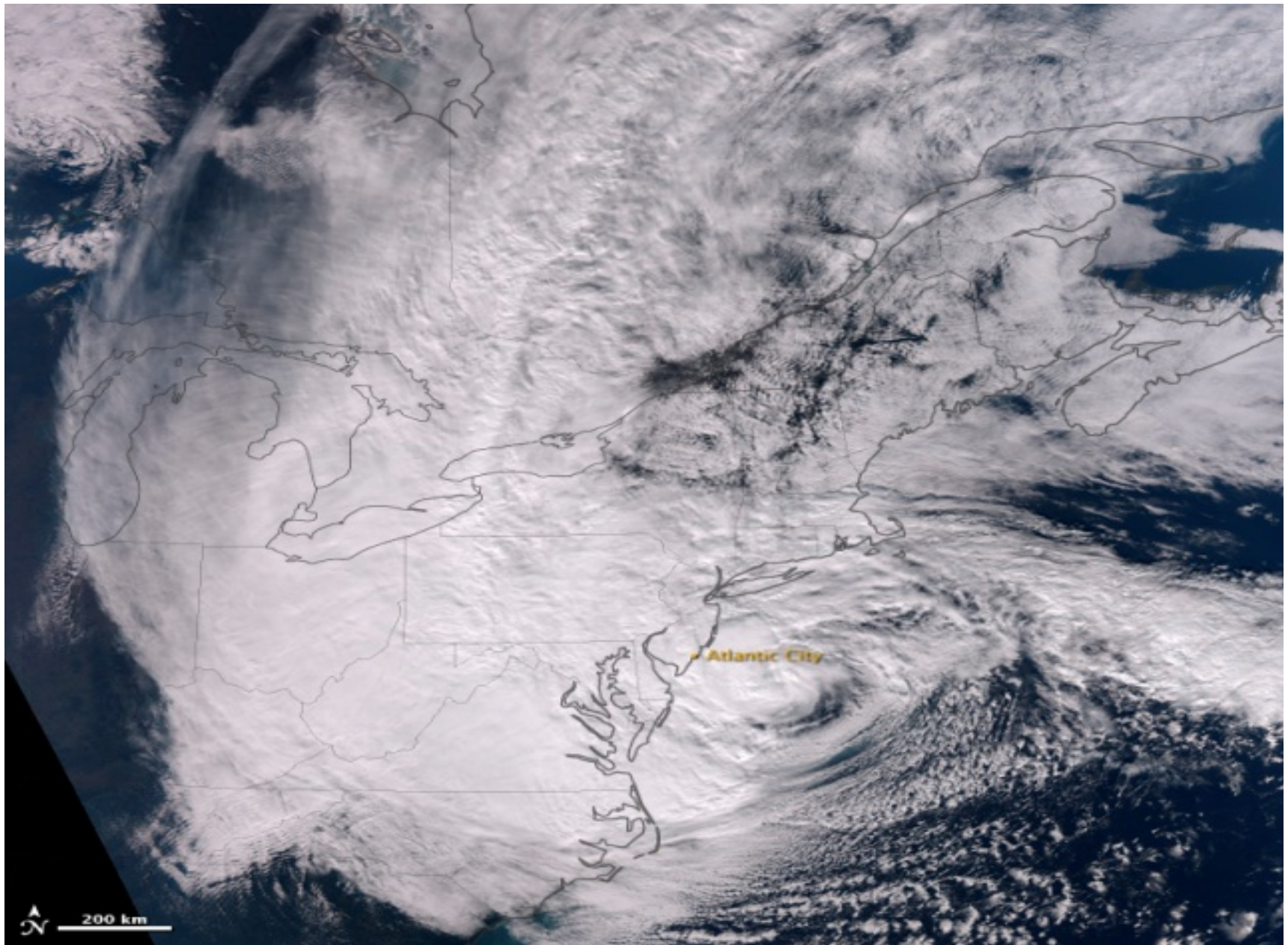


Hurricane Sandy and Critical Health Infrastructure

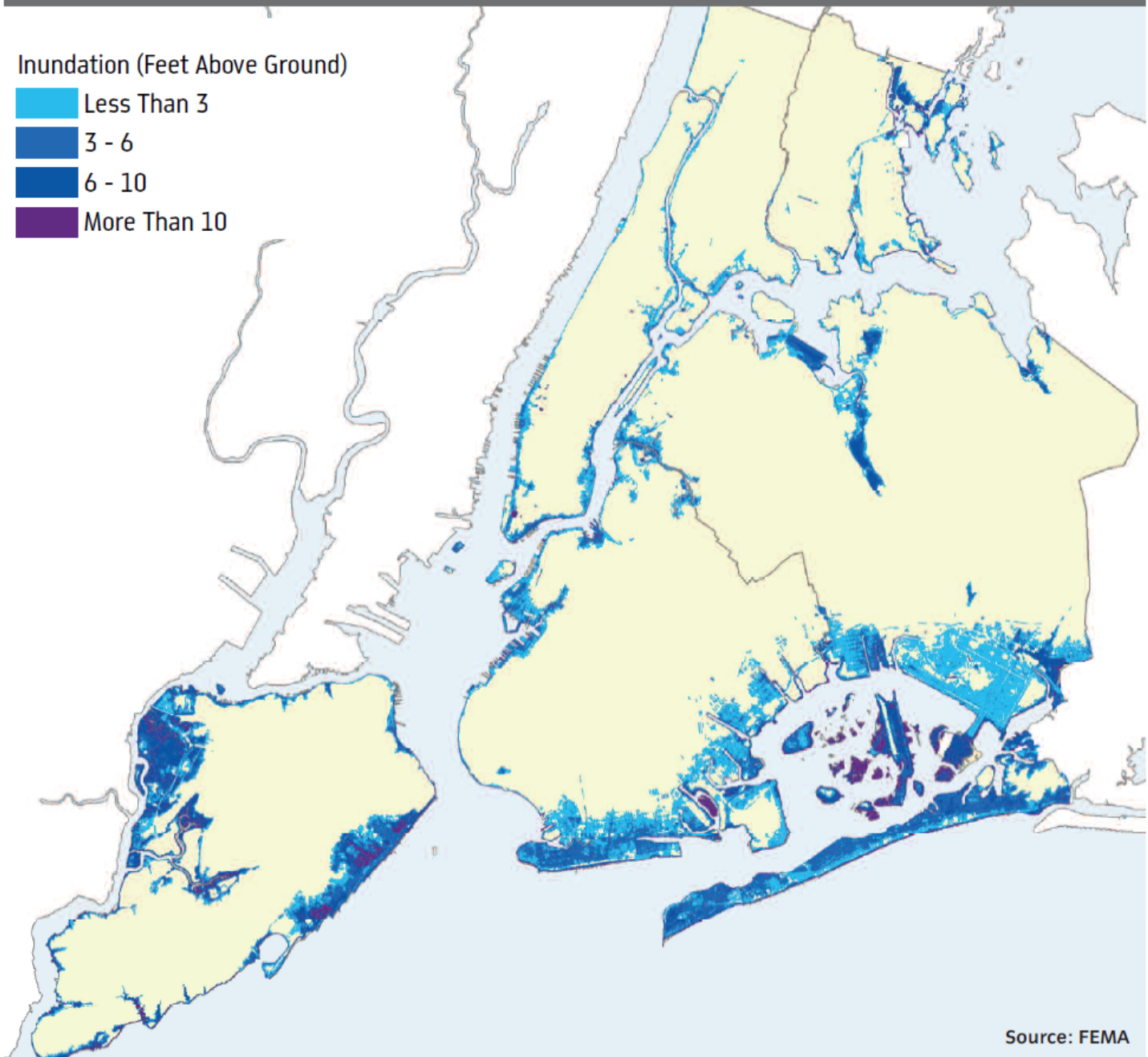
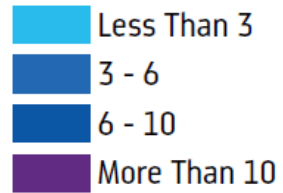


Hurricane Sandy, 28 October 2012



Sandy Inundation

Inundation (Feet Above Ground)

