

Non-Driver Opportunity Analysis

The Strategic Co-Positioning of
Transportation, Activity Locations, and Housing
to Improve Non-Driver Mobility in Hampton Roads



June 2009



T09-02

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NON-DRIVER OPPORTUNITY ANALYSIS

THE STRATEGIC CO-POSITIONING OF TRANSPORTATION, ACTIVITY LOCATIONS, AND HOUSING TO IMPROVE NON-DRIVER MOBILITY IN HAMPTON ROADS

This report was included in the Work Program
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ABSTRACT

This is the seventh report from a multi-year effort to improve the mobility of non-drivers in Hampton Roads. Having measured—earlier in the effort—the impact which proximity to activities and bus routes have on the mobility odds of non-drivers, in this report staff uses mobility odds to measure the success of localities' co-positioning of activity locations, bus routes/stops, and residences favored by non-drivers. Specific successes and prospects in the proximity of these three are identified. In addition, this report visually examines the proximity of non-drivers and bike/ped facilities, pointing out successes and prospects in that arena as well. Local government can use the findings of this report to identify prospects for modifying land use and investing in bus, bicycle, and pedestrian infrastructure to improve non-driver mobility.

ACKNOWLEDGEMENTS

This report was prepared by the Hampton Roads Transportation Planning Organization (HRTPO) in cooperation with the Federal Highway Administration (FHWA) and the Virginia Department of Transportation (VDOT). The contents of this report reflect the views of the Hampton Roads Transportation Planning Organization (TPO). The HRTPO staff is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the FHWA, VDOT, or HRPDC. This report does not constitute a standard, specification, or regulation. FHWA or VDOT acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

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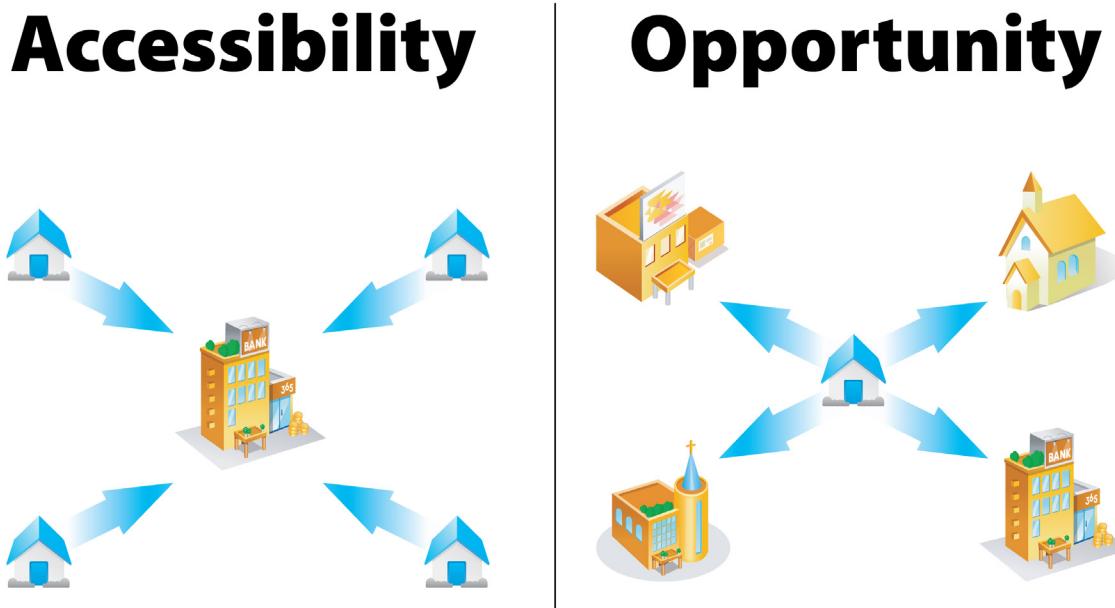
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INTRODUCTION

DEFINITIONS

“Non-driver” as used in this report refers to a person who does not consider them self to be a driver. The usage of this term comes from the National Household Travel Survey in which persons are simply asked “Are you a driver?”. It is assumed that non-drivers—for whatever reason: physical, financial, legal—do not have a drivers license and therefore *cannot* currently drive. In this report, non-drivers are at least 18 years of age and live in households.

Accessibility vs. Opportunity



Source: accessibility-opportunity.jpg

“Opportunity” as used in this report refers to travel opportunity, a characteristic of the combination of a specific location and a type of person which indicates that person’s prospects for reaching various destinations from that origin. Such opportunity is made possible by the starting location being proximate to activity locations enabling them to be reached by walking, and/or the starting location being proximate to transportation systems (bus, highway, etc.) joining it to activity locations. In this “non-driver opportunity analysis”, the travel opportunity provided to non-drivers at each of the 20,000 blocks in Hampton Roads is analyzed based on nearby activity locations, bus stops, and bike/ped facilities.

“Co-positioning” as used in this report means simply to place things near each other.

OVERVIEW OF MULTI-YEAR STUDY

This document is the seventh in a series of non-driver documents emanating from work begun by HRTPO staff in 2003. The first non-driver document (published June 2005) examined improvements to the mobility of elderly non-drivers using the National Household Travel Survey (NHTS).¹ It revealed that:

- elderly non-drivers travel half as much as elderly drivers, but
- elderly non-drivers living in denser areas have higher mobility due to walking and bus usage.

The second document (published November 2006) examined non-drivers age 18-64 again using the NHTS.² It revealed that:

- 18-64 non-drivers also make half as many trips as their driving counterparts,
- the mobility of 18-64 non-drivers living in central areas is significantly higher than those living in other areas, and
- walking and use of public transit give non-drivers in central areas this higher mobility.

It was concluded in these first two documents that living near destinations and having access to public transit causes the higher non-driver mobility observed in dense areas and central areas. But due to the structure of the NHTS survey, neither study was able to directly measure the mobility impact of living near transit and living within walking distance of destinations. Therefore, a local survey was designed, implemented, and analyzed to measure these factors. A third document (published June 2007) presented a statistical snapshot of local non-drivers based on data from the survey.³

A fourth document (published June 2007) presented a model—developed from the local survey—which indicated numerically the factors which determine non-driver mobility.⁴ That mobility model revealed that:

- better-walking non-drivers living in the high activity locations in urban and suburban areas of Hampton Roads have odds of leaving home five (5) times higher than the odds of those living away from activities, and
- better-walking non-drivers living near a bus stop have odds of leaving home two (2) times higher than the odds of those living away from bus stops.

¹ Robert B. Case, *Improving Elderly Transportation Using the NHTS* (Chesapeake, Va.: Hampton Roads Planning District Commission, June 2005).

² Robert B. Case, *Improving the Mobility of Non-Drivers Age 18-64 Using the NHTS* (Chesapeake, Va.: Hampton Roads Planning District Commission, November 2006).

³ Robert B. Case, *Snapshot of Non-Drivers in Hampton Roads* (Chesapeake, Va.: Hampton Roads Planning District Commission, June 2007).

⁴ Robert B. Case, *Improving the Mobility of Non-Drivers Using Proximity to Destinations and Bus Routes* (Chesapeake, Va.: Hampton Roads Planning District Commission, June 2007).

The fourth document presented recommendations to local governments, developed from these findings, for improving the mobility of local non-drivers, including:

1) furthering the location of mobility-enhancing infrastructure near non-drivers:

- locating bus routes near concentrations of residences
- locating government facilities near concentrations of residences
- using zoning authority to ensure that adequate numbers of activity locations (businesses, institutions, etc.) are allowed to be built near concentrations of residences

2) furthering the location of housing near mobility-enhancing activity areas:

- using zoning authority to ensure that adequate numbers of residences are allowed to be built in High Business Activity Locations

A fifth document (published June 2007) applied the findings of the fourth document to three specific neighborhoods in Hampton Roads.⁵ In addition to recommendations concerning deficiencies in neighborhood pedestrian and bus networks, recommendations were made based on the neighborhoods' proximity to activity locations. Additional residential units were recommended for areas proximate to activity locations; additional businesses were recommended for areas away from activity locations.

In the sixth document (published June 2008), a method of locating the residences of non-drivers in Hampton Roads was developed in order that local government could place bus routes, activity locations, and bicycle and pedestrian facilities near those residences.⁶ Both successes and prospects for improvement in the proximity of non-drivers, bus routes/stops, and activity locations were identified by locality.

⁵ Andy Pickard, *Improving the Mobility of Non-Drivers: Neighborhood Gaps Analysis* (Chesapeake, Va.: Hampton Roads Planning District Commission, June 2007).

⁶ Robert B. Case, *The Location of Non-Drivers in Hampton Roads* (Chesapeake, Va.: Hampton Roads Metropolitan Planning Commission, June 2008).

STUDY PURPOSE

This seventh non-driver study applies the statistical findings from the survey of 800 local non-drivers from the fourth non-driver study to every part of Hampton Roads to help local government improve non-driver mobility in each locality. The first of the two mobility models presented in the fourth study—the Lesser Walkers Model—contained variables (e.g. health and income) which are beyond the expertise of TPO staff. The second model from the fourth study—the Better Walkers Model—contains, however, one transportation and one land use variable on which local government has a direct impact. This seventh non-driver study, therefore, applies the statistical findings for these transportation and land use variables to every part of Hampton Roads to help local government improve the mobility of their better-walking non-drivers.

As shown in the fourth non-driver study proximity to activity locations and proximity to a bus stop improve the mobility of better-walking non-drivers:

- Better-walking non-drivers living in the high activity locations in urban and suburban areas of Hampton Roads have odds of leaving home five (5) times higher than the odds of those living away from activities.
- Better-walking non-drivers living near a bus stop have odds of leaving home two (2) times higher than the odds of those living away from bus stops.

The zoning decisions of local government determine, in part, the positioning of activity locations and residences favored by non-drivers; the budgeting and planning decisions of local government—in cooperation with local transit agencies—determine the location of bus routes/stops. Local governments have been taking steps to place bus routes/stops, activity locations, and residences favored by non-drivers in proximity to each other for decades. In order to improve their efforts, an understanding of the effectiveness of past efforts, and an understanding of the specific location of successes, and prospects for success, is needed.

The purpose, therefore, of this seventh non-driver study is to:

- 1) provide local government with a measure of the effectiveness of their efforts to supply travel opportunity to non-drivers by placing residences favored by non-drivers, bus routes/stops, activity locations, and bicycle/pedestrian facilities near each other, and
- 2) provide local government with an improved identification of specific successes and prospects for success in the proximity of residences favored by non-drivers, bus routes/stops, activity locations, and bicycle/pedestrian facilities.

Where efforts have been effective, local government can redouble those efforts. Where prospects exist, local government can use its zoning and budgetary powers to modify land use and invest in bus, bicycle, and pedestrian infrastructure to improve non-driver mobility.

Co-Positioning Activity Locations, Bus Routes/Stops, and Non-Driver Residences



Source: OpportunityLogo.png

STUDY METHODOLOGY

In order to remove subjectivity from the analysis, this study numerically measures local efforts to co-position bus routes/stops, activity locations, and residences favored by non-drivers by performing a calculation on each of the 20,000 blocks⁷ in Hampton Roads. In order to directly measure the effectiveness of co-positioning efforts, this study calculates the actual effect which nearby activity locations and bus stop have on mobility—a mobility odds factor—for each of the 20,000 blocks in Hampton Roads.

A mobility odds factor is a number which indicates the degree to which nearby activity locations and bus stop increase the odds of a better-walking non-driver leaving the home on a given day. For example, a block having a mobility odds factor of 3.5 indicates that, all other things being equal, a better-walking non-driver will have odds of being mobile 3.5 times higher living in that block than living in a rural block without nearby activity locations or bus stop. Therefore, a given non-driver who would have 2:1 odds (i.e. 67% chance⁸) of leaving home if living in a rural area (based on non-geographic factors—age, family structure, vehicles in household, etc.), would have 7:1 odds⁹ (i.e. 88% chance¹⁰) of being mobile when living in the block with mobility odds factor of 3.5.

⁷ The US Census defines blocks for the entire nation, typically being an area surrounded, but not subdivided, by roads.

⁸ $2 / (1+2) = 0.67$

⁹ $2 * 3.5 = 7$

¹⁰ $7 / (1+7) = 0.88$

METHOD OF MEASURING OPPORTUNITY- THE CALCULATION OF GEOGRAPHY-BASED MOBILITY ODDS FACTOR

The mobility odds factor—used in this study to measure and inform local efforts to composition bus routes/stops, activity locations, and residences favored by non-drivers—was calculated using the non-driver mobility model developed in the fourth non-driver study. That mobility model revealed that the odds of a better-walking non-driver being mobile on a given day:

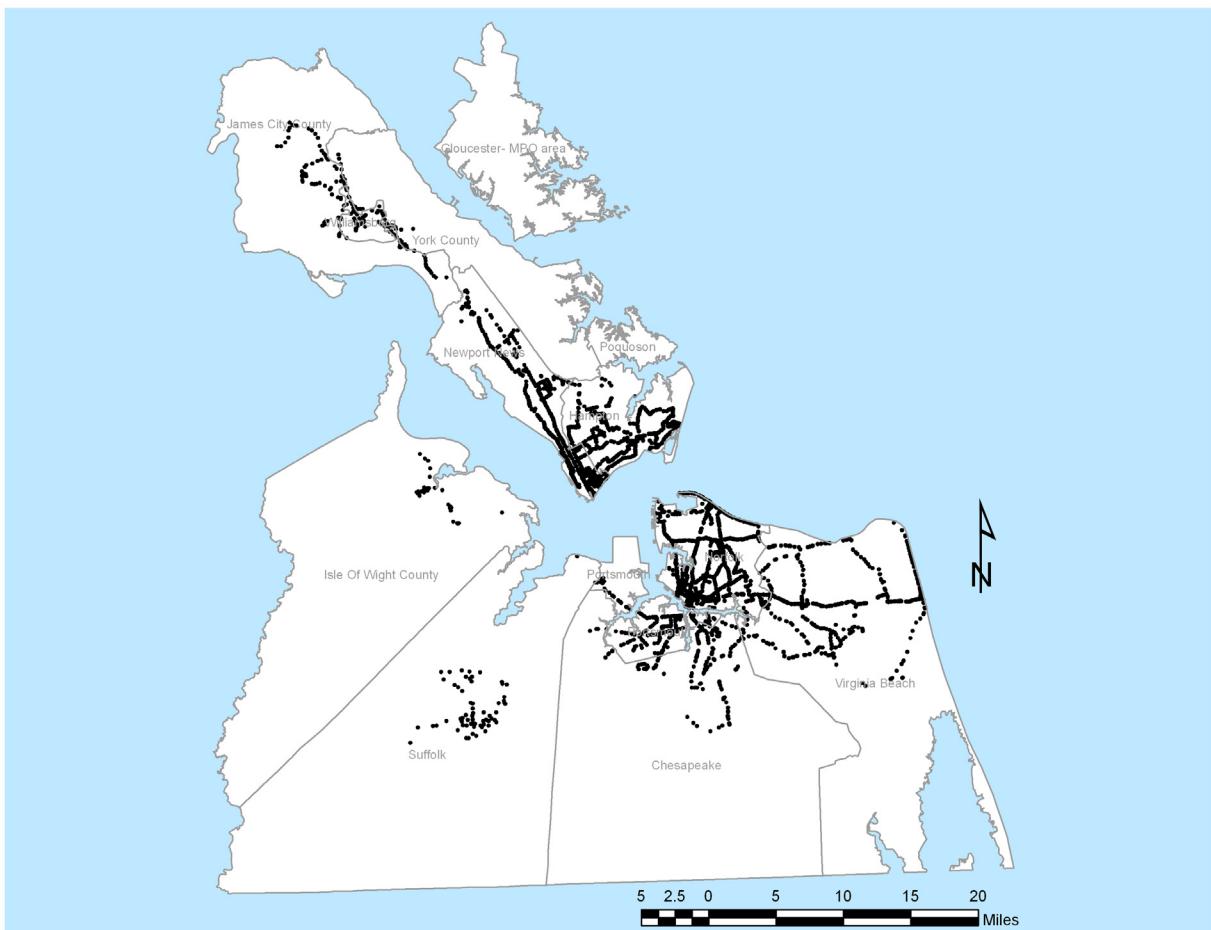
- increase by a factor of 1.19 for every 1,000 Activity Location Units¹¹ (ALUs) within one half-mile of the non-driver residence (measured directly, i.e. “as the crow flies”), and
- increase by a factor of 2.15 if the non-driver residence is within one mile of a bus stop (measured along the roadway network).¹²

Therefore, calculations were made for each of the 20,000 blocks in Hampton Roads to determine the number of ALUs within one half-mile and whether or not the block is within one mile of a bus stop.

¹¹“Activity Location Units”, a measure of the attractiveness of a location, is equal to the number of employees for non-retail establishments, and equal to three times the number of employees for retail establishments.

¹² These distances, half-mile and one mile, were chosen automatically by regression software from a set of candidate distances (quarter-mile, half-mile, one mile) as the distances which best statistically explain the mobility of the non-drivers surveyed. Separate analysis of survey results confirmed that use of bus is fairly consistent up to one mile for non-drivers in Hampton Roads, confirming the regression result and revealing the great need for—and value of—bus transit in the non-driver community. See “Improving the Mobility of Non-Drivers Using Proximity to Destinations and Bus Routes”, Hampton Roads Planning District Commission, June 2007, pg’s 21, 22. This one mile mobility influence distance should not be confused with the industry-standard quarter mile transit planning distance. Note also that the earlier research, and therefore this application thereof, treats all bus stops equally, regardless of frequency and hours of service. It is assumed, however, that the real mobility influence of service with higher frequency and more service hours is greater than that of service with lower frequency and fewer service hours.

Bus Stops, Hampton Roads

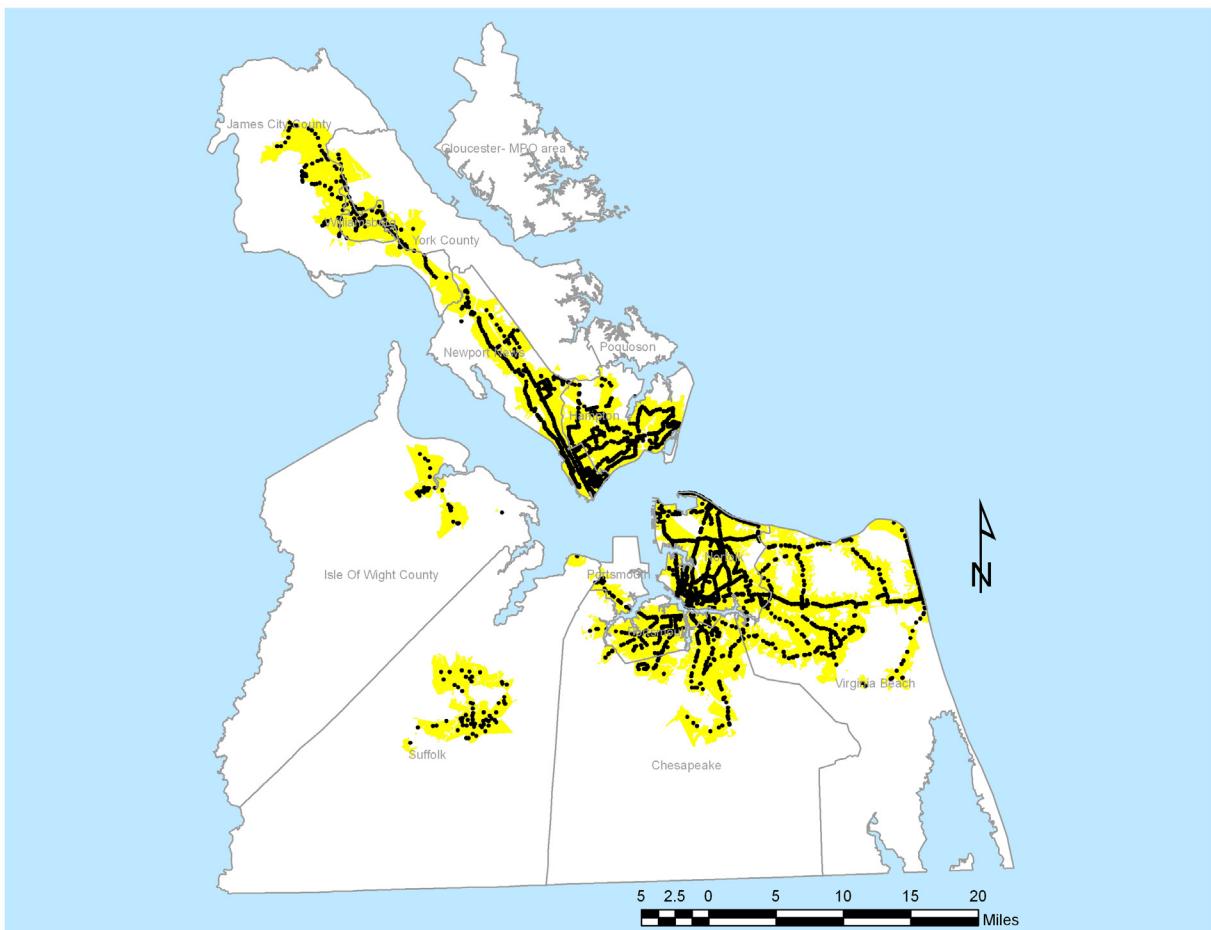


Source: Bus Stops- size 2.jpg

To determine which blocks in Hampton Roads provide bus-based mobility, bus stops were located using data obtained in 2006 from local transit agencies for the fourth non-driver study, updated for Suffolk and Isle of Wight.

Blocks within one mile (via roadway) of a bus stop were determined using GIS software. Based on a visual examination of anomalies in the resulting map, i.e. blocks which appeared to be inappropriately included or excluded from the bus mobility influence area, discretion was used to improve the data by adding or dropping blocks to be considered near a bus stop. Less than 1% of blocks were affected by this adjustment.

Blocks Enjoying Bus-Based Mobility, Hampton Roads

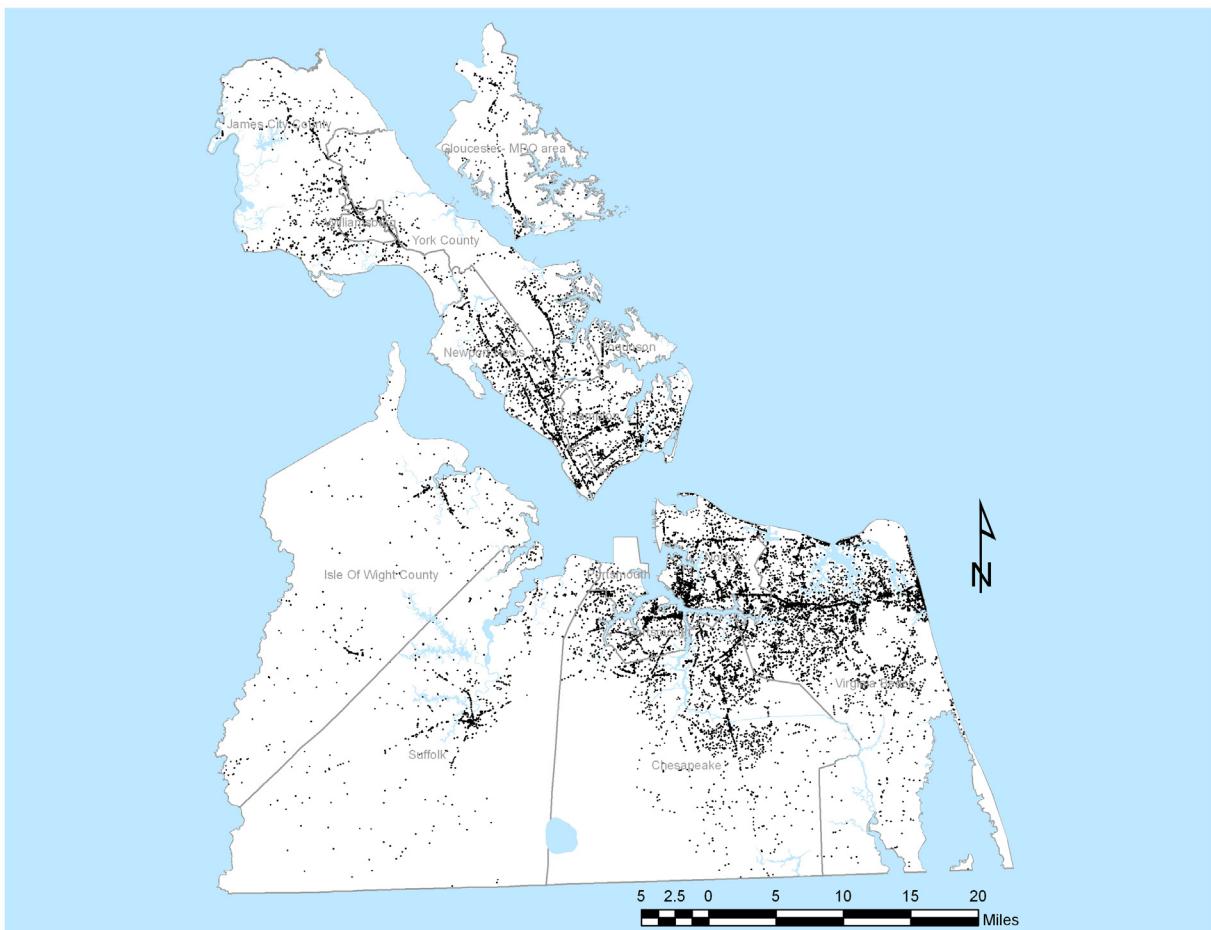


Source: Bus stops on bus blocks.jpg

The better-walking non-drivers in each of the above yellow opportune blocks near a bus stop are enjoying twice the odds¹³ of being mobile as compared to better-walking non-drivers living in the white-colored blocks above.

¹³ Mobility odds factor of 2.15 [“Improving the Mobility of Non-Drivers Using Proximity to Destinations and Bus Routes”, Hampton Roads Planning District Commission, June 2007, pg. 12]

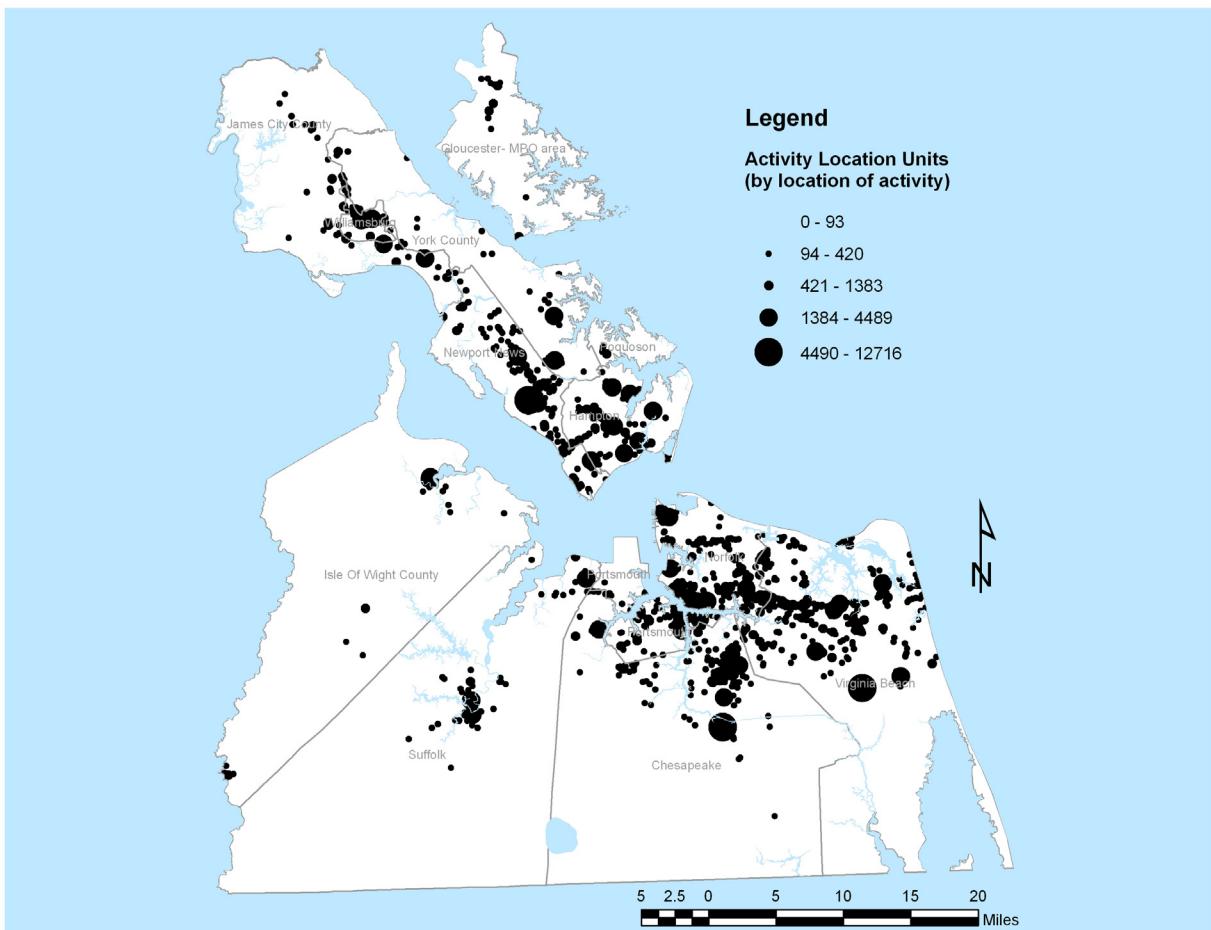
Activity Locations, Hampton Roads



Source: activity locations- small dots.jpg

To determine the degree to which blocks in Hampton Roads provide activity-location-based mobility, activity locations were found using the Virginia Employment Commission (VEC) data (2005, 2nd Quarter) from the fourth non-driver study.

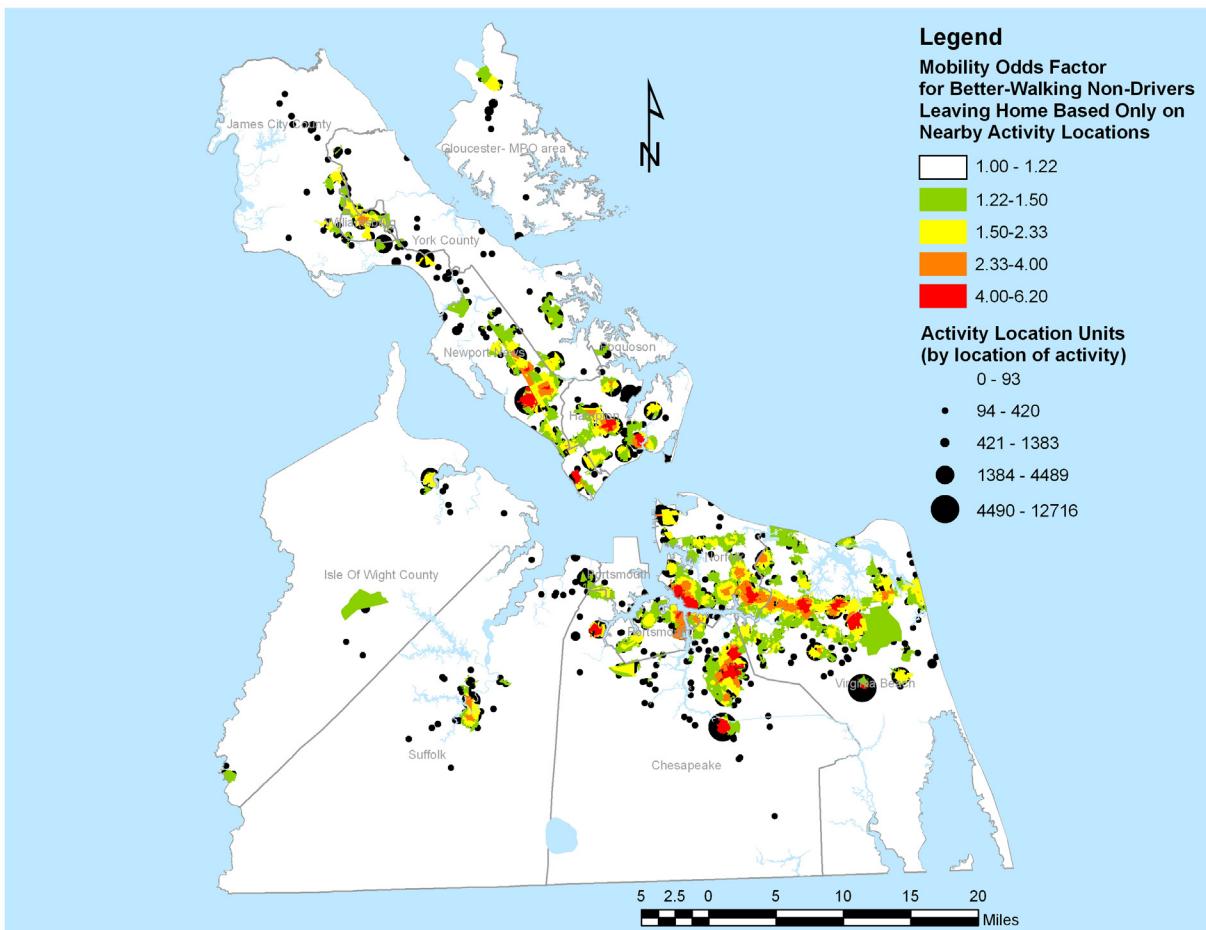
Activity Locations by Attractiveness, Hampton Roads



Source: activity locations- w ALUs.jpg

In accordance with the mobility model developed in the fourth non-driver study, the attractiveness of each activity location was determined by calculating Activity Location Units, equal to the number of employees for non-retail establishments and three times the number of employees for retail establishments.

Block-Level Mobility Odds Factors Based on Underlying ALUs



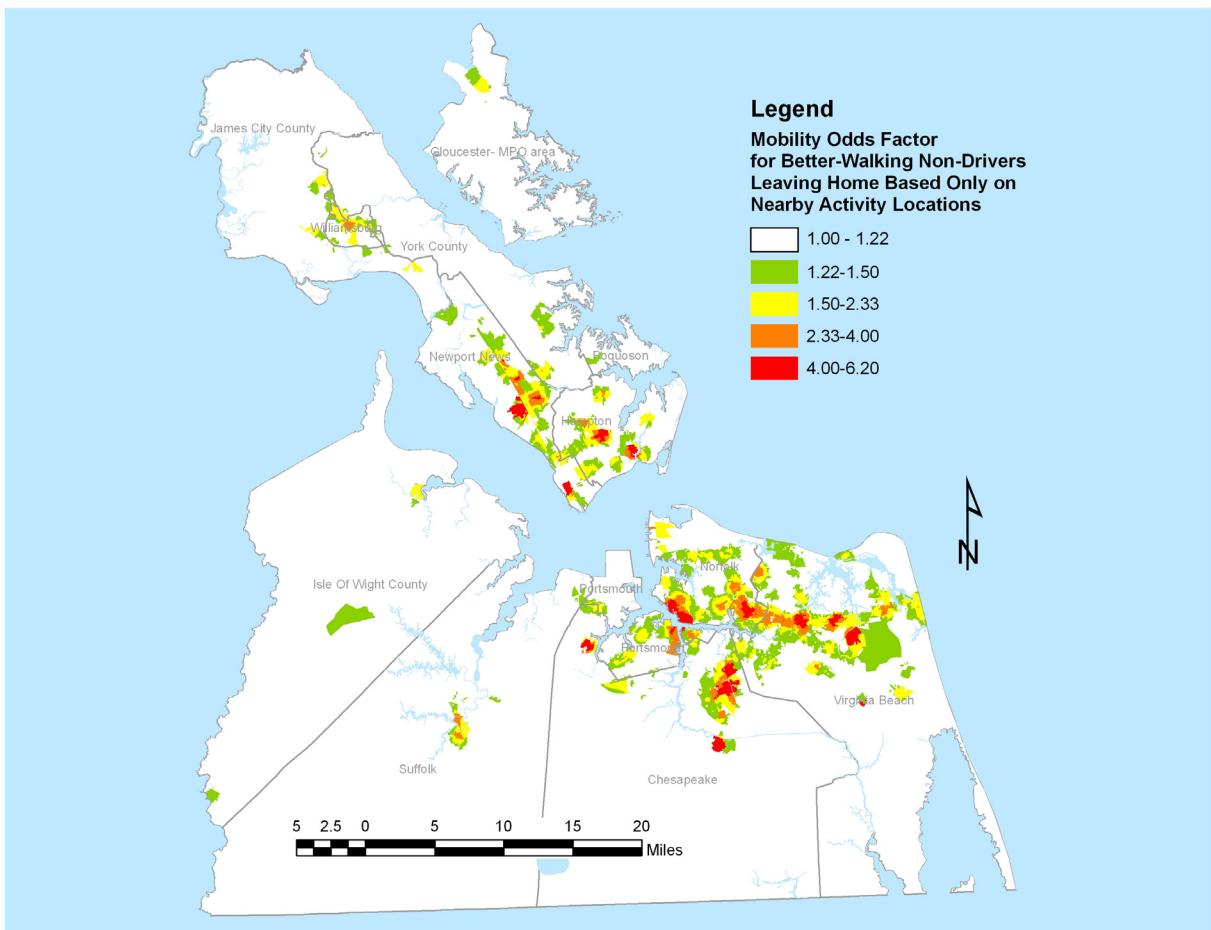
Source: activity-based odds on ALUs- white back.jpg

Based on the applicable coefficient from staff's statistical / geographic analysis of its survey of local non-drivers in the fourth non-driver study, a mobility odds factor (MOF) for each block was calculated according to the activity locations within one-half mile.¹⁴ The most opportune blocks—those affording the highest non-driver mobility—are shown in color.

On this map, the blocks colored by opportunity are shown on top of the activity locations from the previous map to indicate the relationship between mobility and proximity to activity locations.

¹⁴ MOF = $1.192^{\wedge}(\text{ALUs}/1,000)$ [based on "Improving the Mobility of Non-Drivers Using Proximity to Destinations and Bus Routes", Hampton Roads Planning District Commission, June 2007, pg. 12]

Activity-Location-Based Mobility Odds Factors, Hampton Roads



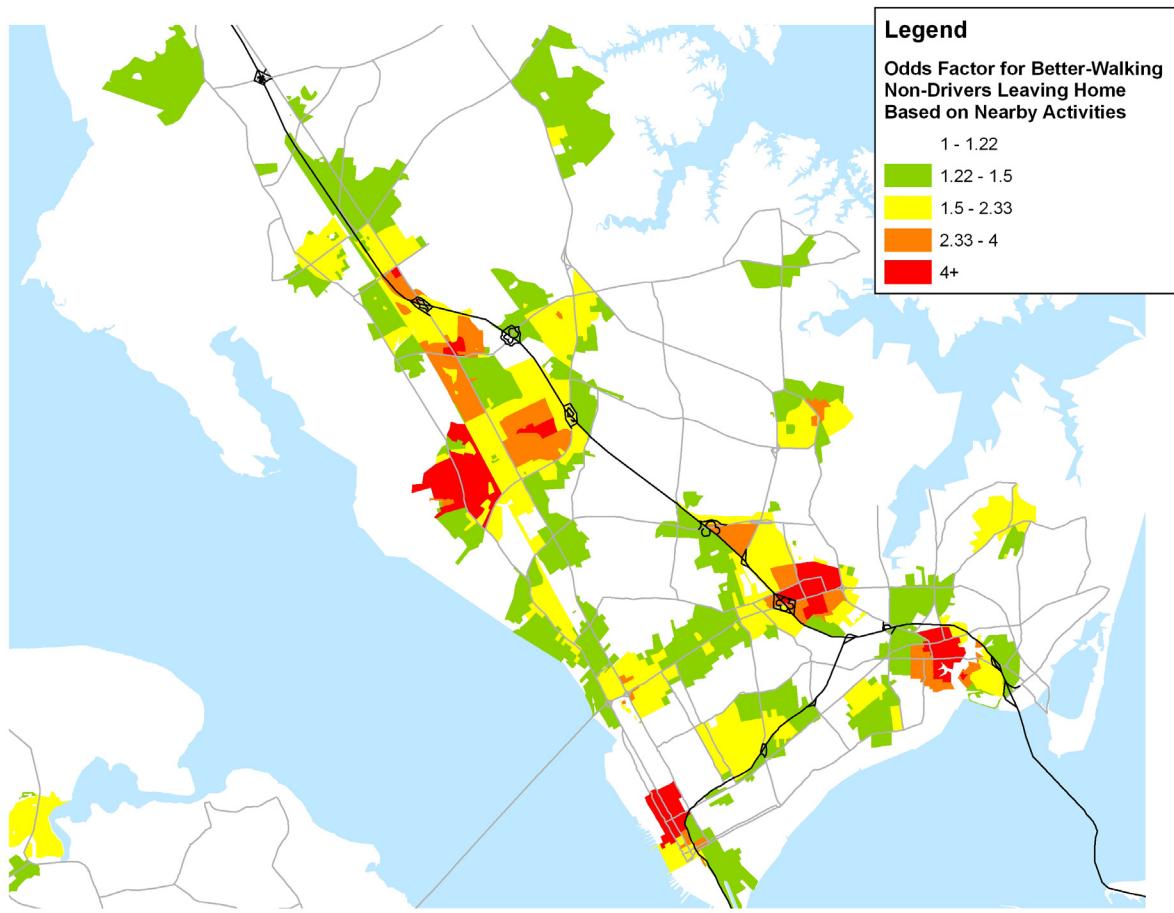
Source: activity-based odds- white back.jpg

This map shows the same high opportunity blocks from the previous map, this time without the activity locations underneath. The color indicates the impact of the nearby activities on the odds of a better-walking non-driver leaving the home on a given day.

One can see the mobility provided:

- along the major corridors—both urban and suburban—in the larger cities (Newport News, Hampton, Norfolk, Portsmouth, Chesapeake, and Virginia Beach)
- in smaller villages and downtowns (Gloucester Courthouse, Williamsburg, Smithfield, Windsor, Downtown Suffolk).

Activity-Location-Based Mobility Odds Factors, Lower Peninsula



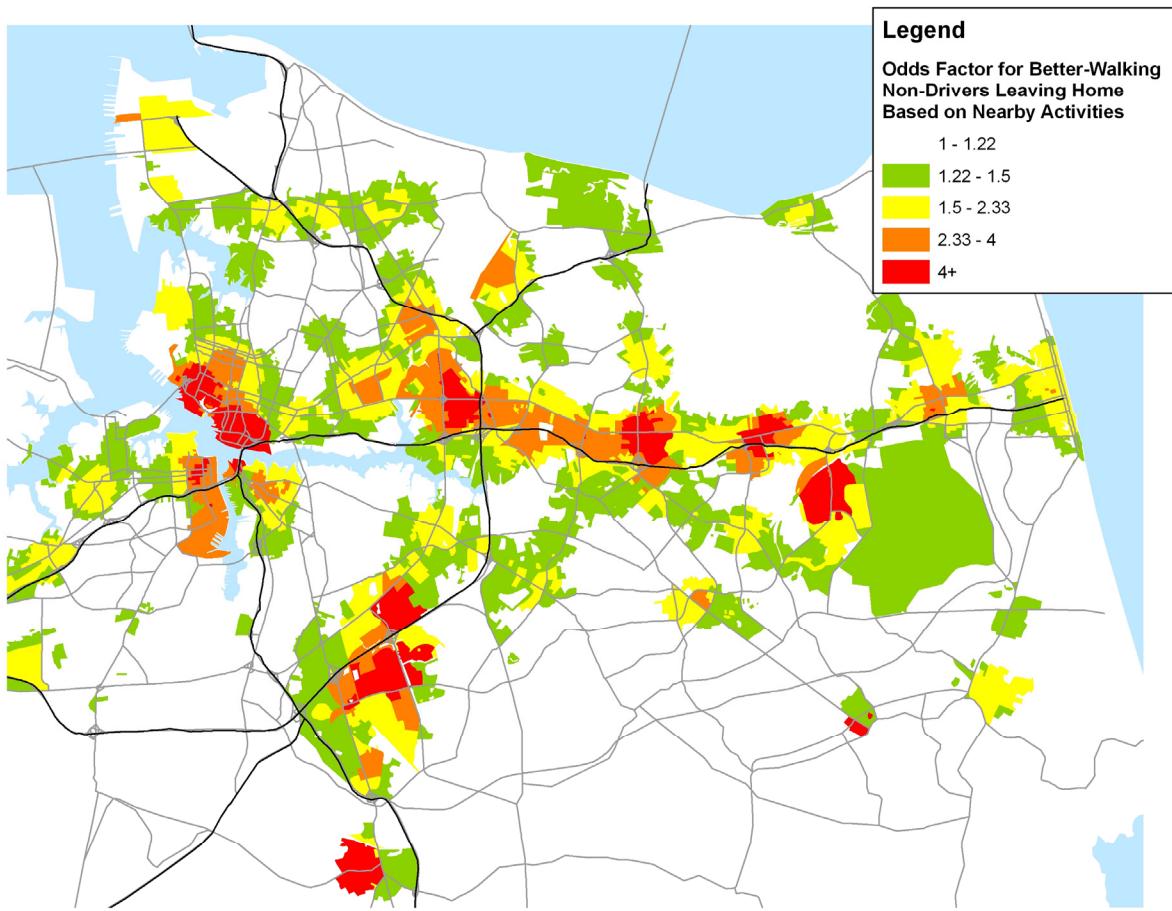
Source: activity-based odds- Peninsula- on white.jpg

This map shows the high mobility impact of activity locations on the Peninsula, particularly in the following red areas:

- CNU
- Oyster Point
- Coliseum Central
- Downtown Hampton
- Newport News Shipyard

Interestingly, although all of the above areas have a mixture of uses within each area, each has a different image—education for CNU area, office for Oyster Point, shopping for Coliseum, traditional downtown for Hampton, and shipyard for Newport News.

Activity-Location-Based Mobility Odds Factors, Eastern Southside



Source: activity-based odds- Southside- on white.jpg

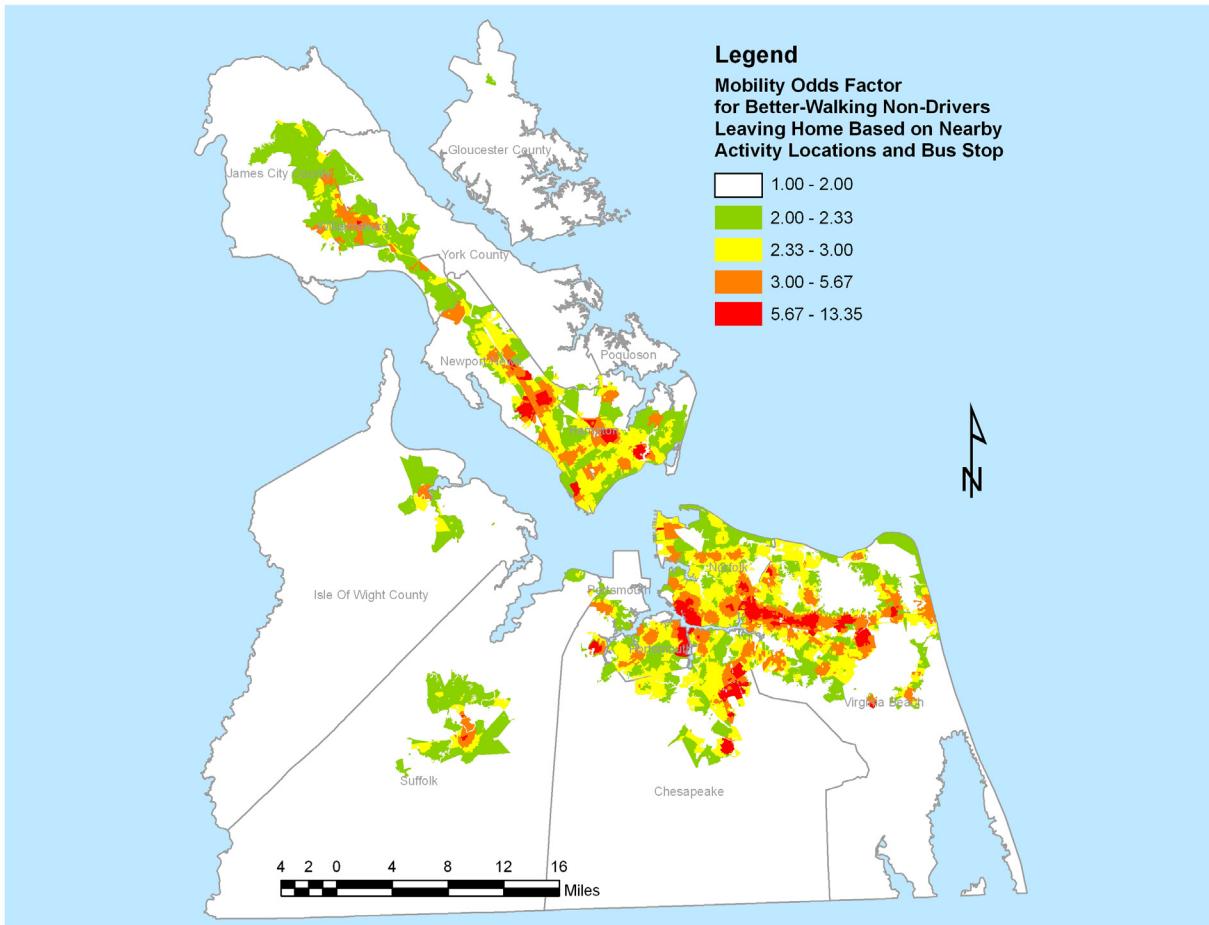
This map shows the high mobility impact of activity locations on the Southside, particularly in the following red areas:

- Downtown Norfolk
- Downtown Portsmouth
- Military Circle
- Greenbrier
- Great Bridge
- Virginia Beach Town Center
- Rosemont Rd & VB Blvd
- Oceana West

Note that although all of the above areas have a mixture of uses within each area, they have varying images—Military Circle: shopping; Greenbrier and Oceana West: office park; Norfolk and Portsmouth: traditional downtown; Great Bridge: village; Town Center: “21st Century downtown”; Rosemont Rd & VB Blvd: suburban commercial.

Combining the effects of both 1) nearby activities, and 2) nearby bus stops renders the impact on better-walking non-driver mobility¹⁵ shown by the following opportunity map.

Mobility Odds Factors, Hampton Roads



Source: ALU & bus -based odds.jpg

This map shows the mobility advantage enjoyed by non-drivers living:

- along the spine of the Peninsula
- at the lower end of the Peninsula
- in the Smithfield area
- in and around the downtown area of Suffolk
- throughout Norfolk and Portsmouth
- in South Norfolk
- along the major corridors of Virginia Beach

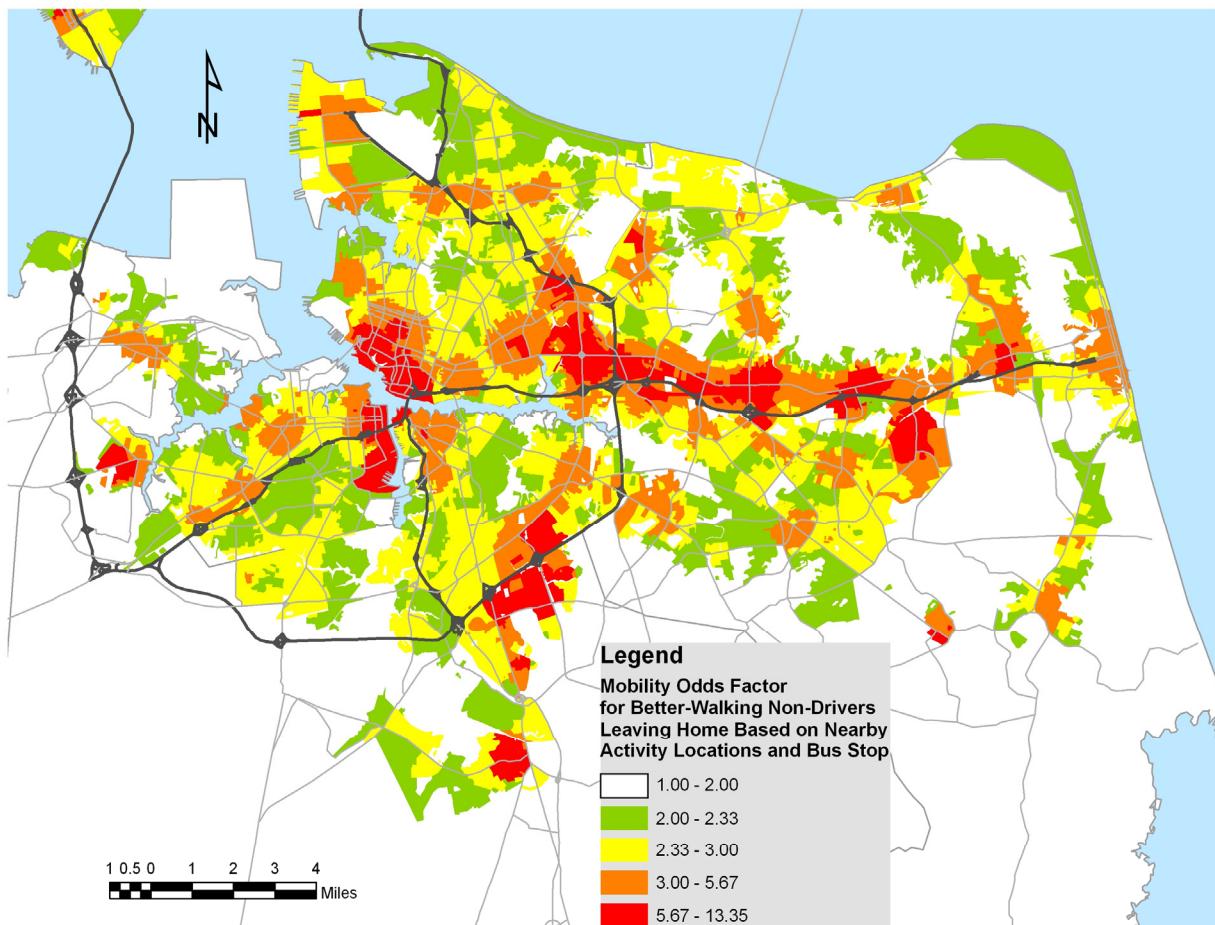
Red blocks provide a high level of mobility for better-walking non-drivers. For example, living in a red block with a mobility odds factor of 6 indicates that a given non-driver who would have 1:1 odds (i.e. 50% chance) of leaving home if living in a rural area (based

¹⁵ Total geography-based mobility odds factor (MOF) = bus-based MOF * activity-location-based MOF

on his/her age, family structure, vehicles in household, etc.) would have 6:1 odds (i.e. 86% chance¹⁶) of being mobile living in the high mobility block.

Likewise, green blocks provide a medium-low level of mobility to better-walking non-drivers. For example, living in a green block with a mobility odds factor of 2 indicates that a given non-driver who would have 1:1 odds (i.e. 50% chance) of leaving home if living in a rural area (based on his/her age, family structure, vehicles in household, etc.) would have 2:1 odds (or 67% chance¹⁷) of being mobile living in the medium-low mobility block. The mobility of yellow blocks (medium mobility) and that of orange blocks (medium-high mobility) falls between that of green and red.

