



DIVISION OF
CAPITAL ASSET
MANAGEMENT &
MAINTENANCE



DCAMM SRMP: September TAG Meeting

09 | 27 | 2016 revised 10/07/16

Today's Presenters

Frank Ricciardi- Weston & Sampson

Julie Eaton – Weston & Sampson (by phone)

Robert Almy – Weston & Sampson

Nathalie Beauvais – Kleinfelder

Indrani Ghosh - Kleinfelder



Project Number: **DCP 1607 HS1**

Project Name: **DCAMM STATEWIDE RESILIENCE MASTER PLAN (SRMP)**

In partnership with: **Massachusetts Emergency Management Agency (MEMA)**

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Objectives for Meeting

1. Achieve Consensus on Phase 1 Results
 - Discuss criticality evaluation and priority facilities list
 - Review climate projections
2. Look forward, what is next
 - Phase 2: Risk and Vulnerability Assessment
 - Selection of Facilities for Table Top exercises
 - Phase 3: Prepare Adaptation Guidelines



Agenda

1. Introductions
2. Phase 1 Criticality Analysis
 - Process: Screening, Survey and Worksheet
 - Results and Discussion
3. Kickoff of Phase 2: Risk and Vulnerability Assessment
 - Climate Change Projections
 - RVA Methodology
 - Initial Mapping Results
 - Discussion
4. Additional Discussion/Related Initiatives
5. Next Steps



Goal and Scope of SRMP Project

SRMP Project Goal Considerations

- Mission Specific Goals
- Agency Goals for Service Continuity
- Goals for Resilient Design Guidelines

Review the Massachusetts Division of Capital Asset Management and Maintenance (DCAMM) portfolio's vulnerability to climate change impacts and develop a set of design guidelines for DCAMM facilities which encourage climate adaptation and resilience.

Project Scope

PHASE I: Benchmarking & Criticality Analysis

PHASE II: Risk and Vulnerability Analysis & Pilot Site Workshops

PHASE III: Compilation and Distribution of Guidelines



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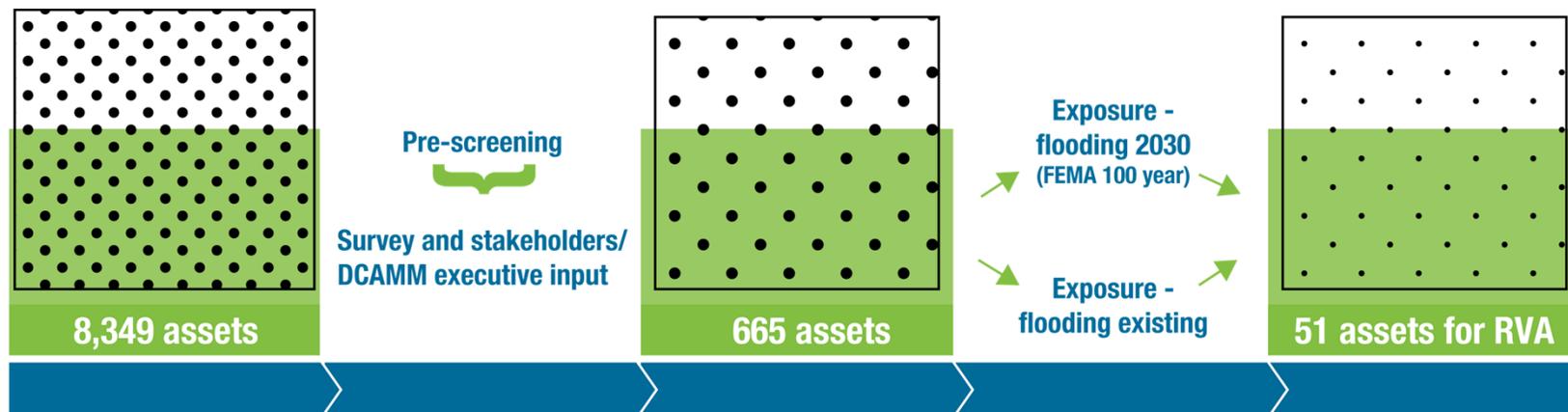
Phase 1: Portfolio Screening and Criticality Assessment

GOAL: IDENTIFY COMMONWEALTH'S MOST CRITICAL ASSETS FOR RVA

- Criticality Definition
- Step 1: Portfolio Screening
- Step 2: Feedback received
 - Survey
 - Worksheet
- Step 3 Results: list of priority facilities for RVA



Approach to Portfolio Screening and Criticality Assessment



Criticality

Scope

Geographic area and population affected by loss of facility

Time

Length of time a facility can be inoperable without consequences

Severity

Public Health and Safety

Economic Effect

Environmental Effect

Interdependency

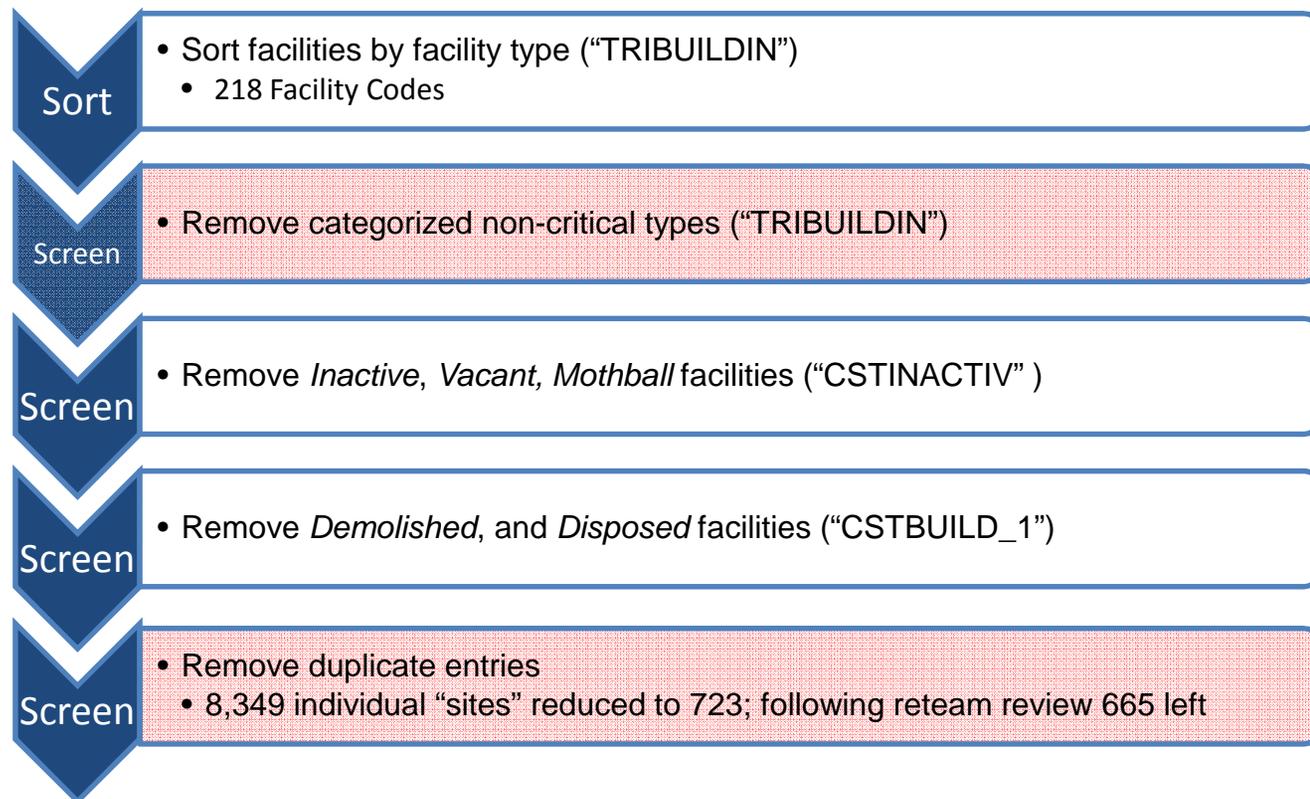
Political Effect

Psychological Effect



Step 1: Portfolio Screening

8349 Assets Entered in DCAMM CAMIS Database



665 Assets remain after screen



Feedback Received

1. Survey

- Gather facility information not included in the CAMIS data base
- 106 responses allowed a qualitative understanding of a range of facilities

