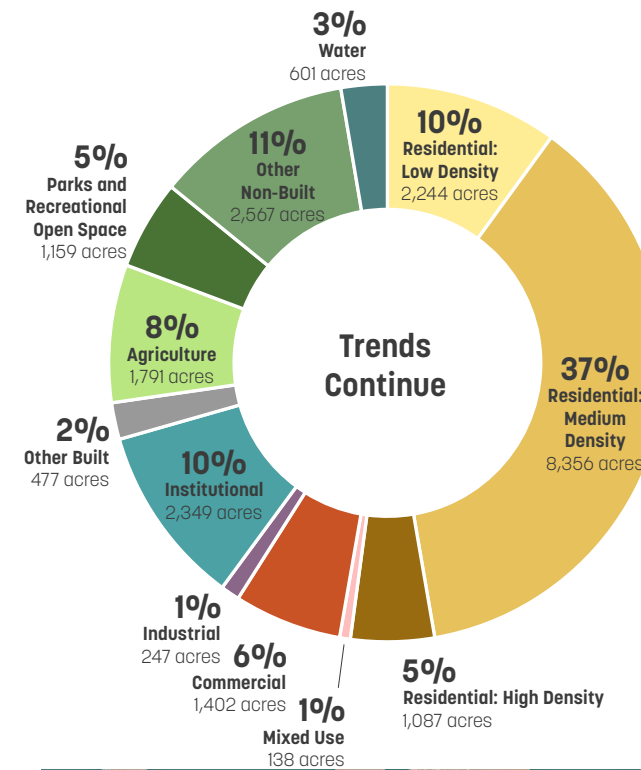
## Island-wide Land Use

The maps shown here provide an overall summary of the land use changes that occur within the two scenarios. The land use categories that vary the most are Residential: Medium Density and Agriculture. Today 25% of the Island is Residential: Medium Density. If current trends continue, by 2050, 37% of the Island will be Residential: Medium Density, but in the alternative scenario, this number only increases to 28%. Much of the land that is developed for suburban housing in Scenario 1 is currently agricultural land, which goes from 18% of the Island today, down to 8% by 2050. Scenario 2 manages to preserve many of these areas, keeping the Island at 15% farmland. In very broad terms, Scenario 1 represents the suburbanization of the Island, while Scenario 2 mostly preserves the current mix of land use types while accommodating growth by densifying within some of the existing urban areas.



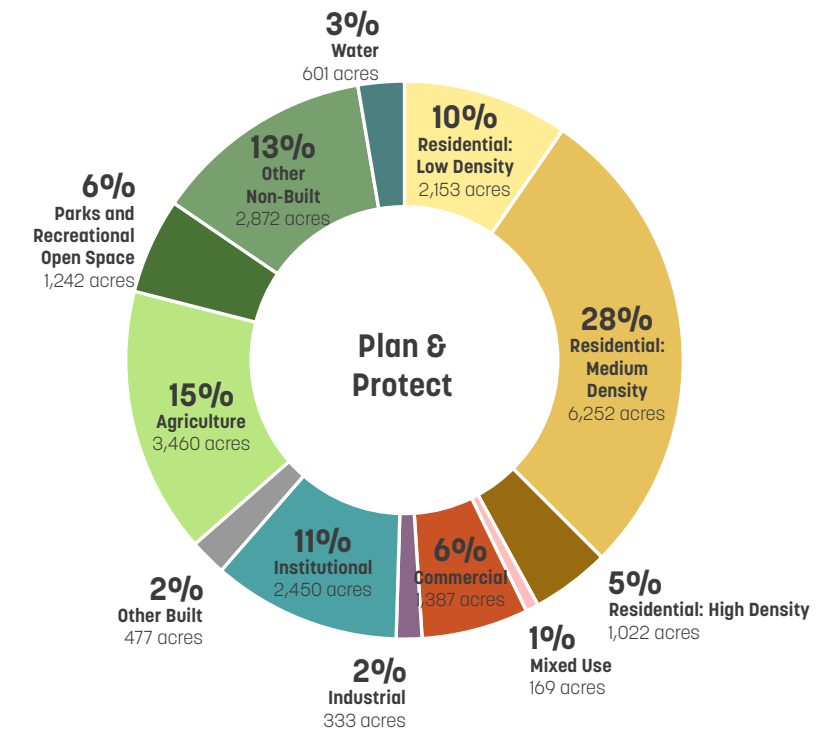
### Scenario 1: Trends Continue

55% reduction in agricultural land with 52% growth in suburban residential



### Scenario 2: Plan & Protect

87% of agricultural land remains undeveloped with same number of new housing units as Scenario 1



#### Land Use

- Residential: Low Density
- Residential: Medium Density
- Residential: High Density
- Mixed Use
- Commercial
- Industrial
- Institutional
- Other Built
- Agriculture
- Parks and Recreational Open Space
- Other Non-Built
- Water



LAND USE - EXISTING



LAND USE CHANGES - SCENARIO 1

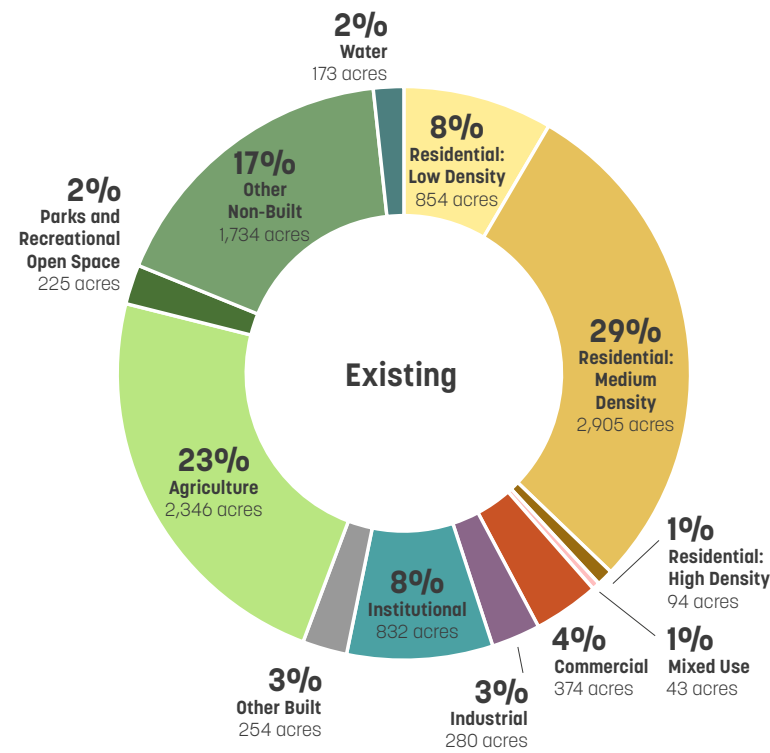


LAND USE CHANGES - SCENARIO 2

## Portsmouth Land Use

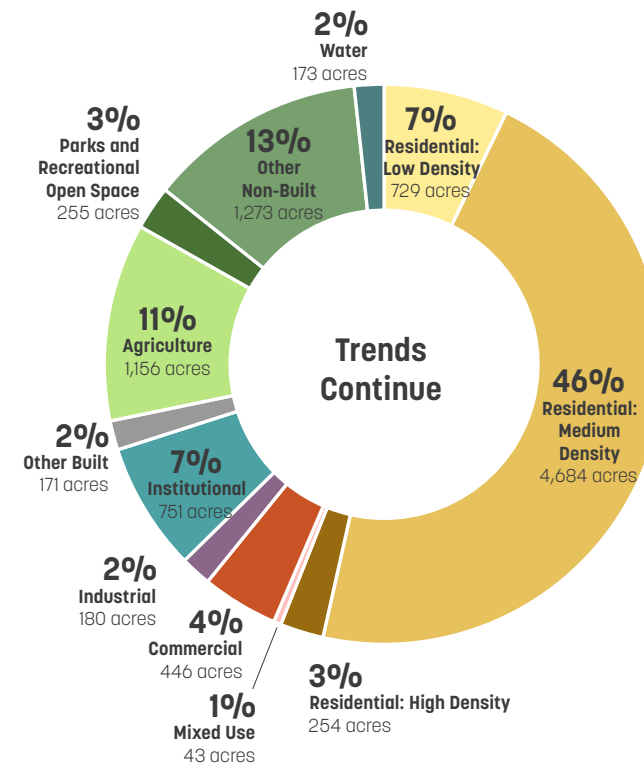
In Scenario 1, Portsmouth would experience considerable new development of suburban, medium-density residential units, largely at the expense of existing agricultural and other non-built land. The resulting character of the town would drastically change as new subdivisions would replace the existing open spaces along East Main Road and West Main Road.

In the Scenario 2, however, substantially less acreage would be developed, allowing the majority of unprotected open space to remain undisturbed. While less land would be developed, the same number of new housing units would be accommodated through higher density residential and mixed use development.



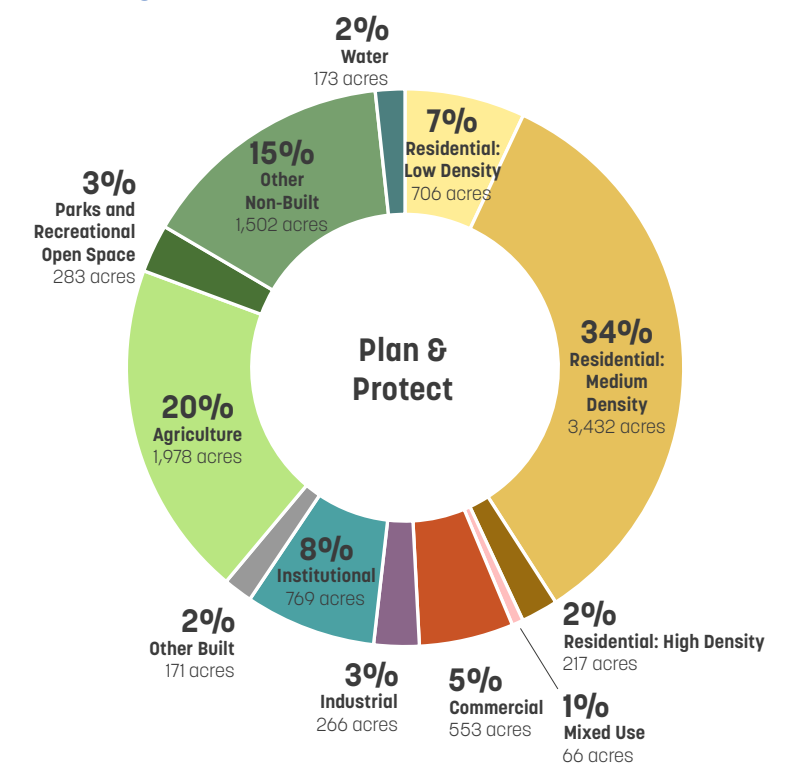
### Scenario 1: Trends Continue

51% reduction in agricultural land with 62% growth in suburban residential



### Scenario 2: Plan & Protect

84% of agricultural land remains undeveloped with same number of new housing units as Scenario 1



### Land Use

- Residential: Low Density
- Residential: Medium Density
- Residential: High Density
- Mixed Use
- Commercial
- Industrial
- Institutional
- Other Built
- Agriculture
- Parks and Recreational Open Space
- Other Non-Built
- Water



PORTSMOUTH LAND USE - EXISTING



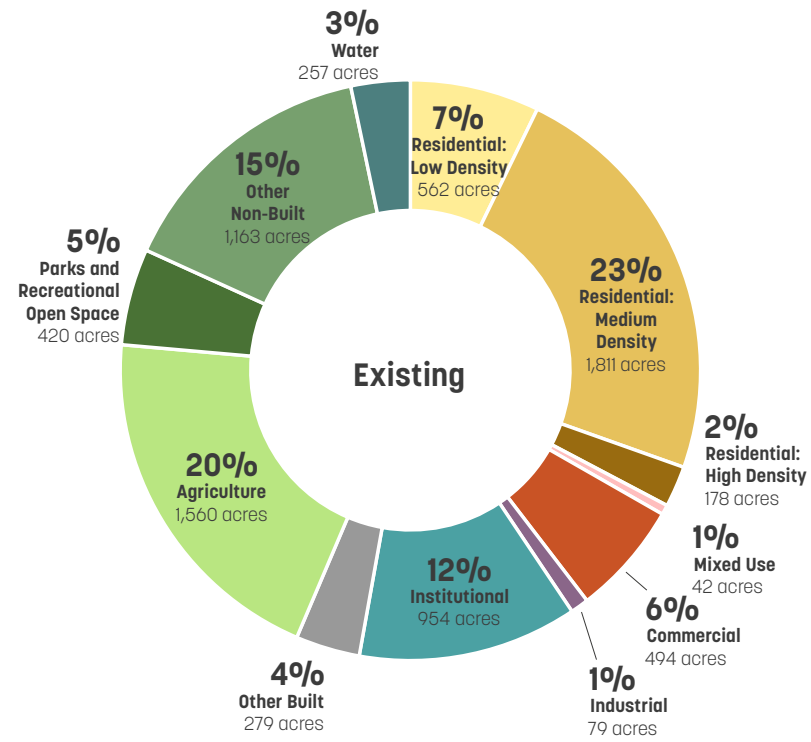
PORTSMOUTH LAND USE CHANGES - SCENARIO 1



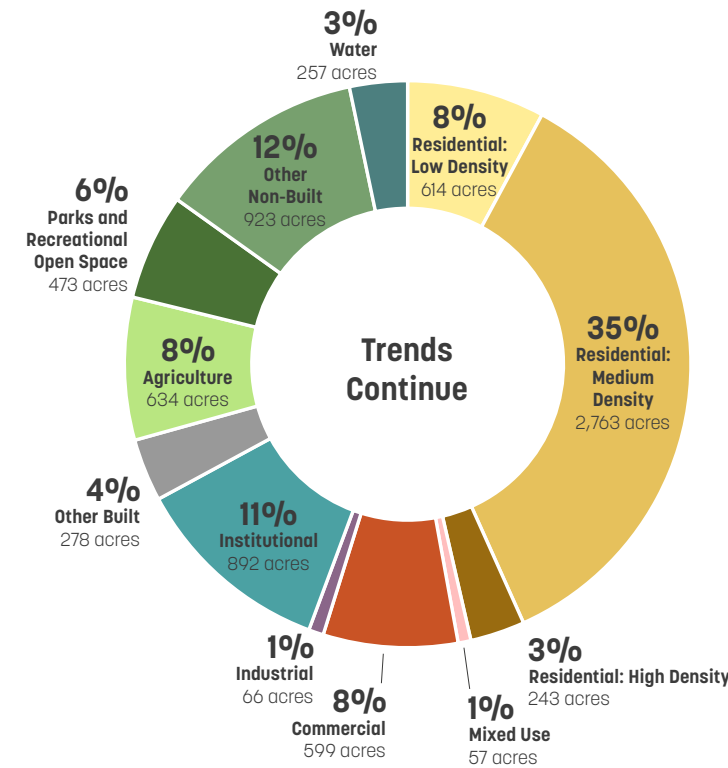
PORTSMOUTH LAND USE CHANGES - SCENARIO 2

## Middletown Land Use

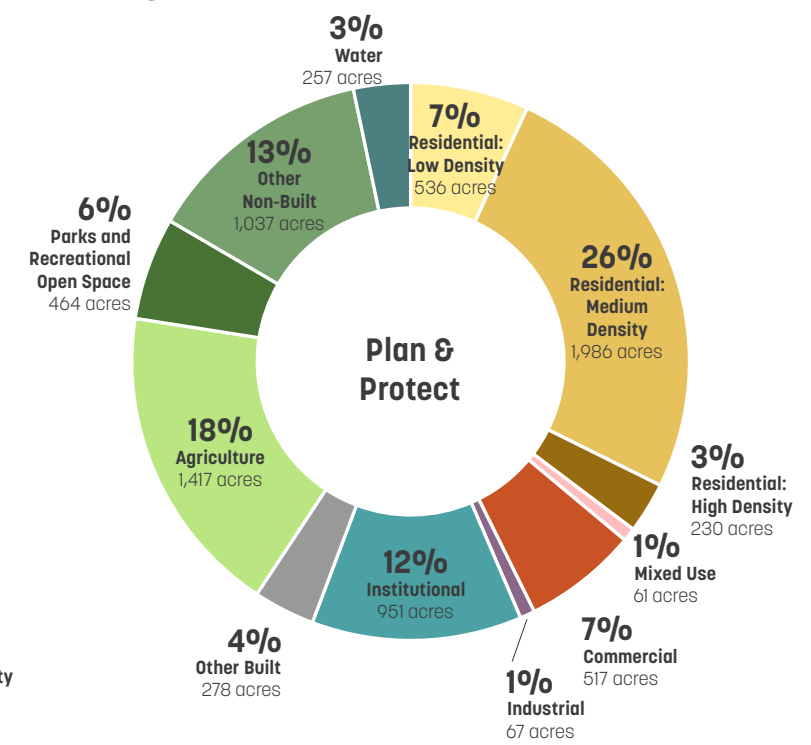
As in Portsmouth, Scenario 1 would see Middletown's agricultural land reduced with the creation of considerable new medium density residential development, especially in the eastern portions of the town. Scenario 2, however, would accommodate the same units in fewer, denser developments, preserving most of the town's existing agriculture and other open spaces.



**Scenario 1: Trends Continue**  
60% reduction in agricultural land with 53% growth in suburban residential

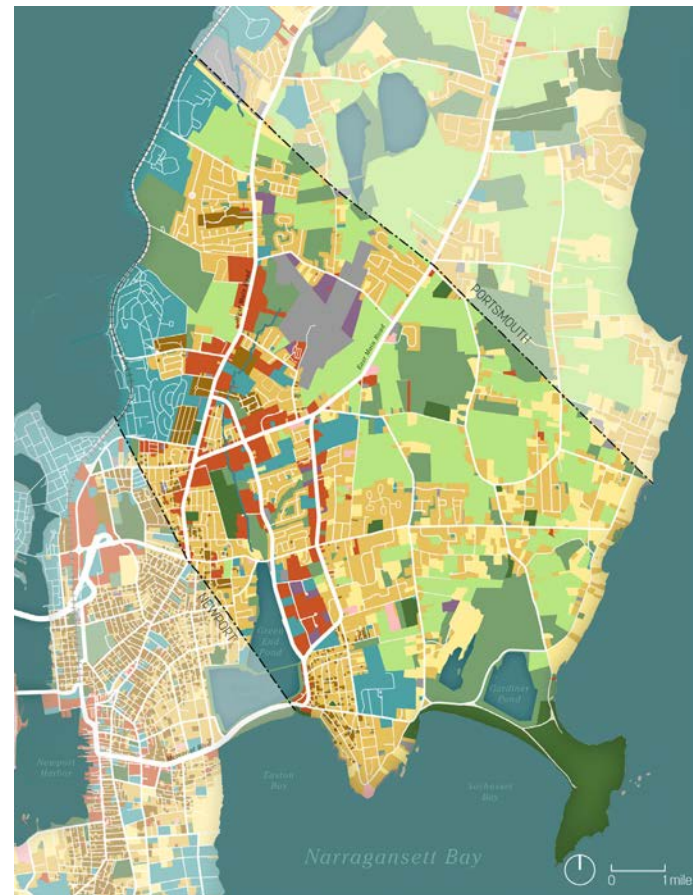


**Scenario 2: Plan & Protect**  
91% of agricultural land remains undeveloped with same number of new housing units as Scenario 1



### Land Use

- Residential: Low Density
- Residential: Medium Density
- Residential: High Density
- Mixed Use
- Commercial
- Industrial
- Institutional
- Other Built
- Agriculture
- Parks and Recreational Open Space
- Other Non-Built
- Water



MIDDLETOWN LAND USE - EXISTING



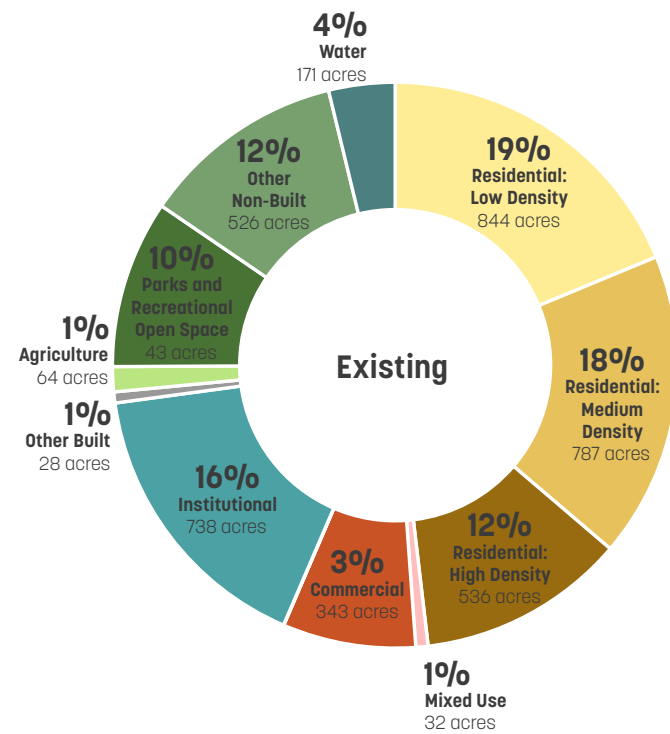
MIDDLETOWN LAND USE CHANGES- SCENARIO 1



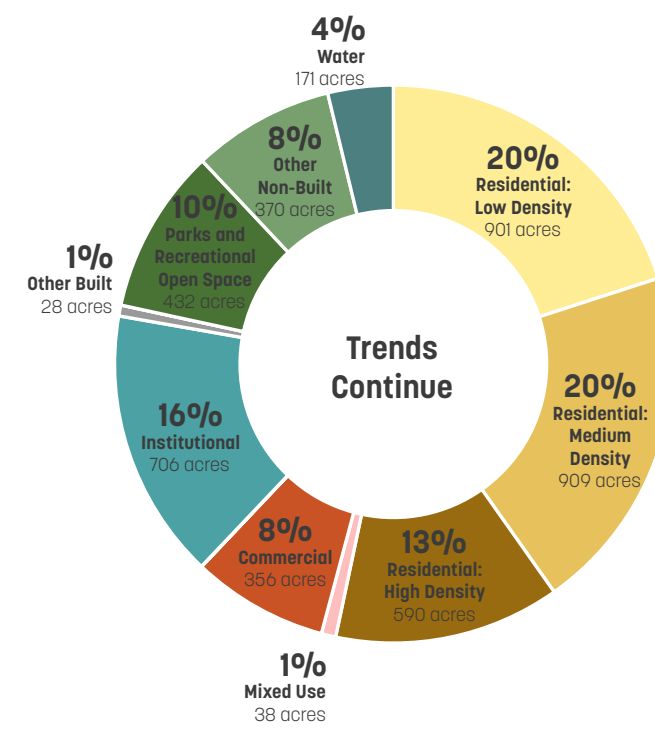
MIDDLETOWN LAND USE CHANGES - SCENARIO 2

## Newport Land Use

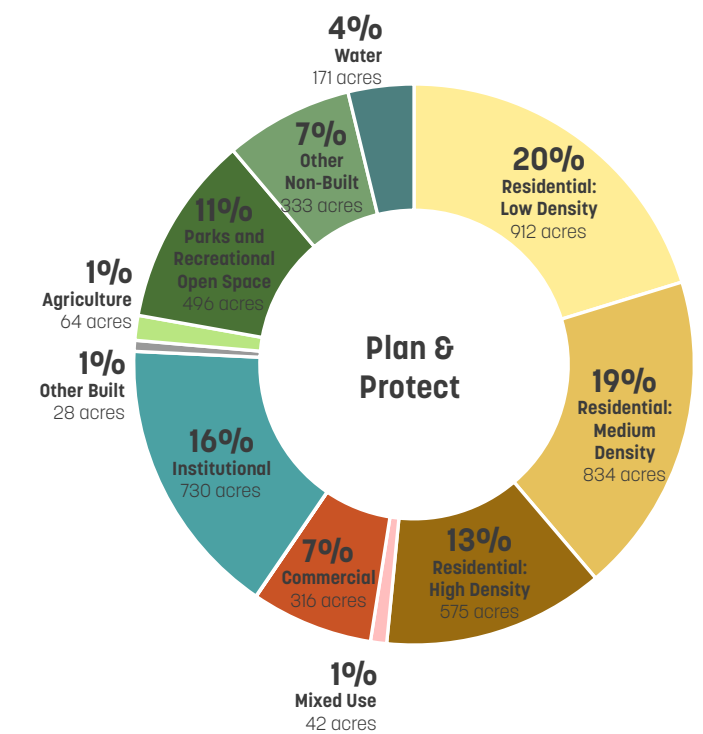
Due to the built-out nature of Newport, limited development would be possible in either Scenario 1 or Scenario 2, with most growth occurring elsewhere on the Island. However, the smart growth principles of Scenario 2 do provide for a reduction of new suburban residential development when compared to Scenario 1 through the use of mixed use town center redevelopment of existing auto-oriented parcels where appropriate.



