CLIMATE ADAPTATION:
SEPTA'S EXPERIENCE & VALUE OF FTA PILOT PROGRAM

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AGM/Chief Engineer
March 21, 2012

SEPTA: Partnering for Regional Sustainability

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PRESENTATION OVERVIEW

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1. SEPTA's Key Challenge: Climate *Variability and Extremes*
2. Approaches to Maintain Operational Reliability
3. Drain on Resources & Manpower Capacity
4. Information Required for Decision-Making
5. FTA Project Pilot: SEPTA's Manayunk/Norristown Line

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SEPTA:
AMONG THE "LARGEST & OLDEST RAIL TRANSIT SYSTEMS"

SEPTA Regional Rail & Rail Transit

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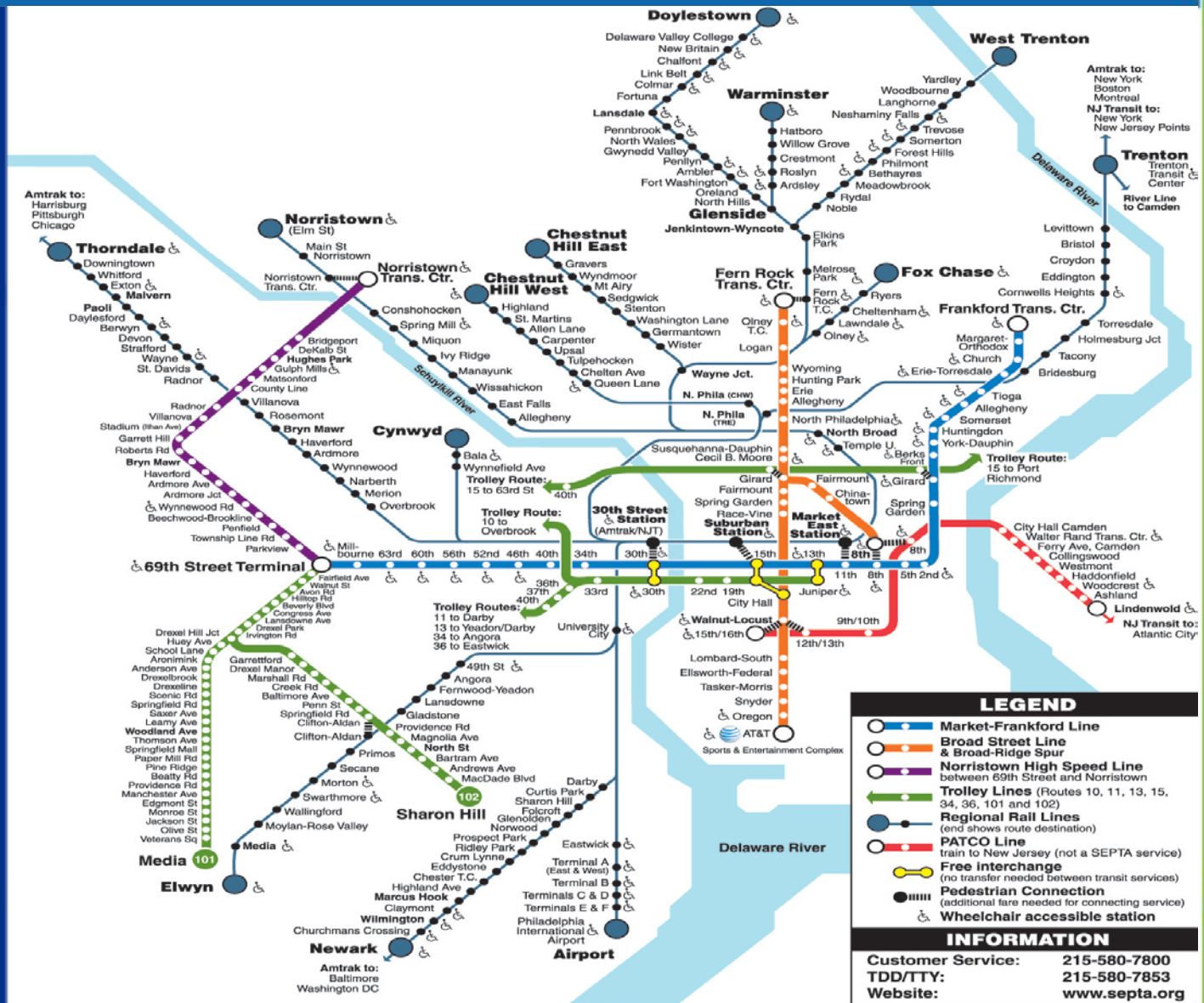