2. Worksheet

- Solicited specific information regarding criticality
- ReTeam and selected facility managers
- Criticality factor calculated by a formula from responses
- Criticality factors applied to other, similar facilities (such as courthouses)



Critical Facilities

- Emergency Response
 - MEMA, Police, Sheriff
- Corrections
- Health and Human Services
- Operational (reservoirs)
- Judicial/Courts
- Higher Education



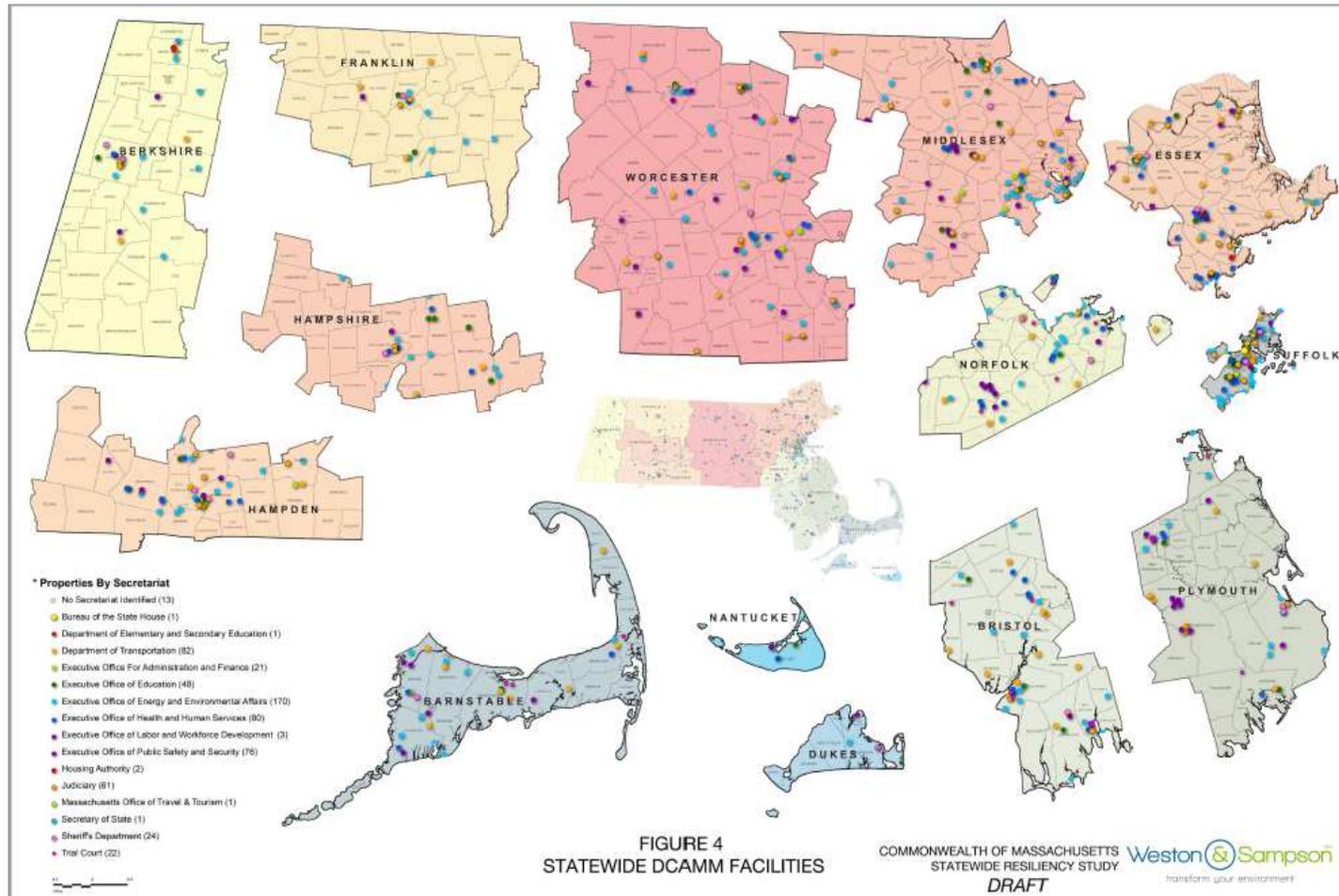
Critical Facilities

Site Code	Facility Name	Final Criticality Score	Criteria based on DCAMM Input			Rationale/Comments
			Critical to State Functions	Current or Potential (2030) Climate Vulnerabilities	Under Other Agency's Purview	
BSB01	McCormack Building	4.4	X			Based on ReTeam criticality worksheet
UMM01	State Laboratory Institute	4.4	X			AKA Hinton Labs
POL09	General Headquarters Compound	4.4	X	X		Criticality score based on SRMP team opinion
WSE_MEMAB	MEMA Bunker at Framingham	4.4	X			Criticality score based on SRMP team opinion
ITD00	ITD Data Center At Springfield	4.2	X	X		
BSB00	Hurley Building	4.2	X			Based on ReTeam criticality worksheet
DCP27	Massachusetts Information Technology Center	4.2	X			Based on ReTeam criticality worksheet
BSB03	State House	4.0	X			Based on ReTeam criticality worksheet
DCP15	Springfield State Office - Dwight Street	4.0	X	X		Criticality score based on McCormack building
WSE_HOOS	Hoosic River Flood Control	4.0	X	X	X	Under DCR
MDC18	Charles River Dam	3.9	X		X	Based on ReTeam criticality worksheet; Under DCR
CHE00	Soldiers Home - Chelsea	3.9	X			
SSA00	Salem State University	3.9				Based on ReTeam criticality worksheet
MDCA8	Amelia Earhart Dam	3.9	X		X	Based on ReTeam criticality worksheet; Under DCR
STC00	Springfield Tech Community College	3.9				Based on ReTeam criticality worksheet
GCC00	Greenfield Community College	3.9		X		Based on ReTeam criticality worksheet
MMA00	Massachusetts Maritime Academy	3.8		X		Based on ReTeam criticality worksheet
LOW02	University Of Massachusetts Lowell	3.7				Based on ReTeam criticality worksheet
NSC01	North Shore Community College - Lynn	3.6				Based on ReTeam criticality worksheet
MWC00	Mount Wachusett Community College	3.6				Based on ReTeam criticality worksheet
MCC00	Middlesex Community College	3.5				Based on ReTeam criticality worksheet

