

This presentation does not describe a real potential asteroid impact. The information is fictional and provided only to support an emergency response exercise conducted during the **2019 Planetary Defense Conference (PDC)** in Washington DC, USA, April 29–May 3, 2019. This is only an exercise.

Physical Effects Briefing

2019 PDC Exercise: Day 5

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April 19, 2027

Probabilistic Asteroid Impact Risk

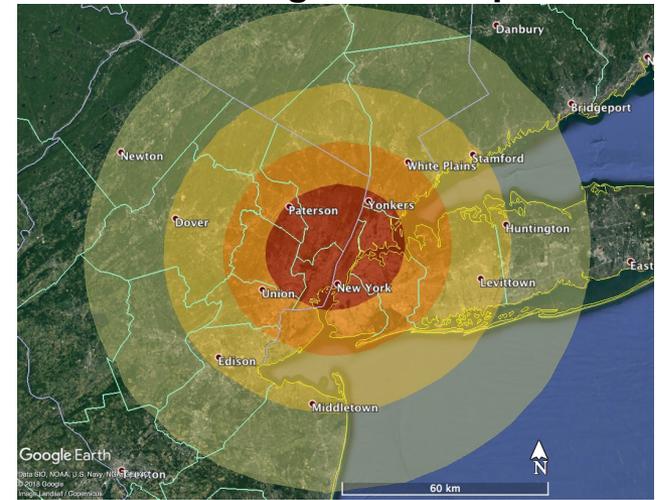


NASA Ames, Asteroid Threat Assessment Project

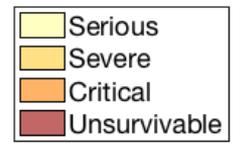
Characterization Summary & Updates

- Assessment date: 19 April 2027
- Impact date: 29 April 2027 (10 days)
- Earth impact probability: 100%, New York Area
- Diameter (m): 60 ± 10 (1- σ), range 26–93
- Energy: mean 11 Mt, range 650 kt – 46 Mt,
- Type: S class, remaining chunk of disrupted contact binary.

Potential Damage Zone Map



Full extent of regions potentially falling within each damage severity level.

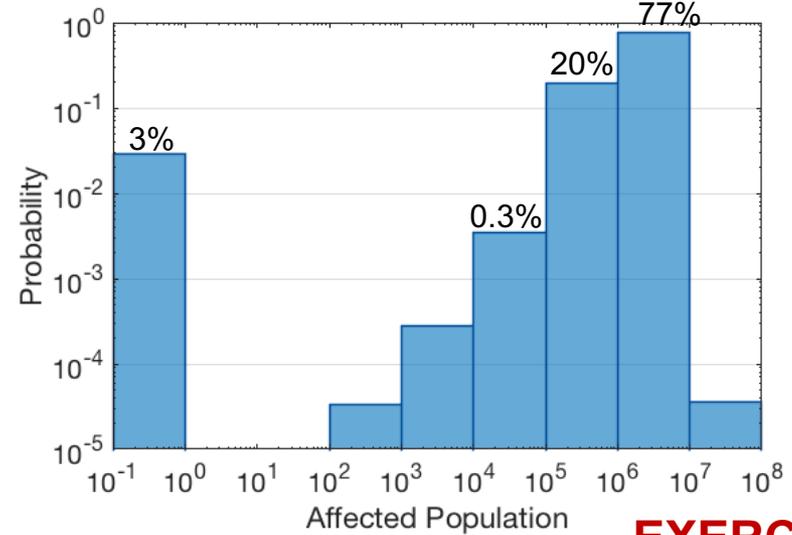


Risk Summary

- Affected population: mean 2.4M, range 0–10.2M
- Likely airburst at ~16 km altitude (8–29 km).
- Blast overpressure is primary hazard.
- Damage out to ~70 km if larger, lower burst
- Little-to-no damage if burst is small & high

Damage Levels	Mean Radius	Radius Range
Serious	33 km	0 – 68 km
Severe	13 km	0 – 45 km
Critical	3 km	0 – 28 km
Unsurvivable	0.1 km	0 – 15 km

Affected Population Probabilities



EXERCISE

What we know with precision

- Impact is certain
- Location is New York City
- Date: April 29, 2027 (local)
- Time: 12:01:38 am EDT
- Entry speed: 19 km/s (43,000 mph, ~Mach 57)
- Entry angle: 77° from horizontal
- Will approach from: 119° (29° south of due east)
(note: Manhattan streets strike 29° south of due east)



