

American Water Resources Association Philadelphia Metropolitan Area Section

Levee Evaluation and Certification under the NFIP

November 18, 2010



- Background and Overview
- Flood Insurance Rate Maps (FIRMs) & Levee Accreditation by FEMA
- Provisionally Accredited Levees (PALs)
- Consequences of De-Certification
- Role of FEMA and USACE
- Technical Requirements for Certification
- Questions



Background and Overview



- 1968 – National Flood Insurance Program**
- Established by the National Flood Insurance Act
 - Requires mapping of flood prone areas
 - Reduced rates on flood insurance for communities participating in the NFIP
 - Participating communities must adopt floodplain management ordinances complying with minimum NFIP criteria



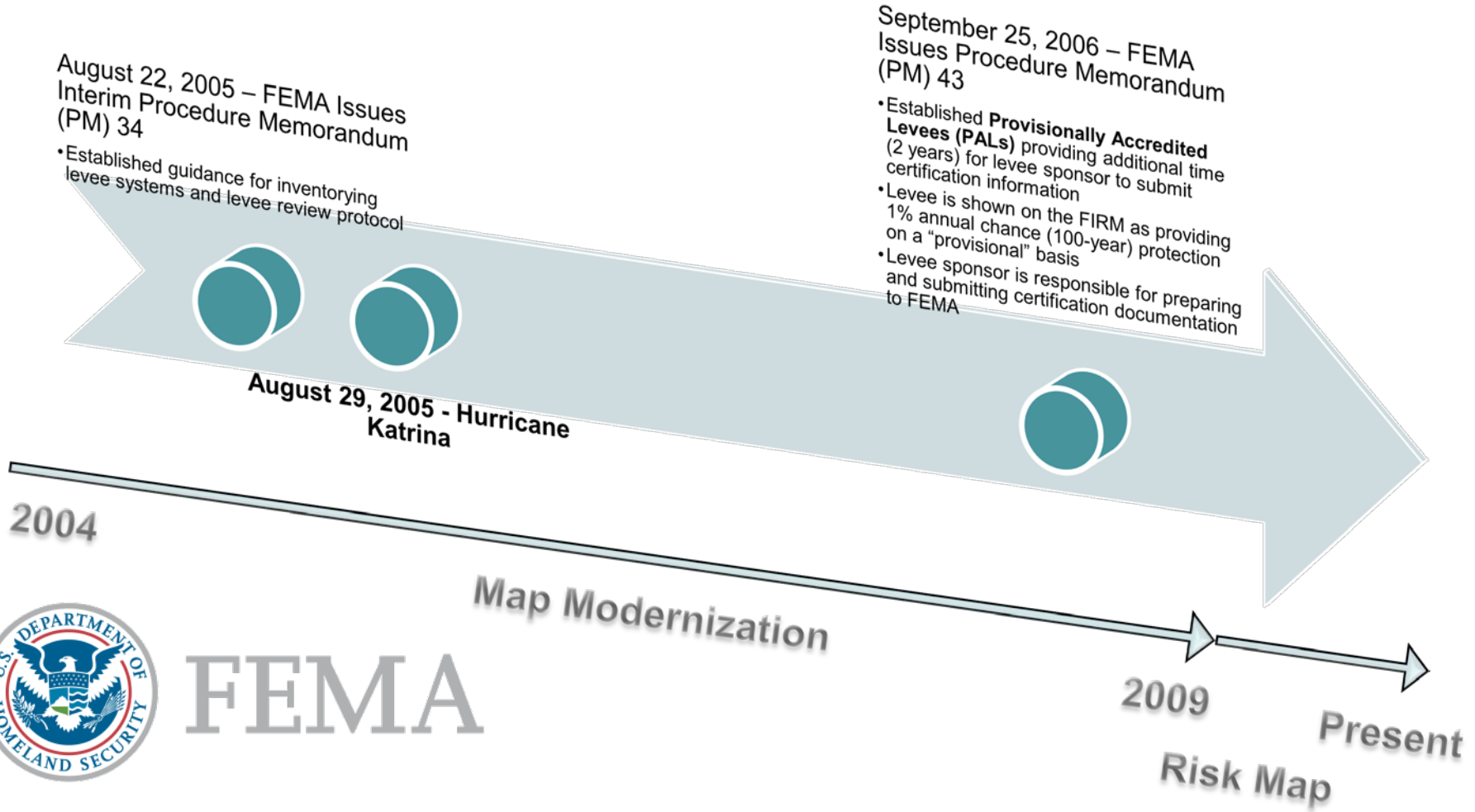
- 1986 – 44 CFR 65.10 Adopted**
- Provides requirements for FEMA accreditation of levees