Criticality out of a maximum score of 6



Critical Facilities Map



Sources: Mass GIS, CAMIS database

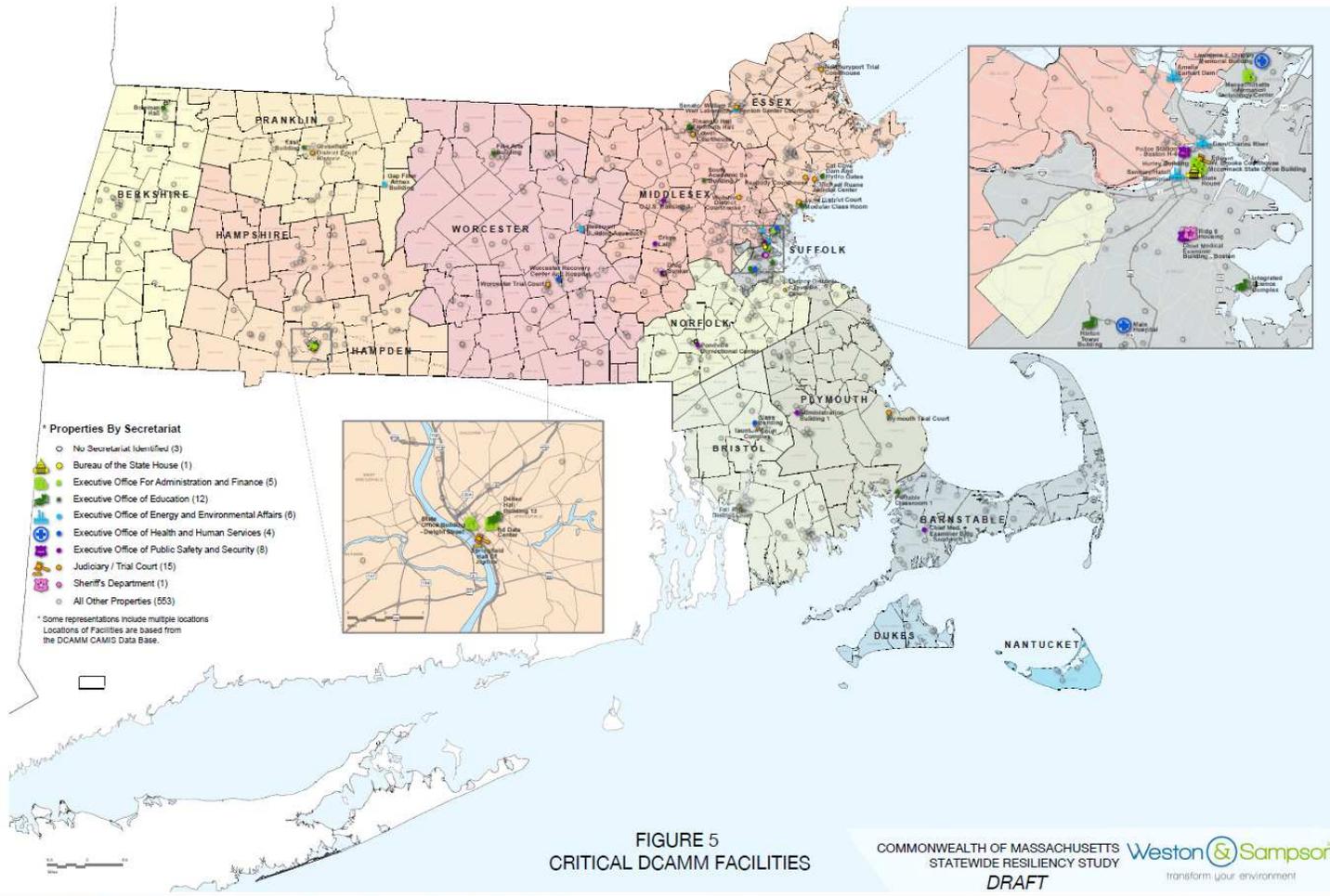


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Critical Facilities Map – 51 Critical Facilities



Sources: Mass GIS, CAMIS database



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Phase 1 Part II: Basis for the Risk and Vulnerability Assessment

1. Climate Change Projections as Risk Factors
 - Develop and confirm scenario projections
2. Risk and Vulnerability Methodology
 - Develop and confirm approach
 - Confirm outcomes support development of Adaptation Guidelines



Climate Change Projections

1. Primary Changes/Parameters
 - Sea Level Rise and Storm Surge (coastal)
 - Precipitation and Flooding (inland)
 - Temperature
2. Secondary Changes/Parameters
 - Wind, Drought, Fire, Landslide, Winter Storms
3. Time Horizons
 - 2030 and 2070
4. Use of Existing Climate Change Information



Climate Scenarios

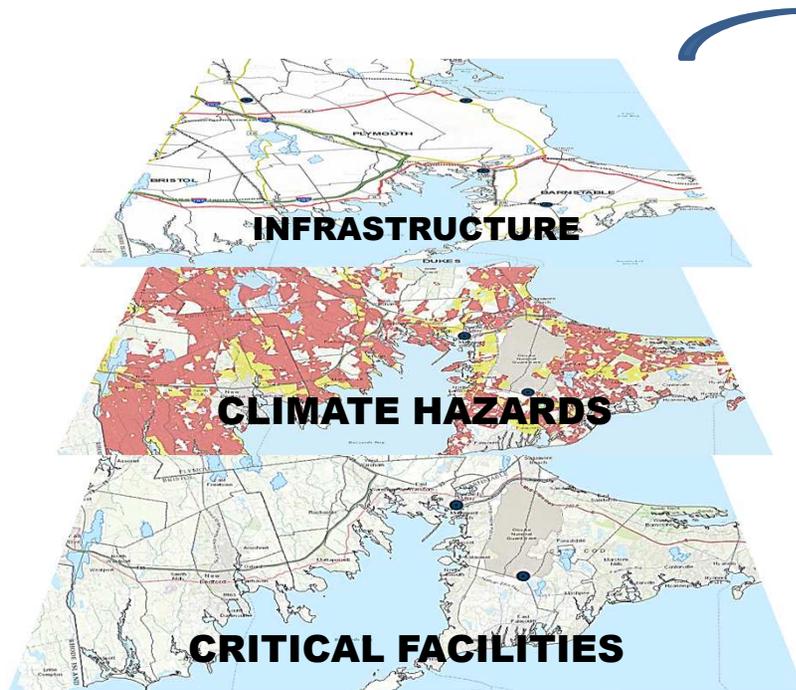
Climate Parameters		Existing		2030		2070	
		Data	Map	Data	Map	Data	Map
Sea Level Rise/SS		NA	NA	SLOSH CAT1 & BH-FRM data in avail. locations	✓	SLOSH CAT2 & BH-FRM data in avail. locations	✓
Precipitation		NA	NA	FEMA 100 Year / Argonne Lab	✓	FEMA 500 Year / Argonne Lab	✓
Temperature (Average number of heat waves per decade or Annual Avg. Days >90)		NA	NA	Argonne Lab (Digitized NCA data as alternative)	✓	Argonne Lab (Digitized NCA data as alternative)	✓
Extreme Events	Winter Storms	MEMA	✓	NA	NA	NA	NA
	Fire	MEMA	✓	NA	NA	NA	NA
	Drought	US Drought Monitor Map for MA	✓	NA	NA	NA	NA
	Landslide	MEMA	✓	NA	NA	NA	NA
	Earthquake*	MEMA	✓	NA	NA	NA	NA
	Wind	MEMA	✓	NA	NA	NA	NA

* Recommendation is not to include earthquake as there are no proven link between CC and earthquake incidence