**Scenario 1: Trends Continue**  
100% reduction in agricultural land

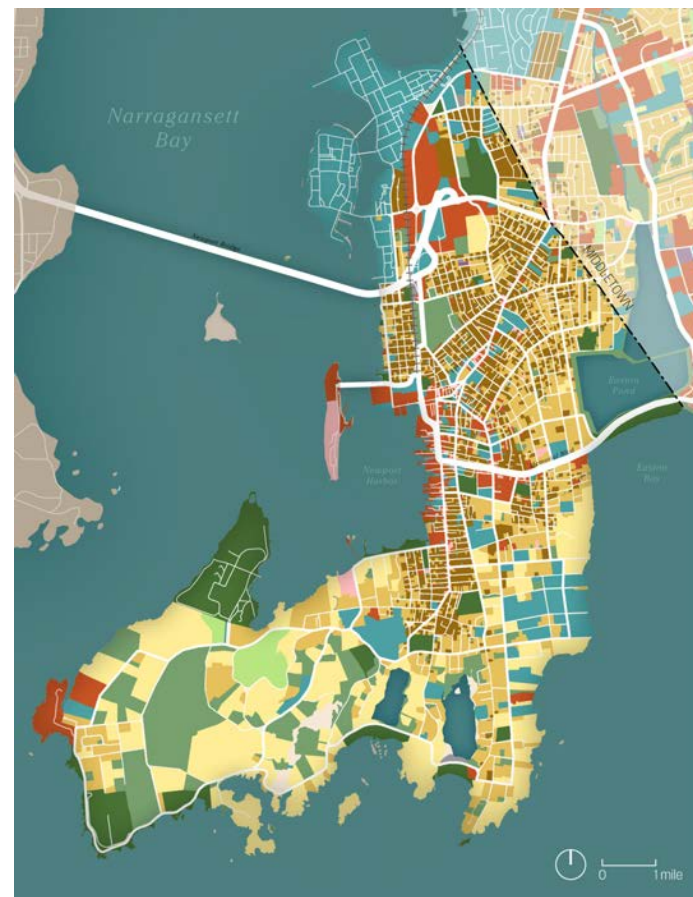


**Scenario 2: Plan & Protect**  
100% of agricultural land remains undeveloped with same number of new housing units as Scenario 1



### Land Use

- Residential: Low Density
- Residential: Medium Density
- Residential: High Density
- Mixed Use
- Commercial
- Industrial
- Institutional
- Other Built
- Agriculture
- Parks and Recreational Open Space
- Other Non-Built
- Water



**NEWPORT LAND USE - EXISTING**



**NEWPORT LAND USE CHANGES - SCENARIO 1**



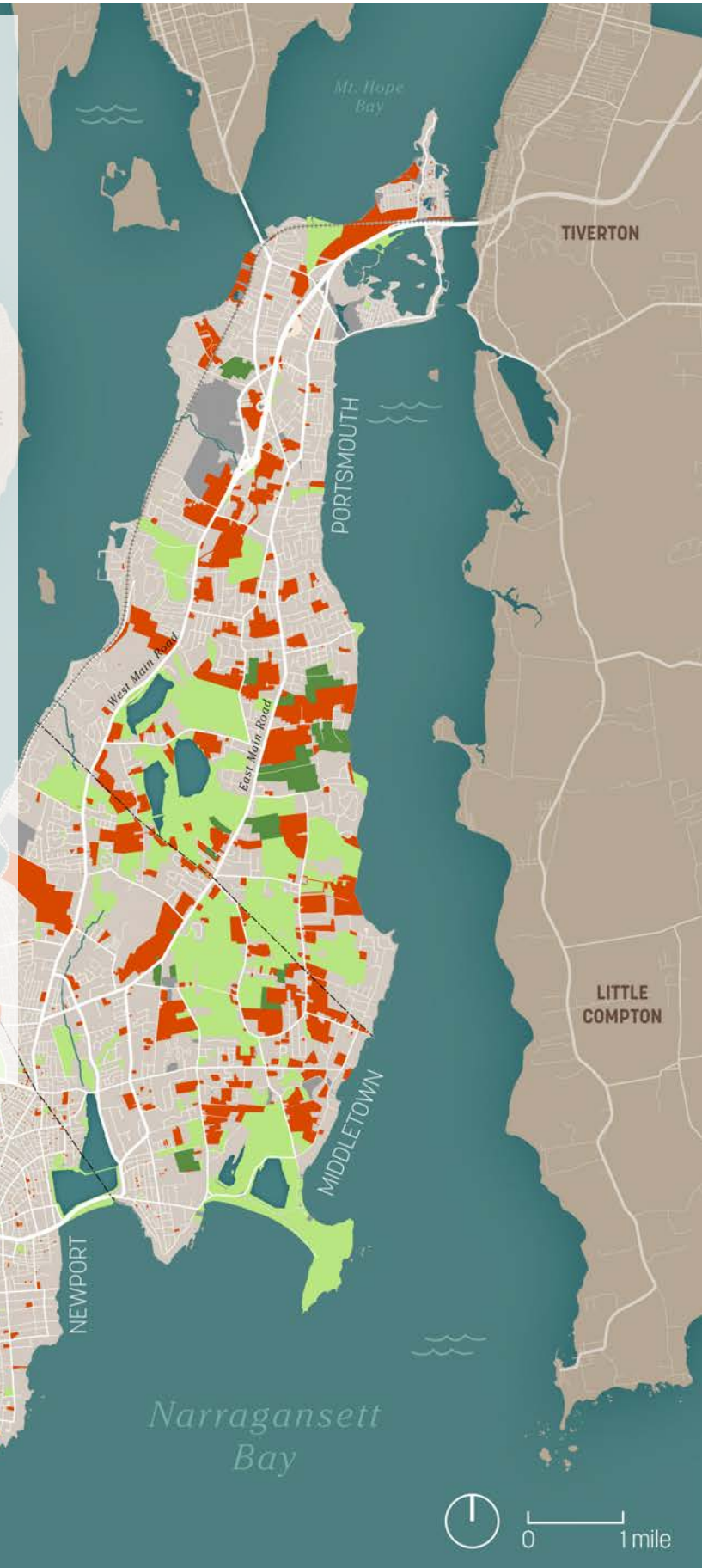
**NEWPORT LAND USE CHANGES - SCENARIO 2**

## Development Summary

The maps and charts shown here aggregate the land use changes from the previous section into a simplified set of categories to summarize the general development and conservation dynamics within each of the scenarios. Note the following:

1. 14% of the Island is newly developed in Scenario 1 versus only 4% in Scenario 2
2. 8% of the Island is newly conserved in Scenario 2 versus only 2% in Scenario 1
3. All of the unprotected open space on the Island is developed in Scenario 1, while 3% of the Island remains both unprotected and undeveloped in Scenario 2

This last point is one of the most important findings of this study. By 2050 at the latest—and most likely sooner—all of the Island’s unprotected open space will be consumed if current rates of development continue. In fact, the Scenario 1 model ran out of greenfield areas available for development before the demand numbers were exhausted, prompting the need for some additional infill and redevelopment, which suggests that the Island’s build-out point, given current rates of development and zoning, will be reached prior to 2050.

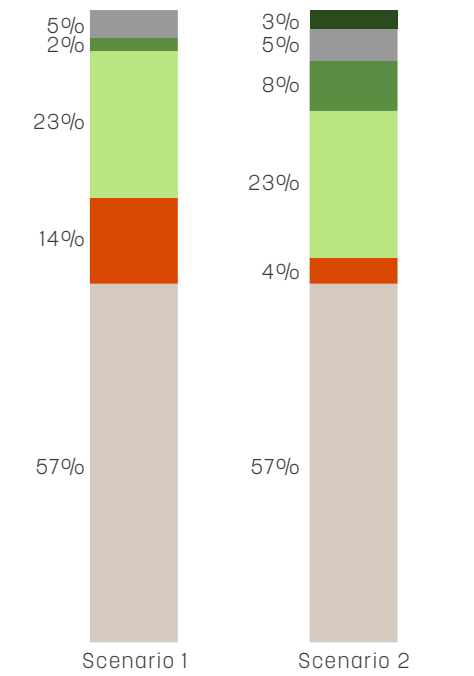


**Scenario 1**  
Trends Continue

DEVELOPMENT SUMMARY - SCENARIO 1

## Development Summary

- Existing Development
- Development Constraints
- New Development
- Existing Conservation
- New Conservation
- Remaining Unprotected Open Space



**Scenario 2**  
Plan & Protect

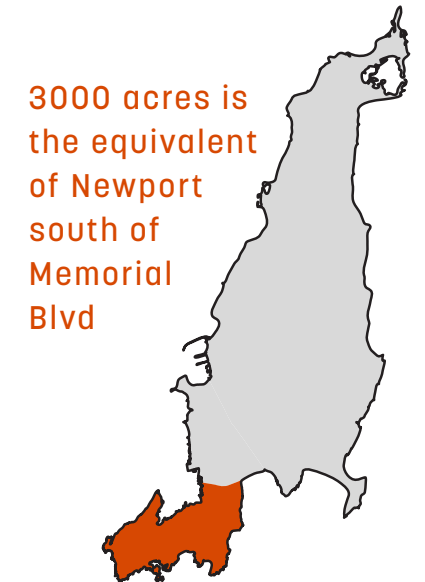
DEVELOPMENT SUMMARY - SCENARIO 2

## Development Comparison: Trends Continue vs. Plan & Protect

As mentioned previously, both scenarios accommodate the same number of residential units and square footage of commercial & industrial space; however, they vary dramatically in terms of the gross acres of land they consume because of differences in their land use policies and development assumptions. In Scenario 1, 3,000 new acres of land are developed, which is the equivalent of everything in Newport south of Memorial Boulevard, shown at the top right. In Scenario 2, only 900 new acres of land are developed, which is the equivalent of the red area in the map shown on the bottom right. This is a 70% reduction in the amount of open space consumed for development. This is achieved by prioritizing a higher rate of mixed use and Residential: High Density and a greater rate of infill and redevelopment. This underscores the fact that growth and open space consumption are not necessarily linked. It is possible to achieve the same level of population growth and economic development while taking up a much smaller footprint in terms of physical development.



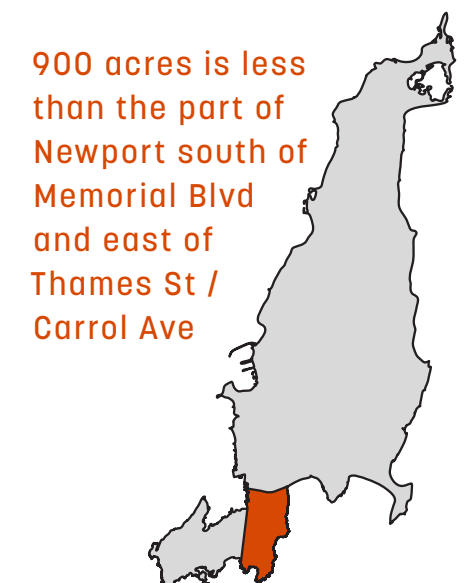
### Trends Continue



VS.



### Plan & Protect



# 5

## Development Impacts

# Development Impacts

## *What can we learn from the scenarios?*

Scenarios are tools for learning. The insights presented thus far have been derived from mapping, visualizations, and high level summaries. To fully leverage the value of the scenarios, the research team analyzed them along several key thematic dimensions to understand the potential future impacts of development.

The impact analysis was structured around a set of indicators. Each indicator addresses a topic of public interest, such as water quality, fiscal health, etc. A full list of indicators can be seen on the opposite page. Each indicator is summarized with the results of the scenarios presented side-by-side, and wherever relevant, a current conditions benchmark is also provided.

Given that the scope of this research is focused on open space, development, conservation, and land use change, most of the indicators are directly or indirectly related to these issues. The Conservation and Open Space analyses describe the fate of the natural and unbuilt areas on the Island. Greenfield vs Infill Development shows the variation in development strategy between the scenarios. The Zoning analysis indicates gaps between Scenario 2 and existing zoning. The Scenic Views analysis considers the impacts of development on the scenic character of the Island and its iconic viewsheds. Agricultural Heritage examines the impacts of development on farm land. Hydrology & Watersheds analyzes the impacts of development on watershed health, the drinking water supply, and the Island's beaches. Sea Level Rise presents the conflicts of rising sea levels with new and existing development, while Carbon Storage analyzes the loss of carbon sinks

that contribute to climate change and sea level rise. Fiscal Health looks at the financial implications of the two scenarios for local government and taxpayers. Finally, Transportation analyzes impacts on traffic and commute times for the Island's 3 communities.

Some of the indicators are incremental, meaning they measure only the new or incremental impact of land use change / development. Others combine current and future development to form a composite picture of the future. The modes of presentation were chosen to tell the most clear and transparent story associated each indicator.

While the indicators cover many of the topics of current public interest, the research was constrained by available data and models, so some areas of interest may be omitted. Given that the scenarios, at their core, are property parcels with use, density, and conservation information, any analysis undertaken needed to have a direct linkage between land use and the topic being studied.

Finally, each indicator varies significantly in its technical complexity. Some are 1-step, simple GIS operations, while others require more sophisticated methods. Therefore, while general indicator methodologies are described in the body of this report, some additional details for the more complex indicators can be found in the Technical Appendix.

## INDICATORS ASSESSED

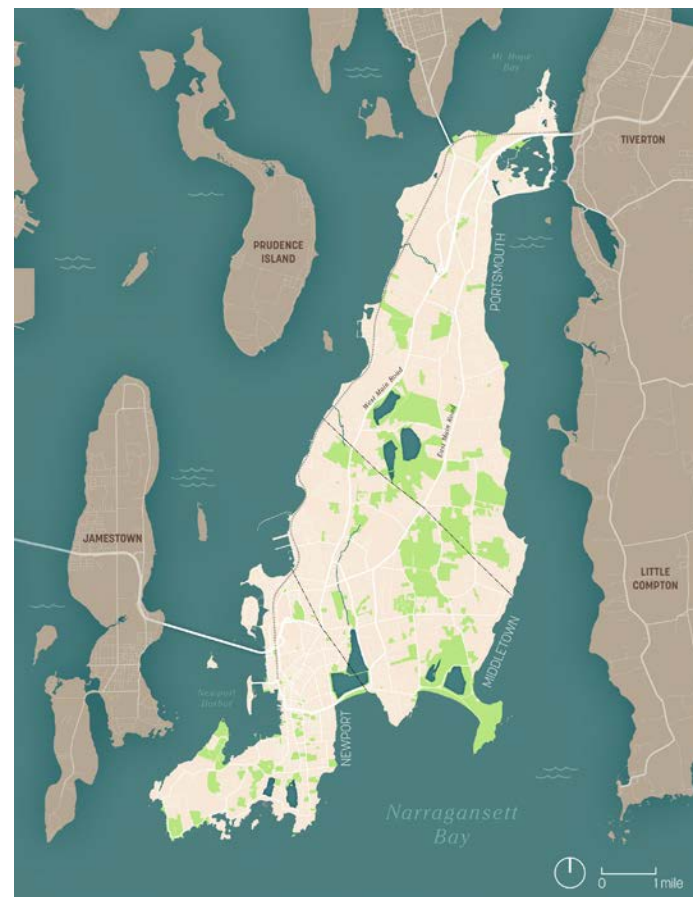
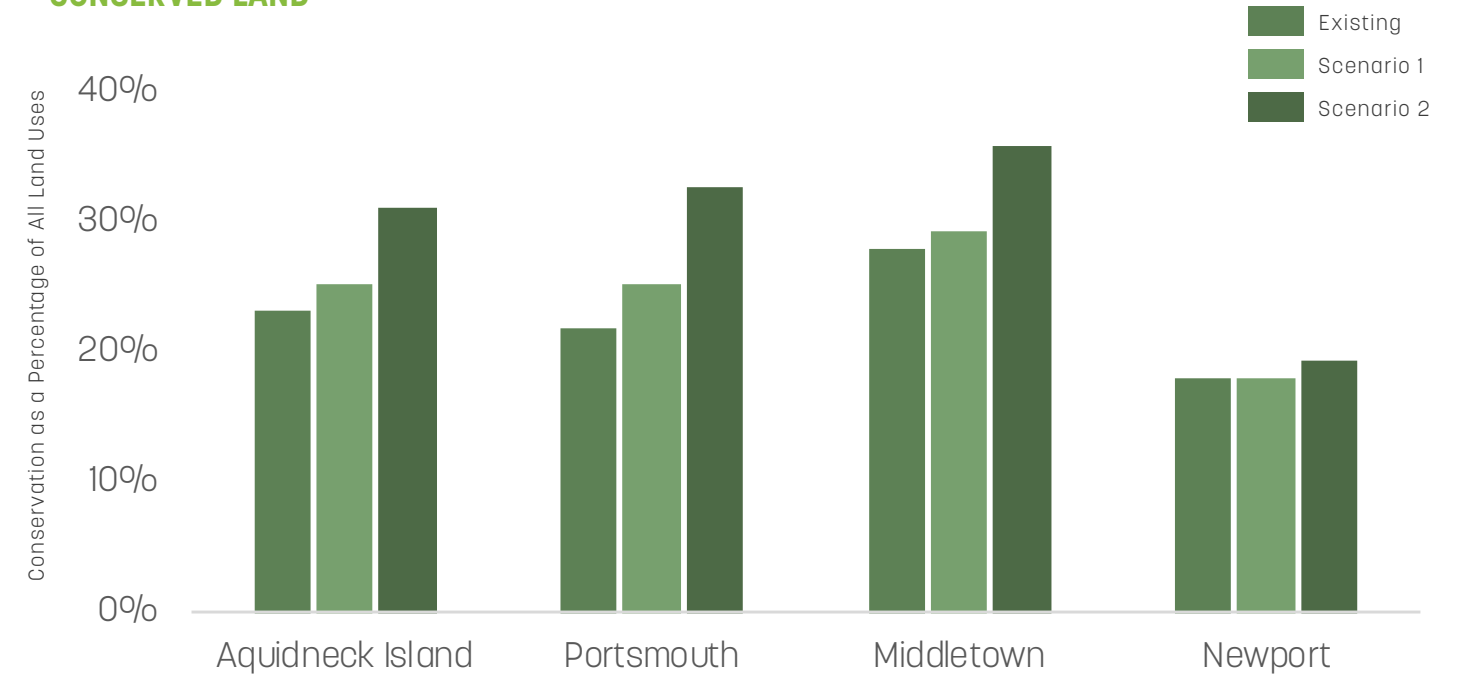
- ▶ **Conservation**
- ▶ **Greenfield vs. Infill Development**
- ▶ **Open Space**
- ▶ **Zoning**
- ▶ **Scenic Views**
- ▶ **Agricultural Heritage**
- ▶ **Hydrology & Watersheds**
- ▶ **Sea Level Rise and Coastal Flooding**
- ▶ **Carbon Storage**
- ▶ **Fiscal Health**
- ▶ **Transportation**

## Conserved Land

While Scenario 1 would see 100% of 2050's unprotected open space on the Island converted to development, it is presumed that some acreage of existing unprotected open space would be conserved by 2050 based on the current pace of conservation. This is reflected in the chart and maps to the right, where some new conservation is shown in both Portsmouth and Middletown in Scenario 1.

In Scenario 2, considerably more acreage would be conserved, as the Plan and Protect approach would ensure an aggressive conservation campaign in the coming 30 years.

### CONSERVED LAND



CONSERVATION - EXISTING

**Conservation**  
■ Existing Conservation  
■ New Conservation



CONSERVATION - SCENARIO 1



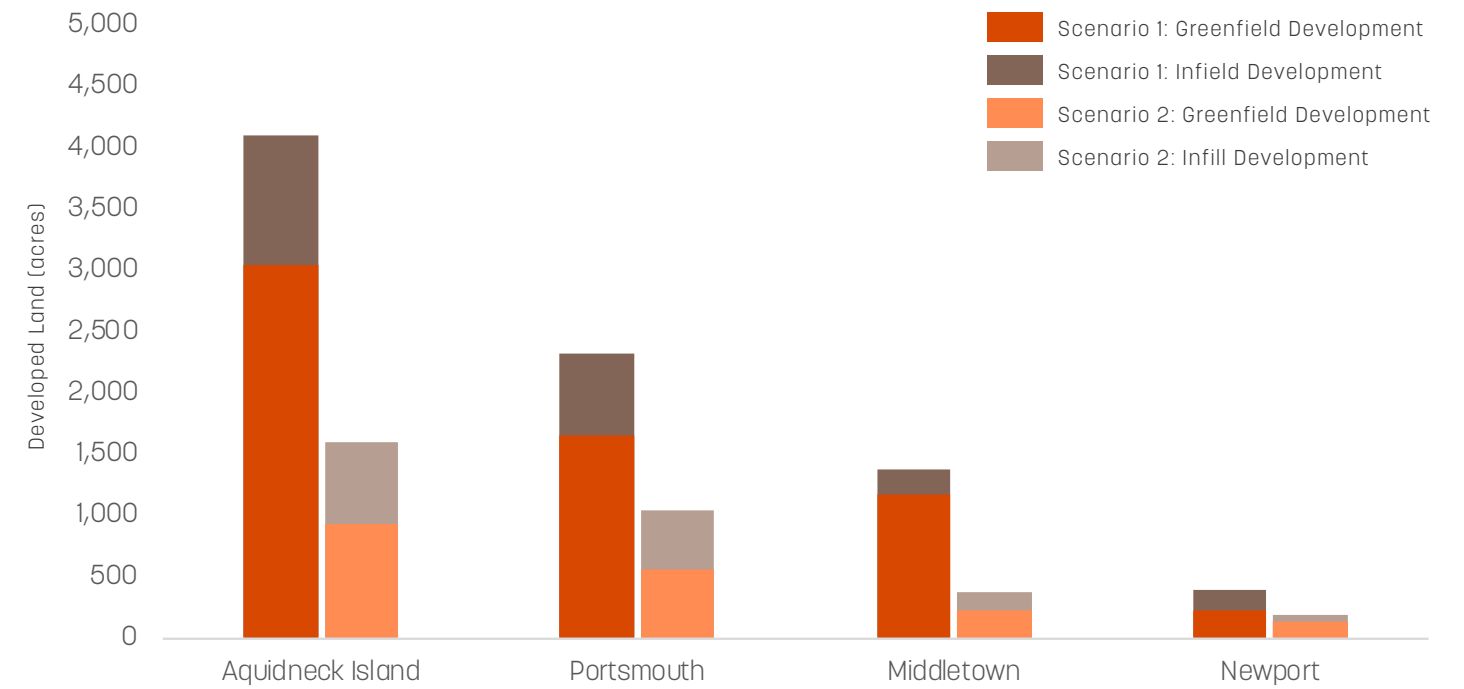
CONSERVATION - SCENARIO 2

## Greenfield vs. Infill Development

Another way to understand the potential reduction in the Island’s open space is to compare greenfield to infill development across the two scenarios. Greenfield development occurs when previously undisturbed land (open space) is developed. Infill development, however, is comprised of either the development of vacant parcels in otherwise built-out areas or the redevelopment of existing parcels, usually containing auto-oriented uses like strip malls and big box stores.

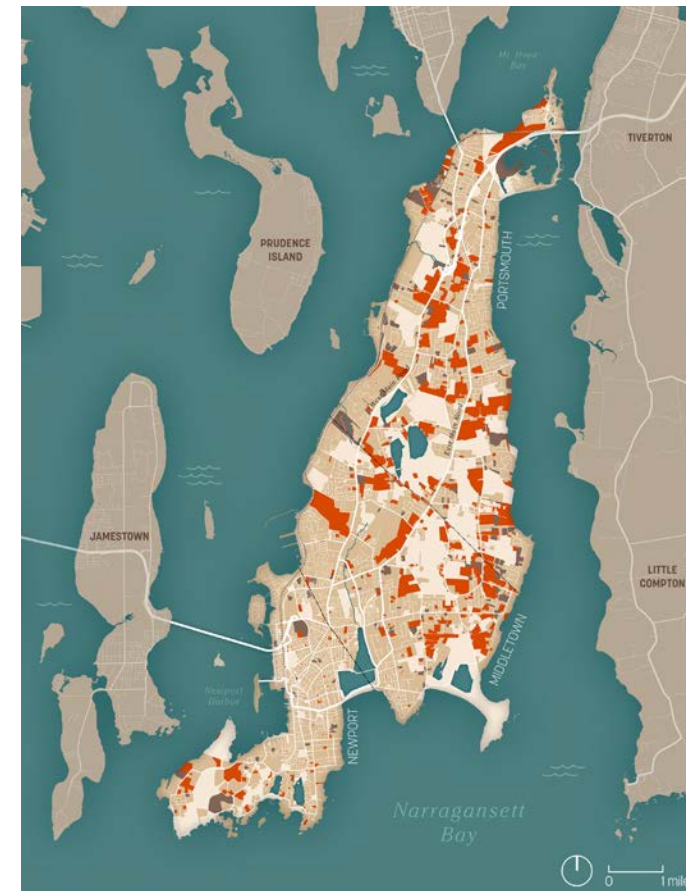
As seen in the charts and maps to the right, across all municipalities, Scenario 1 is overwhelmingly comprised of greenfield development - over 3x as much acreage as new infill development Island-wide. Development in Scenario 2, however, is much more balanced between greenfield and infill. In addition, the overall reduction in total new development is apparent in the adjacent graphics, owing to the denser development typologies proposed in Scenario 2.

