Impact of a nuclear weapon detonation on infrastructure and the economy

Richard Moyes, Managing Partner, Article 36

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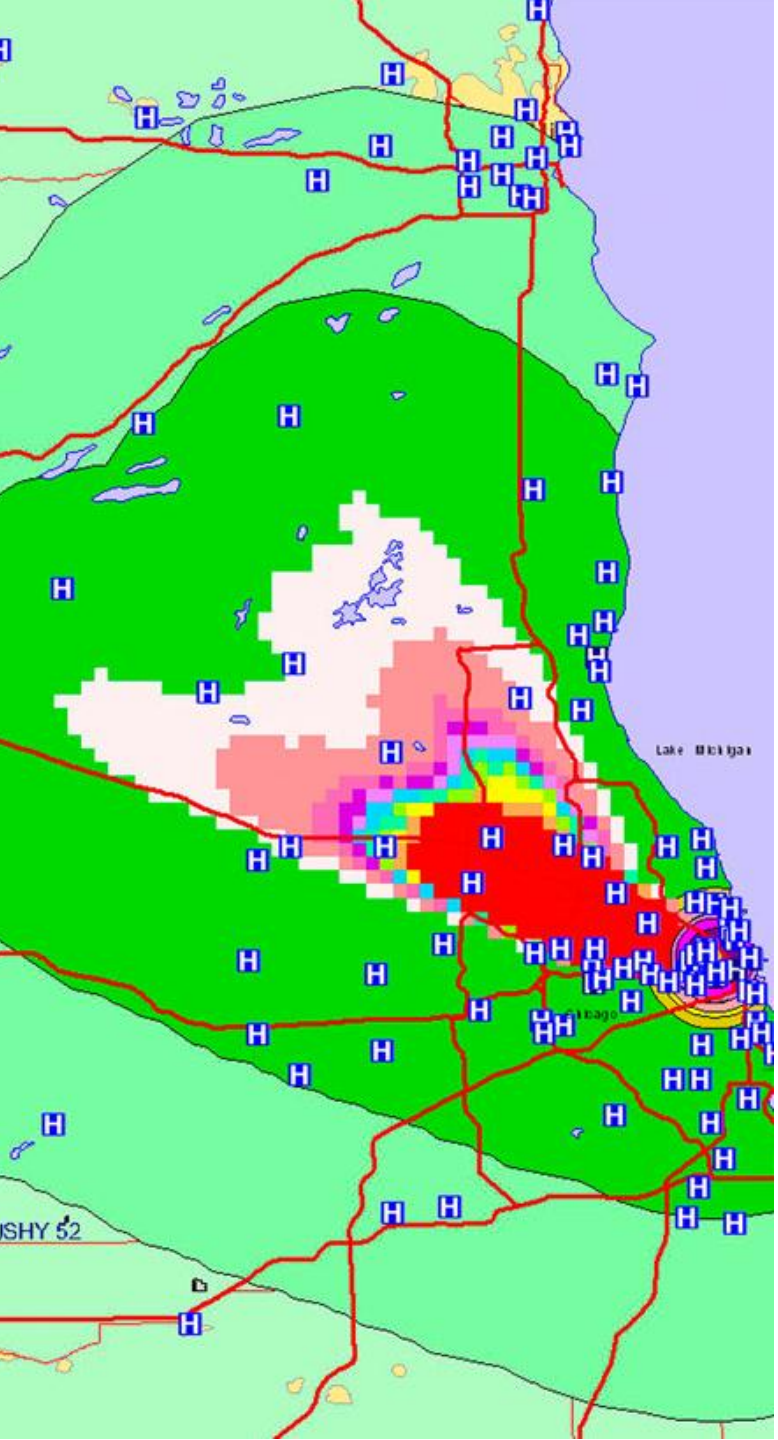

Destruction costs

- Loss of productivity of people (dead and injured).
- Damage to physical assets.
- Response costs.

Disruption costs

- Cascading infrastructure effects.
- Breakage of supply chains.

Reaction costs

- Political responses.
- Wider economic reactions.