RISK AND VULNERABILITY METHODOLOGY

- Methodology Proposed
- Purpose and Outcomes of RVA



VULNERABILITY ASSESSMENT

RISK RANKING

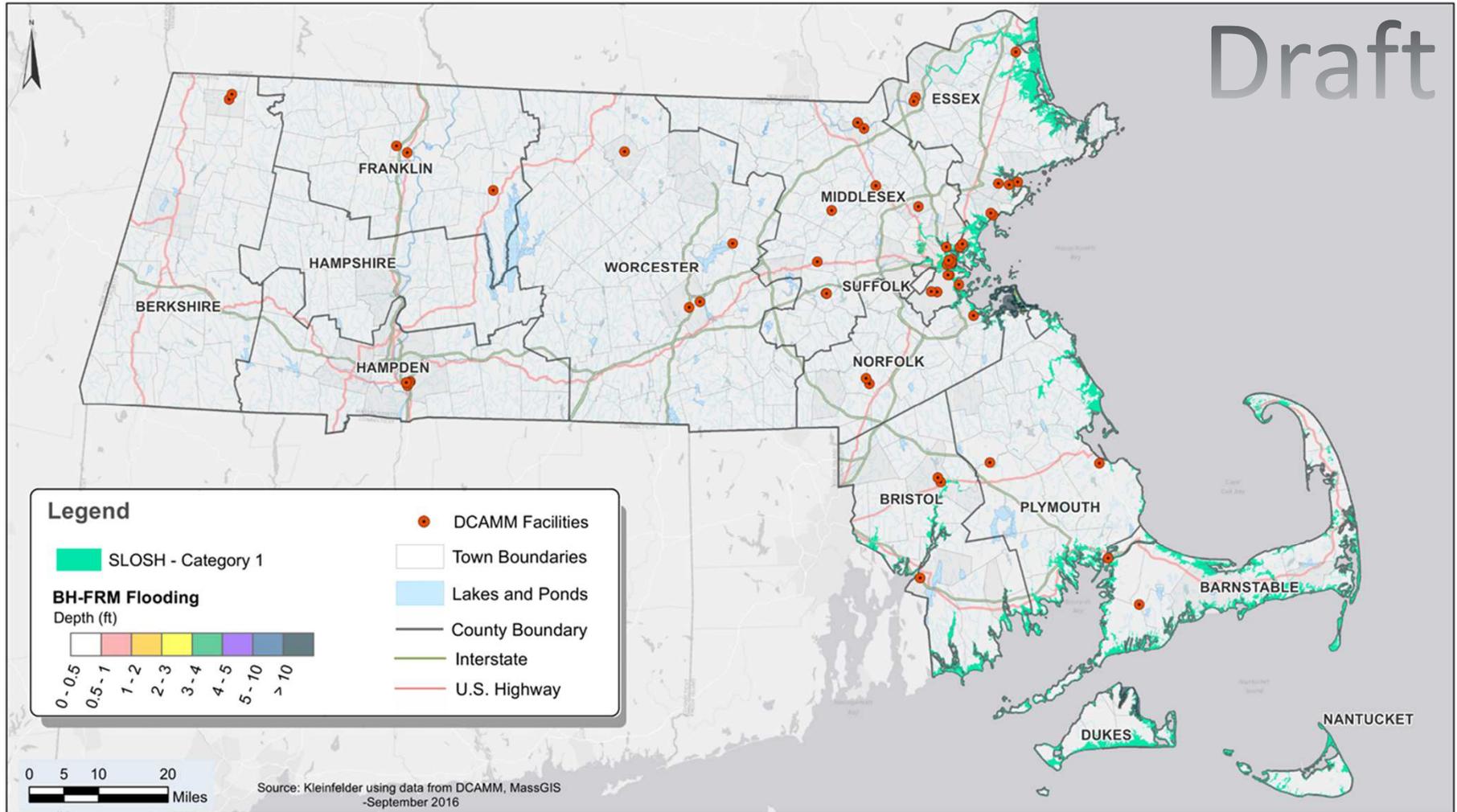
Consequence of Impact	High	R2	R3	R5	R5 High Risk
	Medium	R1 Low Risk	R2	R3	R4 Areas
	Low	R1 Areas	R1	R2	R2
		Low	Medium	High	Very High
		"Probability" of occurrence of impact →			

SELECT 3 PILOT SITES



2030 Sea Level Rise / Storm Surge Flood Zone

Draft



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016

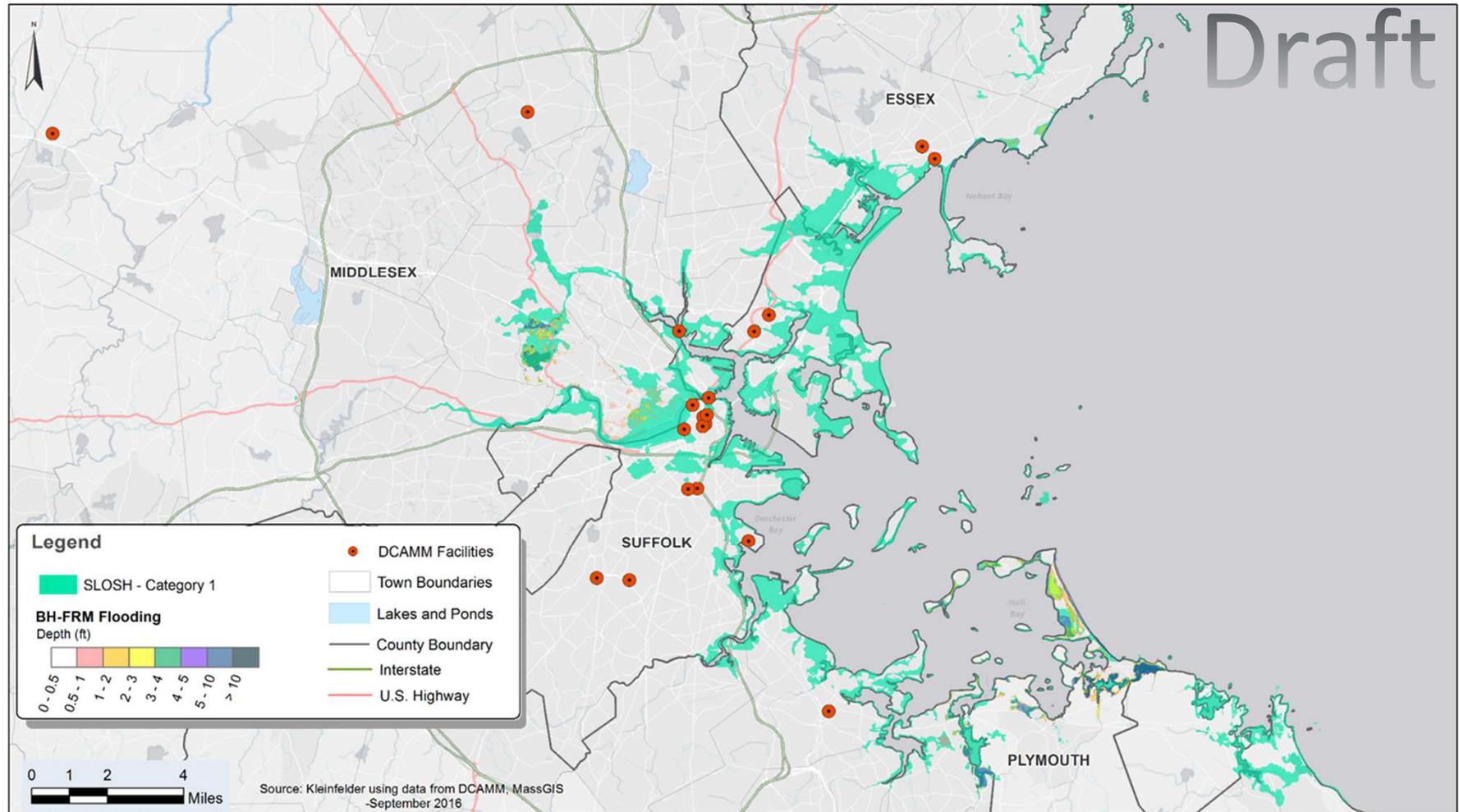


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2030 Sea Level Rise / Storm Surge Flood Zone - Boston