### GREENFIELD VS. INFILL DEVELOPMENT



### Greenfield vs. Infill

- Existing Development
- New Infill Development
- New Greenfield Development
- Undeveloped Land



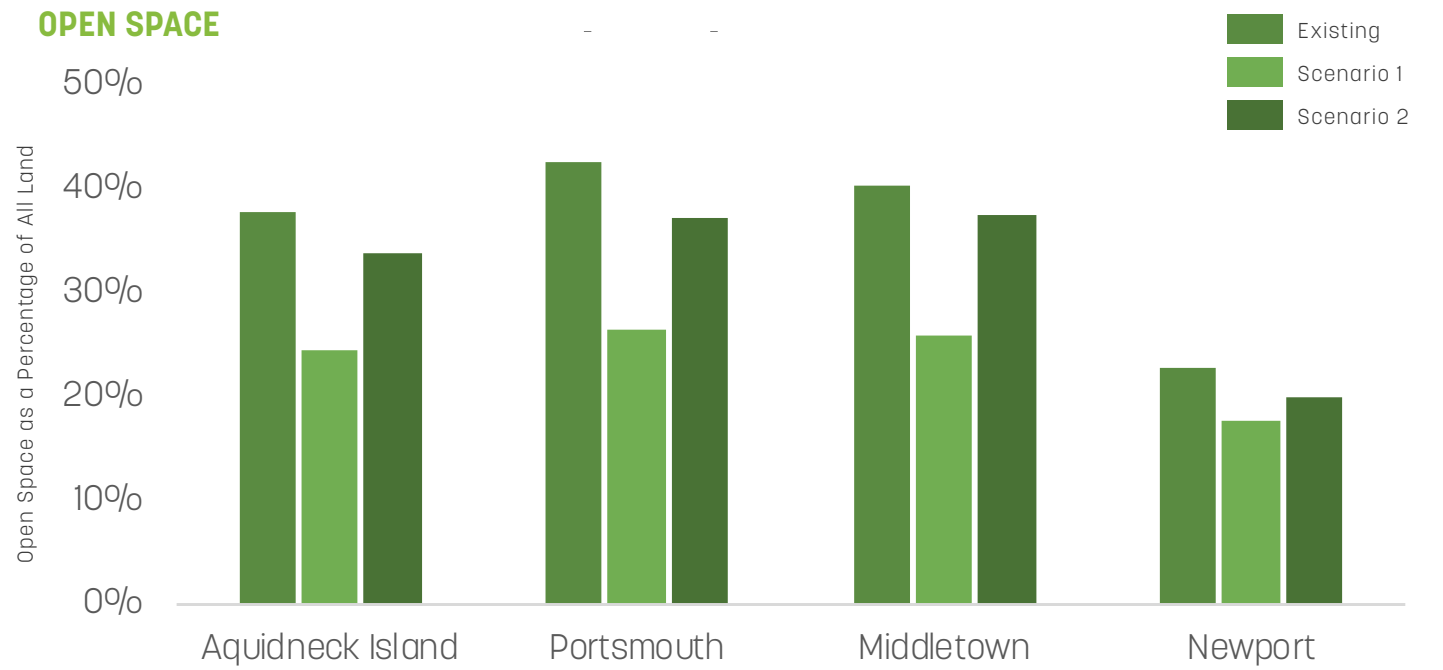
GREENFIELD VS. INFILL - SCENARIO 1



GREENFIELD VS. INFILL - SCENARIO 2

## Open Space

As previously noted, open space across the Island would be drastically reduced in a Scenario 1 future, dropping from nearly 40% to less than 25% Island-wide, with similar trends in each municipality. In Scenario 2, however, while open space is decreased due to new development, this reduction is far smaller thanks to more aggressive conservation and a push for fewer, denser developments, resulting in the preservation of additional open space parcels without the need for explicit conservation.



OPEN SPACE - EXISTING



OPEN SPACE - SCENARIO 1



OPEN SPACE - SCENARIO 2

### Open Space

- Parks and Recreational Open Space
- Agriculture
- Other Non-Built
- Conserved

## Zoning Analysis

While future land uses in Scenario 1 adhered closely to existing zoning, the more aggressive conservation approach of Scenario 2 reduced available parcels for future development, resulting in the need to allocate uses and densities that fell outside current zoning allowances. The following spreads highlight those required changes.

### Use Changes

The adjacent map indicates the proposed land uses of the 33 parcels Island-wide that would require a zoning change to achieve the vision of Scenario 2. While these uses deviate from the uses laid out in the respective municipal zoning codes, in many cases, they respond to proposed adjustments recommended by each town's comprehensive plan. In particular, many of the parcels shown as mixed use or high density residential reflect the communities' desire to create additional densities and mix of uses in select areas. Categories shown indicate the Scenario 2 use, so a parcel shown as mixed use means that it became mixed use in Scenario 2 but is currently zoned for a different use and would require re-zoning in order to achieve the Scenario 2 outcome.

Importantly, the analysis shown here merely represents the potential for future zoning changes and should not be construed as a recommendation for rezoning of any specific parcels.



ZONING LAND USE CHANGES - SCENARIO 2

## Zoning Analysis

### Density Changes

In addition to changes in use, Scenario 2 would require some degree of upzoning - or increase in allowable residential densities on some parcels. The adjacent map illustrates those parcels and indicates the increase in dwelling units per acre that would be required on each. While the majority of such parcels would increase existing per acre densities by two or fewer units, a select few would see a more considerable increase in density.

Though this analysis highlights the need for adjustments to existing zoning, neither the spread nor the severity of these changes represent a drastic shift in zoning or development character across the Island. Still, the analysis shown here merely represents the potential for future zoning changes and should not be construed as a recommendation for rezoning of any specific parcels.



ZONING DENSITY CHANGES - SCENARIO 2

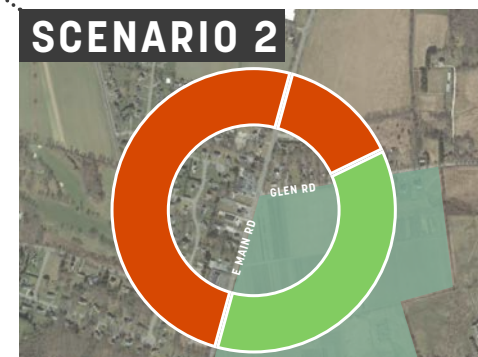
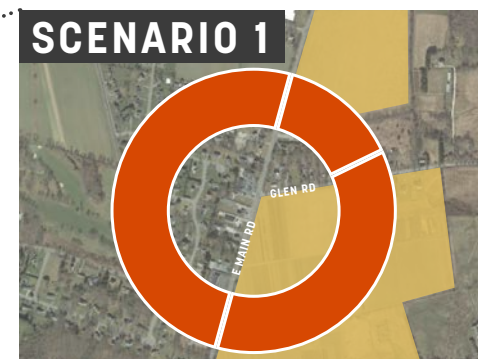
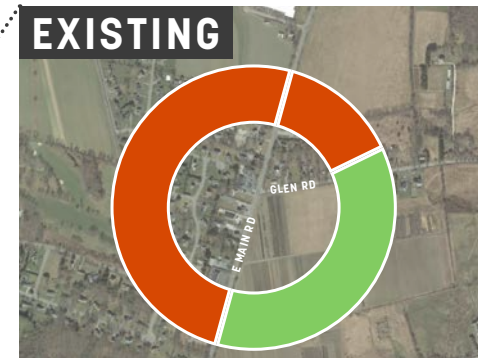
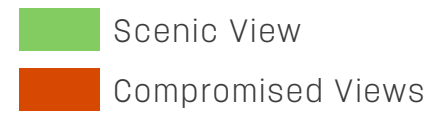
# Scenic Views

Aquidneck Island offers a multitude of scenic views, from historic New England estates, to expansive agricultural vistas, to views of the surrounding Narragansett Bay. Potential new development can threaten these views, either by directly converting open space to development or by blocking more distant views beyond.

This study analyzed 23 scenic viewsheds on the Island. The graphics shown here explain how to read the viewshed analysis using one of our earlier example sites in Portsmouth. The circle diagrams represents a 360-degree view from the observation point. Portions with scenic views are represented in green, while views that are blocked by development are shown in red. The circle diagrams are oriented to match the cardinal compass directions. The

example here, with accompanying renderings, shows the southeastern view from East Main Road as a scenic view currently and in Scenario 2 but blocked by new development in Scenario 1.

The array of graphics on the following pages illustrate the extent of viewshed impairment across the 23 views studied. Of those views, 17% are at least somewhat compromised in their existing condition. That figure jumps to 83% in Scenario 1, with 26% of views completely impaired in all directions. In Scenario 2, aggressive conservation sees only 35% of views somewhat compromised, and only one (4%) is completely compromised.



# Scenic Views - Summary

## EXISTING CONDITIONS

- 17% of existing views are somewhat compromised.

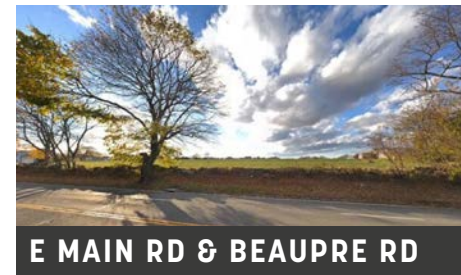
## SCENARIO 1: TRENDS CONTINUE

- 87% of views in Scenario 1 are at least somewhat compromised, 26% are fully compromised.

## SCENARIO 2: PLAN & PROTECT

- 35% of views in Scenario 2 are at least somewhat compromised, **only one** is fully compromised.





EXISTING



SCENARIO 1



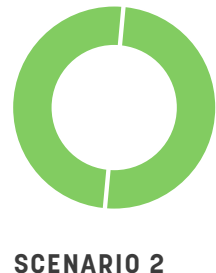
SCENARIO 2



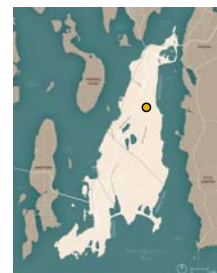
EXISTING



SCENARIO 1



SCENARIO 2



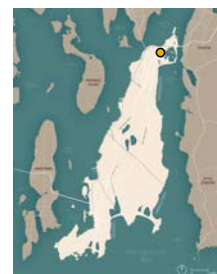
EXISTING



SCENARIO 1



SCENARIO 2



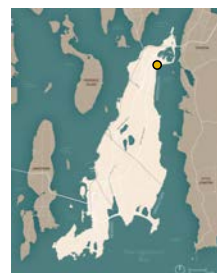
EXISTING



SCENARIO 1



SCENARIO 2



EXISTING



SCENARIO 1



SCENARIO 2



EXISTING



SCENARIO 1



SCENARIO 2



EXISTING



SCENARIO 1



SCENARIO 2



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SCENARIO 1



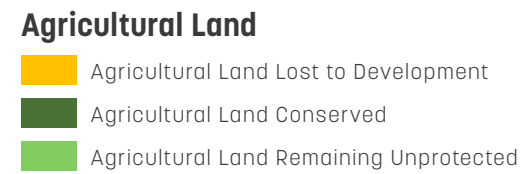
SCENARIO 2

## Agricultural Heritage

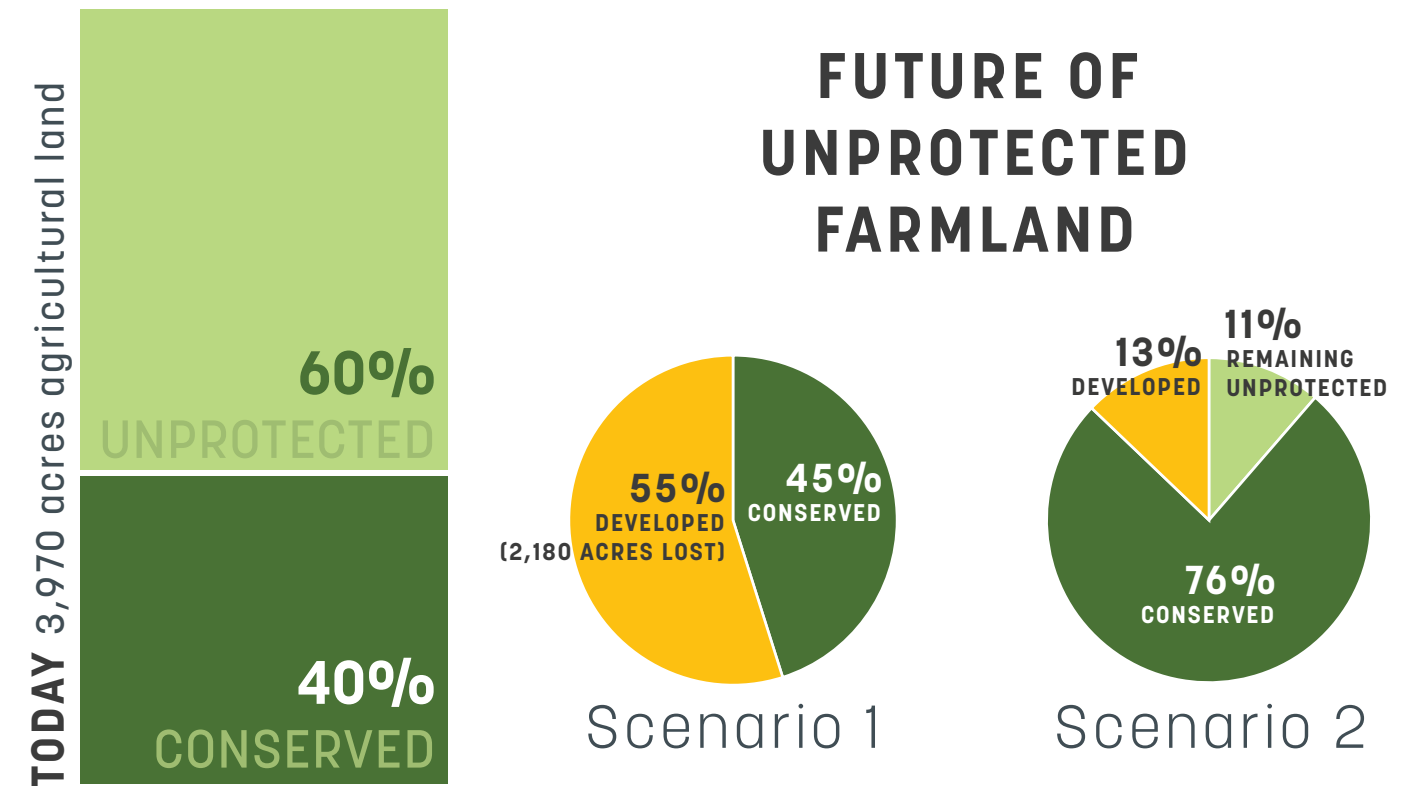
Aquidneck Island has a strong farming heritage and is known for its iconic agricultural landscape. Agriculture is also an integral part of the Island's economy. Of the 3,970 acres of agricultural land on the Island, 40% is conserved and protected from future development.

In Scenario 1, some new conservation of agricultural land is anticipated, but the remaining unprotected land is expected to be lost to development.

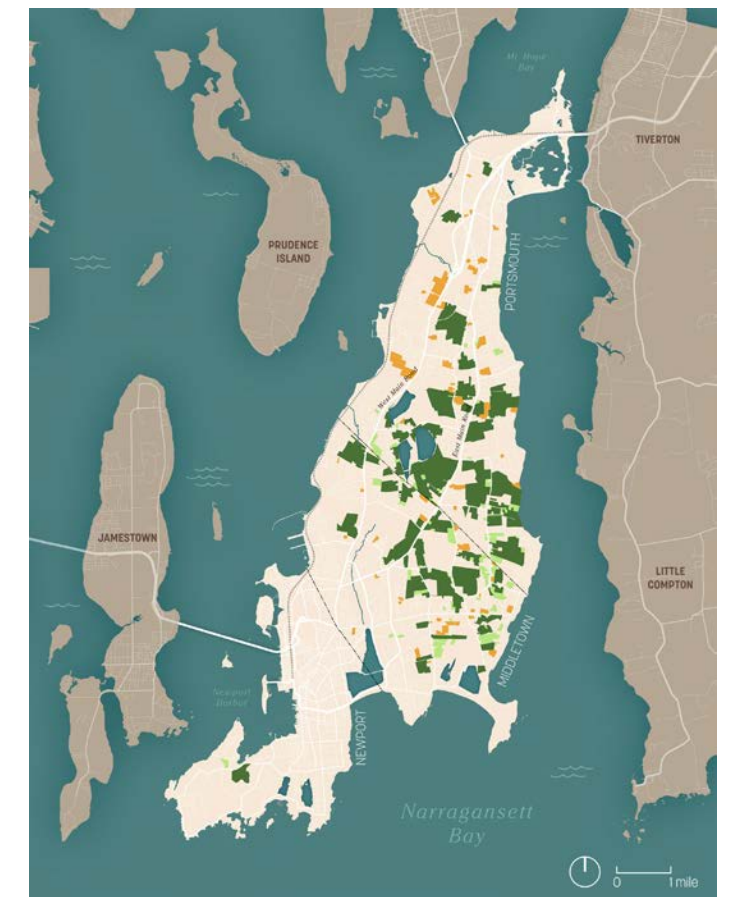
In Scenario 2, considerably more land is expected to be conserved. In addition, while some land would be lost to development, this scenario's smart growth approach would also allow 11% of existing agriculture to remain undeveloped without explicit conservation thanks to development demand being accommodated in fewer, denser developments.



ISLAND AGRICULTURAL HERITAGE - VINEYARD ROWS



AGRICULTURAL LAND - SCENARIO 1



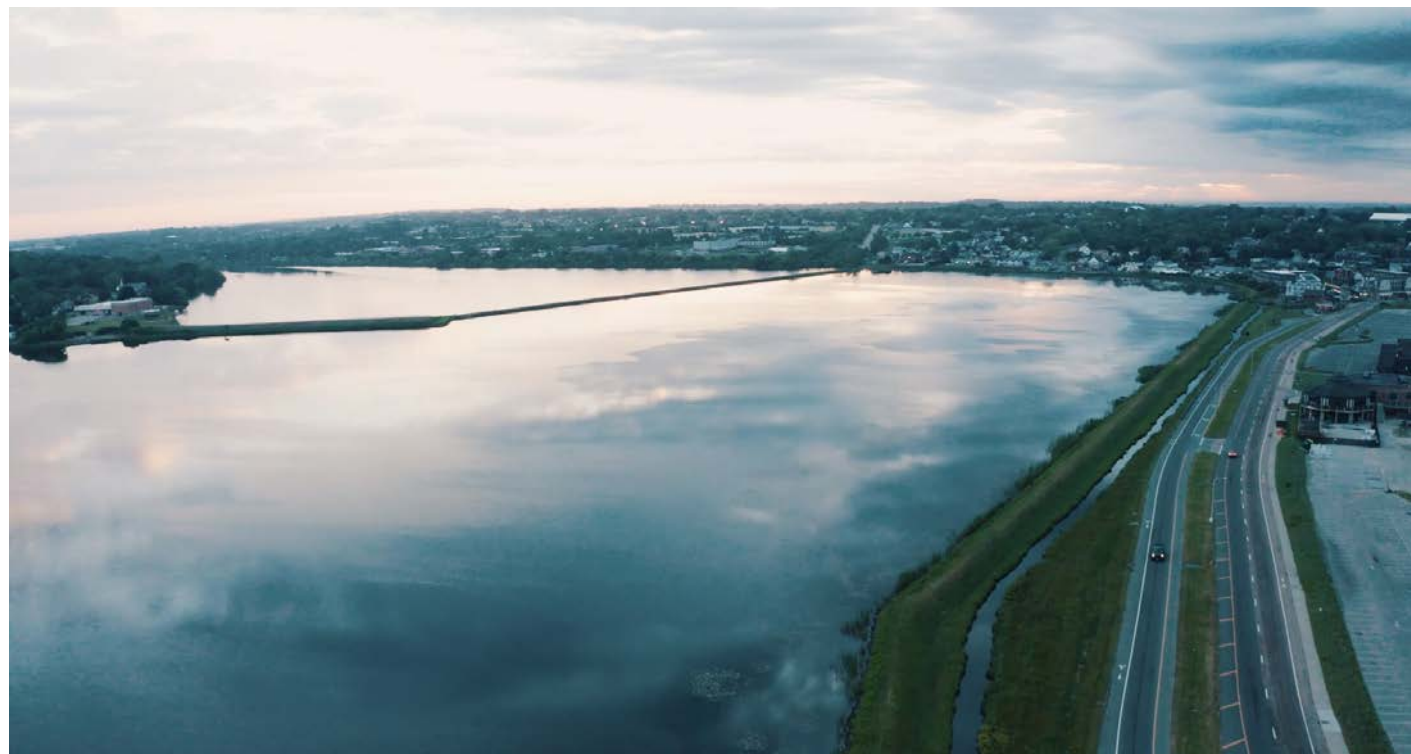
AGRICULTURAL LAND - SCENARIO 2

# Hydrology

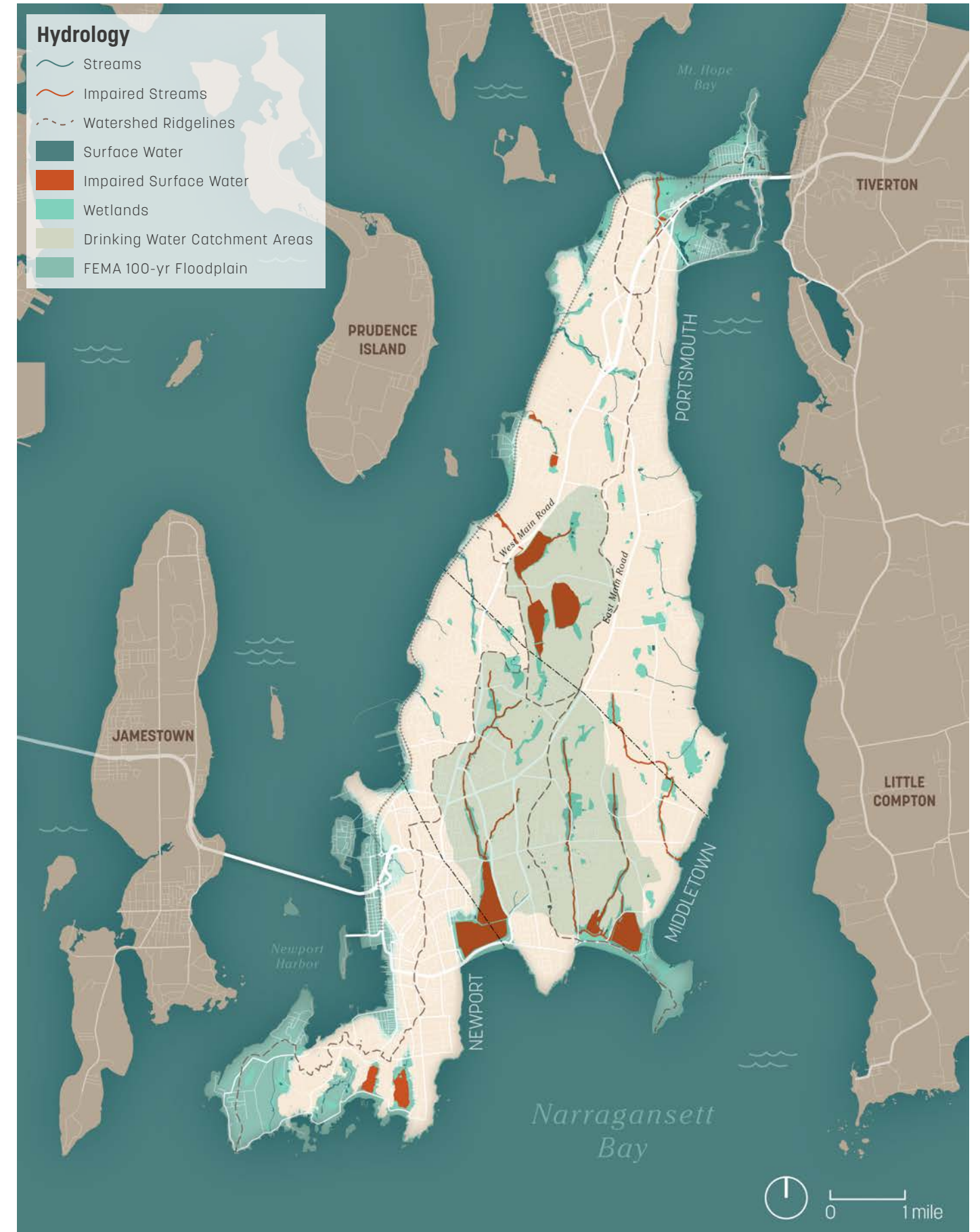
The health of Aquidneck Island’s waters is crucial to the future of its natural and human communities. The following spreads explore the potential impacts to Island waters in both scenarios.