EXERCISE

Likely scenario

- Size: 60 meters diameter
- Composition: Stone, density 3.0 g/cm³
- Height of burst: 13-15 km (~40-50 thousand feet)
- Explosive yield: 15 Megatons (1,000 x Hiroshima)

EXERCISE



New York, New York

EXERCISE

EXERCISE

Asteroid 2019 PDC fragment



60 m



400 m

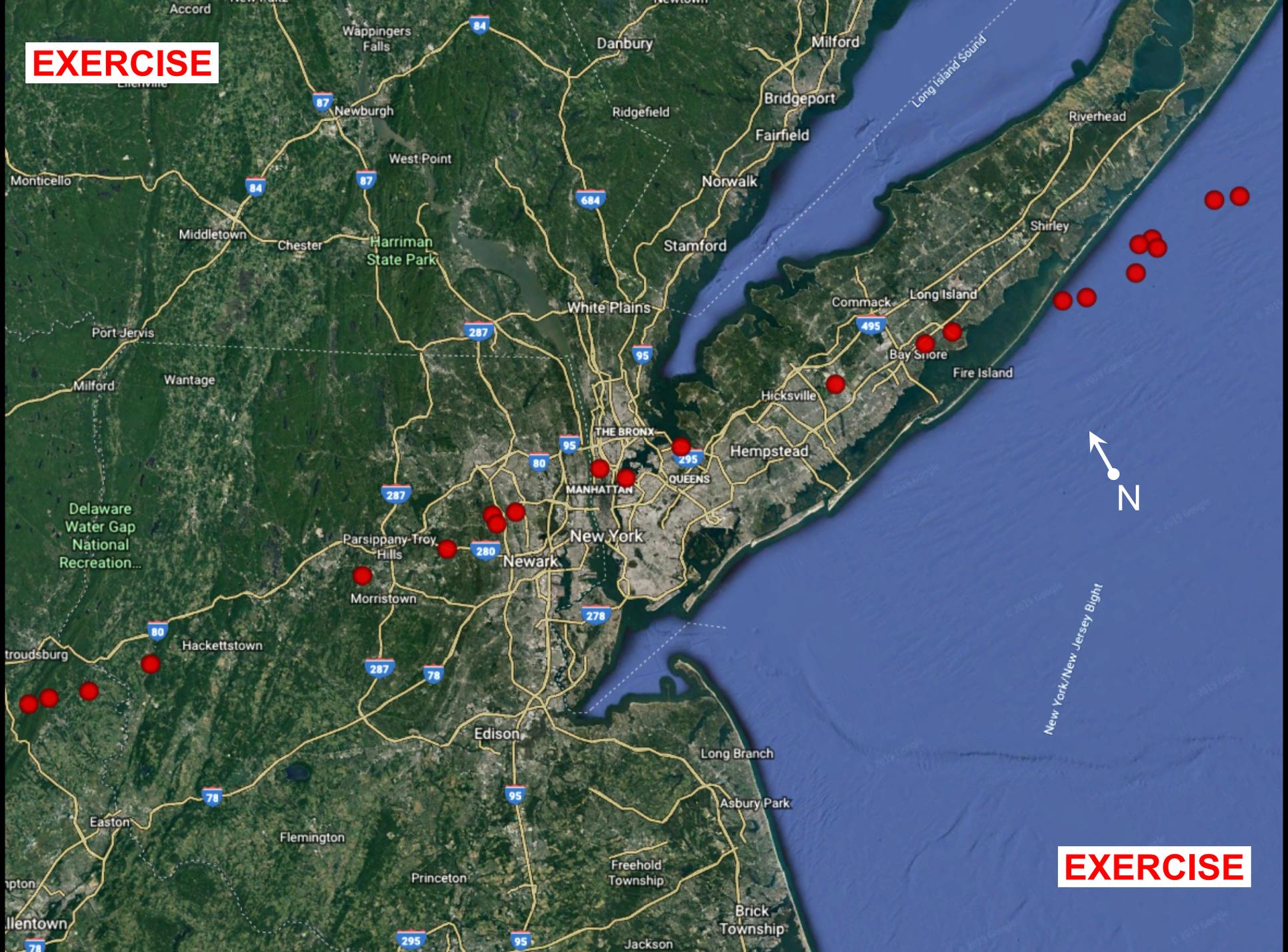
EXERCISE

EXERCISE



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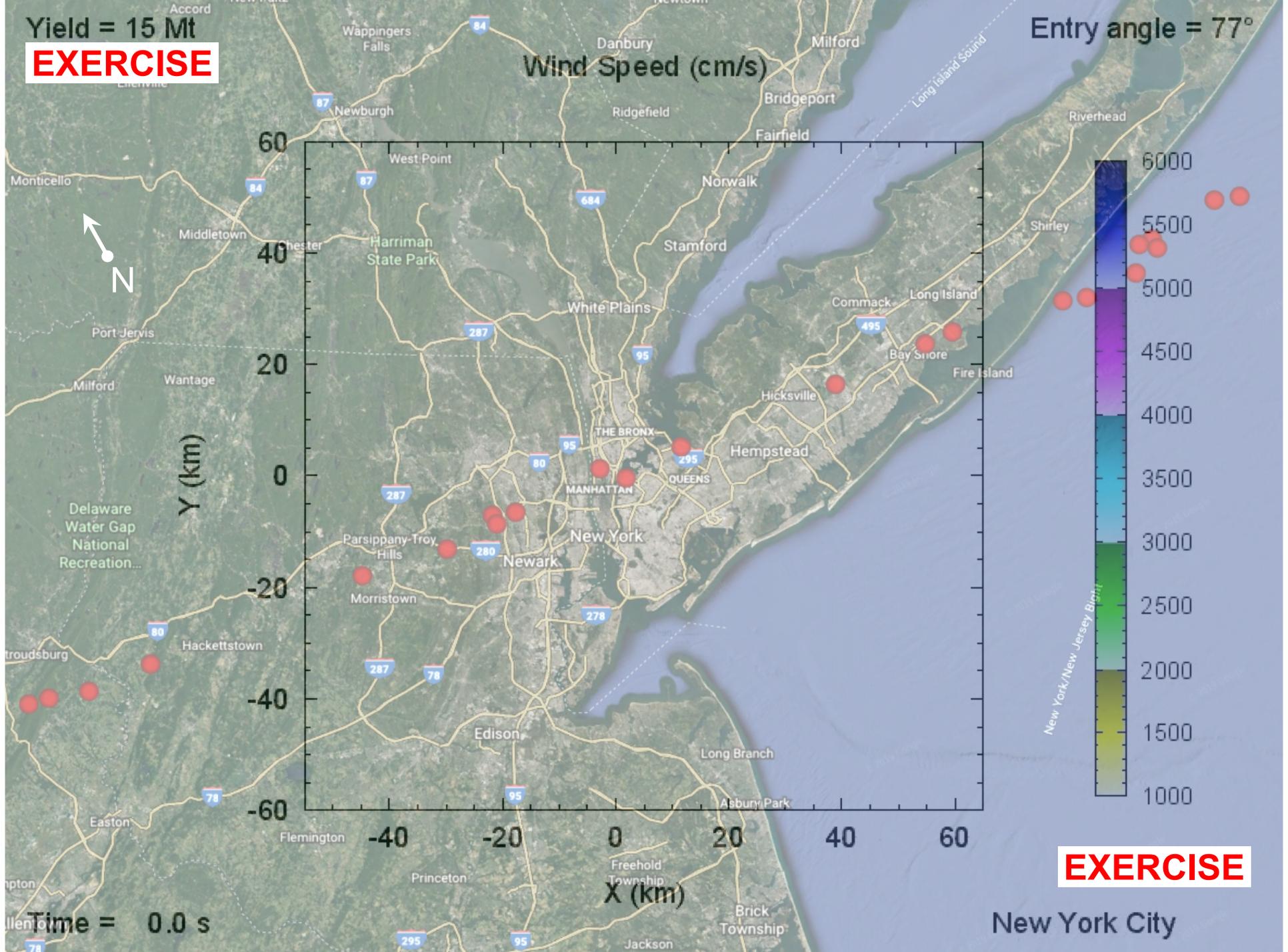
EXERCISE

Yield = 15 Mt

EXERCISE

Entry angle = 77°

Wind Speed (cm/s)