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016

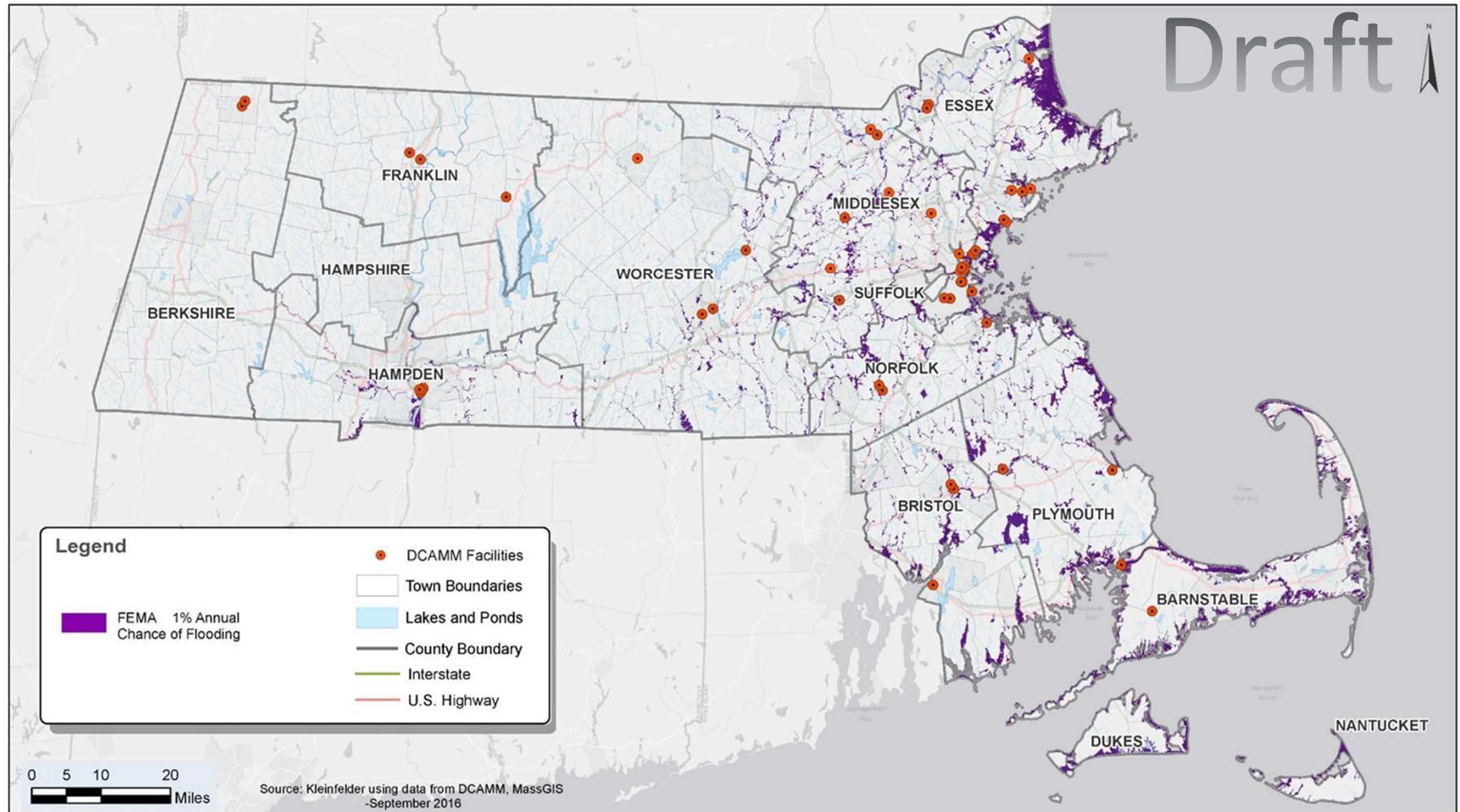


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SEPTEMBER PRESENTATION

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2030 Precipitation: FEMA 100 yr. Flood Zone



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016

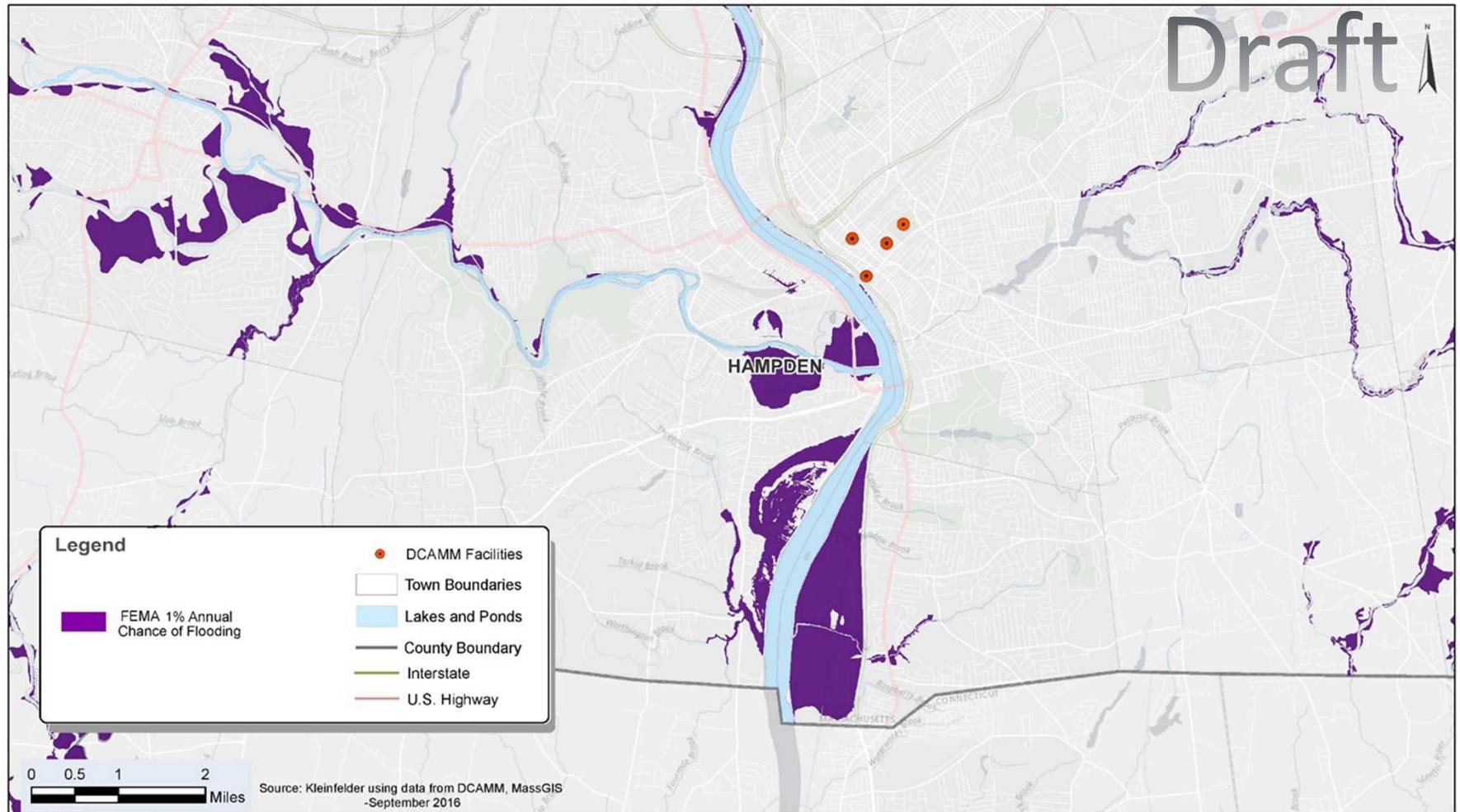


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2030 Precipitation: FEMA 100 yr. Flood Zone – Springfield, MA