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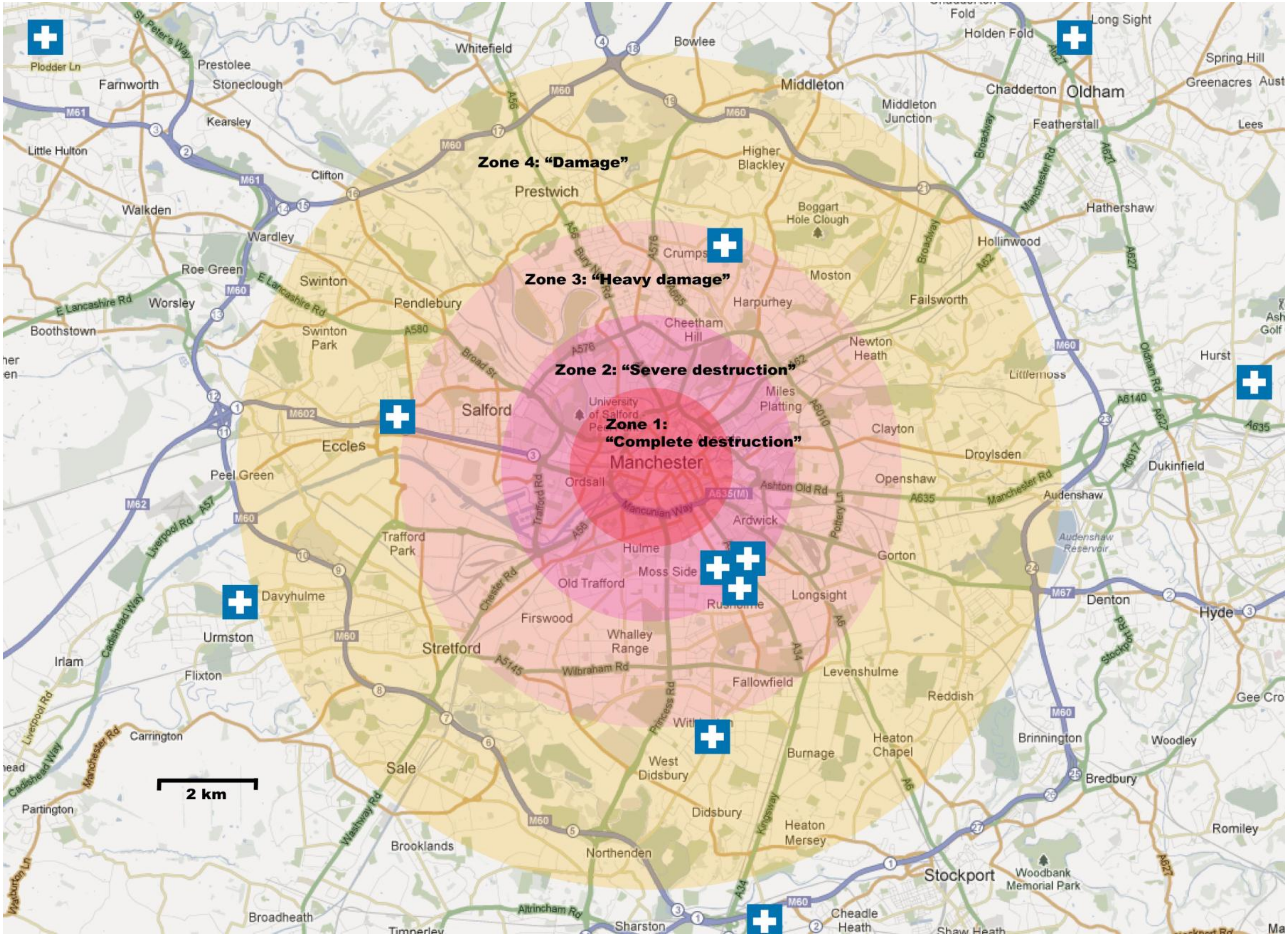
Destruction costs

- Loss of life and injury
- Damage to physical assets
- Social and economic effects
- Response costs: immediate to long-term



