

Sea-level Rise

Transportation Vulnerability Assessment



Technical Advisory Committee
May 19, 2011

WILMAPCO

Goals

- ❑ Inform and influence adaptation planning
- ❑ Identify at-risk existing/planned infrastructure
- ❑ Address climate change ahead of federal regulations
- ❑ Continue work of Delaware and Maryland

Chapters

- ❑ Background
- ❑ Methodology
- ❑ Regional Impacts
- ❑ Local Impacts (Cluster Profiles)
- ❑ Policy



Steering Committee

- ❑ January 27, 2010
DNR
- ❑ June 3, 2010
MD-DNR
- ❑ December 20, 2010
SHA
- ❑ May 4, 2011
DeDOT
Counties



Methodology

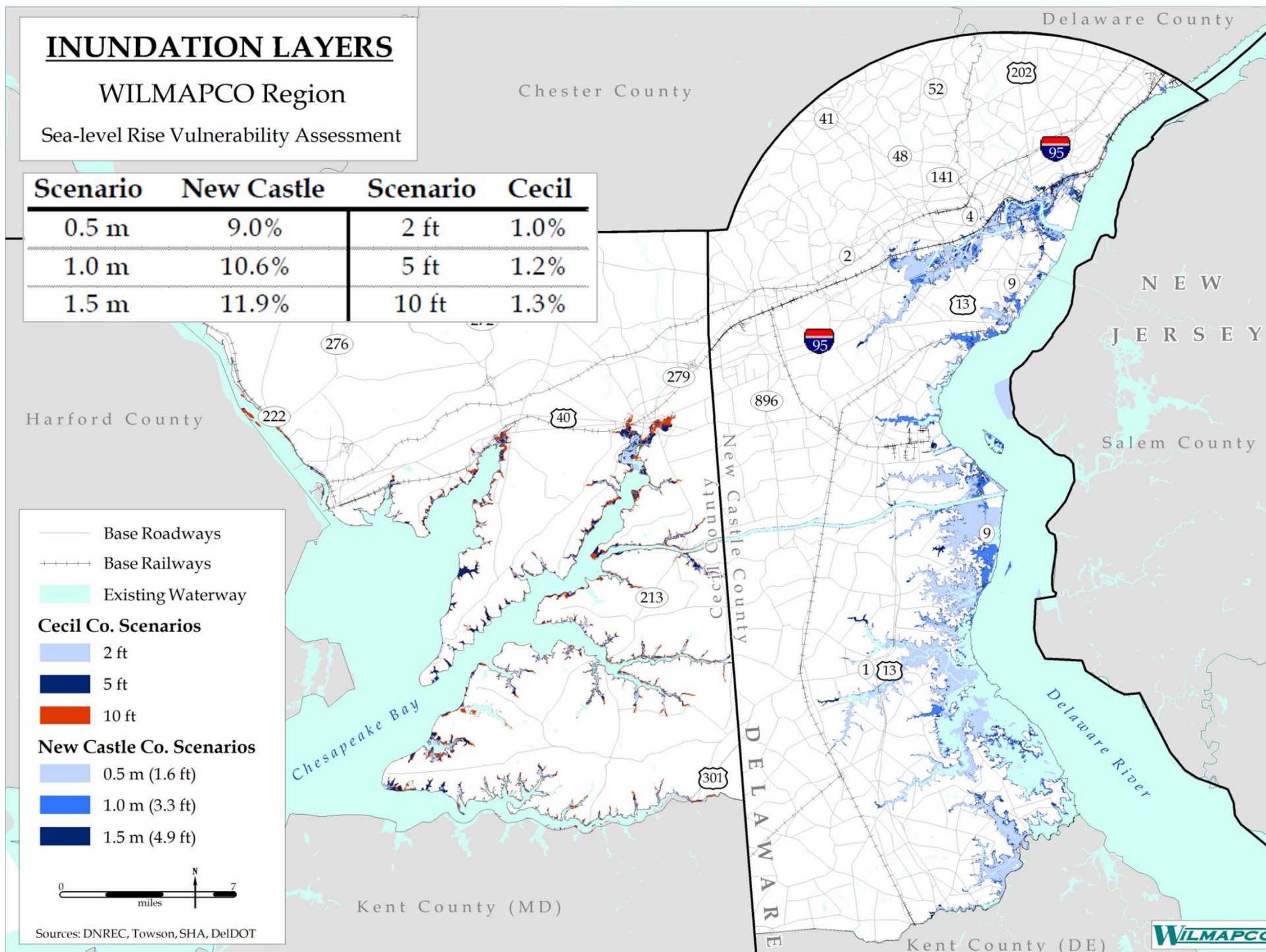


INUNDATION LAYERS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment

Scenario	New Castle	Scenario	Cecil
0.5 m	9.0%	2 ft	1.0%
1.0 m	10.6%	5 ft	1.2%
1.5 m	11.9%	10 ft	1.3%





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graph TD; A[Inundation Scenarios] --> B[Neighborhoods Affected]; B --> C[Group into 20 Clusters];
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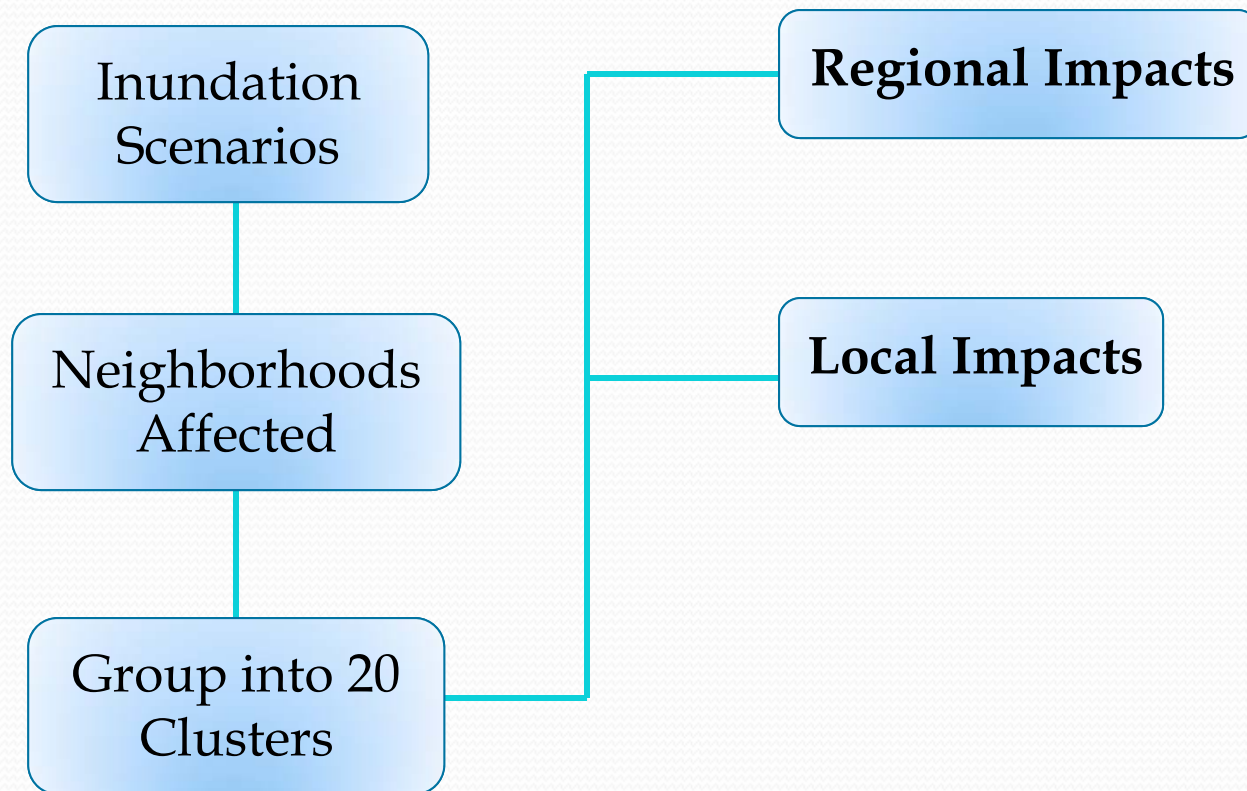
Inundation
Scenarios