Mobility Odds Factors, Eastern Southside



Source: ALU & bus -based odds- Southside.jpg

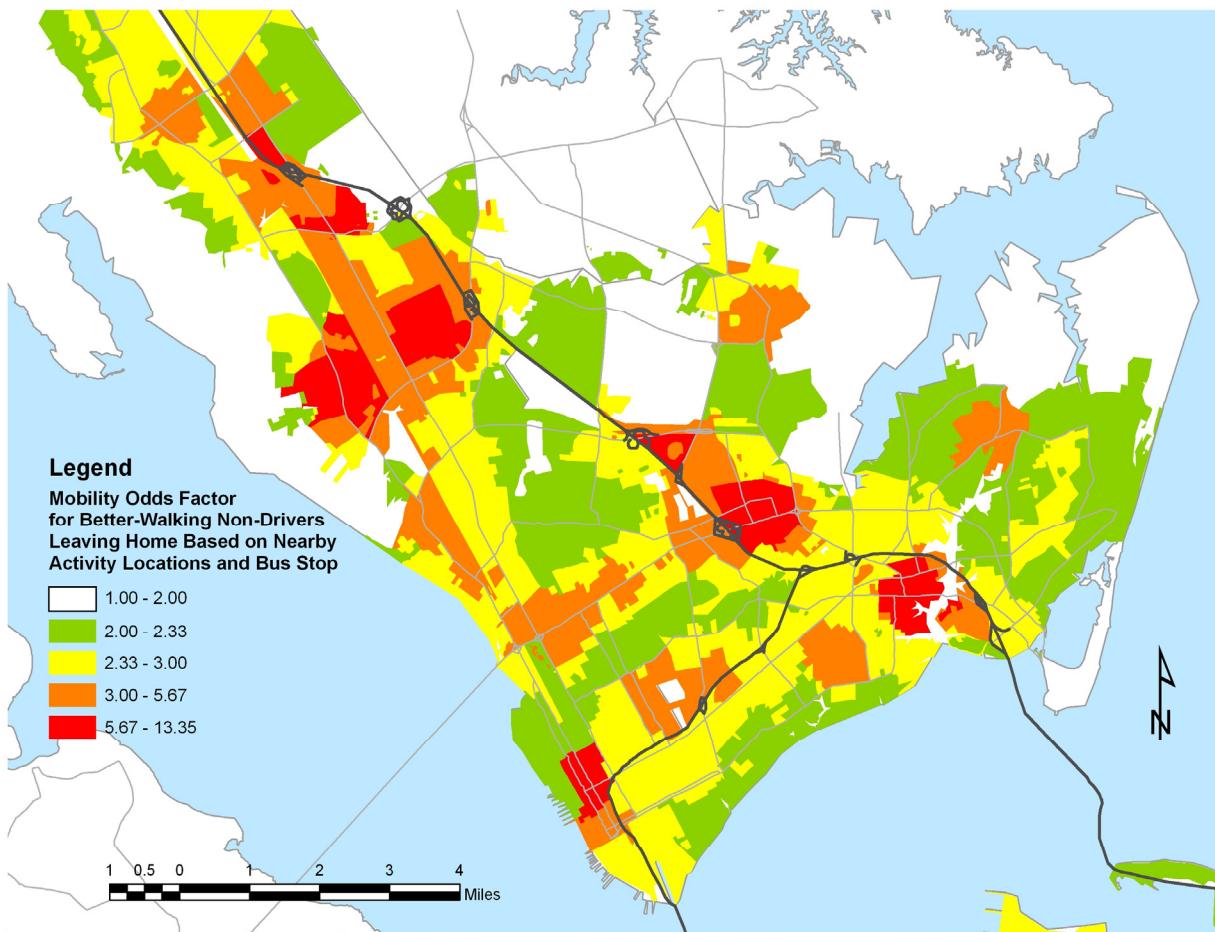
This map shows a high mobility advantage enjoyed by non-drivers living:

- along the VB Blvd corridor
- along the Military Hwy corridor
- along the Battlefield Blvd corridor
- in downtown areas

¹⁶ $1 * 6 = 6; 6 / (1+6) = 0.86$

¹⁷ $1 * 2 = 2; 2 / (1+2) = 0.67$

Mobility Odds Factors, Lower Peninsula



Source: ALU & bus -based odds- Peninsula.jpg

This map shows the higher mobility advantage enjoyed by non-drivers living:

- along the Mercury Blvd corridor
- along the upper Jefferson Ave corridor
- in six high activity areas along the Warwick Blvd corridor
- in downtown Hampton
- near the Newport News shipyard

Mobility odds factor maps for each locality are included in the “Specific Successes and Prospects” section below.

MEASURING THE SUCCESS OF LOCAL EFFORTS TO PLACE RESIDENCES FAVORED BY NON-DRIVERS, BUS ROUTES/STOPS, AND ACTIVITY LOCATIONS NEAR EACH OTHER

In this section the success of local efforts to place residences favored by non-drivers, bus routes/stops, and activity locations near each other—thereby improving non-driver mobility—is measured numerically using the mobility odds factors calculated as described in the previous section.

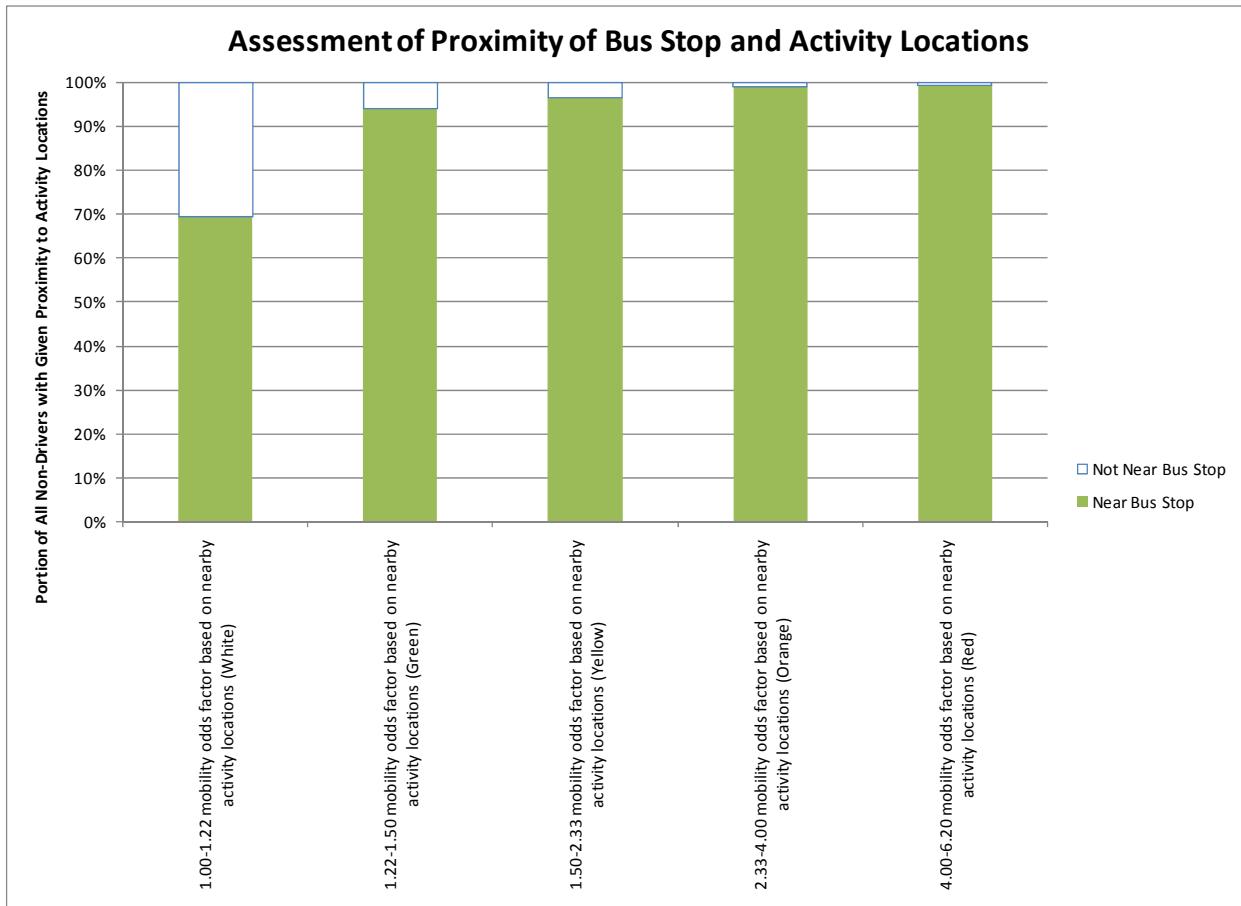
This proximity is examined below in three different ways:

- A. assessing the degree to which bus routes/stops and activity locations have been placed near each other
- B. measuring the success of placing bus routes/stops and activity locations near non-drivers
- C. measuring the success of placing residences favored by non-drivers near bus routes/stops and activity locations.

The first of the three examinations simply investigates the geographic relationship between the two measured geographic mobility enhancers—bus stops and activity locations—without regard to non-driver locations. The second of the three examinations looks at the placement of these two mobility enhancers in relationship to where non-drivers live. Conversely, the third examination looks at the placement of residences favored by non-drivers in relationship to the two mobility enhancers.

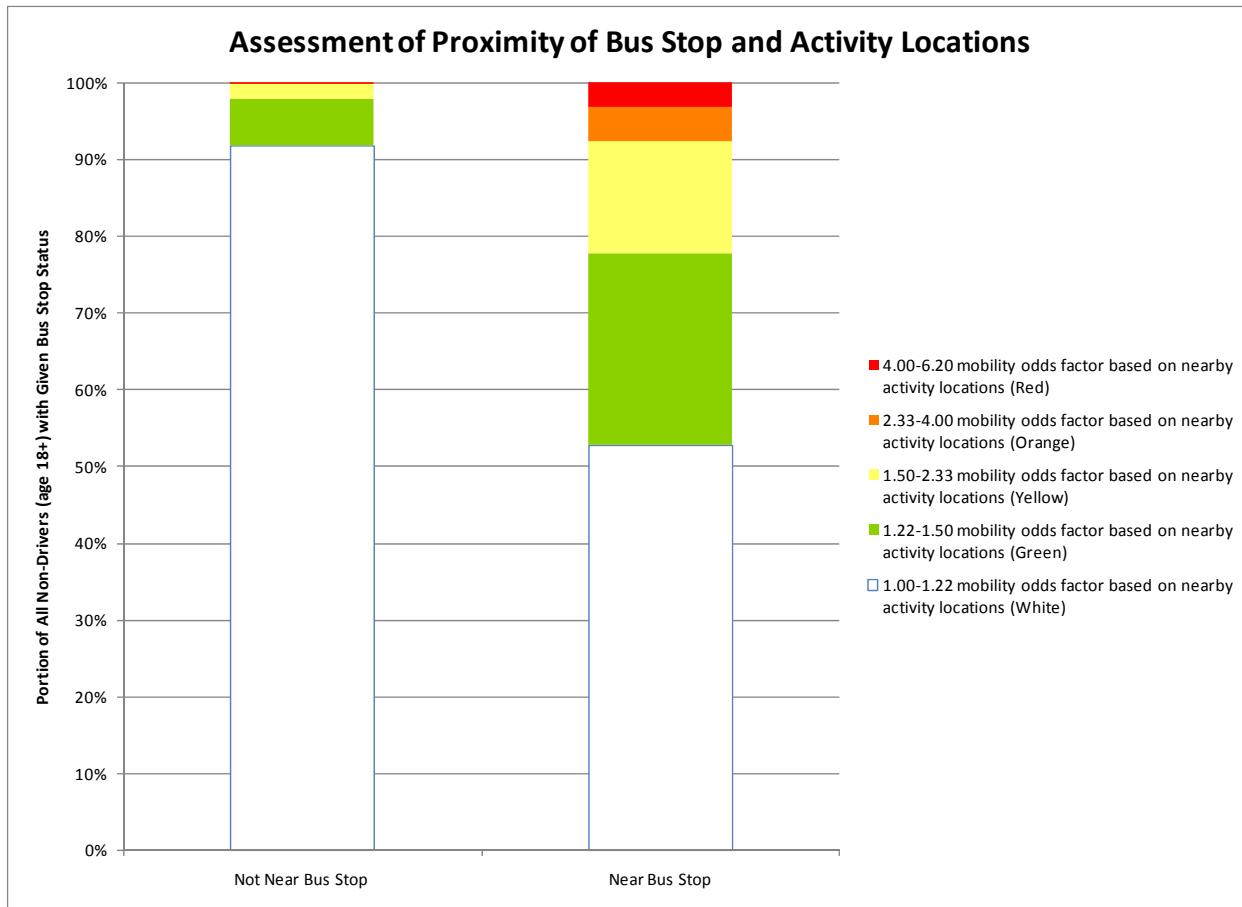
ASSESSING THE DEGREE TO WHICH BUS ROUTES/STOPS AND ACTIVITY LOCATIONS HAVE BEEN PLACED NEAR EACH OTHER

Prior to examining the geographic relationship between non-drivers and the two measured geographic mobility enhancers, the proximity between the two mobility enhancers themselves—bus stops and activity locations—was examined.



Source: block_data.xlsx

Not surprisingly, one can see that bus routes/stops have generally been placed where activity locations exist. As shown by the four right-hand columns above, over 90% of non-drivers living in higher activity-location-based mobility areas live near a bus stop.



Source: block_data.xlsx

Conversely, activity locations have generally been placed where bus service exists. As shown by the right-hand column above, almost 50% of non-drivers who live near a bus stop enjoy higher activity-location-based mobility. Likewise, as shown by the left-hand column above, few activity locations have been placed where non bus service exists. Less than 10% of non-drivers who live away from bus routes/stops live close to activity locations.

MEASURING THE SUCCESS OF PLACING BUS ROUTES/STOPS AND ACTIVITY LOCATIONS NEAR NON-DRIVERS

Having seen above the proximity between bus routes/stops and activity locations, the degree to which these two geographic mobility enhancers have been placed near non-drivers is examined in this section, and the impact of that proximity is measured.

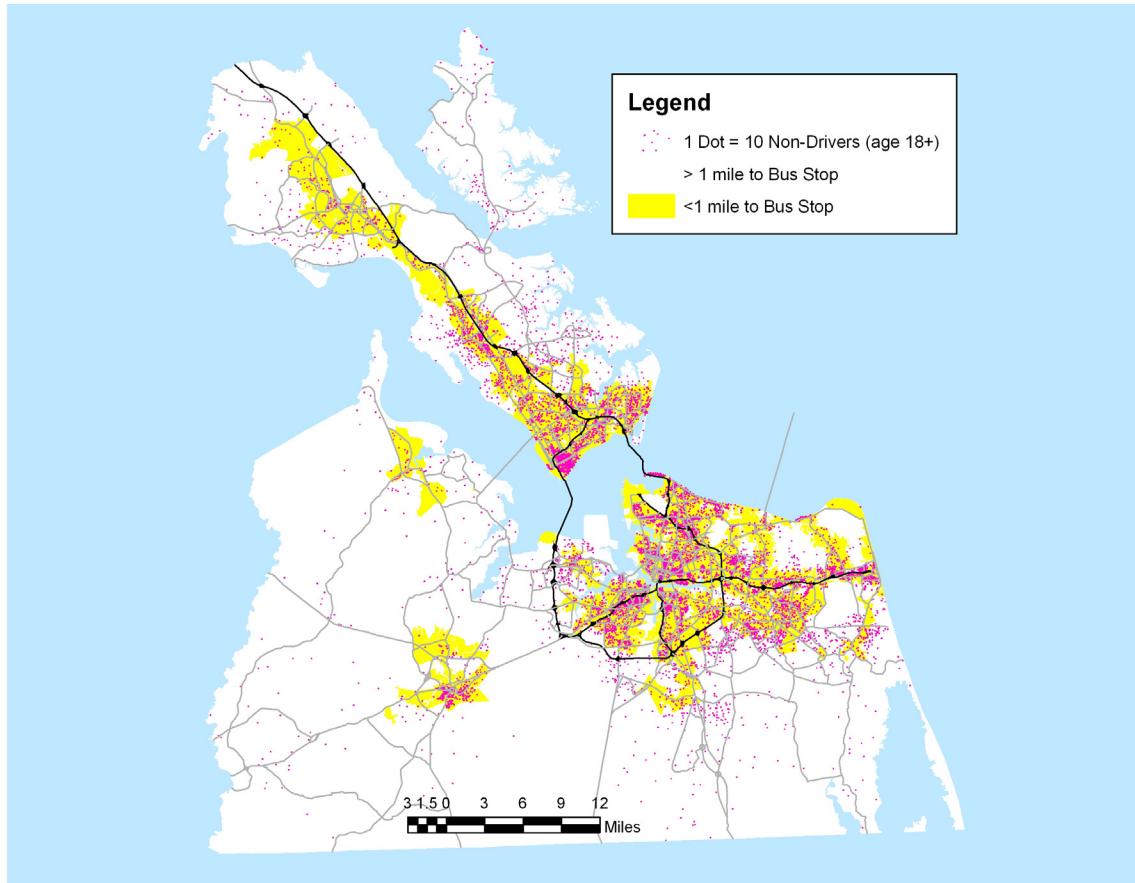
This examination is conducted in three parts—the first two parts examine the two measured geographic mobility enhancers in turn, and the third part examines the combination of the two mobility enhancers:

1. measuring the success of placing bus stops near non-drivers
2. measuring the success of placing activity locations near non-drivers
3. measuring the success of placing *both* activity locations and bus stops near non-drivers.

Measuring the Success of Placing Bus Routes/Stops Near Non-drivers

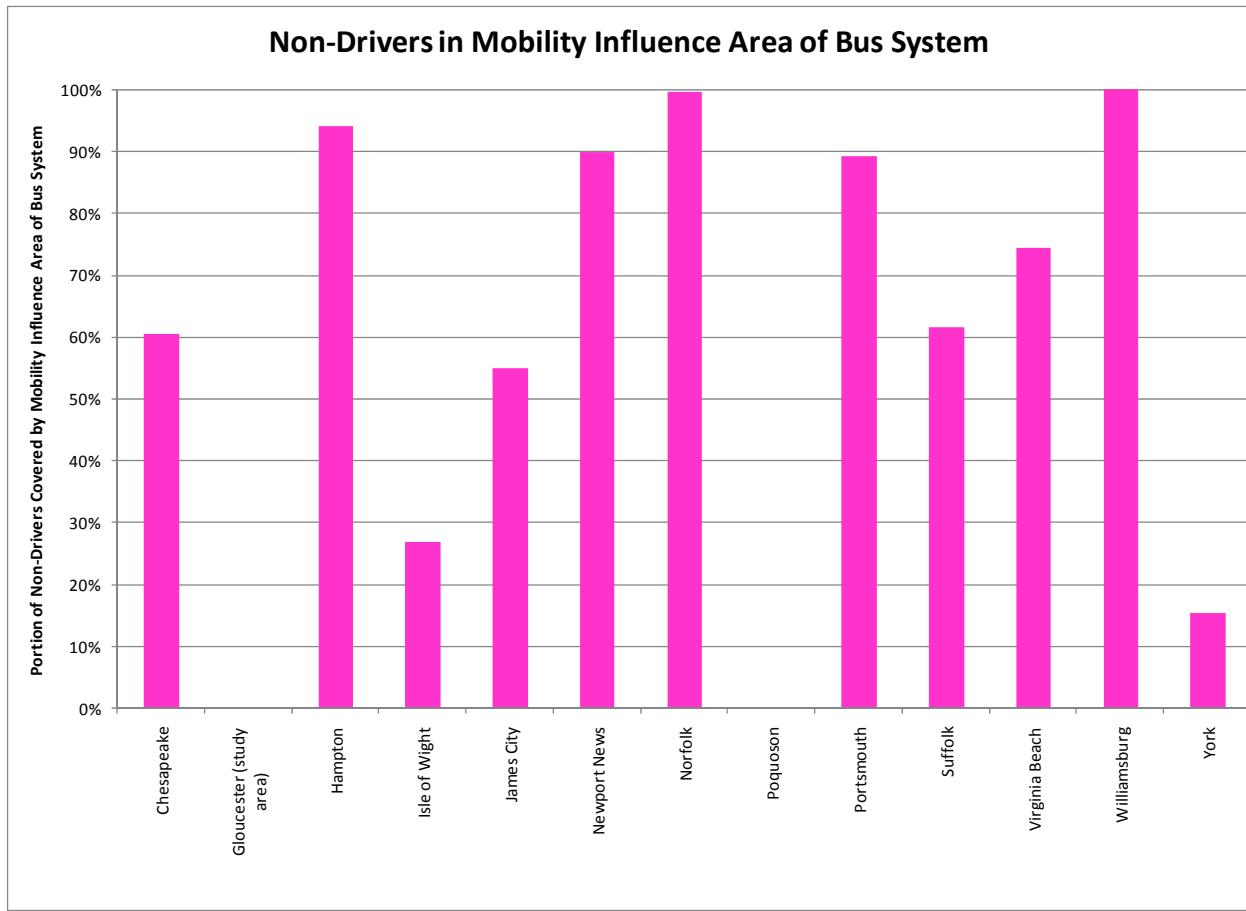
The first of the two measured geographic mobility enhancers—bus service—is examined in this section.

Bus-Based Mobility Area and Non-drivers



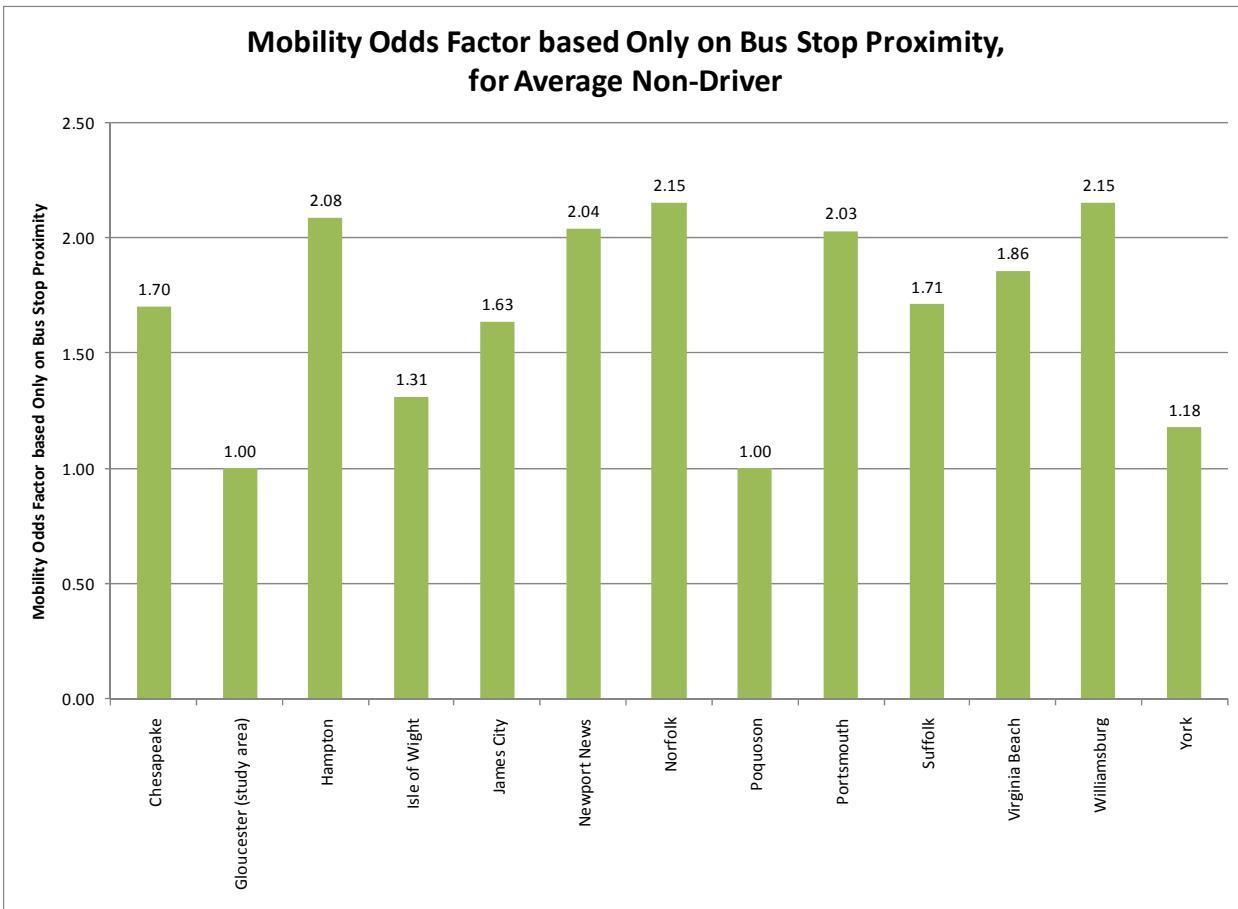
Source: NDs on bus yellow.jpg

As shown above, there exists a fairly good match between blocks enjoying higher bus-based mobility and non-driver residential locations. In fact, bus routes/stops have been placed in Hampton Roads such that 80% of non-drivers live in the mobility influence area of the bus system.



Source: block_data.xlsx

Although—examining the Hampton Roads region as a whole—80% of non-drivers can enjoy the mobility boost of bus service, individual localities differ in the portion of local non-drivers to which bus-based mobility is provided, as shown above.

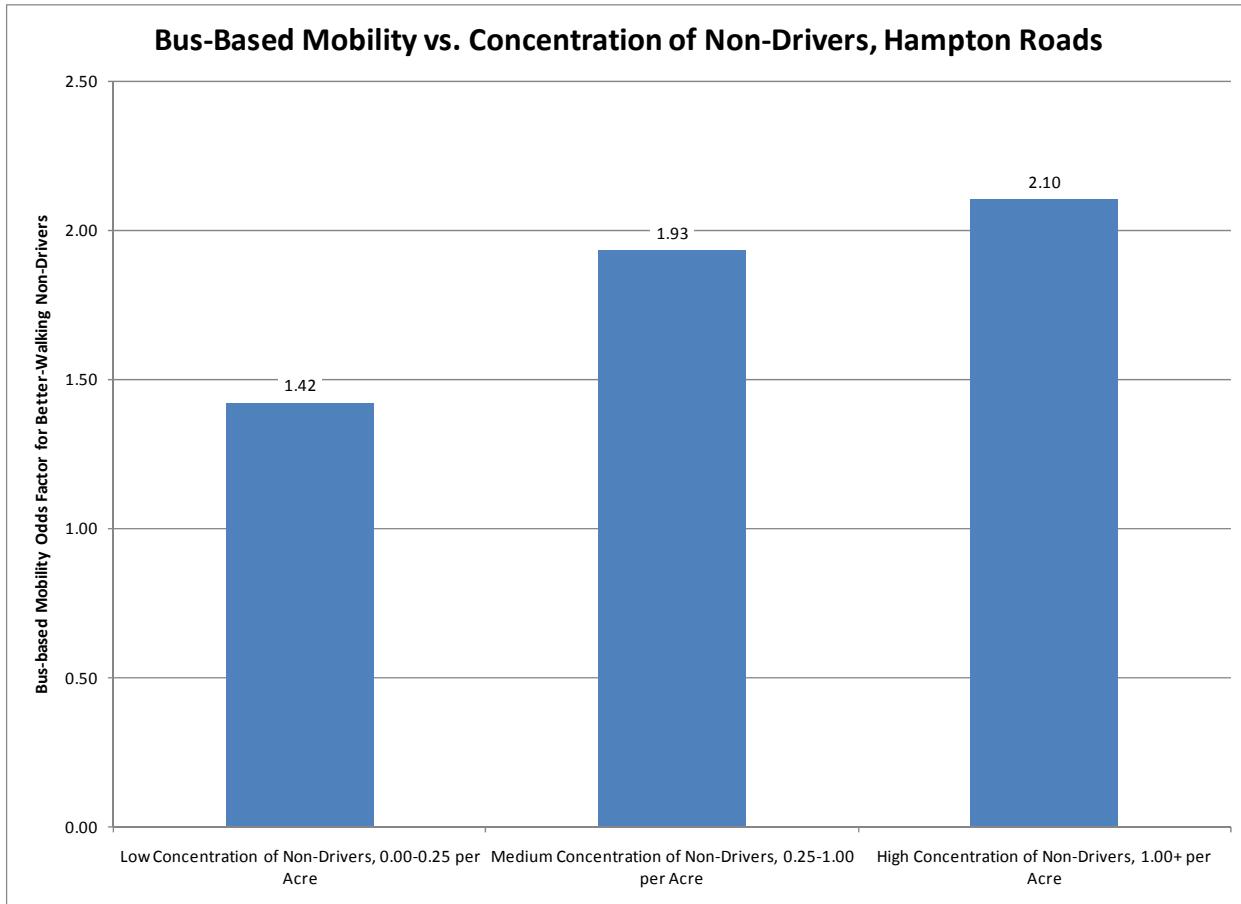


Source: block_data.xlsx

Because, as discussed on the previous page, localities differ in the portion of local non-drivers to which bus-based mobility is provided, they also differ in the bus-based mobility enjoyed by their average non-driver, as shown above. Non-drivers in localities with no bus service—Gloucester and Poquoson—experience, of course, no mobility boost from such service, and have therefore a bus-based mobility odds factor (MOF) of 1.00. In localities with a bus stop network extensive enough to influence the mobility of every local non-driver (Norfolk and Williamsburg), the average non-driver, of course, enjoys the maximum (2.15) bus-based mobility odds factor (MOF), as measured in the fourth non-driver study. The bus-based mobility odds factor enjoyed by the average non-driver for other localities falls between these two extreme values (1.00 and 2.15) depending on the degree to which bus routes/stops have been placed near non-drivers. Perhaps surprisingly:

- James City's bus routes/stops provide mobility to its non-drivers (bus-based MOF=1.63) almost as high as that of Chesapeake (bus-based MOF=1.70).
- Virginia Beach's bus routes and stops have been located to provide its non-drivers with mobility approaching that of Portsmouth (bus-based MOF's of 1.86 and 2.03 respectively).

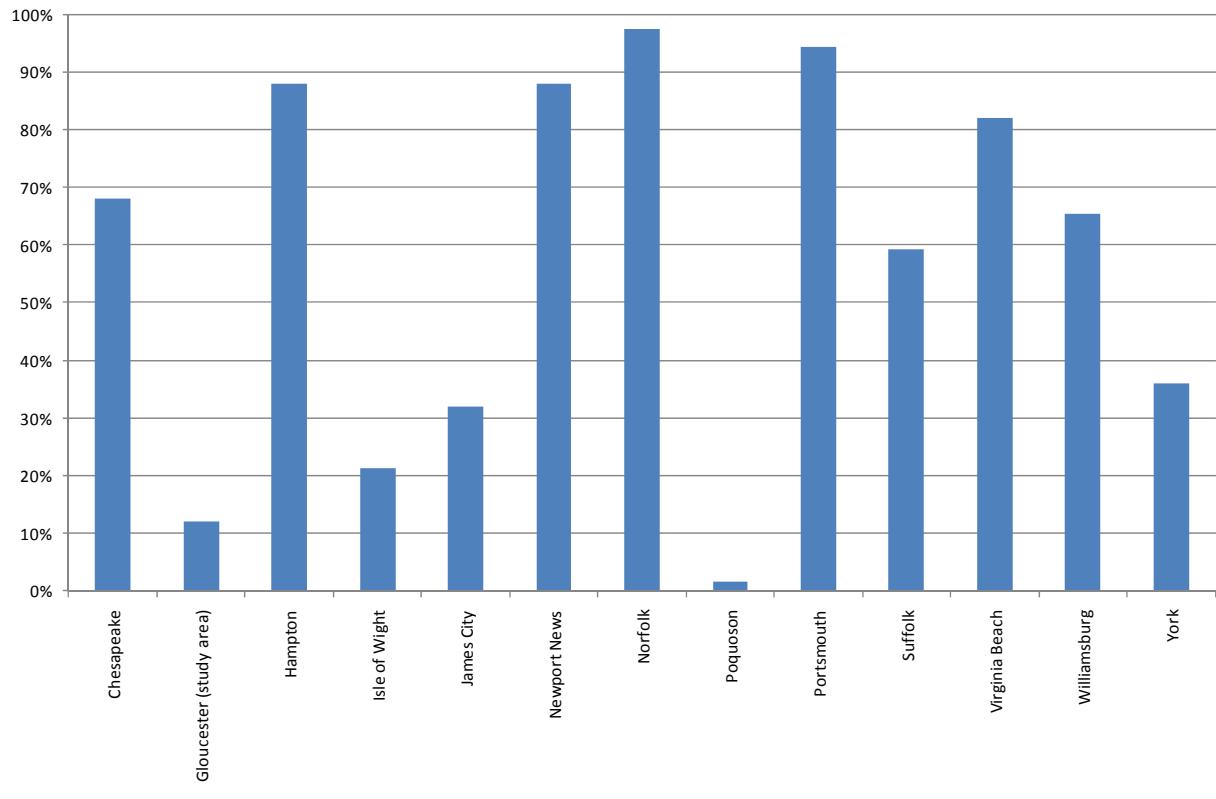
Considering Non-Driver Concentration when Judging Bus-Based Success



Source: block_data.xlsx

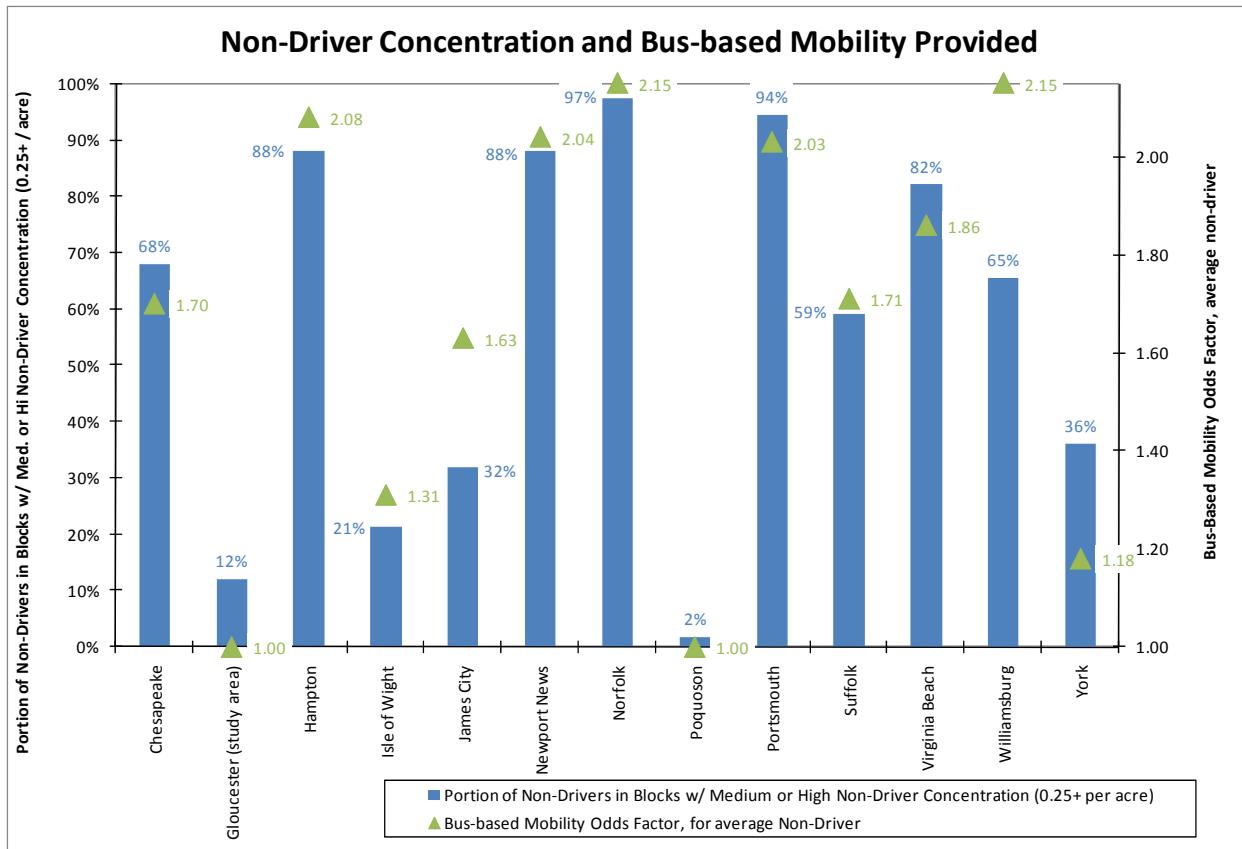
It is difficult to provide bus service to non-drivers living in low concentration, as shown above.

Portion of Non-Drivers in Blocks w/ Medium or High Non-Driver Concentration (0.25+ per acre)



Source: block_data.xlsx

As shown above, localities differ greatly in the portion of non-drivers who live in those concentration levels which can more easily be served by bus transit.



Combining the non-driver concentration data from the previous page with the bus-based mobility odds factors from an earlier page, as shown above, allows one to view bus-based mobility relative to the concentration of non-drivers.

Not surprisingly, for most cities, their bus service to non-drivers is commensurate with the concentration of those non-drivers:

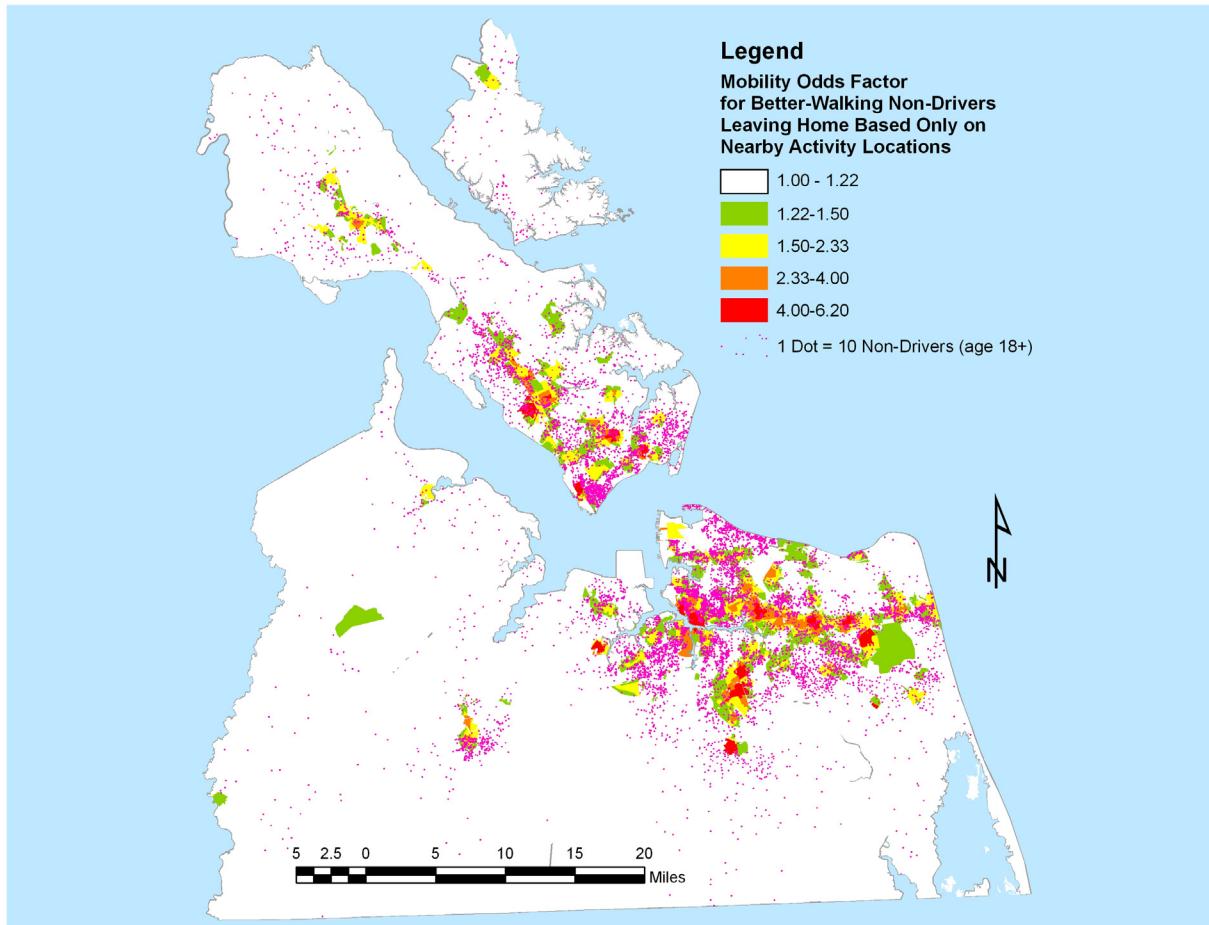
- Hampton, Newport News, Norfolk, and Portsmouth have concentrated non-drivers and high bus-based non-driver mobility.
- Chesapeake, Virginia Beach, and Suffolk have moderate concentration of non-drivers and moderate bus-based non-driver mobility.
- Gloucester and Poquoson have low concentration of non-drivers and low bus-based non-driver mobility.

Some localities, however, have bus service to non-drivers which differs from their concentration of non-drivers. Williamsburg has moderate concentration of non-drivers, and yet high bus-based non-driver mobility. James City and York have similar concentration of non-drivers, and yet James City provides a moderate level of bus mobility to its non-drivers.

Measuring the Success of Placing Activity Locations Near Non-drivers

Having examined bus stops above, the degree to which the other measured geographic mobility enhancers—activity locations—have been placed near non-drivers will be examined in this section.

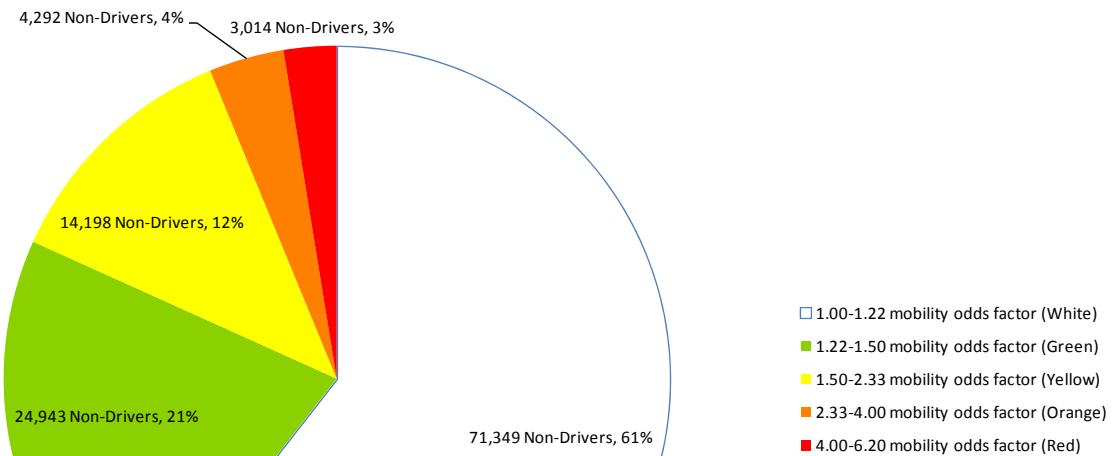
Activity-Location-Based Mobility Area and Non-drivers



Source: NDs on activity-based odds.jpg

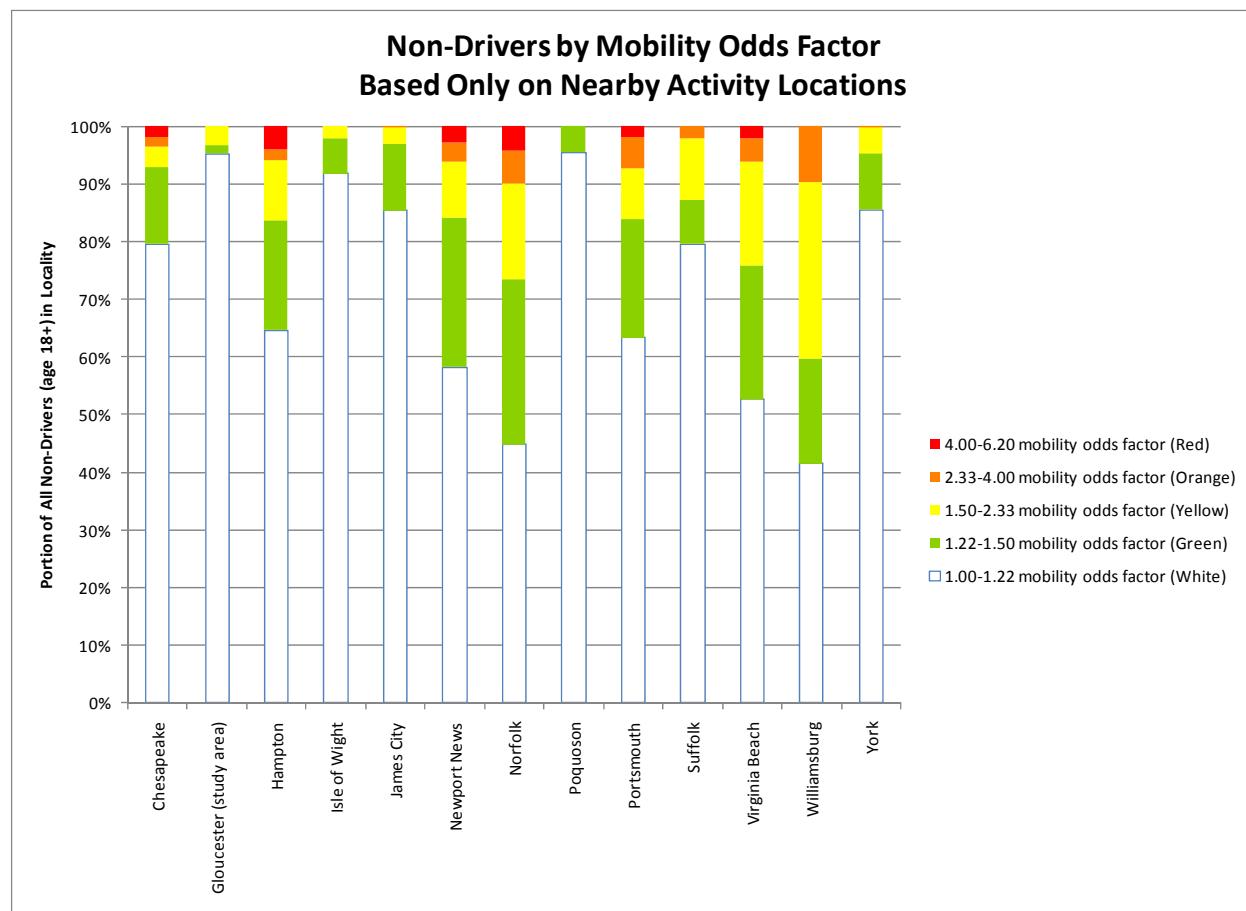
The above map indicates that activity locations have been placed such that many non-drivers live outside of the mobility influence of activity locations.

Non-Drivers by Mobility Odds Factor Based Only on Nearby Activity Locations, Hampton Roads



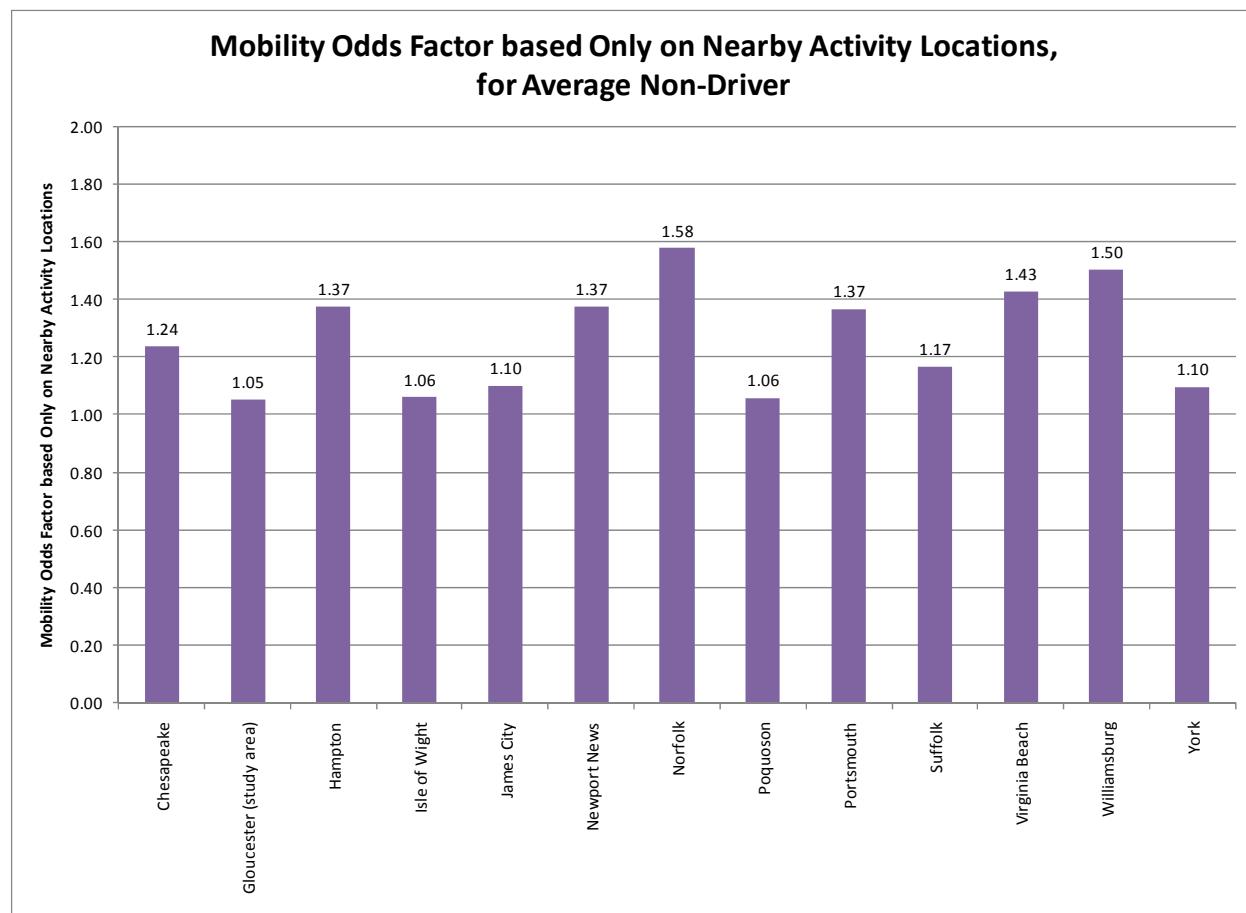
Source: block_data.xlsx

In Hampton Roads, although activity locations have been placed such that they improve the mobility odds of more than 40,000 non-drivers, more than half of regional non-drivers live in areas with little activity-location influence on mobility.



Source: block_data.xlsx

Localities differ in the portion of local non-drivers to which activity-location-based mobility has been provided, as shown above. In Norfolk and Williamsburg activity locations have been placed such that approximately half of local non-drivers enjoy higher related mobility. Surprisingly, in Virginia Beach the array of activity locations has a similarly high coverage.



Source: block_data.xlsx

Because, as discussed on the previous page, localities differ in the portion of local non-drivers to which activity-location-based mobility is provided, they also differ in the related mobility enjoyed by their average non-driver, as shown above.

Results of interest include:

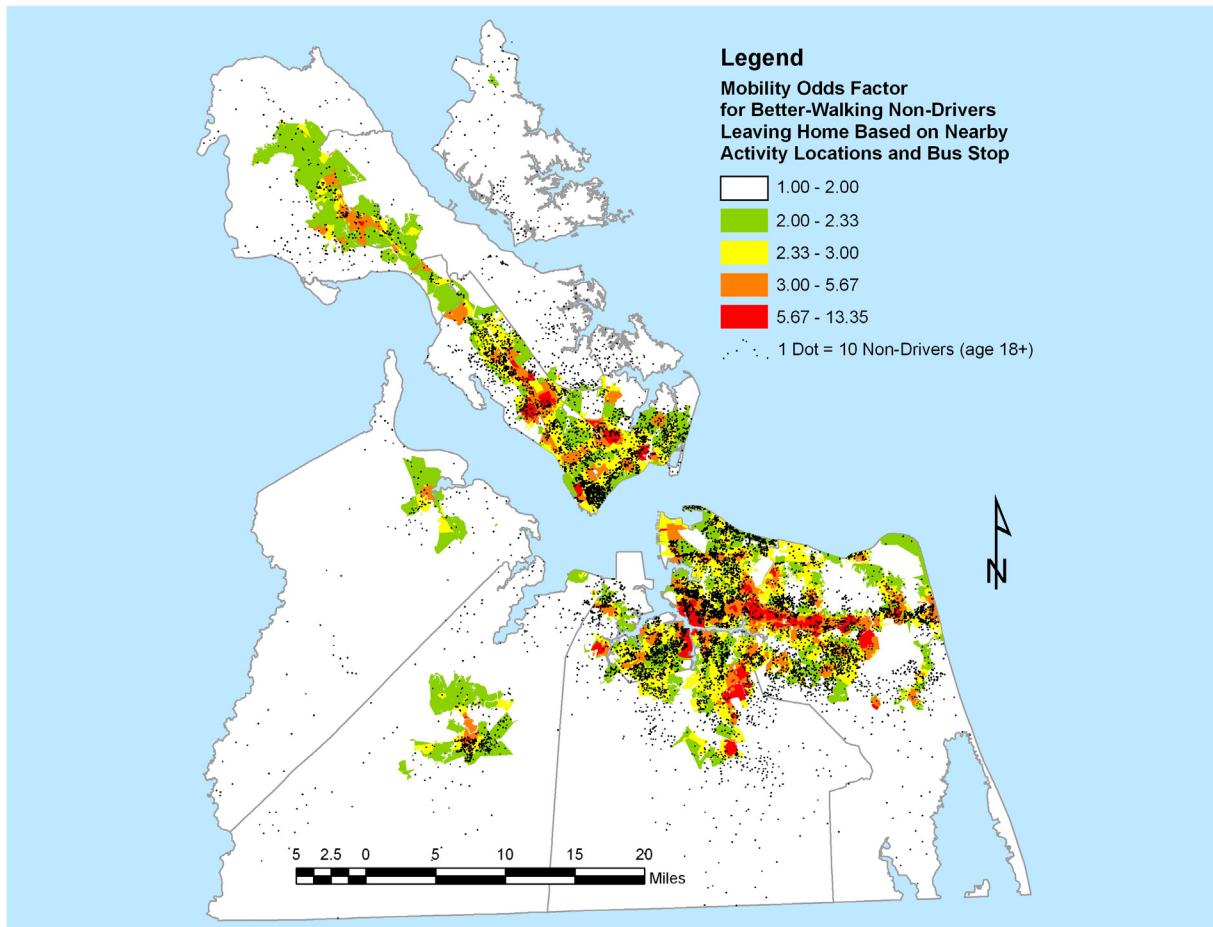
- Because of the placement of activity locations in Norfolk, Williamsburg, and Virginia Beach mentioned on the previous page, the odds of leaving home for better-walking non-drivers in those localities is on average approximately half again as high¹⁸ as it would otherwise be.
- Activity locations have been placed in Chesapeake such that non-drivers there enjoy an activity-location-based mobility odds factor (1.24) higher than that of Suffolk (1.17).

¹⁸ factor of approx. 1.50

Measuring the Success of Placing Both Activity Locations and Bus Routes/Stops Near Non-drivers

Having individually examined bus stops and activity locations above, in this section the combined impact of the placement of bus routes/stops and activity locations near the homes of non-drivers is measured.