Zone 4: “Damage”
Zone 3: “Heavy damage”
Zone 2: “Severe destruction”
Zone 1:
“Complete destruction”
2 km
Manchester
Salford
Eccles
Prestwich
Middleton
Oldham
Stretford
Sale
Stockport
Whitefield
Farnworth
Walkden
Swinton
Pendlebury
Cheetham Hill
Crumpsall
Harpurhey
Moston
Failsworth
Newton Heath
Miles Platting
Clayton
Droylsden
Openshaw
Ardwick
Gorton
Longsight
Hulme
Moss Side
Old Trafford
Ordsall
Trafford Park
Firswood
Whalley Range
Fallowfield
Levenshulme
Reddish
Withington
West Didsbury
Didsbury
Burnage
Heaton Chapel
Heaton Mersey
Northenden
Brooklands
Urmston
Davyhulme
Flixton
Irlam
Peel Green
Denton
Hyde
Audenshaw
Dukinfield
Hollinwood
Chadderton
Brinnington
Bredbury
Romiley
Woodley
Cheadle Heath
Sharston
Broadheath
Carrington
Partington

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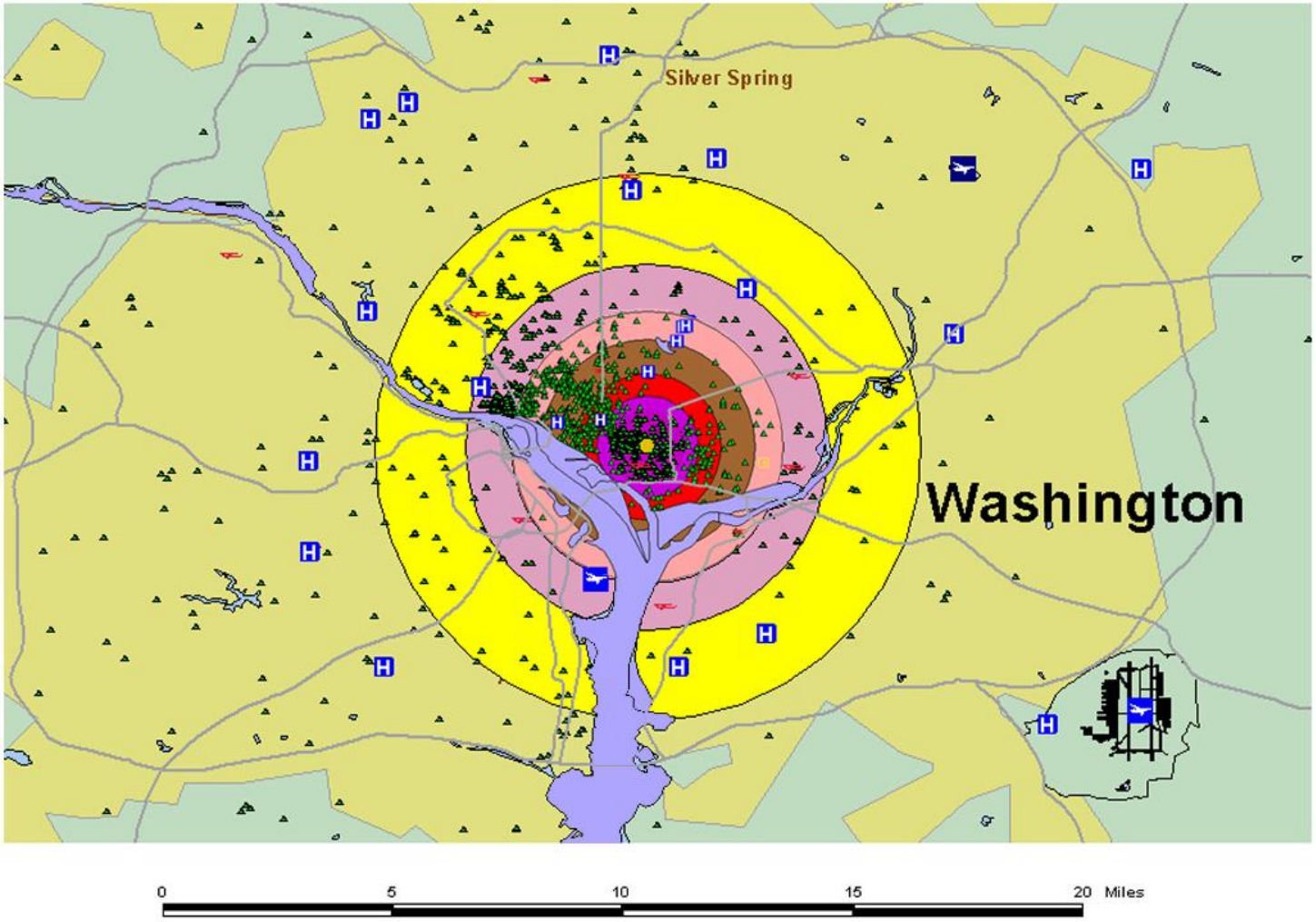
William C Bell and Cham E Dallas, Vulnerability of populations and the urban health care systems to nuclear weapon attack – examples from four American cities, in the *International Journal of Health Geographics*, 2007, 6:5