- 1973 – Flood Disaster Protection Act**
- Mandates purchase of flood insurance for insurable structures within flood prone areas as a condition of receiving federal or federally-backed financing (currently based on the 100-year standard)

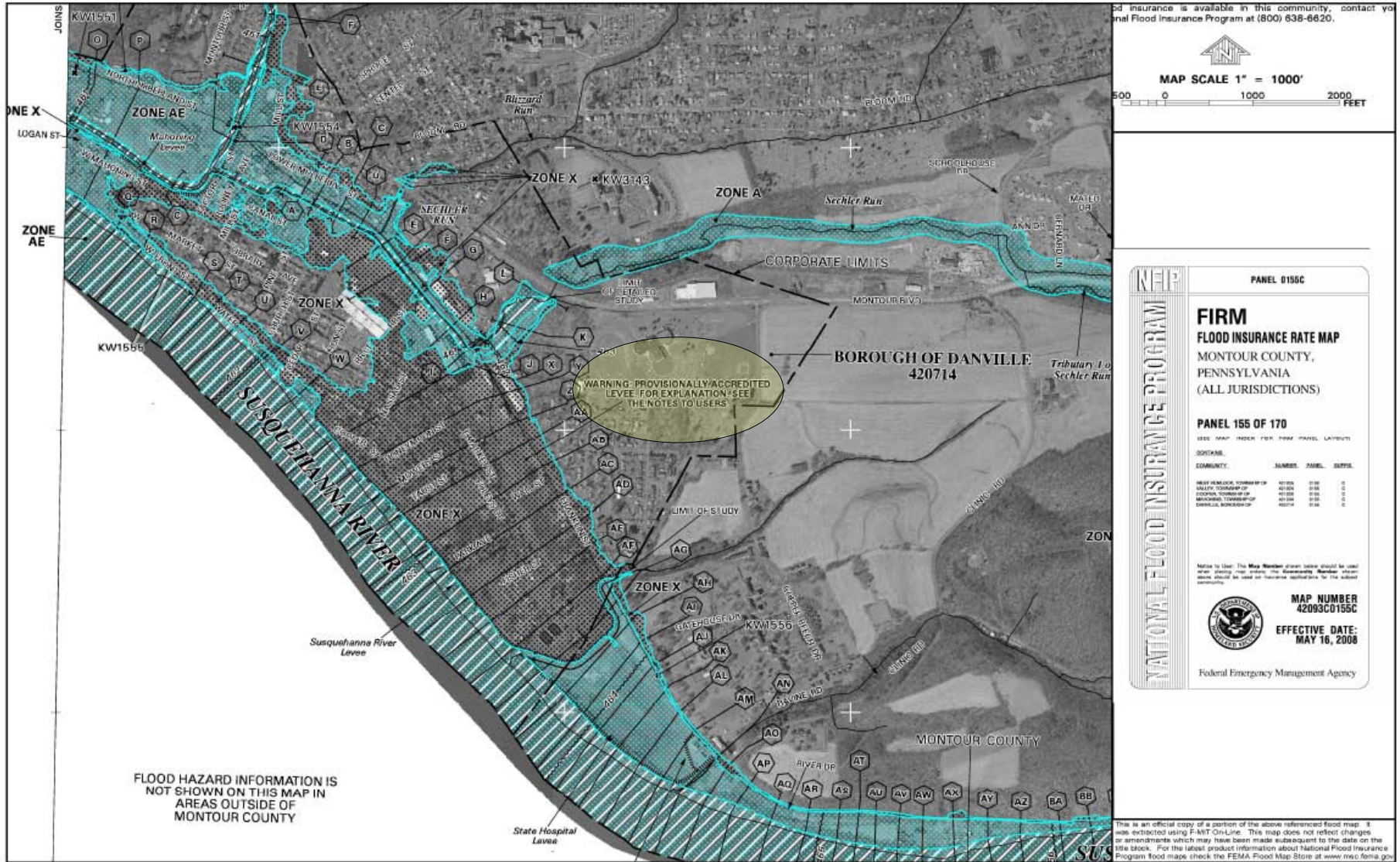


FEMA

Background and Overview



Flood Insurance Rate Maps (FIRMs) & Levee Accreditation by FEMA



Insurance is available in this community, contact your local Flood Insurance Program at (800) 638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