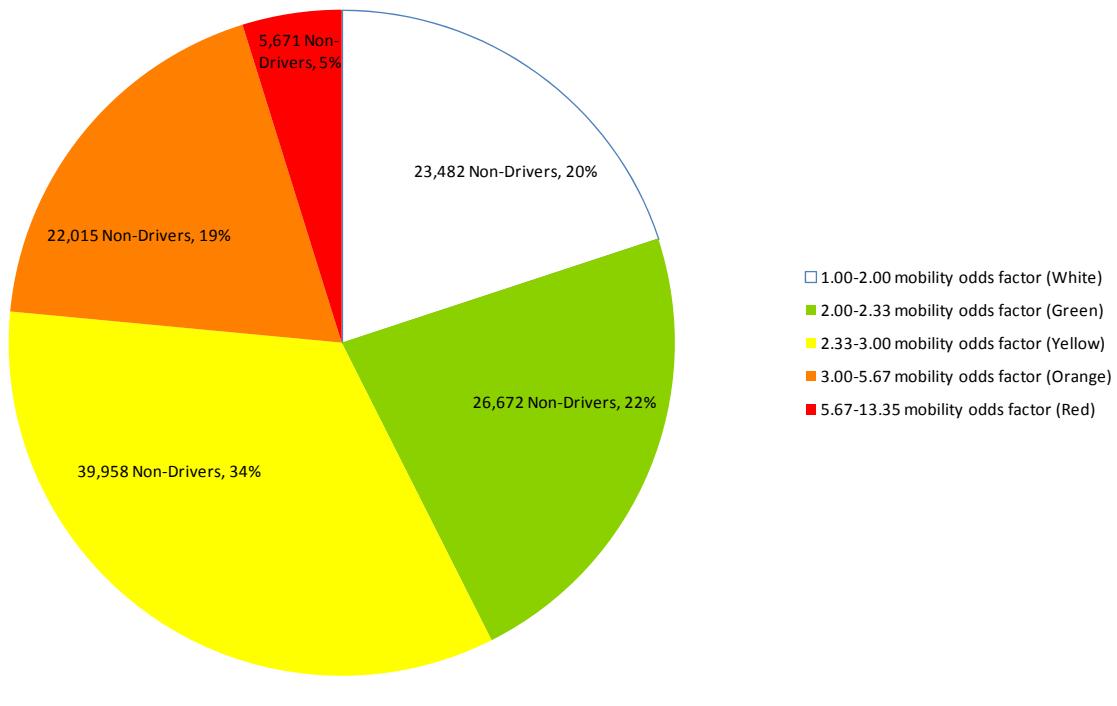
Bus-based and Activity-Location-based Mobility and Non-drivers



Source: NDs on MOF- HR.jpg

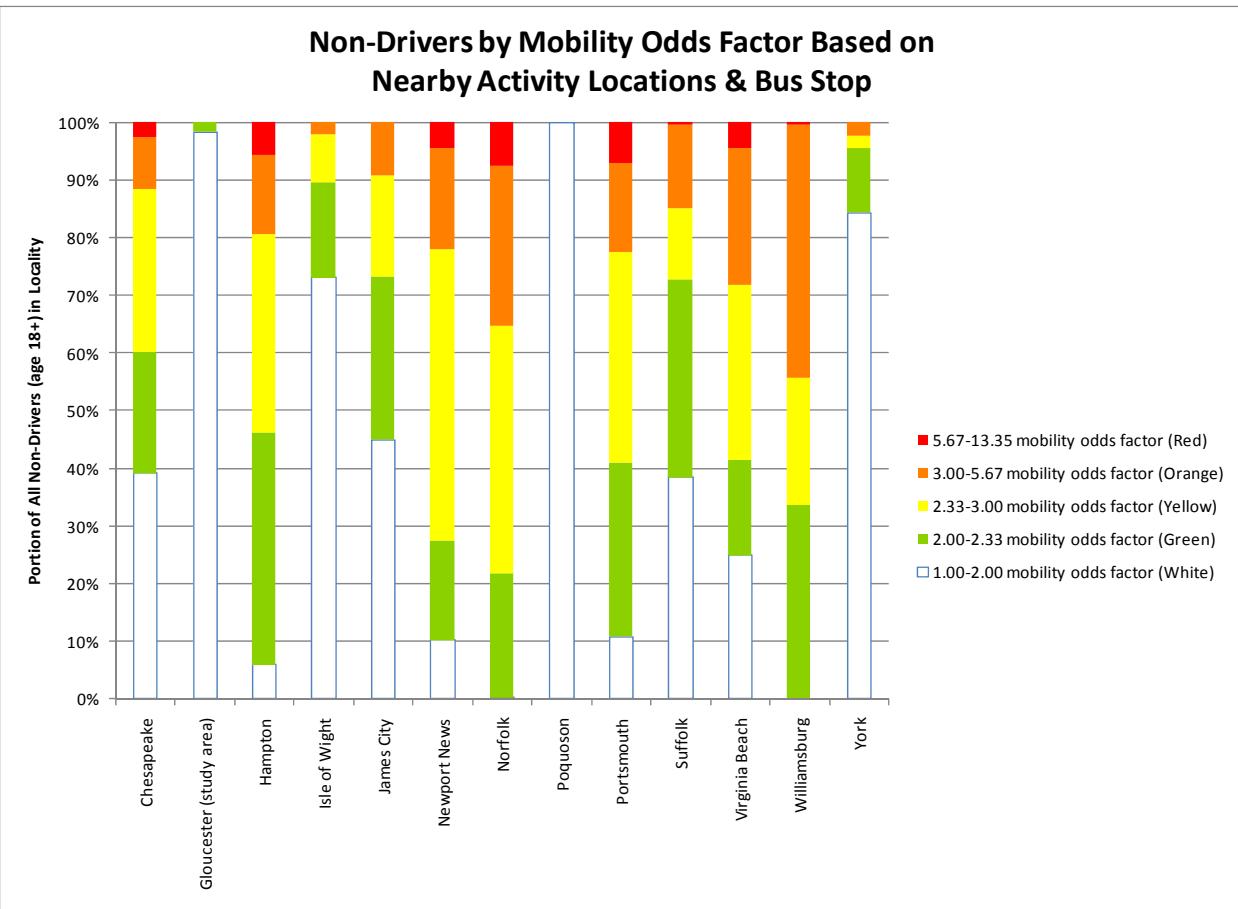
The above map indicates that bus routes/stops and activity locations have been placed such that most non-drivers live in opportune, or higher mobility, areas.

Non-Drivers by Mobility Odds Factor Based on Nearby Activity Locations & Bus Stop, Hampton Roads



Source: block_data.xlsx

Because of the placement of bus routes and activity locations in proximity to non-drivers in Hampton Roads, more than half of regional non-drivers enjoy mobility odds factors of 2.33 or higher.

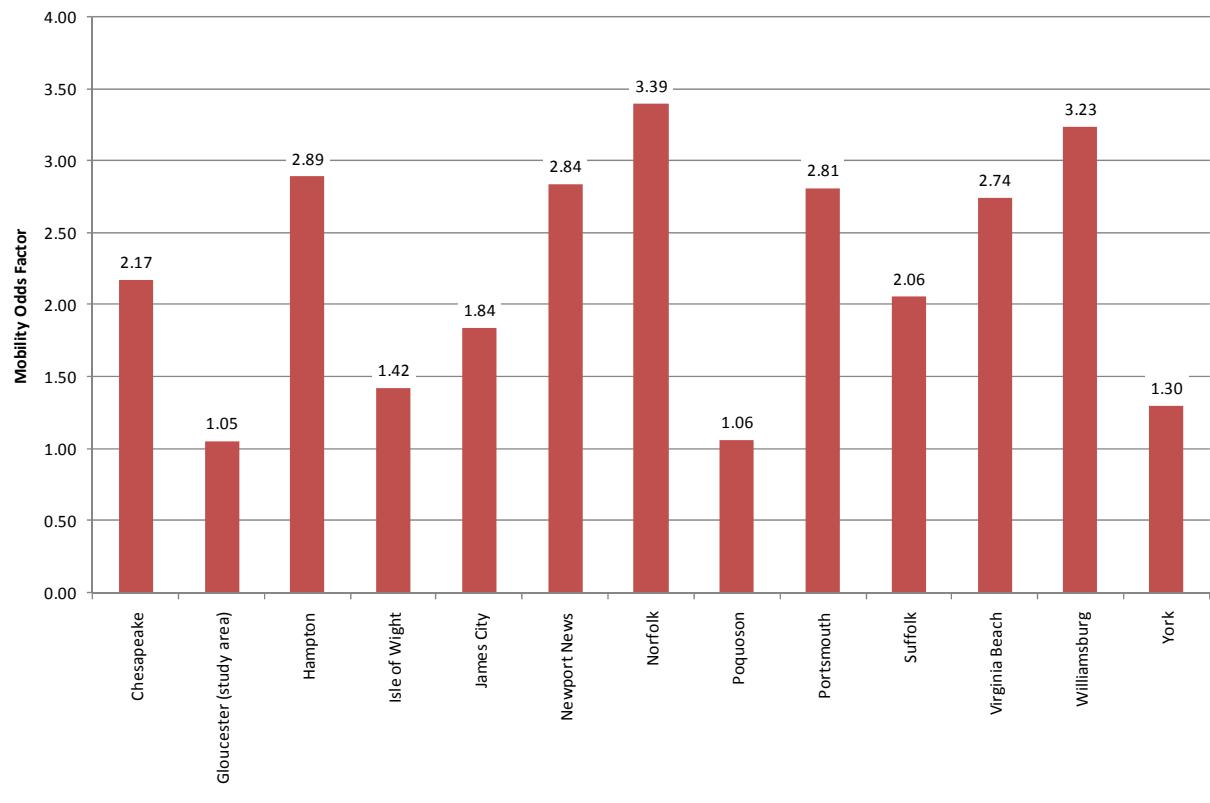


Source: block_data.xlsx

Localities differ in the amount of geography-based¹⁹ mobility provided to their non-drivers. At least 90% of the non-drivers in Hampton, Newport News, Norfolk, and Williamsburg live in opportune areas.

¹⁹ i.e. bus-based mobility and activity-location-based mobility

**Mobility Odds Factor based on Nearby Activity Locations & Bus Stop,
for Average Non-Driver, Hampton Roads**



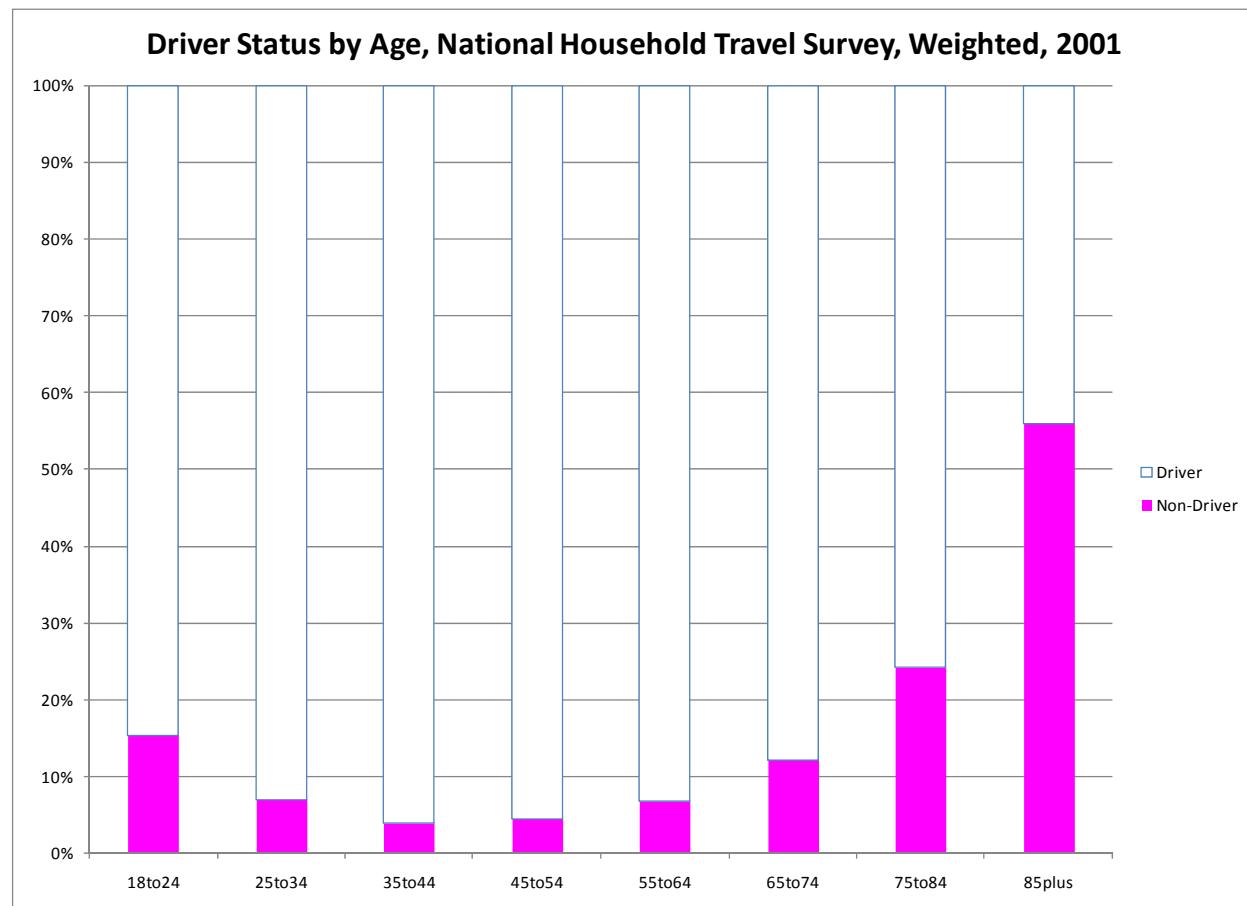
Source: block_data.xlsx

Because, as discussed on the previous page, localities differ in the portion of local non-drivers to which activity-location-based and bus-based mobility is provided, they also differ in the total geography-based mobility enjoyed by their average non-driver, as shown above. Results of interest include:

- In Gloucester and Poquoson non-drivers have no bus service and little proximity to activity locations.
- Localities which have both an extensive bus network and well-placed activity locations—Hampton, Newport News, Norfolk, Portsmouth, and Williamsburg—provide their better-walking non-drivers with relatively high mobility (average MOF of at least 2.81).
- Although it does not have as well-placed a system of bus routes/stops as do the above five localities, due to its well-placed activity locations, Virginia Beach's non-drivers enjoy a total MOF (2.74) almost as high as Hampton, Newport News, and Portsmouth.

MEASURING THE SUCCESS OF PLACING RESIDENCES FAVORED BY NON-DRIVERS NEAR BUS ROUTES/STOPS AND ACTIVITY LOCATIONS

Although localities obviously do not directly control where non-drivers live, they can use zoning to affect where housing is built which is attractive to non-drivers.

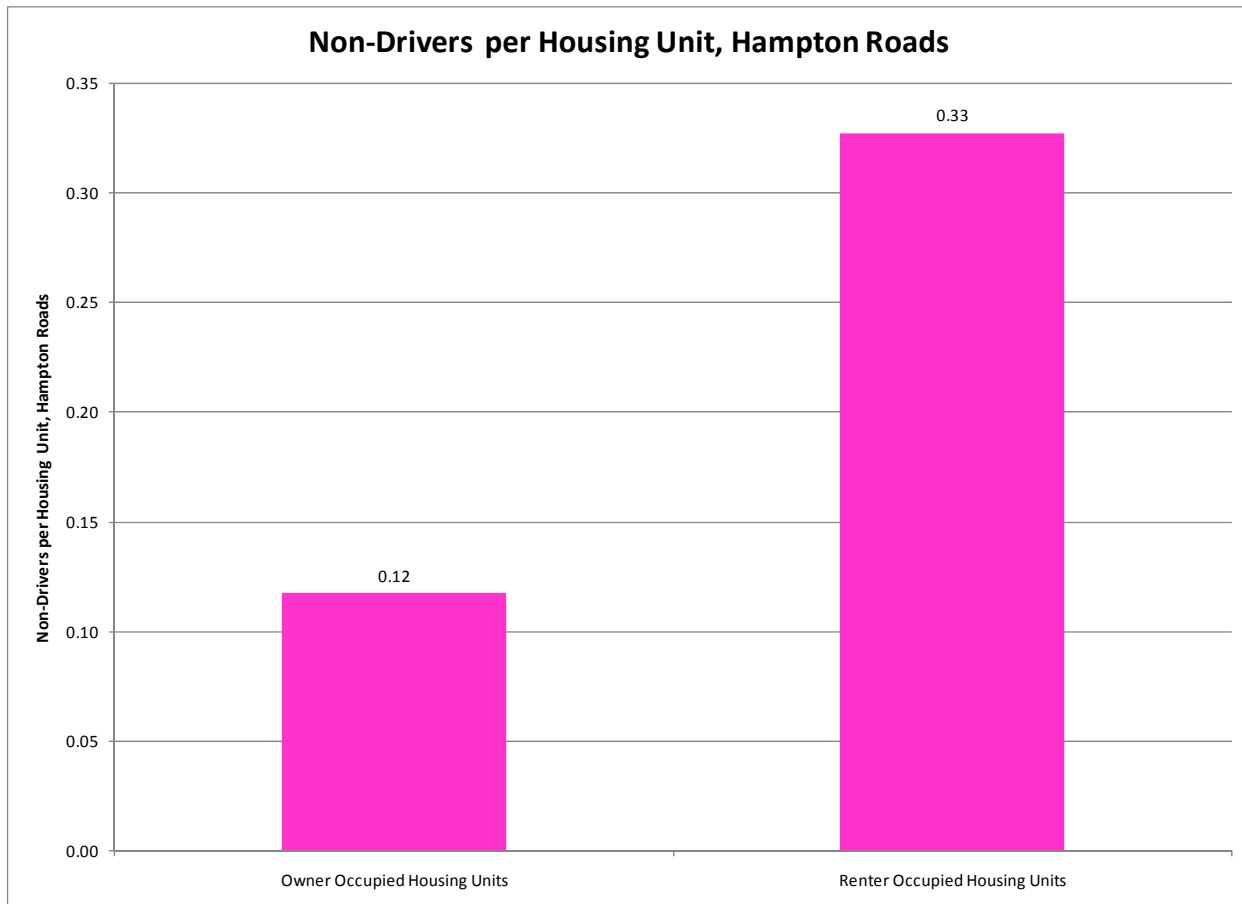


Source: National Sample 18+ vars re nondr.xls

As shown above, senior adults have a greater tendency than other adults to be non-drivers. Dwelling units with senior adults, therefore, tend to contain a significant number of non-drivers. Senior adults live in three types of dwellings: 1) nursing homes, 2) senior housing (i.e. age-graded apartments and condos), and 3) other homes (single-family, apartment, condo, etc.). Based on the assumption that nursing homes contain few persons who are both better walkers and allowed to leave the facility²⁰, the success of placing nursing homes near bus routes/stops and activity locations will not be examined below. Because census block data does not identify senior/age-graded housing, and because "other" homes contain drivers and young persons in addition to

²⁰ According to census.gov, the "institutionalized population", which includes persons in "nursing homes", is defined as "People under formally authorized, supervised care or custody in institutions at the time of enumeration. Generally, restricted to the institution, under the care or supervision of trained staff, and classified as "patients" or "inmates.\"",

non-drivers, the success of placing the latter two types of dwellings will also not be examined.



Source: Block_data.xlsx

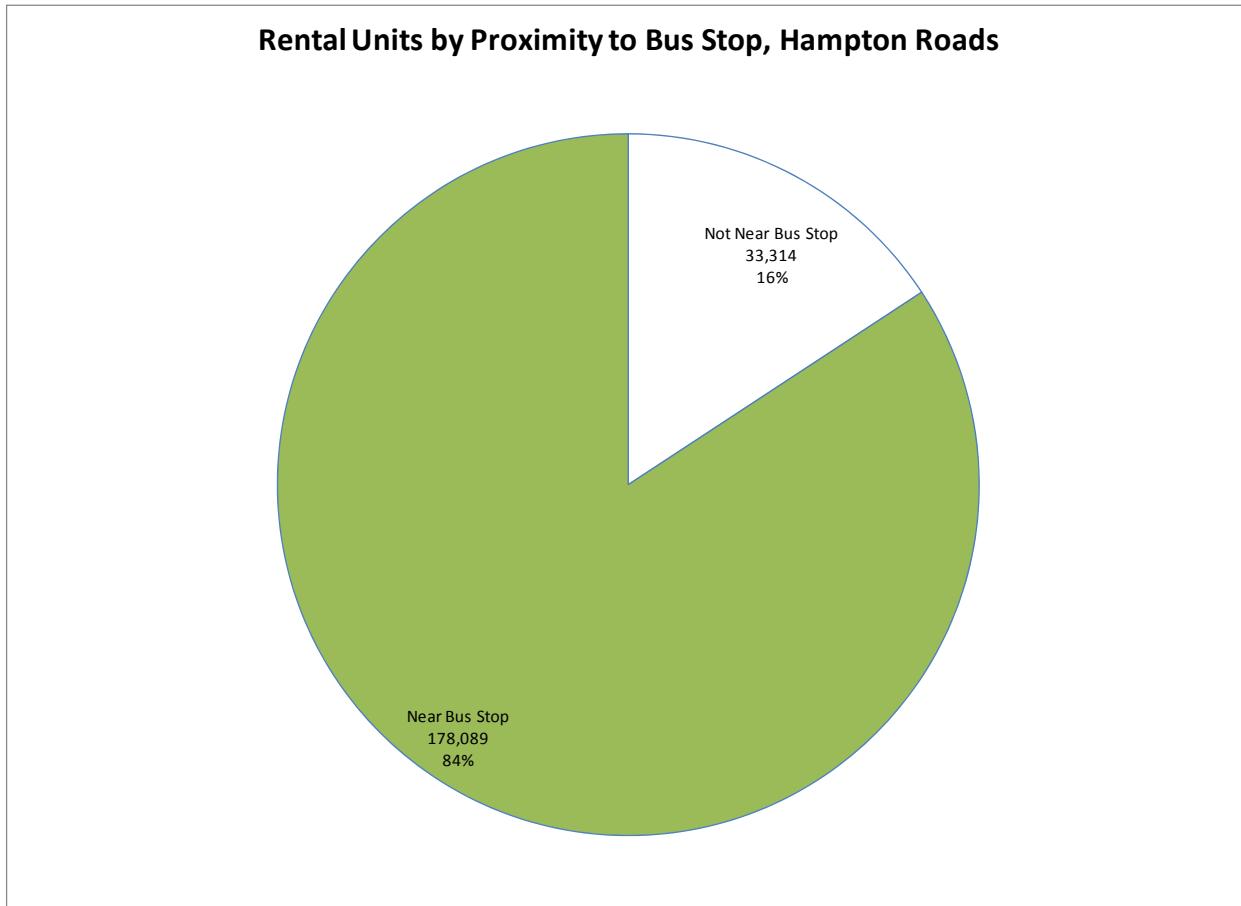
Although some non-drivers live in owner-occupied homes, rental units have a much greater tendency to contain non-drivers. Therefore, the success of placing rental units near bus routes/stops and activity locations will be examined below.²¹ This examination will be conducted in three parts:

- measuring the success of placing rental units near bus routes/stops
- measuring the success of placing rental units near activity locations
- measuring the success of placing rental units near bus routes/stops and activity locations

²¹ Note that an analysis of housing favored by drivers who use transit is beyond the scope of this study.

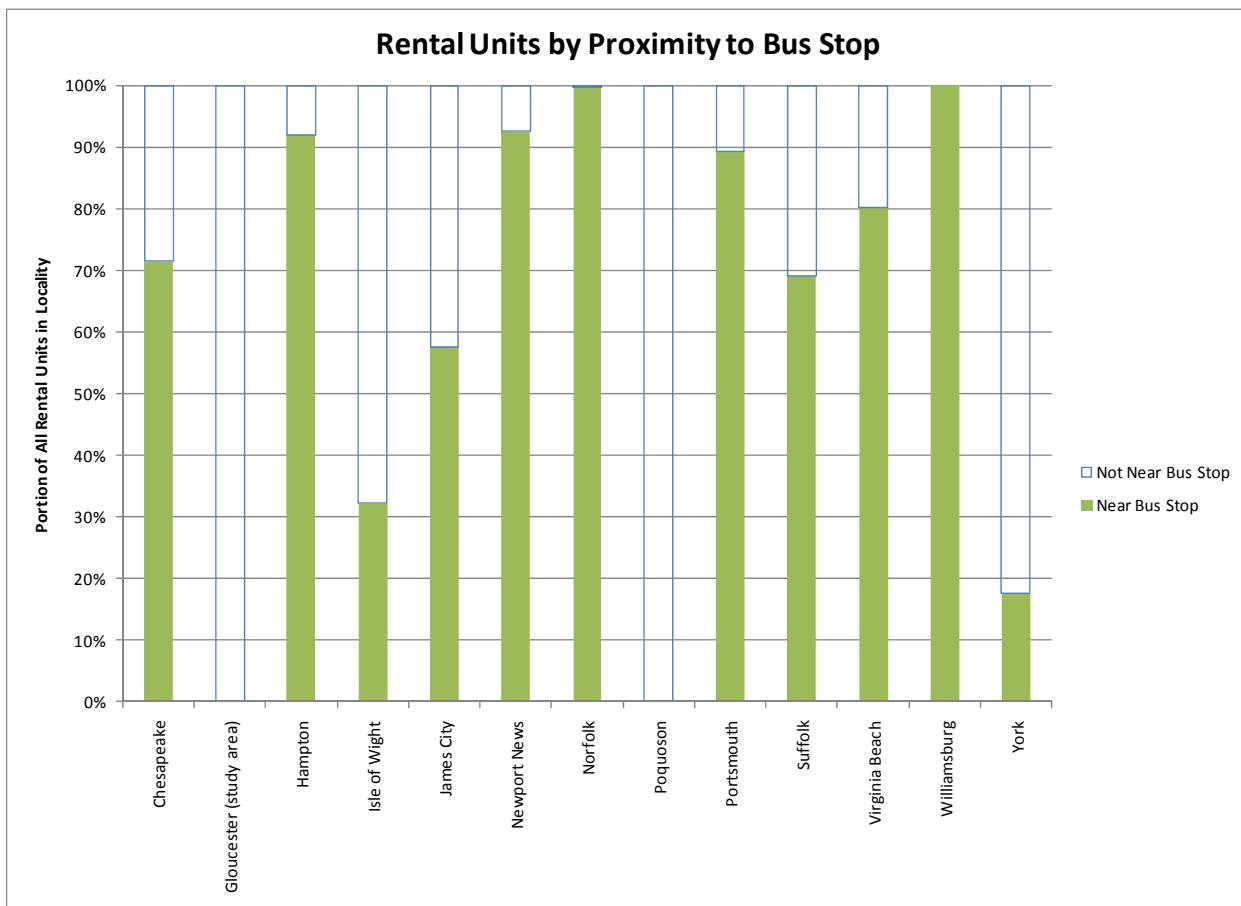
Measuring the Success of Placing Rental Units Near Bus Routes/Stops

Because rental units tend to contain a significant number of non-drivers, as shown above, local governments can improve non-driver mobility by using their zoning authority to further the placement of rental units near bus routes/stops.



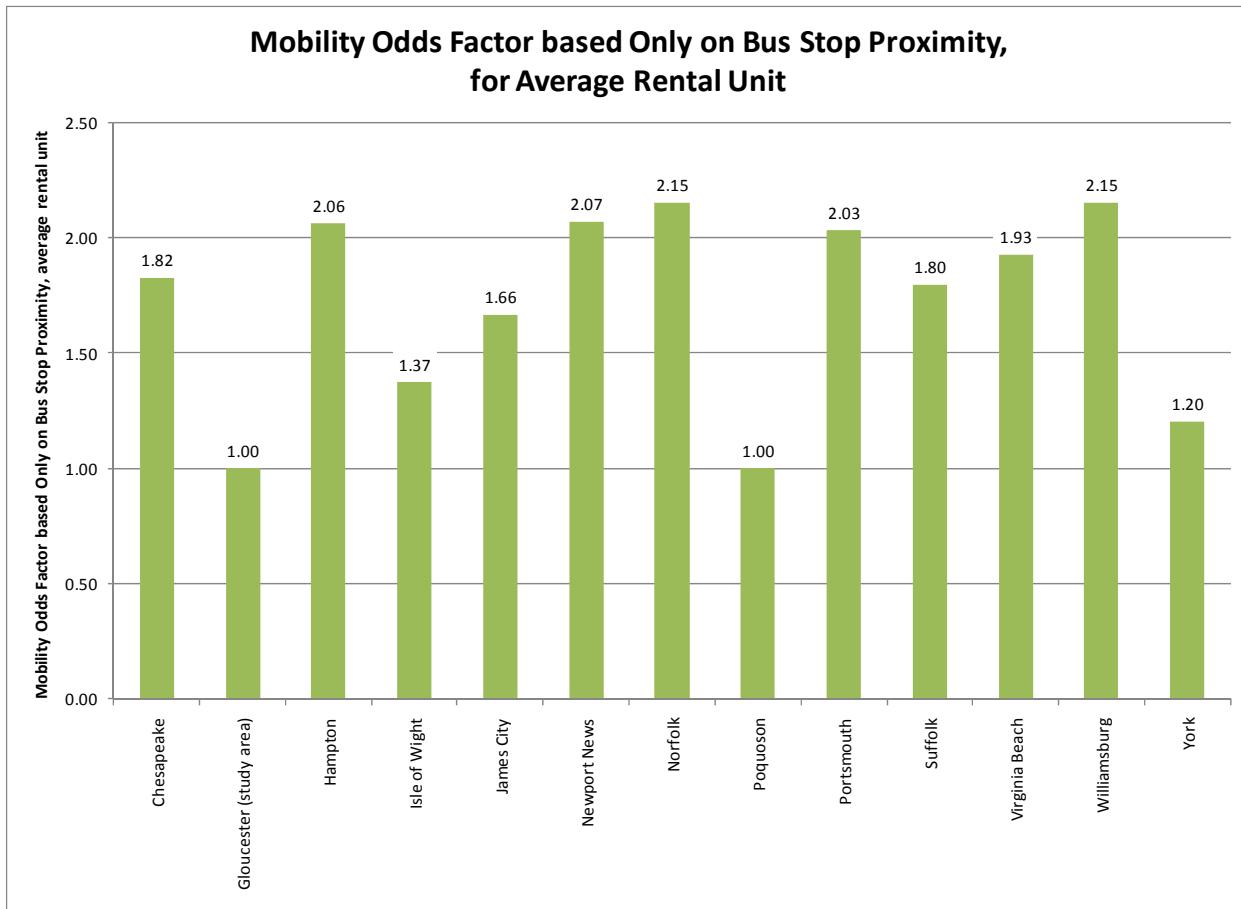
Source: Block_data.xlsx

Fortunately, 84% of rental units in Hampton Roads are located within the mobility influence area of a bus stop.



Source: Block_data.xlsx

In localities with extensive bus networks—Hampton, Newport News, Norfolk, Portsmouth, and Williamsburg—approximately 9 out of 10 rental units have been placed near a bus stop.

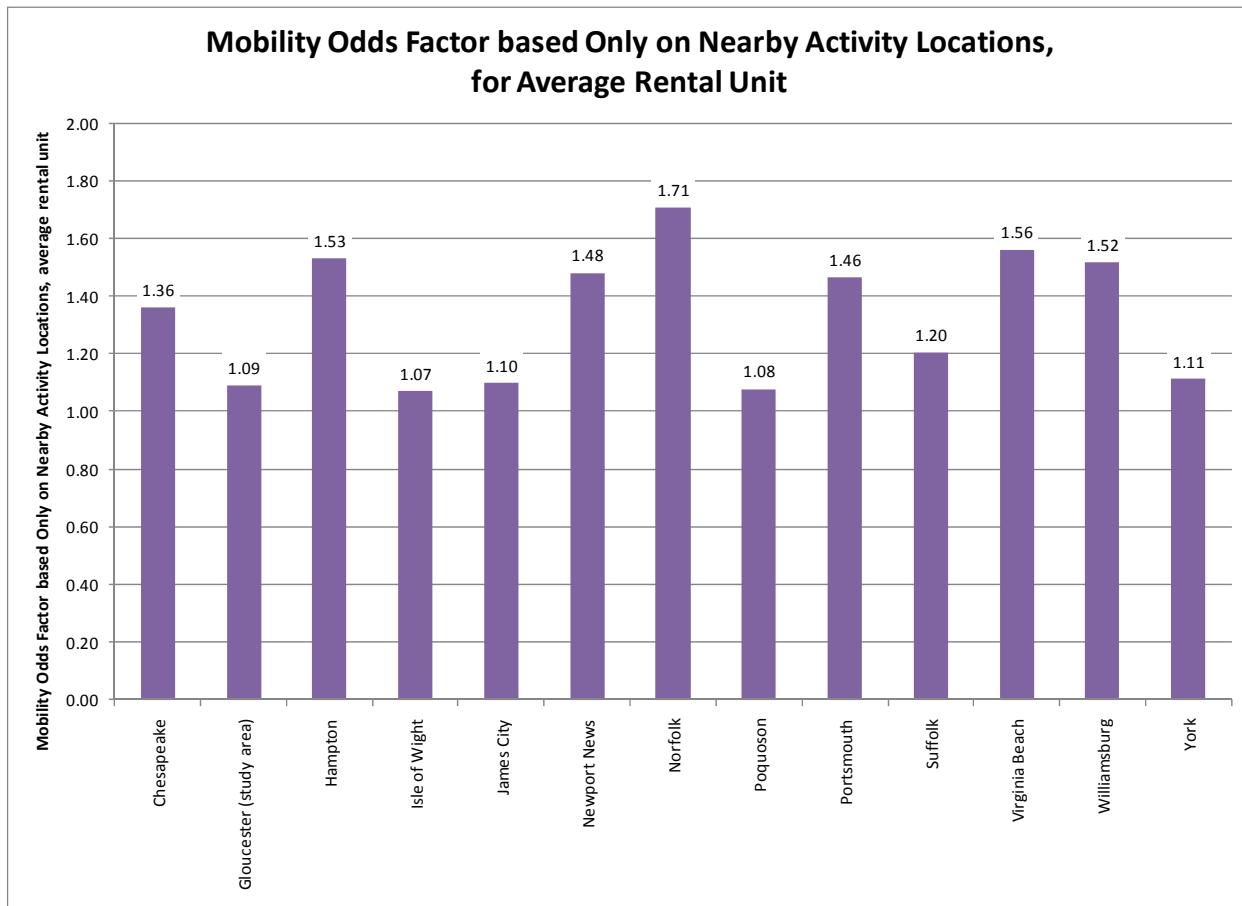


Source: Block_data.xlsx

In localities with extensive bus networks—Hampton, Newport News, Norfolk, Portsmouth, and Williamsburg—people living in rental units, if they are better-walking non-drivers, have—on average—more than twice the bus-based odds of being mobile on a given day than similar persons living away from bus routes/stops. The placement of rental units in Virginia Beach is such that the mobility odds for rental units there are almost doubled.

Measuring the Success of Placing Rental Units Near Activity Locations

Because rental units tend to contain non-drivers, as shown above, local governments can improve non-driver mobility by using their zoning authority to further the placement of rental units near activity locations.



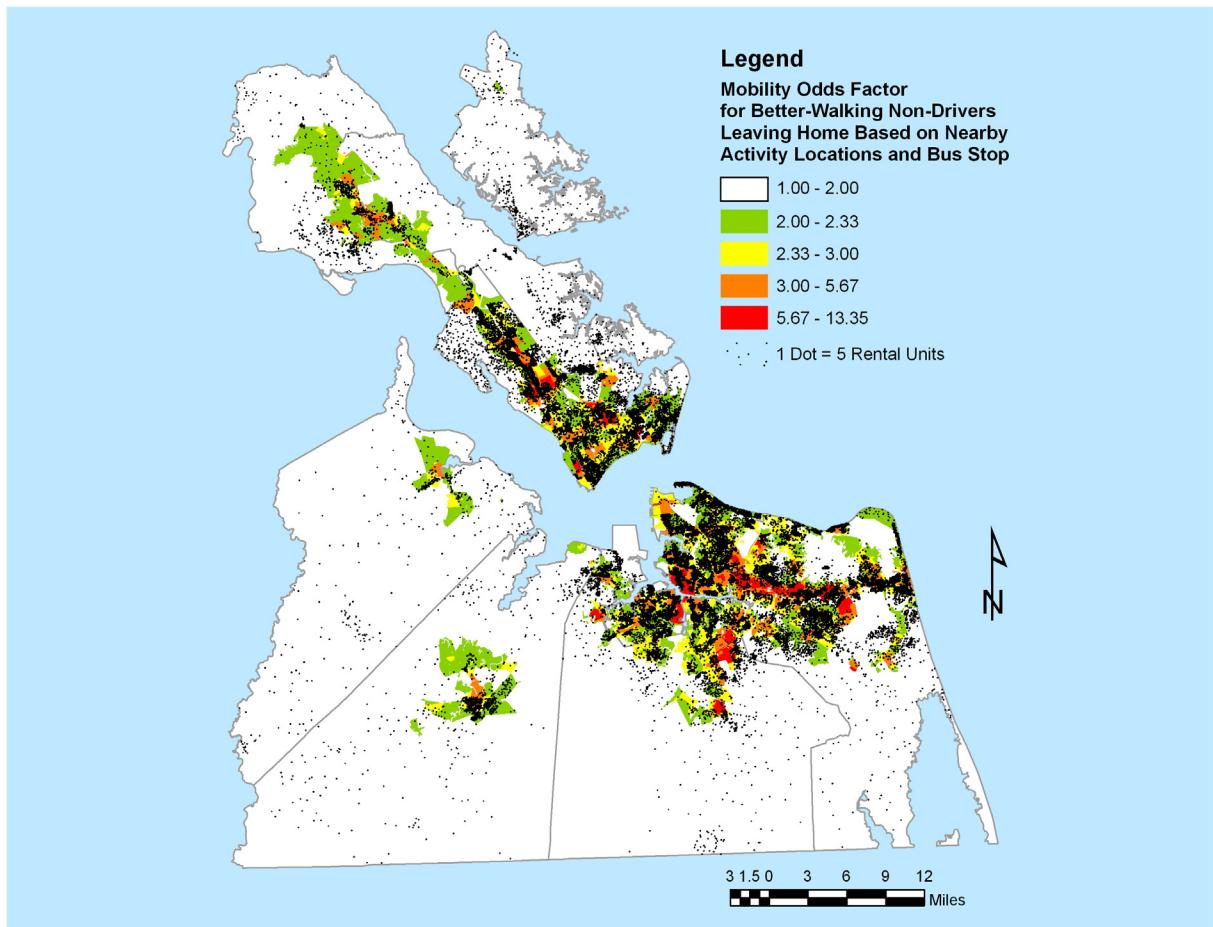
Source: Block_data.xlsx

Hampton, Newport News, Norfolk, Portsmouth, Virginia Beach, and Williamsburg—have placed rental units near activity locations such that people living in rental units, if they are better-walking non-drivers, have activity-location-based odds of being mobile on a given day half again higher than similar persons living away from activity locations. Surprisingly, the placement of rental units in Virginia Beach is such that the activity-location-based mobility odds for rental units there are commensurate with those in Hampton, Newport News, Portsmouth, and Williamsburg.

Measuring the Success of Placing Rental Units Near Bus Routes/Stops and Activity Locations

Having examined above bus stops and activity locations individually, the success of placing rental units near bus routes/stops and activity locations is collectively examined below.

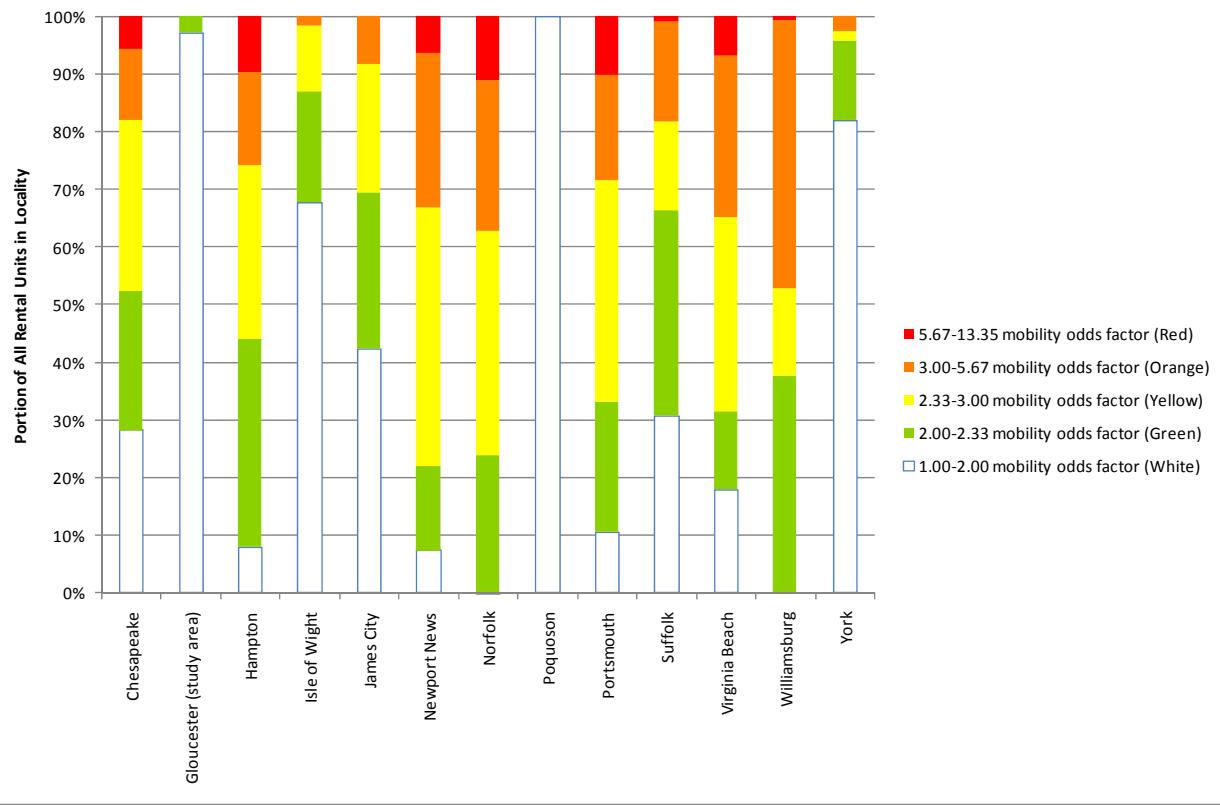
Rental Units vs. Bus-based and Activity-Location-based Mobility



Source: Rental Units on MOF- HR.jpg

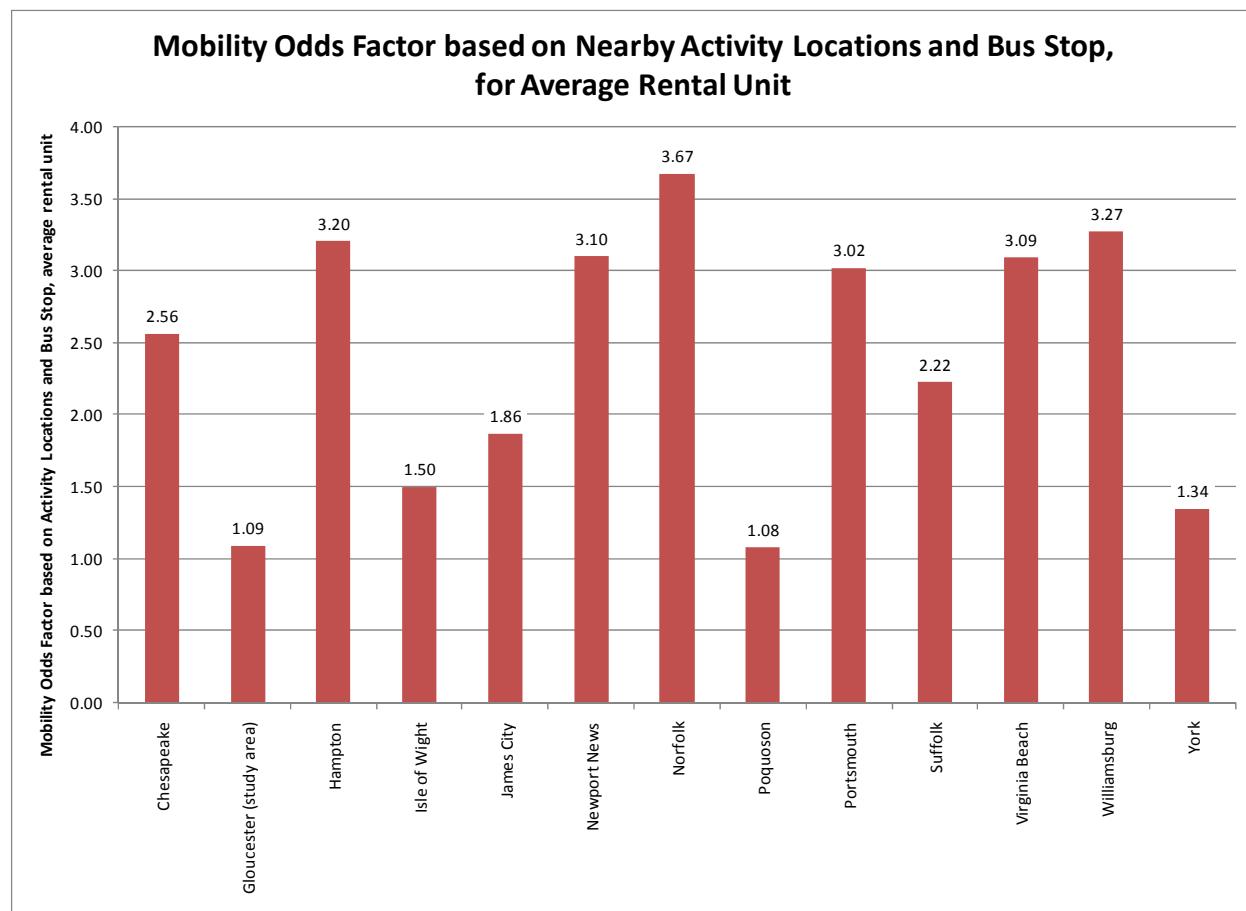
Rental units in Hampton Roads have typically been placed in areas of higher geography-based mobility for better-walking non-drivers.

Mobility Odds Factor Based on Nearby Activity Locations & Bus Stop, for Average Rental Unit



Source: Block_data.xlsx

Localities vary significantly in the portion of rental units which have been placed in areas of higher non-driver mobility.



Source: Block_data.xlsx

Likewise, localities vary significantly in the amount of non-driver mobility provided to rental units. In the following localities, people living in rental units, if they are better-walking non-drivers, have more than three times the odds of being mobile on a given day than similar persons living away from bus routes/stops and activity locations:

- Hampton
- Newport News
- Norfolk
- Portsmouth
- Virginia Beach
- Williamsburg

SPECIFIC SUCCESSES & PROSPECTS IN THE PROXIMITY OF NON-DRIVERS, ACTIVITY LOCATIONS, BUS ROUTES/STOPS, AND BIKE/PED FACILITIES

Prior to examining bicycle and pedestrian facilities, the specific successes and prospects in the proximity of non-drivers and the two measured geographic mobility enhancers—activity locations and bus stops—will be examined.

SPECIFIC SUCCESSES AND PROSPECTS IN THE PROXIMITY OF NON-DRIVERS, ACTIVITY LOCATIONS, AND BUS ROUTES/STOPS

In this section successes—i.e. specific places in each locality which have good proximity between non-drivers and activity locations / bus stops—are identified in order to serve as examples of best practices, and prospects—i.e. those places which have a geographic miss-match between non-drivers and activity locations / bus stops—are identified to allow localities to consider improving non-driver mobility in those places.

The prospect of improving non-driver mobility exists in places where: 1) a large number of non-drivers live but there is no bus service and/or few activity locations, or 2) bus service and many activity locations are situated but few non-drivers live. In the first type of place, the addition of bus service and/or activity locations will improve the mobility of existing non-drivers. In the second type of area, the addition of housing attractive to non-drivers, i.e. rental units and senior housing, will provide high mobility for the non-drivers attracted to that housing.

Better Methodology Based on Improved Non-Driver Location Data

The identification of specific successes and prospects in this section of the report represents an improvement to the “Findings” pages of “The Location of Non-Drivers in Hampton Roads, the 2008 HRTPO non-driver study. The current identification effort has the same purpose as that of the previous findings effort—i.e. to point out specific locations in each locality of successful and prospectively successful proximity between non-drivers and activity locations / bus stops—but the current identification effort is based on a better method of analysis enabled by improved non-driver location data.

Improved Non-Driver Location Data

In order to pin-point the residential location of non-drivers such that their proximity to bus routes/stops and activity locations could be measured accurately, non-drivers were located by block²² for this study. The number of non-drivers in each TAZ, from the 2008 study, were dis-aggregated to the blocks in each TAZ using the findings of a linear regression. Although census data on the block level is limited for privacy reasons, the tenure of housing units (owner-occupied vs. renter-occupied) is published on the block level. Applying linear regression to TAZ-level data, it was found that tenure explains the number of non-drivers in a household to a highly significant degree. As shown by the

²² The median block size in Hampton Roads is 6 acres (the area of a square measuring 0.10 mile on each side).

tenure coefficients below, renter-occupied housing units tend to contain three times as many non-drivers as owner-occupied housing units (0.327 and 0.117 per unit, respectively).

Regression of TAZ-Level Household Data for Hampton Roads: The Relationship Between Tenure and Number of Non-Drivers

Model Summary				
Model	R	R Square(a)	Adjusted R Square	Std. Error of the Estimate
1	.926(b)	.858	.857	66.519
a For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.				
b Predictors: Renter Occ'd HUs, Owner Occ'd HUs				

ANOVA(c,d)						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26036200.136	2	13018100.068	2942.081	.000(a)
	Residual	4323022.864	977	4424.793		
	Total	30359223.000(b)	979			
a Predictors: Renter Occ'd HUs, Owner Occ'd HUs						
b This total sum of squares is not corrected for the constant because the constant is zero for regression through the origin.						
c Dependent Variable: Non-Drivers, Age 18+, in Households, 2000						
d Linear Regression through the Origin						

Coefficients(a,b)							
Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.
		B	Std. Error	Beta	B		
1	Owner Occ'd HUs	.117	.005		.358	23.752	.000
	Renter Occ'd HUs	.327	.007		.666	44.196	.000
a Dependent Variable: Non-Drivers, Age 18+, in Households, 2000							
b Linear Regression through the Origin							

Source: output.htm

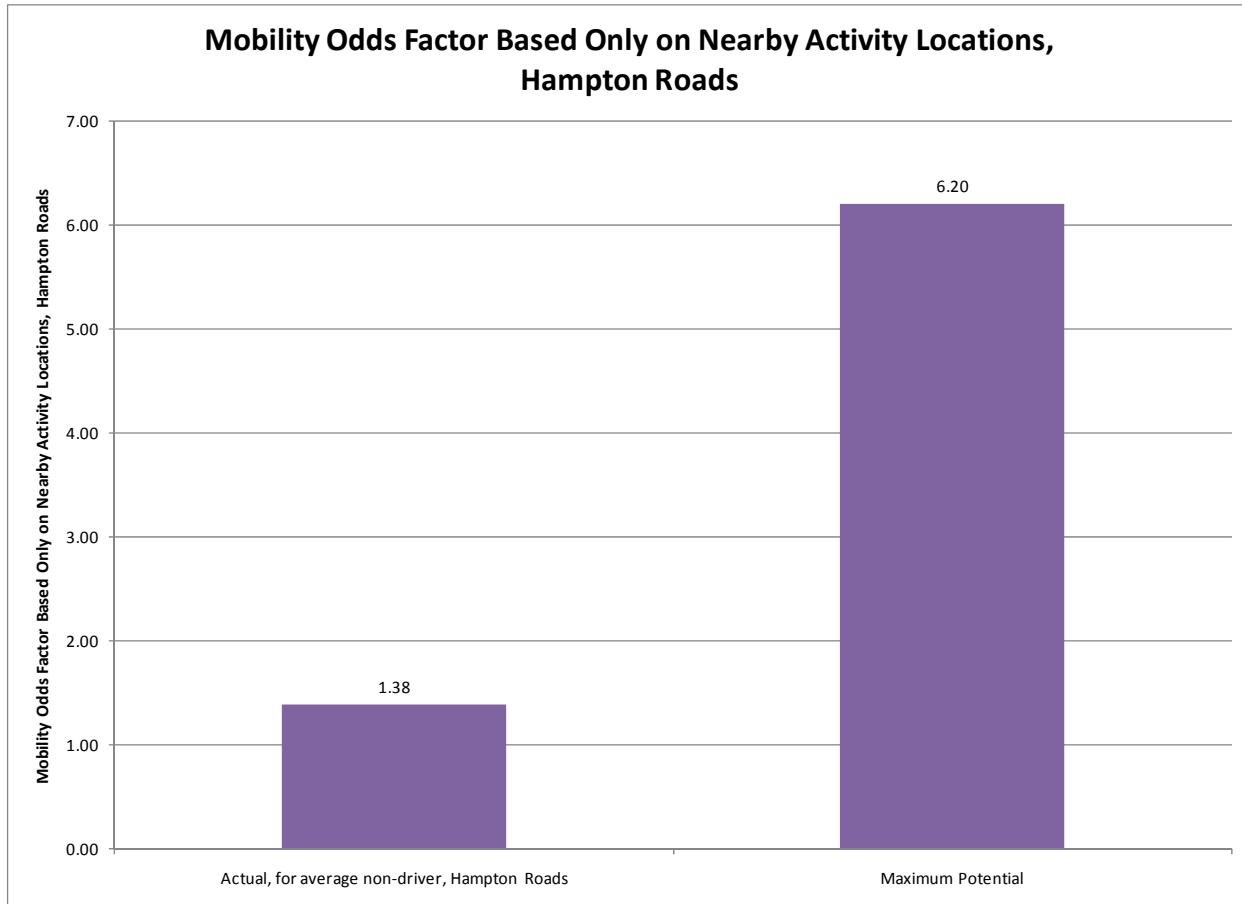
Based on this regression, the number of non-drivers in each of the 20,000 blocks in Hampton Roads was estimated by multiplying the number of renter-occupied housing units and the number of owner-occupied housing units by the appropriate coefficient from above (0.327 and 0.117 per unit, respectively), adding the two together, summing the estimates by TAZ, and then adjusting each block's estimate in order that the TAZ control total be met.

Better Methodology

Having access, as described above, to more detailed (block level) non-driver location data, this study was able to use a better method of identifying successes and prospects in the proximity of non-drivers and activity locations / bus stop than the method used in the 2008 report. In this study, successes and prospects were identified by reviewing maps showing block-level non-driver locations and a direct measure of the effectiveness of the proximity of non-drivers and activity locations, i.e. the mobility odds factors (MOFs) based on nearby bus stop and activity location units calculated for each of the region's 20,000 blocks (as described in the "Method of Measuring Opportunity" section above).

This usage of a direct measure of effectiveness represents a significant improvement over the TAZ-based methodology used in the 2008 non-driver location study. In that study, the proximity between non-drivers and activity locations was judged by looking at maps showing the number of non-drivers in each TAZ and the number of business trips per square mile in each TAZ. In the 2008 study, the proximity between non-drivers and bus stops was judged by looking at maps showing the number of non-drivers in each TAZ and the location of bus stops. Given the large size of TAZs (median size: 330 acres), the proximity between non-drivers and activity locations / bus stop could not be ascertained in the 2008 study using the direct MOF-based measure employed in this 2009 study.

The Potential of Co-Positioning Non-Drivers and Activity Locations



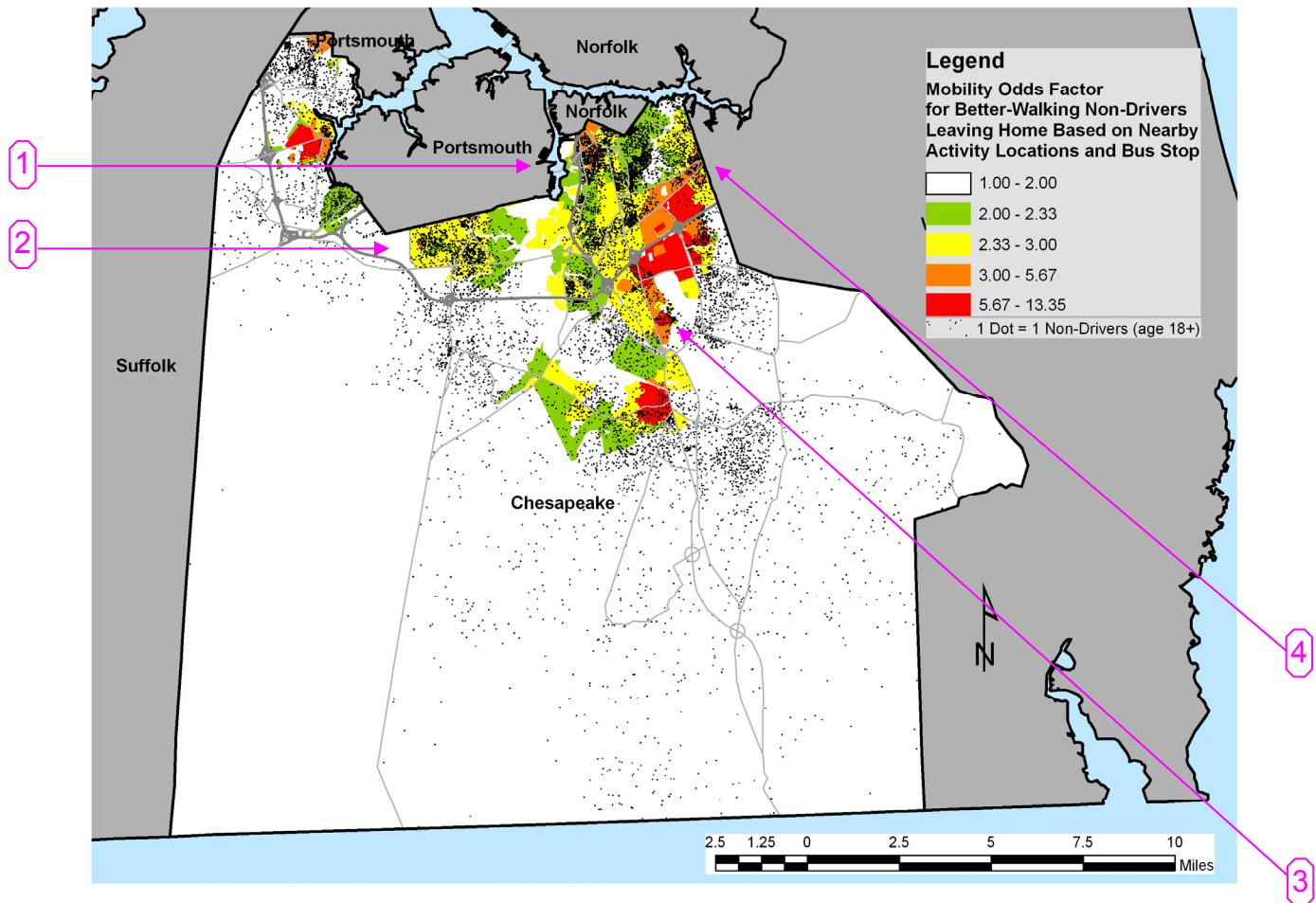
Source: Block_data.xlsx

As measured in the TPO's June 2007 non-driver study ("Improving the Mobility of Non-Drivers Using Proximity to Destinations and Bus Routes"), all other things being equal, better-walking non-drivers living in high activity locations in Hampton Roads have odds of leaving home as much as 6.2 times higher than a better-walking non-driver living away from activity locations. Because the co-location of non-drivers and activity locations in Hampton Roads is imperfect, the average non-driver in Hampton Roads currently experiences an activity-location-based mobility odds factor of only 1.38. Therefore, as shown on the above chart, the potential for improving non-driver mobility in Hampton Roads by co-positioning non-drivers and activity locations is great.