Delaware: 0.5m, 1.0m, 1.5m
Maryland: 2ft, 2-5ft, 5-10ft (surge)

Neighborhoods
Affected

Census Blockgroups

Group into 20
Clusters



Regional Impacts



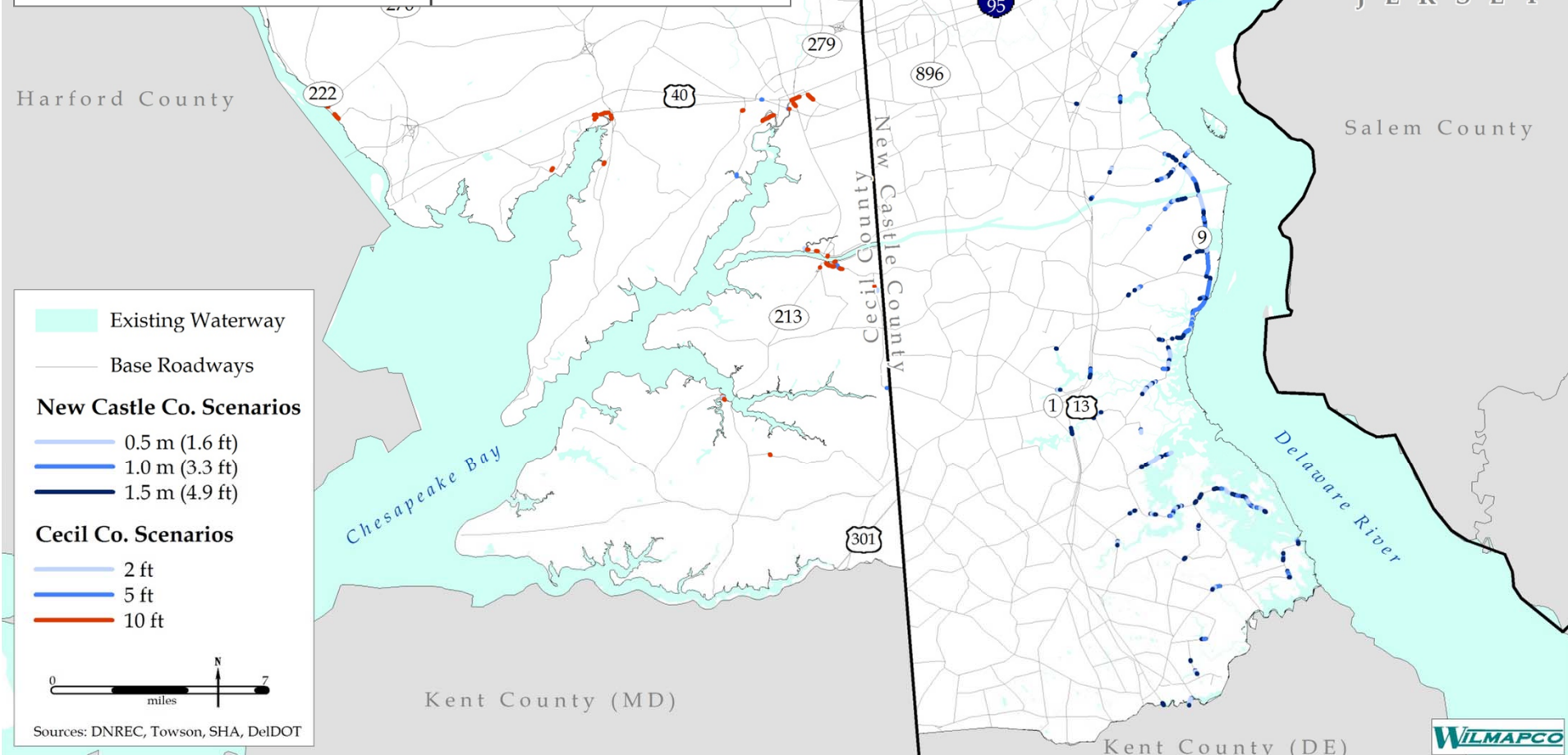
Microsoft Corp.
Pictometry Bird's Eye

ROADWAY IMPACTS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment

Scenario	New Castle (in miles)	Scenario	Cecil (in miles)
0.5 m	8.9	2 ft	0.1
1.0 m	19.6	5 ft	0.6
1.5 m	27.9	10 ft	3.5



ROADWAY IMPACTS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment

Roadway	0.5 m (in miles)	1.0 m (in miles)	1.5 m (in miles)
<i>New Castle County</i>			
SR 9	1.60	5.83	7.54
Cedar Swamp Road	0.60	1.16	2.01
US 13	0.41	0.89	1.96
Walnut Street	0.18	0.93	1.02
Polktown Place	0.41	0.68	0.91
Staves Landing Road	0.38	0.51	0.89
Dutch Neck Road	0.46	0.58	0.86
Old Airport Road	0.41	0.47	0.81
Reedy Point Road	0.52	0.65	0.75
River Road	-	0.73	0.75