Blast Impact of a 550 Kt Surface Nuclear Detonation on Washington D.C. with Weather as of April 22nd, 2004



B. Reichmuth, S. Short and T. Wood, 2005, *Economic Consequences of a Radiological/Nuclear Attack: Cleanup Standards Significantly Affect Cost*, Pacific Northwest National Laboratory

"Because such an event could potentially spread contamination very widely, even an event in a 'remote' location could have huge economic consequences."

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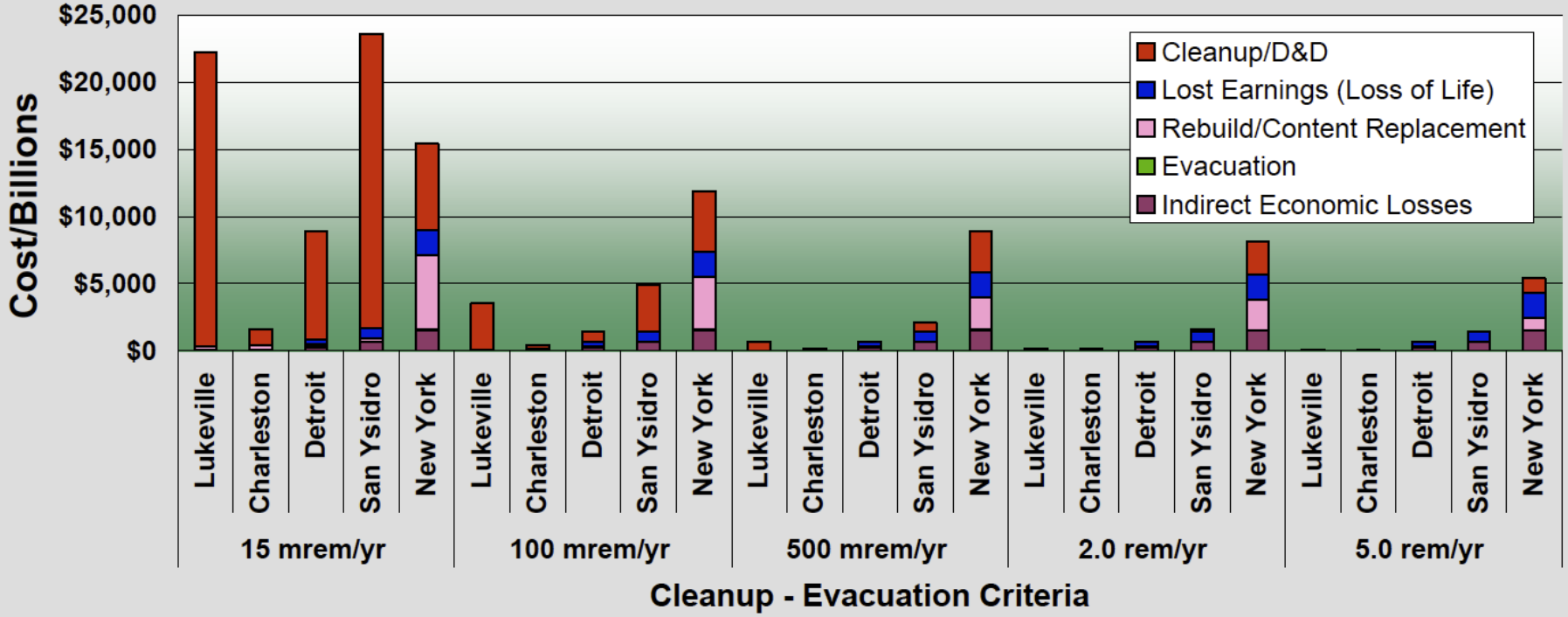
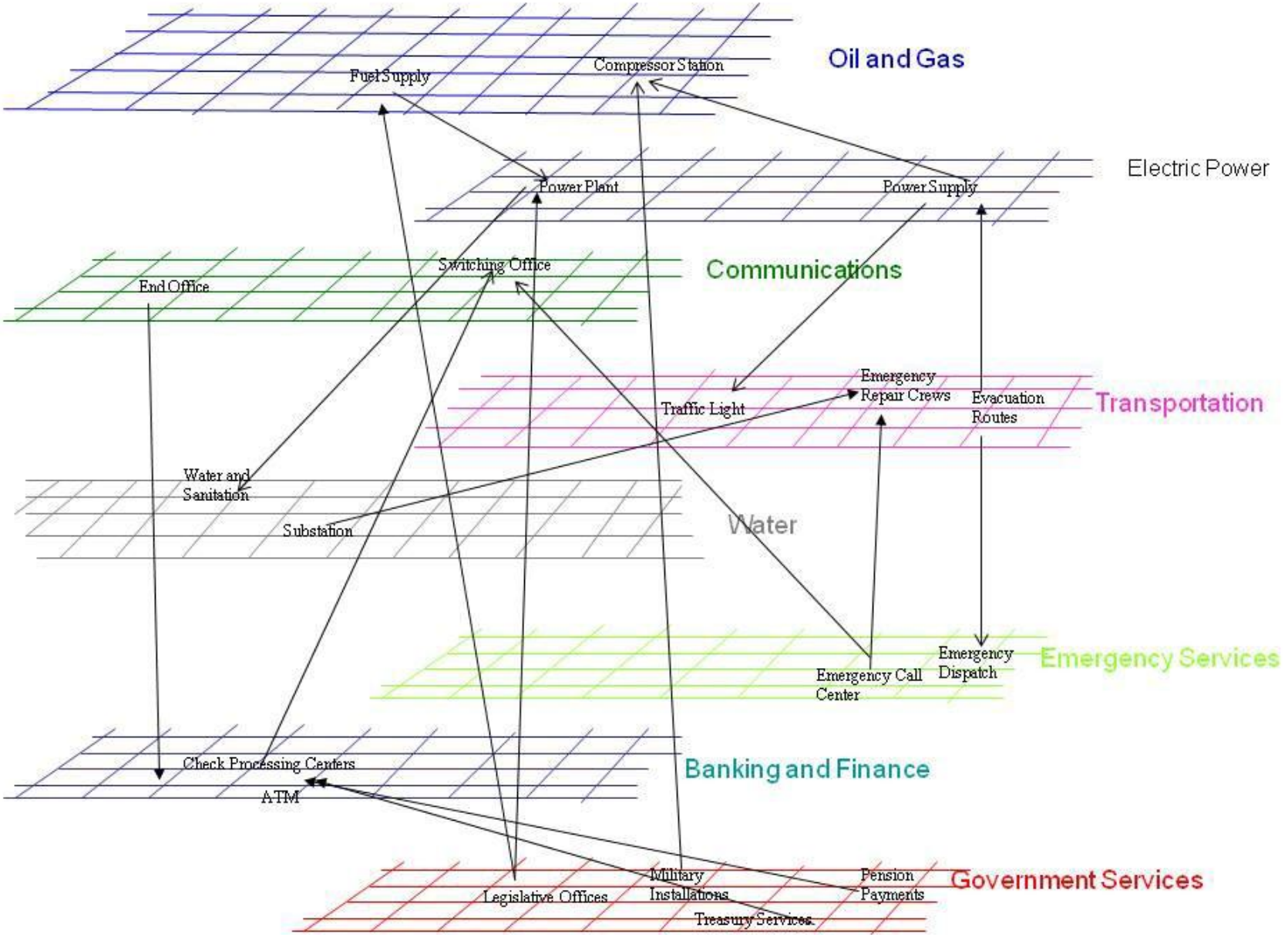
Consequence Summary - 100 kT



Disruption costs

- Cascading infrastructure effects.
- Breakage of trade and supply chains.



Oak Ridge National Laboratory, 2012.