NFP **PANEL 0155C**

FIRM
FLOOD INSURANCE RATE MAP
MONTOUR COUNTY,
PENNSYLVANIA
(ALL JURISDICTIONS)

PANEL 155 OF 170

1985 MAP INDEX FOR FIRM PANEL LAYOUT

| JURISDICTION | COUNTY | NUMBER | PANEL | DATE |
|---|----------|--------|-------|------|
| ALLEGANY TOWNSHIP OF ALLEGANY COUNTY, PA | ALLEGANY | 0100 | 0100 | 0 |
| ARMEDANGERS TOWNSHIP OF ALLEGANY COUNTY, PA | ALLEGANY | 0101 | 0101 | 0 |
| BEAVER TOWNSHIP OF ALLEGANY COUNTY, PA | ALLEGANY | 0102 | 0102 | 0 |
| BRIDGES TOWNSHIP OF ALLEGANY COUNTY, PA | ALLEGANY | 0103 | 0103 | 0 |

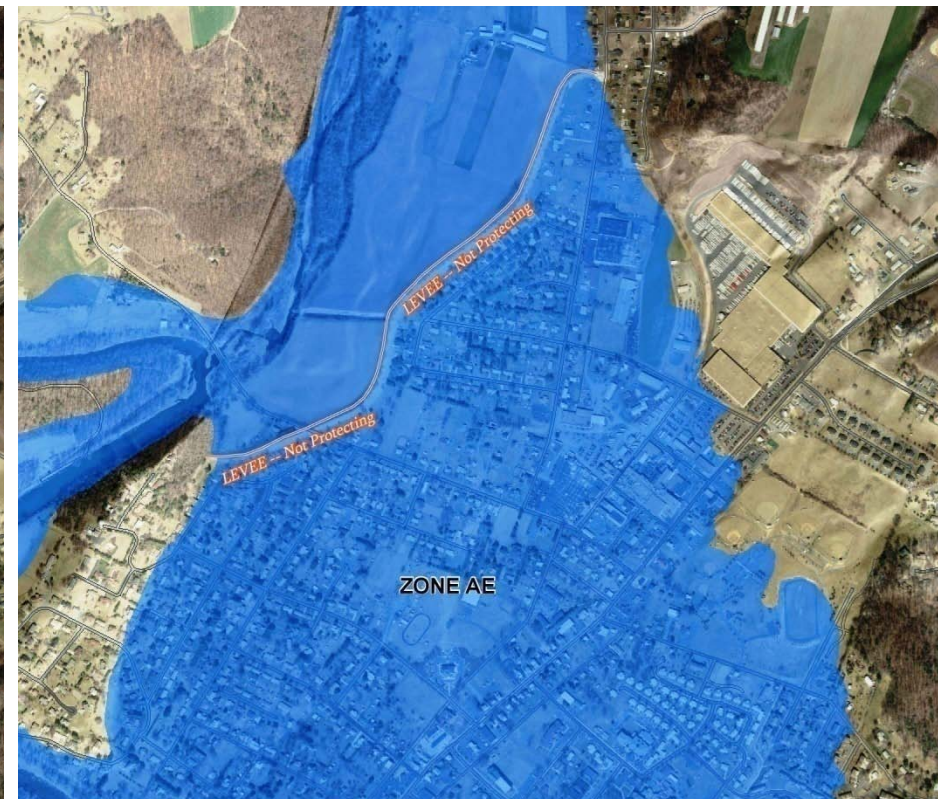
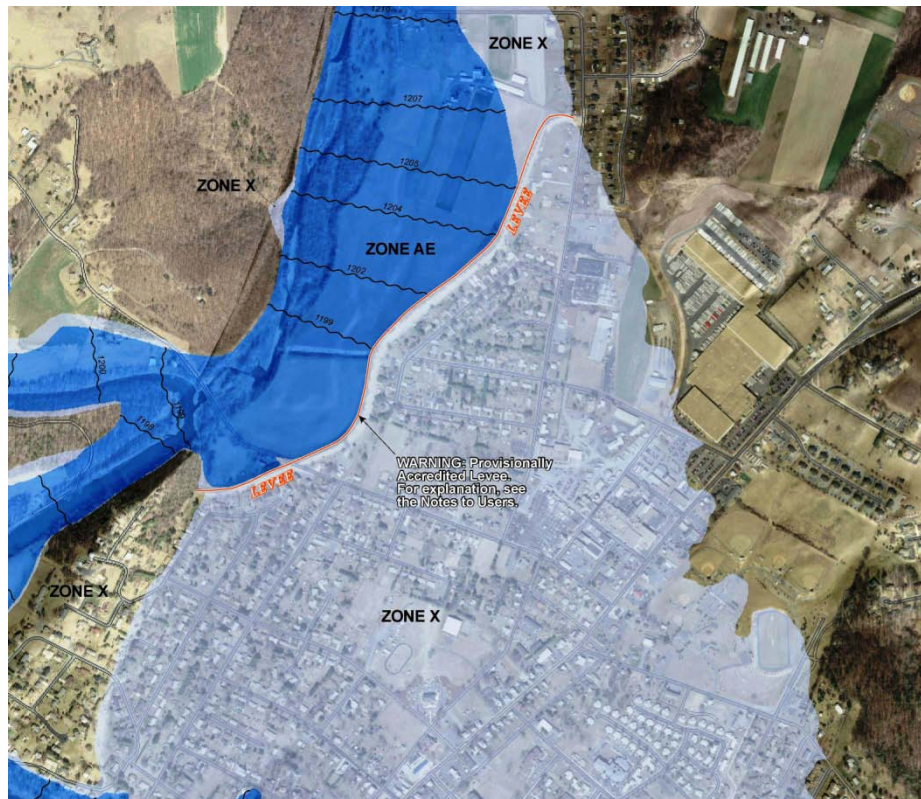
MAP NUMBER 42083CD155C
EFFECTIVE DATE: MAY 16, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using FIRM On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps, check the FEMA Flood Map Store at www.nrc.fema.gov