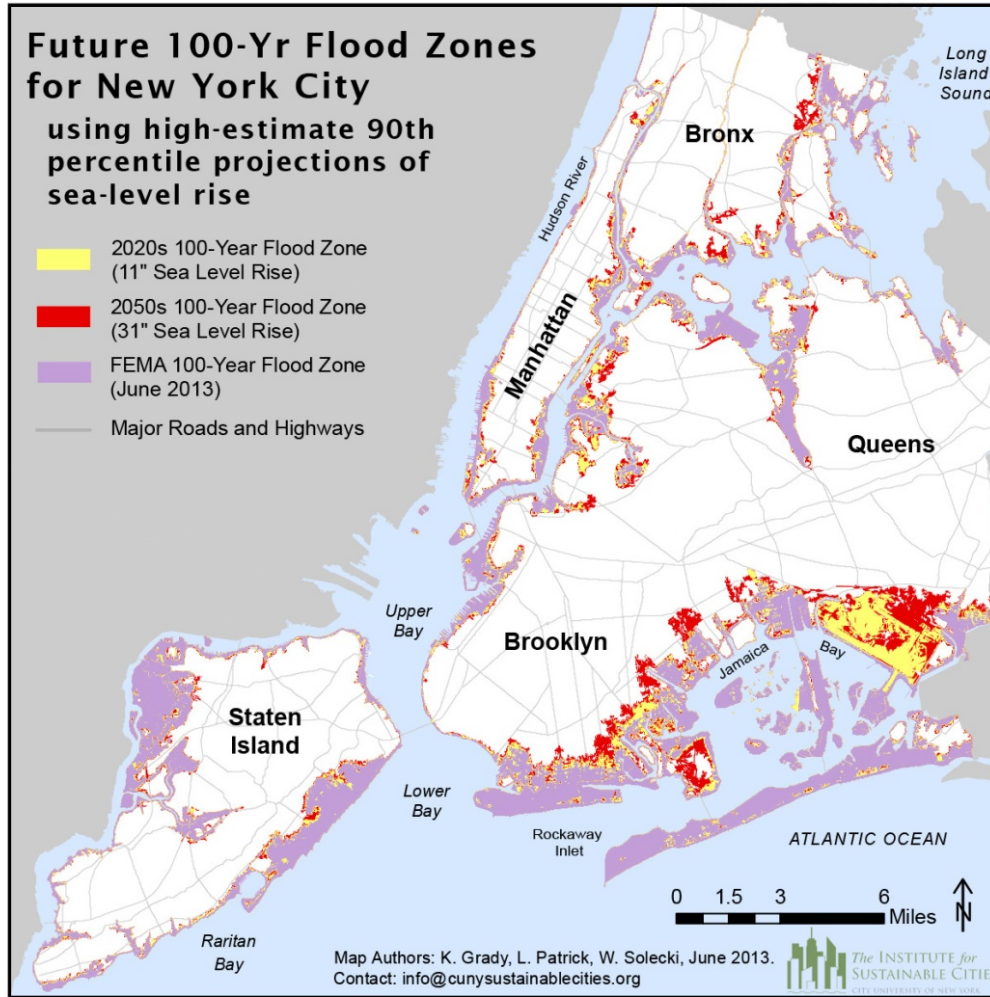


Source: FEMA



Source: PlaNYC 2013

Urban Lifelines and Infrastructure System Failures



- Water Supply
- Electricity
- Transportation
- Gasoline Supply
- Pharmacy – Drug Supply

General Observations about Impacts and Vulnerabilities

- Cascading system impacts
- Uneven geography – not all on the coast, but most impactful on coast
- Role of ecosystem protection opportunities – lost and found – e.g. wetlands
- Data rich assessment – smart city context yielding critical data – challenge is how to use it
- A lot more impact and vulnerability work to be done
- Highly complex systems require significant redundancy and context specific vulnerabilities – e.g. health care system dependent on adequate access to electrical power, internet, wireless phone service

Hurricane Sandy and Critical Health Infrastructure

- Direct loss of life and injury
- Direct loss of medical and health facilities
- Indirect loss of medical health services and access to medical health services because of loss of electrical power, mobility loss – e.g. public transit, internet loss,
- Interacting with a highly dependent populous