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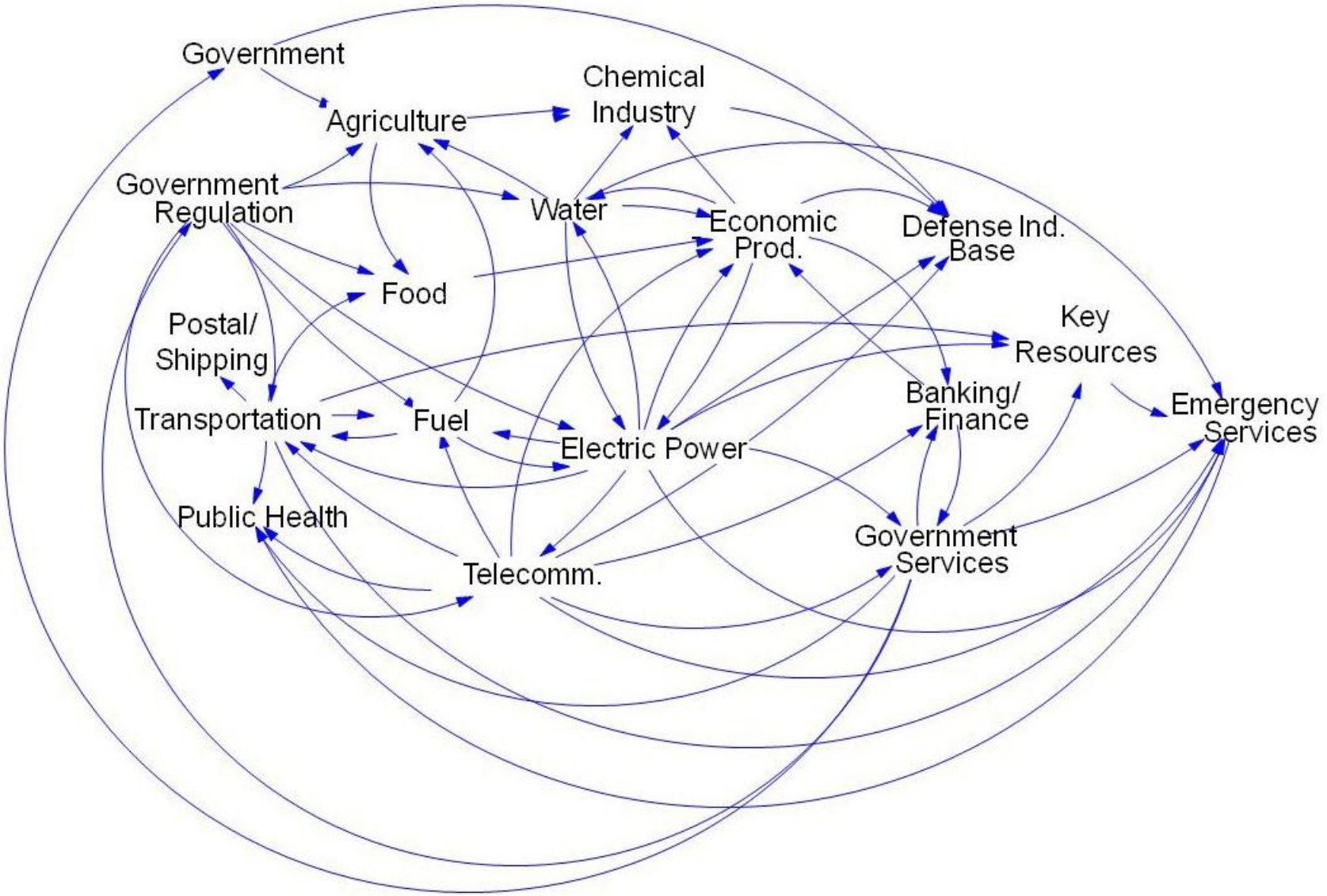


Oak Ridge National Laboratory, 2012.

‘Graham Commission’, 2008, *Report of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack*, Critical National Infrastructures

“The electromagnetic pulse generated by a high altitude nuclear explosion is one of a small number of threats that can hold our society at risk of catastrophic consequences.”

“When a nuclear explosion occurs at high altitude, the EMP signal it produces … when coupled into sensitive electronics, has the capability to produce widespread and long lasting disruption and damage to the critical infrastructures that underpin the fabric of U.S. society.”