EXERCISE

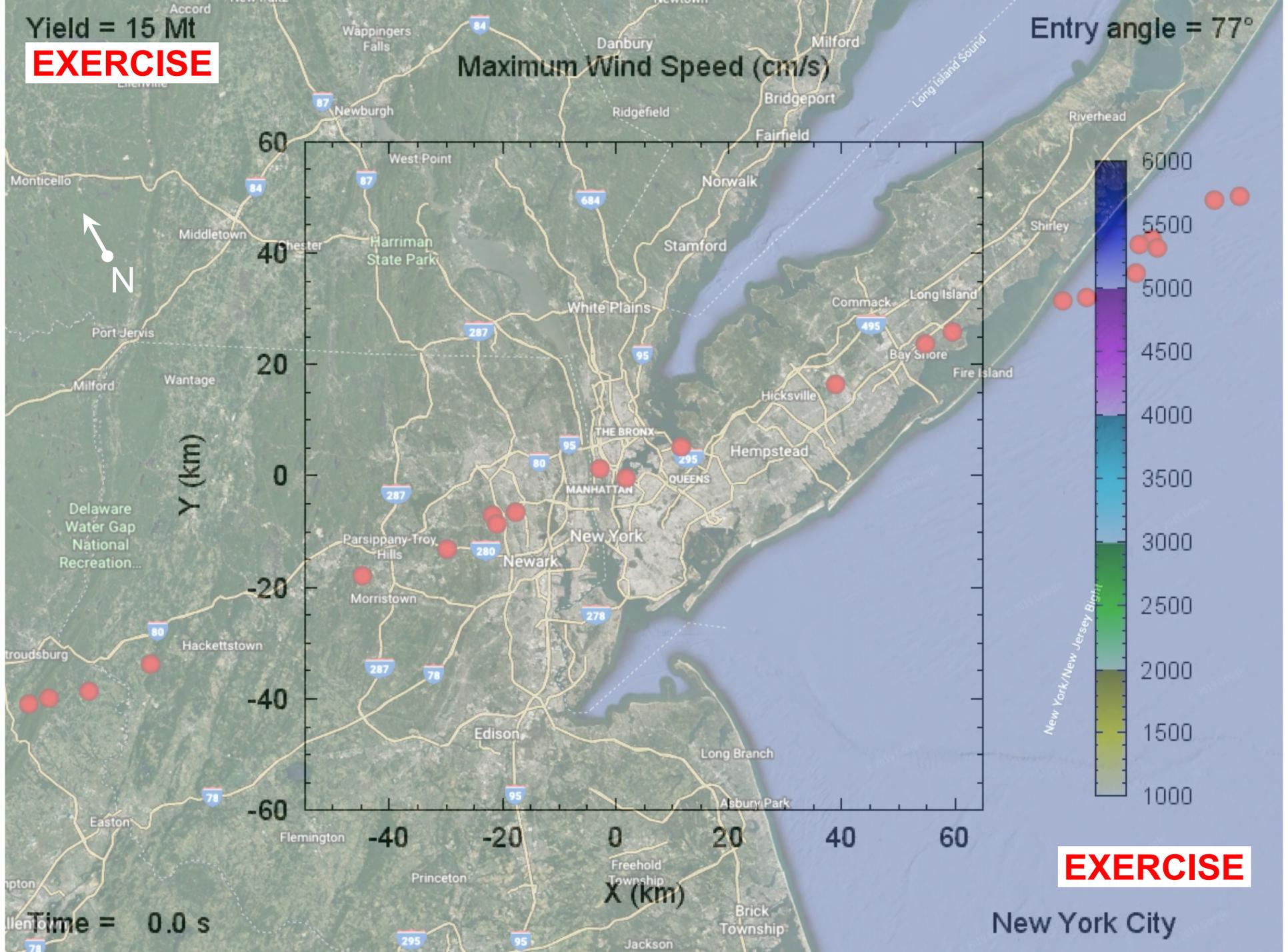
New York City

Yield = 15 Mt

EXERCISE

Entry angle = 77°

Maximum Wind Speed (cm/s)