## Impaired Waterways

According to the Rhode Island Department of Environmental Management, all of the Island’s rivers, creeks, ponds, and drinking water reservoirs are currently impaired and suffer from poor water quality. While restoration plans are in place for many of these waterways, ensuring that new development does not encroach upon or send pollutants towards these already impacted features is an important objective for the Island.



ISLAND HYDROLOGY - EASTON POND AND GREEN END POND



ISLAND HYDROLOGY - EXISTING

## Watershed Impacts

A watershed is defined as an area of land from which all rainwater flowing over land spills out onto the same outflow point or body of water. By studying the impacts of development at the watershed level, it is possible to understand the future of the Island’s water quality and quantity issues.

Watersheds can be further divided into subwatersheds for more detailed analysis. Aquidneck Island is covered by five subwatersheds: Mount Hope Bay, Upper East Passage, Sakonnet River, Lower East Passage, and Coastal Aquidneck. In addition, the Island contains seven drinking water catchment basins - watersheds that flow into the water bodies that provide the Island’s drinking water. The five subwatersheds analyzed in this study include the areas covered by the drinking water catchment basins while also including areas that don’t impact drinking water but do affect Island hydrology and ecology more broadly. A summary of the findings related to the analysis of the drinking water catchment basins is available on Page 97 of this report.

### Imperviousness

Land that is vegetated or otherwise allows water to drain into the soil is considered pervious, while land that is paved or covered with buildings is impervious. High levels of imperviousness in a watershed expose it to flooding risks by sending larger volumes of rainwater over land, known as runoff. This increased runoff also carries pollutants into adjacent waterways. In addition, water that is allowed to infiltrate the ground can be cleansed naturally by vegetation and soil, while runoff often requires mechanical or chemical treatment. Extreme increases in runoff due to heightened imperviousness can trigger the need for enlarged or additional water treatment plants, negatively impacting municipal finances.

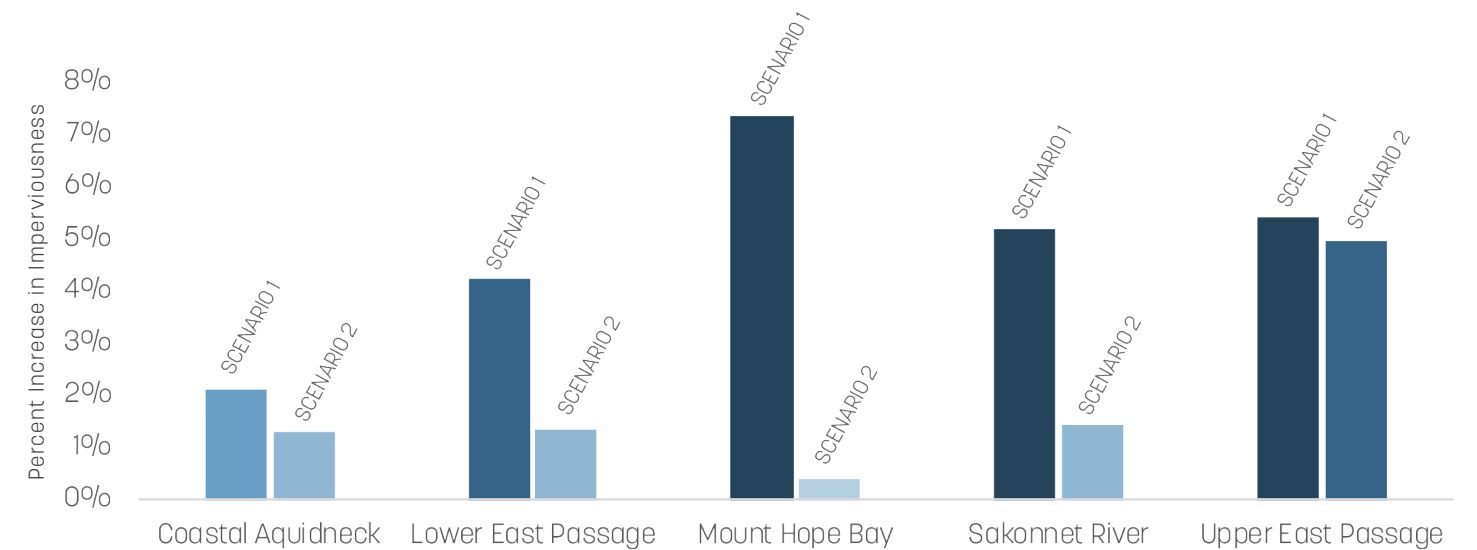
As seen in the chart and maps to the right, additional development means that imperviousness will increase in all watersheds in Scenario 1, with more than a 7% increase expected in the Mount Hope Bay watershed. In Scenario 2, however, while some increase is expected due to new development, that increase is not expected to eclipse 2% in any watershed except Upper East Passage.

### Beach Closures

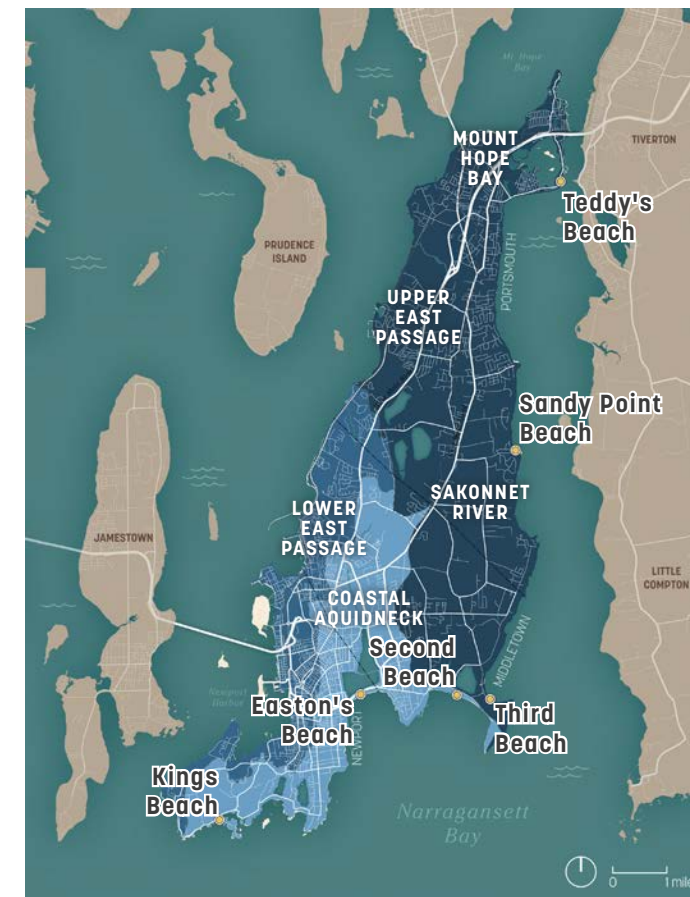
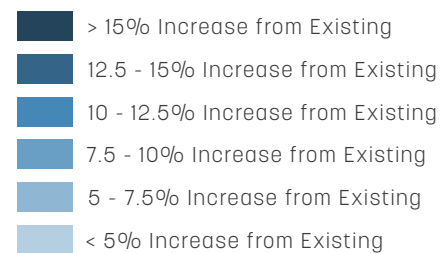
Another impact of increased imperviousness is an increase in beach closures. Every year, when pollutant loads pose a risk to human health, officials close public beaches. In 2019 alone, Aquidneck Island experienced 46 days of beach closures across nine beaches<sup>1</sup>. With the increase in imperviousness anticipated in Scenario 1, that number is expected to climb as additional runoff carries more pollutants into the surrounding Narragansett Bay.

<sup>1</sup> <http://www.health.ri.gov/data/beaches/>

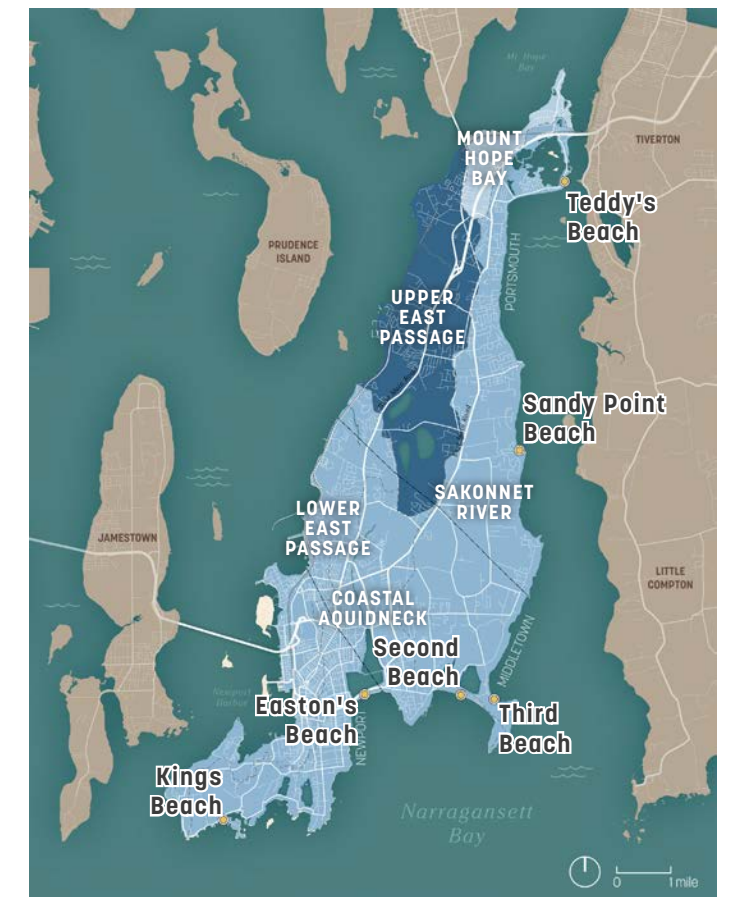
## INCREASE IN WATERSHED IMPERVIOUSNESS



### Imperviousness



IMPERVIOUSNESS - SCENARIO 1



IMPERVIOUSNESS - SCENARIO 2

# Watershed Impacts

## Pollutant Runoff

As previously noted, increased imperviousness results in increased runoff, which carries with it a variety of pollutants. The following pages indicate the expected increase in Total Suspended Solids, Total Kjeldahl Nitrogen, and Total Phosphorous in each scenario.

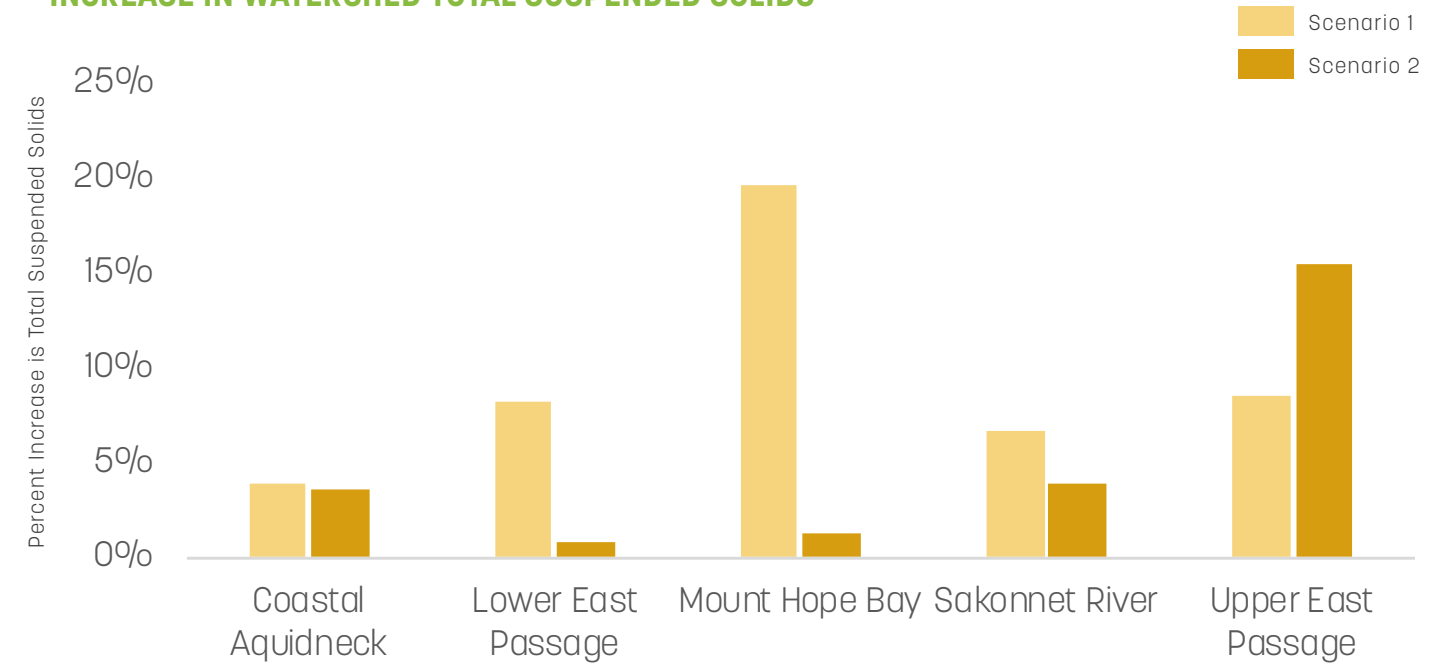
### TOTAL SUSPENDED SOLIDS

Total Suspended Solids (TSS) include particulate matter that is carried by unfiltered runoff, such as soil, decaying plant and animal material, sewage, and industrial waste. An increase in TSS results in cloudier, particle-heavy water that can clog fish gills, reduce light penetration, and impact aquatic wildlife breeding areas. In addition, TSS particles can increase the temperature of surrounding water, which can further harm aquatic wildlife and plants. Finally, drinking water treatment facilities must use additional resources to fully filter water with high levels of TSS, increasing municipal costs and potentially posing health risks.

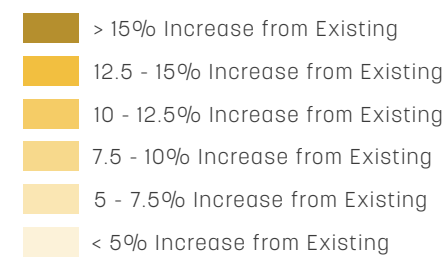
Different land use types are associated with different levels of TSS. Based on the anticipated distribution of land use in Scenario 1, considerable increases in TSS runoff are expected in each watershed, with Mount Hope Bay expected to experience nearly a 20% increase.

In Scenario 2, this increase is far less in all watersheds except Upper East Passage, where Scenario 2 anticipates a high concentration of new development and redevelopment.

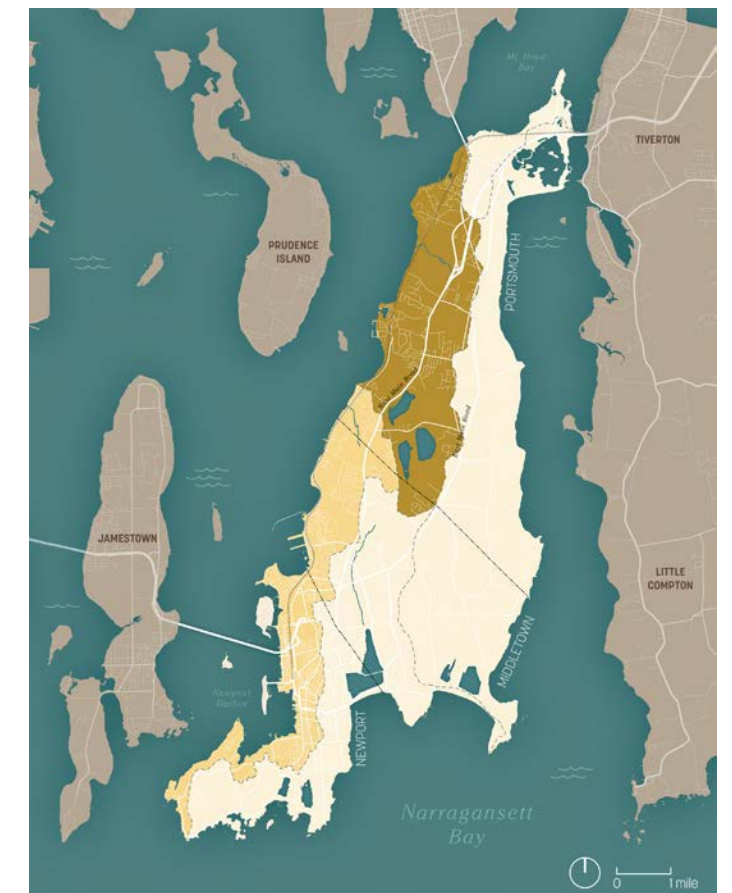
## INCREASE IN WATERSHED TOTAL SUSPENDED SOLIDS



### Total Suspended Solids



TOTAL SUSPENDED SOLIDS - SCENARIO 1



TOTAL SUSPENDED SOLIDS - SCENARIO 2

# Watershed Impacts

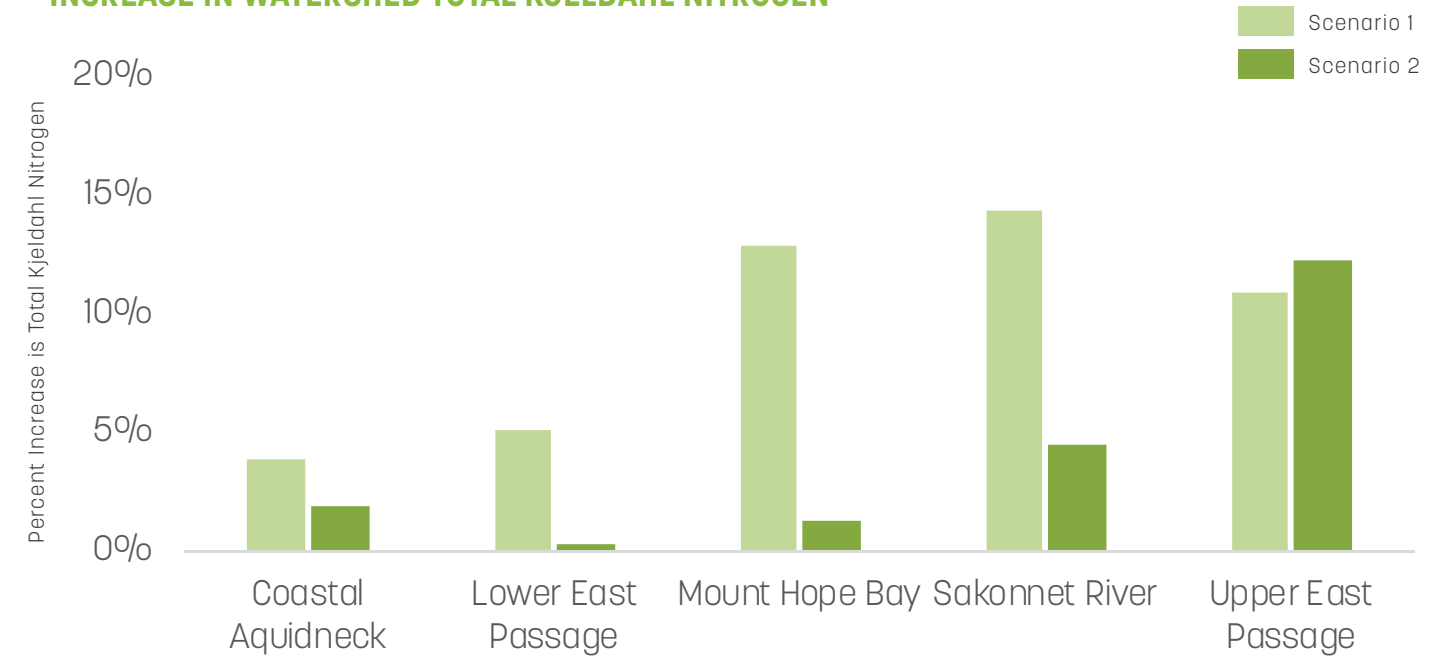
## Pollutant Runoff

### TOTAL KJELDAHL NITROGEN

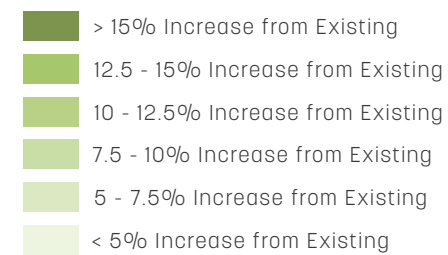
Total Kjeldahl Nitrogen (TKN) represents all forms of nitrogen and ammonia that is available to absorption by organisms in the environment. While TKN excludes nitrite and nitrate, which are the most toxic to human health, TKN can be toxic to aquatic life, especially in the form of ammonia. This can lead to eutrophication, resulting in algal blooms that negatively impact other marine life.

As noted with TSS pollution, anticipated land uses in Scenario 1 would cause a drastic increase in TKN in all watersheds, with nearly 15% expected in the Sakonnet River watershed. Scenario 2, however, would see far lower increases, with the exception of Upper East Passage where more intense development is anticipated.

### INCREASE IN WATERSHED TOTAL KJELDAHL NITROGEN



### Total Kjeldahl Nitrogen



TOTAL KJELDAHL NITROGEN - SCENARIO 1



TOTAL KJELDAHL NITROGEN - SCENARIO 2

## Watershed Impacts

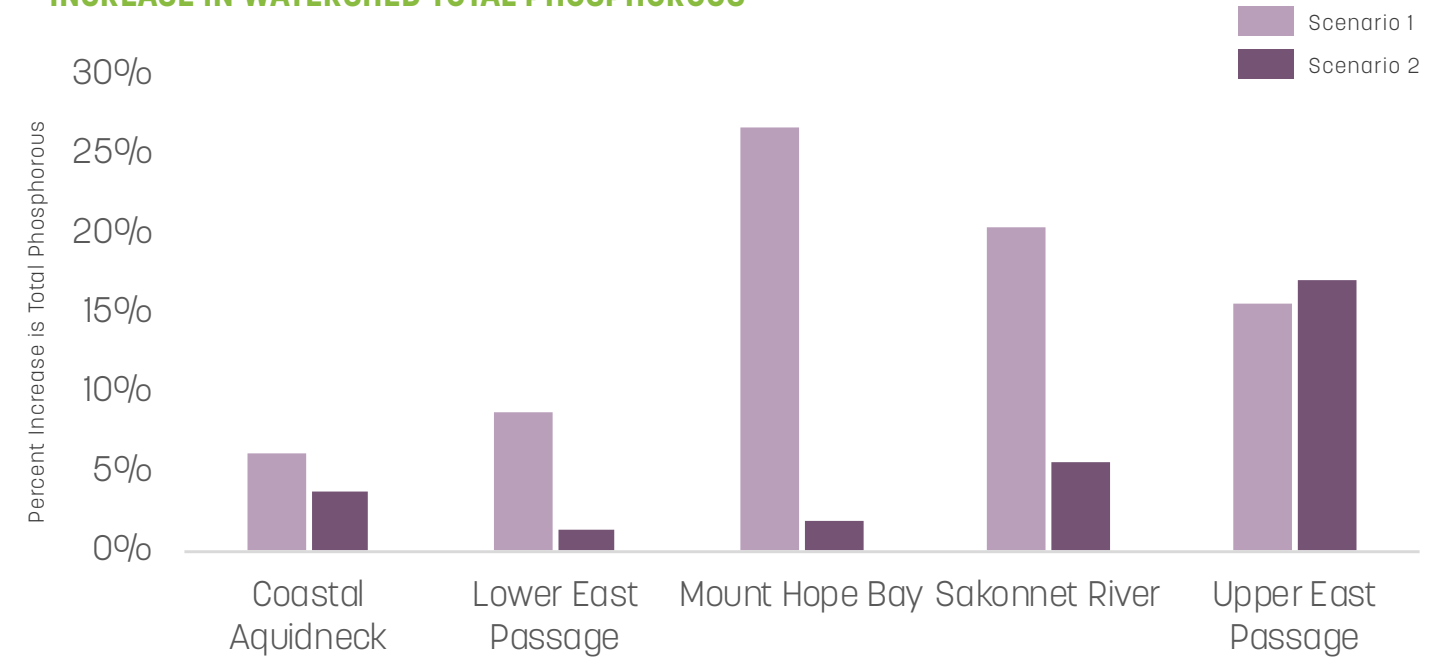
### Pollutant Runoff

#### TOTAL PHOSPHOROUS

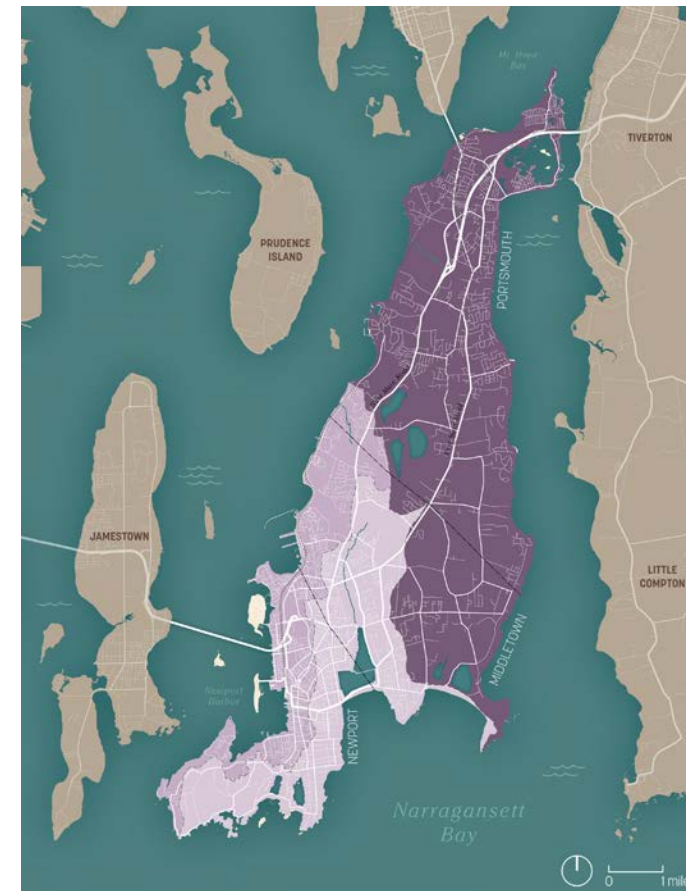
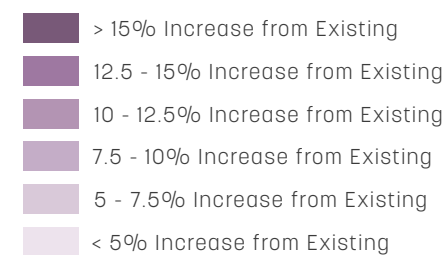
Similar to nitrogen, phosphorous is a nutrient that is both critical to plant health at low levels but harmful at high levels for a number of reasons. It contributes to toxic cyanobacteria blooms which can close down public waterways. It also results in eutrophication which removes all oxygen from the water creating dead areas where wildlife can't survive. Phosphorous inputs are primarily from stormwater runoff of developed areas including runoff from impervious surfaces and treated lawns as well as farmland. These impacts are costly to treat and can have a negative impact on tourism dollars

Again, the anticipated development of Scenario 1 would increase expected levels of phosphorous in all watersheds, most pointedly in Mount Hope Bay where an increase of over 25% is projected. Upper East Passage, where Scenario 2 would see an increase in mixed use development, is the only watershed where Scenario 2 would cause a larger increase in Total Phosphorous than Scenario 1.