Existing Waterway

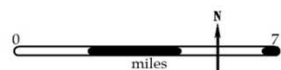
Base Roadways

New Castle Co. Scenarios

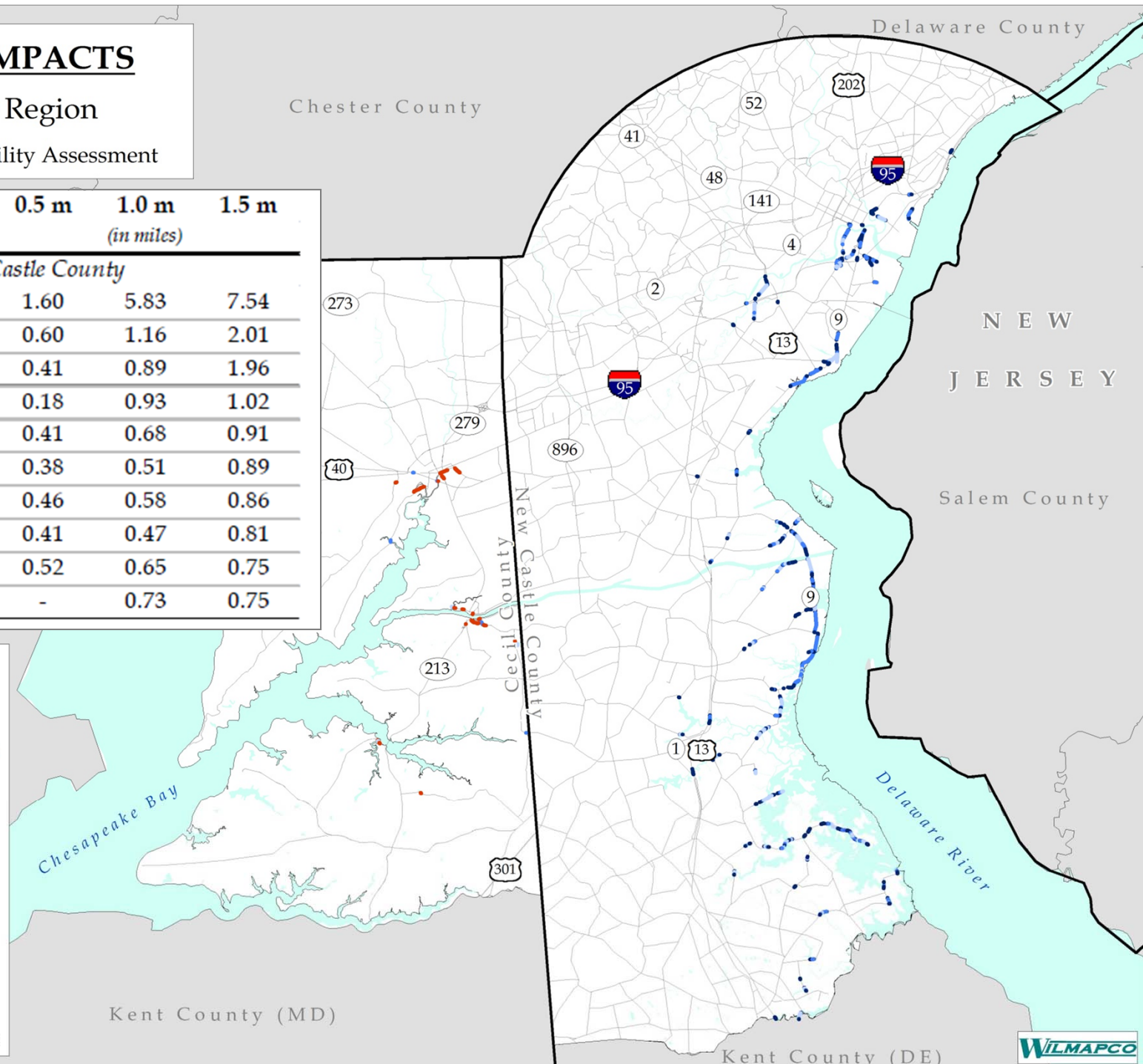
- 0.5 m (1.6 ft)
- 1.0 m (3.3 ft)
- 1.5 m (4.9 ft)

Cecil Co. Scenarios

- 2 ft
- 5 ft
- 10 ft



Sources: DNREC, Towson, SHA, DelDOT



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ROADWAY IMPACTS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment

Chester County

PENNSYLVANIA

MARYLAND

Harford County

NEW JERSEY

Salem County

New Castle County

Cecil County

Kent County (MD)

Kent County (DE)

Existing Waterway

Base Roadways

New Castle Co. Scenarios

0.5 m (1.6 ft)

1.0 m (3.3 ft)

1.5 m (4.9 ft)

Cecil Co. Scenarios

2 ft

5 ft

10 ft



Sources: DNREC, Towson, SHA, DelDOT

2 ft 5 ft 10 ft
(in miles)

Cecil County

SR 7	-	0.01	0.57
Old Field Point Road	-	0.07	0.46
SR 222	-	-	0.41
Howard Street	-	-	0.30

Chesapeake Bay

Delaware River

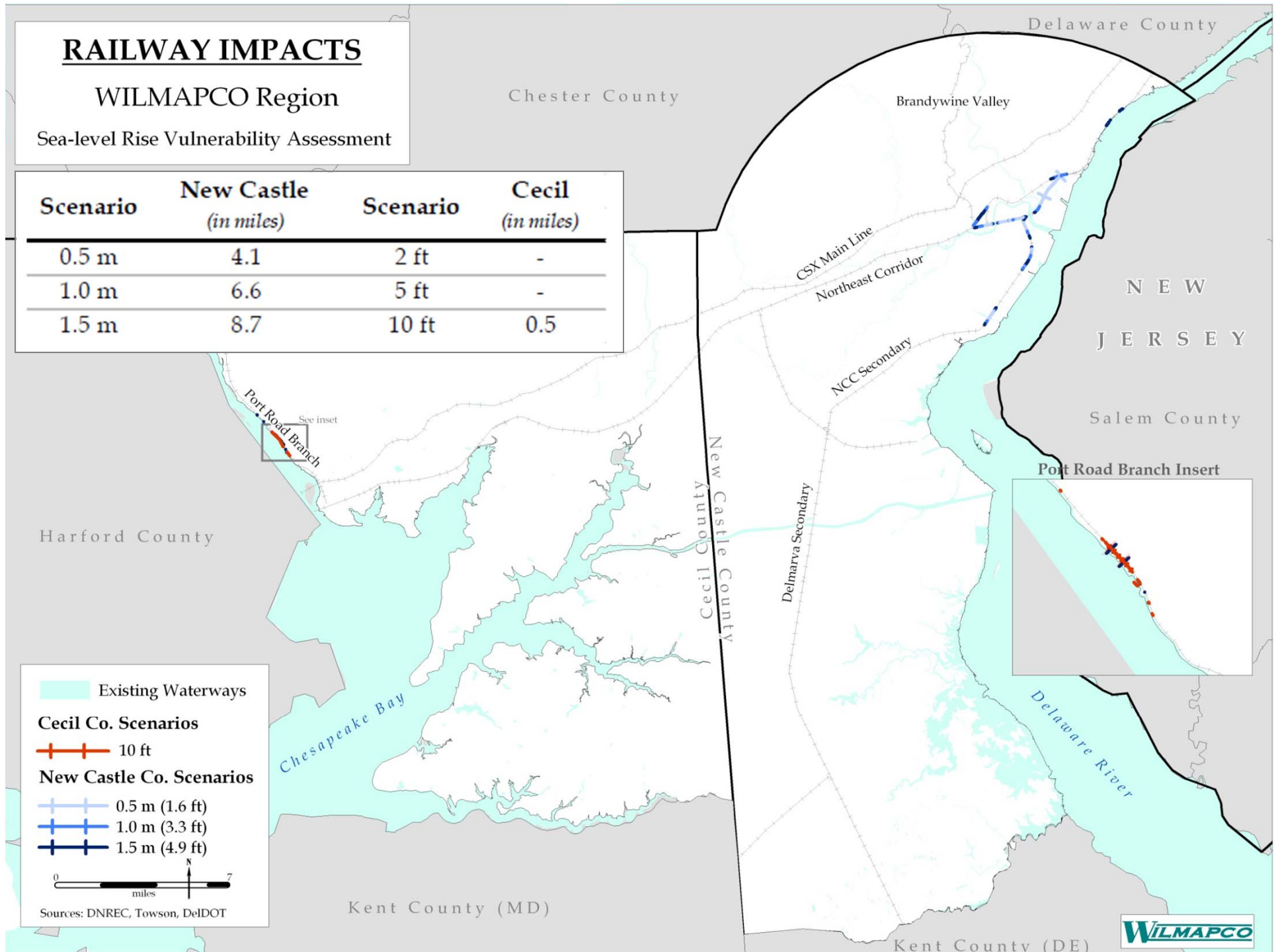
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RAILWAY IMPACTS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment

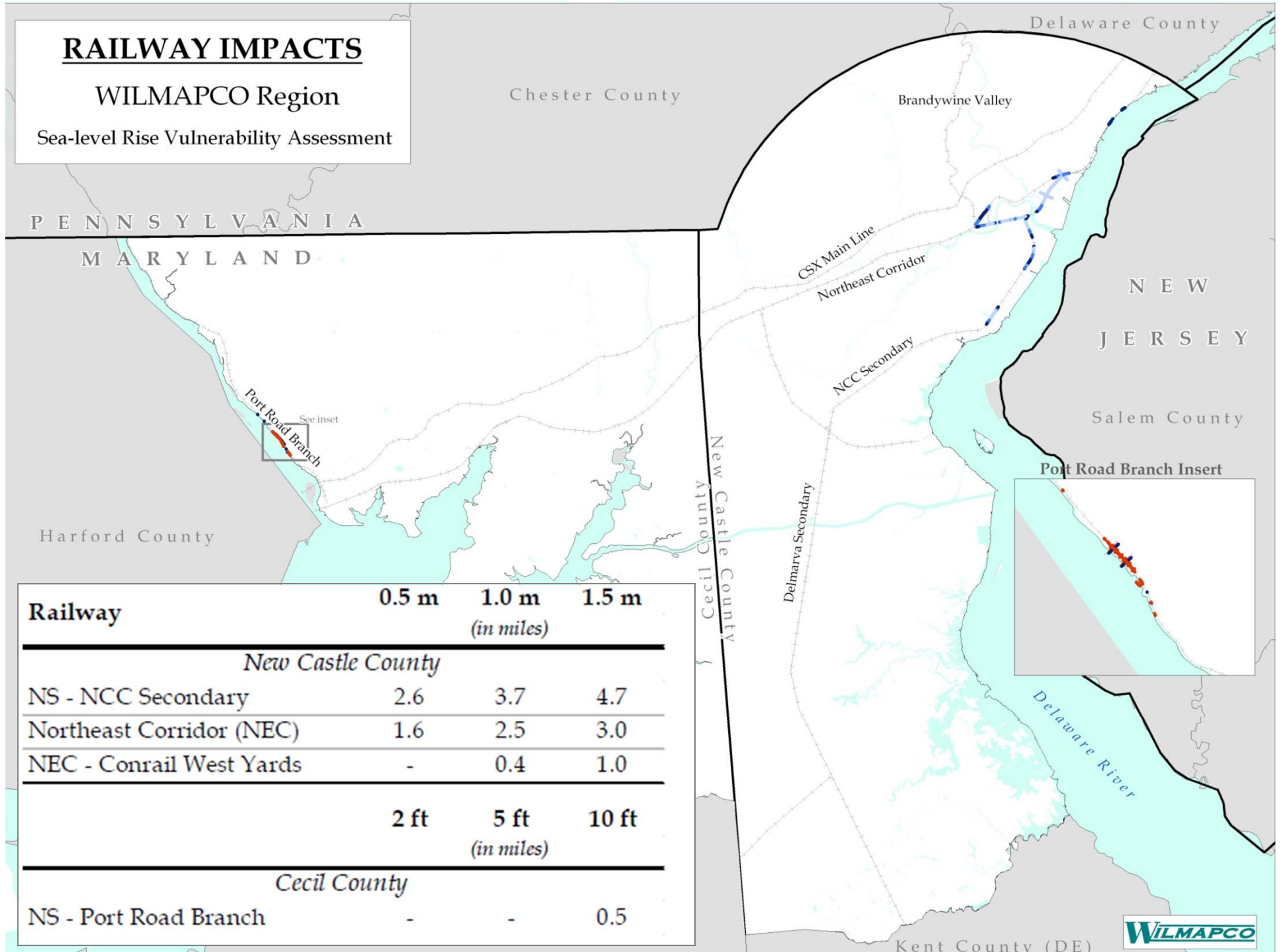
Scenario	New Castle (in miles)	Scenario	Cecil (in miles)
0.5 m	4.1	2 ft	-
1.0 m	6.6	5 ft	-
1.5 m	8.7	10 ft	0.5



RAILWAY IMPACTS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment



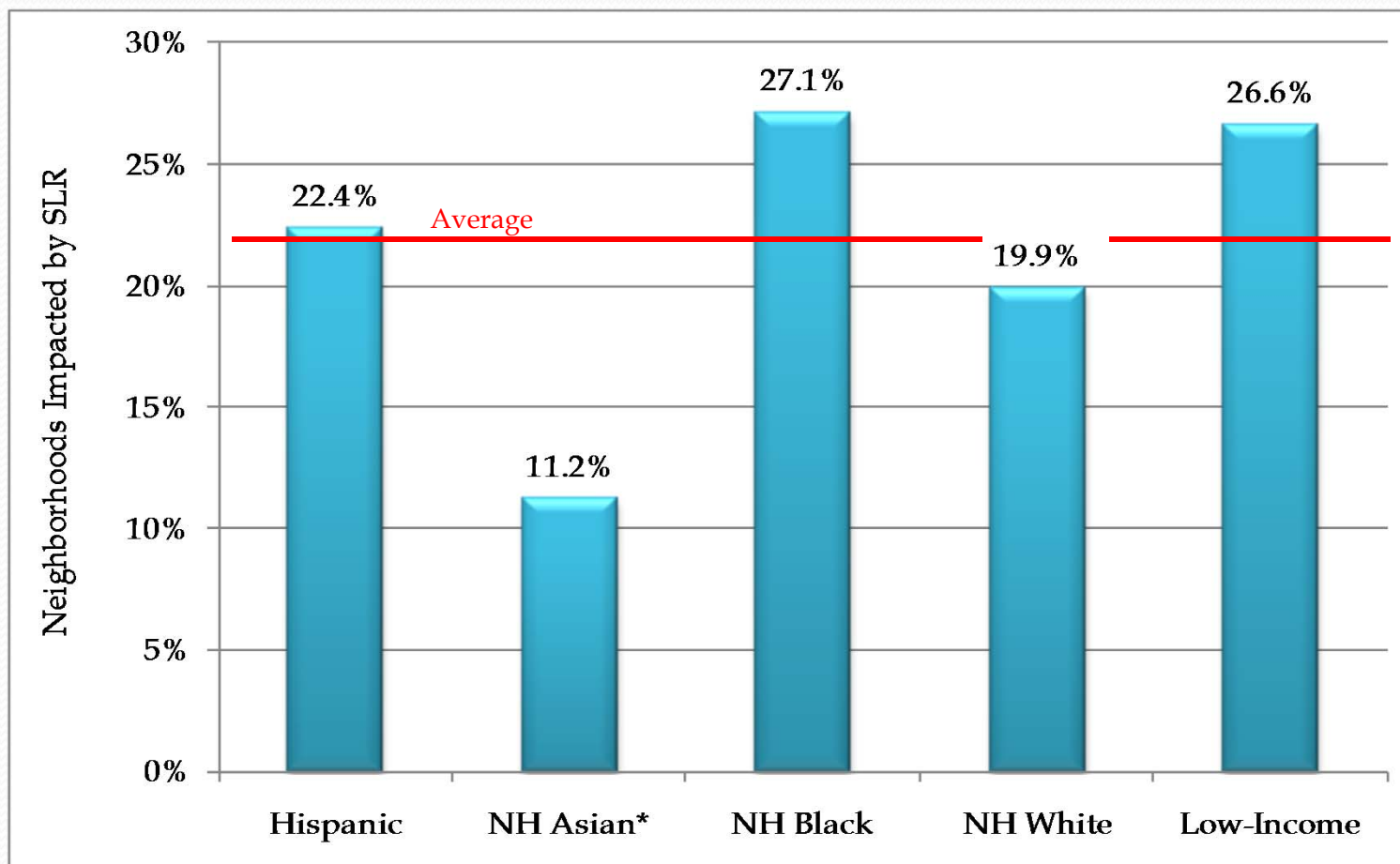
Railway	0.5 m	1.0 m	1.5 m
<i>(in miles)</i>			
<i>New Castle County</i>			
NS - NCC Secondary	2.6	3.7	4.7
Northeast Corridor (NEC)	1.6	2.5	3.0
NEC - Conrail West Yards	-	0.4	1.0
<i>2 ft</i>			
<i>5 ft</i>			
<i>(in miles)</i>			
<i>Cecil County</i>			
NS - Port Road Branch	-	-	0.5