Provisionally Accredited Levees (PALs)

- If CFR 65.10 certification material submitted and approved → PAL designation removed
- If certification not achieved → levee de-accredited



Consequences of De-Certification



- Mandatory Flood Insurance Requirements
- Floodplain Management Requirements
- Property Values and Tax Base
- Public Perception

| RESIDENTIAL (A ZONES) | |
|------------------------------|----------------|
| Building and Contents | |
| Coverage (Building/Contents) | Annual Premium |
| \$35,000/\$10,000 | \$509 |
| \$50,000/\$15,000 | \$686 |
| \$75,000/\$20,000 | \$887 |
| \$100,000/\$30,000 | \$1,143 |
| \$125,000/\$40,000 | \$1,399 |
| \$150,000/\$50,000 | \$1,653 |
| \$250,000/\$100,000 | \$2,766 |

Source: www.floodsmart.gov

| NON-RESIDENTIAL (A ZONES) | |
|----------------------------------|----------------|
| Building and Contents | |
| Coverage (Building/Contents) | Annual Premium |
| \$100,000/\$50,000 | \$1,832 |
| \$200,000/\$100,000 | \$3,680 |
| \$300,000/\$200,000 | \$6,012 |
| \$400,000/\$300,000 | \$8,133 |
| \$500,000/\$400,000 | \$10,240 |
| \$600,000/\$500,000 | \$11,237 |

Source: www.floodsmart.gov

Does Certification Always Make Sense?