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CLIMATE VARIABILITY:
TRENDS IN NORTHEAST U.S.

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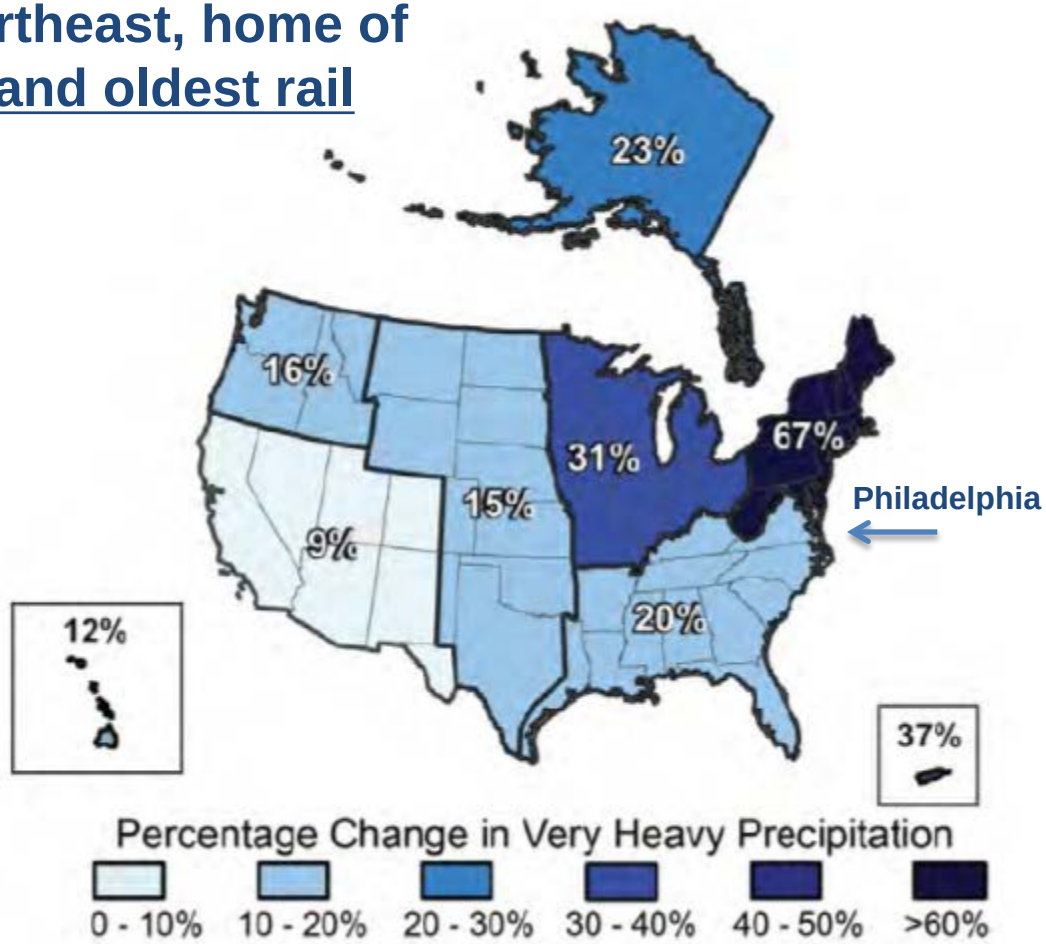
"The biggest increases in very heavy precipitation over the last 50 years have been in the Northeast, home of some of the <u>largest and oldest rail transit systems</u>."