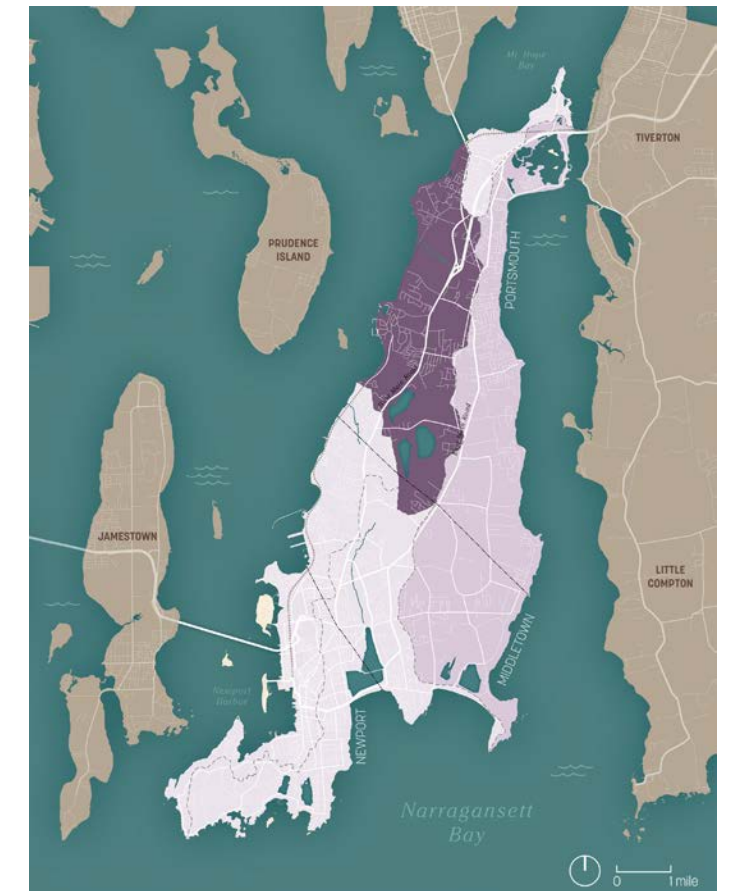
### INCREASE IN WATERSHED TOTAL PHOSPHOROUS



#### Total Phosphorous



TOTAL PHOSPHOROUS - SCENARIO 1



TOTAL PHOSPHOROUS - SCENARIO 2

## Drinking Water Catchment Basin Impacts

While the preceding analysis covered the impacts of development at the watershed level, a similar analysis was conducted for the three drinking water catchment basins on the Island. Like watersheds, these basins describe areas where all rainwater flows to the same water body - in this case, the drinking water reservoirs on the Island. Again, the extent of development in Scenario 1 would result in drastic negative impacts to the drinking water catchment basins.

The adjacent image explains why this is the case. Shown in red are the expected new suburban residential developments surrounding the drinking water reservoirs in Portsmouth. This new development in such close proximity to drinking water sources poses a particular risk to human health due to increased imperviousness and pollutant-loaded runoff. This would result in higher water treatment costs for all communities on the Island.

The aggressive conservation strategies and smart growth development approach of Scenario 2 would reduce this risk by avoiding development in these sensitive areas and protecting more adjacent open spaces which further help filter runoff.



ISLAND HYDROLOGY - SCENARIO 1 RESERVOIR DEVELOPMENT

## Sea Level Rise and Coastal Flooding

As an island, low-lying areas of Newport, Middletown, and Portsmouth are already susceptible to coastal flooding. These risks are projected to increase over the coming decades as sea levels rise. The State of Rhode Island offers guidance to municipalities in planning for sea level rise and recommends considering NOAA high scenario projections for high-level planning.<sup>1</sup> NOAA's high projections for Newport are 2.2 feet by 2040, 3.02 feet by 2050, and 8.99 feet by 2100.

To assess the impact of sea level rise and coastal flooding on Aquidneck Island in 2050, this study used a projected sea level rise of 3 feet to be consistent with NOAA's high scenario. The maps shown illustrate land exposed to flooding during a 1% annual exceedance probability (AEP) flood (also referred to as a "100 year storm"). A 1% AEP flood has a 1 in 100 chance of occurring in any given year. While a 1% chance may not sound very likely, it's important to consider that this small likelihood each year can add up over time. In fact, a house located in the 100 year floodplain has a roughly 26% of being flooded by a 1% AEP flood over a 30 year mortgage.<sup>2</sup>

The land area exposed to a 1% AEP storm is significant on Aquidneck Island: 3,145 acres in total in 2050.<sup>3</sup> Roughly half of this area (1,519 acres) is already developed today. The main risk areas include:

- ▶ Coastal Newport, especially around Downtown Newport; The Point; Wellington Avenue; Navy-owned land and the North End; the Newport Country Club area and other low-lying areas around Ocean Drive; and the area around Easton Pond
- ▶ The southeast tip of Middletown near Gardiner and Nelson Ponds, largely consisting of undeveloped land. This area includes key roads surrounding the major beaches in Middletown.
- ▶ Large areas in northern and northeast Portsmouth including Island Park and Common Fence Point, as well as the Melville area

The two scenarios place very different amounts of new development in the path of coastal flooding. Scenario 1 adds 203 acres of new development that could be exposed to flooding in a 1% AEP storm in 2050 with three feet of sea level rise. In comparison, Scenario 2 only adds an additional 33 acres of new development that could be exposed to flooding in the same conditions.

<sup>3</sup> Land area exposed was analyzed using sea level rise and coastal flooding sets available from RIGIS. These datasets show the extents of coastal flooding during a 100-year storm with 3 feet of sea level rise. The data is available at: <http://www.rigis.org/search?page=2&tags=sea%20level%20rise>

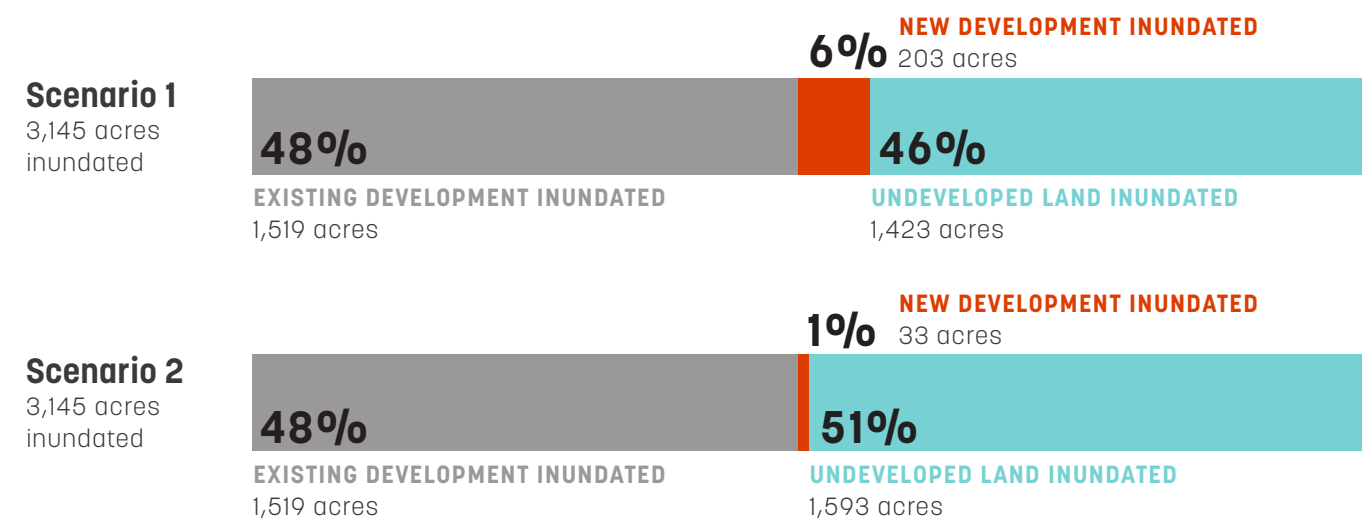
<sup>1</sup> For more information, see Resilient Rhody: An Actionable Vision For Addressing The Impacts Of Climate Change In Rhode Island (2018) (Rhode Island Statewide Climate Resilience Action Strategy). More information is available at the State's resilience website: <http://climatechange.ri.gov/resiliency/>

<sup>2</sup> To learn more about how flood risk is calculated see this USGS website that gives more background on "Floods and Recurrence Intervals" [https://www.usgs.gov/special-topic/water-science-school/science/floods-and-recurrence-intervals?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/special-topic/water-science-school/science/floods-and-recurrence-intervals?qt-science_center_objects=0#qt-science_center_objects)

### Coastal Flooding

- Existing Development Inundated
- New Development Inundated
- Undeveloped Land Inundated

## LAND EXPOSED TO FLOODING FROM A 100-YR STORM IN 2050\*



\*based on Rhode Island estimates of 1% AEP storm with 3' Sea Level Rise



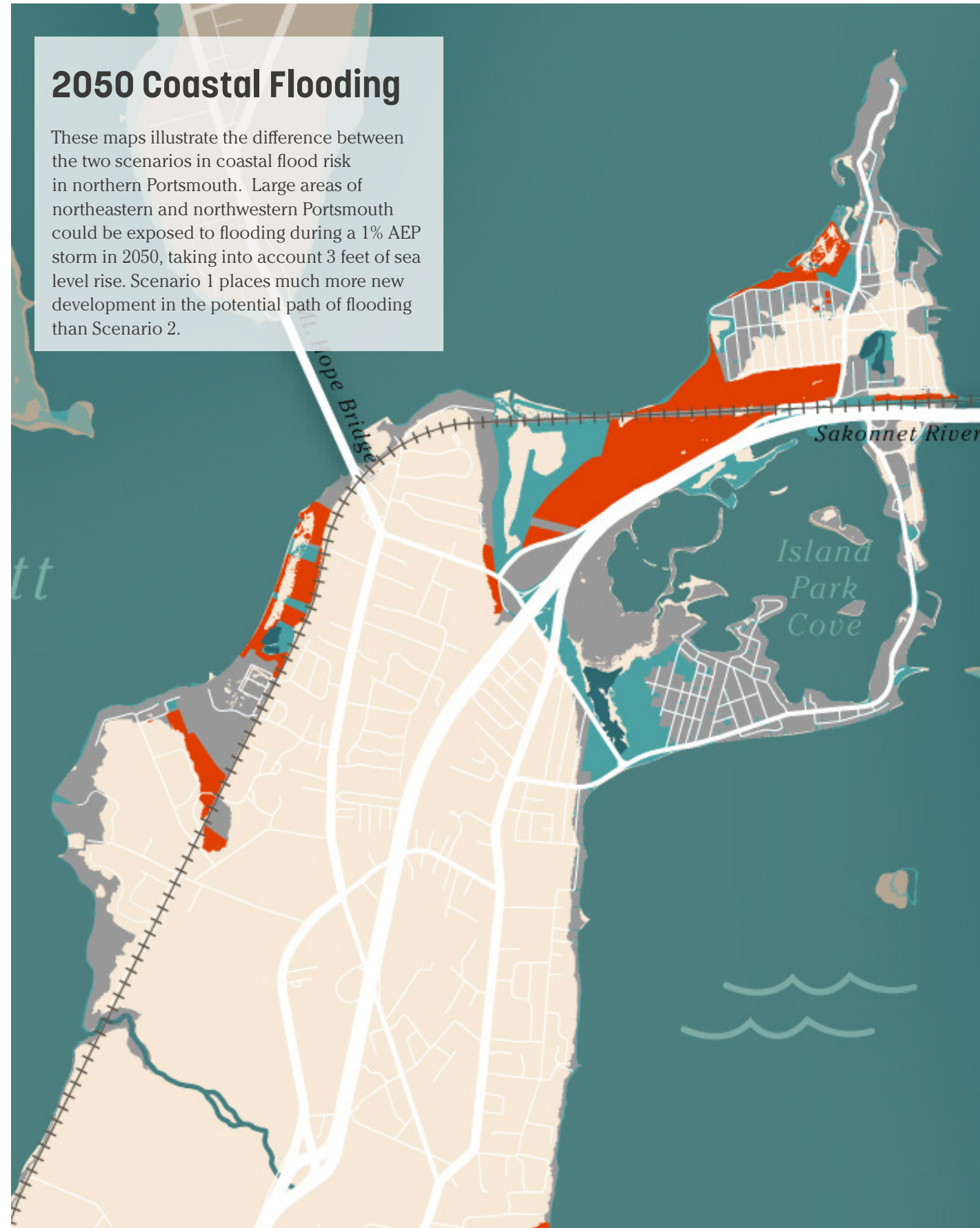
**COASTAL FLOODING**  
100-YEAR STORM WITH SEA LEVEL RISE - SCENARIO 1



**COASTAL FLOODING**  
100-YEAR STORM WITH SEA LEVEL RISE - SCENARIO 2

## 2050 Coastal Flooding

These maps illustrate the difference between the two scenarios in coastal flood risk in northern Portsmouth. Large areas of northeastern and northwestern Portsmouth could be exposed to flooding during a 1% AEP storm in 2050, taking into account 3 feet of sea level rise. Scenario 1 places much more new development in the potential path of flooding than Scenario 2.



**COASTAL FLOODING - NORTHERN PORTSMOUTH**  
100-YEAR STORM WITH SEA LEVEL RISE - SCENARIO 2

## Land exposed to flooding in major storm in 2050\*

- Existing Development Inundated
- New Development Inundated
- Undeveloped Land Inundated



**COASTAL FLOODING - NORTHERN PORTSMOUTH**  
100-YEAR STORM WITH SEA LEVEL RISE - SCENARIO 2

\*based on Rhode Island estimates of 1% AEP storm with 3' Sea Level Rise

## Carbon Storage

As Island open space is developed, the carbon stored in the vegetation and soil of that land is released. Released carbon is at risk of entering the atmosphere as greenhouse gases and contributing to global climate change.

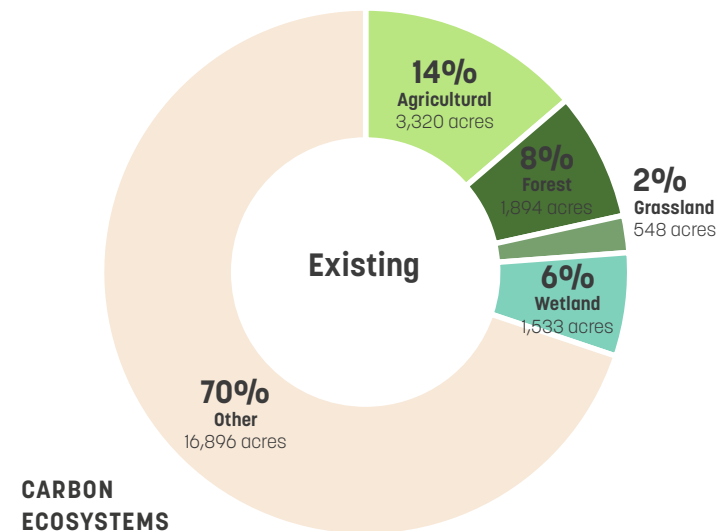
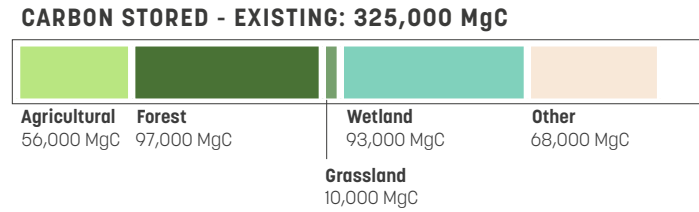
The various ecosystems on the Island - Agricultural, Forest, Grassland, Wetland, and Other (e.g. developed) - store different amounts of carbon. As these ecosystems are disturbed by new development, the resulting total carbon stored is impacted. The pie charts and maps to the right illustrate the distribution of the Island's ecosystems as they exist today and as they may exist in Scenarios 1 and 2. Notably, the increased development of Scenario 1 reduces existing agricultural, forest, grassland, and wetland ecosystems much more drastically than in Scenario 2.

The charts at the top of the page illustrate the total carbon stored by ecosystem today and in each scenario. Because of the low amount of carbon stored in the "Other" ecosystem - which includes urban development, Scenario 1 would see a reduction of 52,000 metric tonnes (Mg) of carbon, compared to a reduction of 20,000 metric tonnes in Scenario 2. This 32,000 metric tonne difference is roughly equivalent to the carbon stored by 1,100 mature oak trees<sup>1</sup>.

<sup>1</sup> M.G.R. Cannell, "Growing trees to sequester carbon in the UK: answers to some common questions," *Forestry* 72, no. 3 (1999), accessed November 12, 2019 www.watermark.silverchair.com

### Carbon Storage Ecosystems

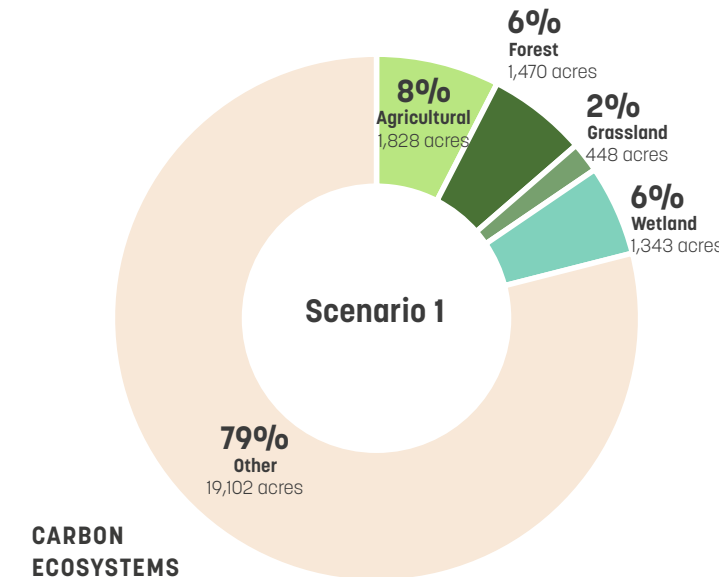
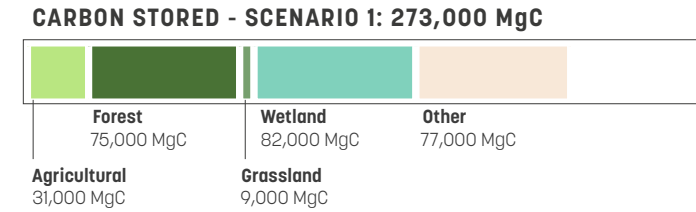
- Agricultural
- Forest
- Grassland / Shrubland
- Wetland
- Other



**CARBON ECOSYSTEMS**



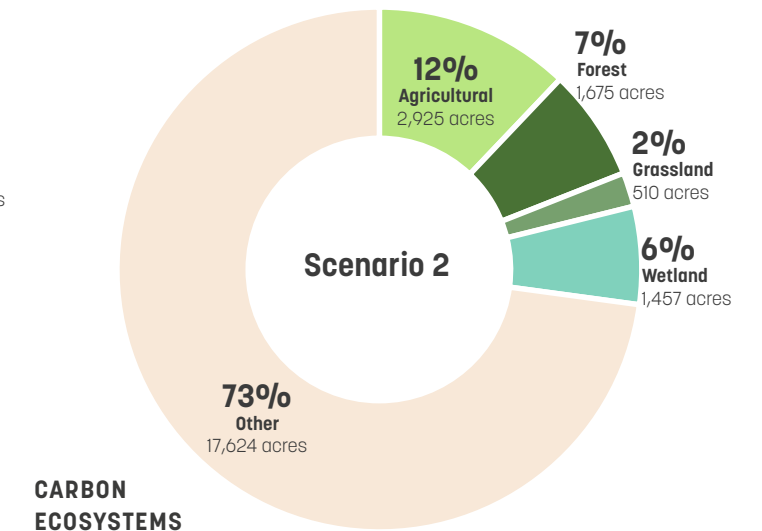
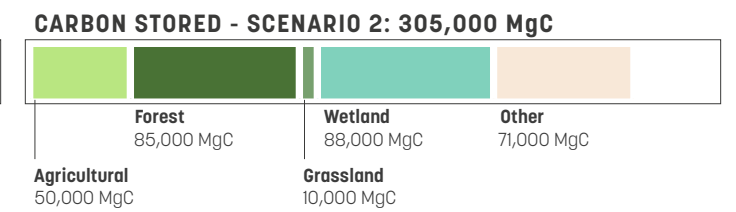
**CARBON STORAGE ECOSYSTEMS - EXISTING**



**CARBON ECOSYSTEMS**



**CARBON STORAGE ECOSYSTEMS - SCENARIO 1**



**CARBON ECOSYSTEMS**



**CARBON STORAGE ECOSYSTEMS - SCENARIO 2**

## Fiscal Health

From the perspective of local governments and tax paying citizens, one of the most important benefits of development is tax revenue. An argument sometimes made against land conservation is that open space needs to be developed in order to maintain economic growth and fiscal well-being. This indicator investigates the fiscal impacts of extensive build-out development (Scenario 1) compared with a smart growth approach that prioritizes higher density, infill, redevelopment, and open space conservation (Scenario 2).

It is commonly understood that properties vary considerably in their assessed value. Across the United States, higher-density, mixed use development is often 10 times more valuable on a per-acre basis than suburban residential properties.<sup>1</sup> Analyzing current tax assessments on Aquidneck Island in 2019 shows that existing mixed-use development provides an average annual tax revenue of \$191,470 per acre while suburban housing provides an average of \$15,053, which is more than a 12-fold difference. Based on this, all other things being equal, adding an acre of mixed use to the Island will generally result in a more positive fiscal outcome than adding an acre of suburban development.

In fact, the comprehensive plans for all three Island municipalities call for increased mixed use development in appropriate areas. In addition to a reduction in infrastructure costs and an increase in tax revenue, the plans cite improved character, decreased traffic, and preservation of open space as reasons to promote this type of development.