Other Measures

- ❑ Bridges
- ❑ Tolling Facilities
- ❑ Evacuation Routes
- ❑ Fixed-route Bus Routes/Stops
- ❑ Train Stations
- ❑ Port/Marinas
- ❑ Airports
- ❑ Commercial Units
- ❑ Residential Units
- ❑ Social Equity
- ❑ Planned Projects
- ❑ Critical Roadway Index



Photo: Peggy Schultz



* NH = Non-Hispanic

Data: 2005-2009 American Community Survey

Planned Projects

Project	In-service	Cost	Level Impact
Cecil Transit Bus Connection to Harford County	2011	\$1 m	2 ft
Elkton Bus Service Circulator	2012	\$60 k	2 ft
Washington Street, New Castle & Frenchtown Road at DE 9	2013	\$7.5 m	0.5 m
I-295: Westbound from I-95 to US 13	2014	\$5.2 m	0.5 m
I-95: Susquehanna River to DE Line (highway/bridge expansion)	2040	\$505 m	2 ft
City of New Castle Improvements (SR9/3rd and SR9/6th)	2016	\$1.4 m	0.5 m
Christina River Bridge	2020	\$21.7 m	0.5 m
Southern New Castle County Improvements	2020	\$46.2 m	0.5 m
Southbridge Streetscape Improvements Phase I (TE)	2012	\$1.2 m	1.0 m
SR 9, River Rd. Area, Dobbinsville (viaduct)	2020	\$12.7 m	1.0 m
City of New Castle Improvements (SR9/Delaware St)	2016	\$3.1 m	1.5 m

Critical Roadway Index

Demographics

- 2010 Population & Employment
- 2030 Population & Employment
- Environmental Justice