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016

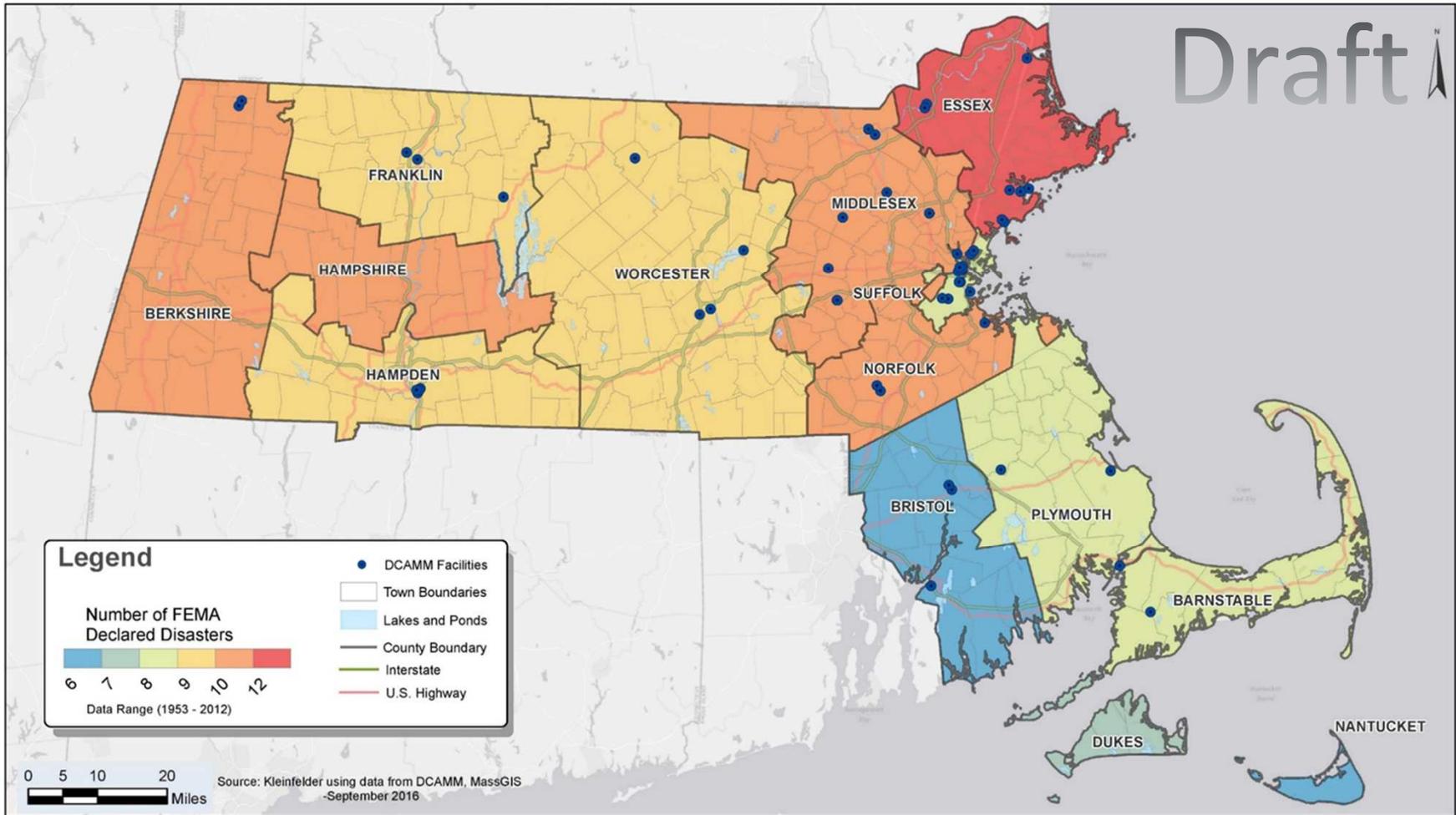


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Winter Storm Existing



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016

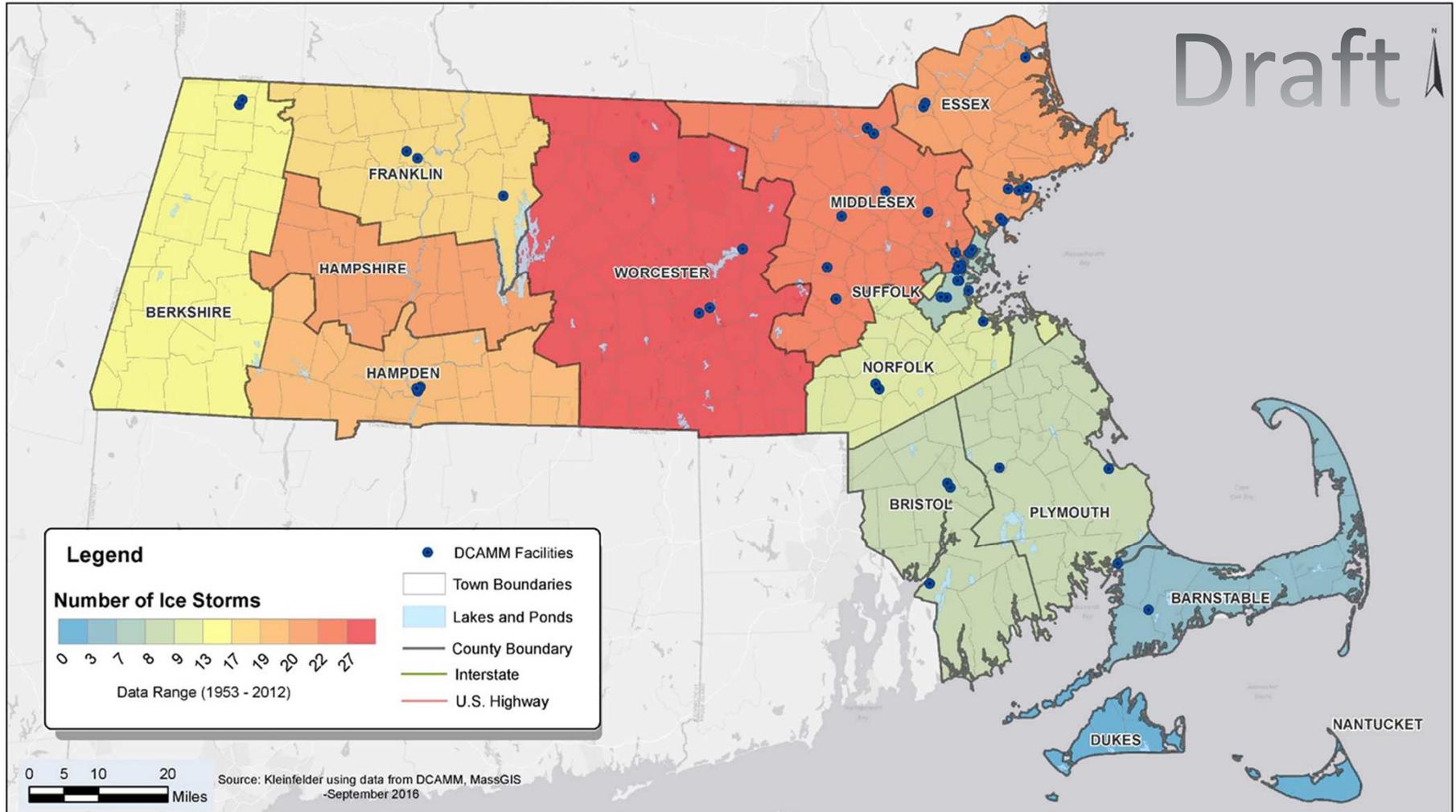