EXERCISE

New York City

Time = 0.0 s

EXERCISE

Definition of damage zones

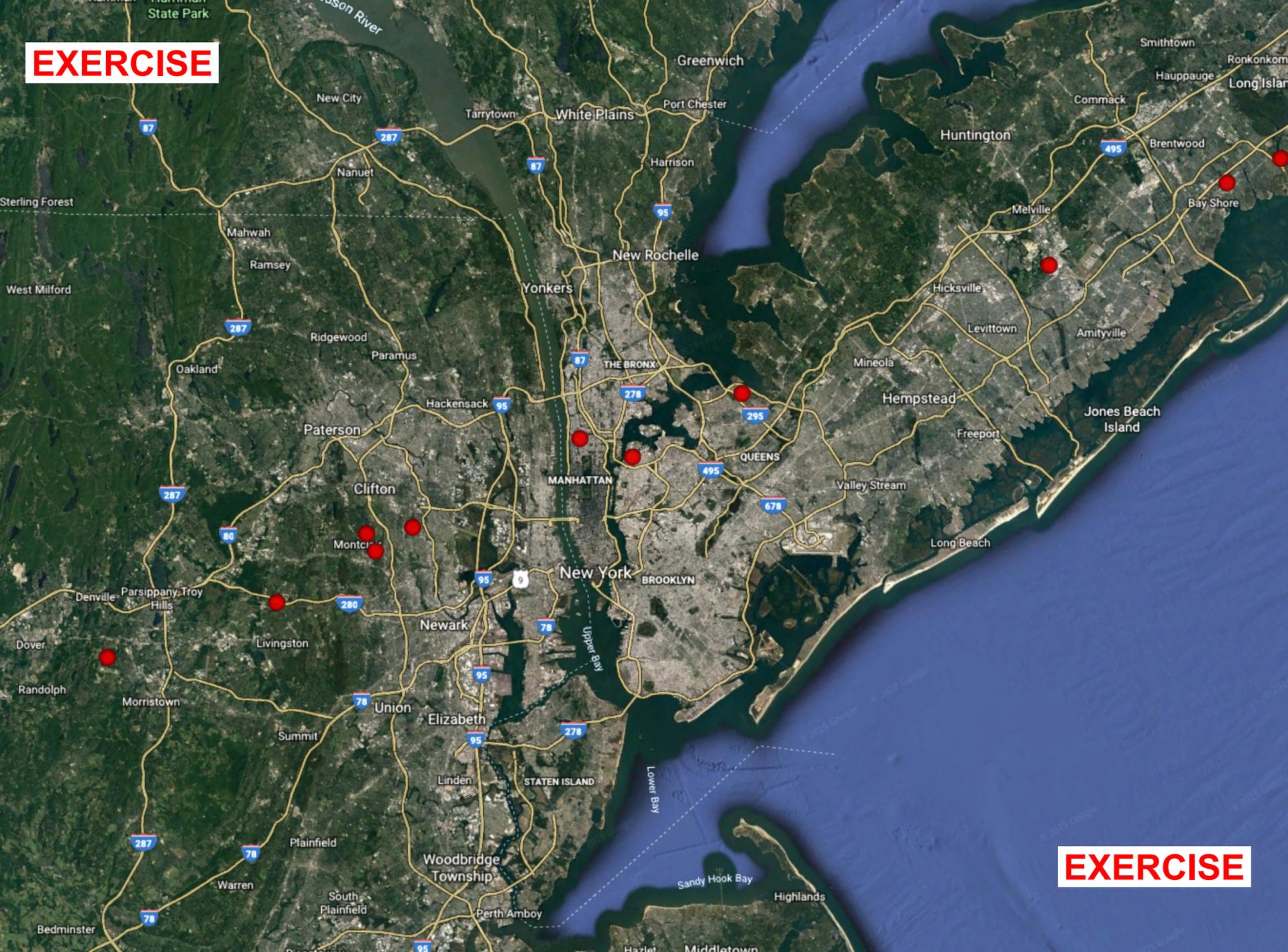
Serious: Overpressures >1 psi (window breakage, minor structural damage), thermal exposure $>2^{\text{nd}}$ degree burns

Severe: Overpressures >2 psi (doors/windows blown out, widespread structural damage), thermal exposure $>3^{\text{rd}}$ degree burns

Critical: Overpressures >4 psi (most residential structures collapse), thermal exposure $>$ clothing ignition

