



WHAT IS A VULNERABILITY ASSESSMENT?

A **Vulnerability Assessment (VA)** is a structured process used to understand how climate hazards affect people, infrastructure, natural systems, and cultural resources. It identifies **where risks occur, how severe they are, and what capacity exists to respond or adapt.**

Purpose of a Vulnerability Assessment

- Identify **assets, systems, and communities** exposed to climate hazards
- Understand **how climate change increases risk** over time
- Evaluate **consequences** if those assets are impacted
- Assess **adaptive capacity** — the ability to prepare, respond, and recover
- Prioritize **actions, investments, and policies** that reduce risk
- Support **cross-jurisdictional coordination** across towns and Tribal Nations
- Provide a foundation for the **Watershed Resilience Action Plan (WRAP)**

What the VA Examines

- **Built systems:** roads, bridges, culverts, utilities, emergency services
- **Natural systems:** wetlands, waterways, forests, wildlife habitat
- **Community systems:** homes, farms, workplaces, public spaces
- **Water systems:** wells, septic systems, impaired waters
- **Cultural resources:** Tribal lands, historic sites, community assets
- **Social vulnerability:** distressed areas, EJ communities, sensitive populations

How Vulnerability Is Scored

- **Exposure:** How likely is the hazard to occur here?
- **Sensitivity:** How badly would the asset be affected?
- **Adaptive Capacity:** How well can the community or system respond?
- **Overall Vulnerability:** Exposure + Consequence – Adaptive Capacity

This creates a clear picture of **what is most at risk** and **where action is most needed.**



HOW WAS OUR VA BUILT?

The Mystic River Watershed VA used a **rigorous, community-led, multi-layered approach** combining including Tribal and non-tribal community perspectives, science, and fieldwork.

Atypically, the main client for Fuss and O'Neill's work on the Mystic River Watershed VA is the Alliance for the Mystic River Watershed, a group of Tribal and non-tribal community members working together across generations to create and implement a comprehensive watershed care plan.

1. Desktop Data & GIS Analysis

A comprehensive mapping effort analyzed:

- Land use and development patterns
- Wetlands, waterways, and floodplains
- Impaired waters (Mystic River estuary, Whitford Brook, Williams Brook)
- Critical facilities (fire, EMS, utilities, schools)
- Transportation networks (roads, bridges, culverts)
- Impervious surfaces and stormwater pathways
- Soil drainage and erosion-prone areas
- Agricultural lands and forest cover
- Environmental Justice designations
- Historic and cultural resources
- Utility service areas (water, sewer, electric)

This created a **baseline picture** of watershed conditions.

2. Fieldwork & On-the-Ground Assessments

Teams conducted targeted site visits to:

- **Stream crossings**
 - Hydraulic capacity
 - Erosion and scour
 - Structural condition
 - Debris blockage
- **Wetlands and floodplain areas**
 - Inundation
 - Habitat stress
 - Storage capacity
- **Roadway flooding hotspots**
 - Low-lying segments

- Drainage failures
- **Dams and pond systems**
 - Water levels
 - Spillway conditions
- **Community-identified vulnerable locations**
 - Places residents repeatedly flagged as problematic

Fieldwork validated GIS findings and revealed **real-world conditions** not visible in maps.

3. Climate Hazard Modeling

Each hazard was analyzed using state, federal, and academic datasets:

- **Flooding**
 - Fluvial (riverine)
 - Pluvial (rainfall-driven)
 - Tidal flooding
 - Storm surge inundation
- **Drought**
 - FEMA National Risk Index
 - Well vulnerability
 - Agricultural impacts
- **Extreme Heat**
 - Heat CCVI (Climate Change Vulnerability Index)
 - Health exposure
 - Built environment heat islands
- **Water Quality**
 - Impaired waters
 - Nutrient loading
 - Algal bloom risk
- **Wildfire**
 - Wildland-urban interface mapping
 - Vegetation and drought conditions

This produced **hazard exposure maps** for the entire watershed.

4. Tribal Sovereignty & Indigenous Knowledge

The VA followed federal guidance on Indigenous Knowledge:

- Tribal Nations co-led the Alliance
- Indigenous ecological perspectives shaped the approach
- Cultural resource protection was prioritized
- Tribal data sovereignty was respected
- Indigenous Knowledge informed land, water, and habitat interpretation

This ensured the assessment honored **place-based knowledge** and **sovereign rights**.

5. Community Engagement & Voice

Community Action Teams (CATs) shaped the VA:

- Defined what “vulnerability” means locally and identified stressed areas
- Identified assets that matter most to residents
- Shared lived experiences of flooding, drought, heat, and water quality issues
- Validated desktop findings
- Highlighted gaps in existing plans
- Co-developed priority actions

Community leadership ensured solutions are **equitable, durable, and grounded in lived reality**.

6. Quality Assurance Project Plan (QAPP)

The EPA-compliant QAPP ensured:

- Data accuracy and consistency
- Transparent methodology
- Protection of sensitive cultural data
- Clear documentation of all procedures
- Alignment with federal standards

This made the VA **defensible, credible, and fundable**.

7. Integration with Existing Plans

The VA builds on:

- SECOG regional plans
- Municipal POCDs
- Hazard Mitigation Plans (HMCAPs)
- Watershed Resilience Action Plan (WRAP)
- CT DEEP water quality data
- CIRCA climate projections

This ensures **alignment, continuity, and actionability**.



Thank you to Alliance volunteer Christian Allyn for preparing this overview.