Specific successes and prospects in the proximity of non-drivers, activity locations, and bus routes/stops are examined for each locality, alphabetically, below.

Chesapeake

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



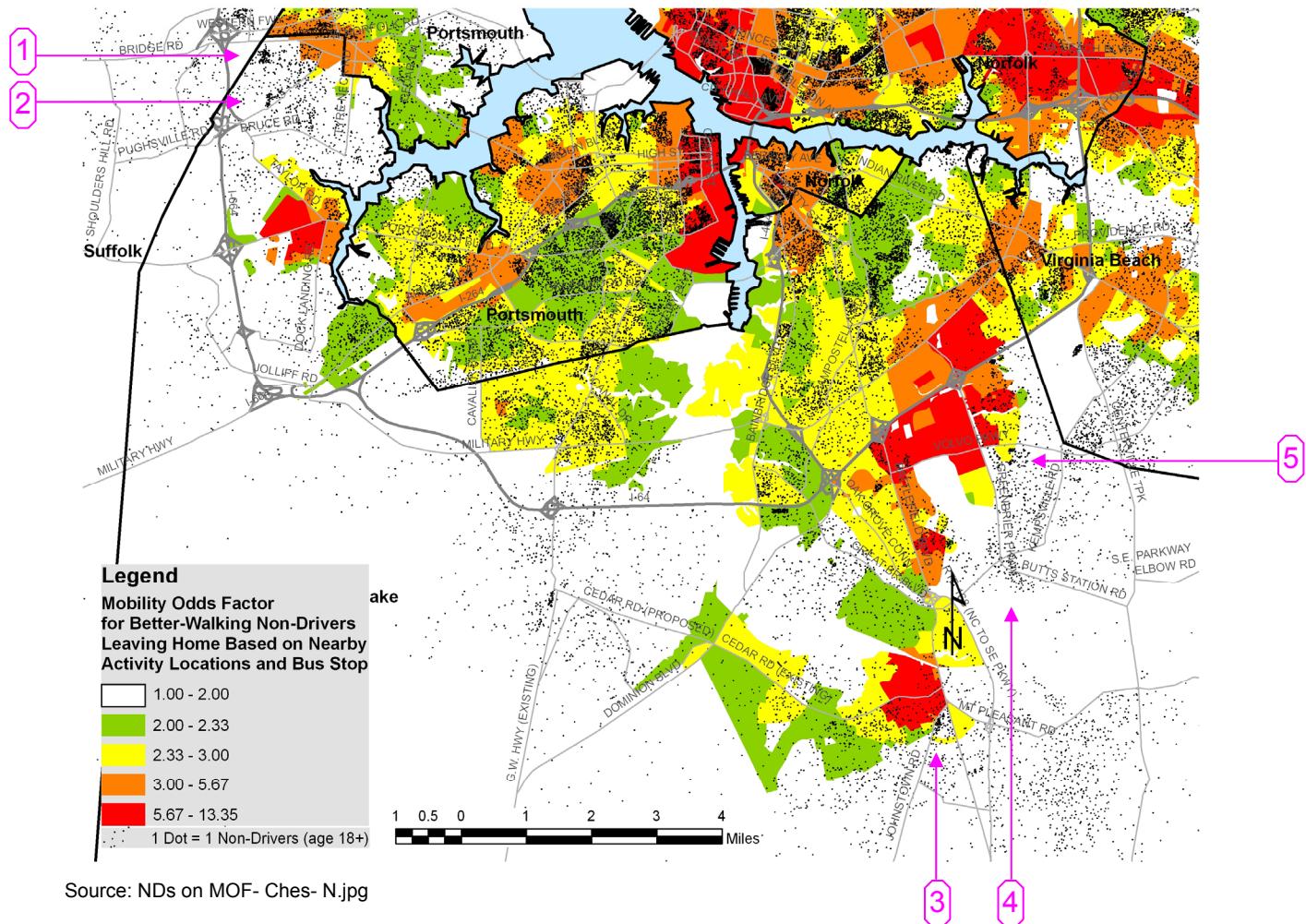
Successes

Concentrations of non-drivers are enjoying the higher mobility provided by nearby bus routes/stops and activity locations in the following areas (indicated by **numbered pink arrows**, above):

1. South Norfolk
2. Camelot
3. Knells Ridge
4. Crosswinds

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



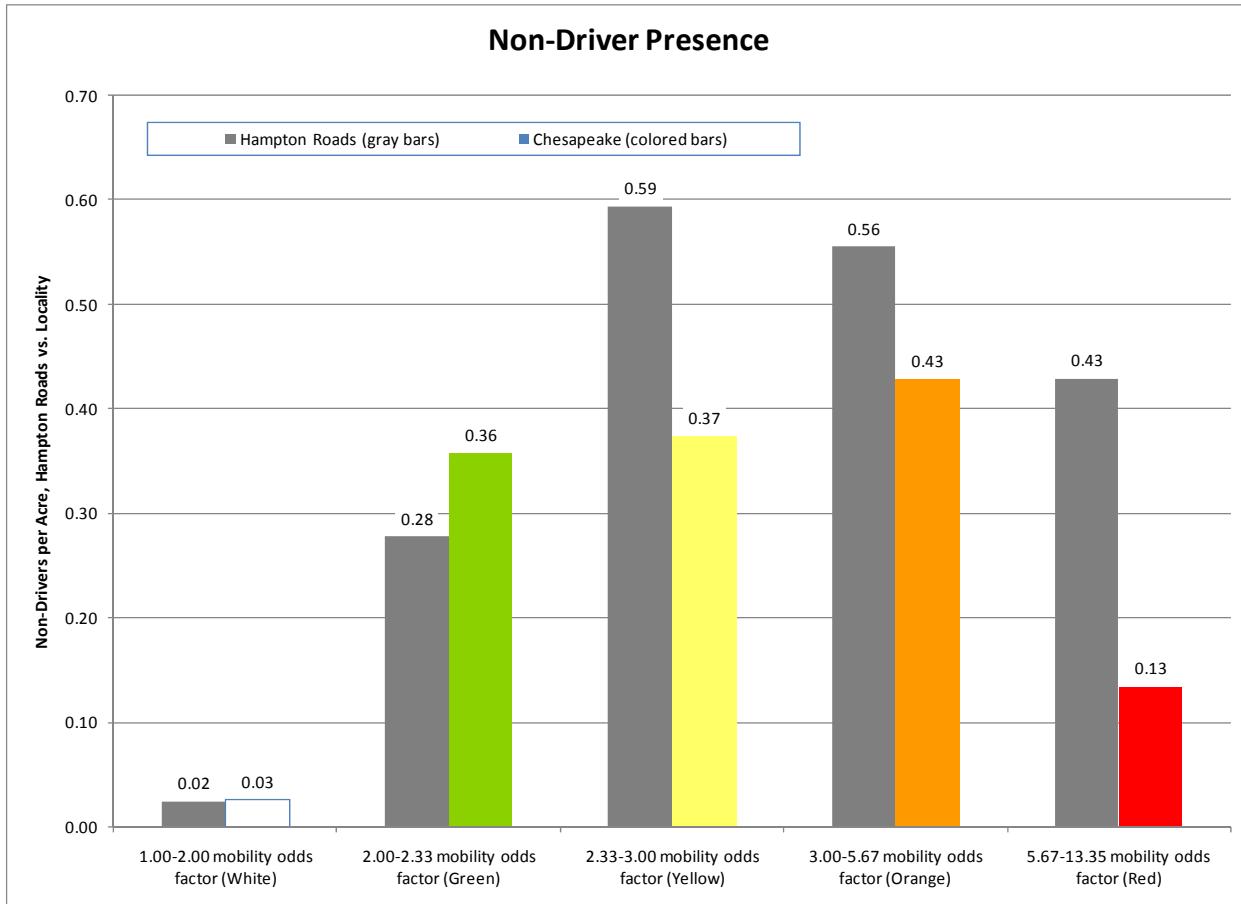
There are concentrations of non-drivers with low geography-based mobility²³ (colored white above) in the following areas (indicated by numbered pink arrows, above):

1. Wellington, Churchland
2. Churchland, along Taylor Rd
3. Great Bridge, along Johnstown Rd
4. Along Butts Station Rd
5. Greenbrier, along Volvo Pkwy

Using budgetary and zoning authority to place bus service and more activity locations (government, commercial, and non-profit) in these low mobility areas would improve the mobility of the non-drivers living there.

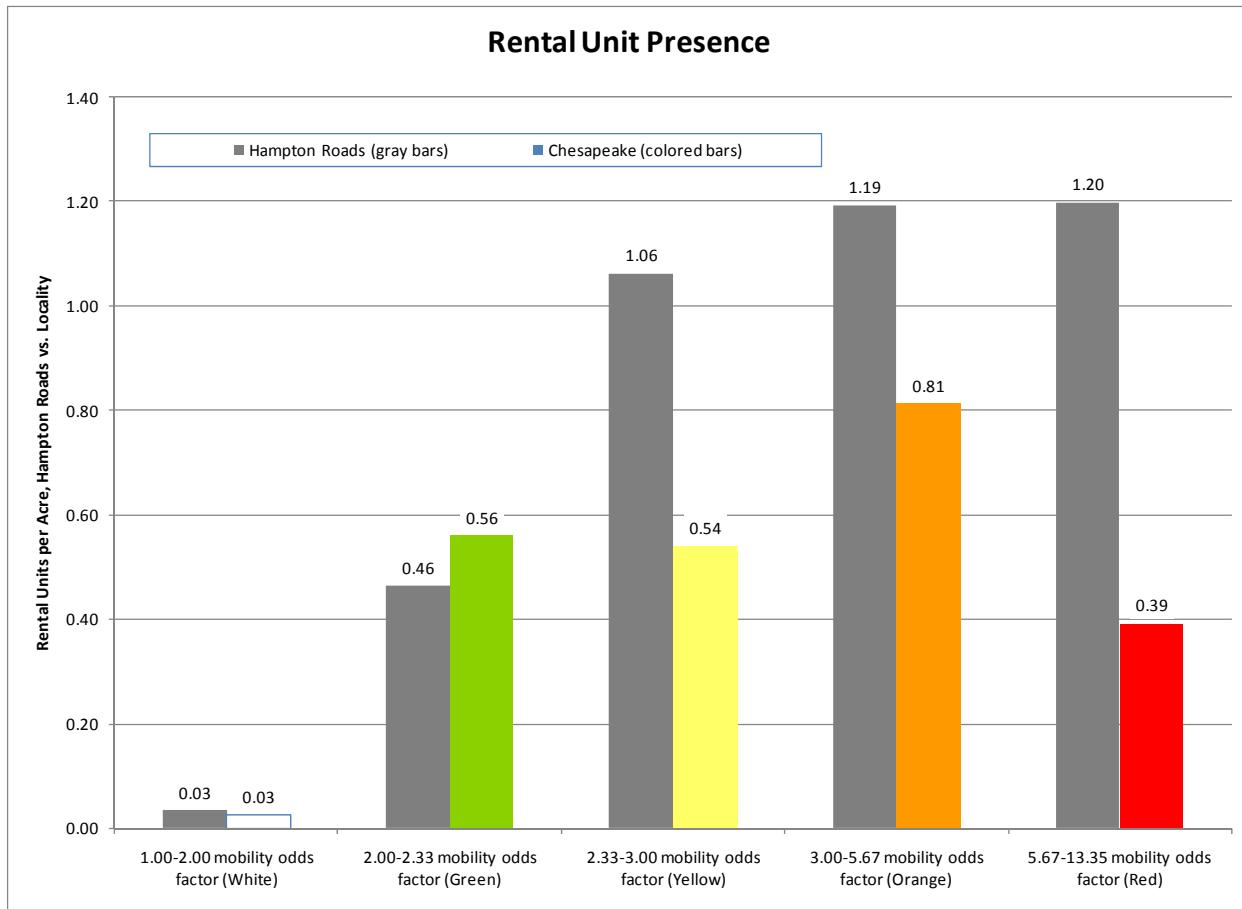
²³ i.e. bus-based mobility and activity-location-based mobility

Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

Although, as shown above, Chesapeake's low mobility area (white bar) and medium-low mobility area (green bar)—the bulk of the city's acreage—contain a typical number of non-drivers, its higher mobility areas (yellow, orange, and red above and on map on previous page) contain fewer non-drivers per acre than the regional averages for those mobility levels.



Source: Block_data.xlsx

Chesapeake's higher mobility areas (yellow, orange, and red above and on map on following page) also contain fewer rental units per acre than the regional averages for those mobility levels, as shown above.

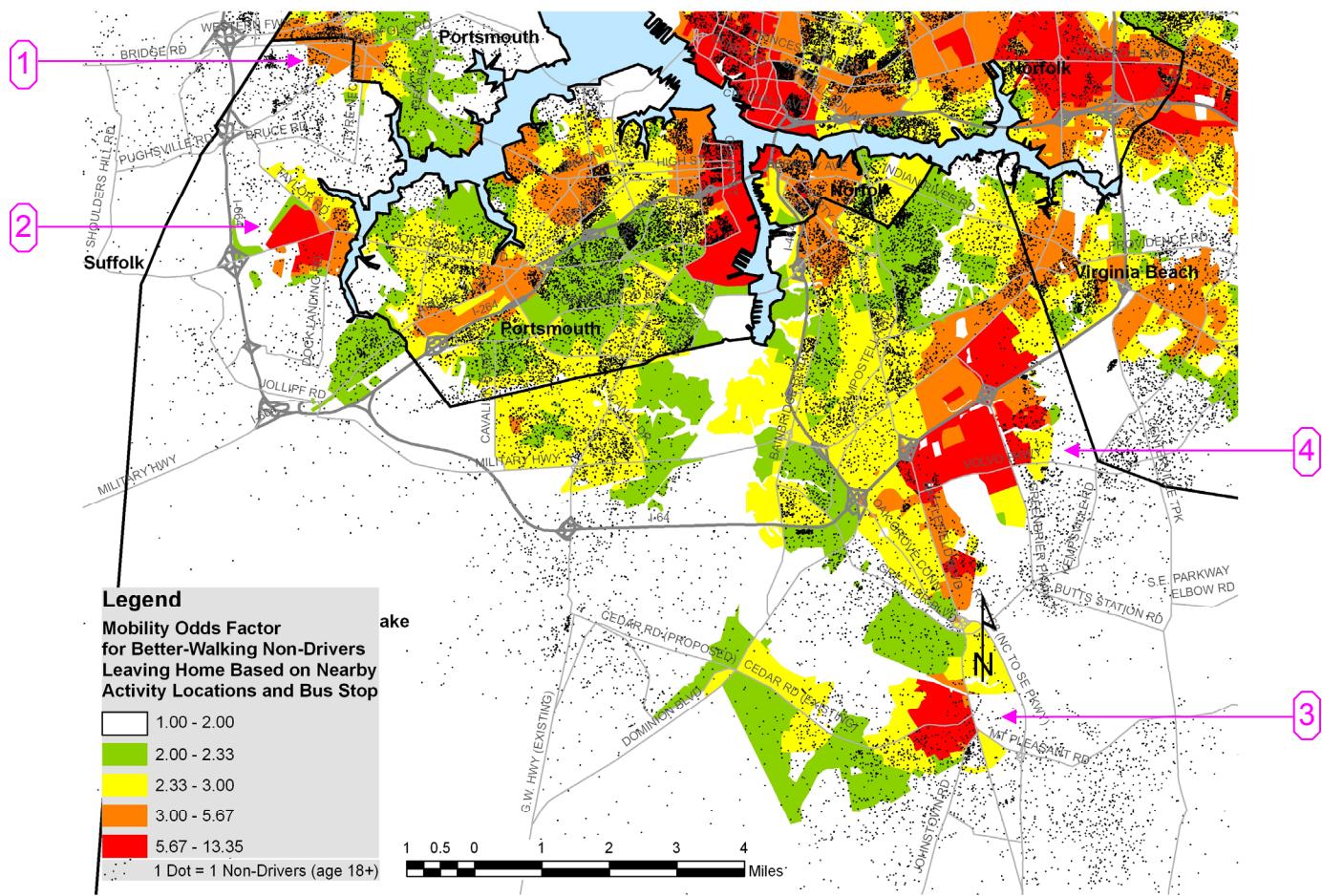
Given:

- 1) the below-average number of non-drivers in Chesapeake's higher mobility areas as discussed on the previous page,
- 2) the fact that rental units tend to contain three times the number of non-drivers found in owner occupied units, as demonstrated in a previous section, and
- 3) the below-average number of rental units in Chesapeake's higher mobility areas, as shown on the chart above,

there may be demand for more rental units in Chesapeake's higher mobility areas by non-drivers seeking such mobility.

If open land or redevelopment opportunities are available, local government could use its zoning authority, if necessary, to enable the construction of housing expected to attract non-drivers—i.e. apartments and senior housing—in these higher mobility areas. In this way, non-drivers relocating to these new homes from areas of lower mobility will experience improved mobility.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Ches- N.jpg

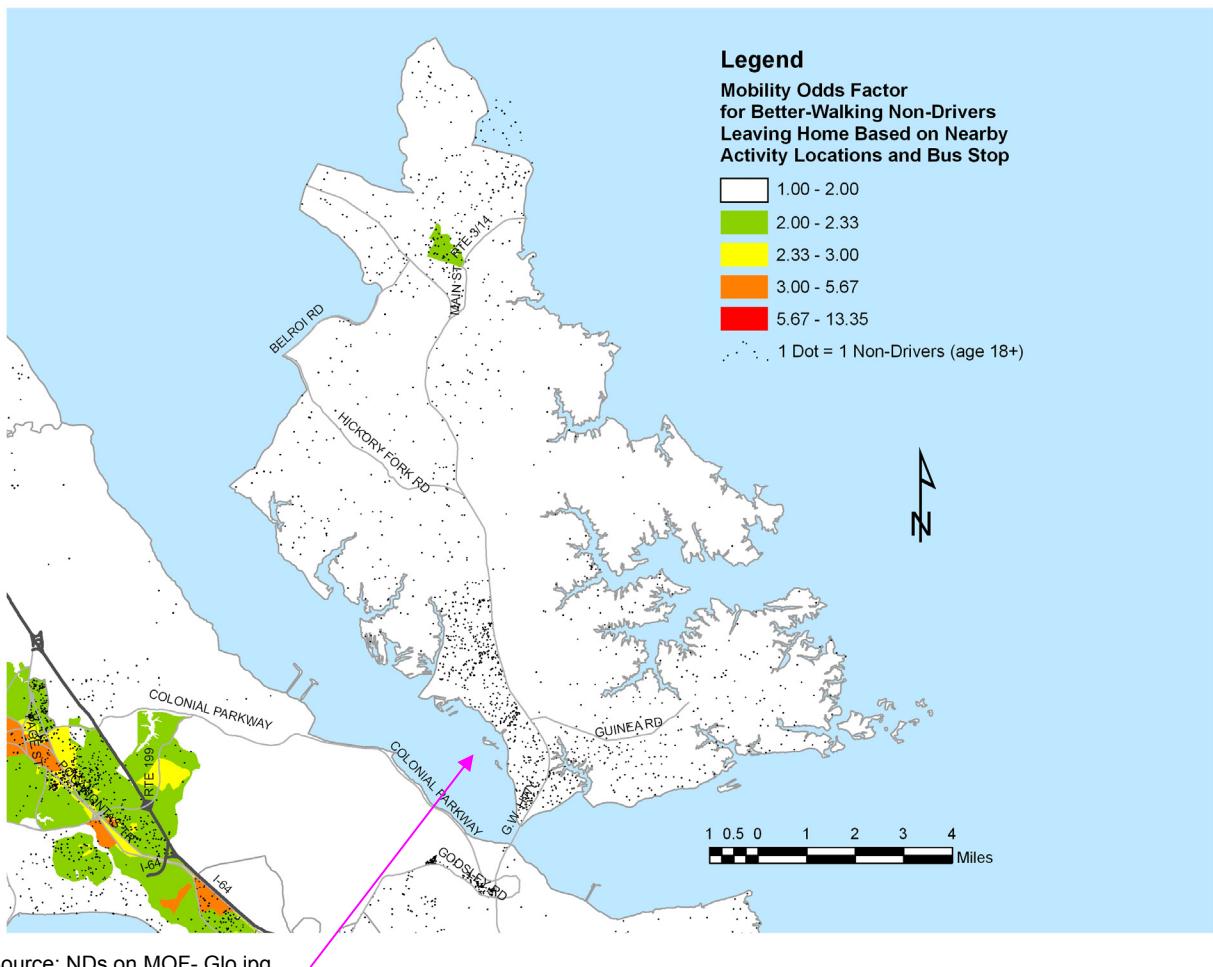
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have medium-high or high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Churchland (orange area)
2. Chesapeake Square (red area)
3. Great Bridge (red area)
4. Greenbrier (red area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Gloucester County

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Glo.jpg

Successes

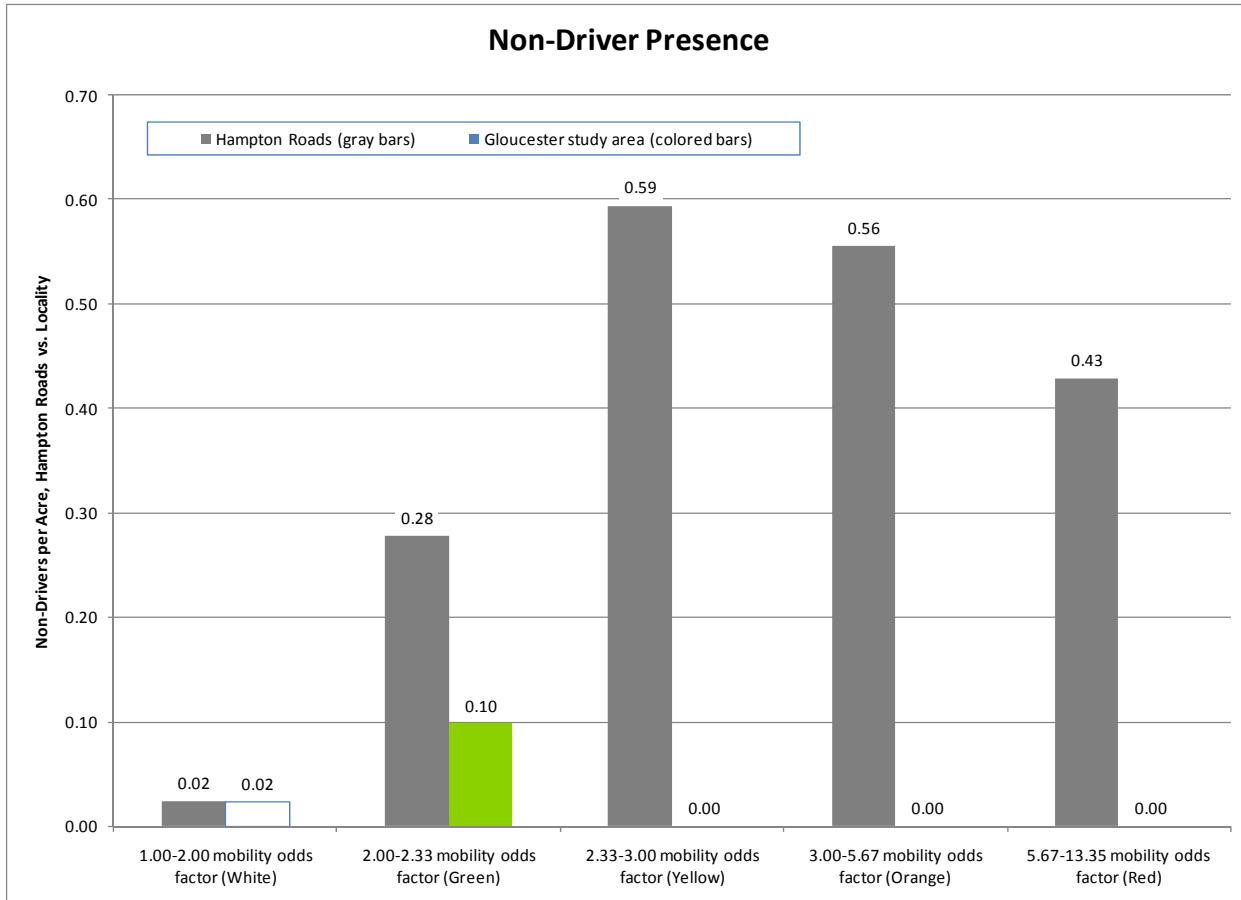
The non-drivers in the Courthouse area (green, above) enjoy higher mobility induced by the activity locations sited there.

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The concentration of non-drivers in **Gloucester Point** (noted by **pink arrow** above) has low geography-based mobility²⁴. Using budgetary and zoning authority to place bus service and more activity locations (government, commercial, and non-profit) in this low mobility area would improve the mobility of the non-drivers living there.

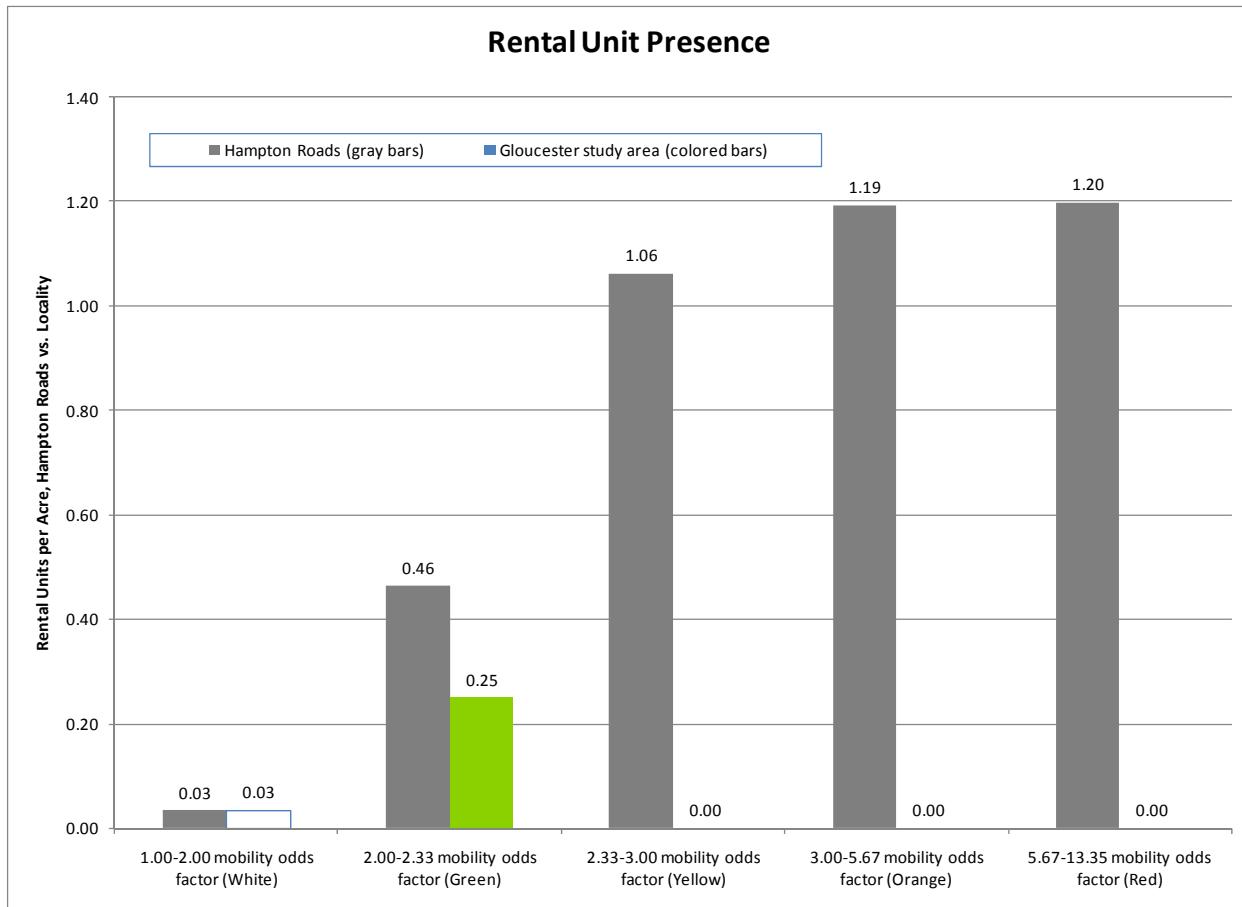
²⁴ i.e. bus-based mobility and activity-location-based mobility

Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

Although, as shown via white bar above, Gloucester's low mobility area—the bulk of the county—contains a typical number of non-drivers, its higher mobility area near the Courthouse (green above and on map on previous page) contains fewer non-drivers per acre than the regional average for that mobility level.



Source: Block_data.xlsx

Gloucester's higher mobility area near the Courthouse (green above and on map in this section) contains fewer rental units per acre than the regional average for that mobility level.

Given:

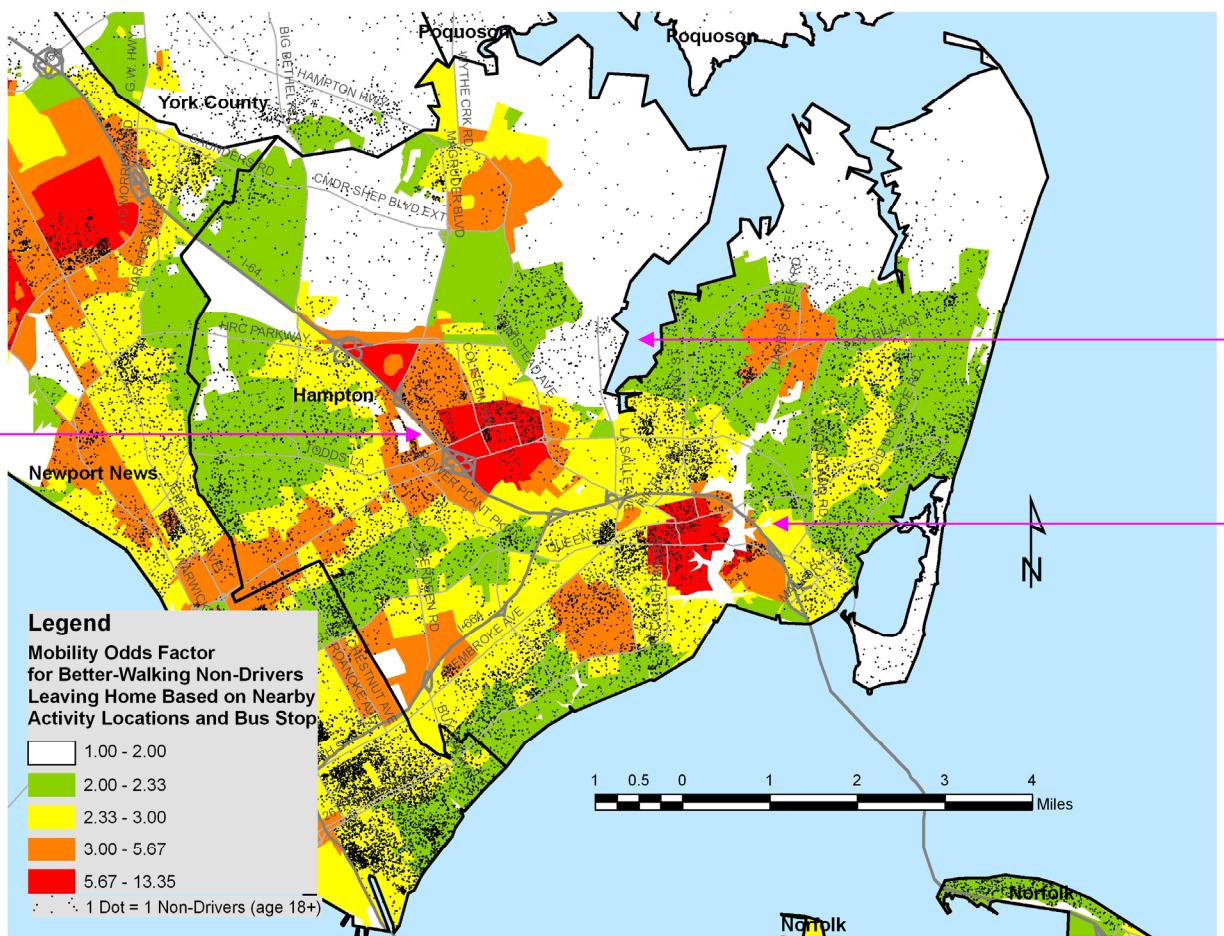
- 1) the below-average number of non-drivers in Gloucester's higher mobility area (near the Courthouse), as discussed on the previous page,
- 2) the fact that rental units tend to contain three times the number of non-drivers found in owner occupied units, as demonstrated in a previous section, and
- 3) the below-average number of rental units in Gloucester's higher mobility area (near the Courthouse), as shown on the chart above,

there may be demand for more rental units in the Courthouse area by non-drivers seeking the higher mobility there.

If open land or redevelopment opportunities are available, local government could use its zoning authority, if necessary, to enable the construction of housing expected to attract non-drivers—i.e. apartments and senior housing—in the higher-mobility Courthouse area. In this way, non-drivers relocating to these new homes from areas of lower mobility will experience improved mobility.

Hampton

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Ham.jpg

Successes

Concentrations of non-drivers are enjoying the higher mobility provided by nearby bus routes/stops and activity locations in the following red areas (indicated by **numbered pink arrows** above):

1. **Downtown** (red area)
2. **Coliseum Central** (red area)

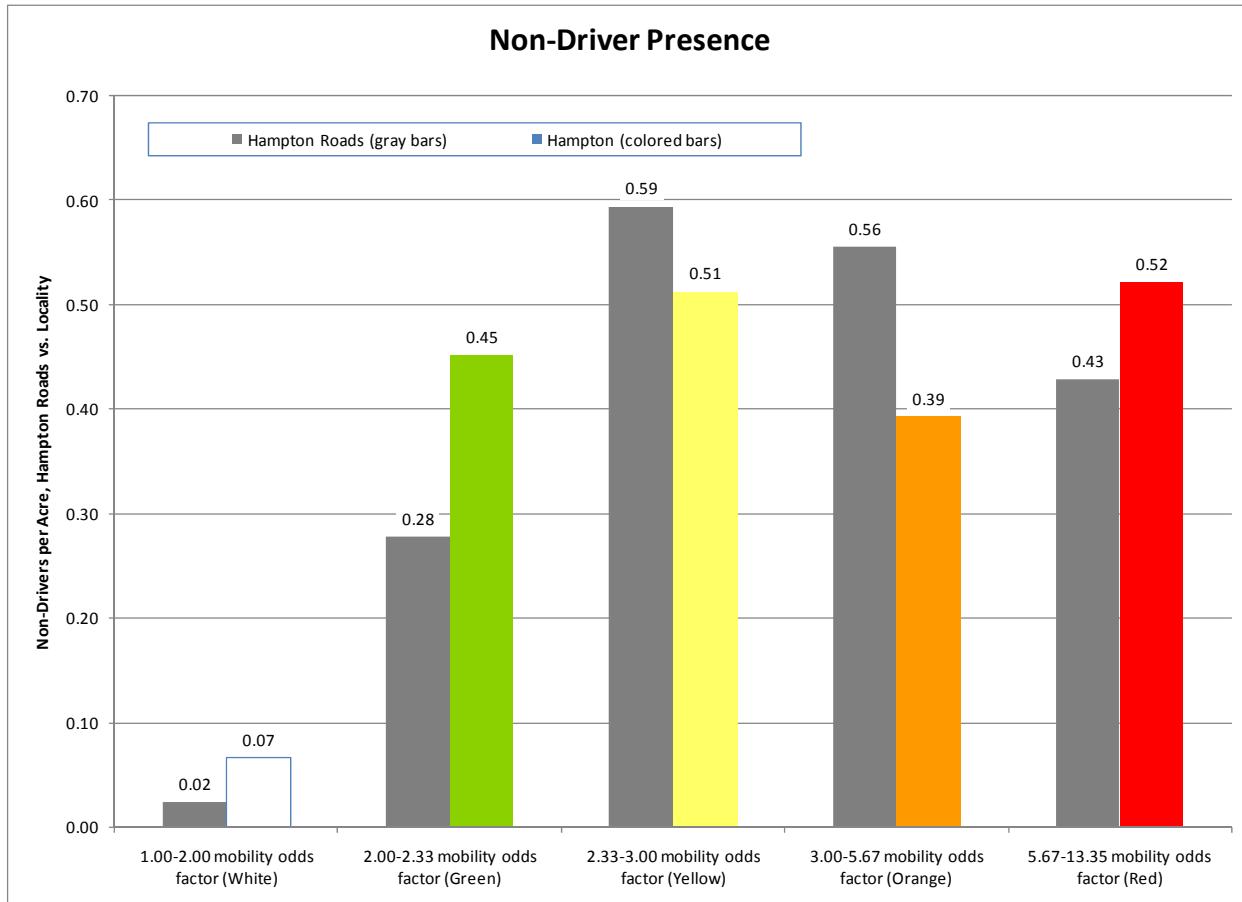
Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The concentration of non-drivers in the **LaSalle Ave & Tide Mill Lane** vicinity (white area indicated by **pink arrow [3]** at upper-right above) has low geography-based mobility²⁵. Using budgetary and zoning authority to place bus service and more activity locations

²⁵ i.e. bus-based mobility and activity-location-based mobility

(government, commercial, and non-profit) in this low mobility area would improve the mobility of the non-drivers living there.

Prospects for Adding Non-Drivers to Higher Mobility Areas

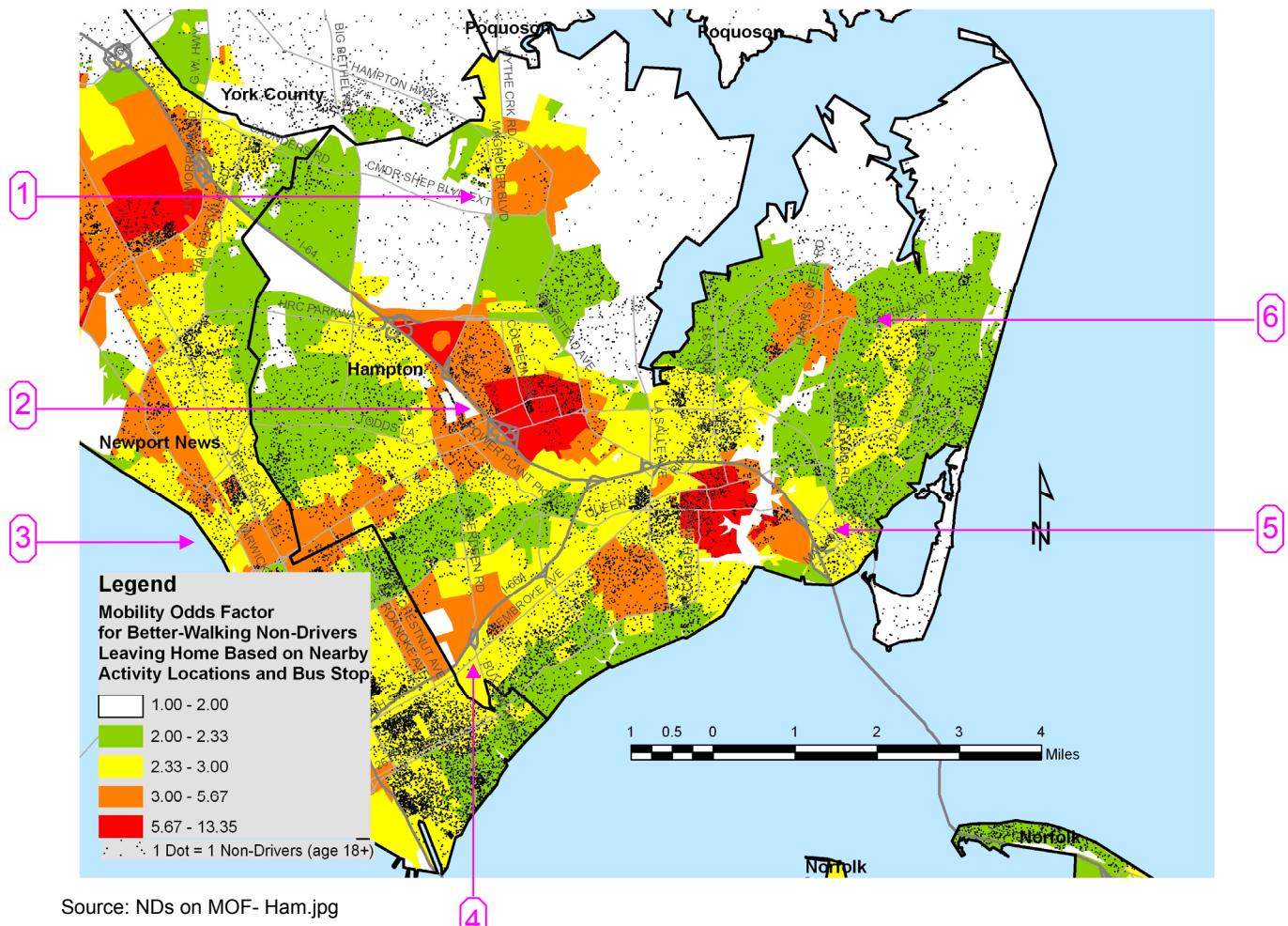


Source: Block_data.xlsx

Hampton's low mobility area (white bar above, and white area on map on previous page) contains three times the regional average of non-drivers per acre for that mobility level, reinforcing the usefulness of bus service and more activity locations in the low mobility area near LaSalle Ave & Tide Mill Lane discussed above.

As shown above, Hampton's higher mobility areas (green, yellow, orange, and red above and on map on following page) contain numbers of non-drivers per acre which roughly match the regional averages for those mobility levels. By zoning an adequate amount of land for housing expected to attract non-drivers—i.e. apartments and senior housing—in these areas of higher mobility, and not in areas of low mobility, the city will provide good geography-based mobility to the non-drivers who will live in those homes as demand for their construction appears.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Ham.jpg

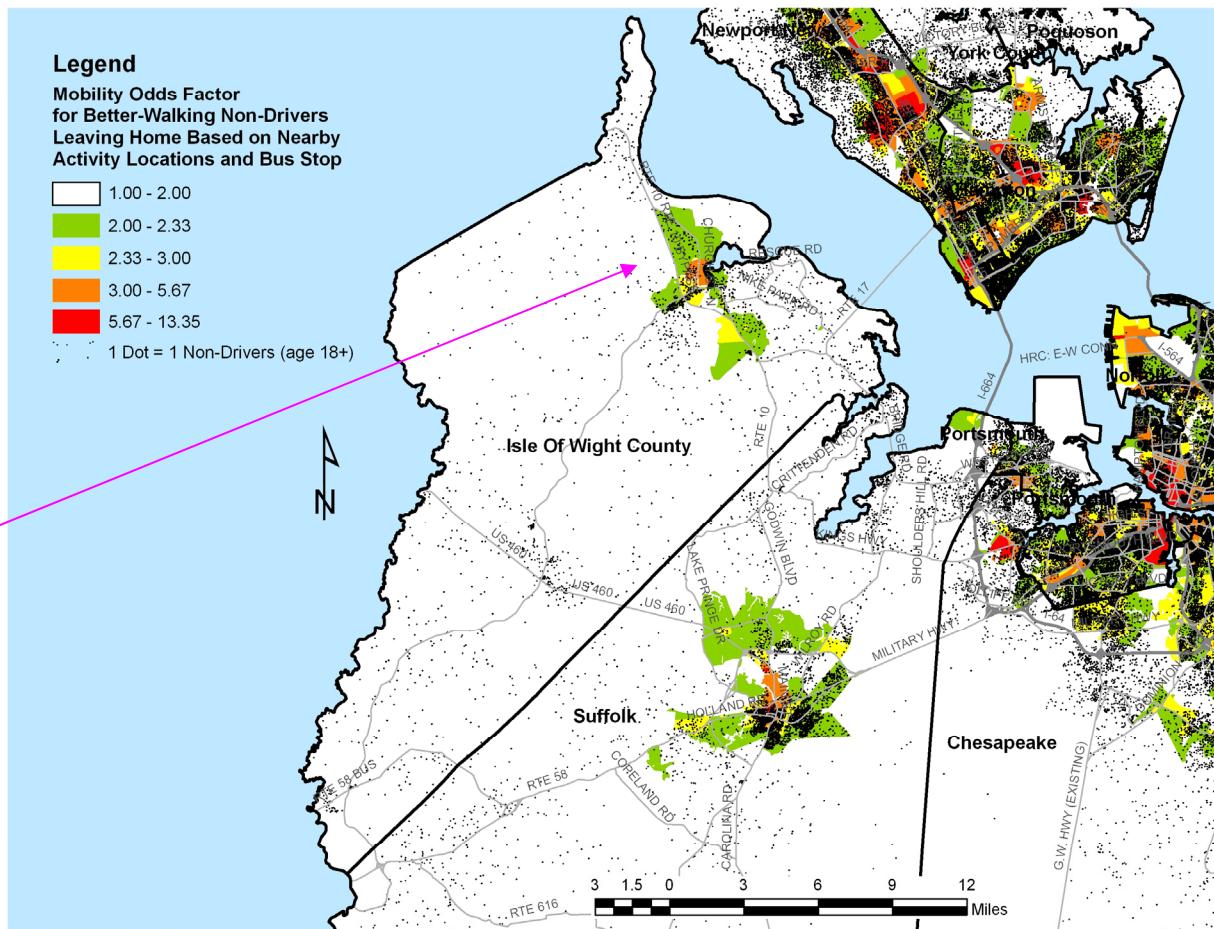
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have medium-high or high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Langley vicinity (orange area)
2. Coliseum Central (part of red area has few non-drivers)
3. Newmarket vicinity (orange area)
4. Copeland and Hampton Industrial Parks (orange area)
5. Hampton University area (part of orange area has few non-drivers)
6. Harris Creek Rd & Fox Hill Rd vicinity (orange area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Isle of Wight County

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- IW.jpg

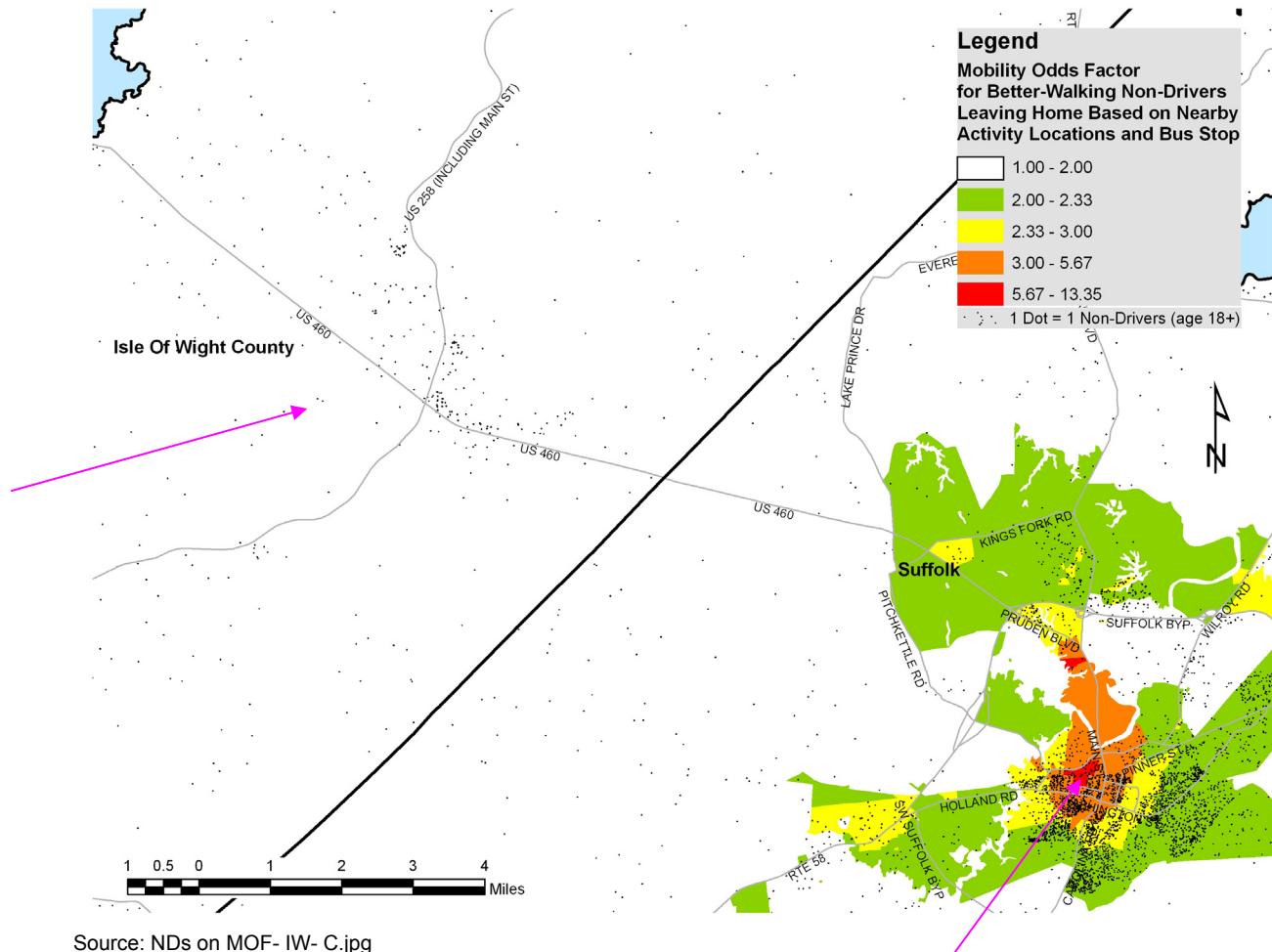
Successes

The concentration of non-drivers in the following area (indicated by **pink arrow**, above) is enjoying the higher mobility provided by nearby bus routes/stops and activity locations:

- Smithfield area

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

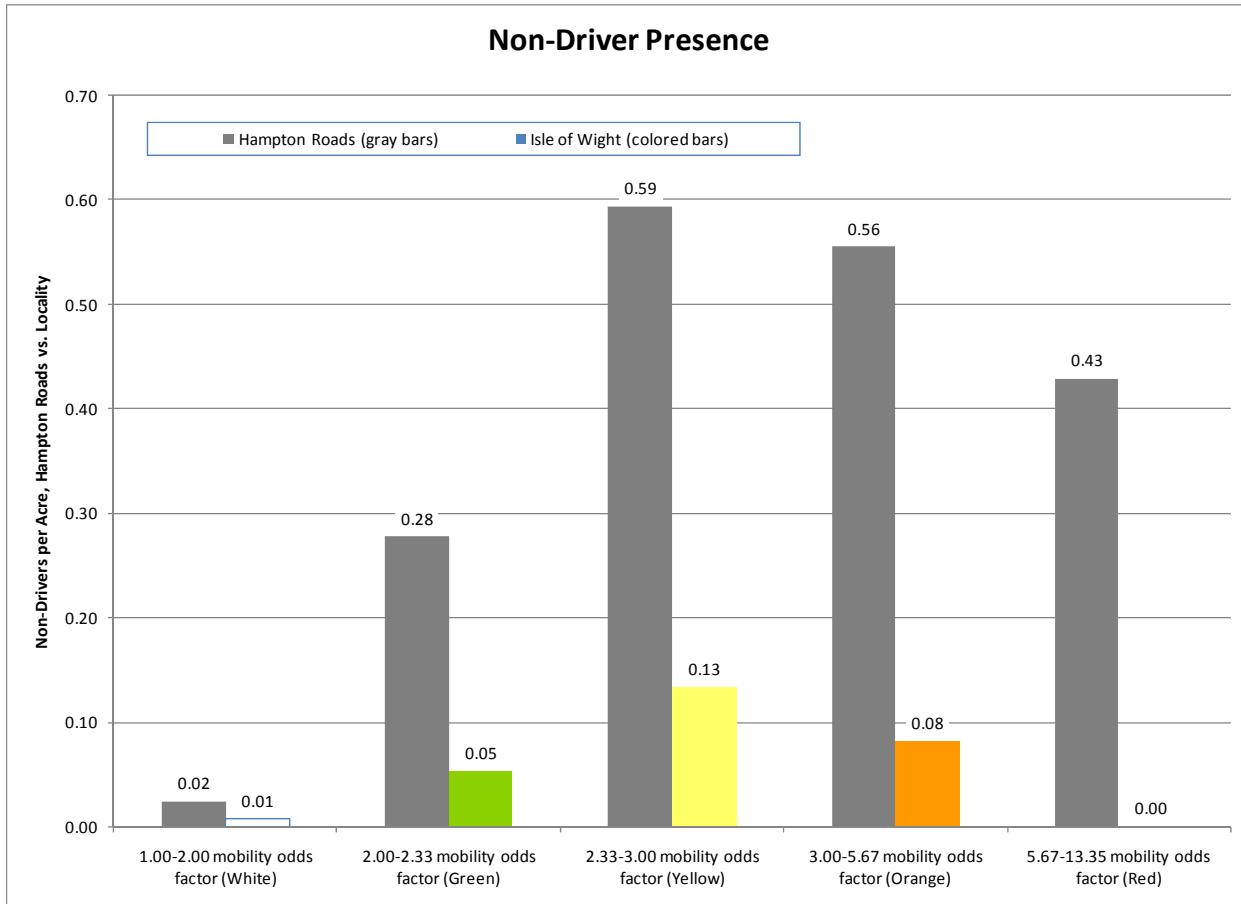


Source: NDs on MOF- IW- C.jpg

The concentration of non-drivers in the **Windsor area** (noted by pink arrow, above) has low total geography-based mobility²⁶. Using budgetary and zoning authority to place bus service and more activity locations (government, commercial, and non-profit) in this low mobility area would improve the mobility of the non-drivers living there.

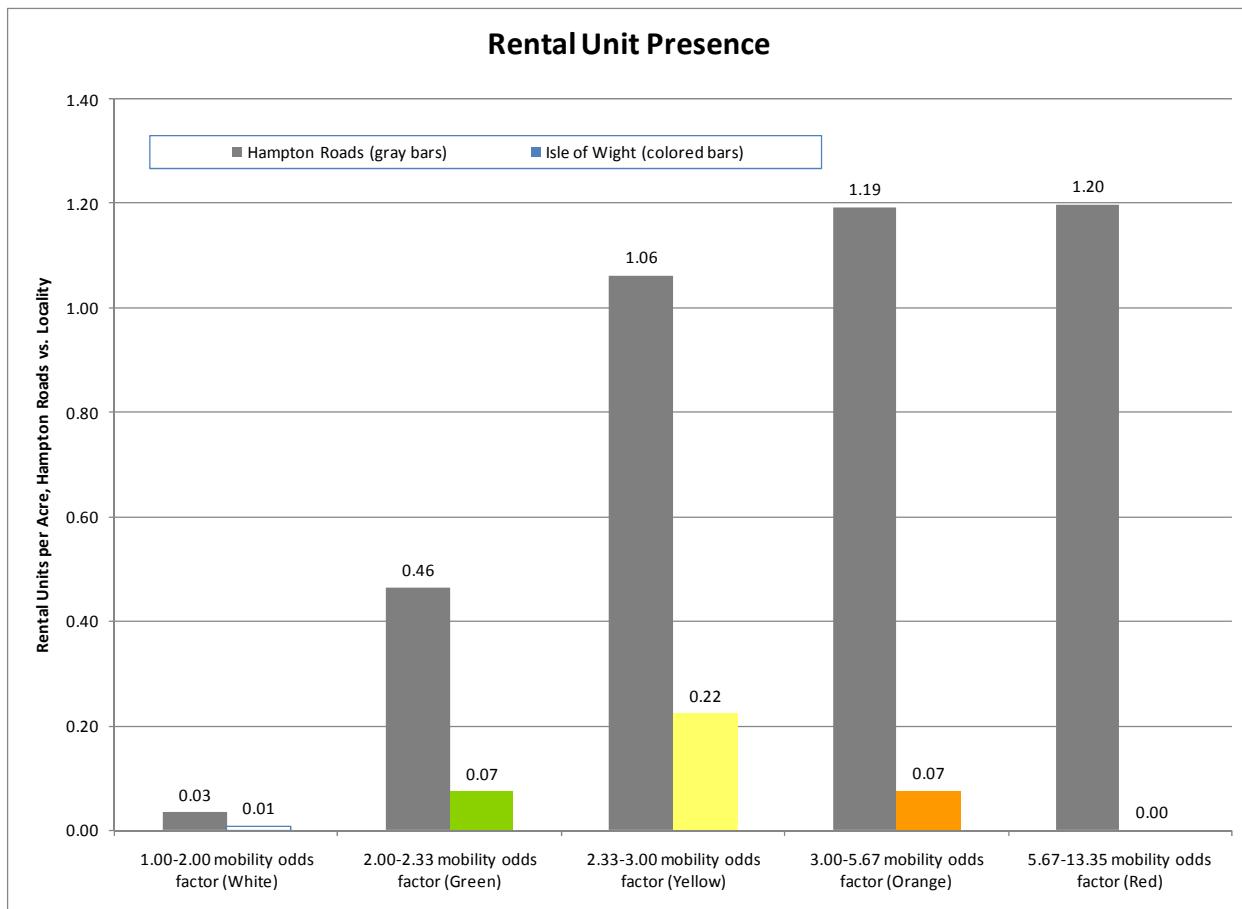
²⁶ i.e. the combination of bus-based mobility and activity-location-based mobility

Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

Isle of Wight's higher mobility areas—Smithfield and Benns Church—(green, yellow, and orange above and on map at beginning of Isle of Wight section) contain fewer non-drivers per acre than the regional average for those mobility levels.