Reaction costs

- Political responses
- Wider economic reactions

Table 2
Notional Direct Costs of a Long Beach Port Nuclear Explosion

Loss	Estimated Loss	Comments on Estimates
600,000 homes lost	$300 billion	Estimated ~ $500,000 per home
60,000 lives lost	$20 billion	Estimated ~ $350,000 in insurance benefits per life[a]
200,000 workers' compensation claims	$80 billion	Estimated ~ $400,000 per claim[b]
Port and surrounding infrastructure damage	$100 billion	Estimated
3 million people evacuated for three years	$300 billion	Estimated ~ $100 per diem per person
1 billion commercial square footage lost	$200 billion	Estimated ~ $200 per square foot[c]
Total	~ $1 trillion	

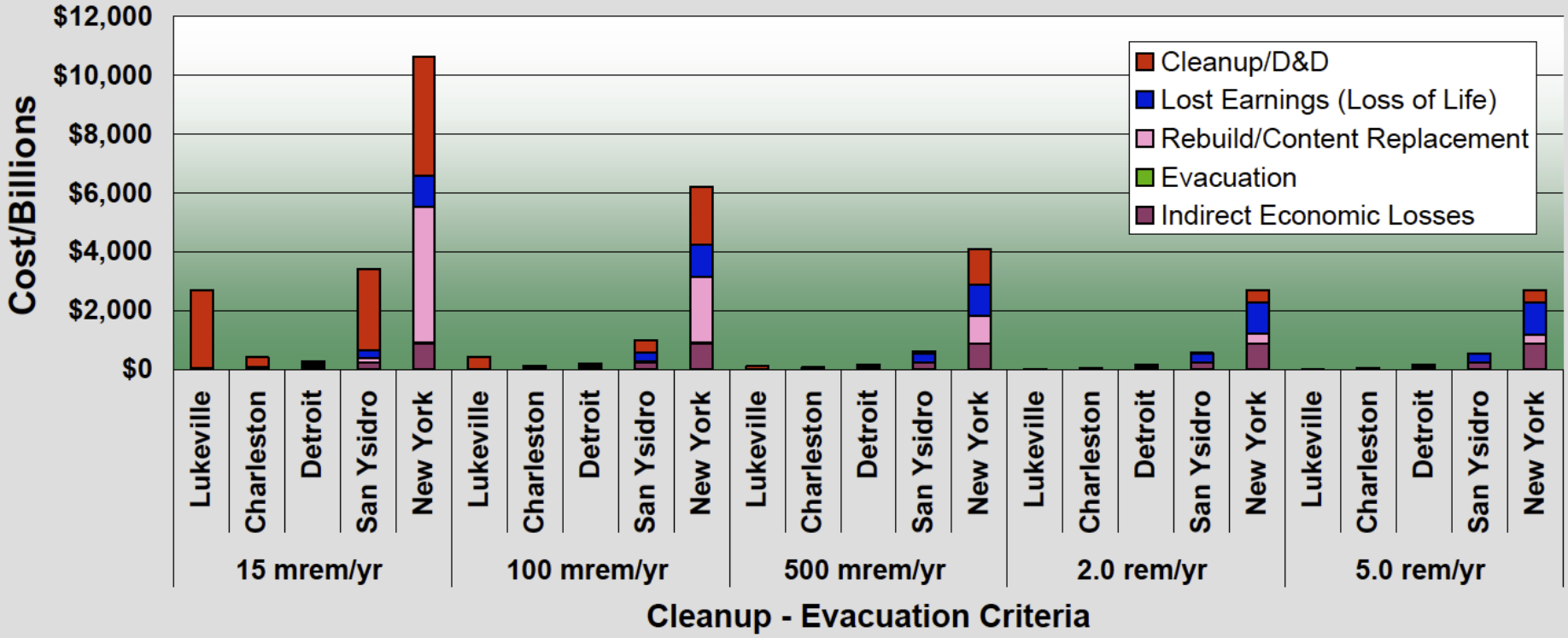
[a] This was the average life insurance payment for deaths from 9/11. If the payments from the Victims Compensation Fund were included, the value would be almost an order of magnitude larger. See Dixon and Stern, 2004.

[b] Estimated average claim from 9/11. See Dixon and Stern, 2004.