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Ice Storm Existing



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016



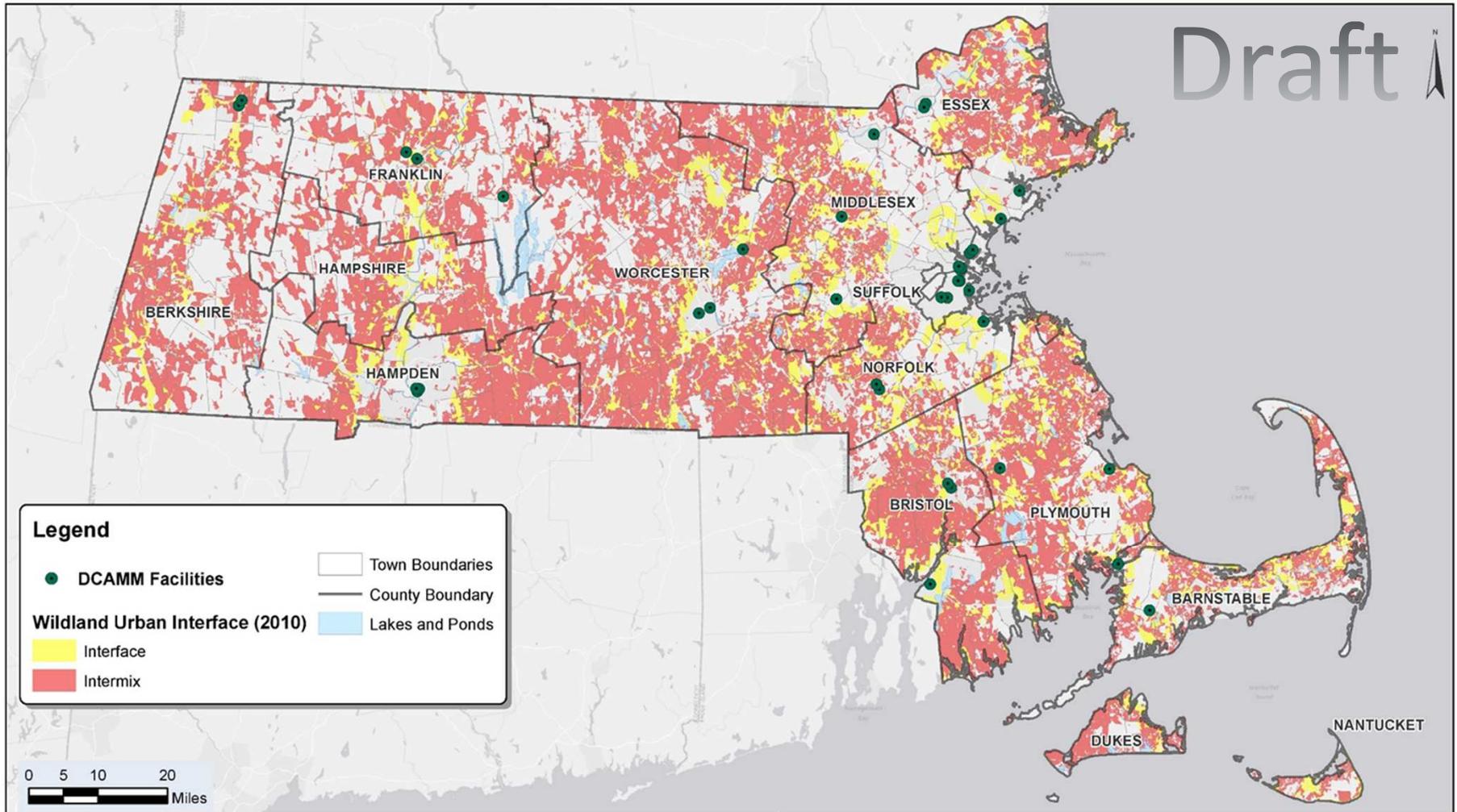
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Wildfire Existing