Source: Block_data.xlsx

Isle of Wight's higher mobility areas (green, yellow, and orange above and on map in this section) contain fewer rental units per acre than the regional average for those mobility levels.

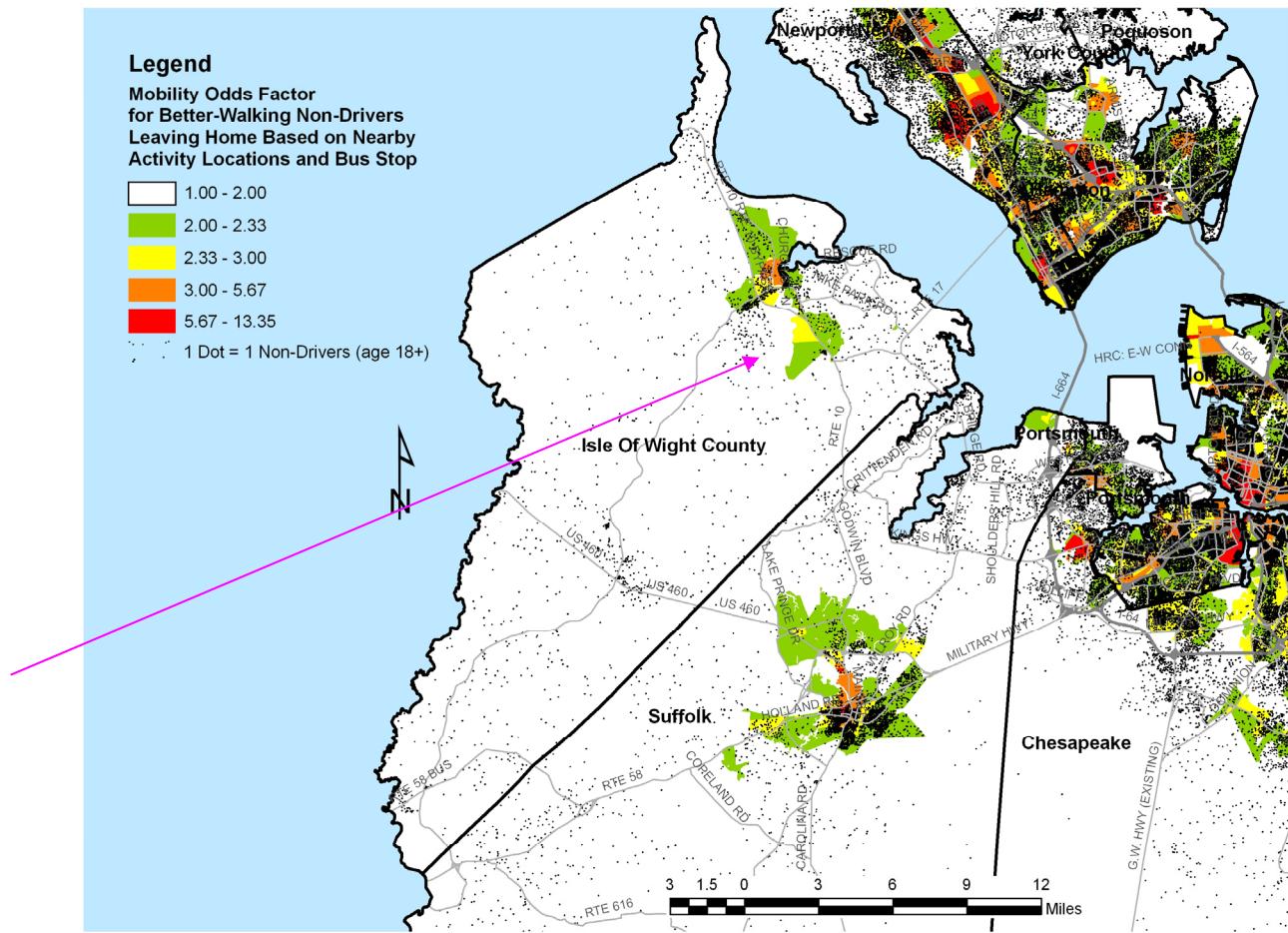
Given:

- 1) the below-average number of non-drivers in Isle of Wight's higher mobility areas, as discussed on the previous page,
- 2) the fact that rental units tend to contain three times the number of non-drivers found in owner occupied units, as demonstrated in a previous section, and
- 3) the below-average number of rental units in Isle of Wight's higher mobility areas, as shown on the chart above,

there may be demand for more rental units in the Smithfield and Benns Church areas by non-drivers seeking the higher mobility there.

If open land or redevelopment opportunities are available, local government could use its zoning authority, if necessary, to enable the construction of housing expected to attract non-drivers—i.e. apartments and senior housing—in these higher mobility areas. In this way, non-drivers relocating to these new homes from areas of lower mobility will experience improved mobility.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



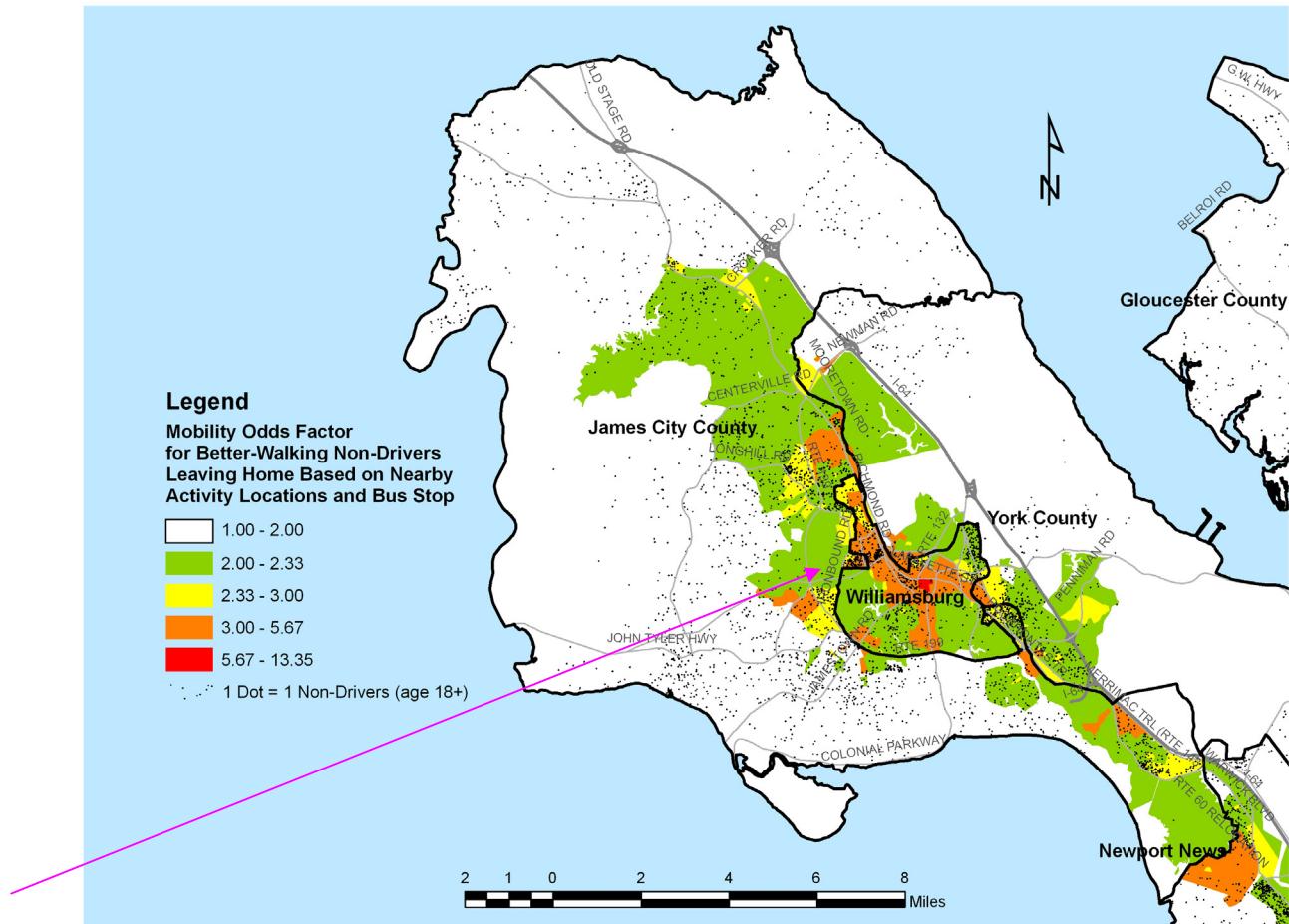
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following area has higher mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by pink arrow, above):

- Ben's Church (yellow and green area)

Using zoning to enable the construction of new apartments and senior housing in this area would enable more non-drivers to take advantage of the higher mobility there.

James City County

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- JCC.jpg

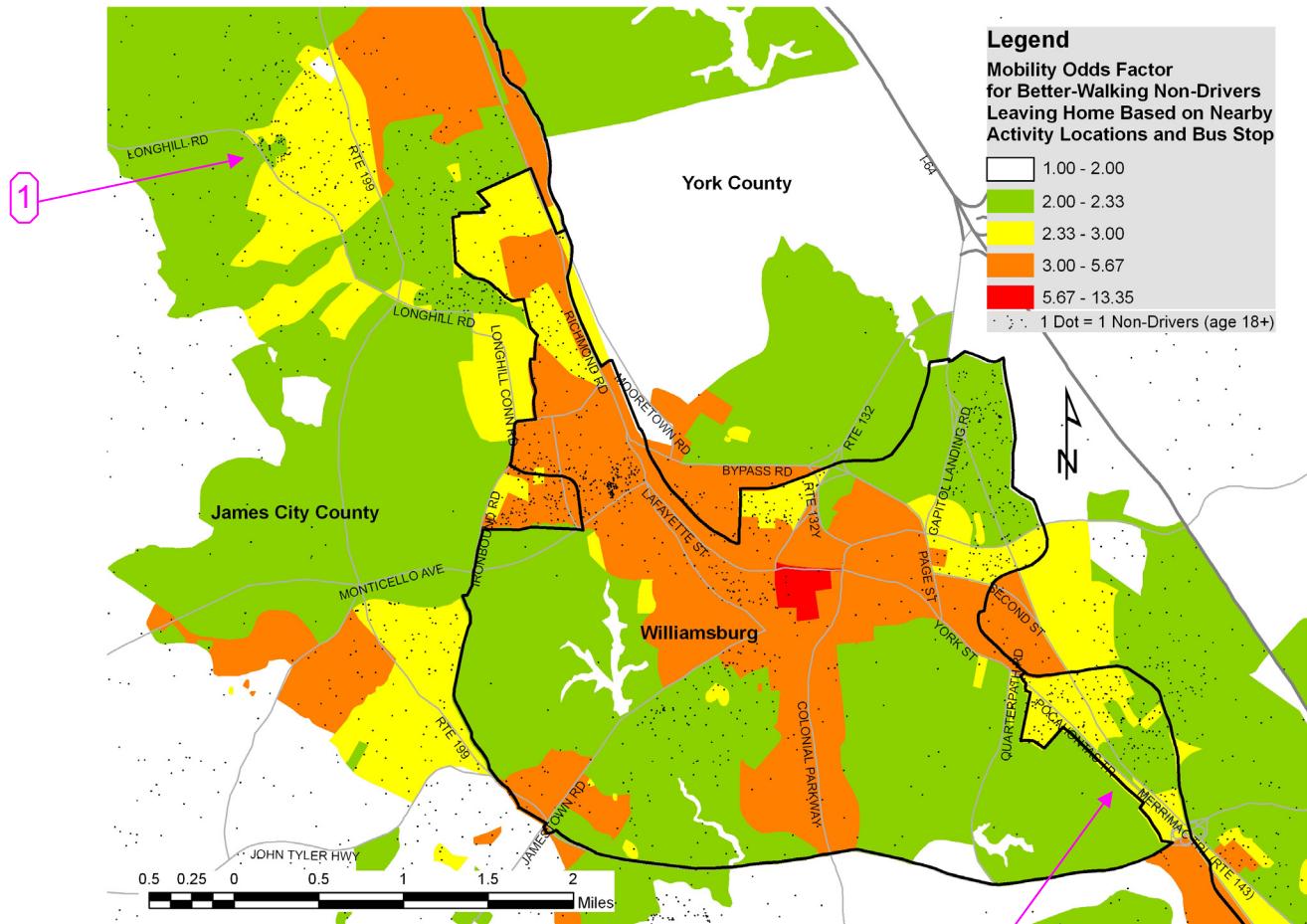
Successes

A group of non-drivers is enjoying the higher mobility provided by nearby bus routes/stops and activity locations in the following area (indicated by **pink arrow** above):

- Carriage Heights / Chambrel (orange area)

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

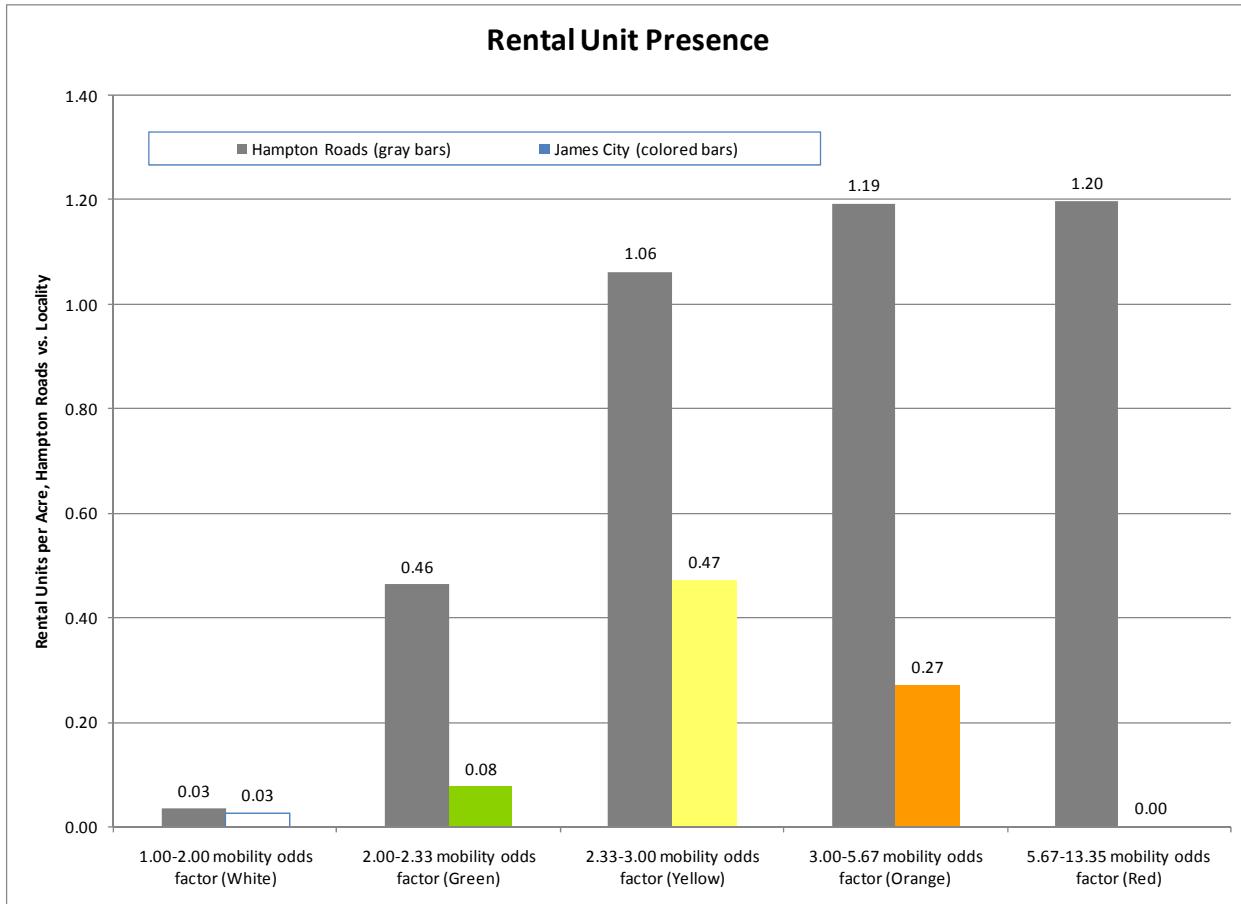


Source: NDs on MOF- JCC- C2.jpg

Even though the concentrations of non-drivers in the **Lafayette Village / Woods of Williamsburg area (1)** and the **Williamsburg Terrace area (2)** (noted by numbered pink arrows, above) enjoy bus-based mobility, they have medium-low total geography-based mobility²⁷ (green). Using budgetary and zoning authority to place more activity locations (government, commercial, and non-profit) in these medium-low mobility areas would improve the mobility of the non-drivers living there.

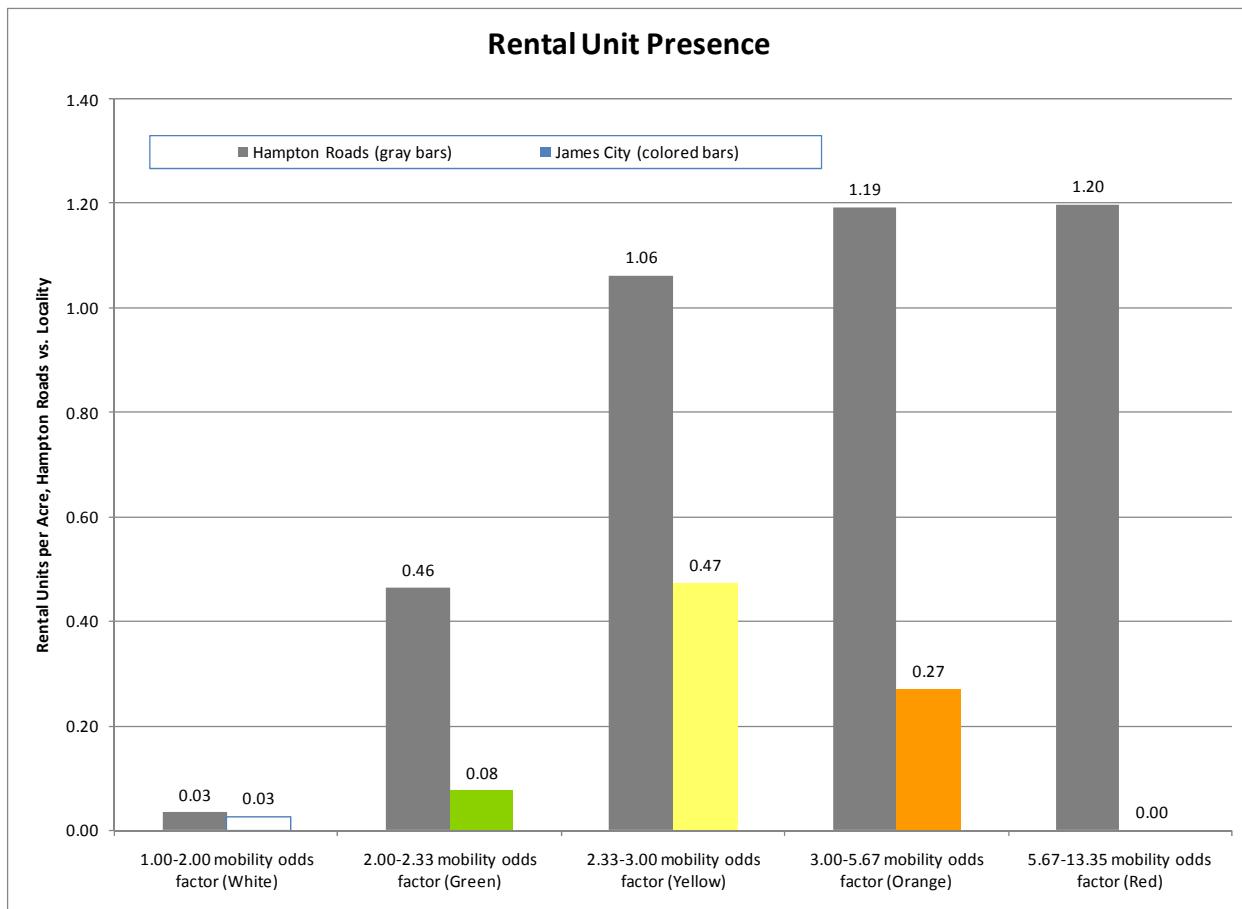
²⁷ i.e. the combination of bus-based mobility and activity-location-based mobility

Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

James City's higher mobility areas (green, yellow, and orange above and on map on previous page) contain fewer non-drivers per acre than the regional average for those mobility levels.



Source: Block_data.xlsx

James City's higher mobility areas (green, yellow, and orange above and on map on following page) contain fewer rental units per acre than the regional average for those mobility levels.

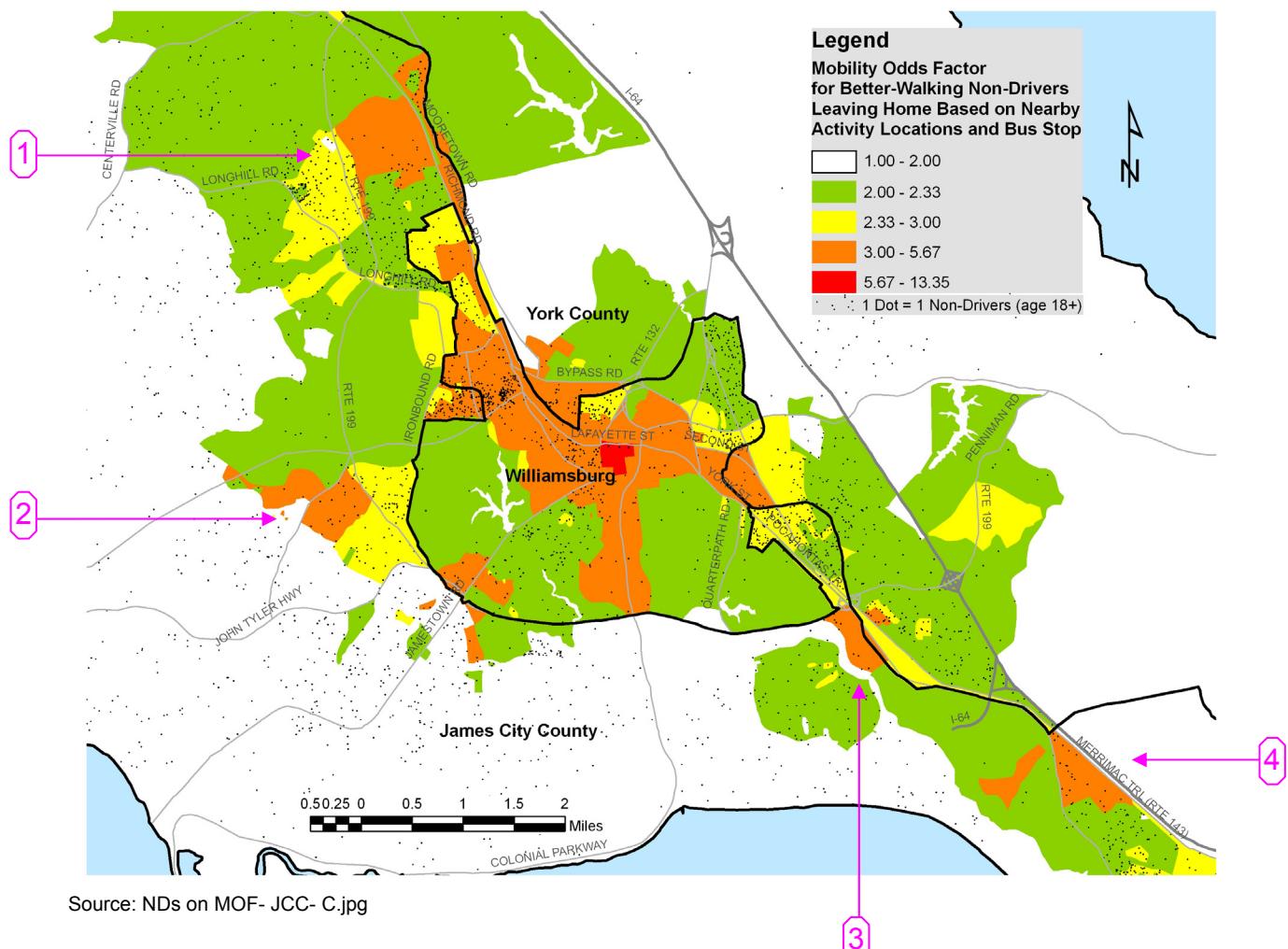
Given:

- 1) the below-average number of non-drivers in James City's higher mobility areas, as discussed on the previous page,
- 2) the fact that rental units tend to contain three times the number of non-drivers found in owner occupied units, as demonstrated in a previous section, and
- 3) the below-average number of rental units in James City's higher mobility areas, as shown on the chart above,

there may be demand for more rental units in James City's higher mobility areas by non-drivers seeking the higher mobility there.

If open land or redevelopment opportunities are available, local government could use its zoning authority, if necessary, to enable the construction of housing expected to attract non-drivers—i.e. apartments and senior housing—in these higher mobility areas. In this way, non-drivers relocating to these new homes from areas of lower mobility will experience improved mobility.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



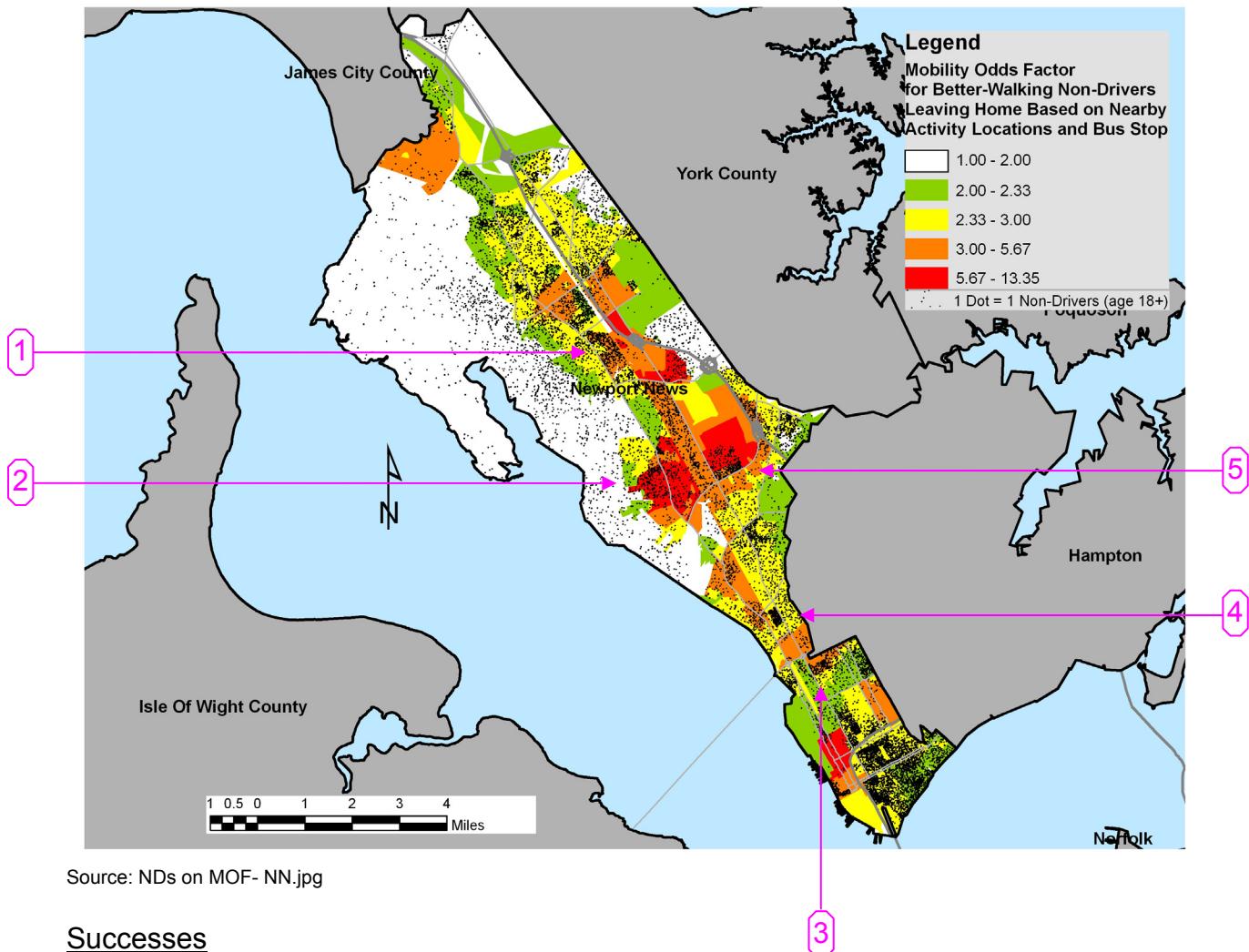
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have medium-high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Prime Outlets (orange area)
2. Monticello Marketplace (orange area)
3. McLaws Circle (orange area)
4. Harwood (orange area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Newport News

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



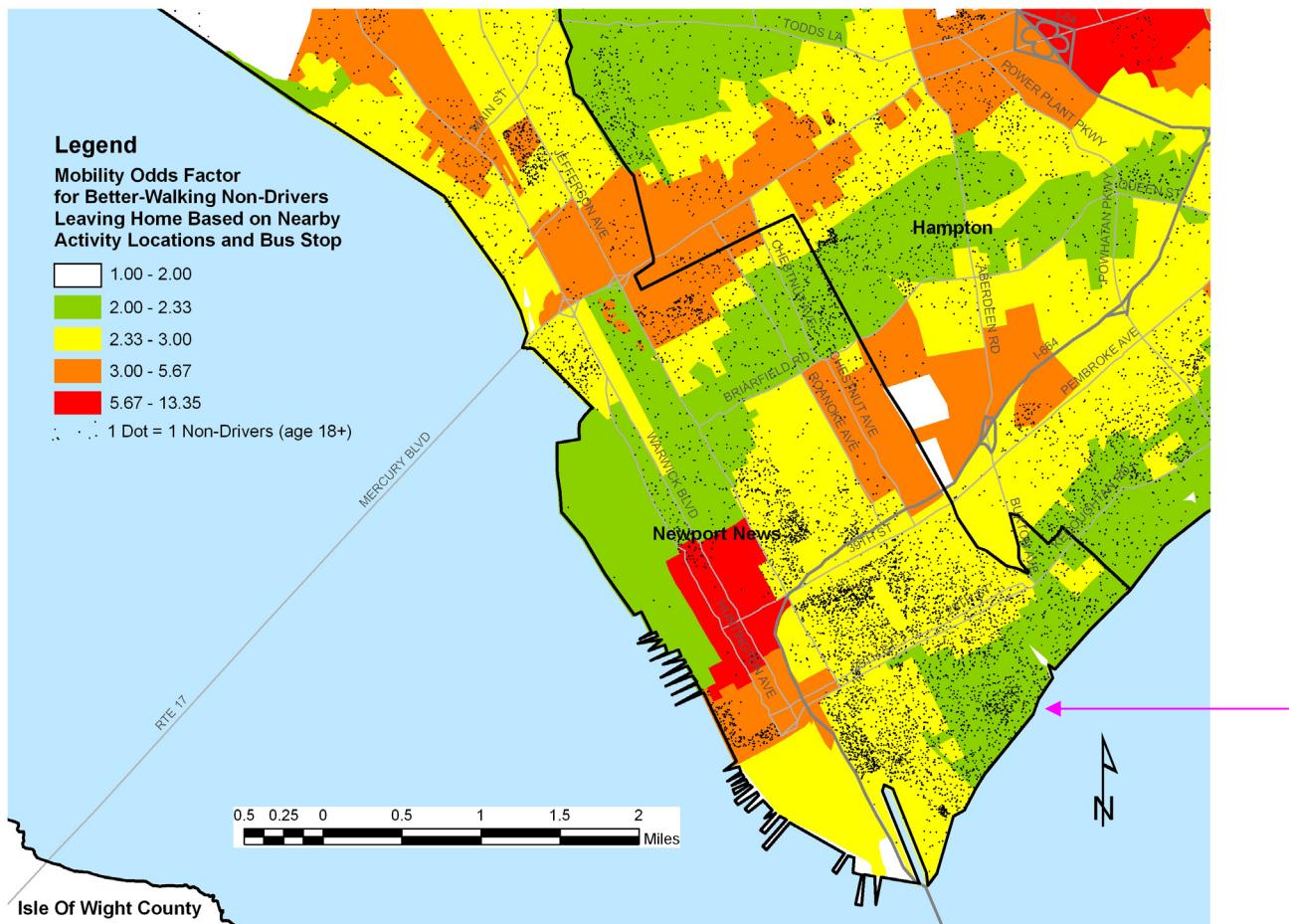
Successes

Concentrations of non-drivers are enjoying the higher mobility provided by nearby bus routes/stops and activity locations in the following areas (indicated by **numbered pink arrows**, above):

1. Colony Rd & Garden State Dr vicinity (orange area)
2. Todd Stadium (red area)
3. Riverlands Dr & Marshall Ave vicinity (orange area)
4. Tyler Ave & Warwickshire Ct vicinity (orange area)
5. Jefferson East (red area)

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

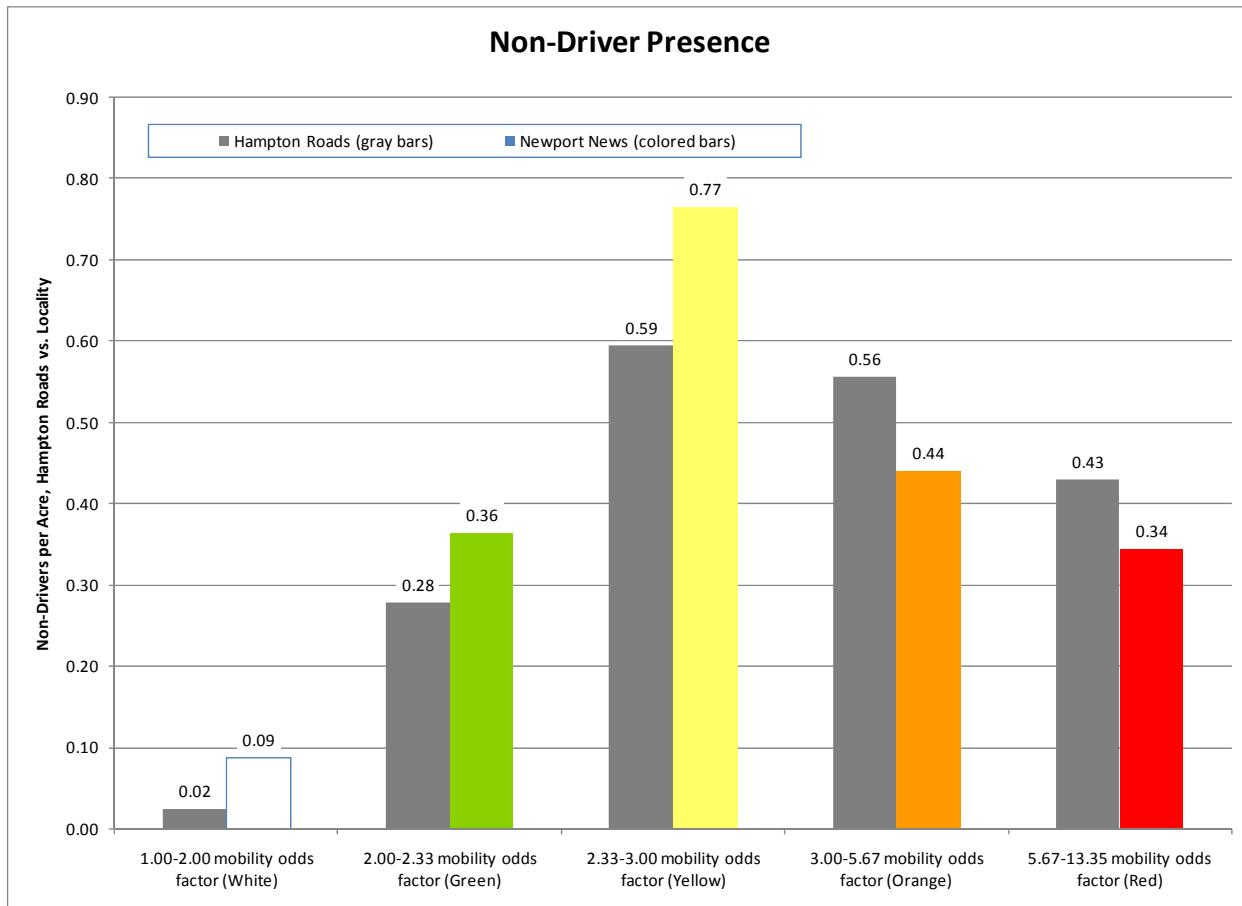


Source: NDs on MOF- NN- S.jpg

Even though the concentration of non-drivers in the **Stuart Gardens** area (noted by pink arrow above) enjoys bus-based mobility, it has medium-low total geography-based mobility²⁸. Using budgetary and zoning authority to place more activity locations (government, commercial, and non-profit) in this medium-low mobility area would improve the mobility of the non-drivers living there.

²⁸ i.e. the combination of bus-based mobility and activity-location-based mobility

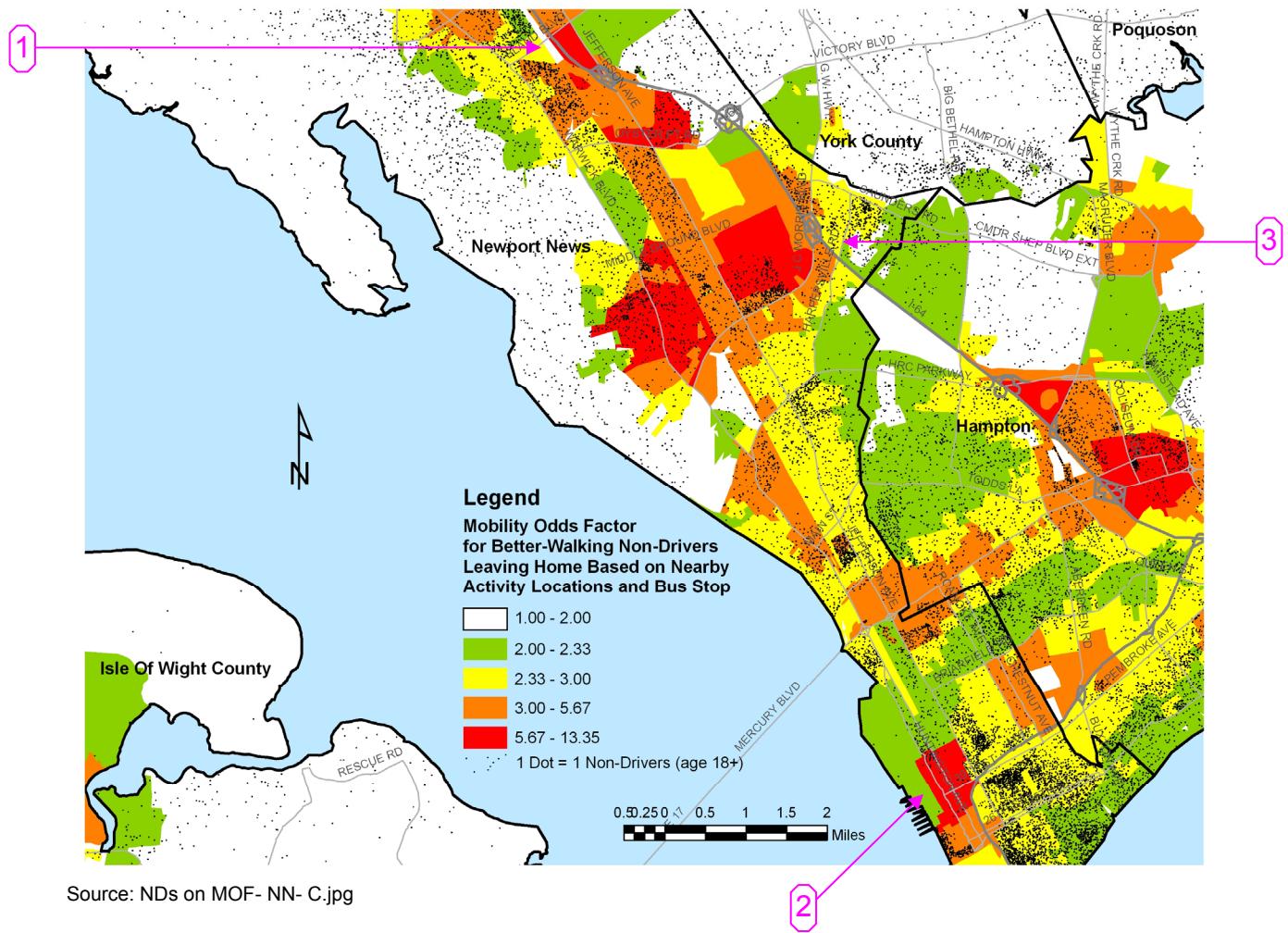
Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

As shown above, Newport News' higher mobility areas (green, yellow, orange, and red above and on maps in this section) contain numbers of non-drivers per acre which roughly match the regional averages for those mobility levels. By zoning an adequate amount of land for housing expected to attract non-drivers—i.e. apartments and senior housing—in these areas of higher mobility, and not in areas of low mobility, the city will provide good geography-based mobility to the non-drivers who will live in those homes as demand for their construction appears.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



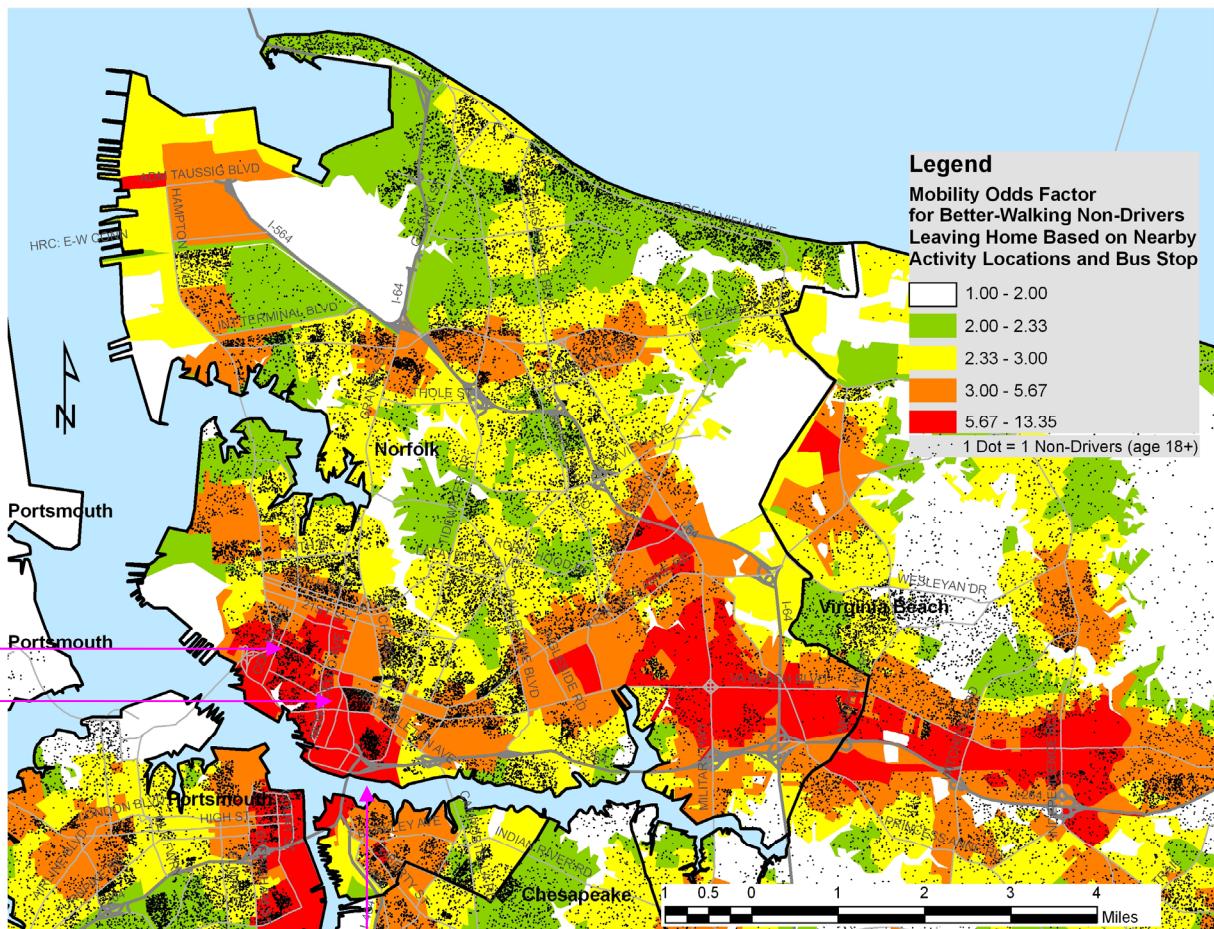
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Habersham Dr vicinity (red area)
2. Huntington Ave & 39th St vicinity (red area)
3. Oyster Point / City Center vicinity (part of red area has few non-drivers)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Norfolk

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Nor.jpg

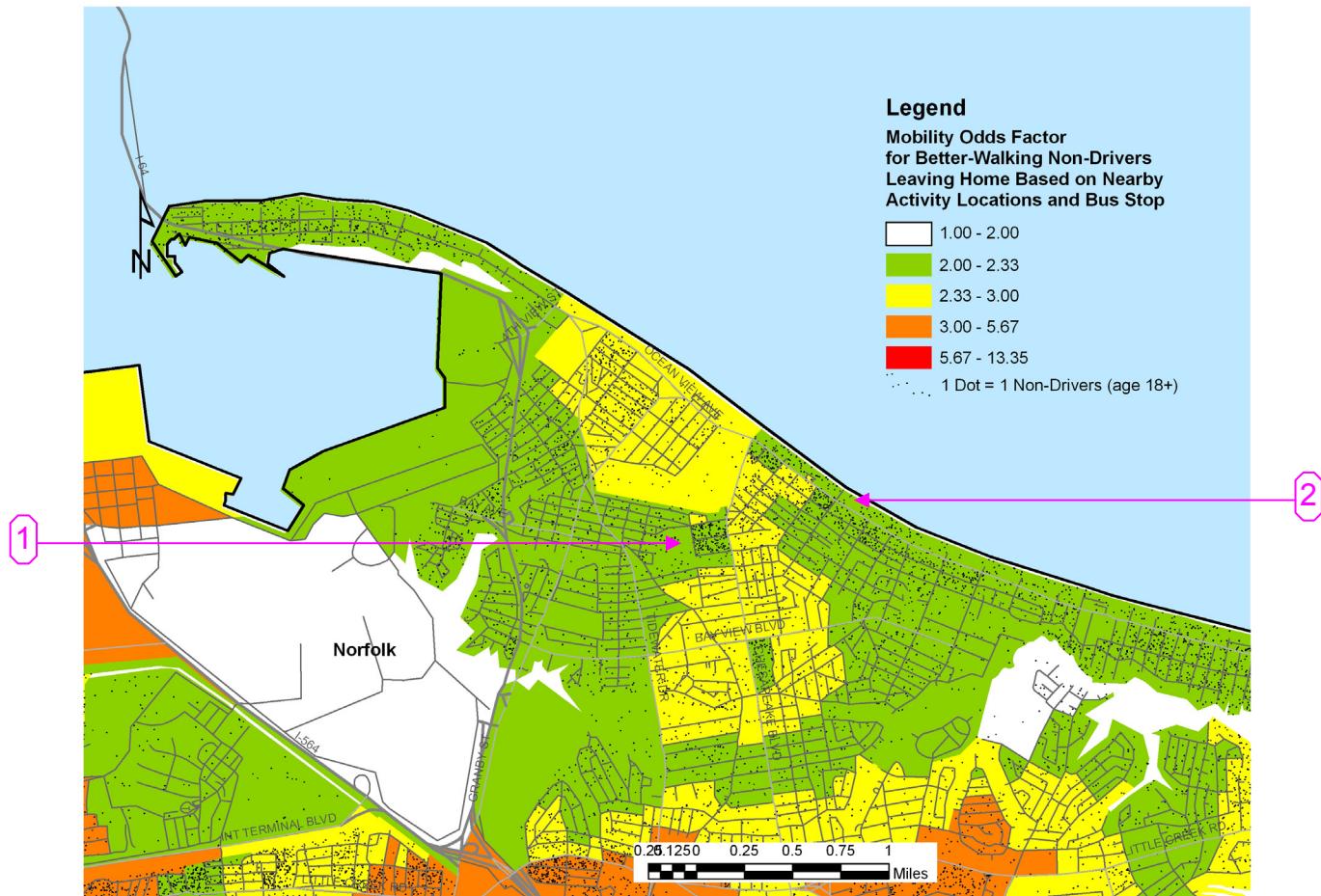
Successes

Concentrations of non-drivers are enjoying the high mobility provided by nearby bus routes/stops and activity locations in the following red areas (indicated by **numbered pink arrows**, above):

1. John Knox Towers
2. Young Terrace
3. Tidewater Park

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Nor- N.jpg

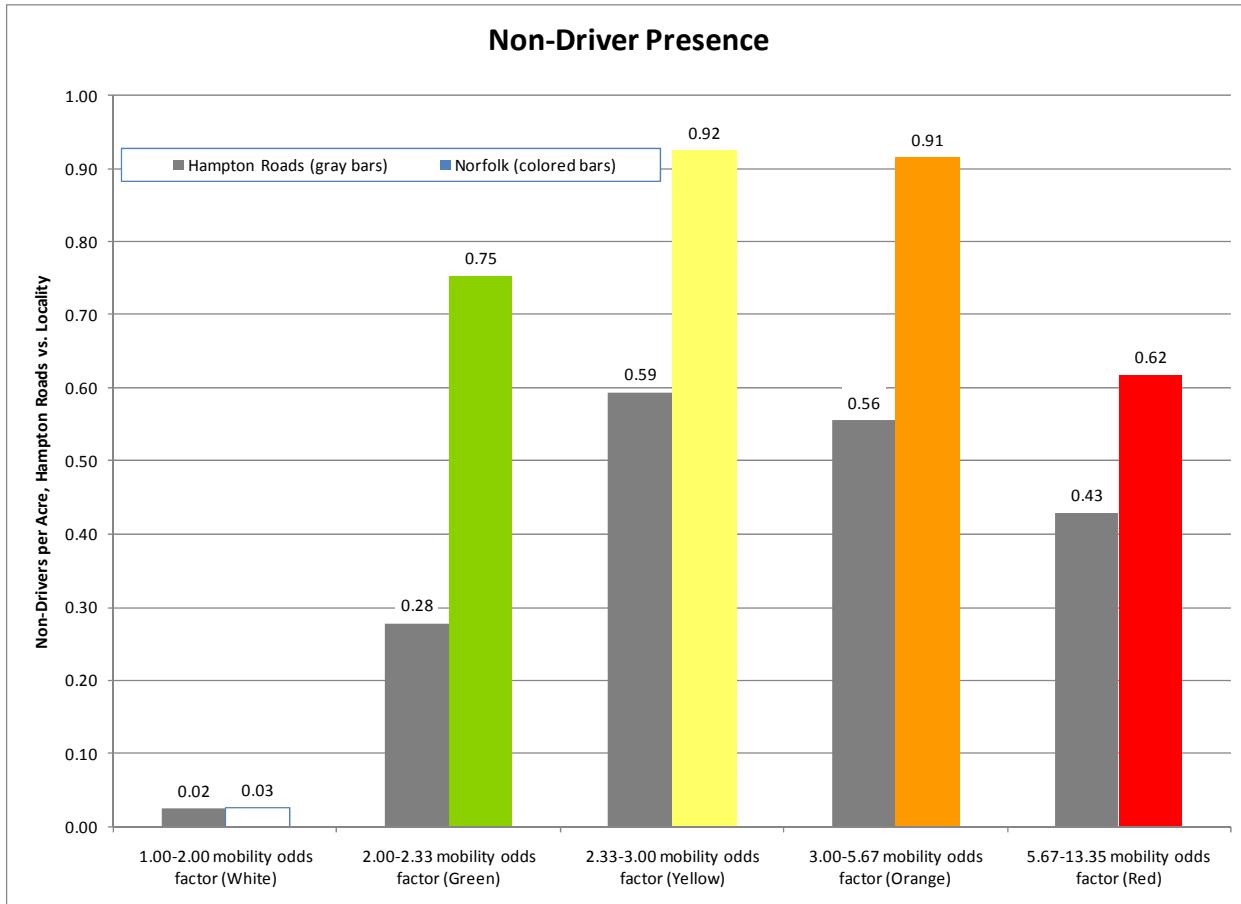
Even though the concentrations of non-drivers in the following areas enjoy bus-based mobility, they have medium-low total geography-based mobility²⁹ (colored green):

1. Area bounded by Chesapeake Blvd / Warwick Ave / Pinedale St / Dudley Ave (two blocks, indicated by pink arrow, above)
2. Area bounded by Ocean View Ave / Beach View St / Hillside Ave / Warwick Ave (one block, indicated by pink arrow, above)

Using budgetary and zoning authority to place more activity locations (government, commercial, and non-profit) in these medium-low mobility areas would improve the mobility of the non-drivers living there.