Figure 2-3

Observed Increases in Amounts of Very Heavy Precipitation (1958-2007)



Source: Federal Transit Administration
Report No. 0001: "Flooded Bus Barns & Buckled Rails: Public Transportation & Climate Change Adaptation"

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CLIMATE VARIABILITY IN THE PHILADELPHIA REGION:
EXTREME WEATHER IN RECENT YEARS

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- 2011: Wettest Year Ever (64.3 in)
- Aug. 2011: Wettest Month Ever (19.8 in)
- Jul. 2011: Warmest July Ever (82.4°)
- 2010: Most > 90° Days Ever (55)
- Summer 2010: Warmest Summer Ever (79.63°)
- Winter 2010: Snowiest Winter Ever (78.7 in)

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CASE STUDY – AUG 27-SEP 8, 2011:
HURRICANE IRENE & TROPICAL STORM LEE

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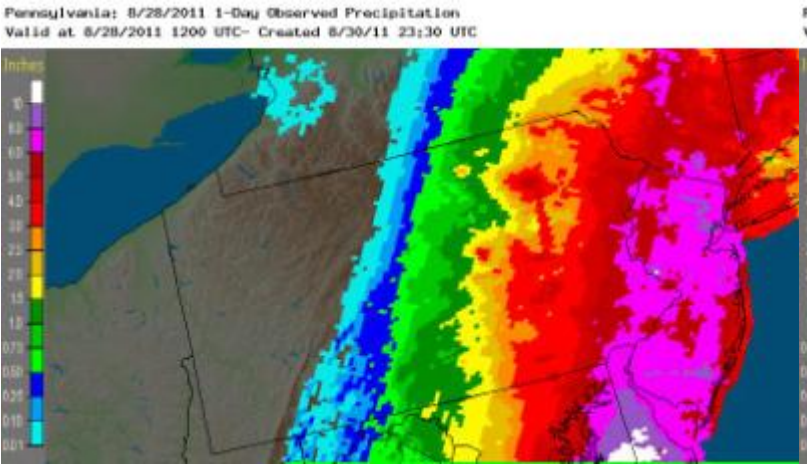
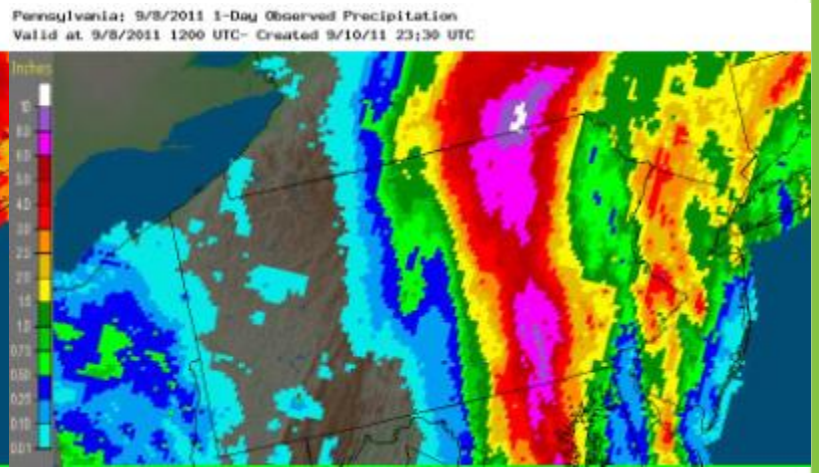
HURRICANE IRENE
August 27-28, 2011

- Six Inches of Rain
- 52 MPH Winds

TROPICAL STORM LEE
September 8, 2011

- Four Inches of Rain
- 26 MPH Winds





"The destructive energy of Atlantic hurricanes has increased in recent decades. The intensity of these storms is likely to increase in this century."[1]

[1] U.S. Global Change Research Program

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SEVERE IMPACTS:
FLOODING & WIND DAMAGE