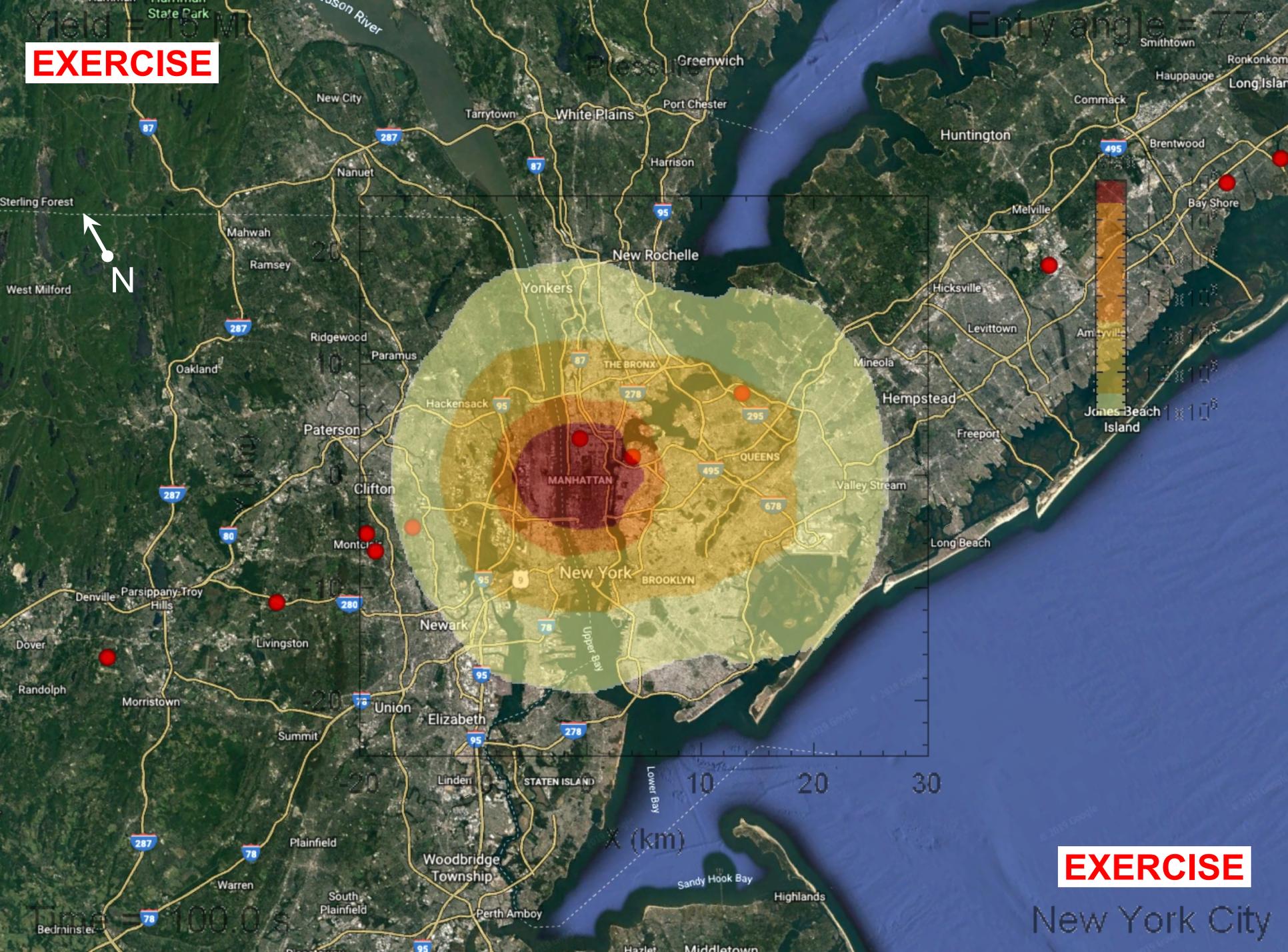
Unsurvivable: Overpressures >10 psi (complete devastation), thermal exposure $>$ roll roofing ignition / sand explodes

EXERCISE



EXERCISE

EXERCISE

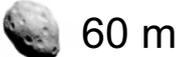


EXERCISE

New York City

EXERCISE

Asteroid 2019 PDC fragment



60 m



400 m

EXERCISE

EXERCISE



EXERCISE

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Asteroid 2019 PDC fragment



EXERCISE