²⁹ i.e. the combination of bus-based mobility and activity-location-based mobility

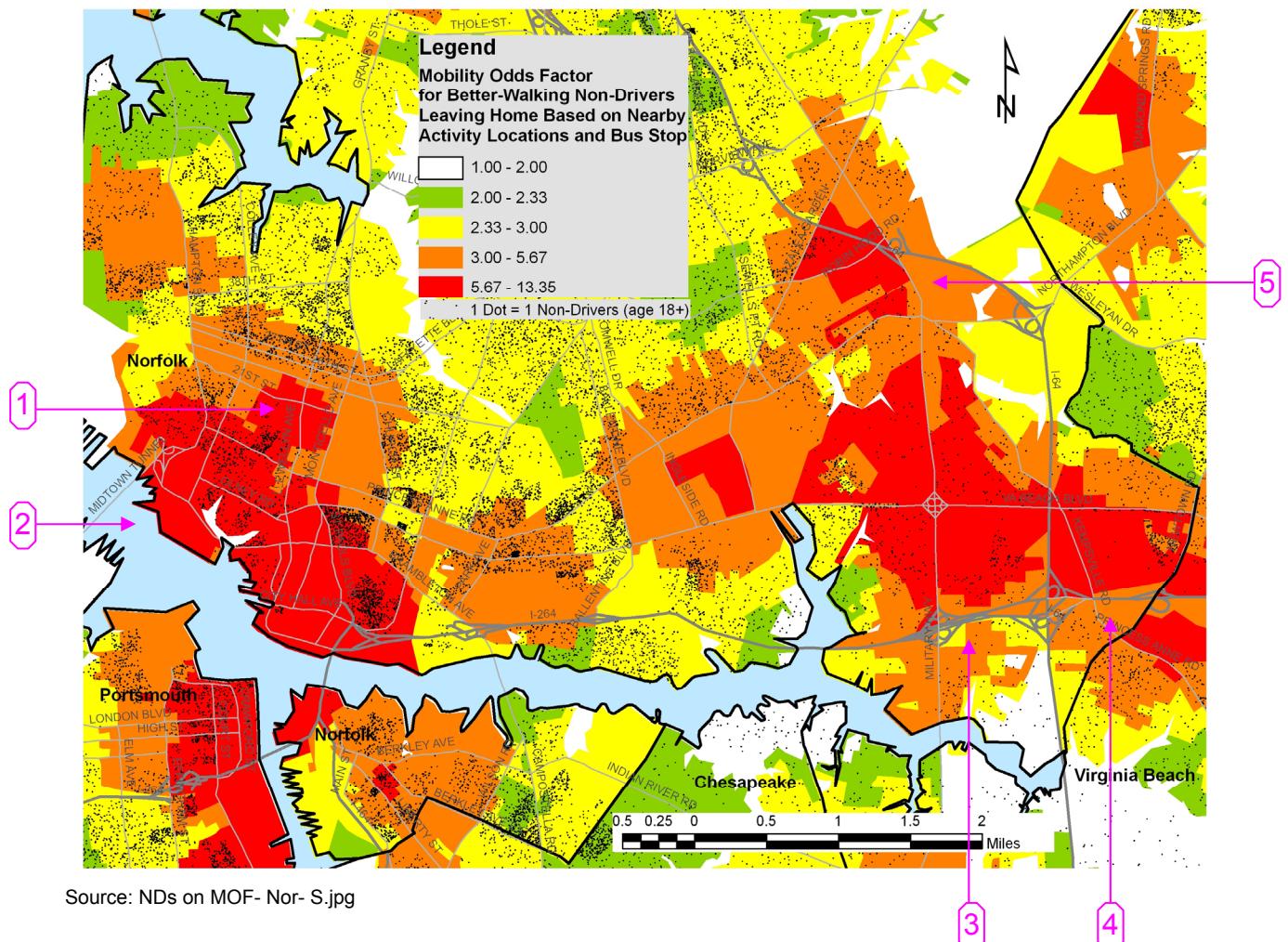
Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

As shown above, Norfolk's higher mobility areas (green, yellow, orange, and red above and on maps in this section) contain numbers of non-drivers per acre which exceed the regional averages for those mobility levels. By zoning an adequate amount of land for housing expected to attract non-drivers—i.e. apartments and senior housing—in these areas of higher mobility, and not in areas of low mobility, the city will provide good geography-based mobility to the non-drivers who will live in those homes as demand for their construction appears.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



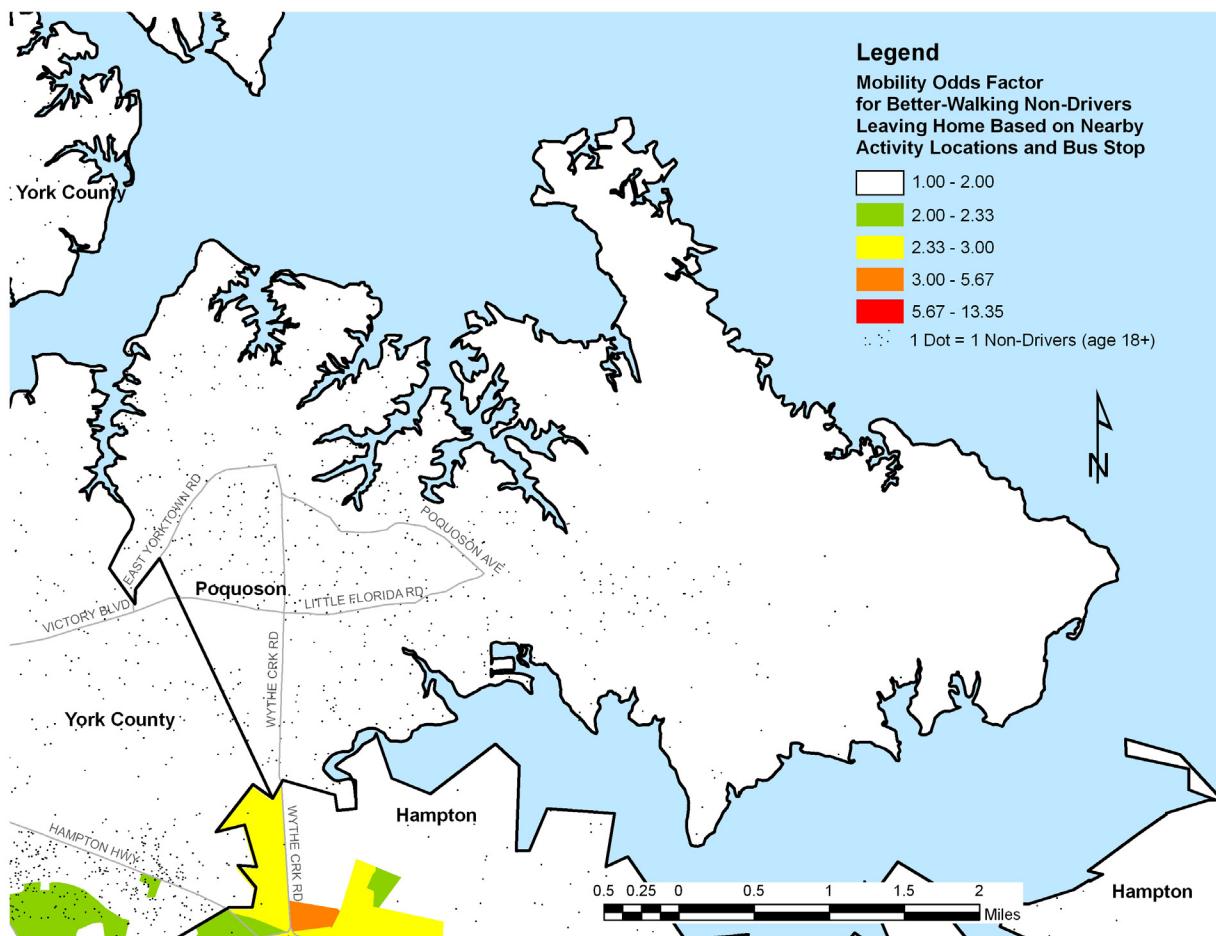
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Llewellyn Ave / 21st St vicinity (red area)
2. Atlantic City (red area)
3. Va. Beach Blvd & Military Hwy vicinity (red area)
4. Interstate Corp. Center / Leigh Hospital vicinity (red area)
5. Norfolk Commerce Park surroundings (red area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Poquoson

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

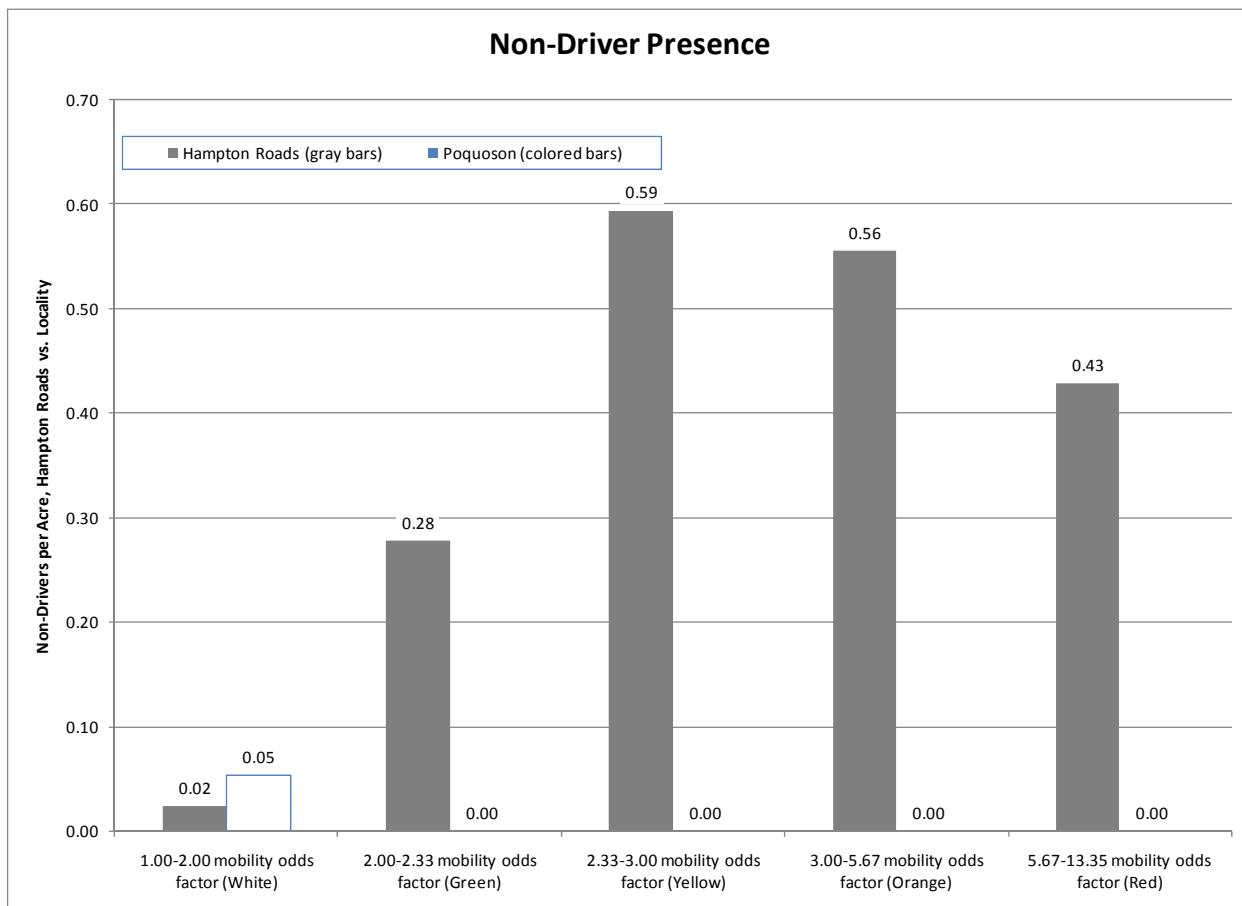


Source: NDs on MOF- Poq.jpg

Prospects for Providing a Higher Mobility Area for Local Non-Drivers

Currently, non-drivers in Poquoson are spread fairly evenly throughout the populated portion of the locality, and they have low geography-based mobility.³⁰ Using it's zoning and budgetary authority to guide the construction of new activity locations (government, commercial, and non-profit) and new housing expected to attract non-drivers—i.e. apartments and senior housing—into a specific area of the locality's choice [along Wythe Creek Rd](#) (where some activity locations already exist) will provide good activity-location-based mobility to the non-drivers who will live in those homes. Some of the non-drivers in this new housing will have relocated from other parts of Poquoson to improve their mobility. The concentration of non-drivers and activity locations in such an area will make a bus route feasible which would connect that area to the rest of Hampton Roads by public transit, thereby increasing the mobility of local non-drivers even more.

³⁰ i.e. bus-based mobility and activity-location-based mobility

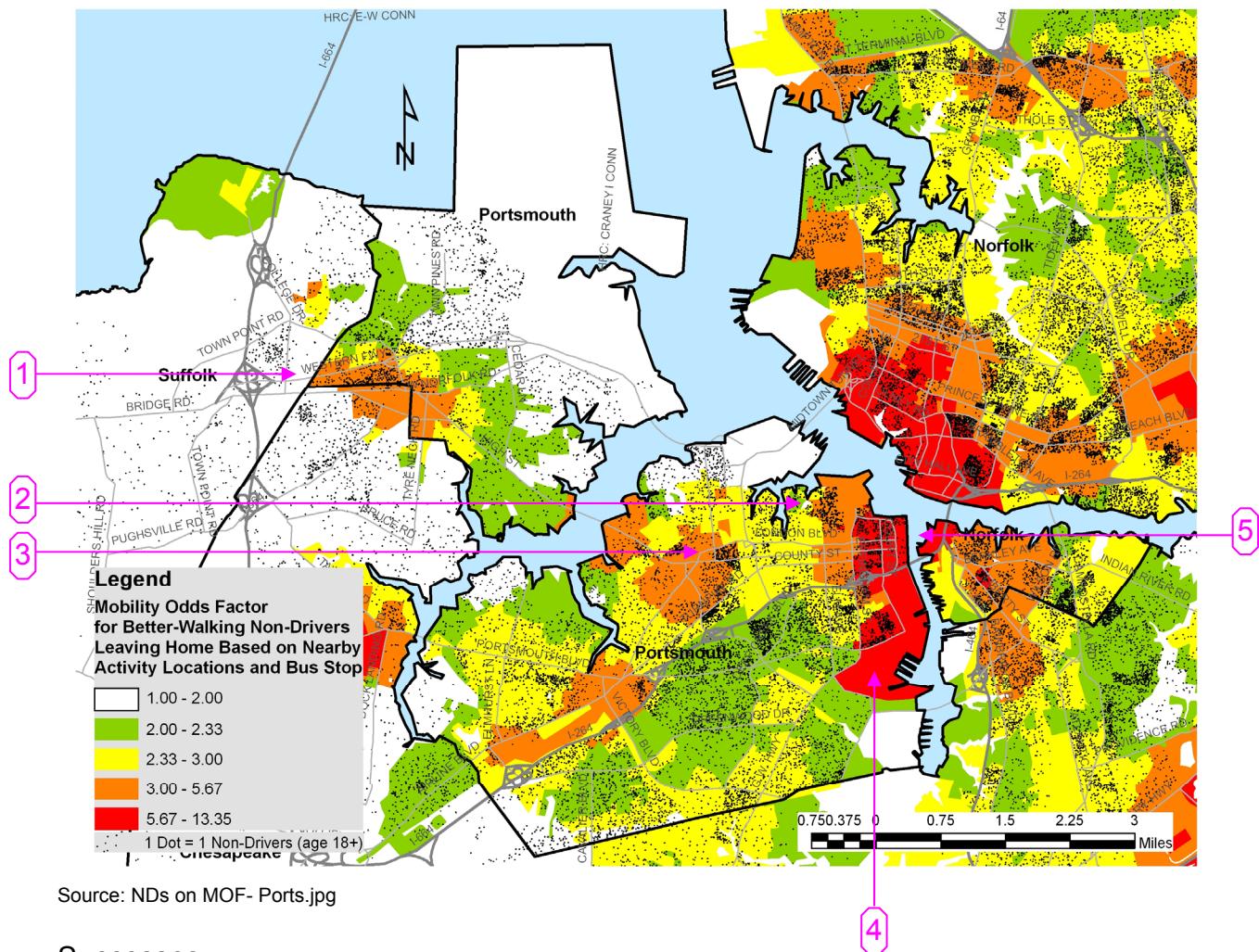


Source: Block_data.xlsx

Poquoson's low mobility area (white bar above, covering the entire locality as shown on map on previous page) contains twice the regional average of non-drivers per acre for that mobility level, showing the need for and possible viability of focusing future activity locations and non-driver-attractive housing in one area along Wythe Creek Rd as discussed above.

Portsmouth

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



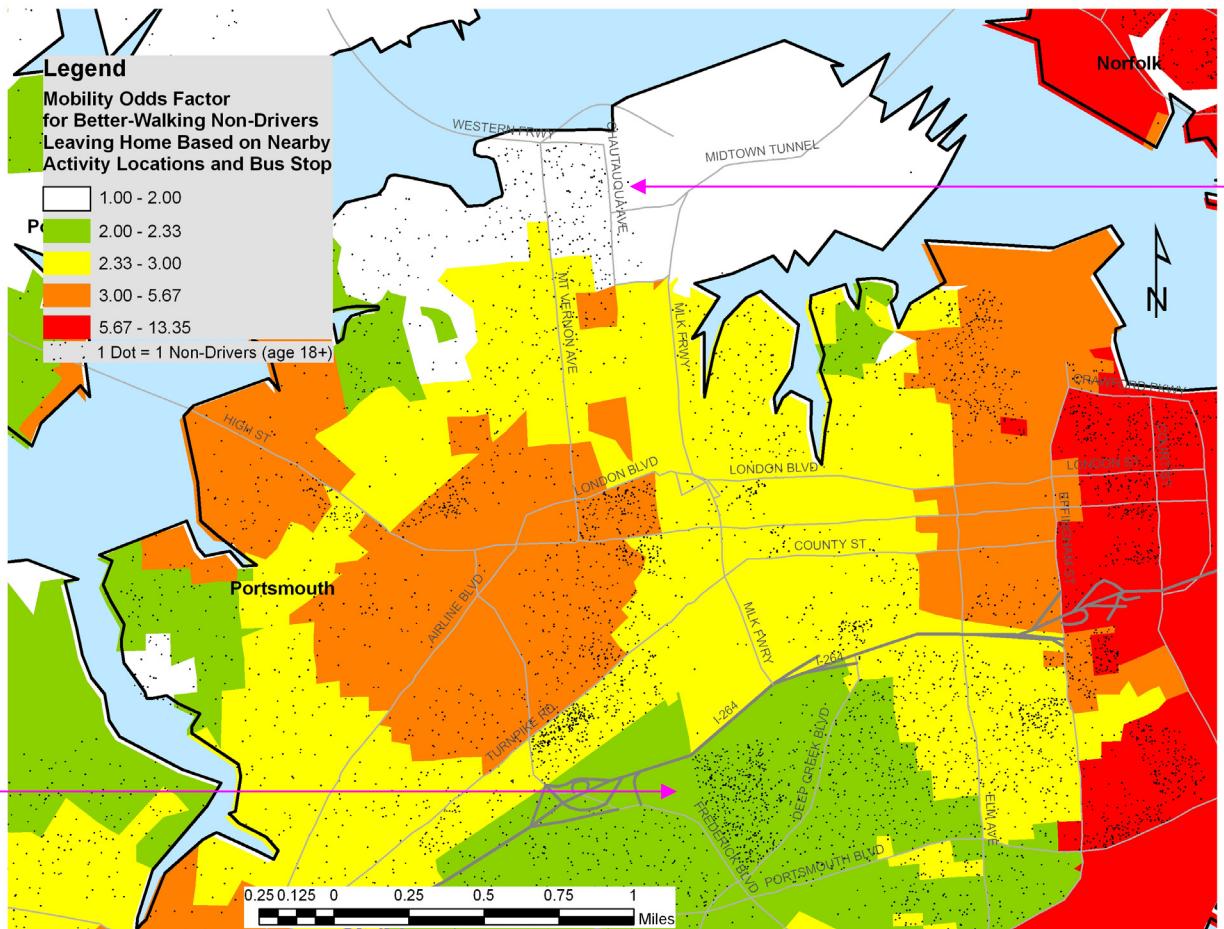
Successes

Concentrations of non-drivers are enjoying higher mobility provided by nearby bus routes/stops and activity locations in the following areas (indicated by **numbered pink arrows**, above):

1. Churchland (in orange area)
2. Park View (in orange area)
3. London Oaks in orange area)
4. Effingham Plaza (in red area)
5. Olde Towne (in red area)

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Ports- C.jpg

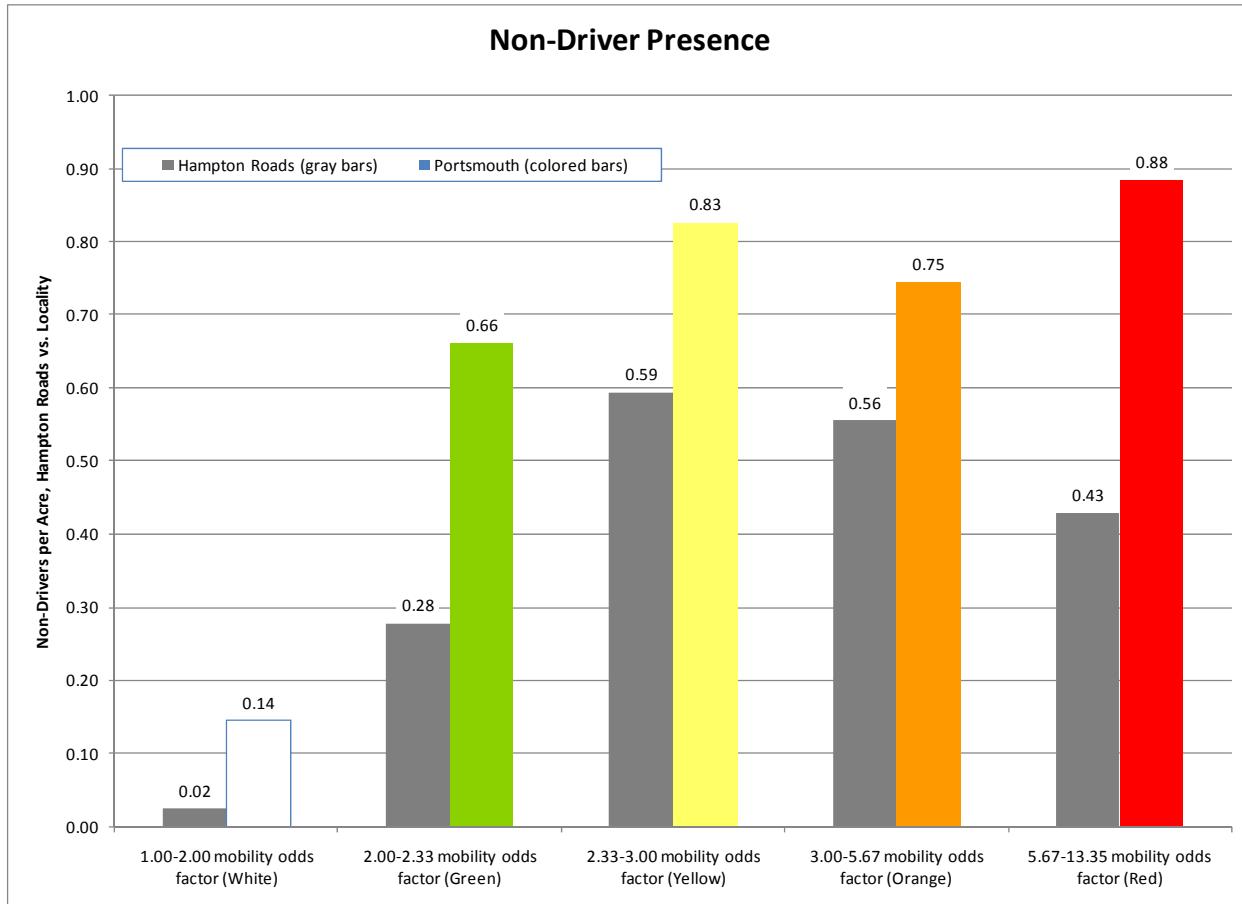
Concentrations of non-drivers in **Port Norfolk** (indicated by pink arrow [1], above) have low total geography-based mobility³¹ (colored white) and would therefore benefit from bus service and more nearby activity locations.

Even though the concentrations of non-drivers in **Dale Homes / Lincoln Park** (indicated by pink arrow [2], above) enjoy bus-based mobility, they have medium-low total geography-based mobility (colored green) and would therefore benefit from more nearby activity locations.

Using budgetary and zoning authority to place bus service and/or more activity locations (government, commercial, and non-profit) in these lower mobility areas would improve the mobility of the non-drivers living there.

³¹ i.e. the combination of bus-based mobility and activity-location-based mobility

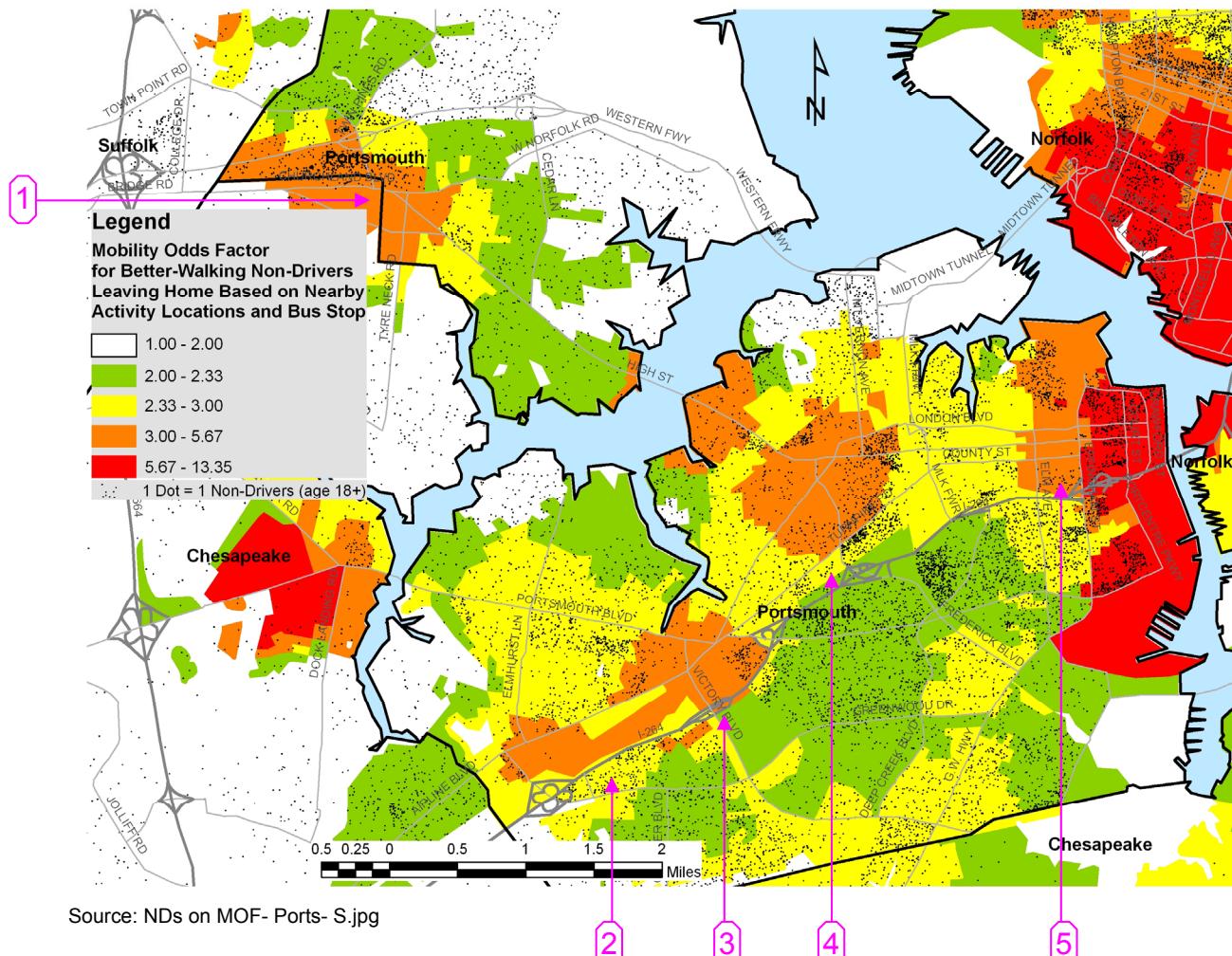
Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

As shown above, Portsmouth's higher mobility areas (green, yellow, orange, and red above and on maps in this section) contain numbers of non-drivers per acre which exceed the regional averages for those mobility levels. By zoning an adequate amount of land for housing expected to attract non-drivers—i.e. apartments and senior housing—in these areas of higher mobility, and not in areas of low mobility, the city will provide good geography-based mobility to the non-drivers who will live in those homes as demand for their construction appears.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



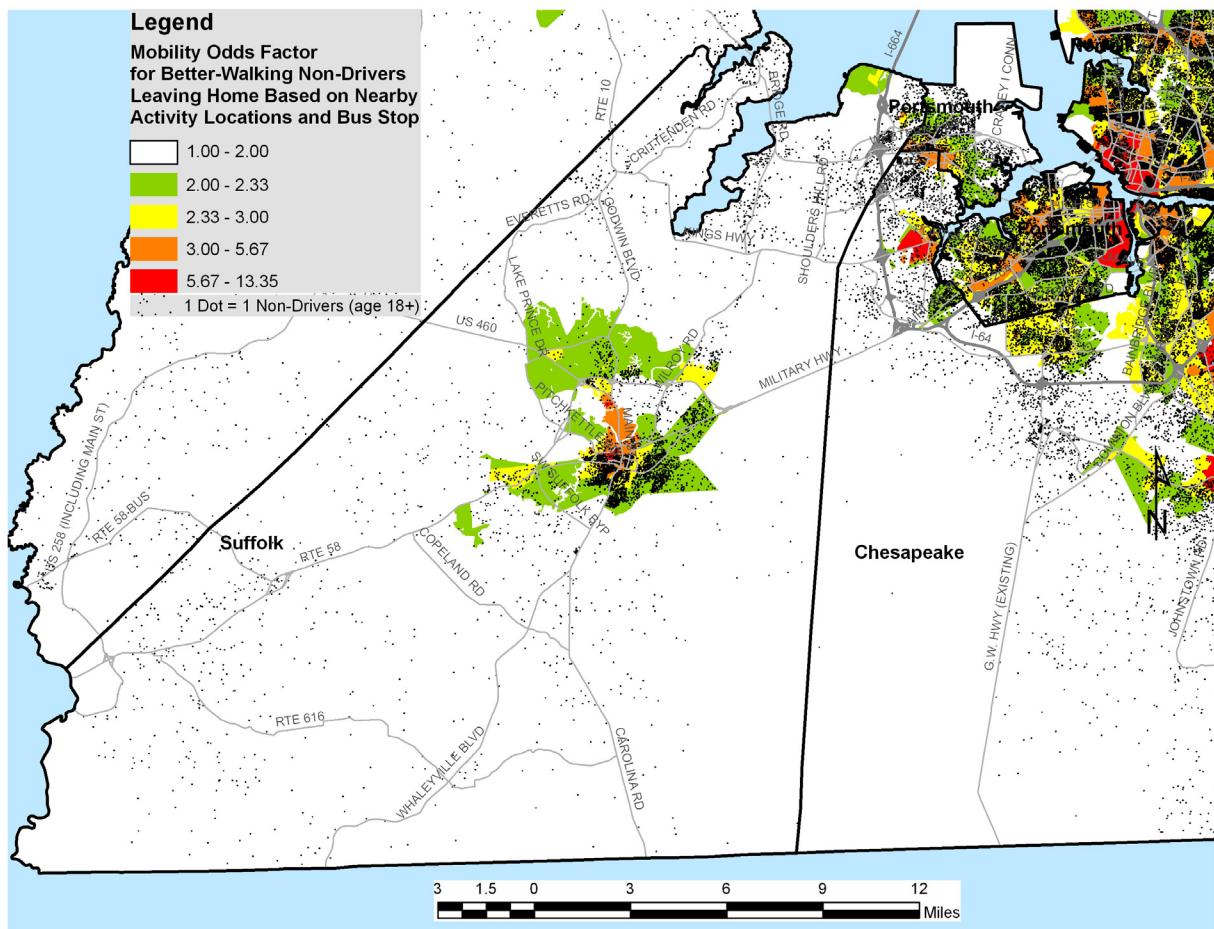
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have medium-high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Churchland: High St & Tyre Neck Rd vicinity (orange area)
2. Elmhurst Ln- south of CSX r/r (orange area)
3. Victory Crossing Shopping Center vicinity (orange area)
4. Frederick Blvd & High St & Airline Blvd vicinity (orange area)
5. High St & Chestnut St vicinity (orange area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Suffolk

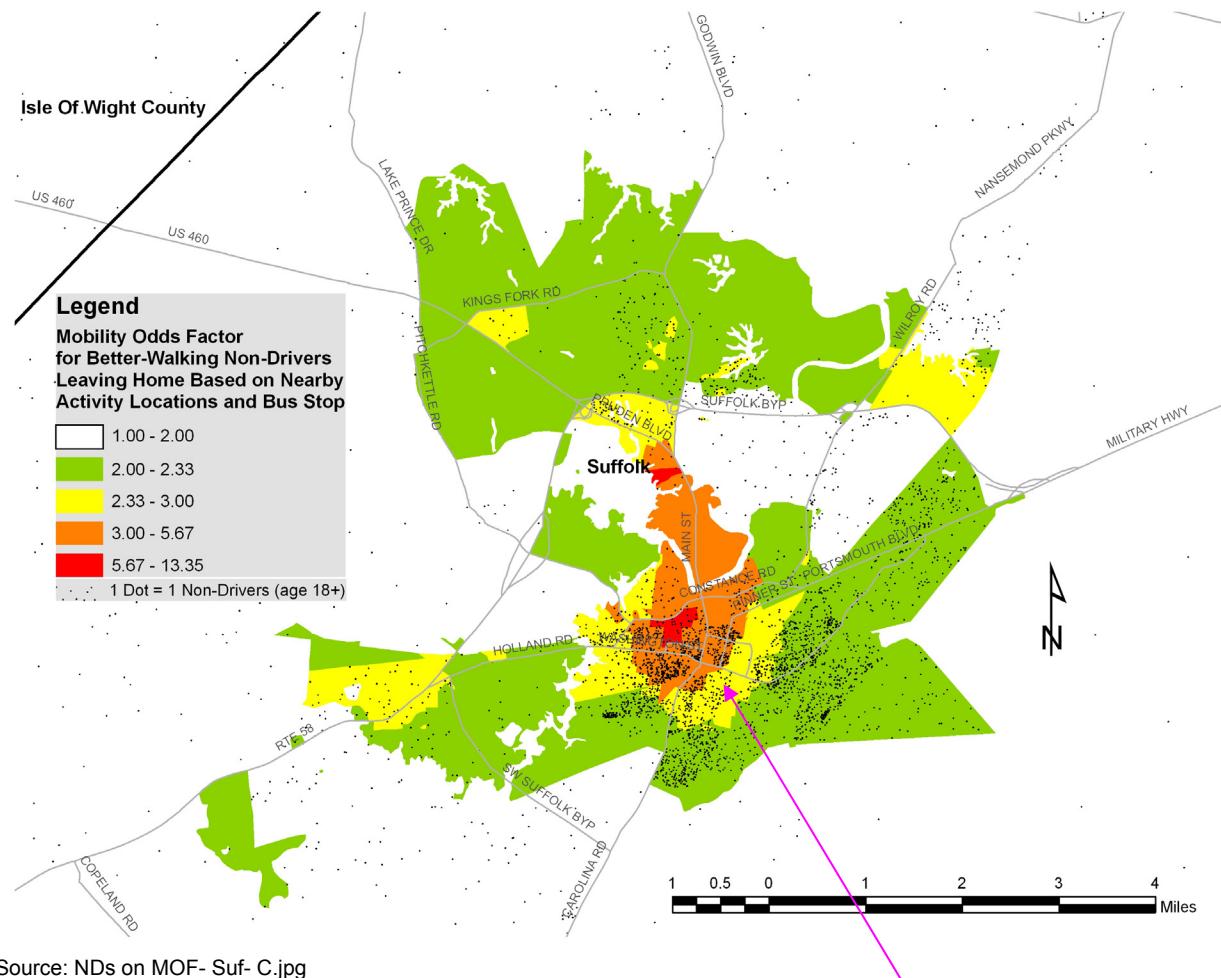
The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Suf.jpg

Successes

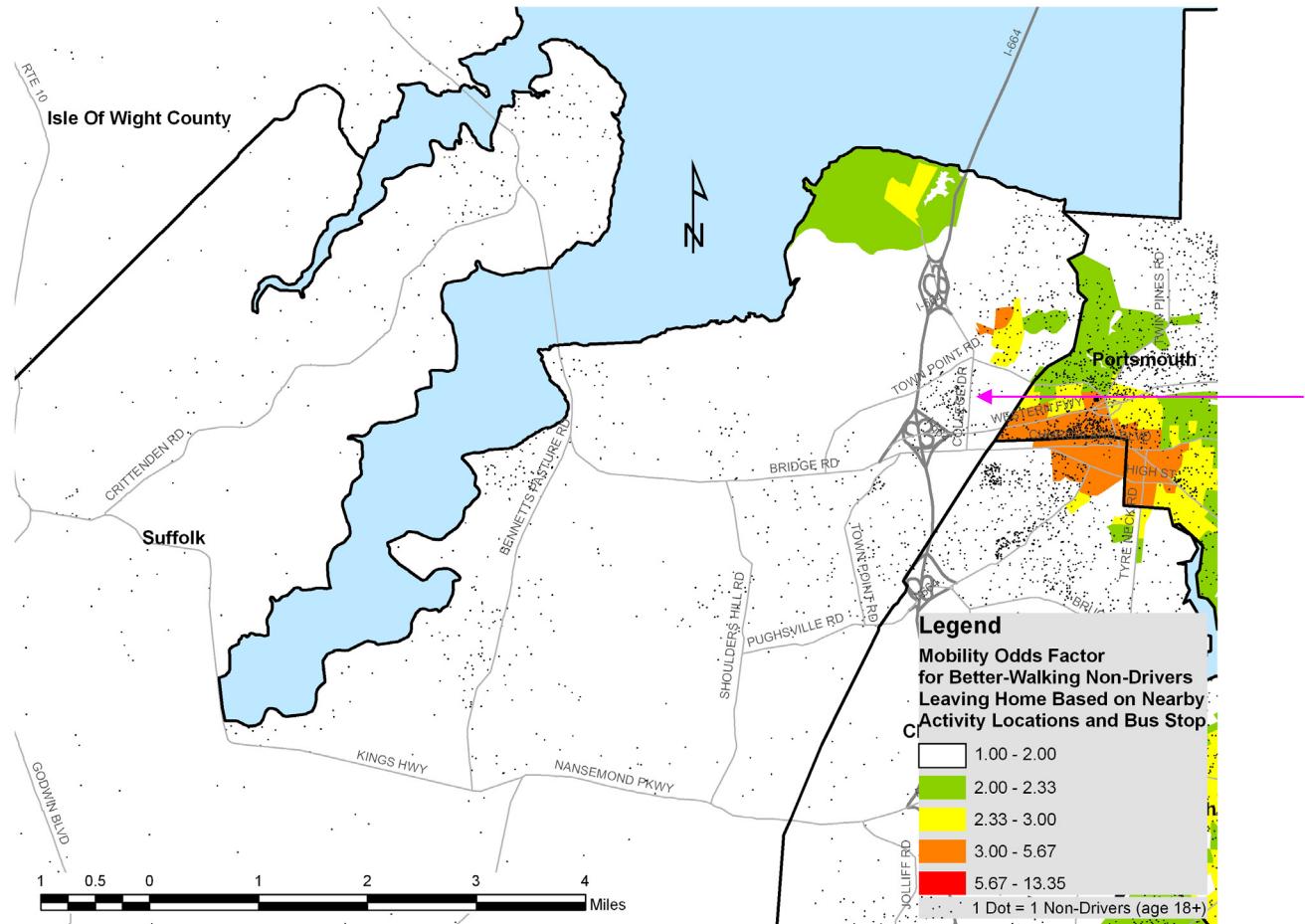
The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



The group of non-drivers **downtown** is enjoying the higher mobility provided by nearby bus routes/stops and activity locations (red and orange area with many dots indicated by **pink arrow**, above).

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

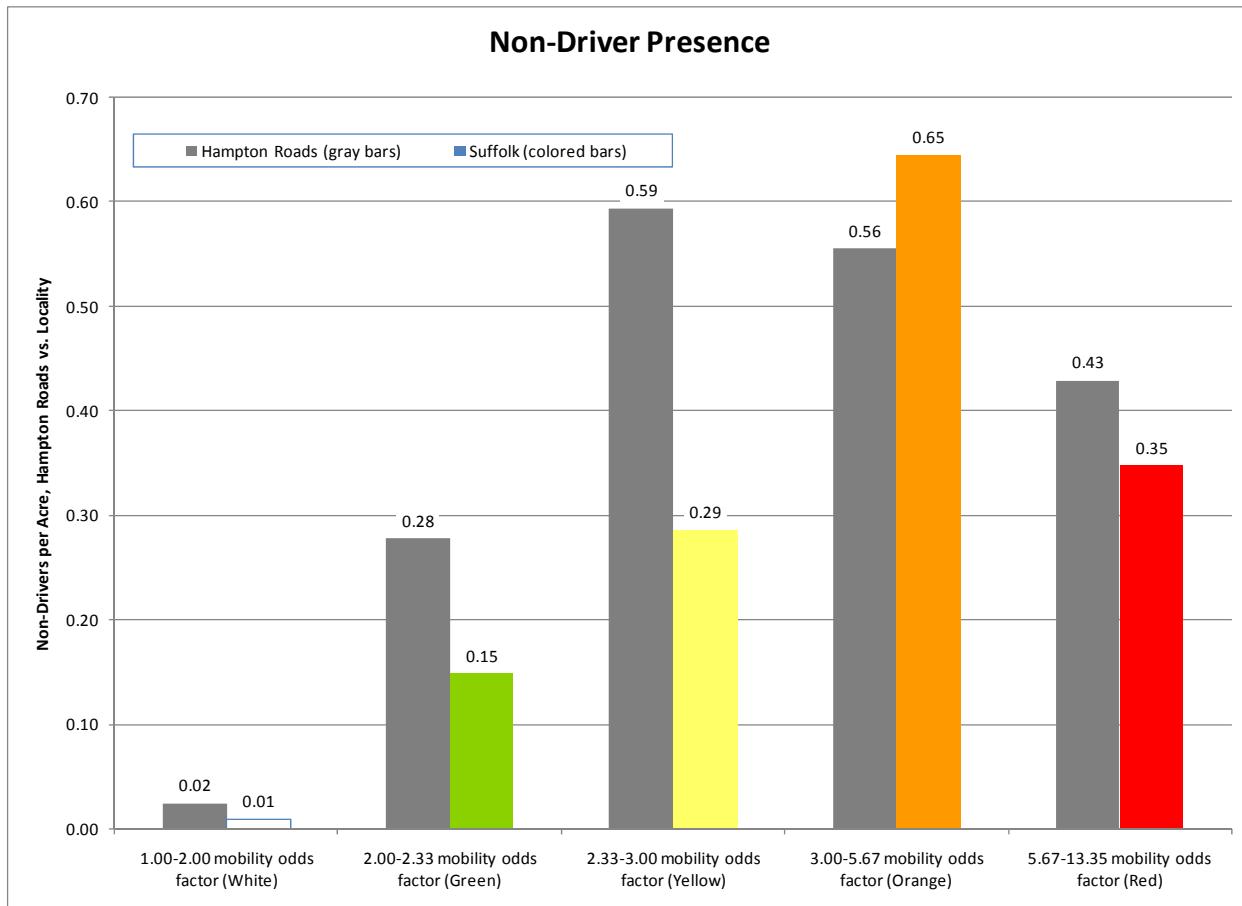


Source: NDs on MOF- Suf- N.jpg

There is a concentration of non-drivers in **Wynnewood** (indicated by pink arrow) with low geography-based mobility³² (colored white above). Using budgetary and zoning authority to place bus service and more activity locations (government, commercial, and non-profit) in this low mobility area would improve the mobility of the non-drivers living there.

³² i.e. bus-based mobility and activity-location-based mobility

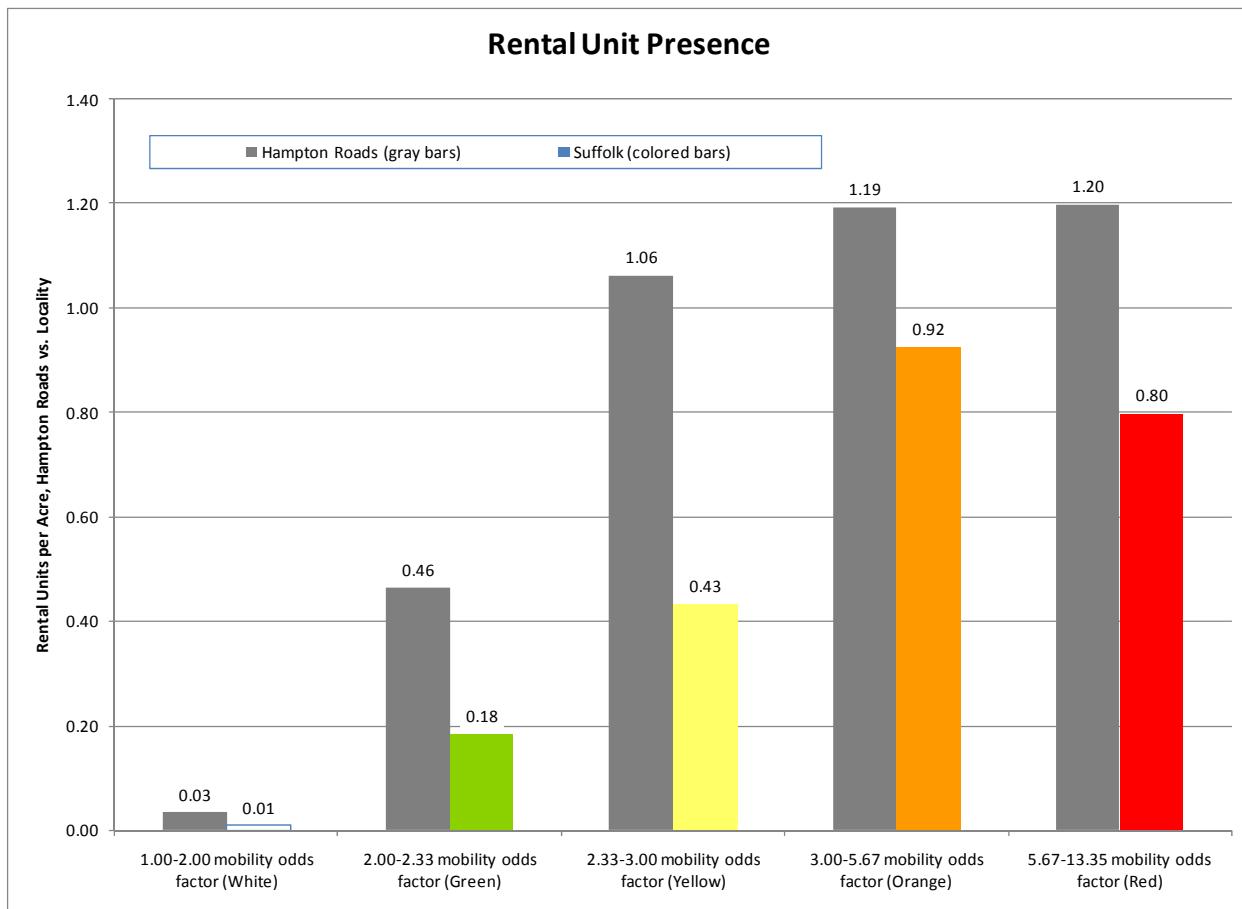
Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

Suffolk's highest mobility areas—downtown and North Main Street vicinity (represented by orange and red bars above)—contain numbers of non-drivers per acre which match the regional averages for those mobility levels. By zoning an adequate amount of land for housing expected to attract non-drivers—i.e. apartments and senior housing—in these areas of highest mobility, and not in areas of low mobility, the city will provide good geography-based mobility to the non-drivers who will live in those homes as demand for their construction appears.

On the other hand, Suffolk's medium-low and medium mobility areas (green and yellow bars above and map at beginning of Suffolk section) contain fewer non-drivers per acre than the regional averages for those mobility levels.



Source: Block_data.xlsx

Suffolk's medium-low and medium mobility areas (green and yellow above and on map on following page) contain significantly fewer rental units per acre than the regional averages for those mobility levels.

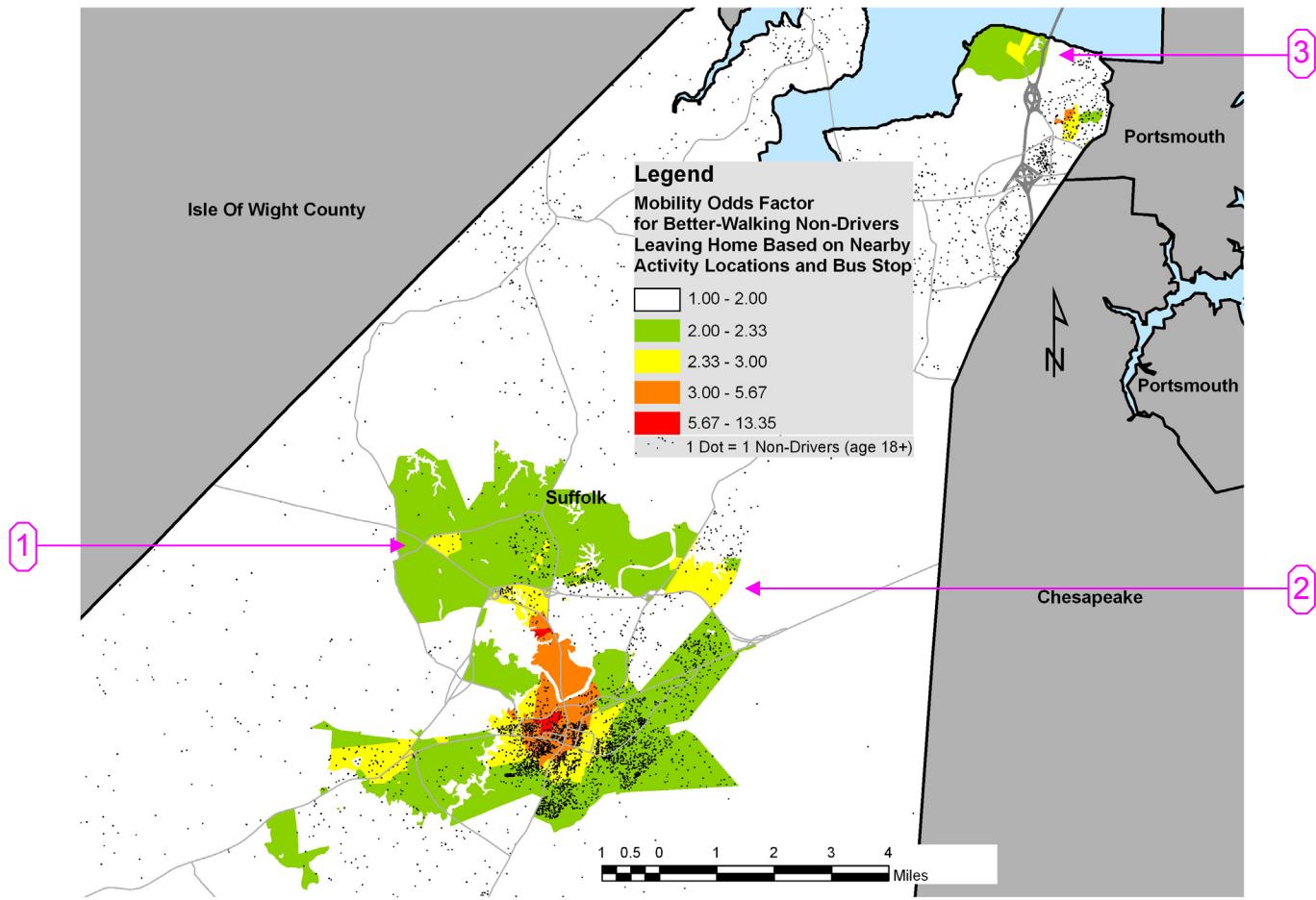
Given:

- 1) the below-average number of non-drivers in Suffolk's medium-low (green) and medium (yellow) mobility areas as discussed on the previous page,
- 2) the fact that rental units tend to contain three times the number of non-drivers found in owner occupied units, as demonstrated in a previous section, and
- 3) the below-average number of rental units in Suffolk's medium-low (green) and medium (yellow) mobility areas, as shown on the chart above,

there may be demand for more rental units in Suffolk's medium-low (green) and medium (yellow) mobility areas by non-drivers seeking such mobility.

If open land or redevelopment opportunities are available, local government could use its zoning authority, if necessary, to enable the construction of housing expected to attract non-drivers—i.e. apartments and senior housing—in Suffolk's medium-low (green) and medium (yellow) mobility areas. In this way, non-drivers relocating to these new homes from areas of lower mobility will experience improved mobility.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Suf- CN.jpg

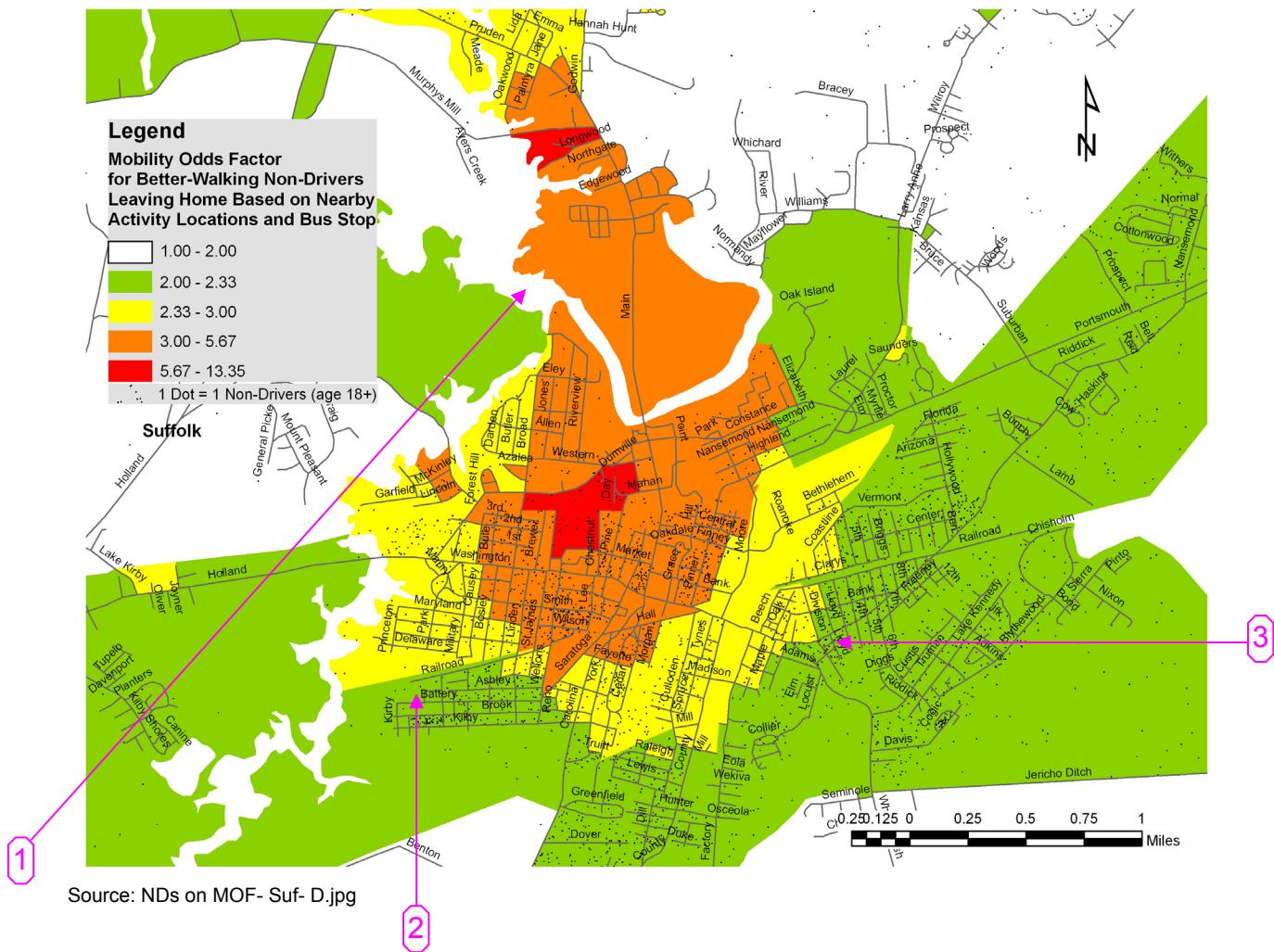
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have medium mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Area bounded by Pruden Blvd / Kings Fork Rd / Kings Point Dr (yellow area)
2. Wilroy Industrial Park (yellow area)
3. TCC vicinity (yellow area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

(Downtown areas are listed on following page.)