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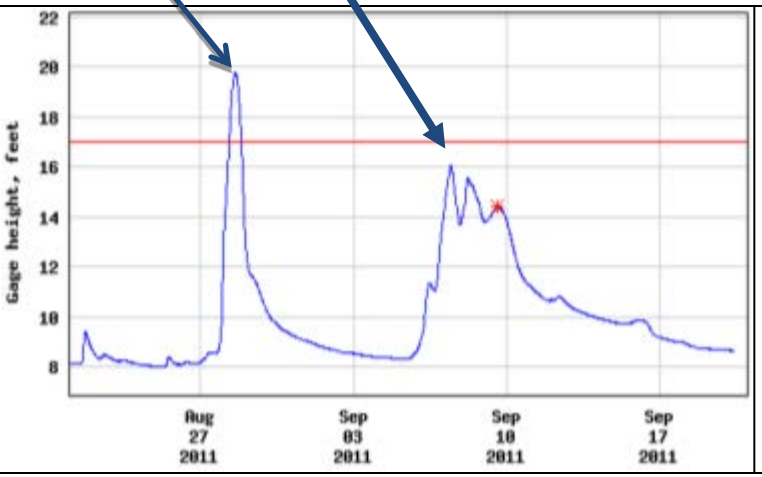
SCHUYLKILL RIVER

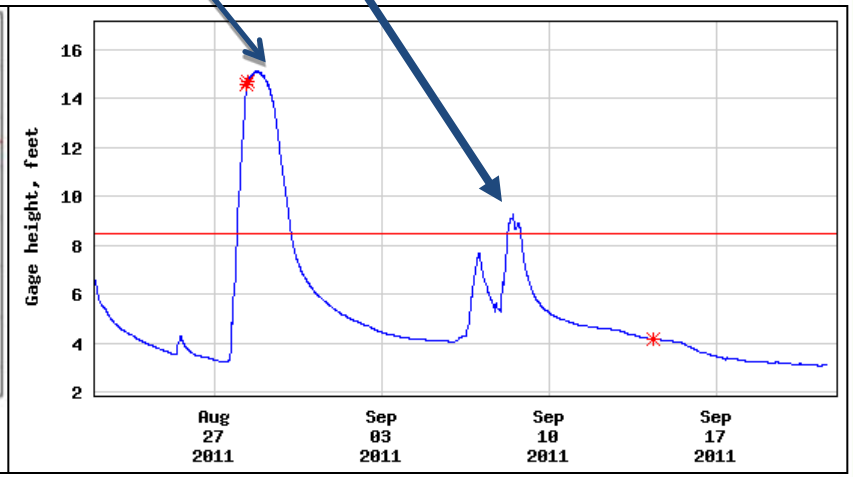
Irene Lee



- Crested at 19.8 Feet (Norristown)
- Fourth Highest Ever

DELAWARE RIVER (Assunpink Creek)

Irene Lee



- Crested at a Record 15.1 Feet (Flood Stage: 8.0 Feet)

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APPROACHES TO MAINTAIN SERVICE RELIABILITY:
EMERGENCY PREPAREDNESS

- Critical Subway Vents Covered
- Pump Rooms Prepared
- Third Party Tree-Trimmers On-Site

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APPROACHES TO MAINTAIN SERVICE RELIABILITY:
PROACTIVE SERVICE ADJUSTMENTS

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- **Vehicles Relocated Out of Known Flood- Prone Areas**
- **Planned Service Suspensions at Midnight 8/27 *for the first time ever.***

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APPROACHES TO MAINTAIN SERVICE RELIABILITY:
PROACTIVE INFRASTRUCTURE ADAPTATION

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- **Brush-Cutting More Regimented**
- **Secondary Drainage Systems Given More Attention**

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APPROACHES TO MAINTAIN SERVICE RELIABILITY:
PROACTIVE INFRASTRUCTURE ADAPTATION

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- **3rd Rails Moved Out from Under Platforms**
- **Salt Dome Added**
- **Snow Contracts Revised**
- **Subway Vent Well and Railroad Signal Cases Raised**