Cascading Vulnerability Pathways

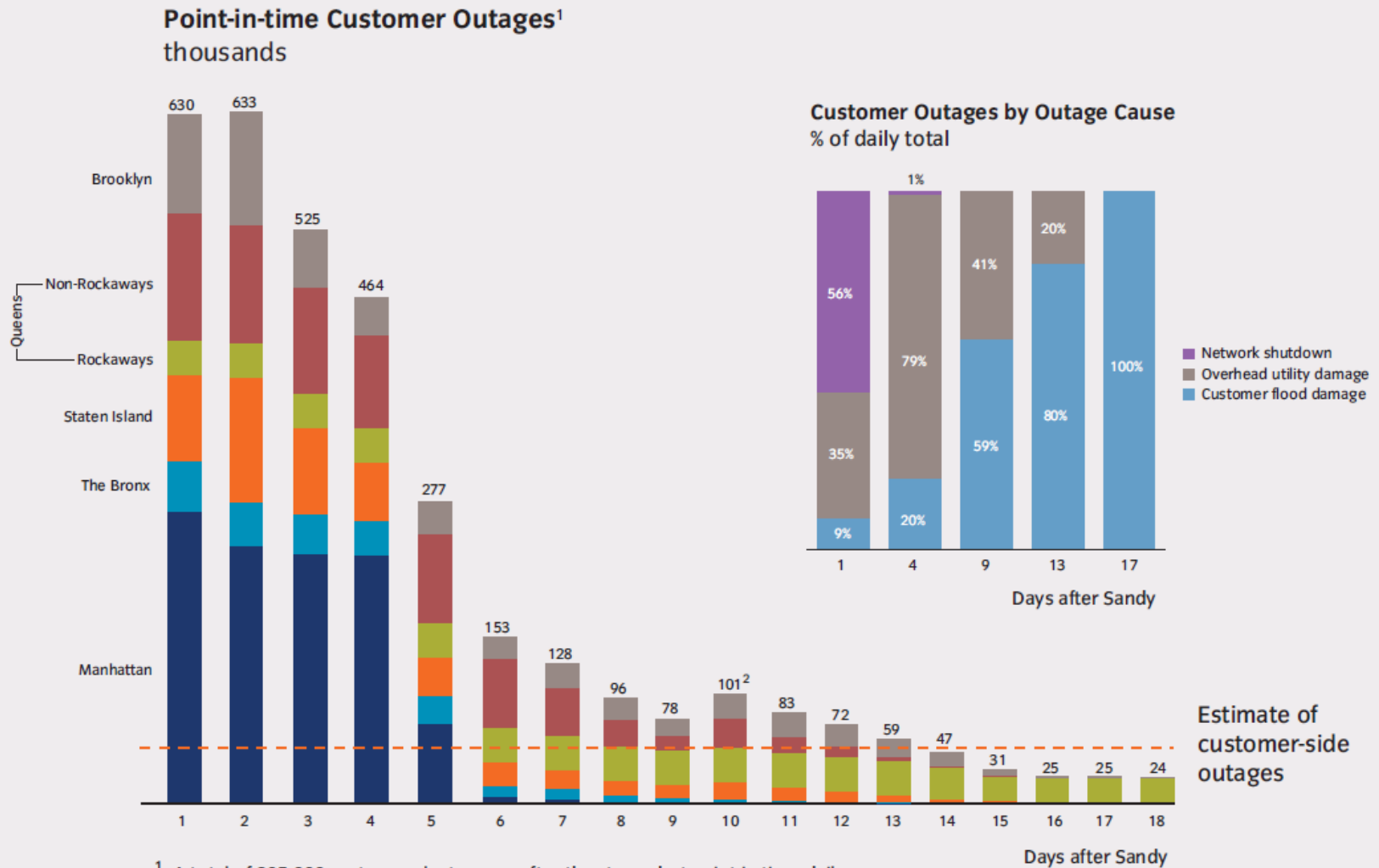


Blackouts and water supply



Loss of Electrical Power in Days Following

Electrical Outage Restoration

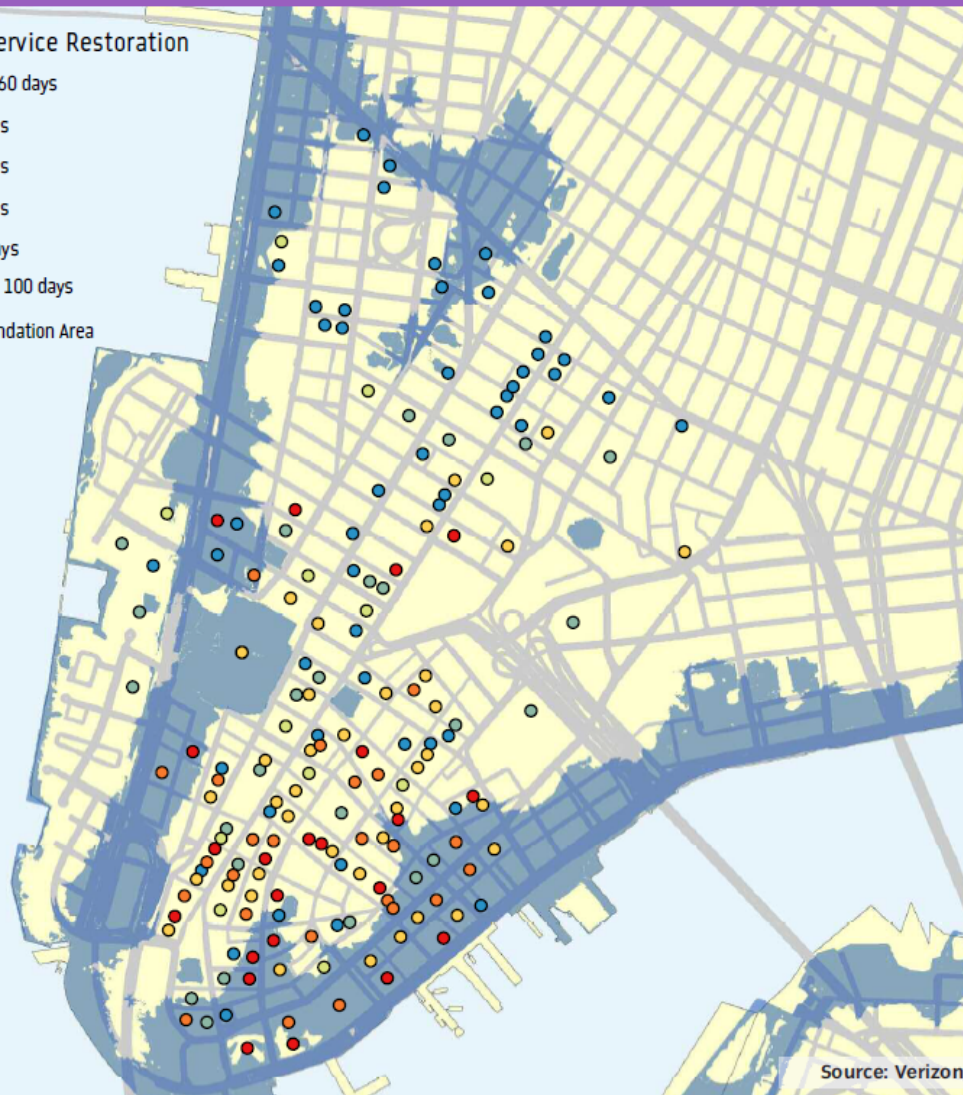


Telecommunications