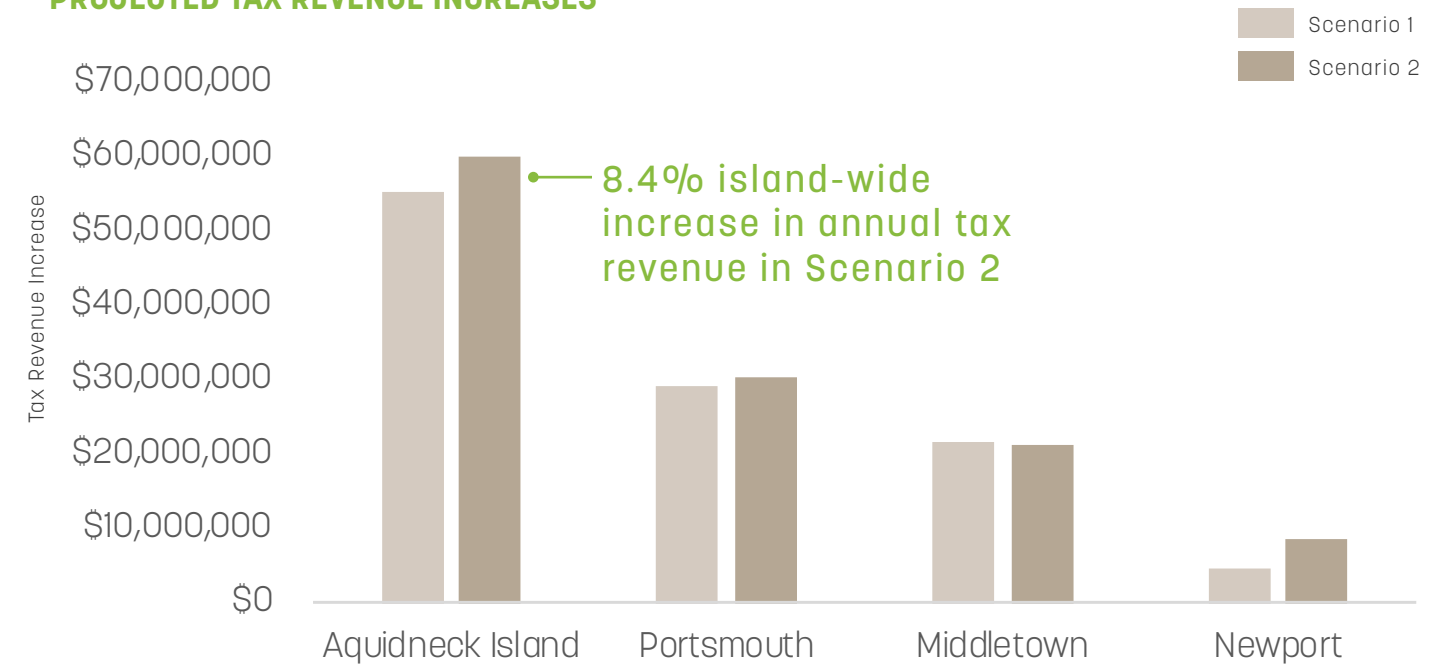
By analyzing the scenario land use patterns and existing tax rates, the research team was able to calculate projected future revenue increases per scenario. The cost side was researched as well; however, since both scenarios assumed the same number of housing units (and therefore, the same level of required municipal services), this analysis focuses

on the revenue side. On an island-wide basis, Scenario 1 added roughly \$55M in additional annual tax revenue, while Scenario 2 added nearly \$60M. For individual jurisdictions, the increases were as follows: Newport, \$4.7M for Scenario 1 and \$8.4M for Scenario 2; Middletown: \$21.5M for Scenario 1 and \$21M for Scenario 2; and Portsmouth: \$29M for Scenario 1 and \$30M for Scenario 2.

As reflected in these numbers, the gains were generally higher in Scenario 2. The gains for Middletown were slightly higher for Scenario 1 because even though the per-acre value of suburban development is lower than the per-acre value of higher density development, the quantity of suburban development in Scenario 1 was so vast, that it slightly outweighed the gains by the smaller-footprint of the development in Scenario 2 (lots of lower-value developments versus fewer higher-value developments).

In summary, Scenario 2 resulted in 8.4% more public revenue gain than Scenario 1 across Aquidneck Island as a whole. As has been seen in many other communities throughout America, smart growth is a fiscally sound land use strategy. This analysis shows that large-scale open land development is not essential for economic growth, and in fact, the approach reflected in Scenario 2—smart growth plus conservation—actually results in a better outcome for island-wide fiscal health.

### PROJECTED TAX REVENUE INCREASES



#### SUBURBAN RESIDENTIAL DEVELOPMENT

Current Average Annual Property Tax Revenue:  
**\$15,053 / acre**



#### MIXED-USE DEVELOPMENT

Current Average Annual Property Tax Revenue:  
**\$191,470 / acre**

Over 12x higher value per acre than suburban residential development

<sup>1</sup> Smart Growth America, "Building Better Budgets: A National Examination of the Fiscal Benefits of Smart Growth Development" (2013)

## Transportation

More development means more traffic, which is a major concern for residents of Aquidneck Island. In general, adding new households will add more cars to the Island’s roads, regardless of the scenario. In 2017, the Federal Highway Administration estimated that the average number of vehicles per household in the Northeastern United States was 1.63.<sup>1</sup> Given the 4,950 additional households that both scenarios anticipate, there will be slightly over 8,000 new vehicles on the Island’s roads by 2050.

Although it cannot be measured precisely given the data available, traffic would likely be mitigated in Scenario 2 for two reasons:

1. The higher amount of mixed-use development would mean that more residents could walk to work/shopping/etc.
2. The densification along major roadways would increase the viability of public transportation

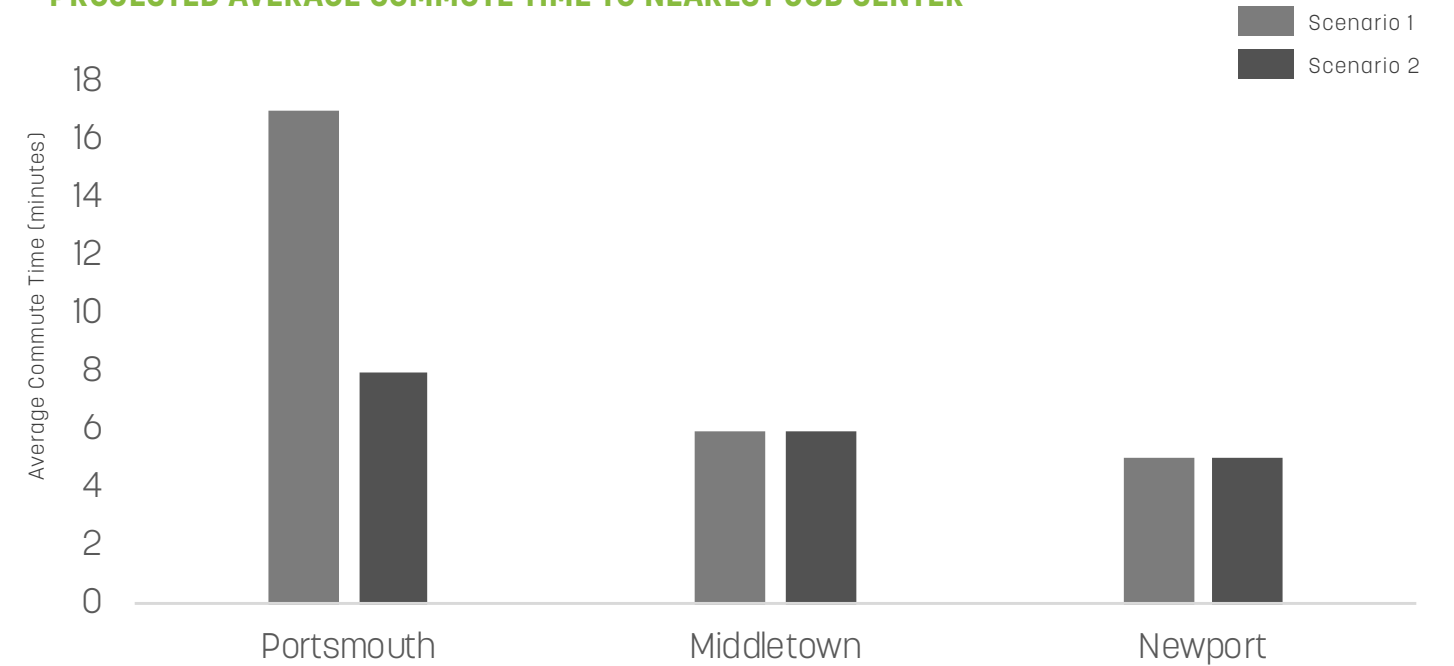
These two land use factors would shift mode share for some households away from strictly car-based travel. In Scenario 1, the suburban-style development that predominates would create a land use pattern almost entirely dependent on personal vehicles. While these differences would have a significant impact on the families living in town centers and along the densified corridors, at the scale of the entire Island, most households would still make their daily trips by driving.

Another dimension to this issue is average commute times. The research team analyzed average commute times to the nearest job center in both scenarios, summarized by the chart to the right. In Newport and Middletown, commute times remain essentially the same—the changes in land use patterns in those communities do not significantly alter proximity between households and jobs. In Portsmouth, however, the analysis suggests a reduction from 17 minutes in Scenario 1 to 8 minutes in Scenario 2. This is due to the

differences in commercial density in Portsmouth between the scenarios. In Scenario 1—as is the case currently—the commercial development is dispersed across shopping centers and strip malls, and there is not a true commercial town center that emerges in that scenario. In Scenario 2, however, a concentration of commercial and mixed use parcels is allocated at a density that rivals similar job centers in Middletown and Newport. For that reason, the travel times in Portsmouth dropped significantly because the model sought the nearest job center to each household.

Overall, traffic congestion would be worse in both scenarios compared with current conditions, but for Portsmouth residents commuting locally and for households that live in more densified areas, Scenario 2 would be a significant improvement over Scenario 1 and offer a greater variety of commuting options.

### PROJECTED AVERAGE COMMUTE TIME TO NEAREST JOB CENTER



**8,000**  
new vehicles are expected to use Aquidneck Island roadways in 2050 in both Scenarios



### SUBURBAN DEVELOPMENT NECESSITATES DEPENDENCY ON PERSONAL VEHICLES

While a considerable number of new vehicles are anticipated to use Island roadways in both Scenarios, the suburban-style development associated with Scenario 1 requires driving for almost all daily trips. The town center style of development associated with Scenario 2, however, can support a reduction in vehicle use as the walkable nature of these mixed use environments can support alternative modes of transportation.

<sup>1</sup> Federal Highway Administration, US Department of Transportation, “2017 National Household Travel Survey” (Summary of Travel Trends, 2017)



# Conclusions

# Conclusions

*The residents of Aquidneck Island face a choice: if the status quo continues, most of the open space that defines the Island will be lost irrevocably. Fortunately, there are other pathways forward that can accommodate growth while also preserving the Island's treasured landscapes for future generations.*

Aquidneck Island is developing rapidly. 6,200 new units of housing have been built since 1980 at a rate that has remained constant right up to the present day. If this continues, by 2050 the Island can expect nearly 5,000 additional households and a massive expansion of the current housing stock. Under existing policies, this trend will result in a complete built-out and suburbanization of the Island at some point in the next 30 years, likely well before 2050, and this would have a significant adverse impact on the Island's economy, landscape preservation, quality of life, ecology, and water supply.

The good news is that it is possible to accommodate new growth while also preserving the farms, fields, forests, beaches, and rolling vistas that are so beloved by Aquidneck Island residents and visitors. The alternative

scenario designed as part of this research illustrates one possible way of achieving this balance by using a combination of smart growth and well-funded conservation. There are certainly other ways of achieving these goals, and local residents should embrace whatever elements of the scenarios most align with their values. The important point is that this research demonstrates that it is feasible to preserve Aquidneck Island's open space assets even if the current rate of development continues. In fact, well-planned development could even be complementary to a robust conservation program.

It is the hope of the research team that this work will be used to inform a thoughtful public dialogue about land planning policy and to inspire future conservation action.

## Key Takeaways

**1** **Aquidneck Island will run out of unprotected open space by 2050** at the current rate of development. This will severely deplete the island's prime **agricultural soils**, compromise many **iconic vistas**, and preclude the creation of **new trails and corridors**. Land conservation can protect open space and preserve important resources for the future.

**2** **The current development trends are more harmful to the island's waters and provide lower per-acre tax base revenue.** Smart Growth is a friend to conservation; it redirects development pressure in a less harmful way, leaves opportunities for future conservation, and provides higher per-acre tax base revenue.

**3** While development decisions occur at the local level, **regional planning is critical to the future of the island**. Development impacts to drinking water, scenic views, and prime farmland cross jurisdictional boundaries and require **island-wide coordination and cooperation**.

## How to Get Involved

Interested in supporting the mission of the Aquidneck Island Land Trust? Here's how:

- » **CONTRIBUTE TO CONSERVATION FUNDING**  
Consider a donation to the Aquidneck Land Trust to support conservation efforts across Aquidneck Island. Encourage your municipality to fund more open space projects.
- » **PROTECT YOUR LAND**  
Get in touch with the Aquidneck Land Trust for opportunities to conserve open spaces on your property.
- » **SUPPORT SMART GROWTH**  
Advocate for Smart Growth strategies that promote infill redevelopment in order to shift demand away from suburban sprawl.

A large, light gray, stylized number '7' is centered on the right side of the page. The number is composed of a horizontal top bar and a vertical stem that tapers slightly towards the bottom.

Technical  
Appendix

# Technical Appendix

## APPENDIX ELEMENTS

|  |            |
|--|------------|
| <b>I. Existing Zoning</b>                    | <b>117</b> |
| <b>II. Scenario Modeling Methodology</b>     | <b>119</b> |
| <b>III. Town-Level Development Summaries</b> | <b>129</b> |
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| <b>V. Project Fact Sheet</b>                 | <b>137</b> |
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# I. Existing Zoning

## Developable Parcels

A town-level breakdown of zoning highlights differences between the Island's municipalities. Focusing on only those parcels which are likely to be developed (i.e. open space parcels and low density residential), highlights the most likely land uses of these parcels.

### PORTSMOUTH

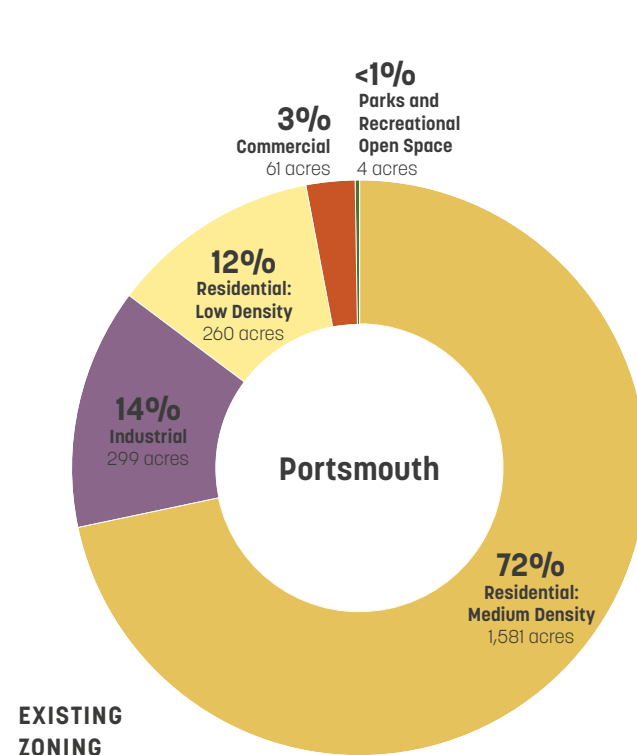
Developable parcels in Portsmouth are primarily zoned medium density residential (72%) with some industrial (14%) and low density residential (12%) as well.

### MIDDLETOWN

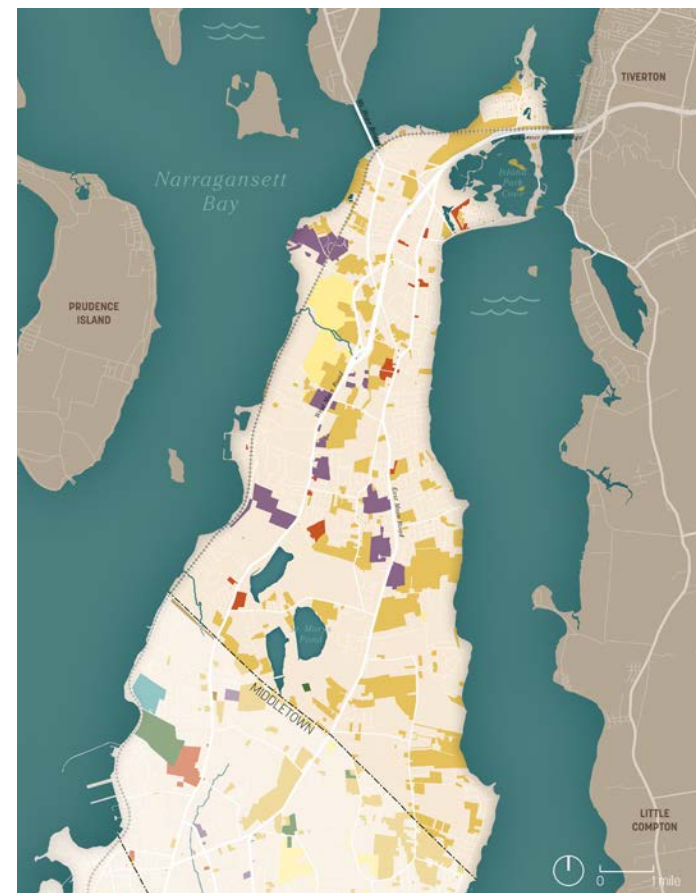
Middletown is also marked by medium density residential (57%) and low density residential (17%). However, the 12% of developable acreage that is zoned as Parks and Recreational Open Space provides an offset to expected future development.

### NEWPORT

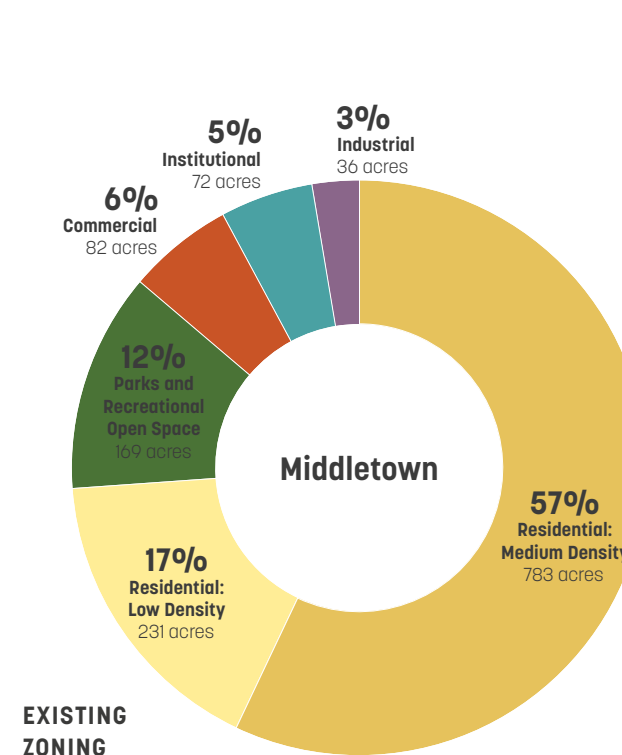
As Newport is largely built out, not many developable parcels exist. Of those that do, a plurality are zoned as Parks and Recreational Open Space (46%), limiting their ability to be developed. The 36% of acres zoned low density residential and the 16% zoned medium density residential, however, do offer the potential for redevelopment.



EXISTING ZONING



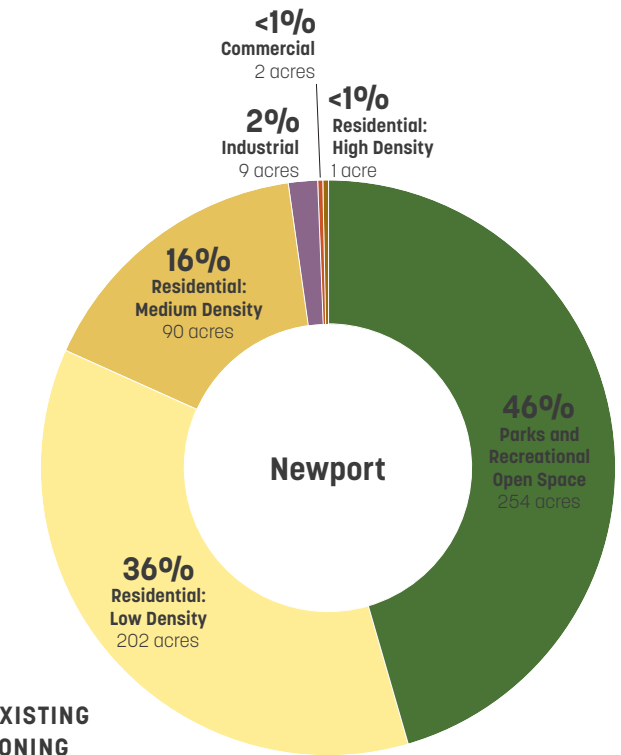
ZONING, DEVELOPABLE PARCELS: PORTSMOUTH



EXISTING ZONING



ZONING, DEVELOPABLE PARCELS: MIDDLETOWN



EXISTING ZONING



ZONING, DEVELOPABLE PARCELS: NEWPORT

# II. Scenario Modeling Methodology

## Process

The first step to model the scenarios was to identify future demand. For residential units, the team extended the current rates of development—per jurisdiction—out to 2050. The adjacent table shows the total number of new units allocated in both of the scenarios.

## Residential Uses

The model land use categories that include residential units are Residential: High Density, Residential: Medium Density, Residential: Low Density, and Mixed-Use. The team determined the current ratios of each type per jurisdiction that exists today. For Scenario 1, these ratios were generally held at the same levels as current. For Scenario 2, they were shifted somewhat to be more consistent with the Scenario’s higher density narrative. The chart below shows the breakdown of new unit allocation by jurisdiction and scenario.

### ALLOCATION OF NEW RESIDENTIAL UNITS BY MUNICIPALITY

| Municipality | New Residential Units |
|--------------|-----------------------|
| Portsmouth   | 2,310                 |
| Middletown   | 1,530                 |
| Newport      | 1,110                 |

### RESIDENTIAL UNIT TYPE ALLOCATION BY MUNICIPALITY AND SCENARIO

| Residential Land Use Category | Portsmouth |            | Middletown |            | Newport    |            |
|-------------------------------|------------|------------|------------|------------|------------|------------|
|                               | SCENARIO 1 | SCENARIO 2 | SCENARIO 1 | SCENARIO 2 | SCENARIO 1 | SCENARIO 2 |
| Residential: High Density     | 10%        | 30%        | 30%        | 40%        | 50%        | 55%        |
| Residential: Medium Density   | 85%        | 55%        | 60%        | 40%        | 40%        | 20%        |
| Residential: Low Density      | 5%         | 5%         | 5%         | 5%         | 5%         | 5%         |
| Mixed-Use                     | 0%         | 10%        | 5%         | 15%        | 5%         | 20%        |

Residential densities within each land use category were based on zoning in Scenario 1 and were custom designed for Scenario 2 (in some instances shifting densities higher than current zoning allows). The Scenario 2 densities are listed in the below table.

### SCENARIO 2 RESIDENTIAL DENSITIES

| Residential Land Use Category | Square Feet per Unit |
|-------------------------------|----------------------|
| Residential: High Density     | 3,111                |
| Residential: Medium Density   | 21,780               |
| Residential: Low Density      | 67,015               |
| Mixed-Use                     | 2,178                |

Each parcel that received residential allocation within a scenario had discount factors applied to it to simulate site design factors. A baseline 30% was removed from all parcels to account for common areas and rights-of-way.

In addition, in Scenario 2, wetlands and floodplains were subtracted from gross parcel acreage. The final units allocated per parcel was calculated by starting with the site gross acreage, subtracting 30%, subtracting non-buildable environmental features, and then converting the net acreage into new units based on scenario densities.

## Non-residential Uses

The non-residential categories that were allocated included Commercial, Industrial, and Parks and Recreational Open Space. The ratio of gross commercial acreage to gross residential acreage from current was extended out to 2050 in both scenarios. Industrial was assumed to only grow at 20% of its historical rate. Parks were assumed to be added at the current ratio for Scenario 2, but for Scenario 1, the relative share of park space was decreased compared with current. The chart below shows new gross acreage of non-residential land uses by jurisdiction and scenario.

Residential uses were allocated on a unit basis, while non-residential land uses were allocated on a gross acres basis.

### NON-RESIDENTIAL LAND USE ALLOCATION IN ACRES BY MUNICIPALITY AND SCENARIO

| Non-Residential Land Use Category | Portsmouth |            | Middletown |            | Newport    |            |
|-----------------------------------|------------|------------|------------|------------|------------|------------|
|                                   | SCENARIO 1 | SCENARIO 2 | SCENARIO 1 | SCENARIO 2 | SCENARIO 1 | SCENARIO 2 |
| Commercial                        | 119        | 119        | 116        | 116        | 36         | 36         |
| Industrial                        | 18         | 18         | 4          | 4          | 0          | 0          |
| Parks and Recreational Open Space | 29         | 72         | 56         | 94         | 5          | 46         |

### Allocation Constraints

After determining the demand for new development, the next step was to establish allocation constraints. This tells the model where each land use is allowed to go. To be consistent with the narrative of each scenario, Scenario

1 was generally more permissive of new development as it related to environmental constraints but more strictly adhered to allowable uses under current zoning codes. Scenario 2 took the reverse approach. The following tables summarize the constraints that were applied to each scenario.