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APPROACHES TO MAINTAIN SERVICE RELIABILITY:
WORKFORCE READINESS

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- **Fine-Tuned Playbook for Emergencies & Extreme Weather**

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APPROACHES TO MAINTAIN SERVICE RELIABILITY:
WORKFORCE READINESS

- **Practice Through Repetition (Earthquake-Hurricane-Tropical Storm Over Three Week Period)**
- **Drain on Resources and Manpower Capacity**

DRAIN ON RESOURCES & MANPOWER CAPACITY:
HURRICANE IRENE & TROPICAL STORM LEE

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TOTAL ESTIMATES	IRENE	LEE	TOTAL
SEPTA Labor & Overtime	$465,000	$492,000	$957,000
Third-Party Contracts	$65,491	$3,714,951	$3,780,442
Equipment & Materials	$98,272	$3,582	$101,854
Damage to Vehicles	$1,600,000	$0	$1,600,000
TOTAL	$2,228,763	$4,210,533	$6,439,296

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INFORMATION REQUIRED FOR DECISION-MAKING:
COMMUNICATION THE KEY

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READY NOTIFYPA *Find Out First!*

- **Forecasts and Weather Alerts Critical**
- **Information Better for Irene Than Lee; Lee Created More Havoc**
- **Reaching Out to Other Agencies to Compare Strategies also Important**
- **Passenger Group Commendation to SEPTA for Communication and Rapid Response**

DVARP

Delaware Valley Association of Rail Passengers
1601 Walnut St., Suite 1129 Philadelphia, PA 19102
215-RAILWAY www.dvarp.org

Resolution of Commendation

September 2011

Whereas in August 2011, the Philadelphia region endured its heaviest month of rain ever recorded, and

Whereas Tropical Storm Irene struck the region with gale-force winds and flooding rains, and

Whereas more rain and flash floods followed on September 7 and 8, and

Whereas these extreme weather conditions caused considerable damage to our transportation infrastructure, including washed-out tracks, flooded stations and other facilities, and fallen trees knocking down power and communications lines, and

Whereas the Southeastern Pennsylvania Transportation Authority continued to operate rail and transit service as Irene approached, shut down in an orderly fashion, and resumed operations just 12 hours later, and

Whereas SEPTA personnel worked long hours to repair damage from each of these storms so rail service could operate normally, and

Whereas SEPTA used the internet and other communications resources to provide up-to-the-minute information to passengers about changes in service during and after the storms,

Therefore we, the Delaware Valley Association of Rail Passengers, hereby COMMEND the operating, maintenance, and management employees of SEPTA for their determined efforts to keep the region's public transportation system serving passengers as much as possible during these challenging conditions, and for their ongoing work to recover from the storms.

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INFORMATION REQUIRED FOR DECISION-MAKING:
MORE COMPREHENSIVE PLANS

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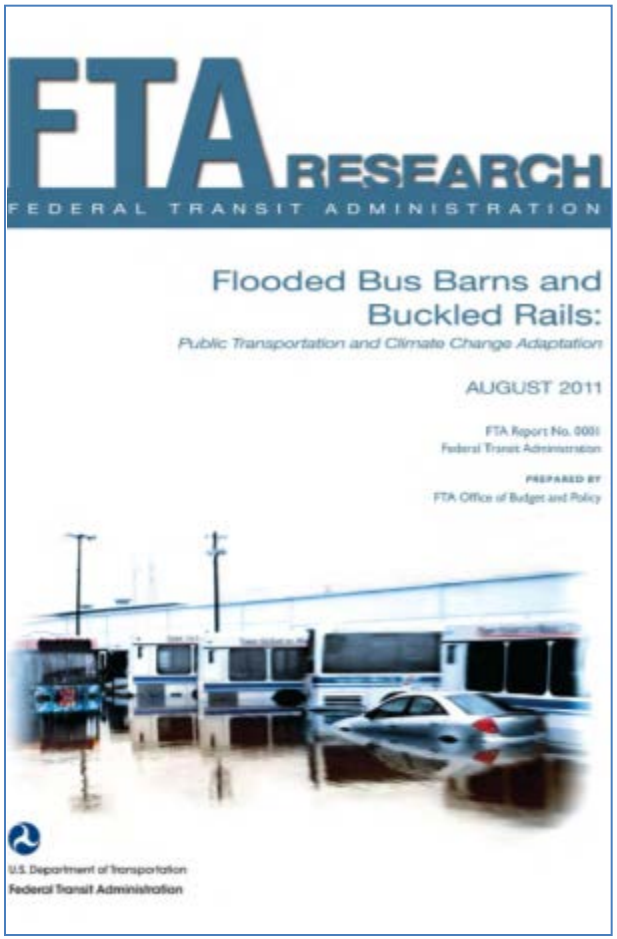
FTA Pilot Will Enable SEPTA To:

- Inform Existing Adaptation Efforts With Climate Science & Risk Analysis
- Better Understand Extent of Costs & Impacts
- Evaluate Techniques to Minimize Service Disruptions
- Develop a Comprehensive Strategy Transferrable to Entire System



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SEPTA'S PILOT PROJECT:
MANAYUNK/NORRISTOWN LINE

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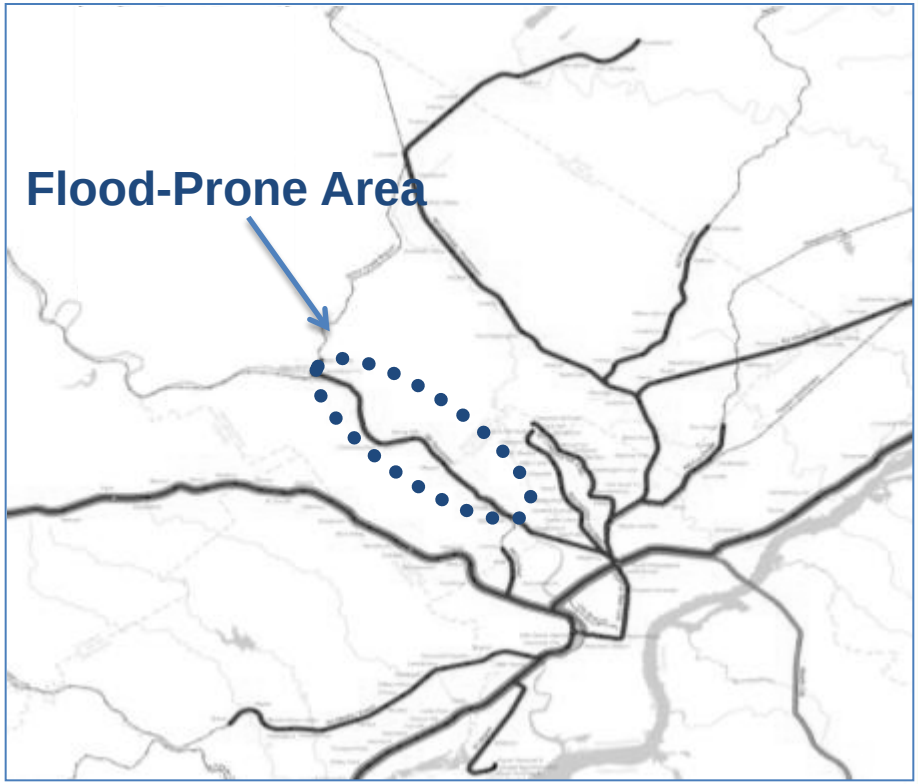
- Partnership with DVRPC & ICF Int'l
- Line Parallels Schuylkill River
- 10 of 18 Highest Schuylkill Crests on Record Since 2003
- 10,360 Daily Passengers



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MANAYUNK/NORRISTOWN LINE:
ADAPTATION ALREADY UNDERWAY

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- Constructing Turnback Just Short of Flood-Prone Area
- Will Allow Some Service to Continue During Flood Events

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