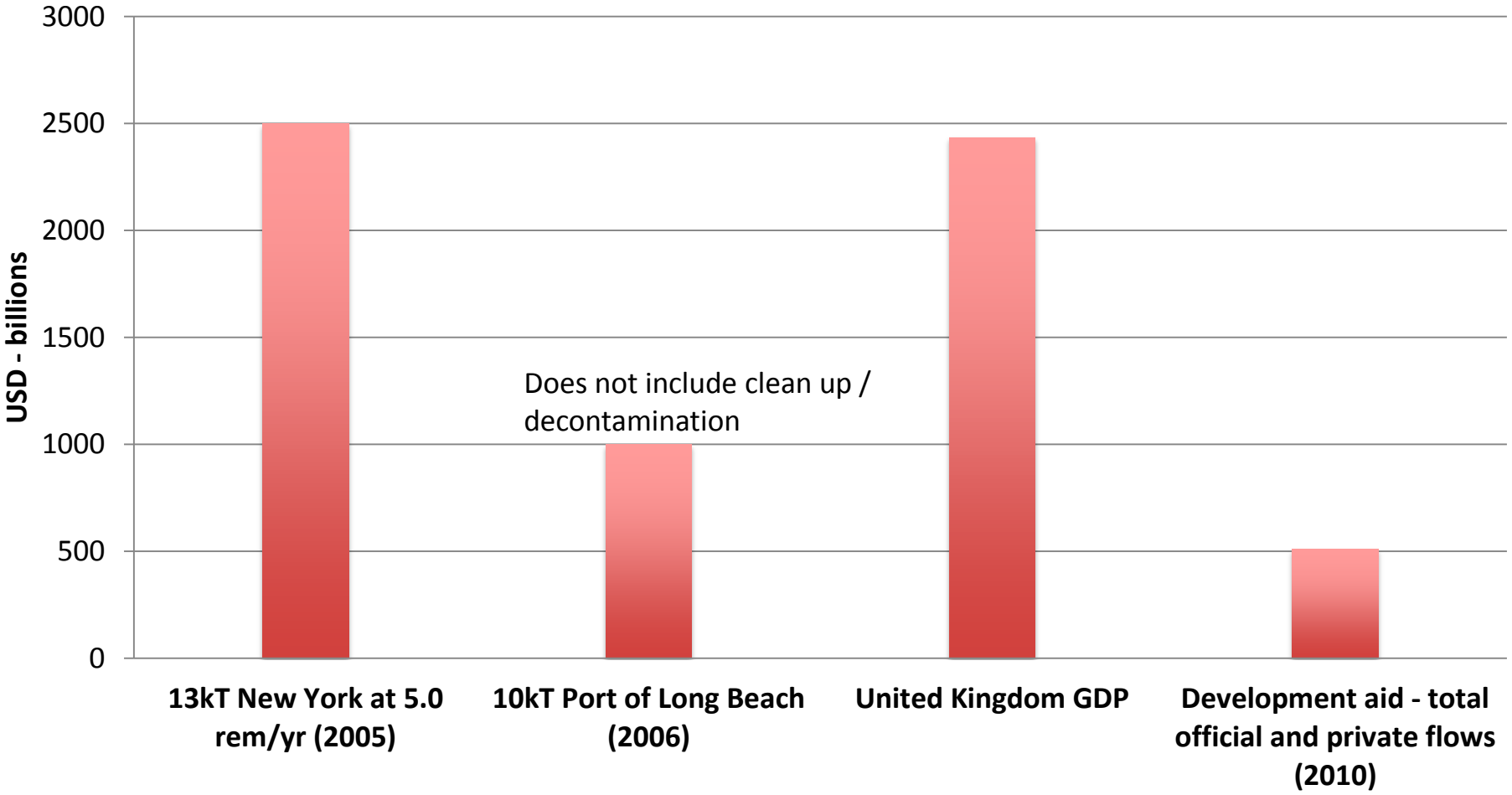
[c] Estimates of commercial construction costs in southern California from Charles Meade, Jonathan Kulick, and Richard Hillestad, *Estimating the Compliance Costs for California SB1953,* Oakland, Calif.: California HealthCare Foundation, 2002. Online at http://www.calhealth.org/public/press/Article%5C103%5CFinal%20RAND%20Report.pdf (as of May 18, 2006).

From Charles Meade and Roger Molander, *Considering the Effects of a Catastrophic Terrorist Attack*, RAND, 2006.

Consequence Summary - 13 kT



Comparison of cost estimates from US studies



Nuclear weapon impact cost evaluations vs. comparative numbers

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Conclusions

Economic impacts would be:

- Severe
- Long-lasting
- Far-reaching

And specific outcomes are highly unpredictable.

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