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



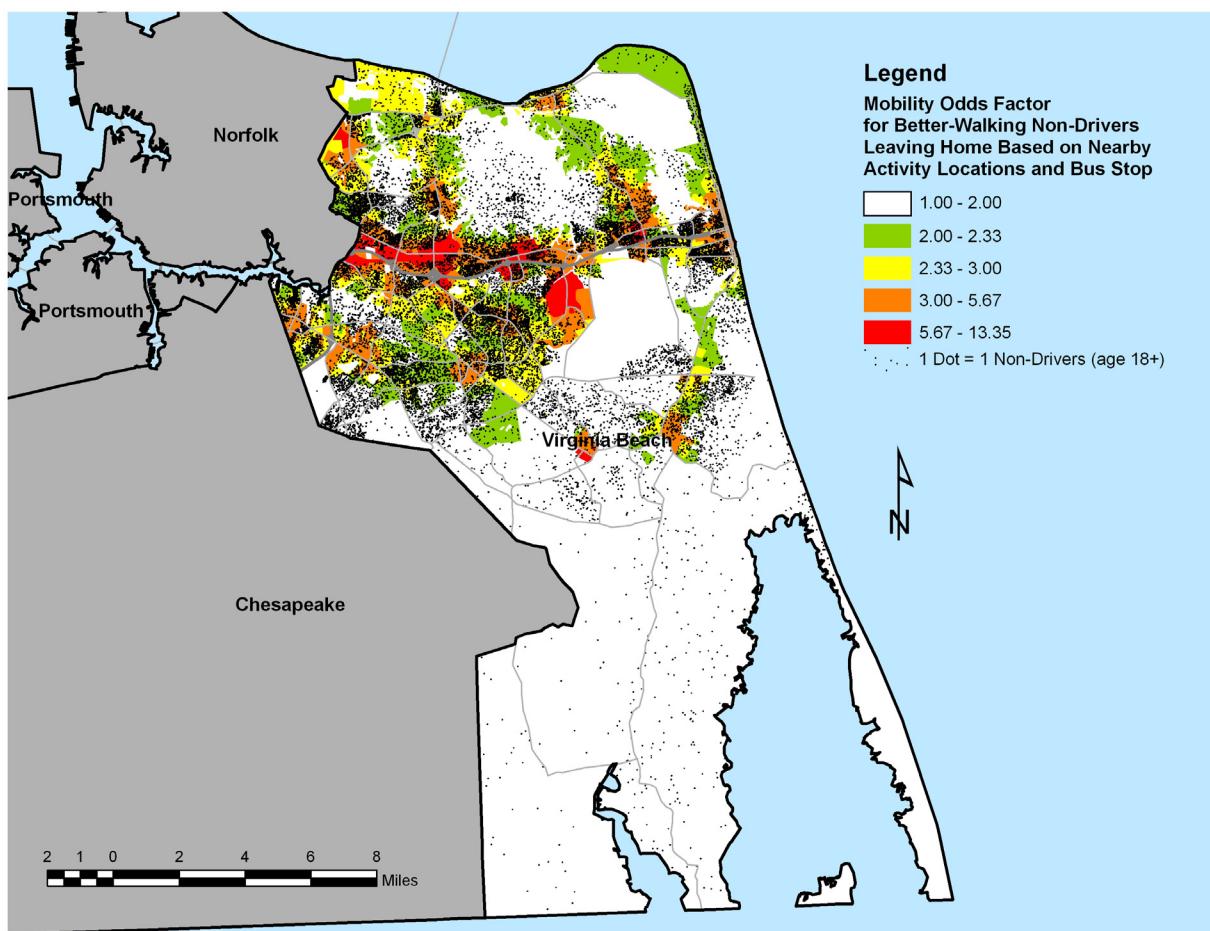
The following Downtown areas have higher mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. North Main St vicinity (orange and red area with few non-drivers)
2. Constance Rd & Washington St vicinity (yellow area)
3. East and south of Downtown (yellow area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Virginia Beach

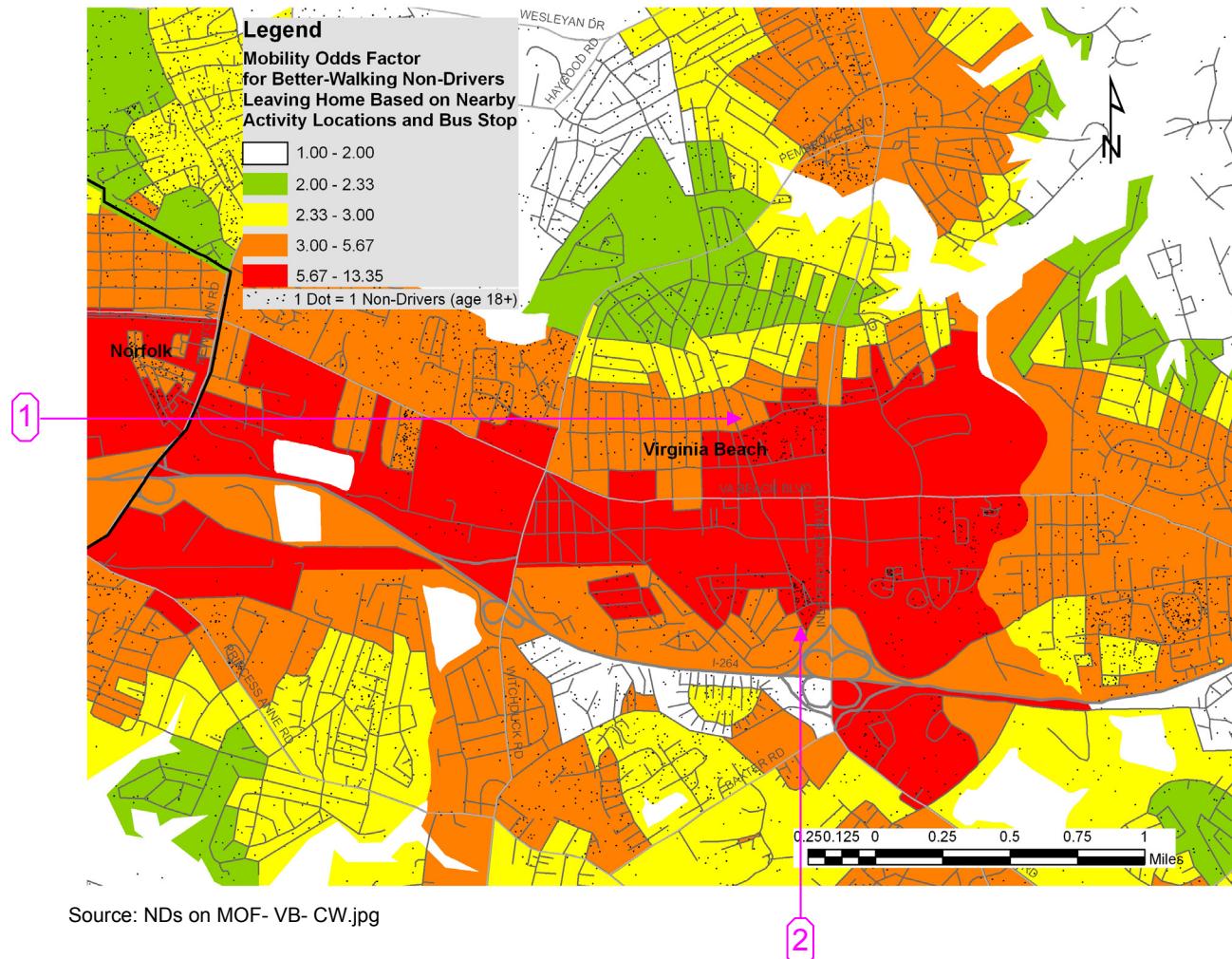
The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- VB.jpg

Successes

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

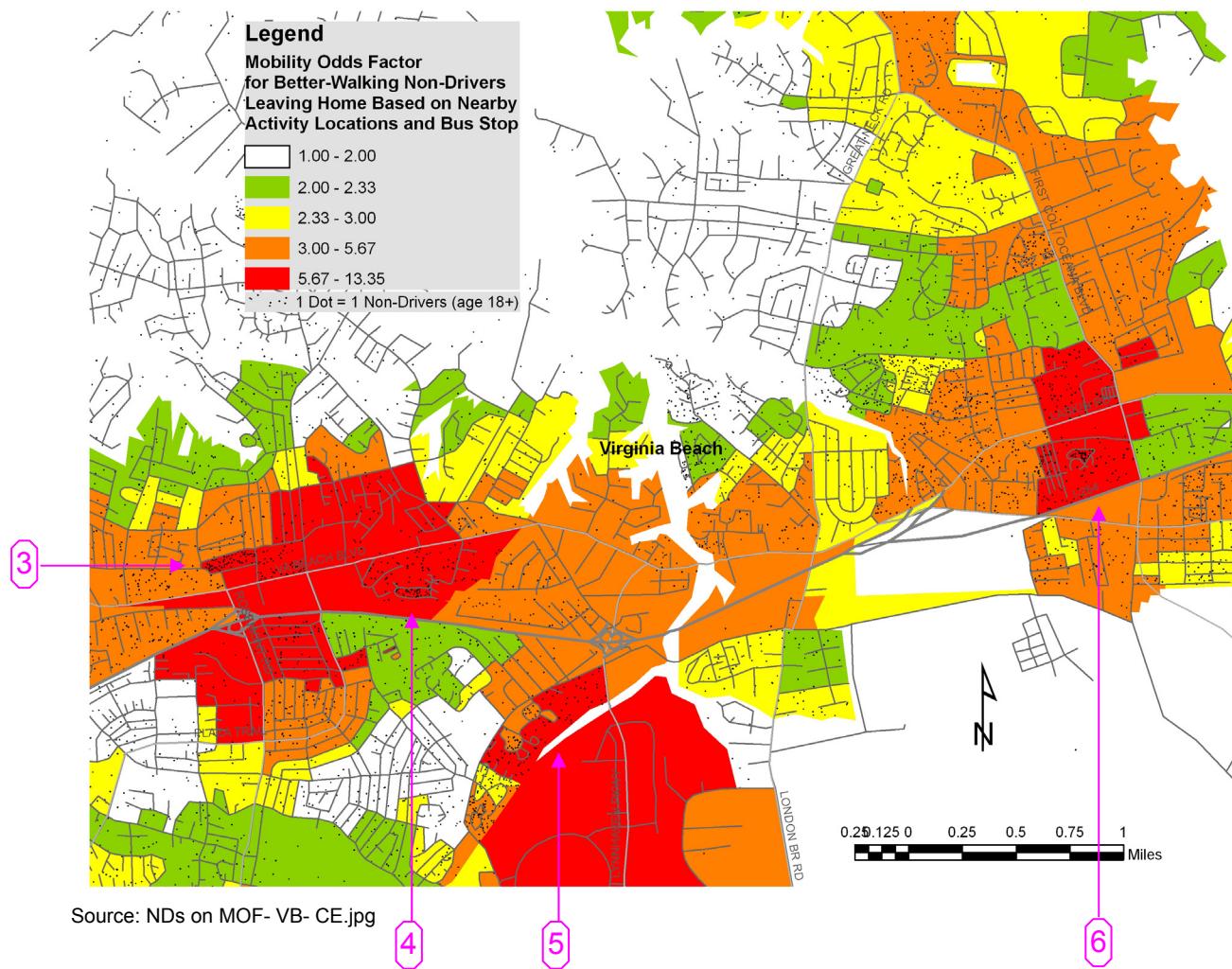


Concentrations of non-drivers are enjoying the mobility provided by nearby bus routes/stops and activity locations in the following high mobility areas (indicated by numbered pink arrows, above):

1. Pembroke Manor (in red area)
2. Independence Square (in red area)

(Additional success areas are listed on following page.)

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

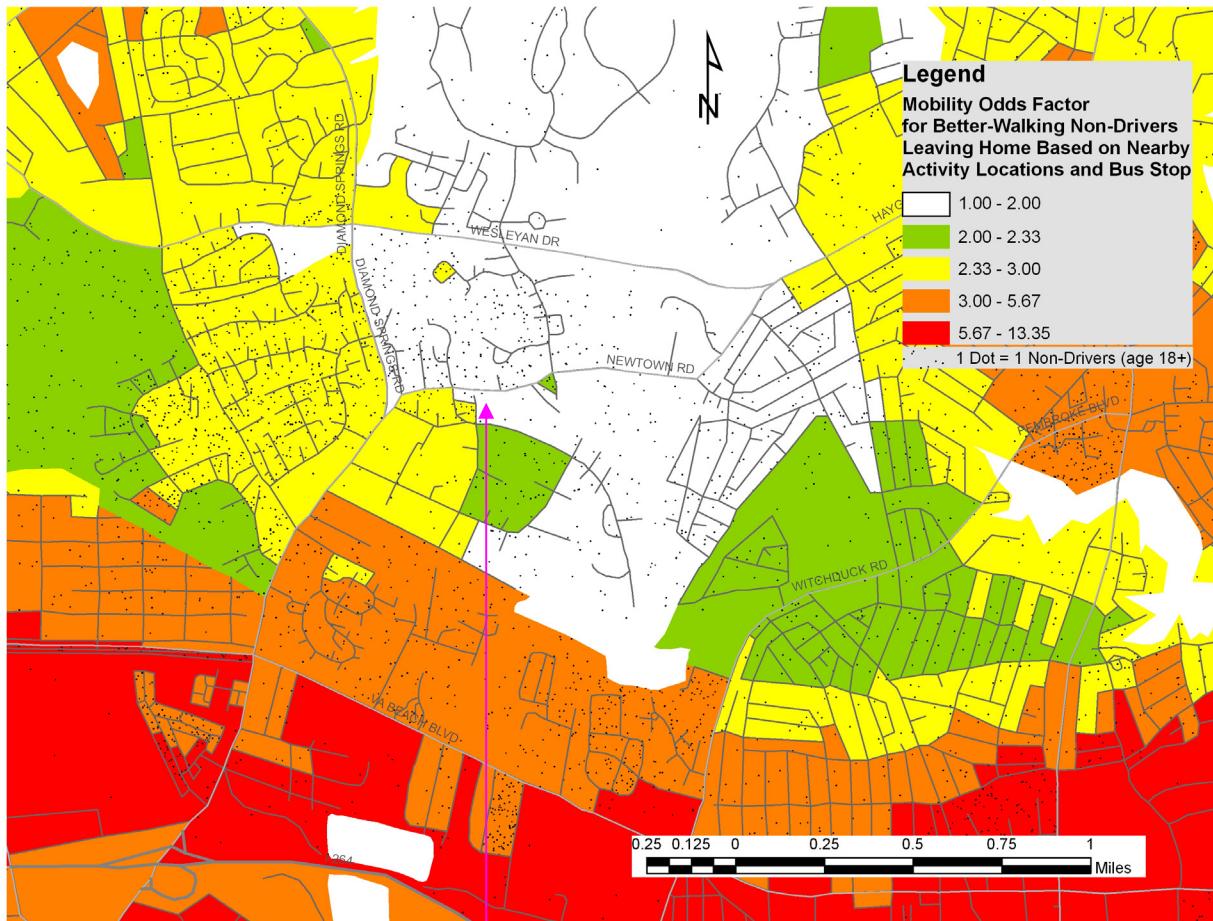


Concentrations of non-drivers are enjoying the mobility provided by nearby bus routes/stops and activity locations in the following high mobility areas (indicated by numbered pink arrows, above):

3. Malibu: South of Alcott Rd (in red area)
4. Princess Anne Plaza: East of Groveland Rd (in red area)
5. Between Lynnhaven Rd and London Bridge Creek (in red area)
6. Hilltop, West of First Colonial Rd (red area)

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



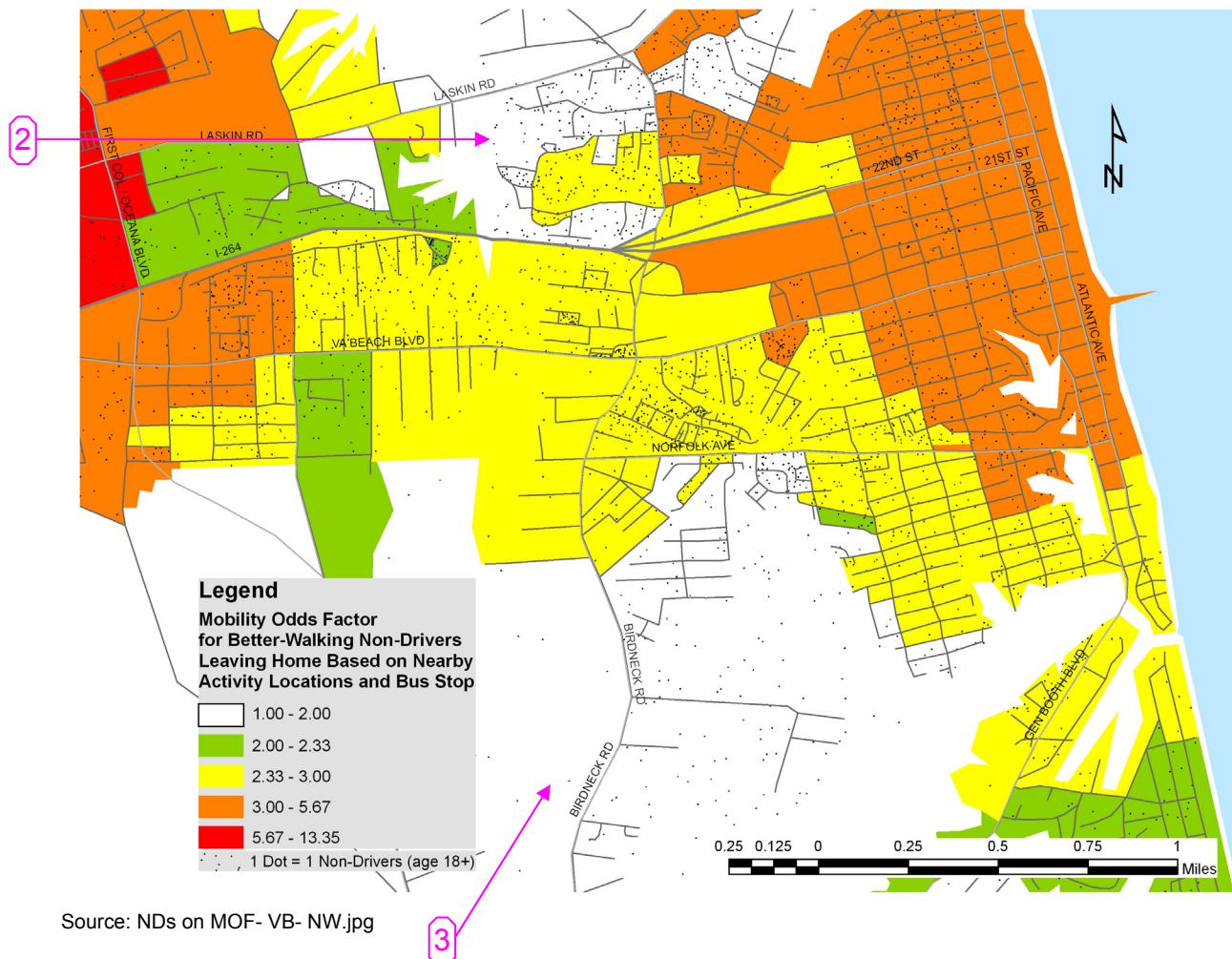
Source: NDs on MOF- VB- NW.jpg

1

The concentration of non-drivers in the **area bounded by Wesleyan Dr / Broad Meadows Blvd / Newtown Rd / Diamond Springs Rd** (noted by numbered pink arrow [1] above) has low total geography-based mobility³³ and would therefore benefit from bus service and more nearby activity locations. (Similar areas are discussed on the following page.)

³³ i.e. the combination of bus-based mobility and activity-location-based mobility

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

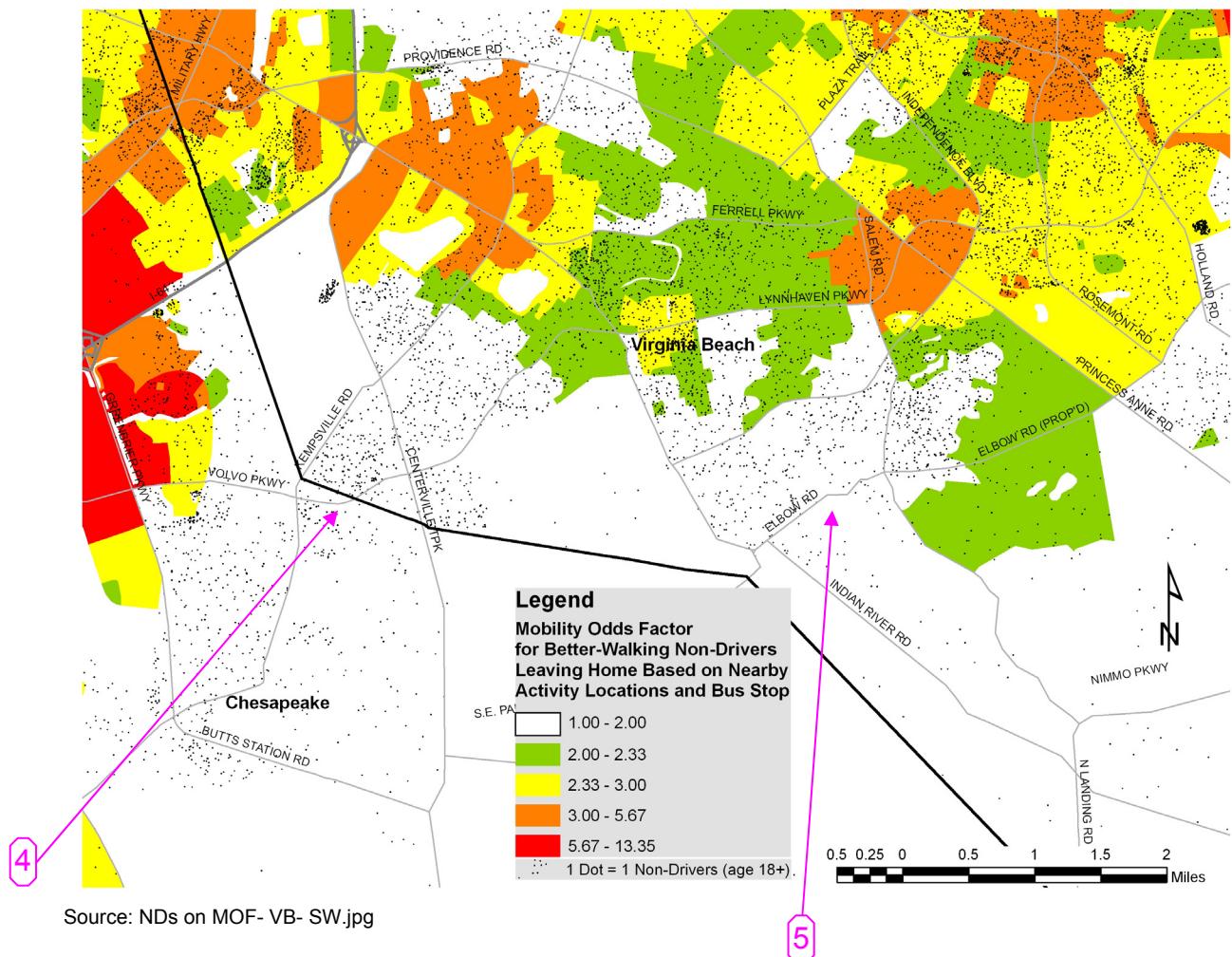


There are concentrations of non-drivers with low geography-based mobility (colored white above) who would therefore benefit from bus service and more nearby activity locations in the following areas (indicated by numbered pink arrows, above):

2. Area south of Laskin Rd, on either side of Birdneck Rd (white areas, above)
3. Area south of Norfolk Ave and east of Birdneck Rd (white area, above)

(Similar areas are discussed on the following page.)

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

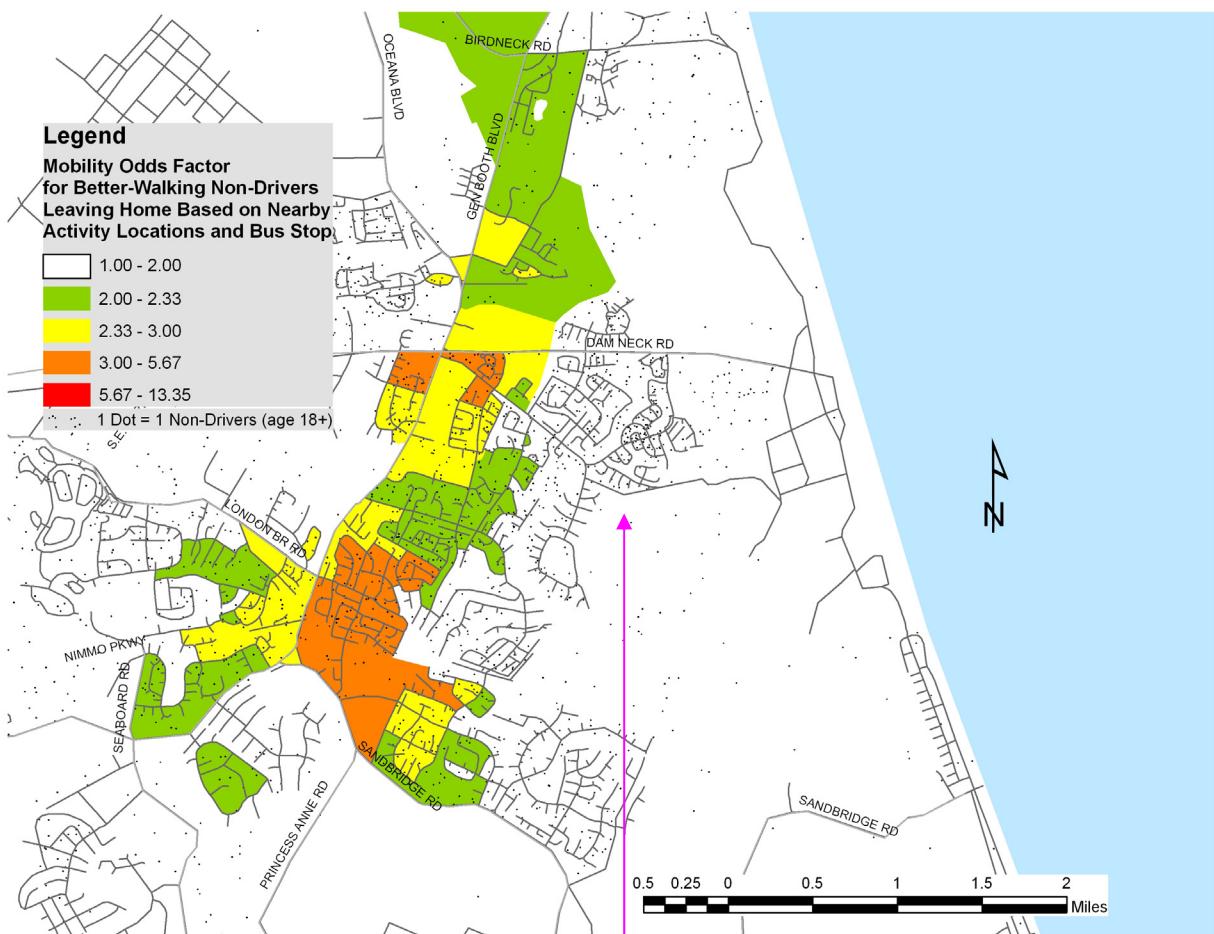


There are concentrations of non-drivers with low geography-based mobility (colored white above) who would therefore benefit from bus service and more nearby activity locations in the following areas (indicated by numbered pink arrows, above):

4. Area north, east, and south of Kempsville Rd & Centerville Tpk intersection (white area)
5. Area bounded by Indian River Rd / Independence Blvd / Princess Anne Commons / Elbow Rd (white area)

(A similar area is discussed on the following page.)

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

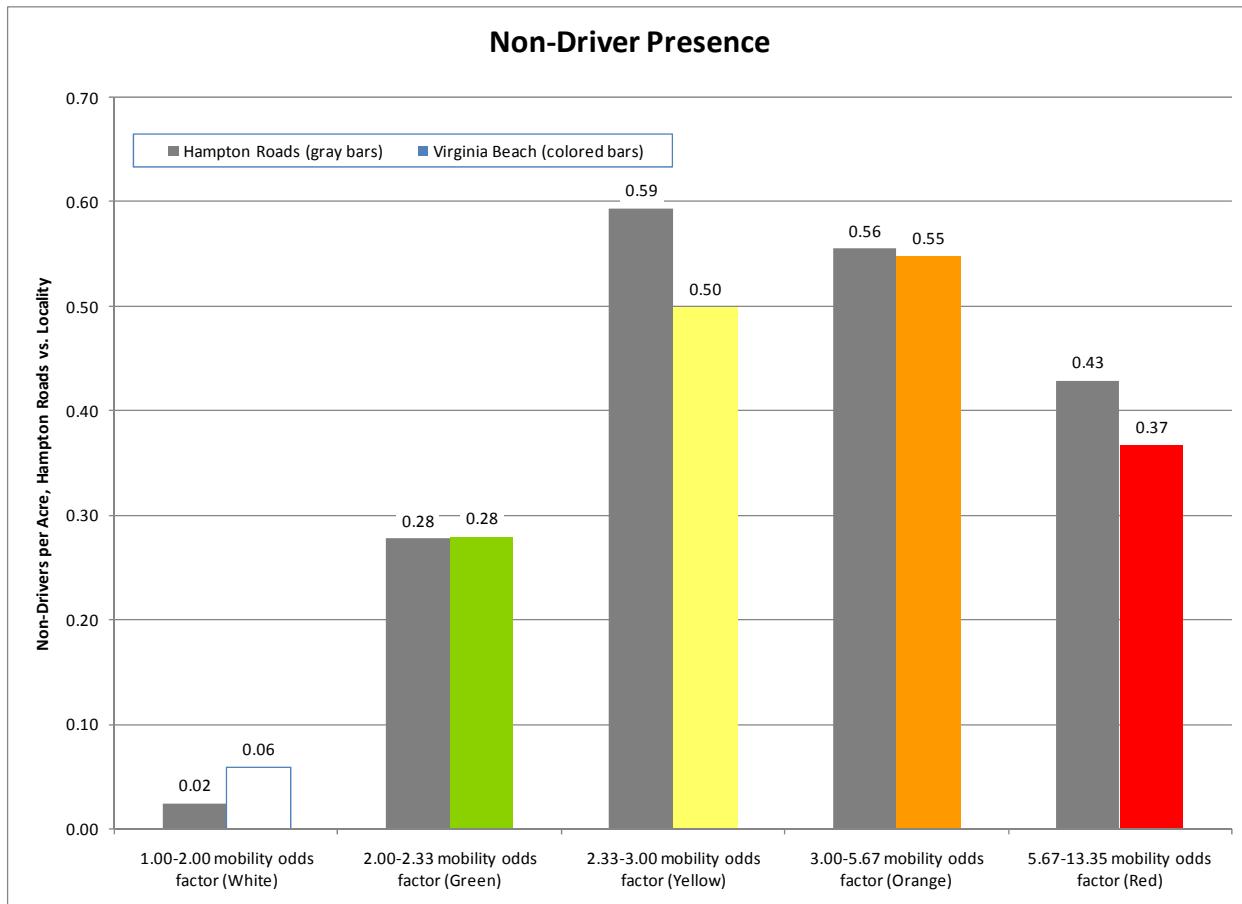


Source: NDs on MOF- VB- SE.jpg

6

The concentration of non-drivers in **Ocean Lakes**, particularly along **Bold Ruler Dr**, (noted by **pink arrow [6]** above) has low total geography-based mobility. Using budgetary and zoning authority to place bus service and more activity locations (government, commercial, and non-profit) in this low mobility area would improve the mobility of the non-drivers living there.

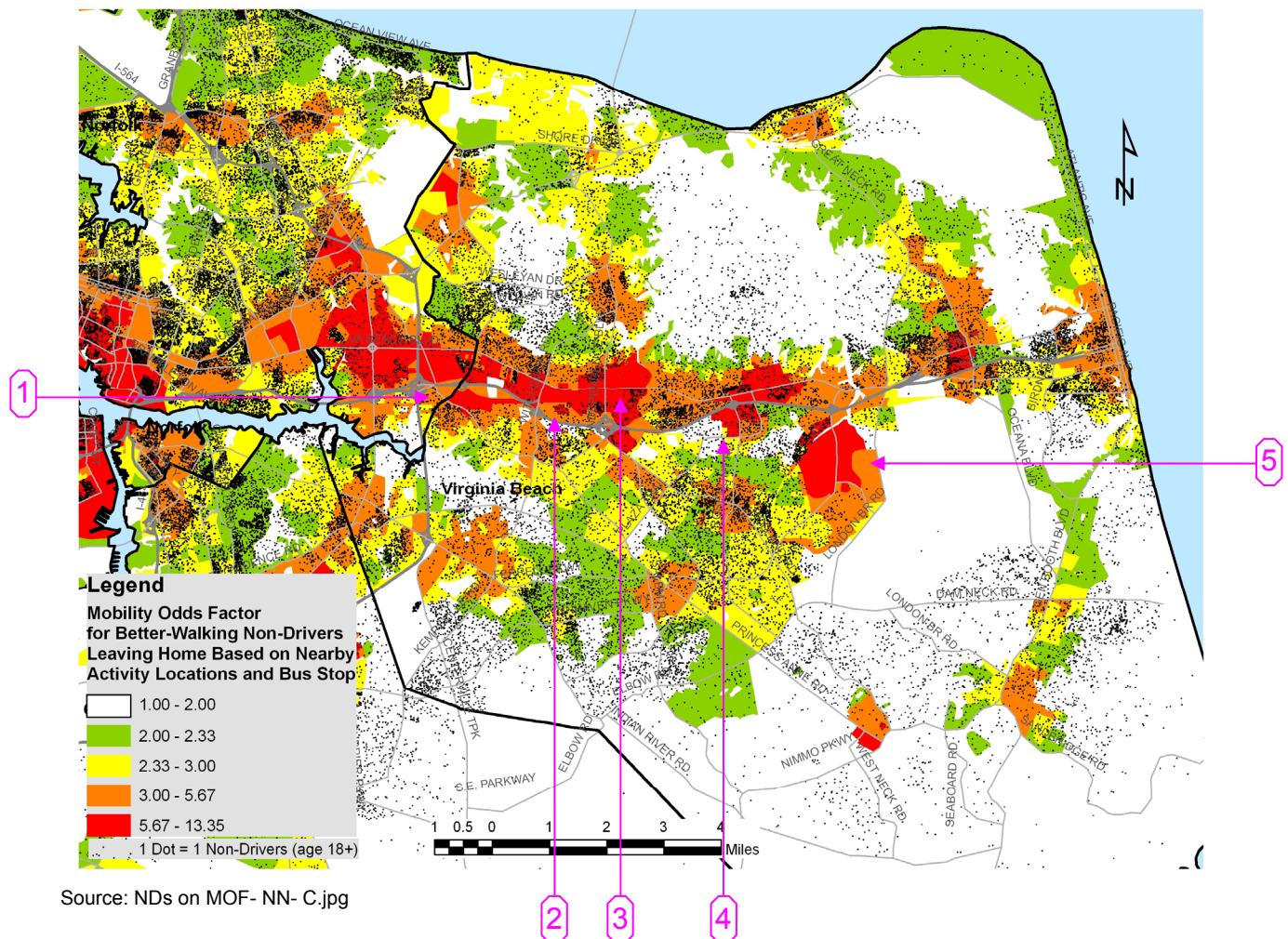
Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

As shown above, Virginia Beach's higher mobility areas (green, yellow, orange, and red above and on maps in this section) contain numbers of non-drivers per acre which match the regional averages for those mobility levels. By zoning an adequate amount of land for housing expected to attract non-drivers—i.e. apartments and senior housing—in these areas of higher mobility, and not in areas of low mobility, the city will provide good geography-based mobility to the non-drivers who will live in those homes as demand for their construction appears.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



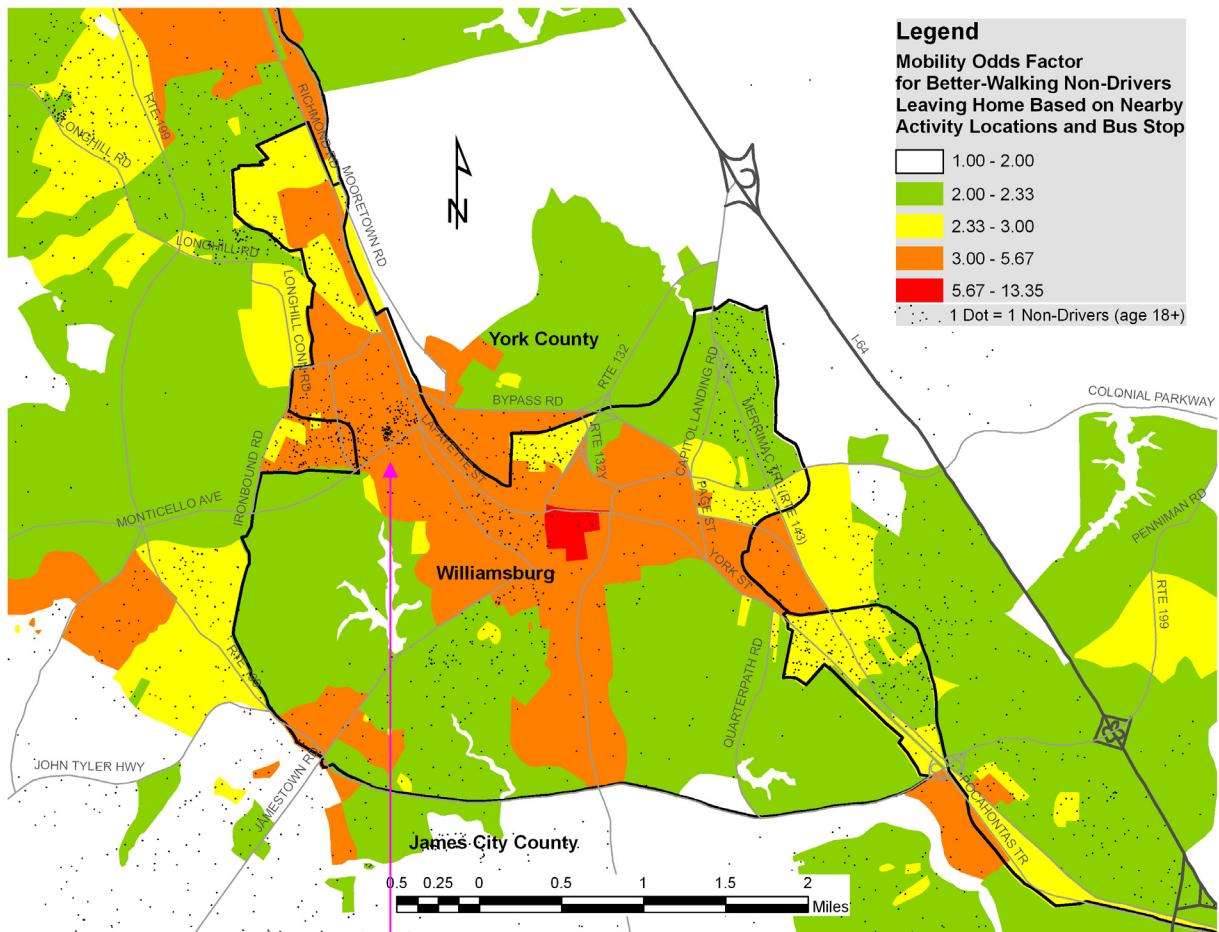
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Area between Greenwich Rd and Parliament Dr (red area)
2. Area along Cleveland St (red area)
3. Area bounded by Jeanne St / Thalia Creek / VB Blvd / Independence Blvd (red area)
4. Area north and east of Windsor Woods Elementary School (red area)
5. Area north and northwest of Lynnhaven Mall (red area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

Williamsburg

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



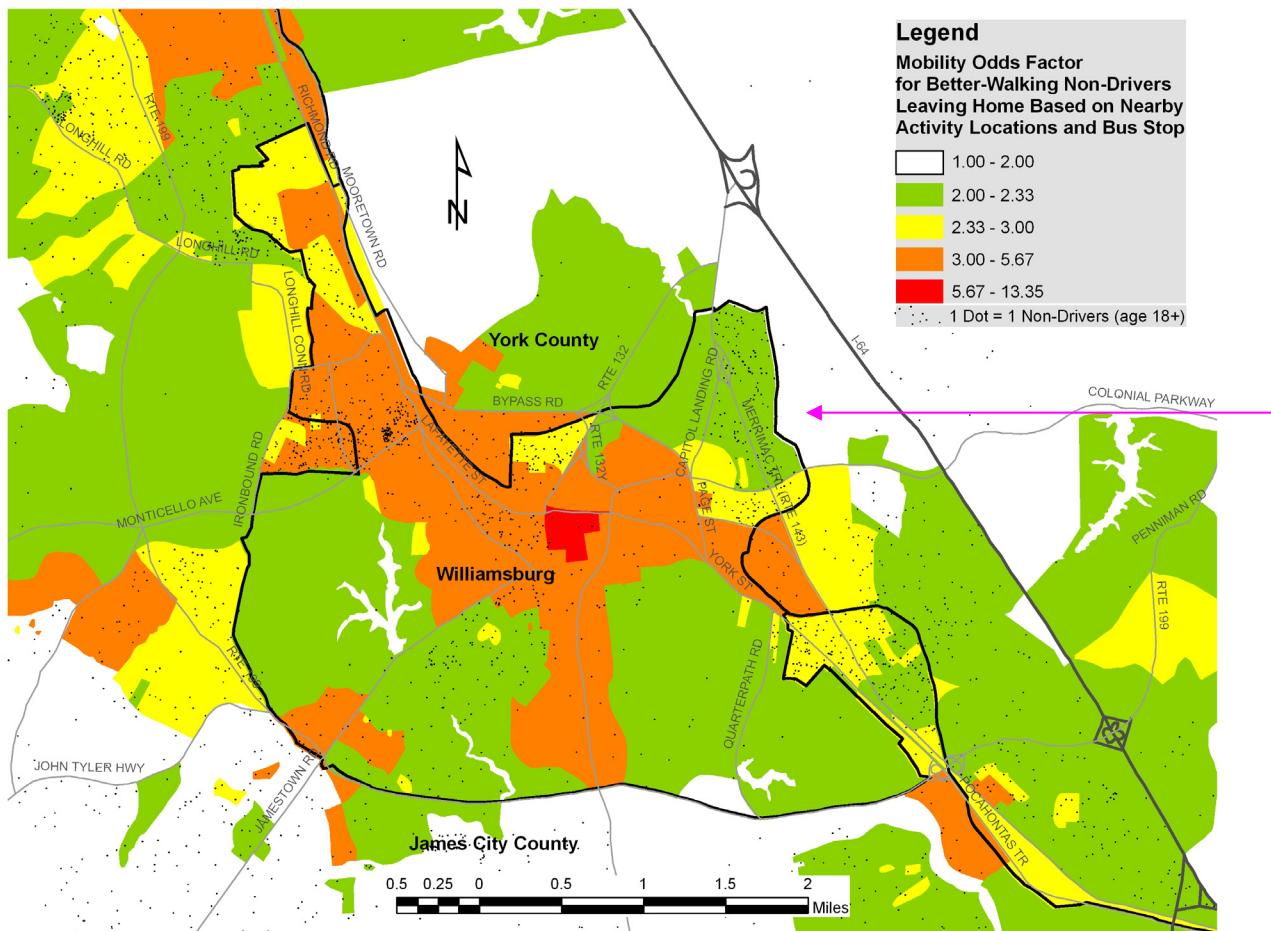
Successes

A group of non-drivers is enjoying the medium-high mobility provided by nearby bus routes/stops and activity locations in the following area (indicated by pink arrow above):

- between New Hope Rd and Williamsburg Shopping Center (in orange area)

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations

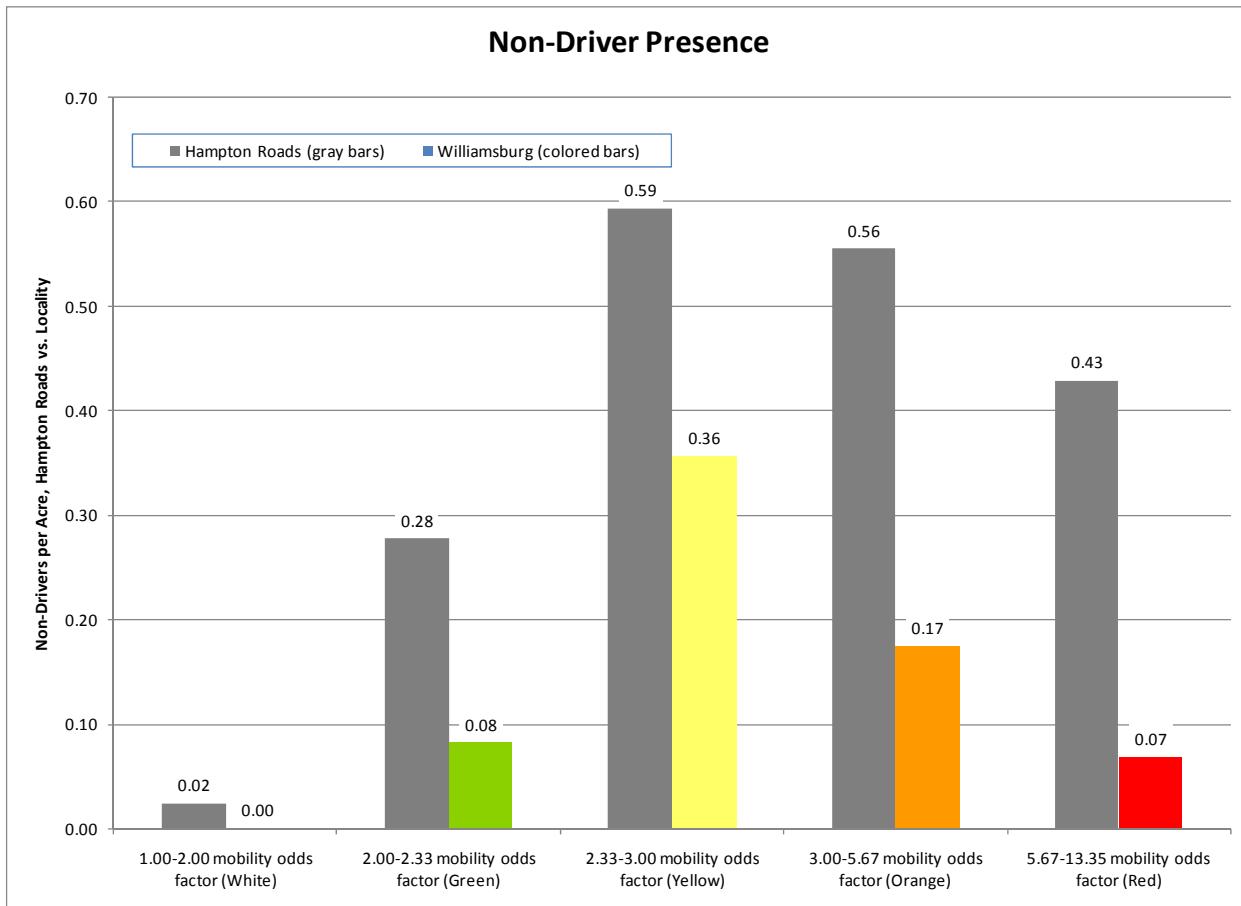


Source: NDs on MOF- Wlm.jpg

Although the groups of non-drivers **along Merrimac Trail** (indicated by **pink arrow** above) are served by a bus route, they have medium-low geography-based mobility³⁴ (green). Using budgetary and zoning authority to place more activity locations (government, commercial, and non-profit) in this low mobility area would improve the mobility of the non-drivers living there.

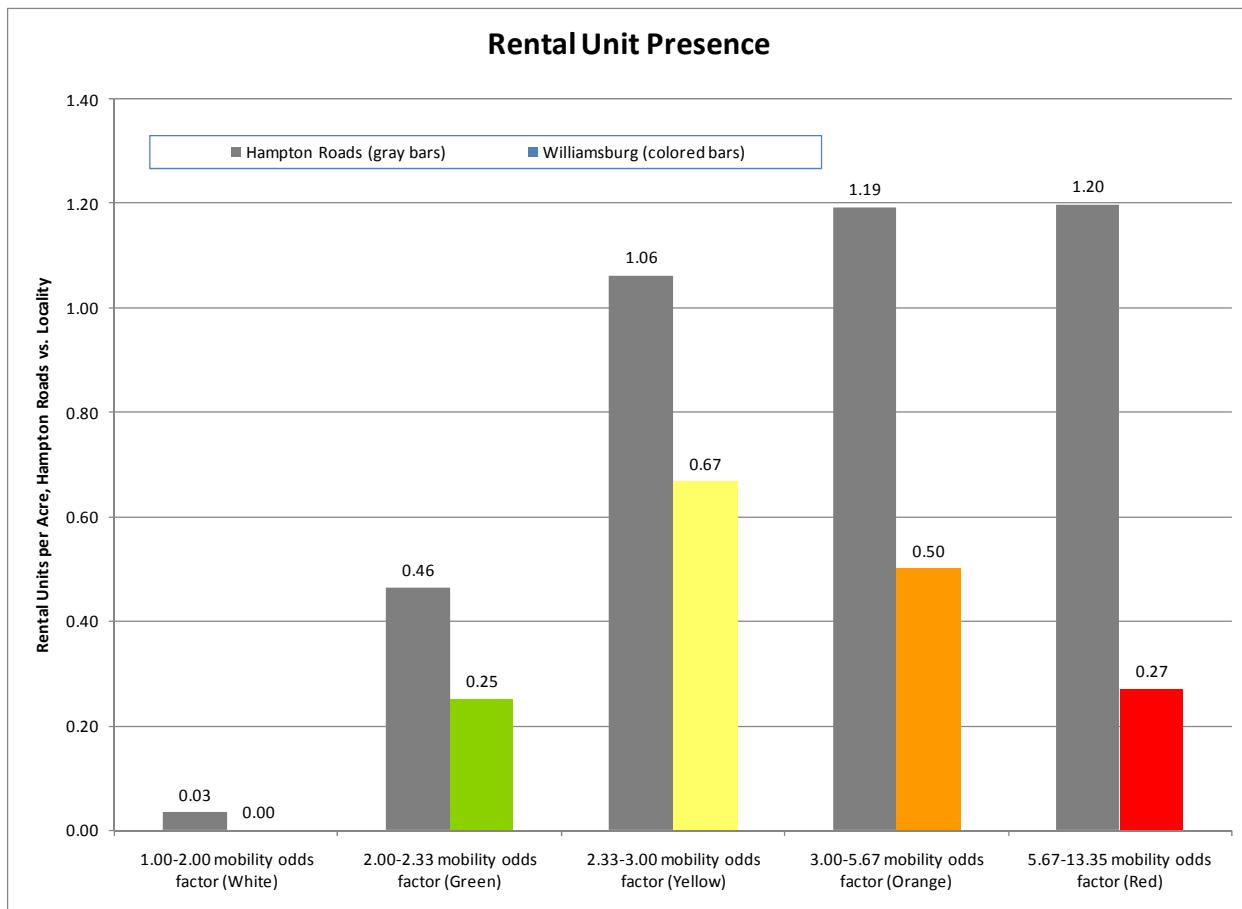
³⁴ i.e. bus-based mobility and activity-location-based mobility

Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

Williamsburg's higher mobility areas (green, yellow, orange, and red above and on map on following page) contain fewer non-drivers per acre than the regional averages for those mobility levels.



Source: Block_data.xlsx

Williamsburg's higher mobility areas (green, yellow, orange, and red above and on map on following page) contain fewer rental units per acre than the regional averages for those mobility levels.

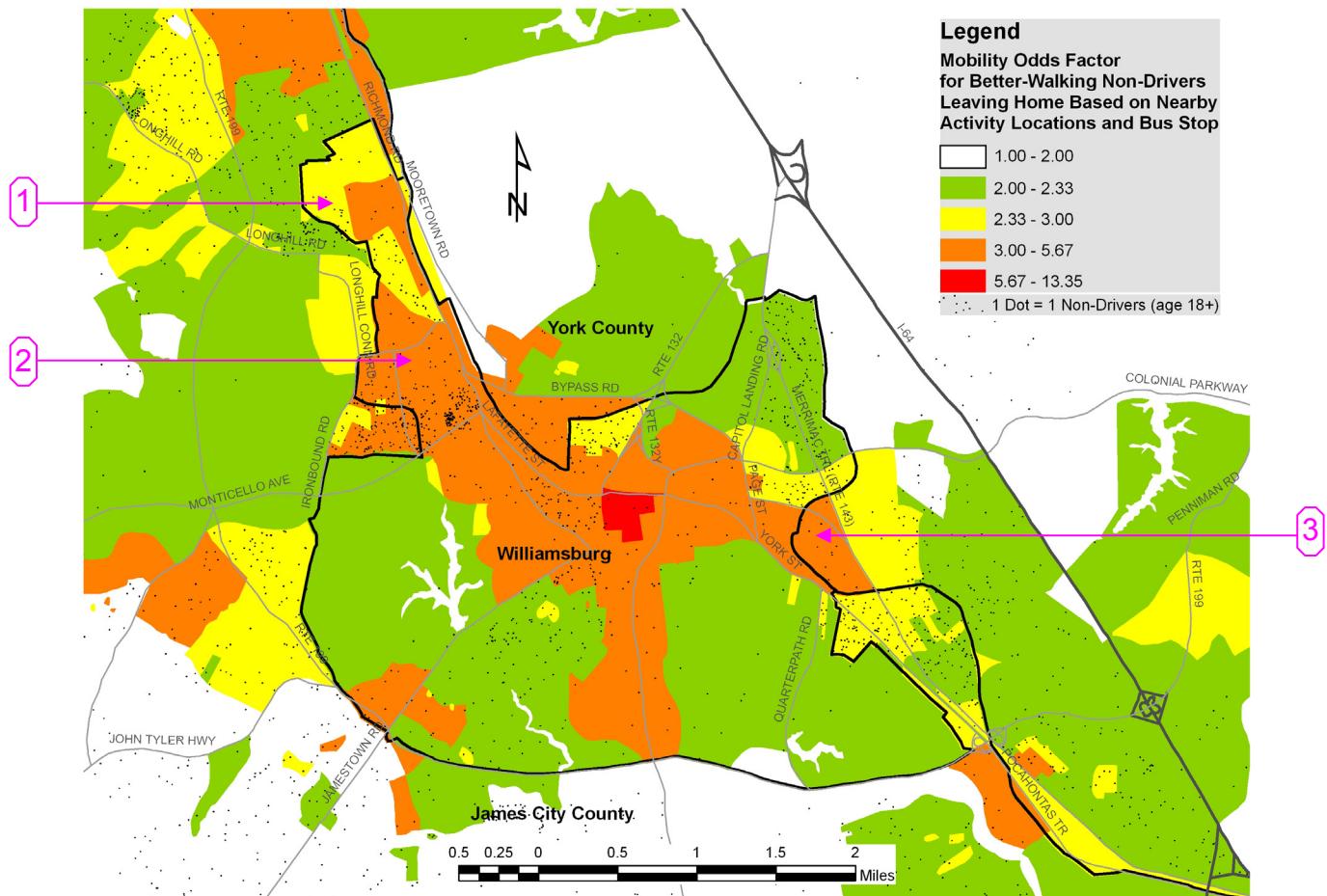
Given:

- 1) the below-average number of non-drivers in Williamsburg's higher mobility areas, as discussed on the previous page,
- 2) the fact that rental units tend to contain three times the number of non-drivers found in owner occupied units, as demonstrated in a previous section, and
- 3) the below-average number of rental units in Williamsburg's higher mobility areas, as shown on the chart above,

there may be demand for more rental units in Williamsburg's higher mobility areas—which cover the bulk of the city—by non-drivers seeking the higher mobility found there.