Sample of Telecommunications Service Restoration Times of Commercial Buildings in Southern Manhattan

Time to Full Service Restoration

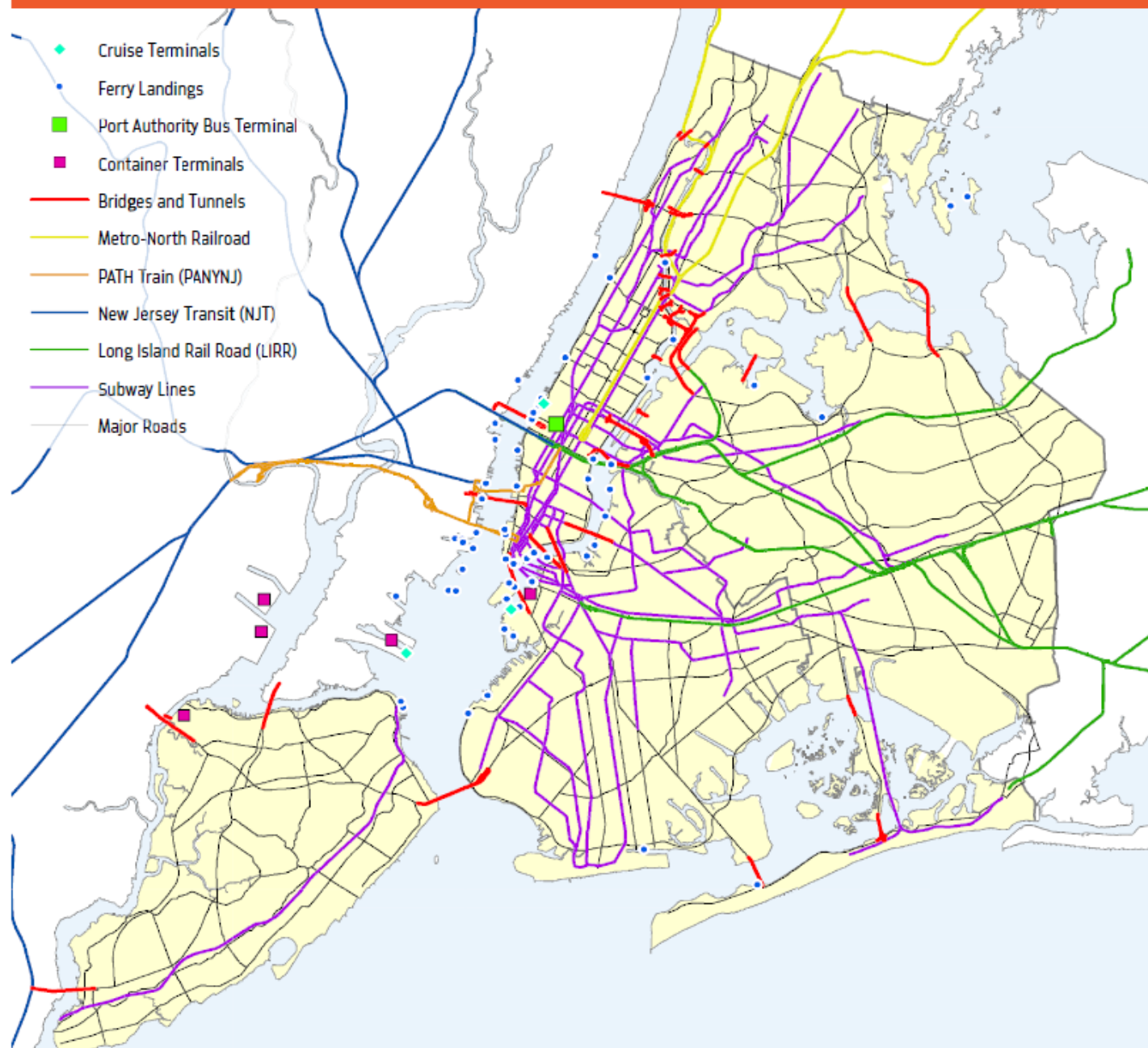
- Less than 60 days
- 60-70 days
- 70-80 days
- 80-90 days
- 90-100 days
- More than 100 days
- Sandy Inundation Area