Draft



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016

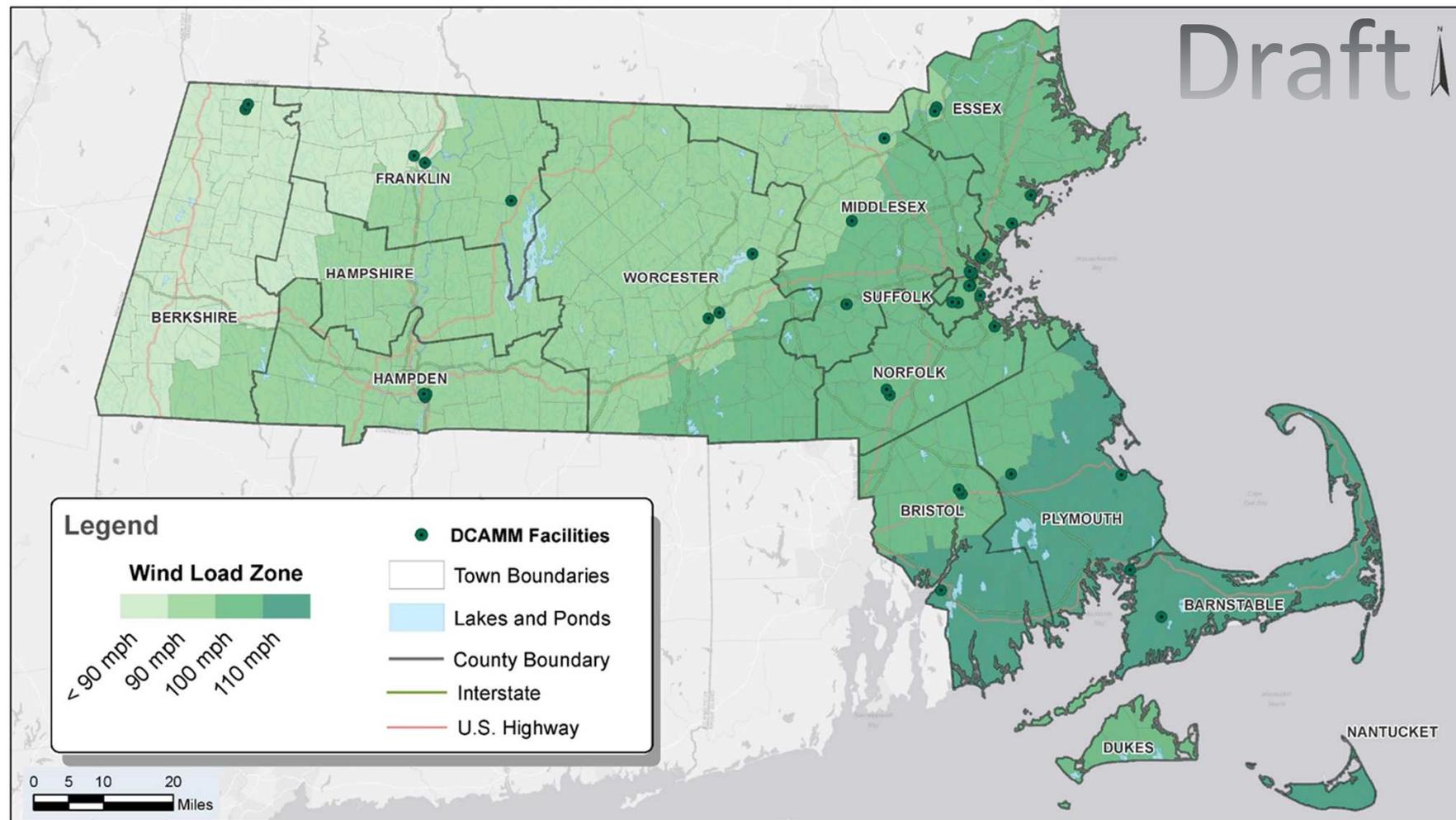


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Wind Load Zone Existing



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016



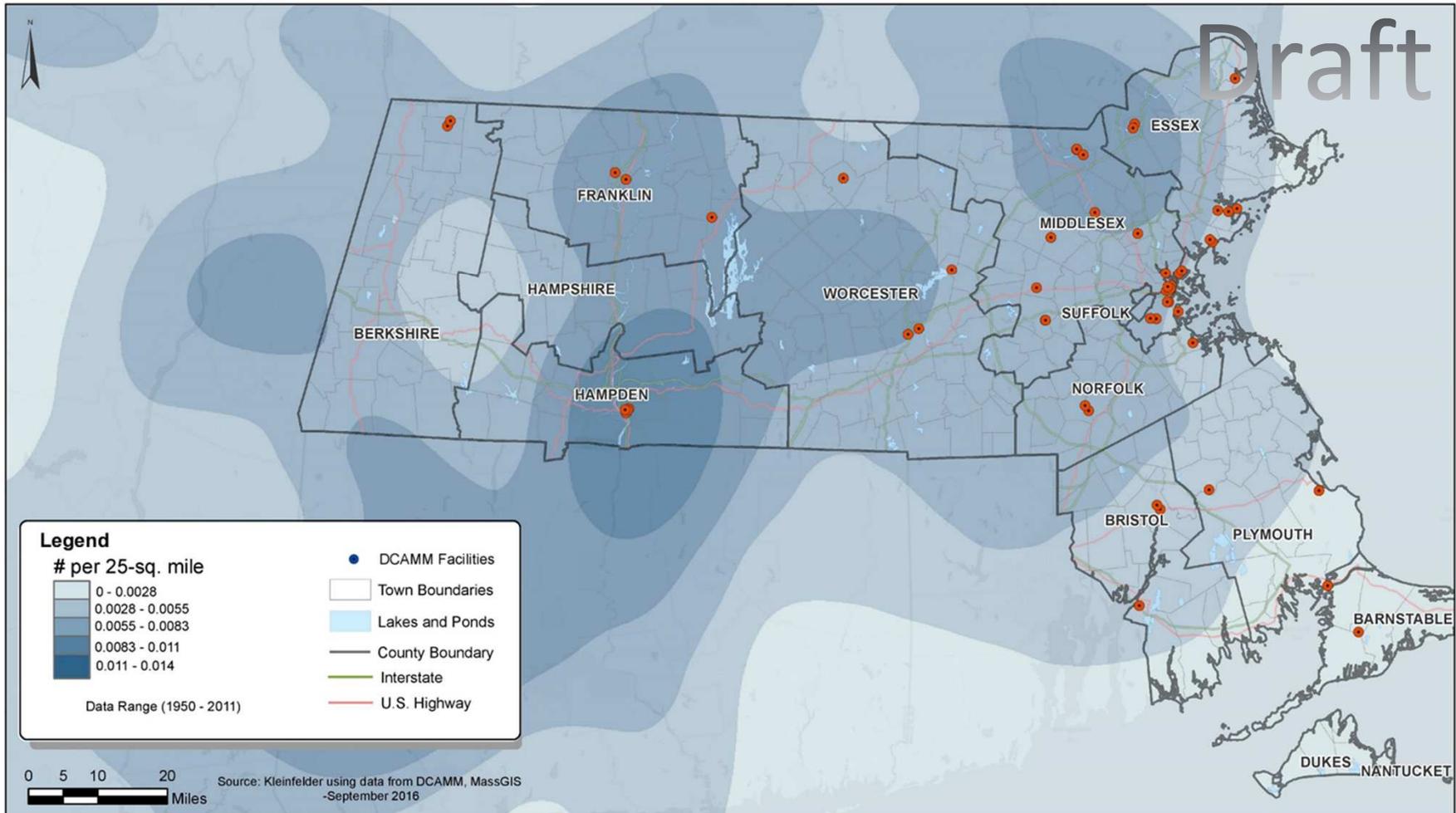
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Tornado Density Existing

Draft



Source: Kleinfelder using data from DCAMM, MassGIS. September 2016



Risk and Vulnerability Methodology

- Methodology Proposed
- Purpose and outcomes of RVA



Vulnerability = Function of Exposure

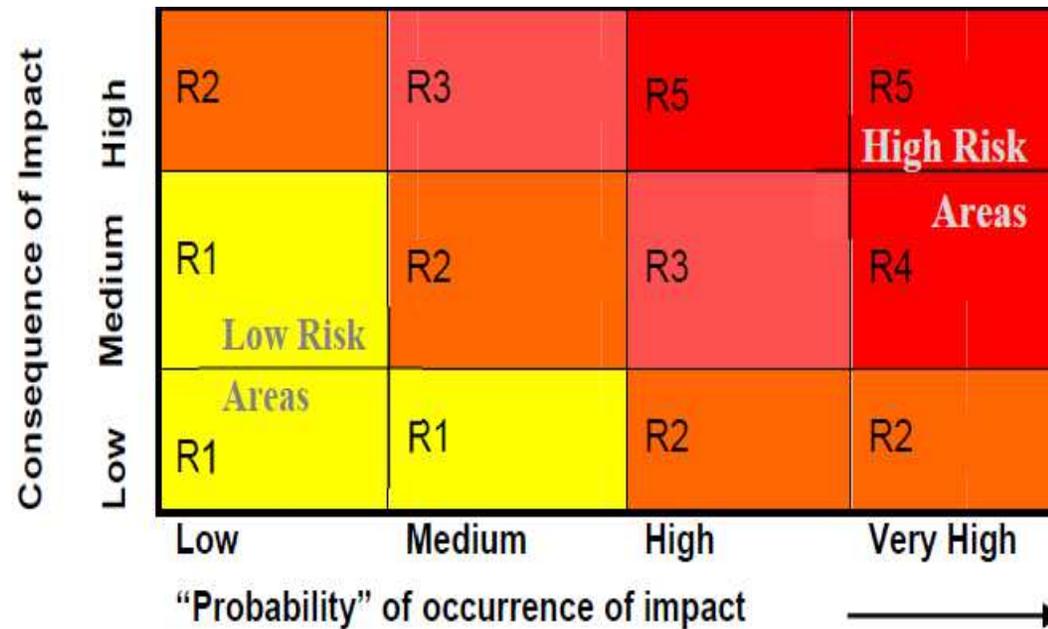
Building Name	CAMIS #	Climate Parameters (EXPOSURE)								VULNERABILITY RANKING
		Tier 1			Tier 2 (Extreme Events)					
		SLR/SS Flooding	Precipitation Inland Flooding	Temp.	Winter Storms	Fire	Drought	Landslide	Wind	
Salem State University	SSA00	X	X		X					
Northeastern Correctional Center	DOC04				X	x				
Mass Maritime Academy	MMA00	X	X						x	



Risk = Function of Probability & Consequence

based on CC Scenarios
2030 = high probability
2070 = low probability

Informed by criticality ranking
(6 criteria for severity)



Related Initiatives

1. Outreach and coordination to Agency partners
2. State House news
3. New Executive order
4. DOER study on energy storage, grants for energy resilience



What is Next?

Upcoming Meetings and Workshops

- October– Present RVA findings and vet pilot site selection (re-team only)
- Consequence and probability analysis -November
- Table top workshops will be held sometime in November / December
- Late December – Tentative/ Draft Report Consequence and probability analysis (re-team only)



Thank You

Comments and other communications to:

Tabitha Harkin

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