If open land or redevelopment opportunities are available, local government could use its zoning authority, if necessary, to enable the construction of housing expected to attract non-drivers—i.e. apartments and senior housing—in these higher mobility areas. In this way, non-drivers relocating to these new homes from areas of lower mobility will experience improved mobility.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- Wlm.jpg

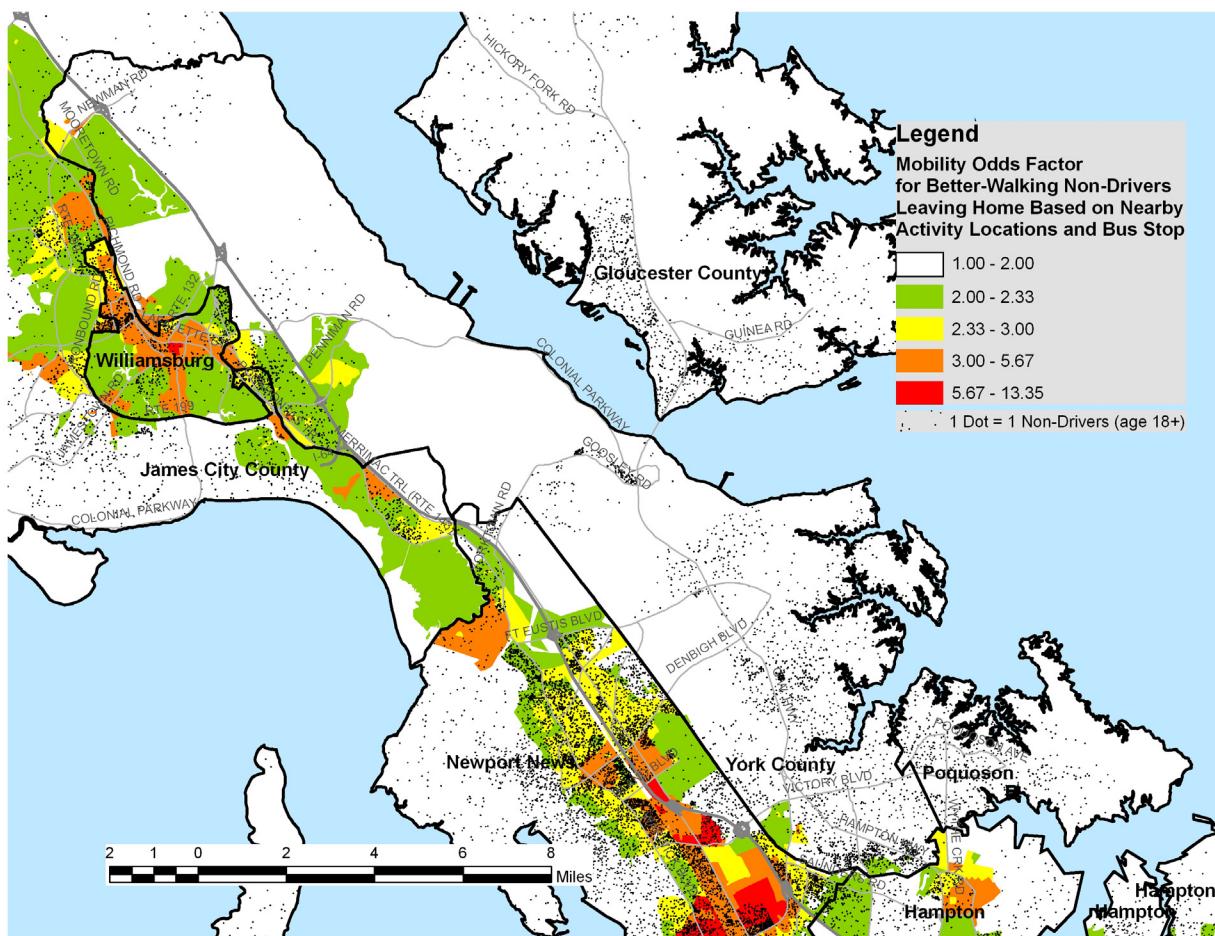
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have medium-high mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. area south of Waltz Farm Dr and east of Meredith Way (orange area)
2. High Street (orange area)
3. Area bounded by York St / Page St / 2nd St / York Co Corp. Limit (orange area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

York County

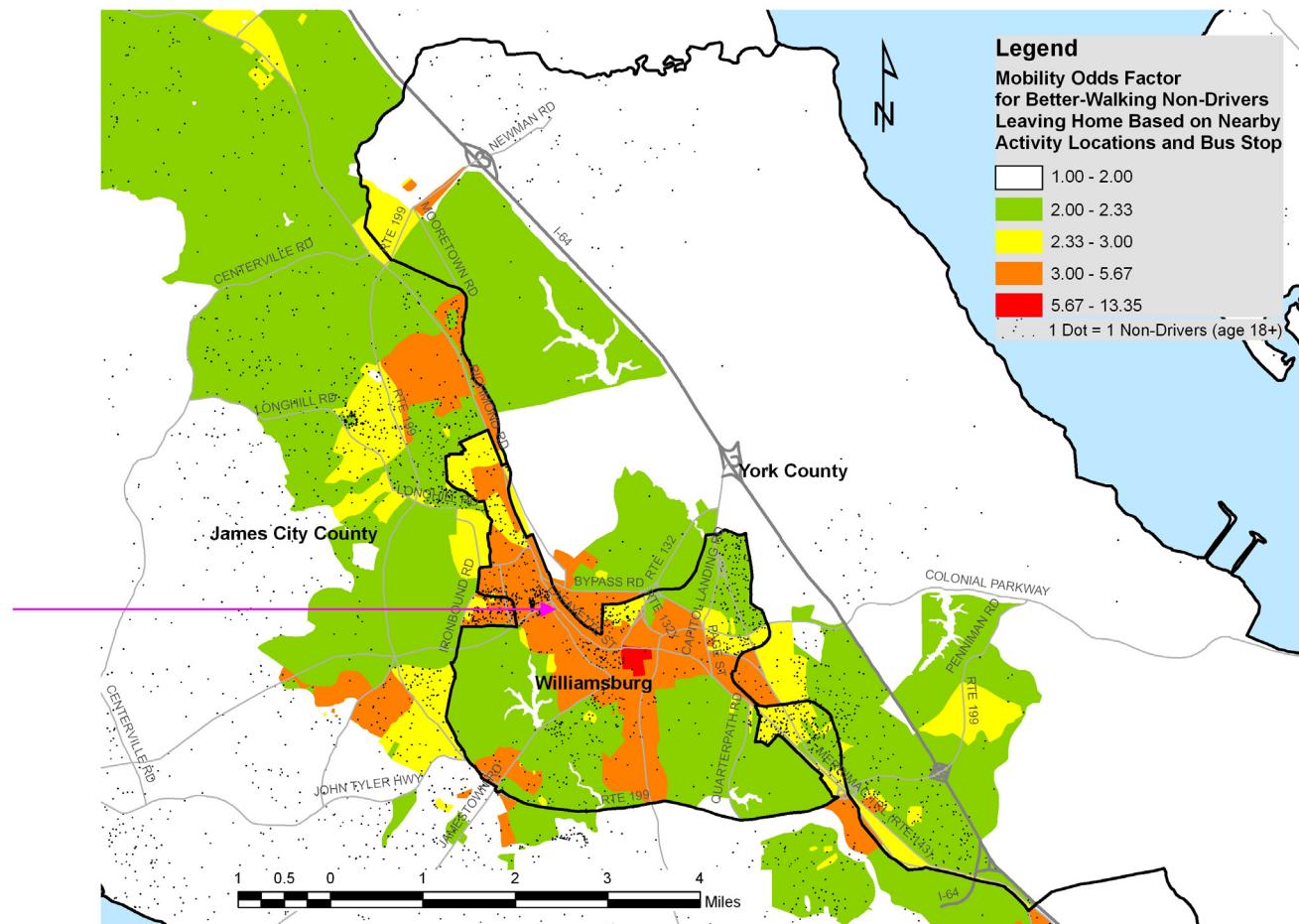
The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- York.jpg

Successes

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



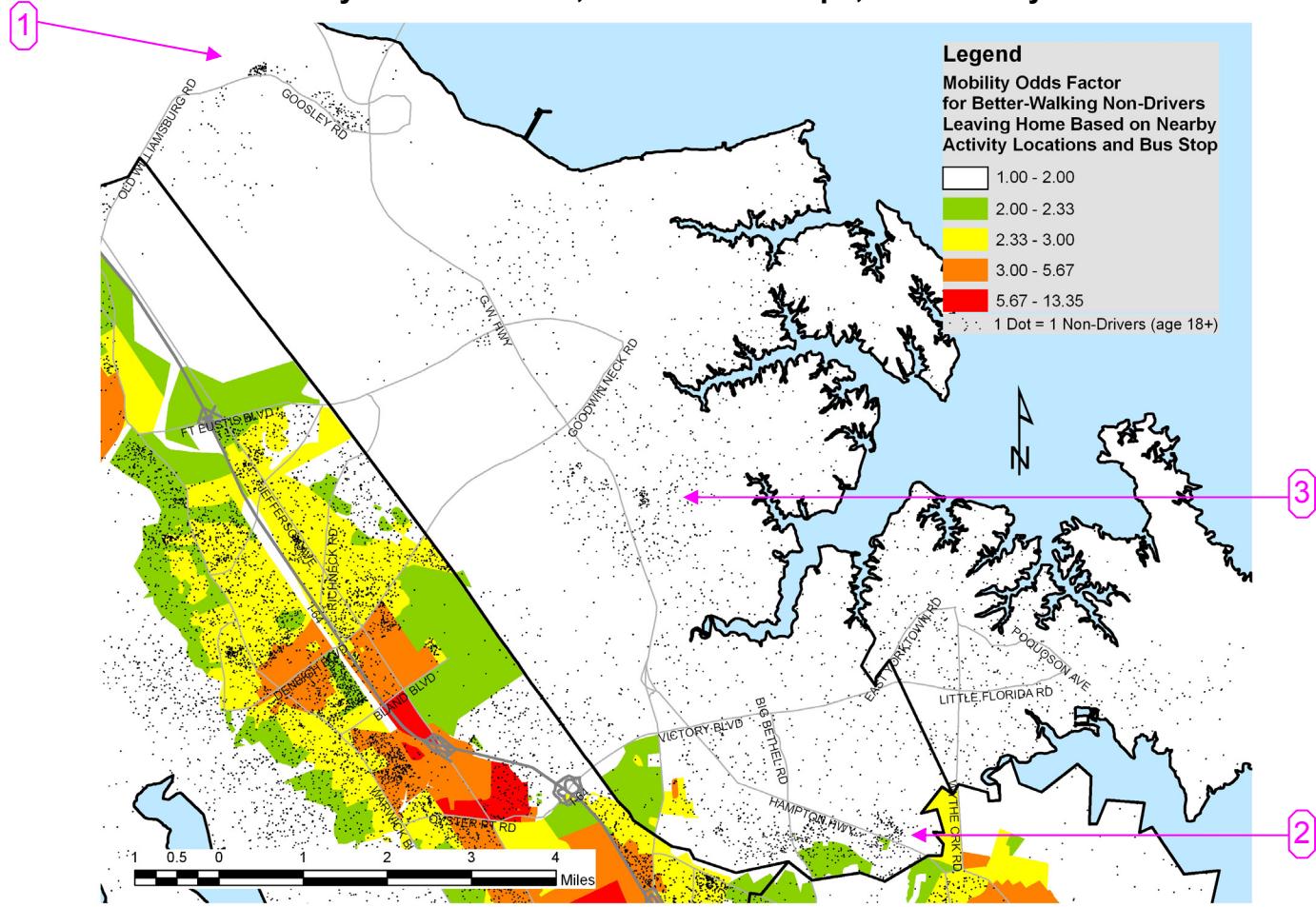
Source: NDs on MOF- York- N.jpg

A group of non-drivers is enjoying the higher mobility provided by nearby bus routes/stops and activity locations in the following area (indicated by **pink arrow** above):

- **Williamsburg Commons** (orange triangle south of Bypass Rd)

Prospects for Improving Low Mobility Areas where Many Non-Drivers Live

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



Source: NDs on MOF- York- CS.jpg

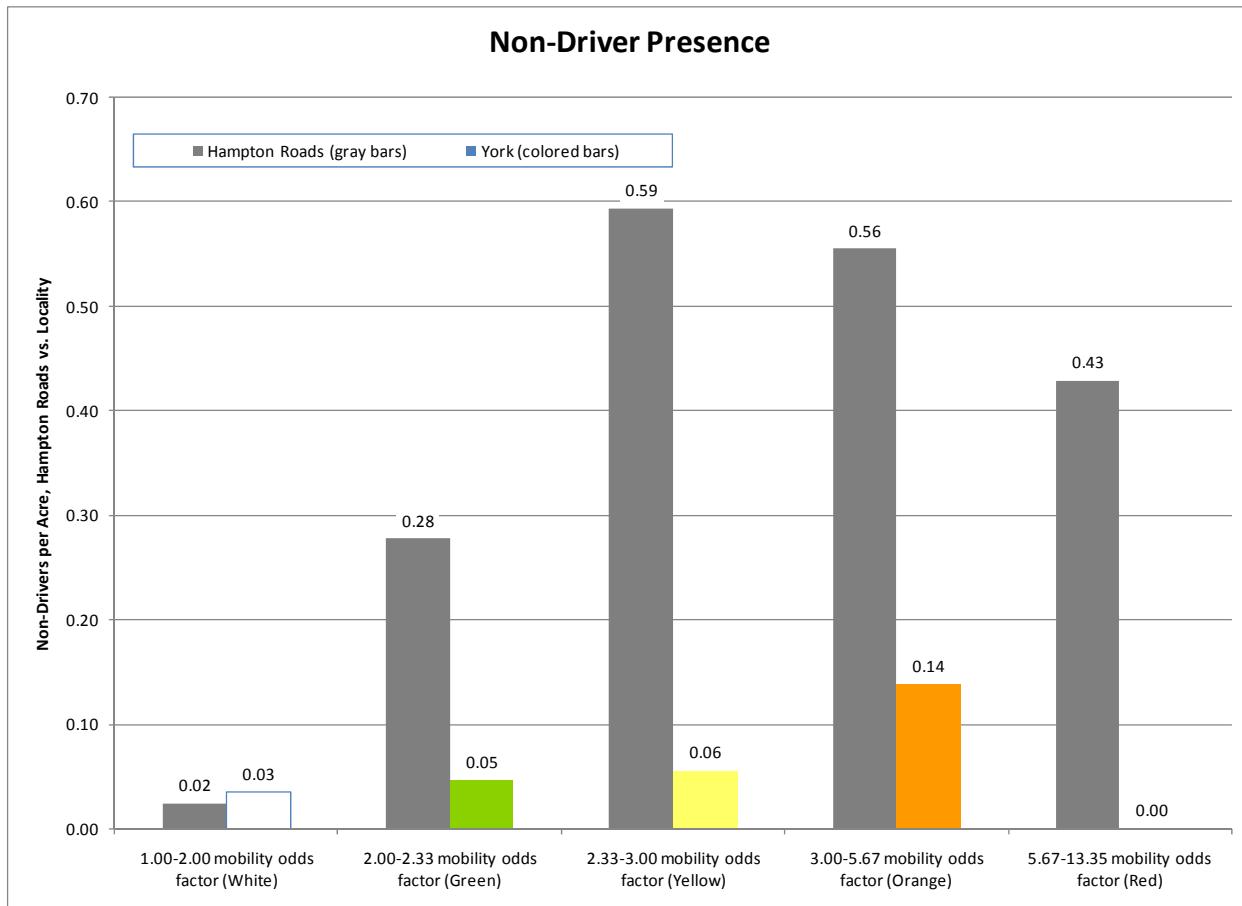
There are concentrations of non-drivers with low geography-based mobility³⁵ (colored white above) in the following areas (indicated by numbered pink arrows, above):

1. Along Old Williamsburg Rd and Goosley Rd (white area)
2. Along Hampton Hwy from Hampton Corp. Limit to Owen Davis Blvd (white area)
3. GW Hwy & Dare Rd vicinity (white area)

Using budgetary and zoning authority to place bus service and more activity locations (government, commercial, and non-profit) in these low mobility areas would improve the mobility of the non-drivers living there.

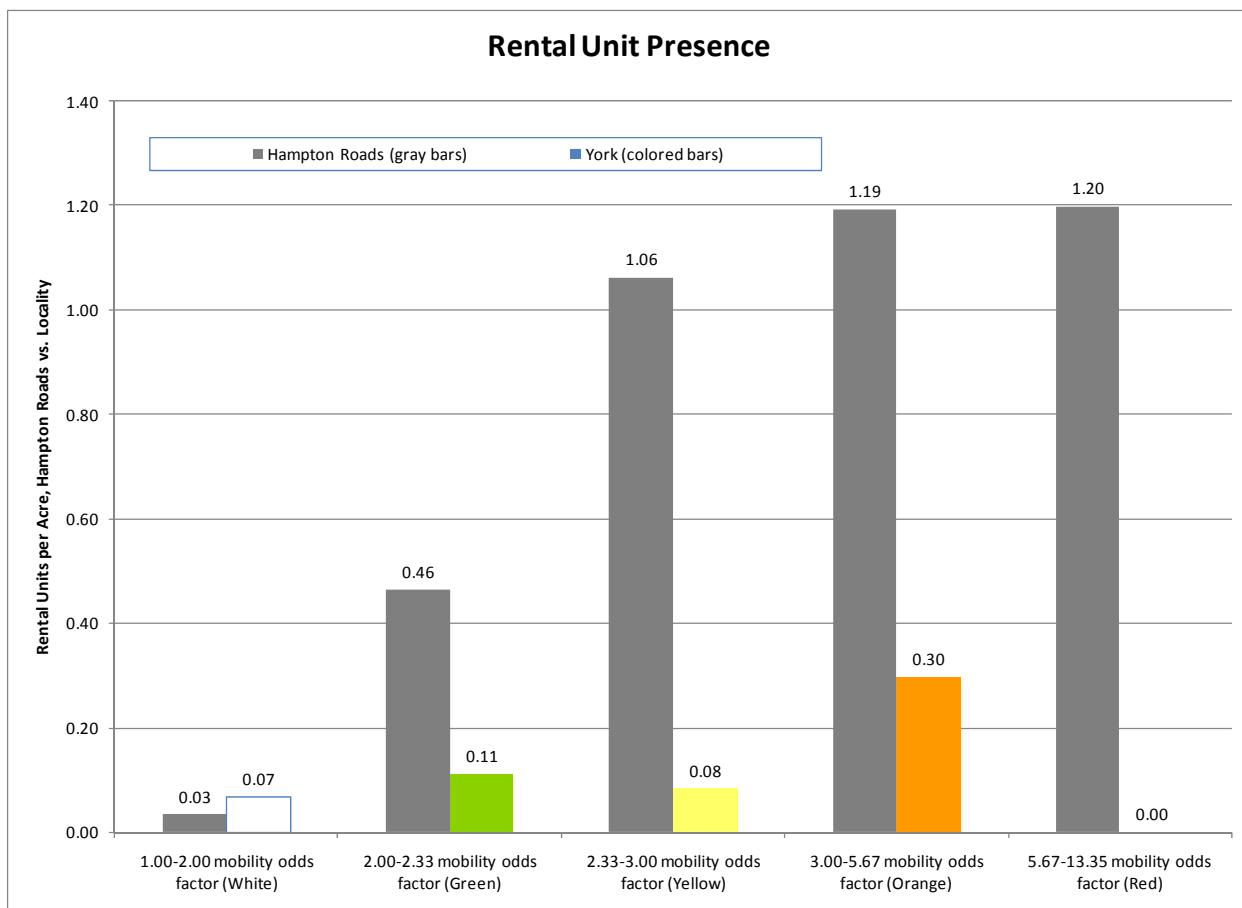
³⁵ i.e. bus-based mobility and activity-location-based mobility

Prospects for Adding Non-Drivers to Higher Mobility Areas



Source: Block_data.xlsx

York County's higher mobility areas (green, yellow, and orange above and on maps in this section) contain fewer non-drivers per acre than the regional average for those mobility levels.



Source: Block_data.xlsx

York County's higher mobility areas (green, yellow, and orange above and on map on following page) contain fewer rental units per acre than the regional average for those mobility levels.

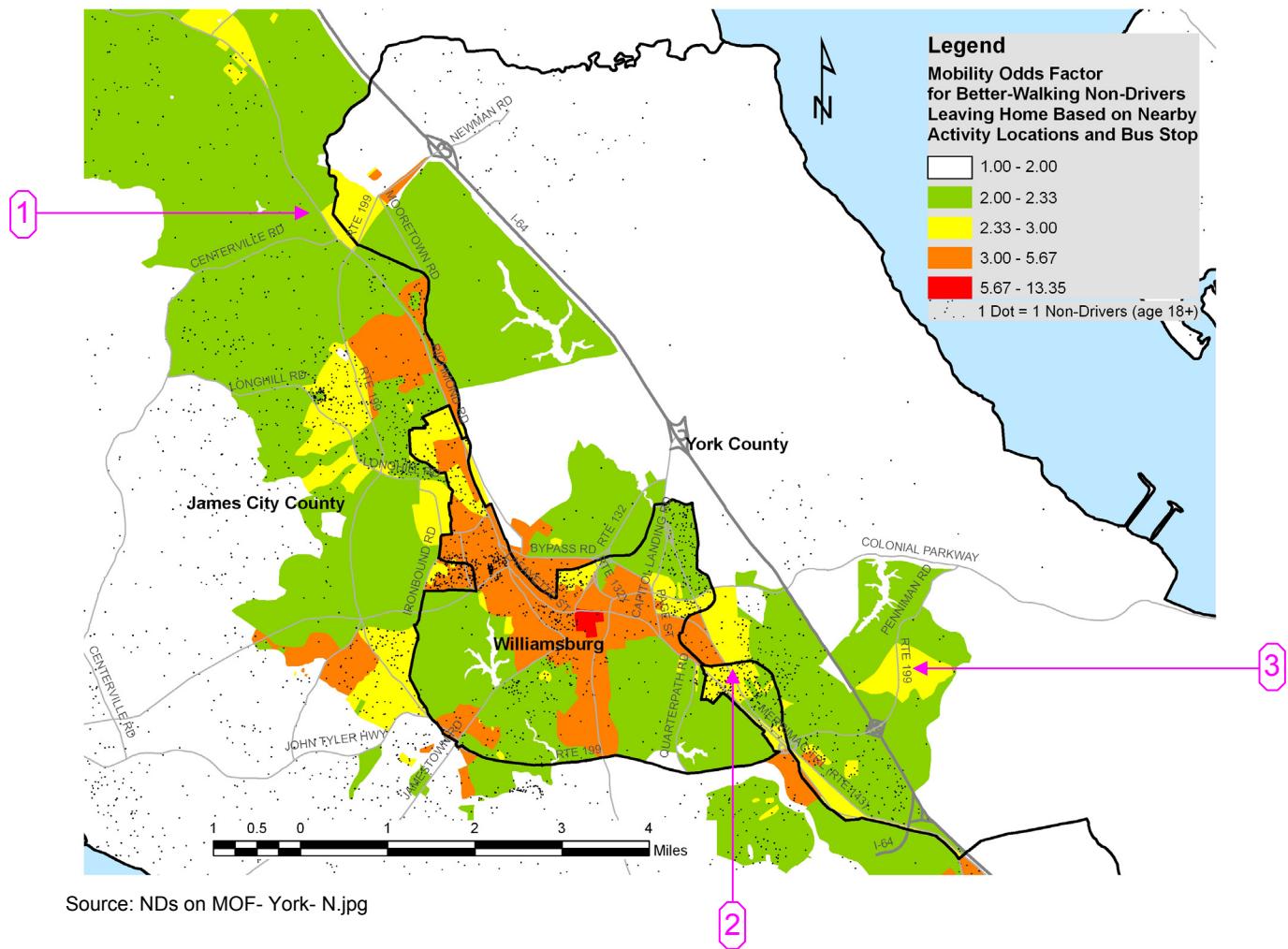
Given:

- 1) the below-average number of non-drivers in York's higher mobility areas, as discussed on the previous page,
- 2) the fact that rental units tend to contain three times the number of non-drivers found in owner occupied units, as demonstrated in a previous section, and
- 3) the below-average number of rental units in York's higher mobility areas, as shown on the chart above,

there may be demand for more rental units in York's higher mobility areas by non-drivers seeking the higher mobility there.

If open land or redevelopment opportunities are available, local government could use its zoning authority, if necessary, to enable the construction of housing expected to attract non-drivers—i.e. apartments and senior housing—in these higher mobility areas. In this way, non-drivers relocating to these new homes from areas of lower mobility will experience improved mobility.

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



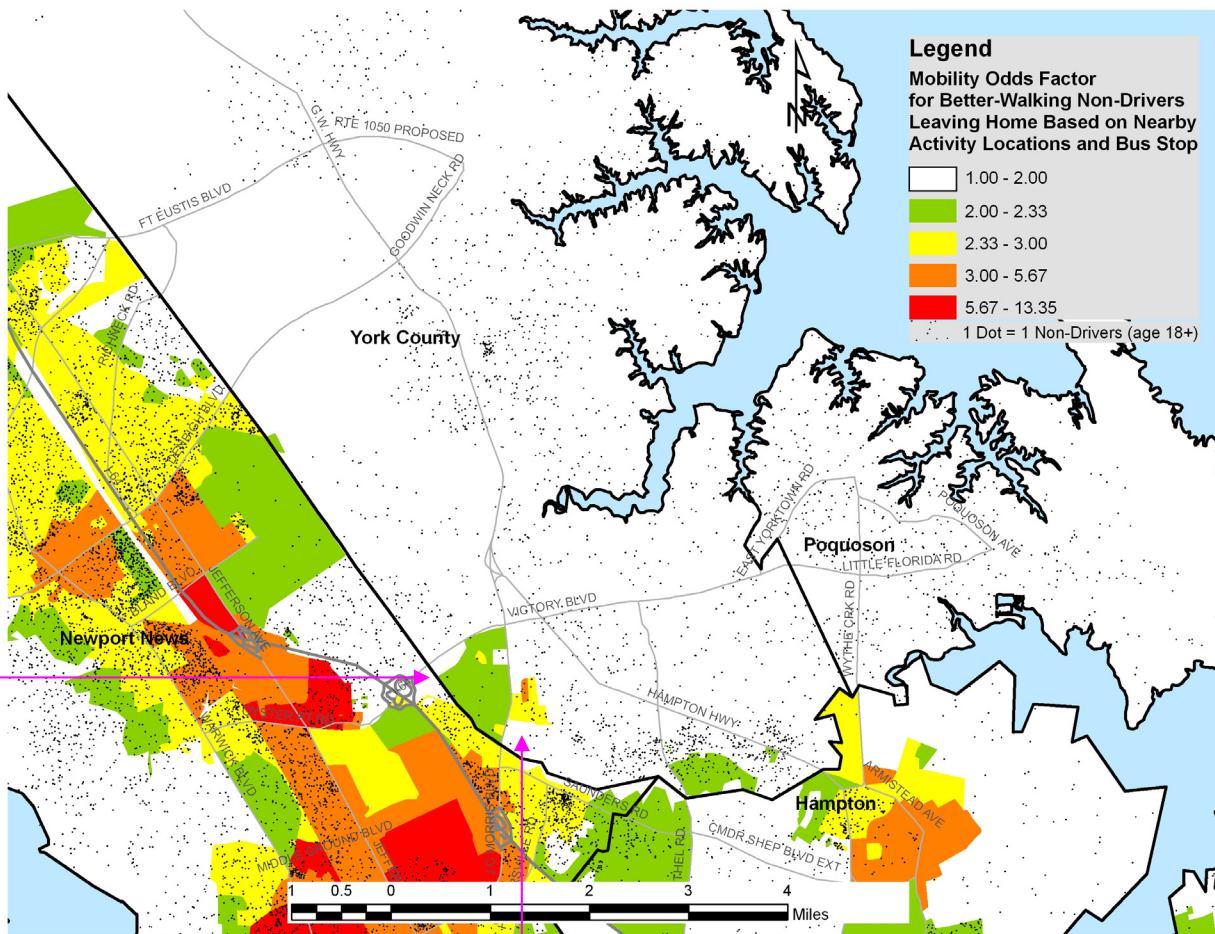
Although there may be demand for more rental units in any of the locality's higher mobility areas, the following areas have medium mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

1. Area bounded by Rte 199 / Williamsburg Pottery Rd / James City Corp. Limit (yellow area)
2. Area bounded by Merrimac Trail / Colonial Pkwy / Hubbard Lane / Penniman Rd (yellow area)
3. Area bounded by Penniman Rd / Rte 199 / Water Country Pkwy (in yellow area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

(Additional areas in the southern portion of the county are listed on following page.)

The Proximity of Non-Drivers, Bus Routes/Stops, and Activity Locations



The following areas have higher mobility combined with few existing non-drivers and may, therefore, be particularly ripe for housing attractive to non-drivers (indicated by numbered pink arrows, above):

4. Area bounded by Victory Blvd / GW Hwy / Newport News Corp. Limit / Village Ave (green area)
5. Area bounded by GW Hwy / Mid-Atlantic Place / Bridge Wood Dr / Coventry Blvd (in yellow area)

Using zoning to enable the construction of new apartments and senior housing in these areas would enable more non-drivers to take advantage of the higher mobility there.

SPECIFIC SUCCESSES AND PROSPECTS IN THE PROXIMITY OF NON-DRIVERS AND BICYCLE & PEDESTRIAN FACILITIES

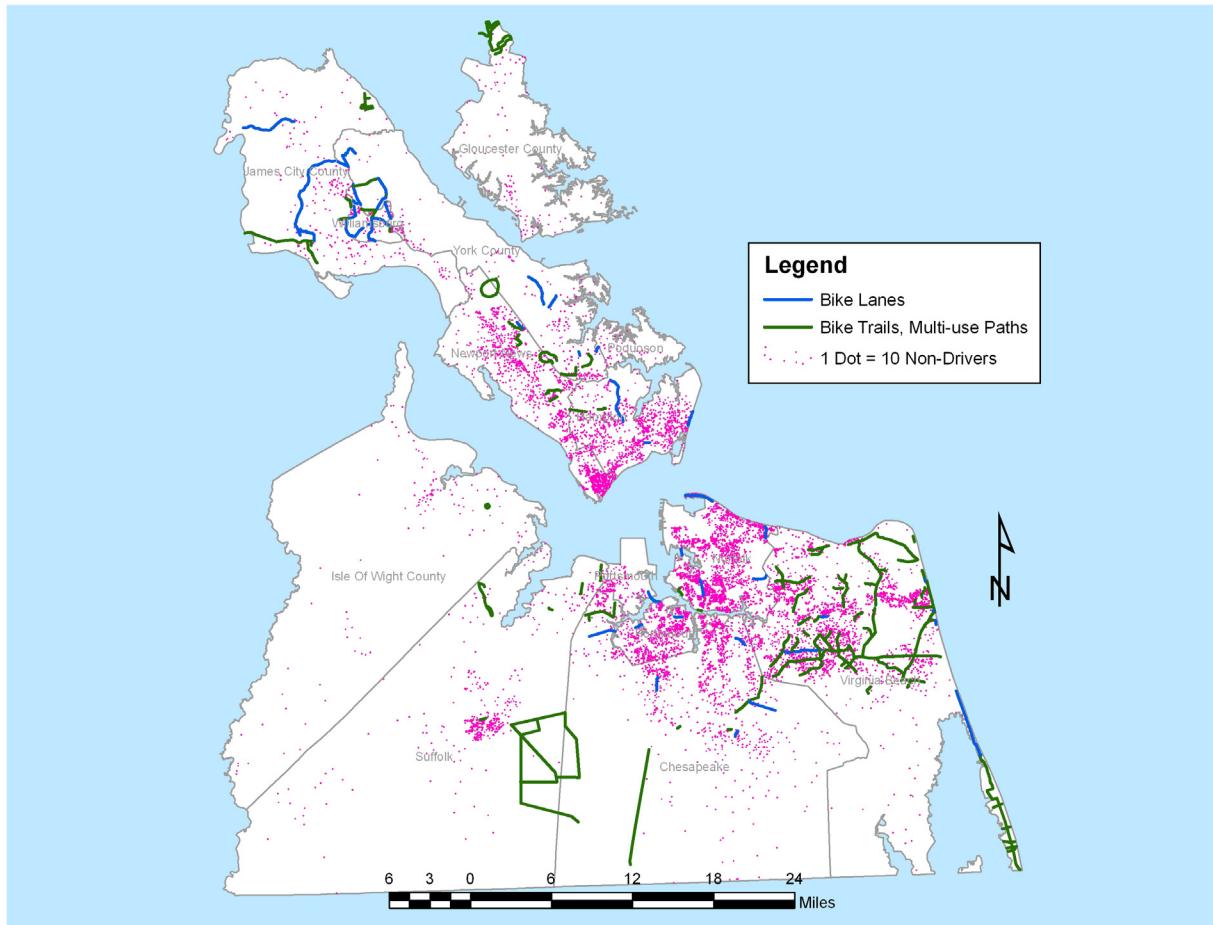
Having identified above specific successes and prospects in the proximity of non-drivers and the two measured geographic mobility enhancers—activity locations and bus stop—successes and prospects in the proximity of non-drivers and bike/ped facilities are identified in this section. Given that the statistical mobility impact of bike and ped facilities on non-drivers is not known³⁶—unlike that of activity locations and bus stops—the search for successes and prospects was conducted in this section by simply visually inspecting the proximity between non-drivers and bike/ped facilities.

³⁶ Bike and ped variables were included as candidates but were found not to be statistically significant during the stepwise process of building models to explain non-driver mobility. See *Improving the Mobility of Non-Drivers Using Proximity to Destinations and Bus Routes* (Chesapeake, Va.: Hampton Roads Planning District Commission, June 2007).

Specific Successes and Prospects in the Proximity of Non-Drivers and Bike Facilities

First, successes and prospects in the proximity of non-drivers and bike facilities were explored.

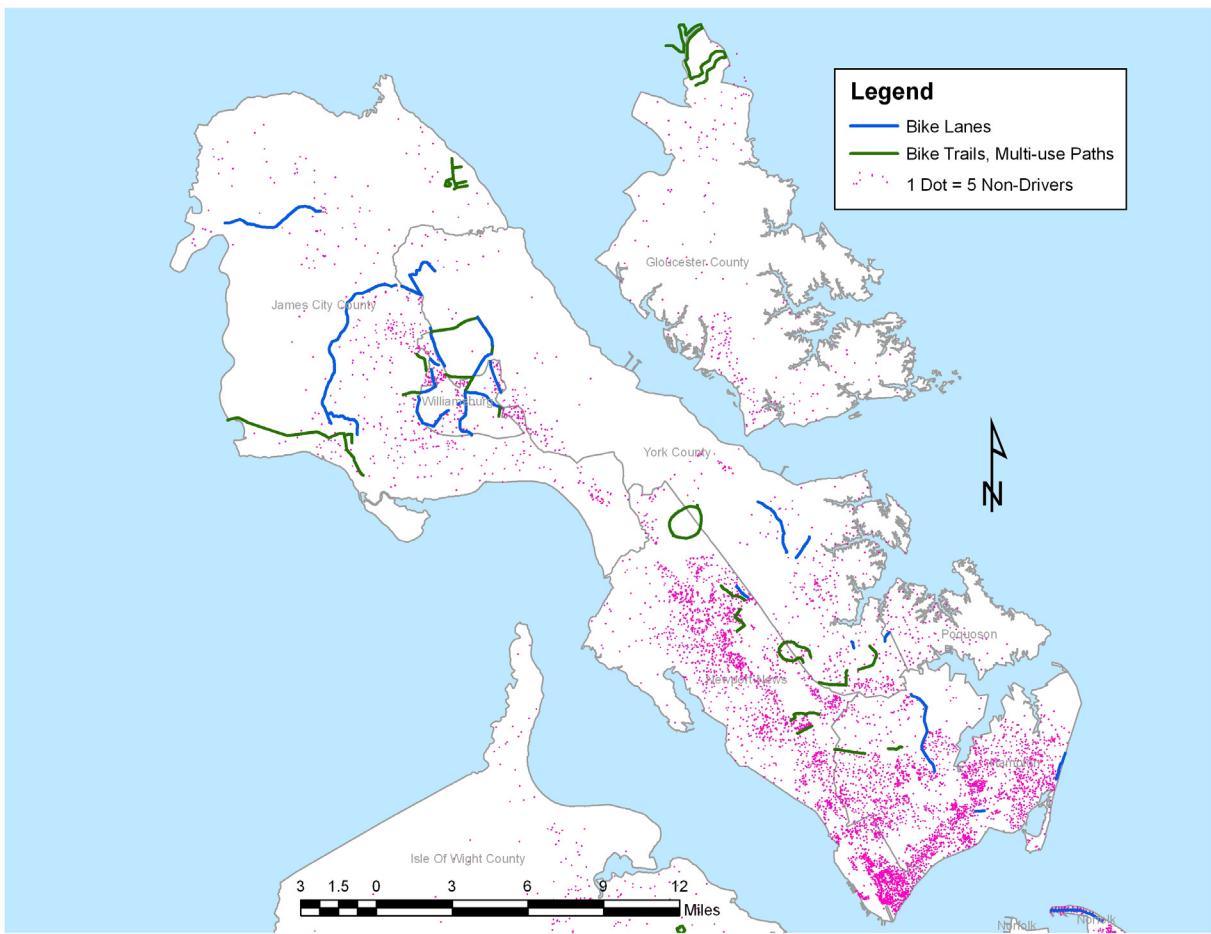
Bike Facilities and Non-Drivers, Hampton Roads



Source: Bikes & NDs.jpg

In Hampton Roads, bike facilities tend to be located in suburban and rural areas, with some facilities proximate to non-drivers, and some not. It should be noted that many local cities allow bicycles on sidewalks which are prevalent particularly in urban settings.

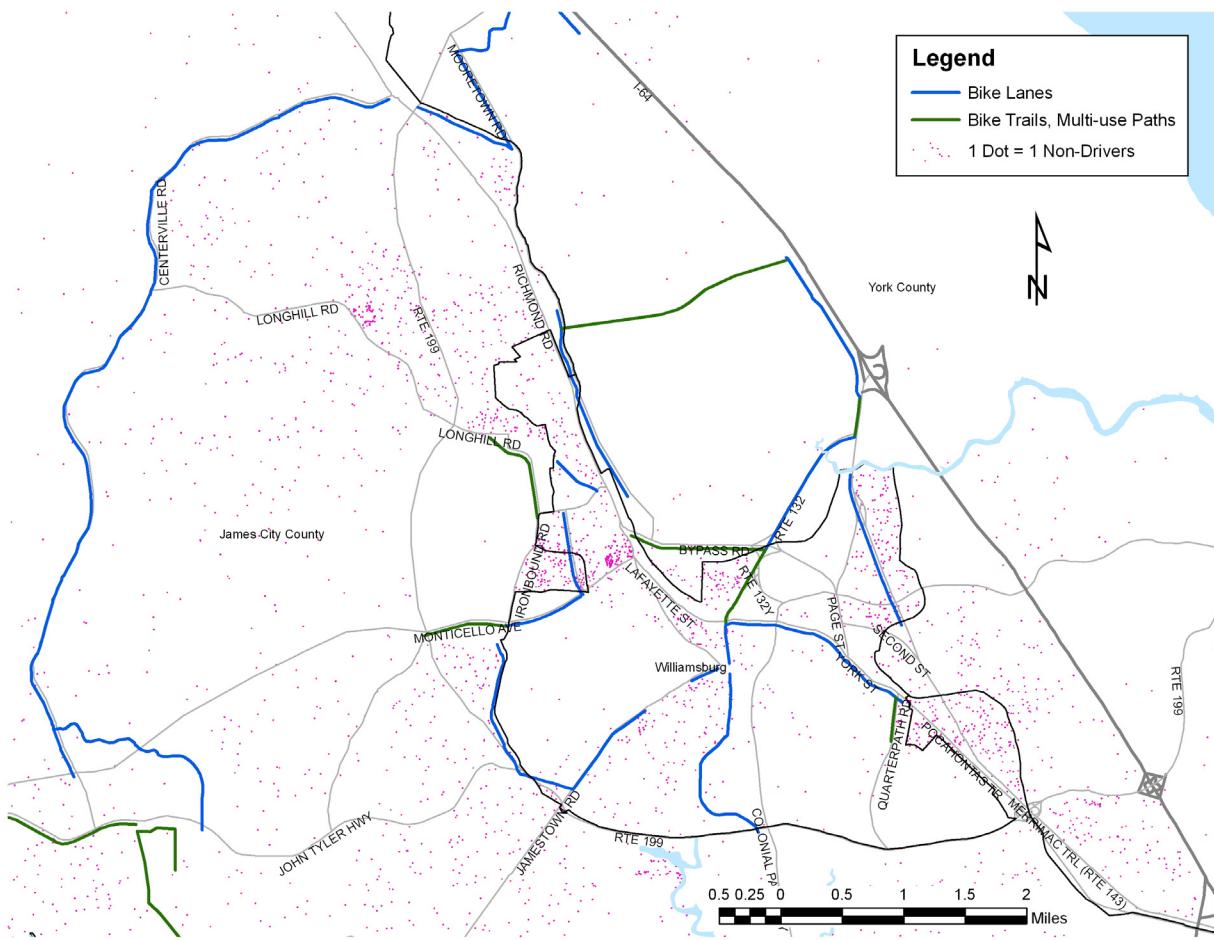
Bike Facilities and Non-Drivers, Peninsula



Source: Bikes & NDs- Pen.jpg

On the Peninsula, the Historic Triangle localities—James City, Williamsburg, and York—have a fairly large number of bike facilities.

Bike Facilities and Non-Drivers, Williamsburg Area

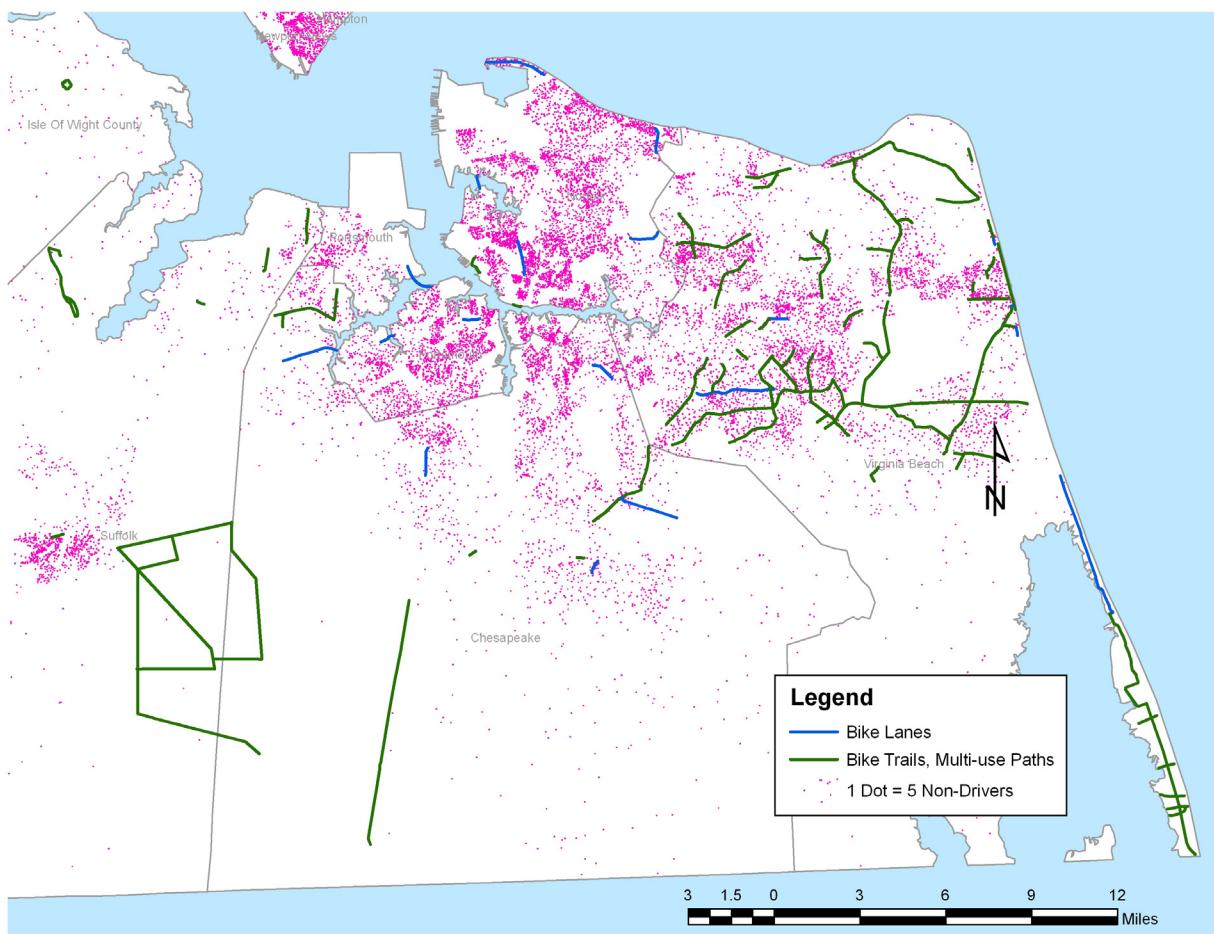


Source: Bikes & NDs- Wlmbg.jpg

The Williamsburg area has a large number of bike facilities. These have been located so that they serve non-driver residences fairly well.

- Filling the gaps—particularly between the facilities in the east and those in the west—would create an extensive network valuable to the non-driver community.

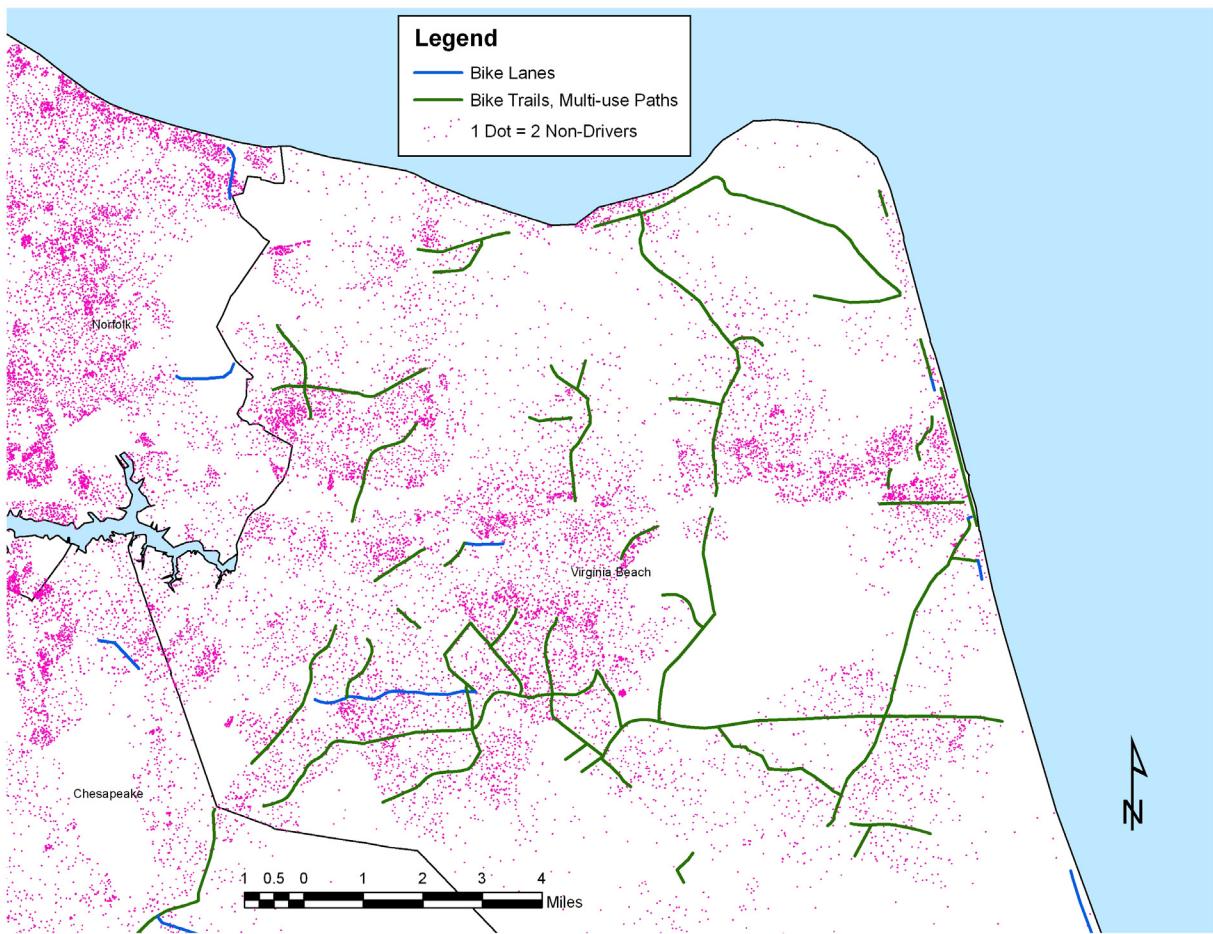
Bike Facilities and Non-Drivers, Southside



Source: Bikes & NDs- SS.jpg

On the Southside, although special bike facilities are typically not located near concentrations of non-drivers, many local cities allow bicycles on sidewalks.

Bike Facilities and Non-Drivers, Northern Virginia Beach



Source: Bikes & NDs- No VB.jpg

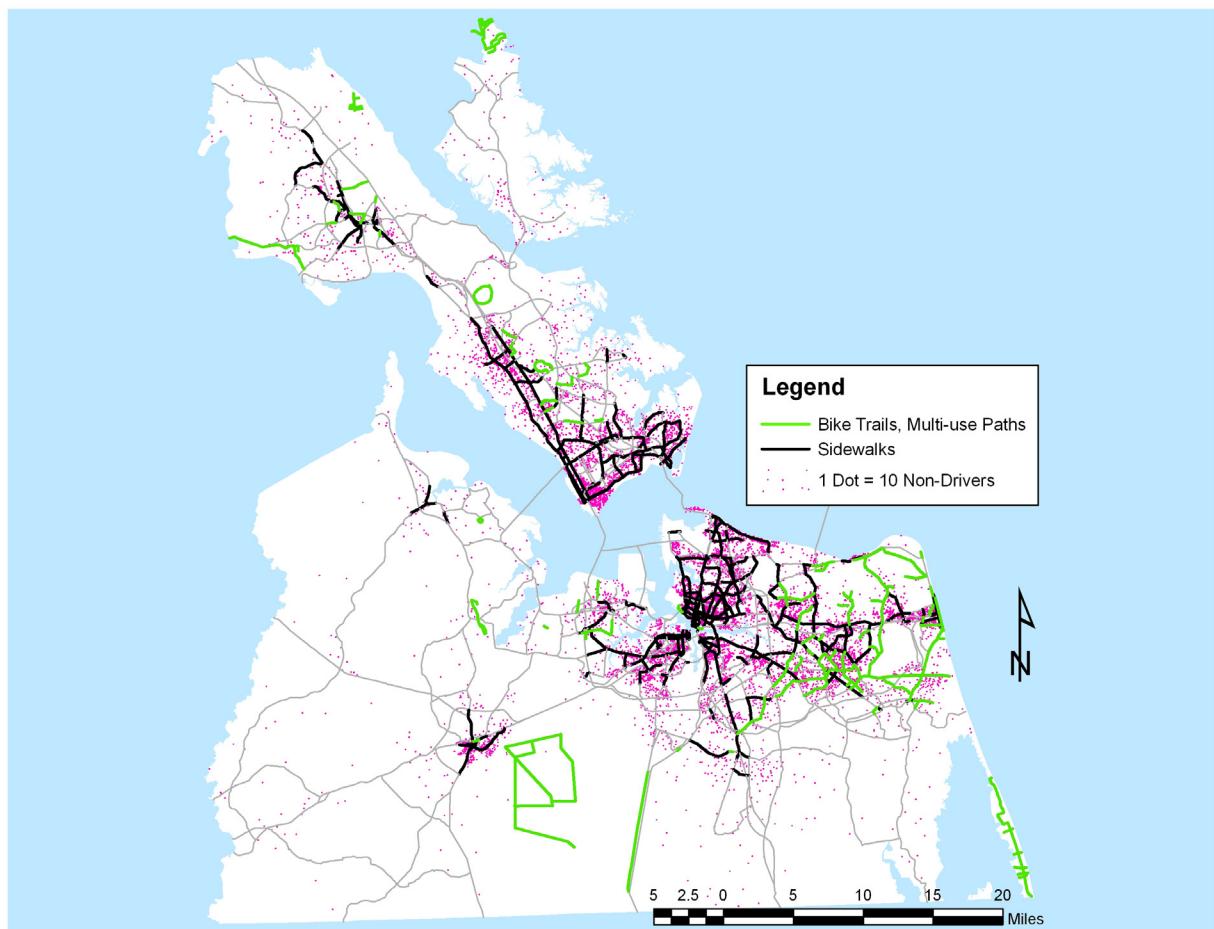
Northern Virginia Beach has a large number of bike facilities, many of which lie near non-driver residences.

- Filling the gaps—particularly between the paths in the north and those in south-central—would create an extensive network valuable to the non-driver community.

Specific Successes and Prospects in the Proximity of Non-Drivers and Pedestrian Facilities

Having examined bike facilities, the successes and prospects in the proximity of non-drivers and pedestrian facilities are explored in this section. Sidewalks on arterial roadways are shown below. Note that sidewalks on neighborhood streets were not included. Bike trails and multi-use paths—the majority of which can be used by pedestrians—are also shown.

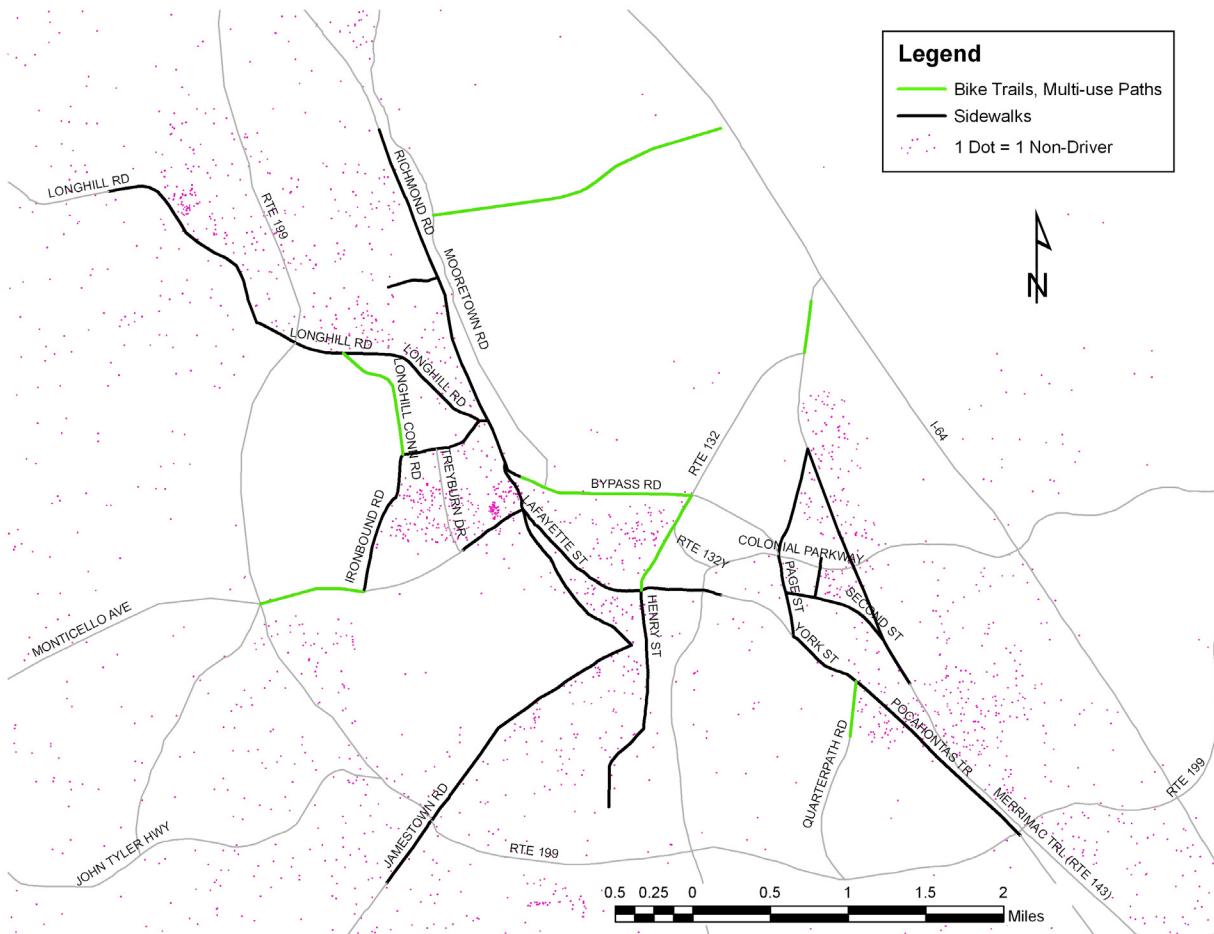
Pedestrian Facilities and Non-Drivers, Hampton Roads



Source: Ped Facts & NDs.jpg

In Hampton Roads, non-drivers are generally well-served by arterial pedestrian facilities.

Pedestrian Facilities and Non-Drivers, Williamsburg Area



Source: Ped Facts & NDs- Wlmbg.jpg

There generally exists a good geographic match between non-driver residential locations and arterial pedestrian facilities in the Williamsburg area.

- Although the map above shows a sidewalk gap west of Page Street, in reality sidewalks along the non-arterial Francis and Duke of Gloucester Streets (not shown on the arterial map above) connect the eastern and western sidewalk systems shown above.
- Extending sidewalks down Merrimac Trail would help the many non-drivers shown above who live east of that road.

SUMMARY

The placement of non-drivers, activity locations, and bus routes/stops near each other improves the mobility of non-drivers.

Having discovered earlier in the series of TPO non-driver studies that proximity to activities and bus routes measurably increases the mobility odds of better-walking non-drivers, in this report staff used mobility odds to measure the success of localities' co-positioning of activity locations, bus routes/stops, and residences favored by non-drivers. Specific successes and prospects in the proximity of these three were identified. In addition, this report visually examined the proximity of non-drivers and bike/ped facilities, pointing out successes and prospects in that arena as well.

Where efforts have been effective, local government can redouble those efforts. Where prospects for improvement exist, local government can improve non-driver mobility by using its zoning and budgetary powers to modify land use—i.e. placing activity locations (businesses, churches, government facilities, etc.) and residences favored by non-drivers near each other—and to invest in bus, bicycle, and pedestrian infrastructure near non-drivers.