Inundation Scenarios

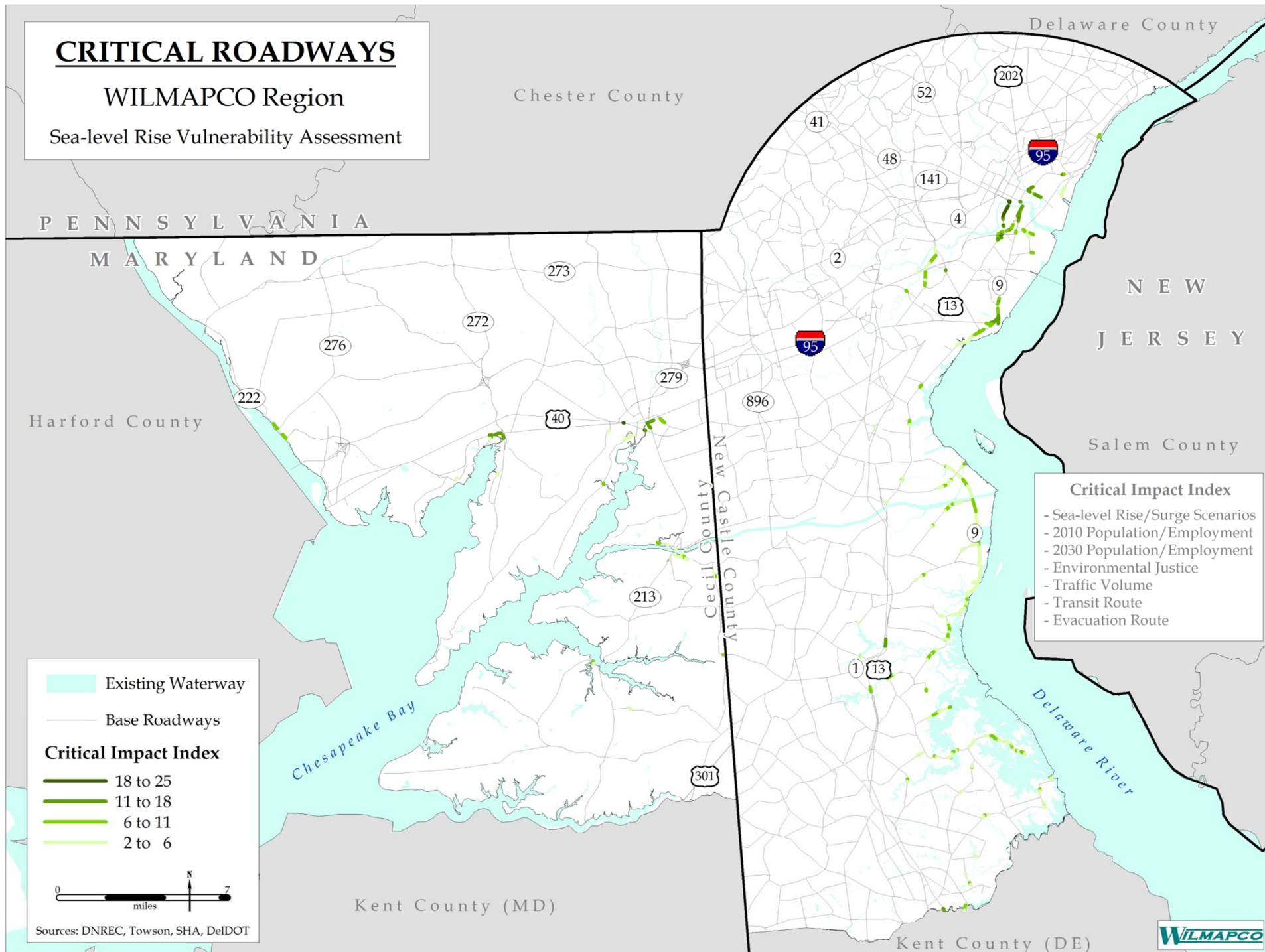
Traffic Characteristics

- Traffic Volume
- Transit Routes
- Evacuation Routes

CRITICAL ROADWAYS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment



Cluster Profiles

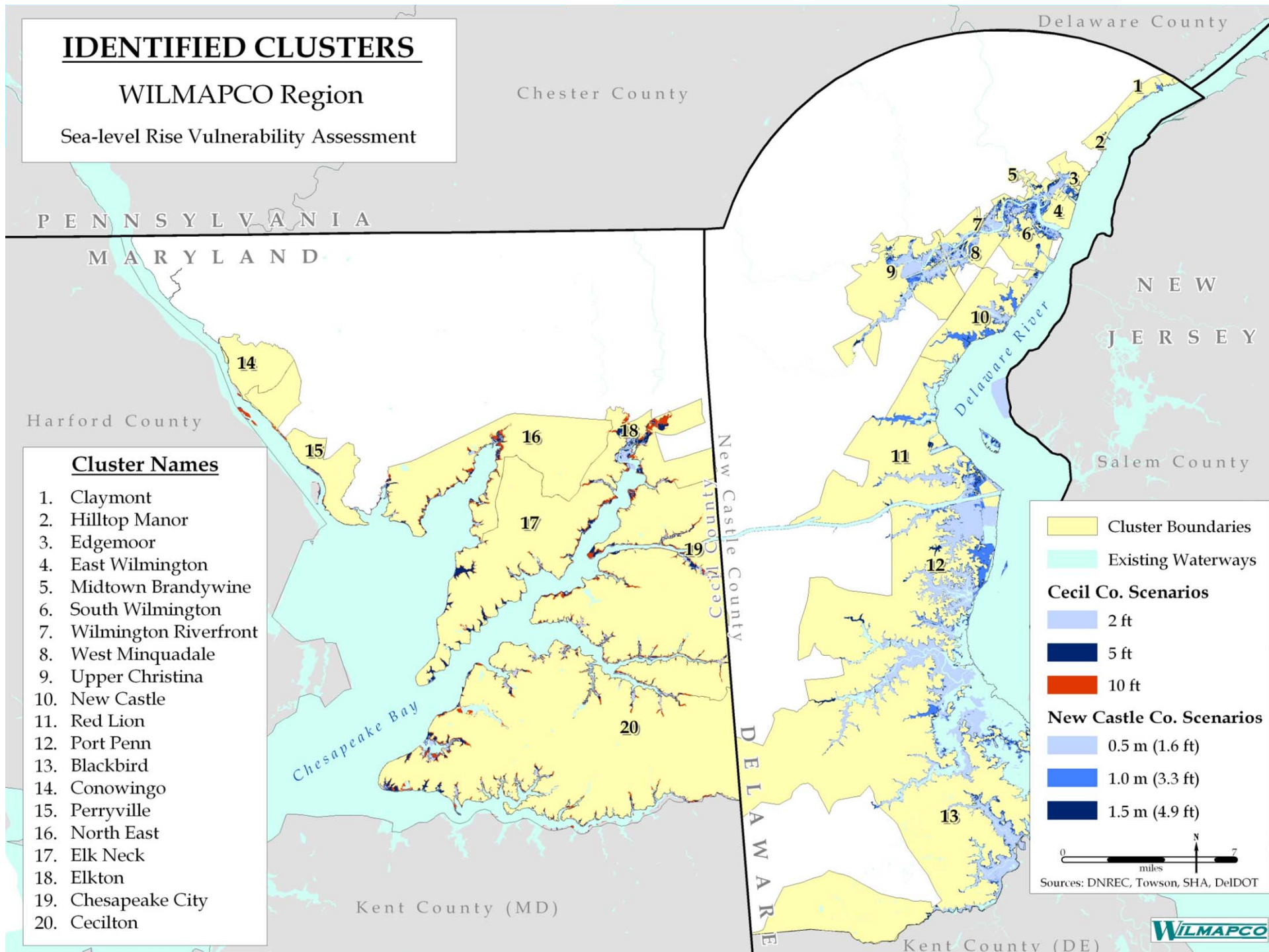


Photo: Peggy Schultz

IDENTIFIED CLUSTERS

WILMAPCO Region

Sea-level Rise Vulnerability Assessment