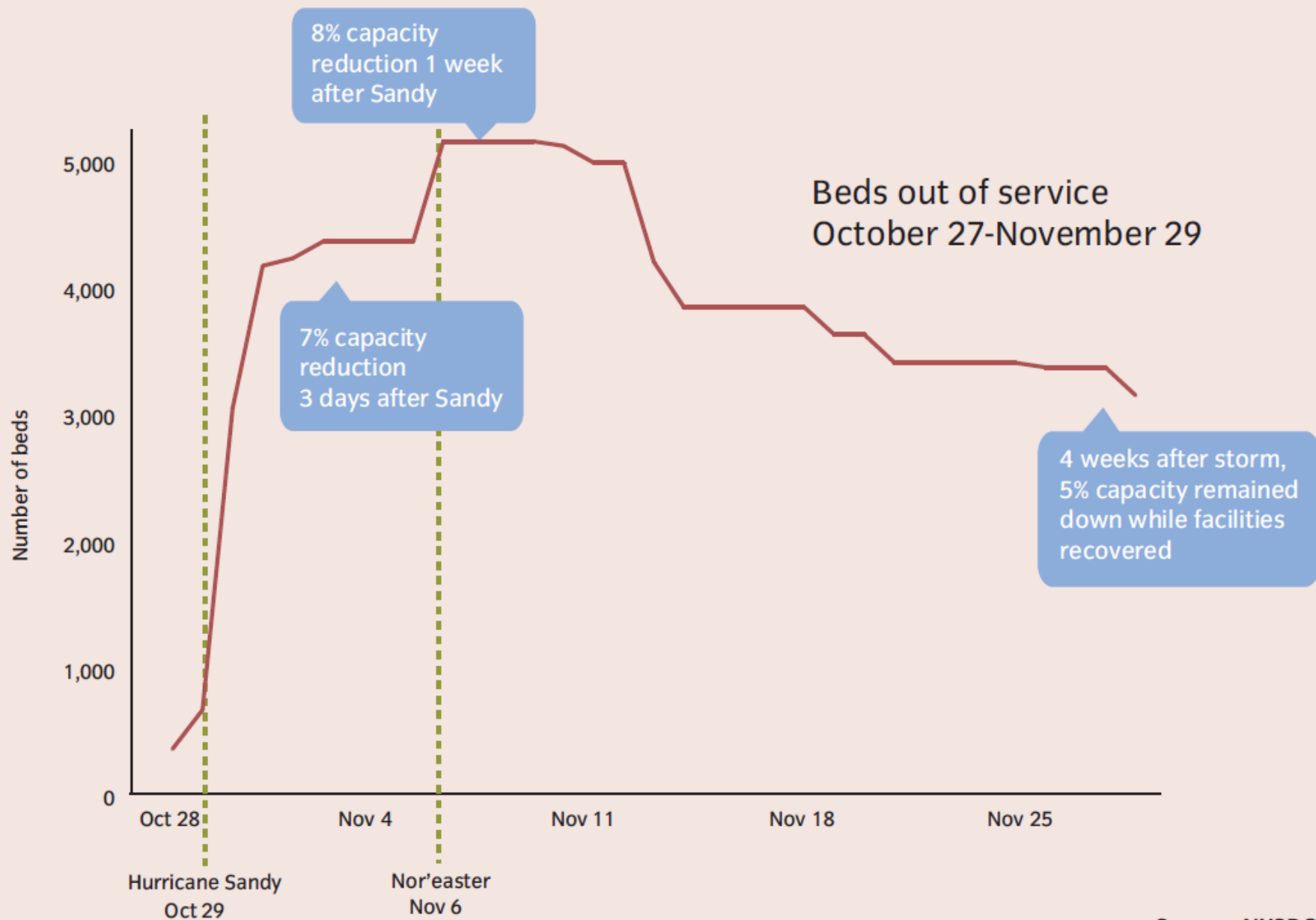
Source: Verizon

High-rise commercial buildings that lost telecommunications service during Sandy took weeks or months to restore service because of damage to copper cables, and difficulties in restoring power and replacing flood-damaged equipment in individual buildings.