#### SCENARIO 1 - ALLOCATION CONSTRAINTS

| Condition  | Commercial    | Industrial    | Residential: High Density | Residential: Med. Density | Residential: Low Density | Mixed-Use     | Parks and Recreational Open Space |
|--|---------------|---------------|---------------------------|---------------------------|--------------------------|---------------|-----------------------------------|
| Protected Land                                       | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Wetlands   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| 100ft Buffer from Wetlands                           | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| Cemetery   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| Historic   | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| Golf Courses: Wanumetonomy and Montaup               | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| Golf Courses: Other                                  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| 500ft Buffer from Reservoirs                         | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| Surface water polygons                               | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| 200ft Buffer from Streams and Ponds                  | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| Floodplain   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Navy properties, except ones planned for disposition | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| Zoned Commercial                                     | Can go here   | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can go here   | Can't go here                     |
| Zoned Industrial                                     | Can't go here | Can go here   | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| Zoned Institutional & Civic                          | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Zoned Res High                                       | Can't go here | Can't go here | Can go here               | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| Zoned Res Med  | Can't go here | Can't go here | Can't go here             | Can go here               | Can't go here            | Can't go here | Can't go here                     |
| Zoned Other Built                                    | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| Zoned Parks  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Zoned Res Low  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can go here              | Can't go here | Can go here                       |
| LU Commercial, except Navy disposition properties    | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |

#### SCENARIO 1 - ALLOCATION CONSTRAINTS (CONTINUED)

| Condition   | Commercial    | Industrial    | Residential: High Density | Residential: Med. Density | Residential: Low Density | Mixed-Use     | Parks and Recreational Open Space |
|---|---------------|---------------|---------------------------|---------------------------|--------------------------|---------------|-----------------------------------|
| LU Industrial, active site, except Navy disposition properties                            | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Industrial, inactive site  | Can go here   | Can go here   | Can go here               | Can go here               | Can't go here            | Can go here   | Can go here                       |
| LU Institutional & Civic, except Navy disposition properties                              | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Res High, except Navy disposition properties   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Res Med, except Navy disposition properties  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Res Low: 1 unit, building footprint >= 2,000 sq ft, except Navy disposition properties | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Res Low: 1 unit, building footprint < 2,000 sq ft                                      | Can go here   | Can go here   | Can go here               | Can go here               | Can't go here            | Can go here   | Can go here                       |
| LU Res Low: >1 unit, except Navy disposition properties                                   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Mixed-Use, except Navy disposition properties  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Other Built, except Navy disposition properties  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Agriculture, except Navy disposition properties  | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| LU Parks, except Navy disposition properties  | Can go here   | Can go here   | Can go here               | Can go here               | Can't go here            | Can go here   | Can't go here                     |
| LU Other Non-Built  | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| LU Water  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |

SCENARIO 2 - ALLOCATION CONSTRAINTS

| Condition  | Commercial    | Industrial    | Residential: High Density | Residential: Med. Density | Residential: Low Density | Mixed-Use     | Parks and Recreational Open Space |
|--|---------------|---------------|---------------------------|---------------------------|--------------------------|---------------|-----------------------------------|
| Protected Land   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Wetlands   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| 100ft Buffer from Wetlands                                     | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Cemetery   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| Historic   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Golf Courses: Wanumetonomy and Montaup                         | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| Golf Courses: Other  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| 500ft Buffer from Reservoirs                                   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Surface water polygons   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| 200ft Buffer from Streams                                      | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Floodplain   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Navy properties, except ones planned for disposition           | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| Zoned Commercial   | Can go here   | Can't go here | Can go here               | Can't go here             | Can't go here            | Can go here   | Can go here                       |
| Zoned Industrial   | Can go here   | Can go here   | Can go here               | Can't go here             | Can't go here            | Can go here   | Can go here                       |
| Zoned Institutional & Civic                                    | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Zoned Res High   | Can go here   | Can't go here | Can go here               | Can't go here             | Can't go here            | Can go here   | Can go here                       |
| Zoned Res Med  | Can go here   | Can't go here | Can go here               | Can go here               | Can't go here            | Can go here   | Can go here                       |
| Zoned Other Built  | Can go here   | Can go here   | Can go here               | Can go here               | Can't go here            | Can go here   | Can go here                       |
| Zoned Parks  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can go here                       |
| Zoned Res Low  | Can't go here | Can't go here | Can go here               | Can go here               | Can go here              | Can't go here | Can go here                       |
| LU Commercial, except Navy disposition properties              | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can go here   | Can't go here                     |
| LU Industrial, active site, except Navy disposition properties | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |

SCENARIO 2 - ALLOCATION CONSTRAINTS (CONTINUED)

| Condition   | Commercial    | Industrial    | Residential: High Density | Residential: Med. Density | Residential: Low Density | Mixed-Use     | Parks and Recreational Open Space |
|---|---------------|---------------|---------------------------|---------------------------|--------------------------|---------------|-----------------------------------|
| LU Industrial, inactive site  | Can go here   | Can go here   | Can go here               | Can go here               | Can't go here            | Can go here   | Can go here                       |
| LU Institutional & Civic, except Navy disposition properties                              | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Res High, except Navy disposition properties   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Res Med, except Navy disposition properties  | Can go here   | Can't go here | Can go here               | Can't go here             | Can't go here            | Can go here   | Can't go here                     |
| LU Res Low: 1 unit, building footprint >= 2,000 sq ft, except Navy disposition properties | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Res Low: 1 unit, building footprint < 2,000 sq ft                                      | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| LU Res Low: >1 unit, except Navy disposition properties                                   | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Mixed-Use, except Navy disposition properties  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Other Built, except Navy disposition properties  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Agriculture, except Navy disposition properties  | Can go here   | Can go here   | Can go here               | Can go here               | Can't go here            | Can go here   | Can go here                       |
| LU Parks, except Navy disposition properties  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |
| LU Other Non-Built  | Can go here   | Can go here   | Can go here               | Can go here               | Can go here              | Can go here   | Can go here                       |
| LU Water  | Can't go here | Can't go here | Can't go here             | Can't go here             | Can't go here            | Can't go here | Can't go here                     |

## Scenario Modeling and Probability

After establishing the constraints, in a typical modeling process the next step would be to determine probabilities that a given land use would occur in a given parcel. For example, parcels closer to major roads would have a higher probability of receiving new Commercial allocation than parcels far away from major roads. However, an initial analysis determined that given our demand and constraints, all available land would be consumed, and some demand would still be left over. This realization led to one of the key conclusions of the analysis, which is that the Island will run out of buildable space by 2050 based on current trends and zoning. This also meant that creating probability layers was unnecessary: all land uses were allocated to those areas that could receive them, and the excess demand was accommodated through a variety of methods described below. Generally these included increasing densities in select locations, being more permissive with redevelopment, and loosening some of the zoning constraints. However, the general rules described above in terms of demand and constraints were still near universally applied and accurately reflect the character of each scenario.

## Island Conservation

In addition to allocating land uses, the scenarios also tracked conservation status. The approach for allocating conservation was to begin by imagining the range of plausible future conservation outcomes and identifying

the optimistic and pessimistic bracketing values along that range. The conclusion was that an optimistic scenario would have twice the rate of conservation compared with today, while the pessimistic scenario would have half the rate of conservation compared with today. The pessimistic rate was applied in Scenario 1, while the optimistic rate was applied in Scenario 2, which is consistent with the core narratives of each scenario. The locations of new conservation were determined through a design process with the Aquidneck Land Trust. In Scenario 2, all of the desired conservation parcels were treated as protected right from the beginning of allocation. In Scenario 1, conservation “competed” with development, so they would take turns conserving/developing parcels across the Island until all demand was satisfied. Parcels that were conserved in either scenario would subsequently be eliminated from the pool of available parcels for other allocation categories (except Parks and Recreational Open Space: a parcel that is today unbuilt and unprotected open space could be protected and turned into a park in the scenarios).

## GIS Scenario Files

The GIS scenario files reflect all aspects of the process described above. They include information about constraints, gross and net acreage, new conservation, new residential units, and final land use designations. These fields are defined in the adjacent table.

## GIS FIELD DEFINITIONS

| Field Name               | Description   |
|--------------------------|---|
| CnstrResH                | Indicates whether Residential: High Density is permitted to be allocated on this parcel within the corresponding scenario. “Can’t go here” means it is not permitted; no value means that it is permitted.  |
| CnstrResM                | Same as above except for Residential: Medium Density  |
| CnstrResL                | Same as above except for Residential: Low Density   |
| CnstrMxUs                | Same as above except for Mixed Use  |
| CnstrCom                 | Same as above except for Commercial   |
| CnstrInd                 | Same as above except for Industrial   |
| CnstrParks               | Same as above except for Parks and Recreational Open Space  |
| AcresGross               | Gross parcel acreage. This is the value entered into the Demand Table spreadsheet for Parks and Recreational Open Space as it is allocated within the scenarios.  |
| AcresAvlbl               | Gross parcel acreage minus undevelopable land such as wetlands. Note that AcresAvlbl does not factor in the 30% discount factor applied to residential parcels to account for ROWs, common space, and utilities. That additional reduction in area is accounted for outside of GIS. |
| SqFtAvlbl                | AcresAvlbl converted to square feet.  |
| Sc1Cnsrved or Sc2Cnsrved | Indicates whether this area is placed under conservation within the scenario. Areas that are already conserved today are not indicated as conserved within this column. Possible values are “Yes” and “No”.   |
| Sc1LU_New or Sc2LU_New   | New land use allocated within the scenario. If the land use doesn’t change from current, this value should be NULL.   |
| Sc1DU_New or Sc2DU_New   | New dwelling units whose construction is being simulated within the scenario. This does not include current DUs.  |
| Sc1CmbndLU or Sc2CmbndLU | The final land use in 2050. If the land use stayed the same, it equals whatever it is today; if it changed, it equals the new land use.   |

## Special Cases and Exceptions

As mentioned above, there was inadequate land available to meet demand in both scenarios. Accordingly, some restrictions in the allocation process needed to be relaxed, which are described below. These happened in relatively few instances, were designed intentionally to match real life planning and development dynamics, and did not significantly affect the overall character of the scenarios.

### Scenario 1

- ▶ Areas zoned R-3 did not provide adequate Residential: High Density land, so areas of R-10 were treated as eligible as well. Density in these cases was assumed to be 10,000 square feet per unit.
- ▶ Residential: Low Density was allocated at 87,120 sq ft per unit, even if the zoning density was lower. Without this change, the Residential: Low Density demand could not be accommodated.
- ▶ In a small number of instances, Residential: Low Density and Residential: Medium Density were allowed to replace existing land uses of the same type, but only in cases when the existing house sizes were small compared with the overall size of the lot, attempting to simulate redevelopment probability. Without this change, the demand for these two categories could not be accommodated.
- ▶ It was necessary to increase the density of Residential: High Density in Newport (no higher than R-10) in some cases to accommodate demand.
- ▶ Some areas zoned for industrial uses in Portsmouth and Middletown received Residential: Medium Density. Sites without existing, nearby heavy industrial uses were prioritized as likely locations for residential development.
- ▶ A limited number of existing Residential: Medium Density parcels in Newport were permitted to be redeveloped into Residential: High Density.
- ▶ A handful of other zoning variances were simulated, none being as frequent as the ones described above. These were almost entirely centered around use, not density.

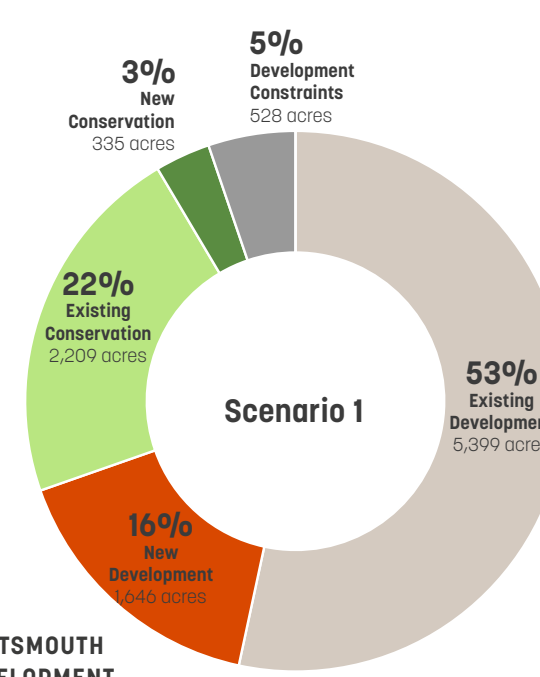
### Scenario 2

- ▶ While zoning was used as a guideline for Scenario 2, several use and density changes were allowed. These are described in the Zoning section of Chapter 5 - Development Impacts. These largely included the conversion of some parcels zoned Commercial or Industrial to Residential: High Density, and the conversion of some Industrial parcels to Commercial uses.
- ▶ In a small number of instances, Residential: Low Density and Residential: Medium Density were allowed to replace existing land uses of the same type, but only in cases when the existing house sizes were small compared with the overall size of the lot, attempting to simulate redevelopment probability. Without this change, the demand for these two categories could not be accommodated.

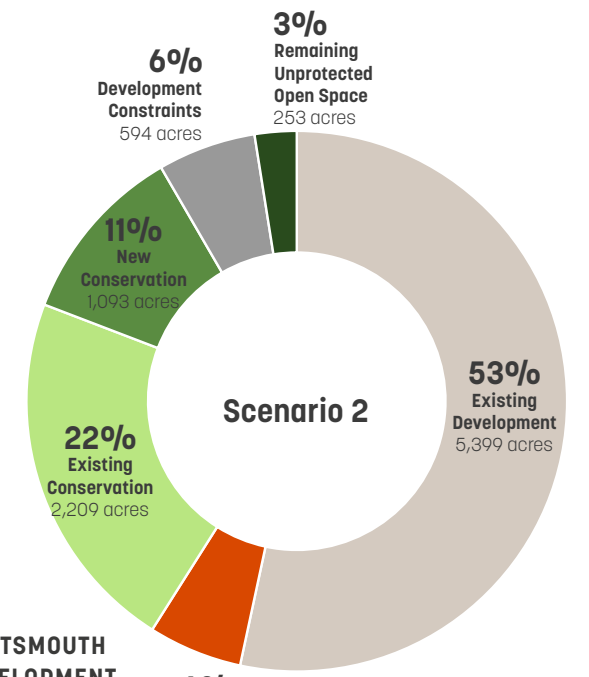
# III. Town-Level Development Summaries

## Portsmouth

In Scenario 1, 16% of Portsmouth's acreage would be covered by new development, adding to the 53% that is already developed. In Scenario 2, only 6% of development would be added, with an additional 11% of land would be conserved through new protection agreements. An additional 3% of the town would remain open space without conservation in Scenario 2.



PORTSMOUTH DEVELOPMENT SUMMARY



PORTSMOUTH DEVELOPMENT SUMMARY



PORTSMOUTH DEVELOPMENT - SCENARIO 1

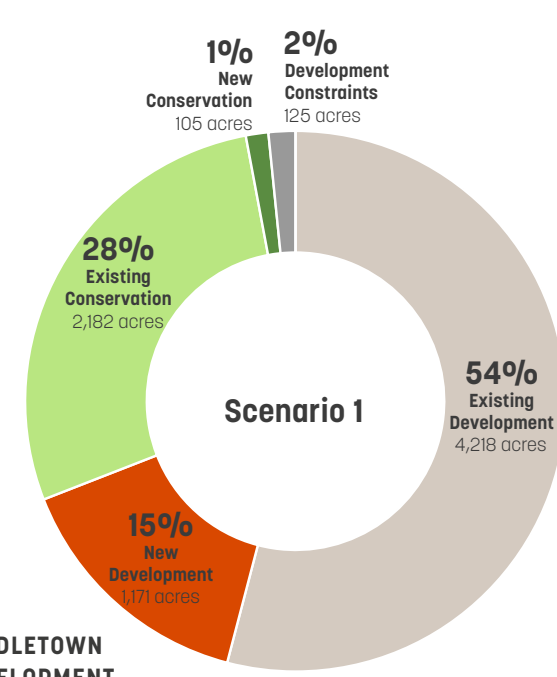


PORTSMOUTH DEVELOPMENT - SCENARIO 2

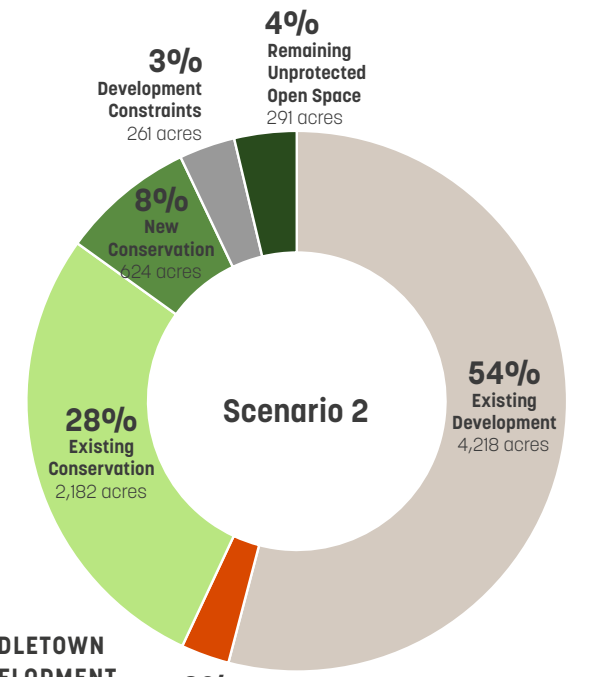
# Town-Level Development Summaries

## Middletown

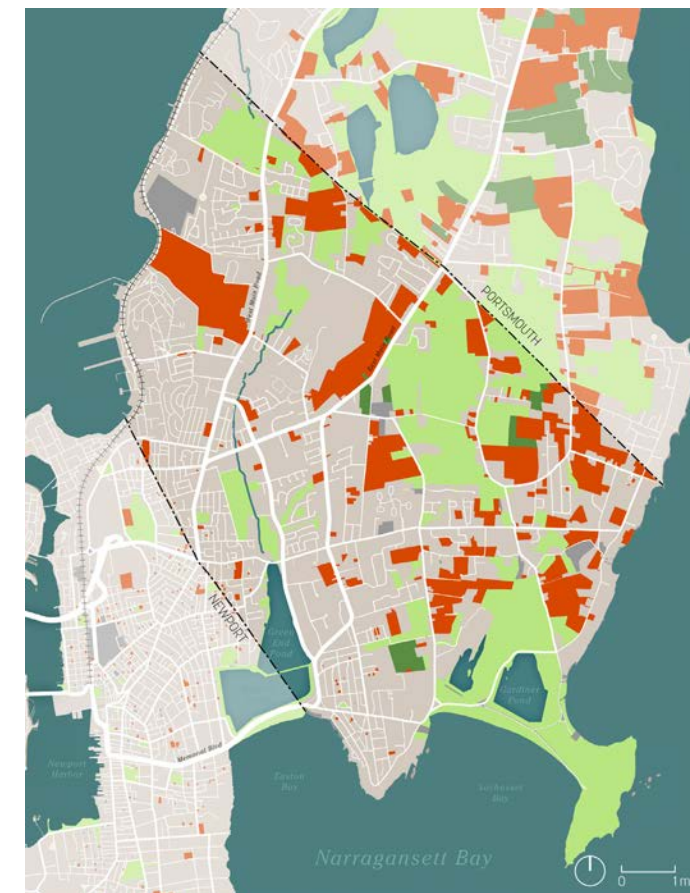
Middletown's development summary is quite similar to Portsmouth's with 54% of existing land developed and additional 15% of land covered by new development in Scenario 1. Scenario 2 would see that new development acreage drop to 3% with 8% protected via new conservation and 4% remaining as unprotected open space.



MIDDLETOWN DEVELOPMENT SUMMARY



MIDDLETOWN DEVELOPMENT SUMMARY



MIDDLETOWN DEVELOPMENT - SCENARIO 1

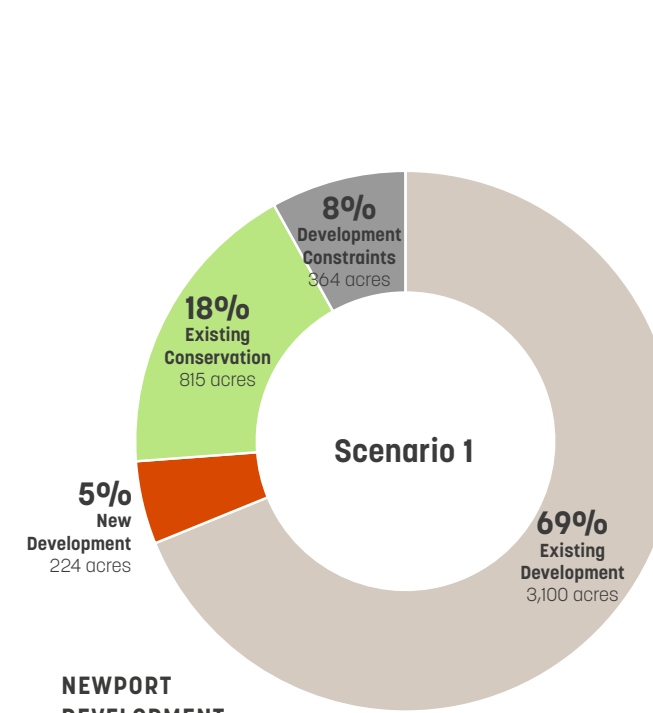


MIDDLETOWN DEVELOPMENT - SCENARIO 2

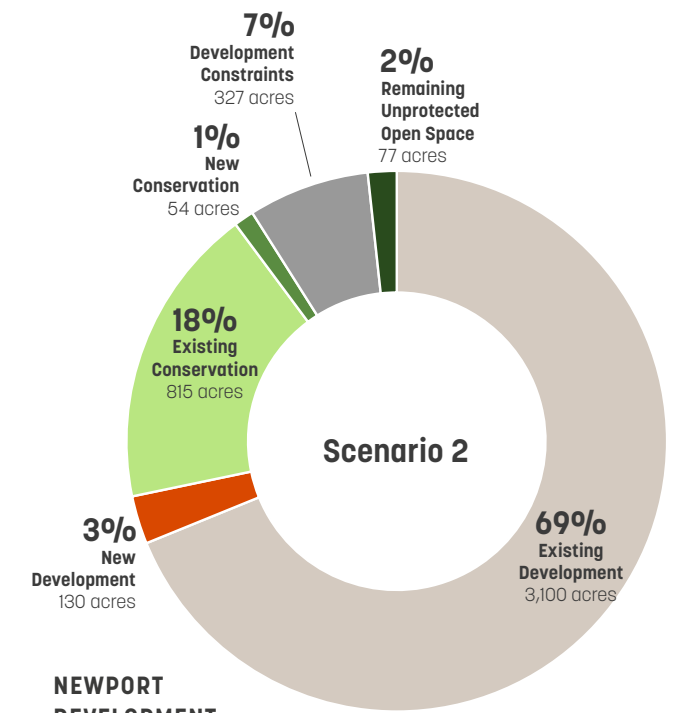
# Town-Level Development Summaries

## Newport

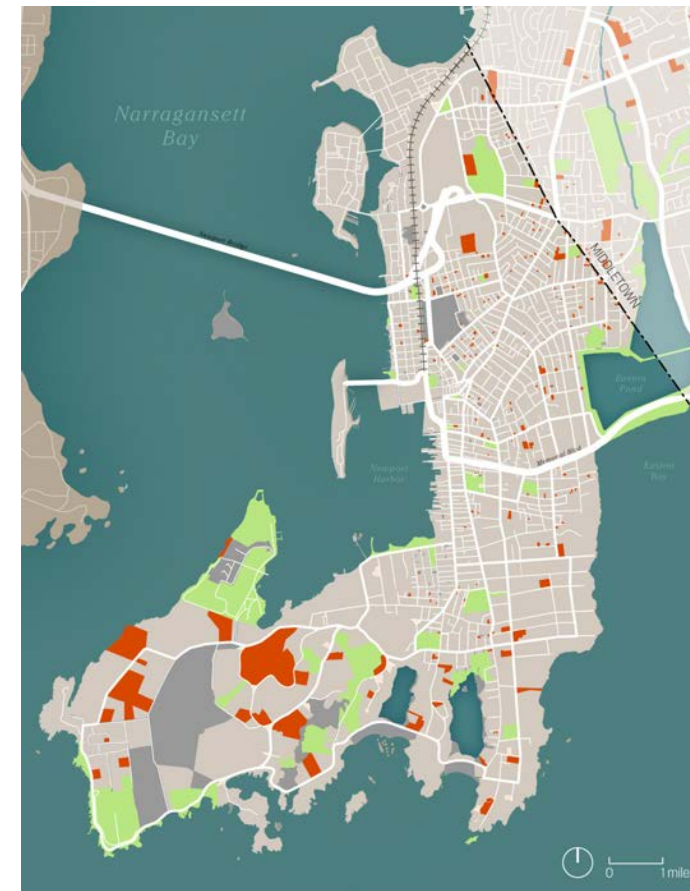
As previously noted, Newport is the most built-out municipality on the Island, with 69% of the city currently developed and 5% covered by new development in Scenario 1. While most open space in the city is already conserved, Scenario 2 would see an additional 5.4 acres (1% of the city's total land) conserved and an additional 2% remaining as open space without conservation.