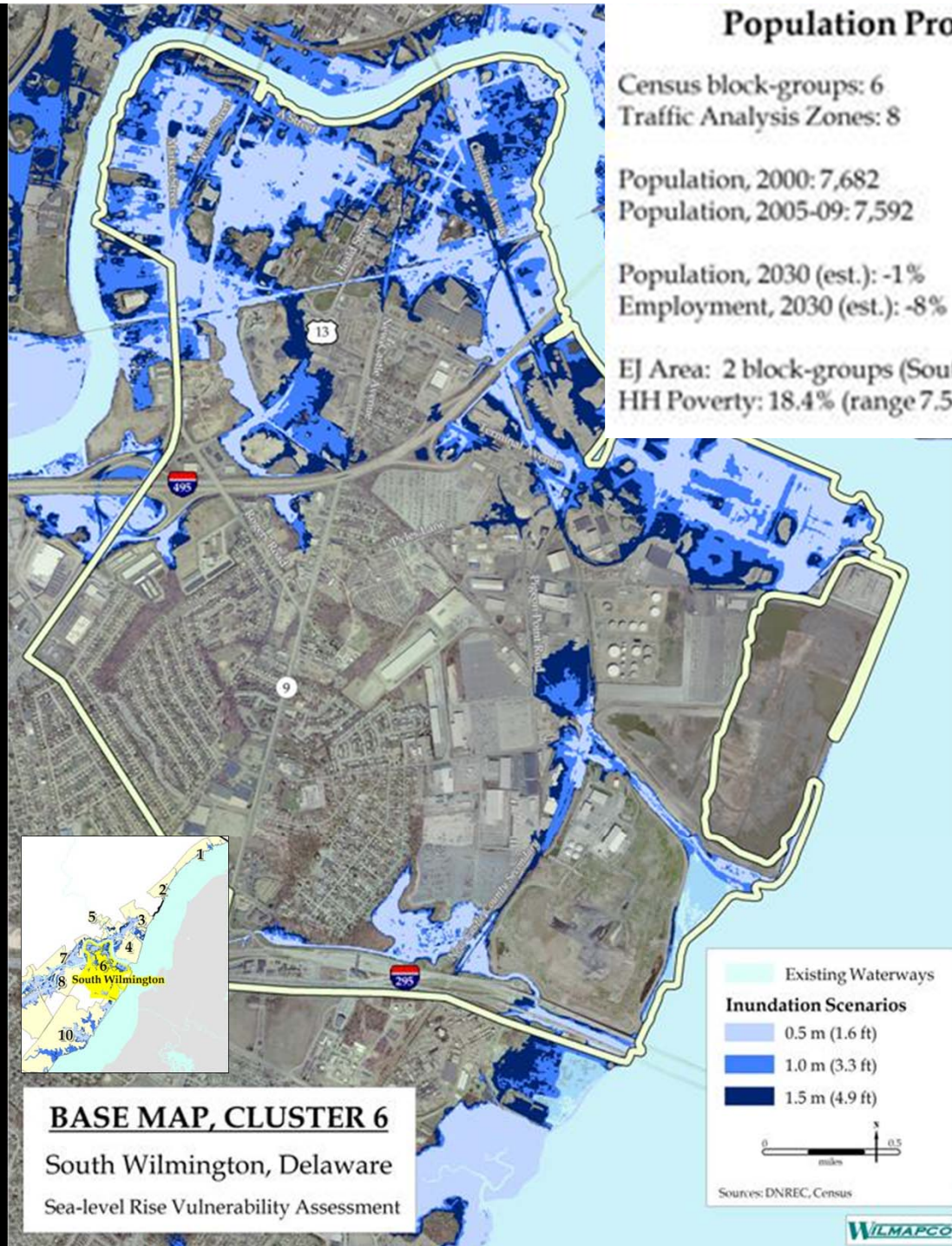
Population Profile

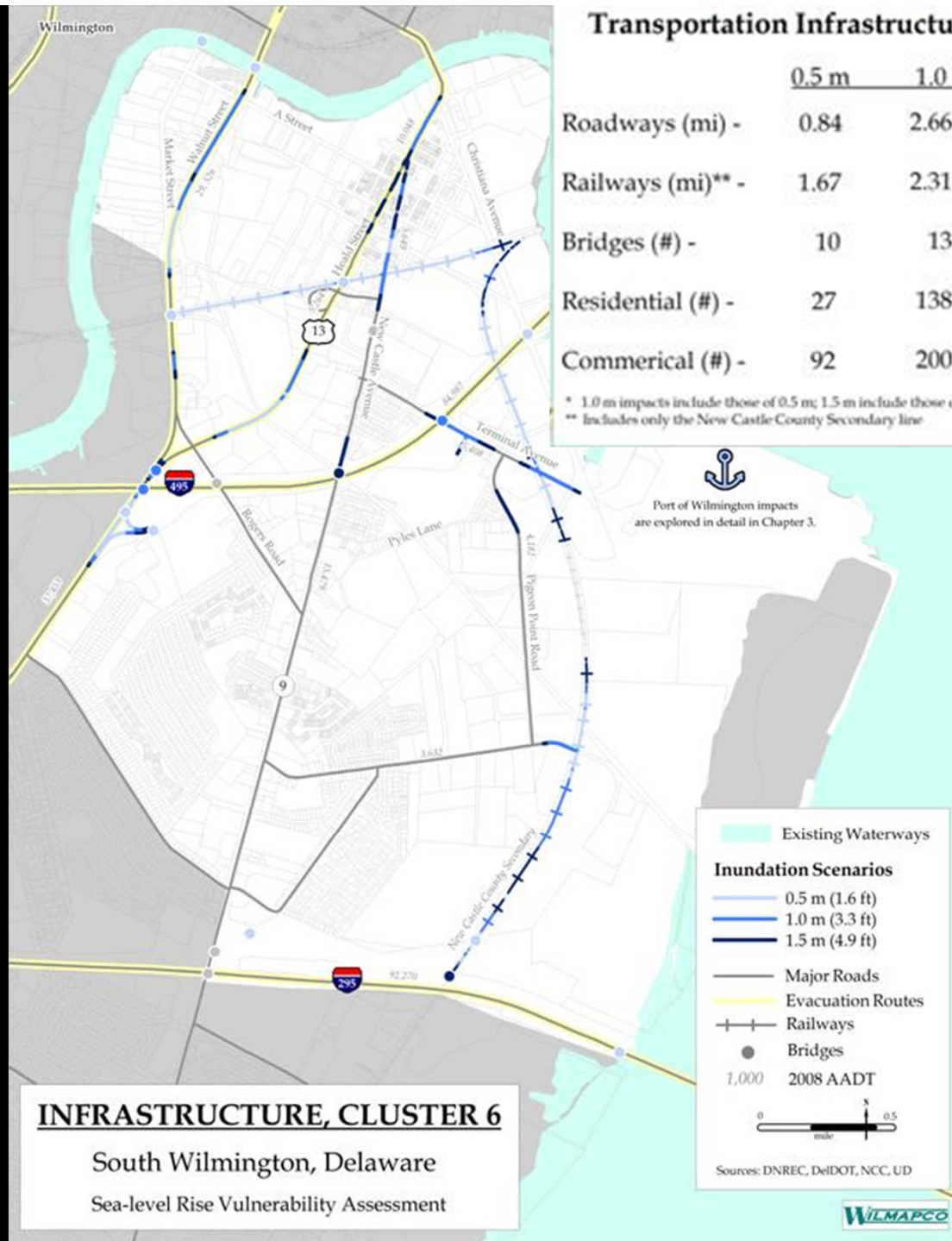
Census block-groups: 6
Traffic Analysis Zones: 8

Population, 2000: 7,682
Population, 2005-09: 7,592

Population, 2030 (est.): -1%
Employment, 2030 (est.): -8%

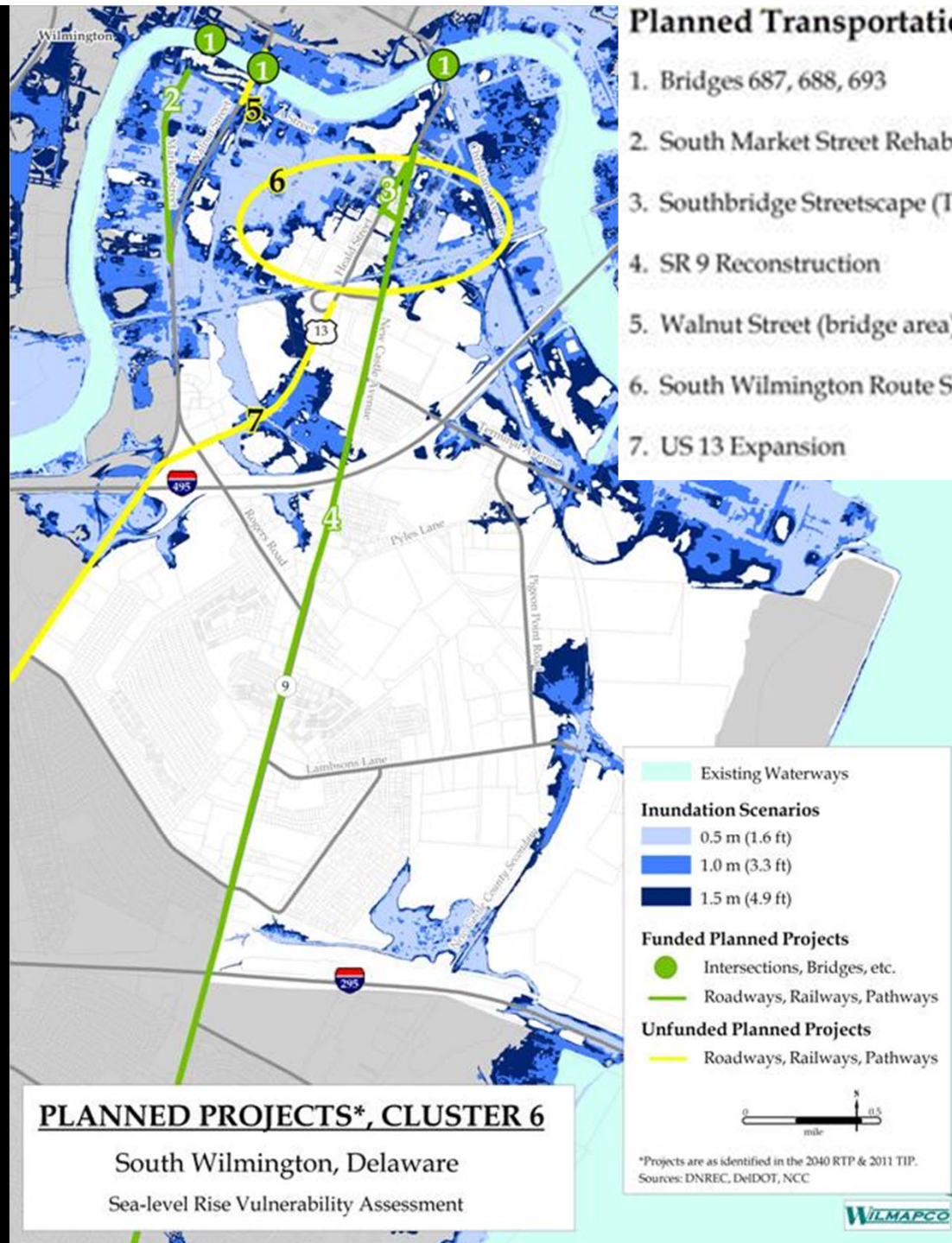
EJ Area: 2 block-groups (Southbridge)
HH Poverty: 18.4% (range 7.5%-39.1%)