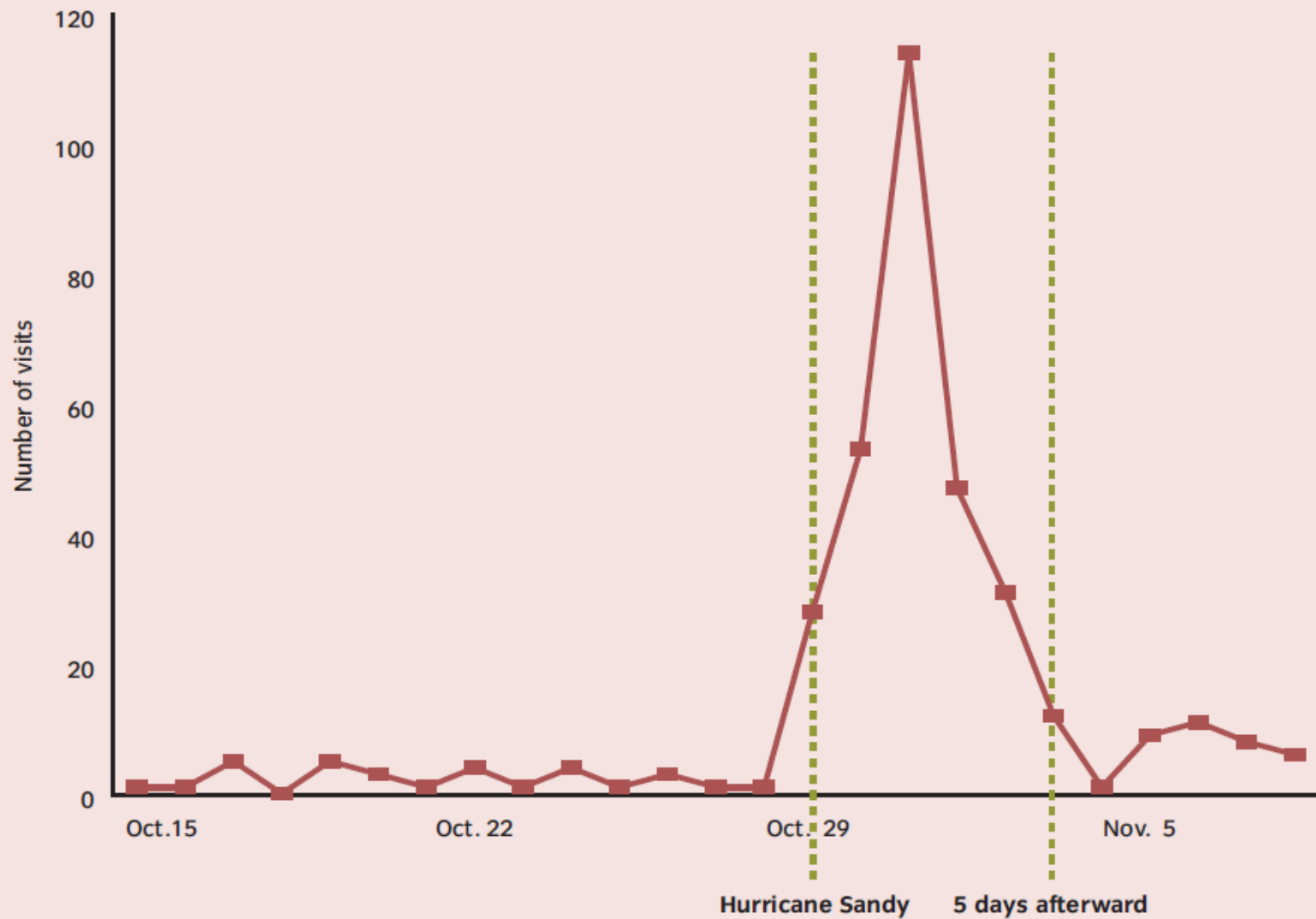
Regional Transportation Network



Citywide Bed Capacity Reductions in Nursing Homes and Adult Care Facilities



Citywide Emergency Department Visits Needing Dialysis



Source: DOHMH

Hospitals in the Floodplain

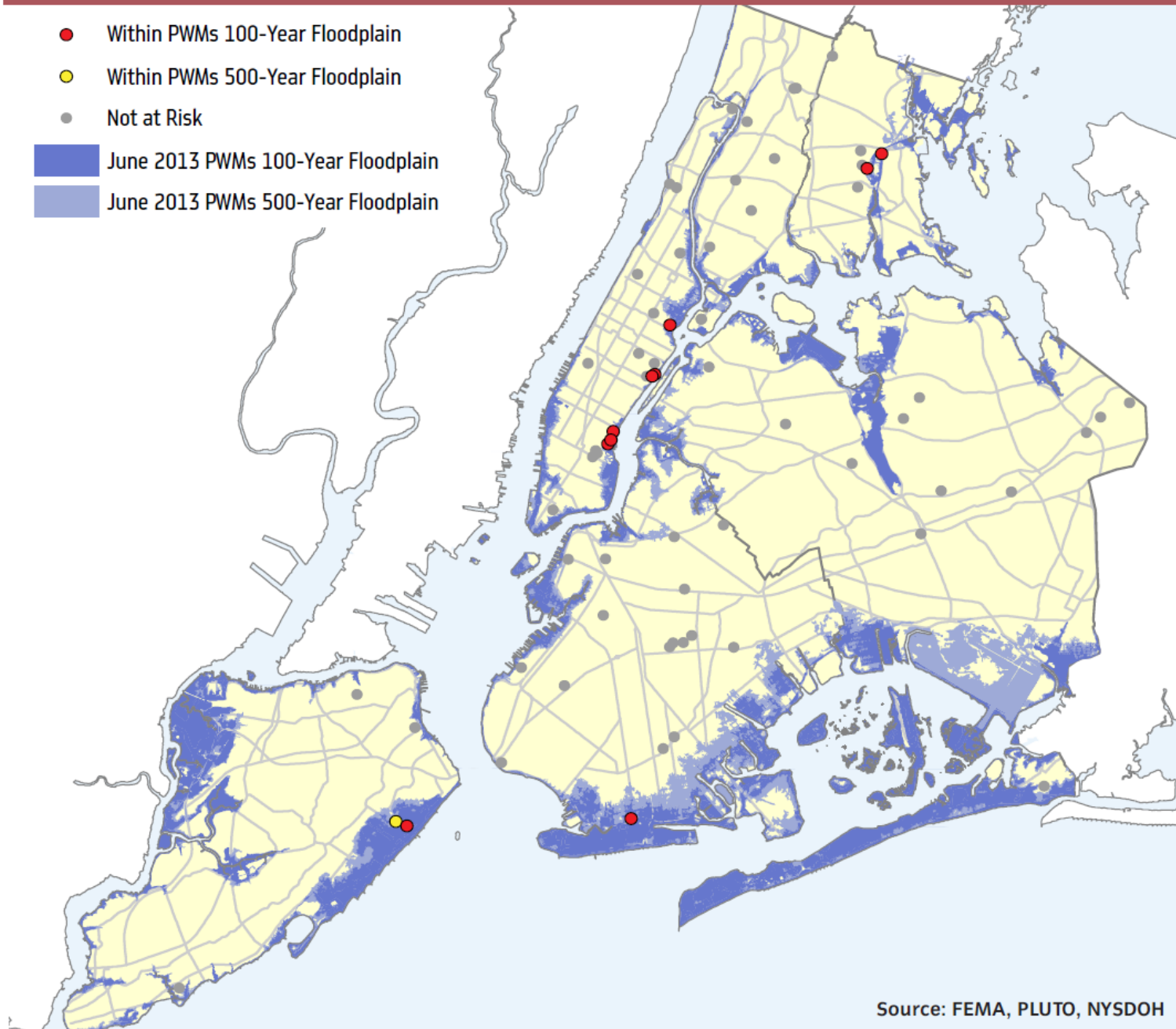
● Within PWMs 100-Year Floodplain

● Within PWMs 500-Year Floodplain

● Not at Risk

June 2013 PWMs 100-Year Floodplain

June 2013 PWMs 500-Year Floodplain



Source: FEMA, PLUTO, NYSDOH

Nursing Homes and Adult Care Facilities in Southern Brooklyn and South Queens