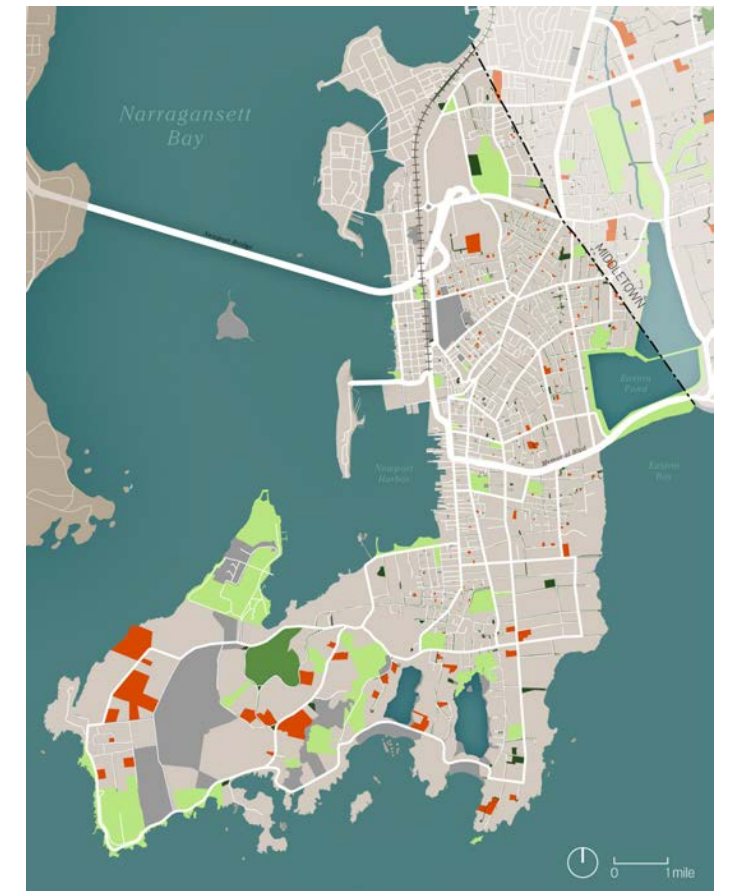
NEWPORT DEVELOPMENT SUMMARY



NEWPORT DEVELOPMENT SUMMARY



NEWPORT DEVELOPMENT - SCENARIO 1



NEWPORT DEVELOPMENT - SCENARIO 2

# IV. Impact Assessment Methodology

## Carbon Storage Analysis

Carbon storage is projected based on the following per-ecosystem carbon density estimates.

### CARBON DENSITY BY ECOSYSTEM

| Ecosystem    | Carbon Density  |
|--------------|-----------------|
| Agricultural | 17.0 MgC / acre |
| Forest       | 51.0 MgC / acre |
| Grassland    | 19.0 MgC / acre |
| Wetland      | 60.7 MgC / acre |
| Other        | 4.1 MgC / acre  |

## Fiscal Impact Analysis

A review of the last several years of municipal budgets for the 3 jurisdictions indicated that the primary difference between the two scenarios would be property tax revenue. Accordingly, the fiscal impact analysis began by looking at the assessed values of each land use category. The following table summarizes the current average assessed values per acre.

### AVERAGE ASSESSED VALUE PER ACRE

| Land Use            | Portsmouth  | Middletown   | Newport      |
|---------------------|-------------|--------------|--------------|
| Agriculture         | \$93,198    | \$183,103    | \$87,258     |
| Commercial          | \$750,939   | \$1,166,917  | \$1,426,096  |
| Industrial          | \$337,646   | \$717,865    | \$717,865    |
| Institutional       | \$627,235   | \$833,381    | \$833,381    |
| Mixed-Use           | \$9,035,267 | \$12,687,028 | \$13,298,603 |
| Other Built         | \$140,612   | \$1,317,598  | \$1,317,598  |
| Other Non-Built     | \$228,862   | \$469,405    | \$350,374    |
| Parks               | \$80,834    | \$974,932    | \$974,932    |
| Residential: High   | \$2,123,132 | \$2,612,649  | \$2,576,533  |
| Residential: Low    | \$338,173   | \$328,154    | \$551,377    |
| Residential: Medium | \$903,527   | \$1,268,703  | \$1,329,860  |

The new acreage composition for the scenarios was then calculated, which included both newly added acres as well as acres of previous land uses that were lost. These net increases/decreases were multiplied by the current tax rates for each of the jurisdictions to provide an initial estimate of additional tax revenue. The following table summarizes the per-acre tax rates that were used in the analysis.

### PER ACRE TAX RATES

| Land Use    | Portsmouth | Middletown | Newport |
|-------------|------------|------------|---------|
| Commercial  | \$15.97    | \$18.20    | \$14.98 |
| Residential | \$15.97    | \$13.75    | \$9.99  |

In Scenario 1, the character of each allocated land use category is roughly equal to its current incarnation today, meaning an acre of new Mixed-Use in Scenario 1 will be essentially the same as an acre of Mixed-Use today. In Scenario 2, the average densities and design character of several of the categories changed, which resulted in a value multiplier being added to the per acre values. For example, an acre of new Mixed-Use in Scenario 2 is significantly more dense and has more program than an acre of Mixed-Use today. To accommodate these differences, a multiplier of 2 was applied for Mixed-Use and a multiplier of 1.4 was applied for Residential: High Density. These multipliers were selected based on literature review of the correlation of land use, density, and land value across the US. As a way to validate this approach, it was confirmed that the ratios of existing land values per use category were consistent with the data used to extrapolate new multipliers.

## Transportation

The analysis started by identifying commute destinations, or nodes, which are concentrations of jobs, schools, services, and/or retail. These are the places that account for the

majority of car trips taken by residents. The location of these nodes was determined by using a kernel density analysis on commercial and institutional parcels in GIS.

A cost distance calculation was then performed to estimate drive times, and the assumed speeds were based on existing GIS road vector data. Zonal statistics was used to apply cost distance values to the parcels, using the minimum value per parcel to simulate the fact that most cars are parked near roads and driveways. These values were multiplied by the number of housing units to account for multi-family housing. The team then calculated the average drive time per household to the nearest node.

The outcome of the analysis is identical for Middletown and Newport. Even if a new development sprawls out further than an infill development closer to one of the nodes, the drive time distances are not significant enough to register across the entire community. The increase for those households might be 1 or 2 minutes, but averaged out across the jurisdiction, commutes remain the same. The difference, obviously, is with Portsmouth. This is due to the emergence of a significant commercial node in Scenario 2 that otherwise does not appear in Scenario 1. To the extent that Portsmouth residents would replace trips to Middletown and Newport to work, shop, etc., in this new node, this model outcome is realistic—the density of commercial development in Scenario 2 essentially creates a new Portsmouth “town center.”

# V. Project Fact Sheet

## What does the future hold for AQUIDNECK ISLAND?



Aquidneck Island is at a critical moment in its history. While our population has remained constant over the past 30+ years, the Island continues to develop rapidly, adding over **6,200 new units since 1980**, most of which has been in the form of suburban sprawl. If we continue on this path, **all of our unprotected open space will be developed by 2050!** Once this land is developed, it will be gone forever.

The images below compare the Island today and the Island in 2050 if current sprawl trends continue. The red buildings represent new development based on existing zoning and current real estate demand. This development trend will result in additional water pollution, beach closures, traffic congestion, the loss of iconic open space views, farms being replaced by subdivisions, reduced outdoor recreation opportunities, greenhouse gas emissions, and more.



### 2050 If Sprawl Continues

**5,000**

Nearly 5,000 new housing units will be built, mostly in suburban-style subdivisions.

**100%**

100% of unprotected farms, woods, and other open spaces will be lost to development.

**8,000**

Over 8,000 new vehicles will occupy the Island's roads, increasing traffic congestion.



## A BETTER PATH FORWARD

It is not too late for the Island to change course and prevent the negative impacts of current sprawl trends. Through a combination of well-funded conservation and alternative development policies, the Island can preserve its landscape heritage while accommodating the same level of real estate demand and economic growth.

### Example Site 1 - Portsmouth Cropland

Sprawl threatens our cropland; conservation can protect the Island's agricultural assets.



### Example Site 2 - Portsmouth Roadside Farm

New developments can also block pristine views; conservation can preserve them.



### 2050 If We Plan & Protect

**70%**  
70% less land will be developed.

**87%**  
87% of existing farmland will remain.

**8%**  
8% more tax revenue than if current sprawl trends continue.

### 2050 Aspirational Conservation

Existing Conservation  
Proposed Conservation



### "Plan & Protect" vs "Sprawl Continues"

An alternative "Plan & Protect" future for the Island was rigorously modeled and analyzed along with the "Sprawl Continues" future. The Plan & Protect future assumes the **same number of housing units** as the Sprawl Continues future, but with two very critical differences:

1. It proposes a **robust, well-funded conservation** program that protects 1,800 acres of farmland and open space by 2050, shown on the map to the left.
2. It envisions a mixed style of housing development that offers greater consumer choice and the transformation of underutilized urban areas into high-quality, compact, walkable town centers, sometimes called **"Smart Growth"**.

By choosing Plan & Protect, the Island can still accommodate the same level of growth with **greater fiscal sustainability** while reducing the negative impacts of development on water, recreation, agriculture, and quality of life. This ensures that future generations can continue to enjoy Aquidneck Island's **treasured landscape and quality of life in perpetuity**.

### Smart Growth Development

"Smart Growth" development policies - which prioritize compact footprints, a mix of uses, and pedestrian-friendly designs - can transform existing strip malls into vibrant town centers to support new residents while contributing to the charming character of the Island.

### Example Site 3 - Middletown Strip Mall Transformation



### How do I get involved?

**Contribute to Conservation Funding** - A donation to the Aquidneck Land Trust supports conservation efforts across Aquidneck Island.

**Protect Your Land** - Get in touch with the Aquidneck Land Trust for opportunities to conserve open spaces on your property.

**Support Smart Growth** - Advocate for Smart Growth strategies that promote infill redevelopment in order to shift demand away from suburban sprawl.

## VI. Public Program

On August 14, 2019, the Aquidneck Land Trust (ALT) and Sasaki hosted a Public Program at the Hilton Newport in Middletown to share draft findings and solicit public feedback on the Development Impact Study. The event attracted over 100 attendees. The agenda included a presentation, live public polling, facilitated round-table discussions, an open comment and Q&A period, and a screening of ALT's recently completed video highlighting key conservation issues for the Island.

### Presentation

The Program began with opening remarks that introduced the Study and contextualized it within ALT's broader mission. The Sasaki team then presented the primary findings of the Study. The presentation included an overview of the scenario-based approach, a summary of the two different development scenarios, a walk-through of the indicators, and key takeaways. Topics covered included Island growth trends, scenario visualizations, watershed analysis, impacts on agriculture, watershed analysis, and fiscal impacts.

### Public Sentiment Poll

Immediately following the presentation, a live, mobile phone-based poll was conducted to gauge public sentiment in response to the following three questions:

1. Are you concerned about the impacts of development on Aquidneck Island if current trends continue?
2. Do you think it's important to protect this Island's farmland and natural open spaces?
3. Which development scenario do you prefer?

Based on the 88 responses received for each question, an overwhelming majority of Program participants (89%)

indicated that they were very concerned about future development impacts. A similar majority (88%) agreed that farmland and natural open spaces should be protected. A smaller majority (67%) expressed a preference for the development policies reflected in Scenario 2, while 15% wanted to see a third alternative and 17% wanted more information. **The responses to the polling questions indicate strong community support for open space conservation and a change from the status quo development policies.**

Complete polling response data is shown on the next page spread.

### Round-table Discussion

Following the polling exercise, participants were engaged in a series of round-table discussions, with each table led by a facilitator, which included ALT staff and Board members, Sasaki planners, and other volunteers. Each group was prompted to respond to five key questions, though flexibility was encouraged to catalyze more free flowing conversations. Responses to the five questions are documented below.

#### 1. WHAT ARE YOUR INITIAL REACTIONS TO THE PRESENTATION YOU JUST SAW?

Participants largely appreciated the depth of information shared during the presentation. They pointed to the clarity that the maps, charts, and visualizations brought to the issues. Many voiced surprise and confusion at the increase in building permits despite flat population, and noted concern surrounding the growth of the second home market. Several participants indicated a desire to build on the momentum of the study to advance planning and regulatory action aimed at preventing the dire impacts predicted in Scenario 1.

**Right:** Participants sign-in at the Public Program and are handed a one-page "fact sheet" highlighting important findings of the Impact Study as well as ways to get involved with the Land Trust.

**Below:** Jill Dixon, Associate Principal at Sasaki, presents the findings of the Impact Study to the participants.



**2. HOW CONCERNED ARE YOU GENERALLY ABOUT THE IMPACTS OF DEVELOPMENT ON AQUIDNECK ISLAND?**

Participants voiced a genuine concern for potential development impacts on the finite resources of the Island, especially those related to water quality, traffic, and affordability. Several participants highlighted that the Island’s open space was one of the main reasons they moved to the community, as well as a key draw for tourists, and felt strongly that it must be protected. Others pointed to specific recent developments as illustrations of the need for better growth management.

**3. WHAT ARE THE 1-2 SPECIFIC DEVELOPMENT IMPACTS THAT MOST CONCERN YOU?**

Participants across tables pointed to many of the same key impacts, with water quality and traffic topping the list. Loss of farmland, heat island effect, sea level rise, sewer infrastructure, and the Island’s physical character were also discussed. In addition, many participants raised concerns about affordability, especially for seniors.

**4. DO YOU SUPPORT THE STYLE OF DEVELOPMENT DEPICTED IN SCENARIO 2?**

Nearly all tables expressed a desire for more information related to the vision of any potential mixed-use development. Many participants generally indicated support for the greater housing diversity and selective mixed-use, town center style of development shown in Scenario 2, especially when compared to the sprawling suburban style of development shown in Scenario 1. They pointed to Scenario 2’s stronger sense of community, its inherent walkability, and its ability to allow for additional open space in undeveloped areas. Still, some participants voiced concern over the ability to ensure a high quality of design in such developments, questioned the demand for the retail needed to support these town centers, and expressed skepticism at the demand for living in the denser unit types shown in the rendering. They also highlighted the uphill battle required to adjust local zoning and building regulations in order to implement this kind of development.

**5. CLOSING COMMENTS**

Participants concluded by expressing appreciation for the Public Program and the information shared during the event. Many indicated a desire to move towards next steps, including broader communication of the study and organization of cross-Island planning initiatives. Others noted skepticism of the popularity of mixed-use development, and highlighted that ALT should continue to pursue its key mission of conservation.

**Open Comments and Q&A**

The open comment and Q&A period offered participants the opportunity to raise issues not covered during the round-table discussions. Highlights from this session included:

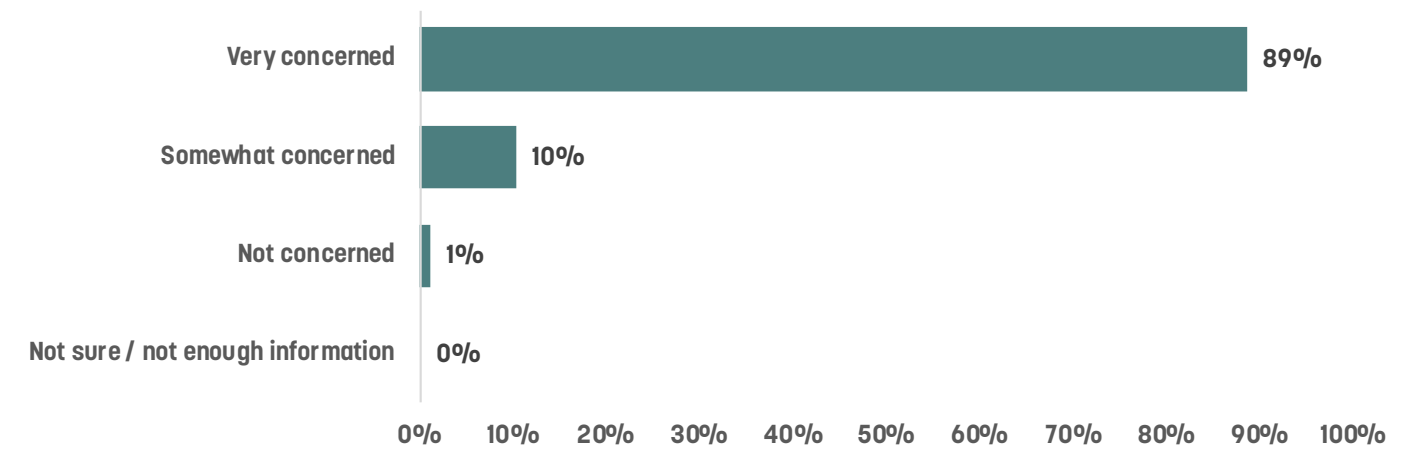
- ▶ Clarification of increasing building permits vs. flat population growth - the Sasaki team indicated that while this disparity was not studied in depth, potential causes could be shrinking household sizes, increases in second homes, and the effects of vacation rentals.
- ▶ The limited potential of higher density development in Portsmouth due to the lack of a central sewer system.
- ▶ A general sense of urgency from the participants to keep the momentum of the study going and begin Island-wide organizing and planning.

**Video Screening**

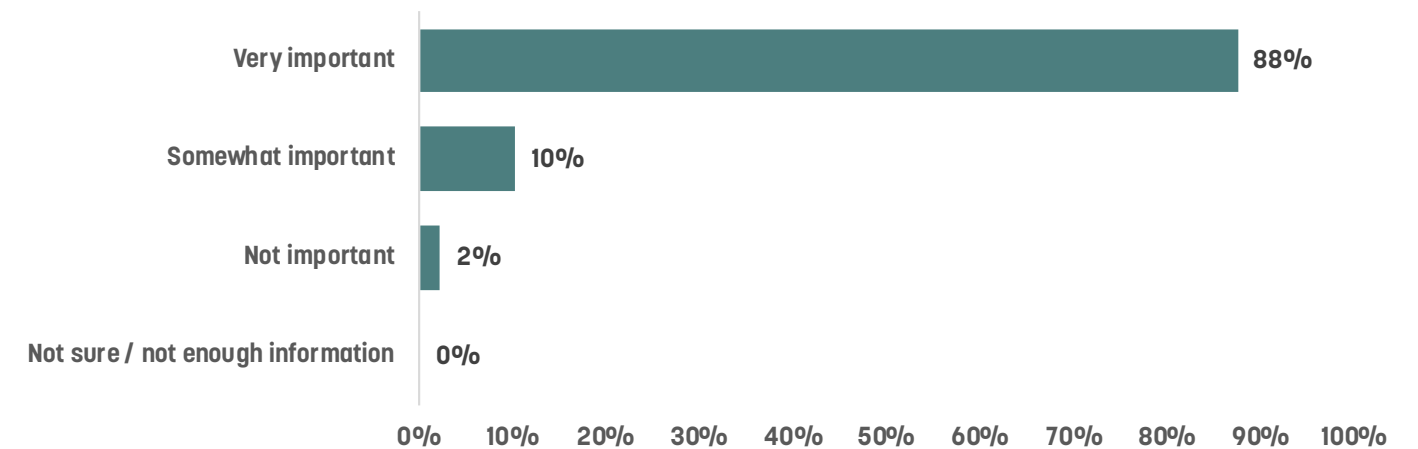
The Public Program concluded with a screening of ALT’s latest advocacy video, which combined interviews with Island residents and conservationists, along with key facts and figures from the Impact Study. Based on the positive reaction to the video from participants, it will prove an important tool in sharing the mission of the Land Trust and spurring action from the public.

**Below:** Charts quantifying responses to each of three questions posed in the texting-based polling exercise.

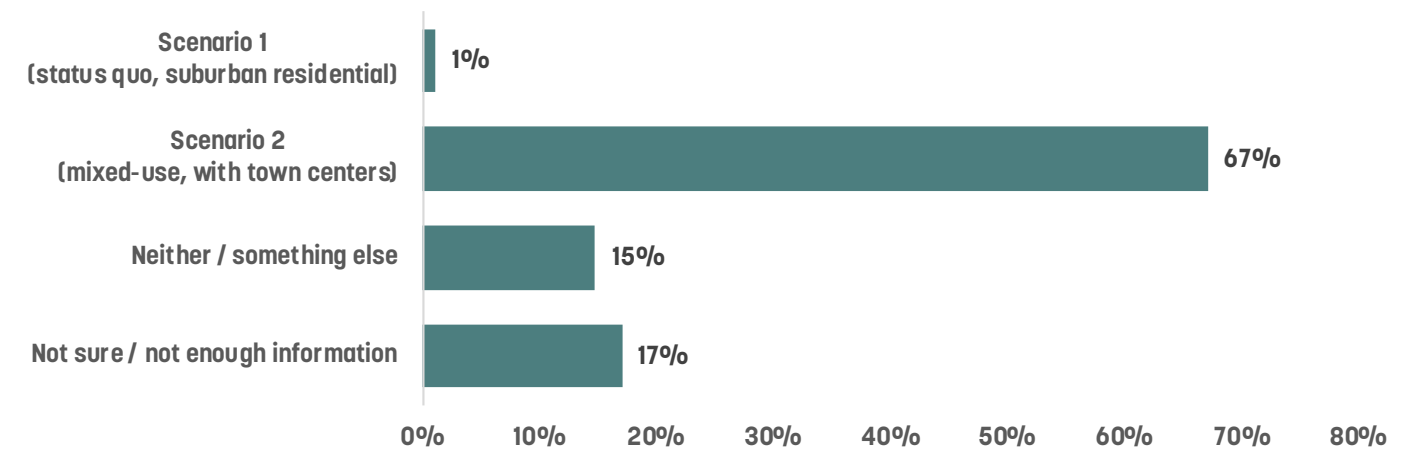
**QUESTION 1: ARE YOU CONCERNED ABOUT THE IMPACTS OF DEVELOPMENT ON AQUIDNECK ISLAND IF CURRENT TRENDS CONTINUE?**



**QUESTION 2: DO YOU THINK IT’S IMPORTANT TO PROTECT THE ISLAND’S FARMLAND AND NATURAL OPEN SPACES?**



**QUESTION 3: WHICH DEVELOPMENT SCENARIO DO YOU PREFER?**





**Left:** Participants pin preferred locations for future conservation on a map.

**Opposite:** A digitized version of the pin-based preferred future conservation map.

**Below:** Aquidneck Land Trust Executive Director, Chuck Allott, facilitates a round-table discussion with participants.



# VII. GIS Data Inventory

| File Name                         | Source  |
|-----------------------------------|---|
| AgParcels2019                     | ALT   |
| BoundariesAquidneckIsland         | RIGIS   |
| BoundariesAquidneckJurisdictions  | RIGIS   |
| BoundariesMiddletown              | RIGIS   |
| BoundariesNewport                 | RIGIS   |
| BoundariesPortsmouth              | RIGIS   |
| BoundariesPortsmouthIslands       | ALT   |
| BoundariesRI_NoAquidneck          | RIGIS   |
| BuildingFootprints                | ALT   |
| BusRoutes                         | ALT   |
| BusStops                          | ALT   |
| CoastalBarrierResourcesSystem2015 | ALT   |
| ConservationLandALT2018           | ALT   |
| ConservationLandNonALT            | ALT   |
| ContoursMiddletown                | ALT   |
| ContoursNewport                   | ALT   |
| ContoursPortsmouth                | ALT   |
| FarmConservationPriorities2017    | ALT   |
| FloodZonesALL                     | FEMA via ALT  |
| FloodZonesSFHA                    | FEMA via ALT  |
| LandUseAquidneck2011              | Photo Science Inc., RI DEM, RI Statewide Planning Program |
| LandUseRhodelsland2011            | Photo Science Inc., RI DEM, RI Statewide Planning Program |
| OpenSpaceInventoryAIPC2011        | AIPC  |
| ParcelsAll                        | Merge of 3 separate parcels files                         |
| ParcelsMiddletown2017             | ALT   |
| ParcelsPortsmouth2017             | Portsmouth Planning Office                                |
| ParcelsNewport2018                | Newport Planning Office                                   |

| File Name                             | Source                     |
|---------------------------------------|----------------------------|
| ParcelsMiddletown2018                 | Middletown Planning Office |
| Rail2010                              | RIGIS                      |
| RoadsAquidneck2010                    | RIGIS via ALT              |
| RoadsRhodelsland2010                  | RIGIS via ALT              |
| Scenario2ConservationNetwork          | ALT                        |
| ScenarioFocalAreas                    | ALT                        |
| Shoreline                             | RIGIS                      |
| Soils                                 | USDA via ALT               |
| Streams2012                           | RIDEM via ALT              |
| SubdivisionsProposed2019              | ALT                        |
| SurfaceWater2012                      | RIDEM via ALT              |
| Trails2018                            | ALT                        |
| ViewshedPoints                        | ALT                        |
| WatershedsDrinkingWaterCatchmentAreas | RIGIS via ALT              |
| WatershedsHUC12                       | RIGIS via ALT              |
| Wetlands                              | USFWS NWI via RIGIS        |