INFRASTRUCTURE, CLUSTER 6

South Wilmington, Delaware
 Sea-level Rise Vulnerability Assessment

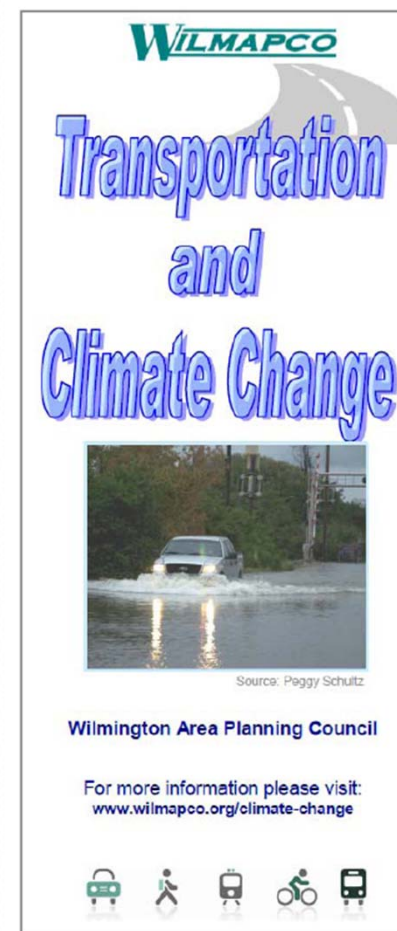


Planned Transportation Projects

1. Bridges 687, 688, 693
2. South Market Street Rehabilitation
3. Southbridge Streetscape (TE)
4. SR 9 Reconstruction
5. Walnut Street (bridge area)
6. South Wilmington Route Signage
7. US 13 Expansion

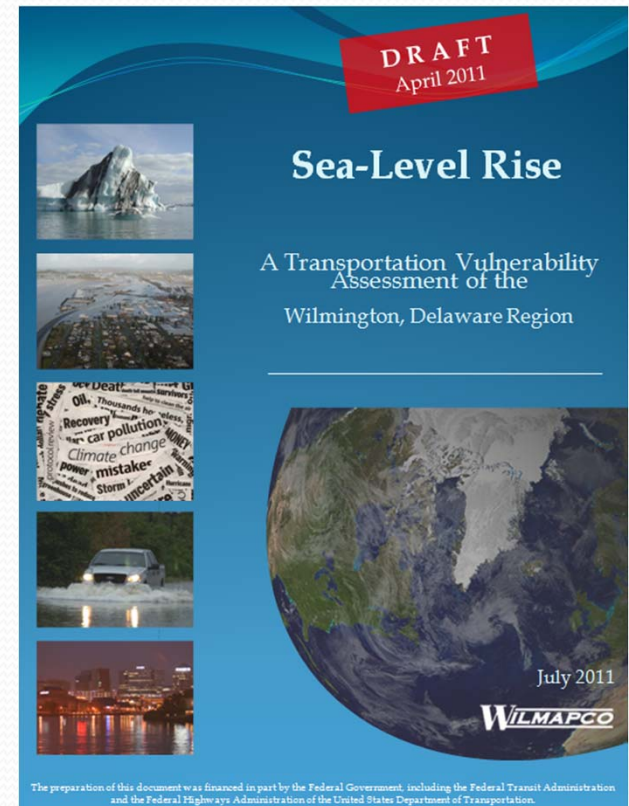
Policy Recommendations

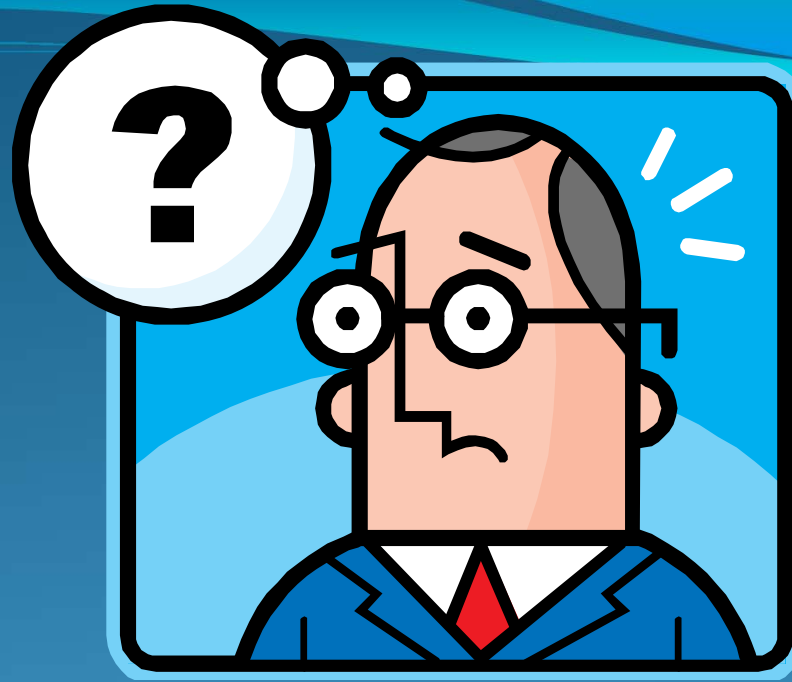
- ❑ Incorporate climate change into RTP
- ❑ Measure effectiveness
 - ❑ Climate Change Adaptation Tool for Transportation
- ❑ Monitor planned projects
- ❑ Enhance climate change outreach
- ❑ Support ongoing climate change efforts



Remaining Steps

- ❑ Council Presentation ✓
- ❑ TAC Presentation ✓
- ❑ Final Draft (June 9th)
- ❑ TAC Endorsement (June 16th)
- ❑ Council Endorsement (July 14th)





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Table X: Critical Roadway Impact Index Measures

Measure	Points	Local Weight	Global Weight
<i>Scenario</i>			
0.5 m (New Castle Co.) & 2 ft (Cecil Co.)	8	50%	17%
1.0 m (New Castle Co.) & 5 ft (Cecil Co.)	5	31%	10%
1.5 m (New Castle Co.) & 10 ft (Cecil Co.)	3	19%	6%
<i>2010 P&E Density</i>			
3x median	3	19%	6%
2x median	2	13%	4%
> median	1	6%	2%
<i>2030 P&E Density</i>			
3x median	3	19%	6%
2x median	2	13%	4%
> median	1	6%	2%
<i>EJ Neighborhood (New Castle Co.)</i>			
Significant	3	19%	6%
Moderate	1	6%	2%
<i>EJ Neighborhood (Cecil Co.)</i>			
Significant	0 (n/a)	0%	0%
Moderate	4	25%	8%
<i>Traffic Volume</i>			
3x median	6	38%	13%
2x median	4	25%	8%
> median	2	13%	4%
<i>Transit Route</i>			
Yes	2	13%	4%
No	0	0%	0%
<i>Evacuation Route</i>			
Yes	2	13%	4%
No	0	0%	0%

Scenarios

Demographic Characteristics & Forecasts

Traffic Characteristics

Table X: Top-Scoring Inundated Roadways

Roadway	Cluster	Miles	Score
<i>New Castle County</i>			
Walnut Street (south of Howard St.)	South Wilmington (6)	0.18	24
Walnut Street (b/t A St. and Howard St.)	South Wilmington (6)	0.21	22
Walnut Street (south of Howard St.)	South Wilmington (6)	0.36	22
US 13 (at I-495)	South Wilmington (6)	0.21	21
Walnut Street (north of A St.)	South Wilmington (6)	0.02	20
Walnut Street (south of Howard St.)	South Wilmington (6)	0.03	20
Walnut Street (north of Howard St.)	South Wilmington (6)	0.02	20
Front Street (at Walnut St.)	Wilmington Riverfront (7)	0.07	20
<i>Cecil County</i>			
US 40 (b/t SR 7 and SR 279)	Elkton (18)	0.03	25
US 40 (northwest of SR 213)	Elkton (18)	0.02	22