- Sometimes levee certification may not be fiscally reasonable
- Cost-benefit analysis appropriate to make determination
- AMEC typically takes a phased approach to certification evaluations

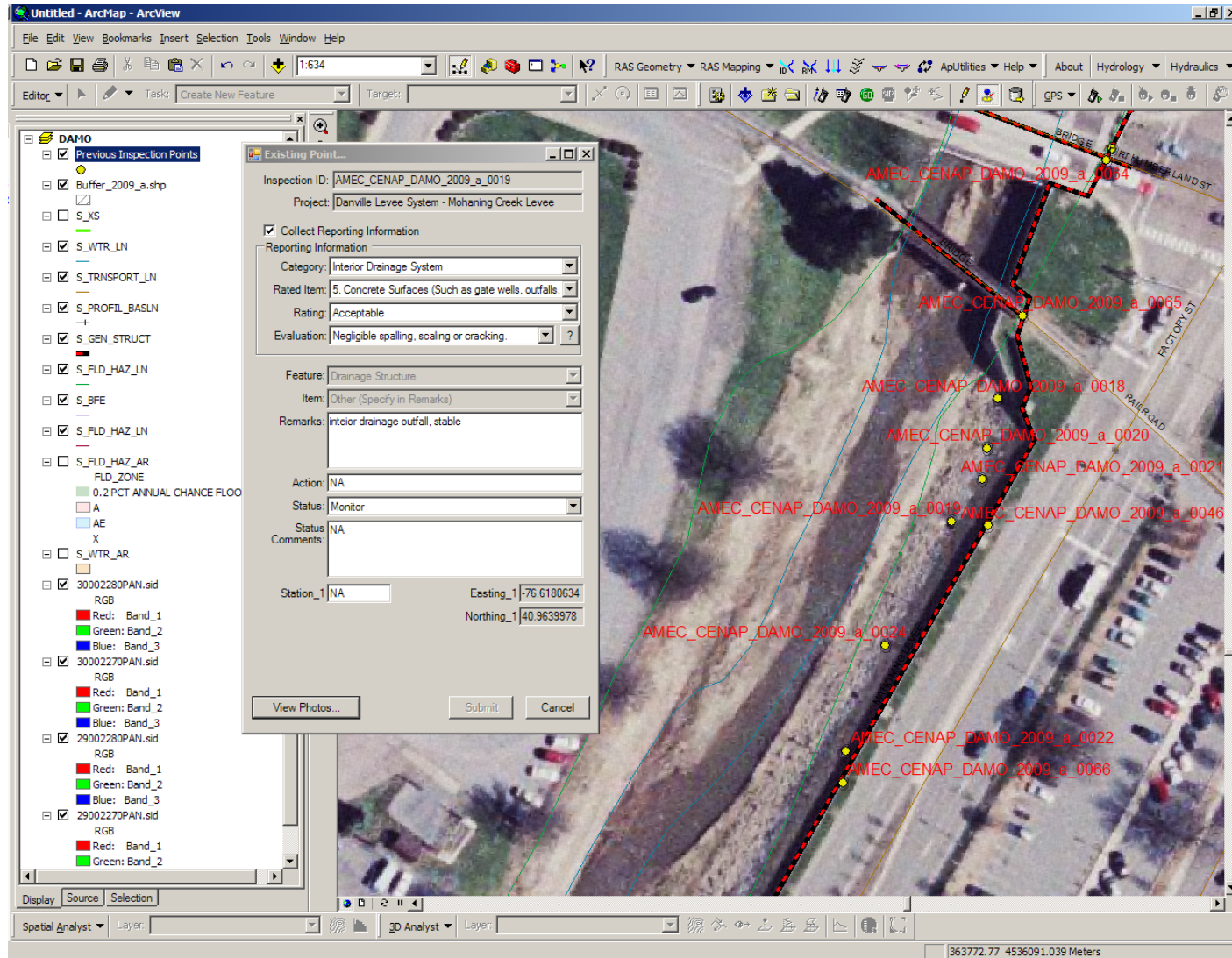


Role of FEMA and USACE



- FEMA does not certify levees; it is the responsibility of the levee owner or local sponsor requesting accreditation to provide technical information demonstrating compliance with 44 CFR 65.10
- Generally, other than active federal projects, the USACE:
 - Is not funded, staffed, or mandated to conduct certification evaluations; and
 - Does not have jurisdiction to perform certifications (per the Thomas Act), except:
 - On a direct cost reimbursable basis with funding from local sponsors or communities
 - If local sponsor provides documentation that certification services cannot be procured “reasonably and expeditiously” through ordinary business channels

44 CFR 65.10 Requirements

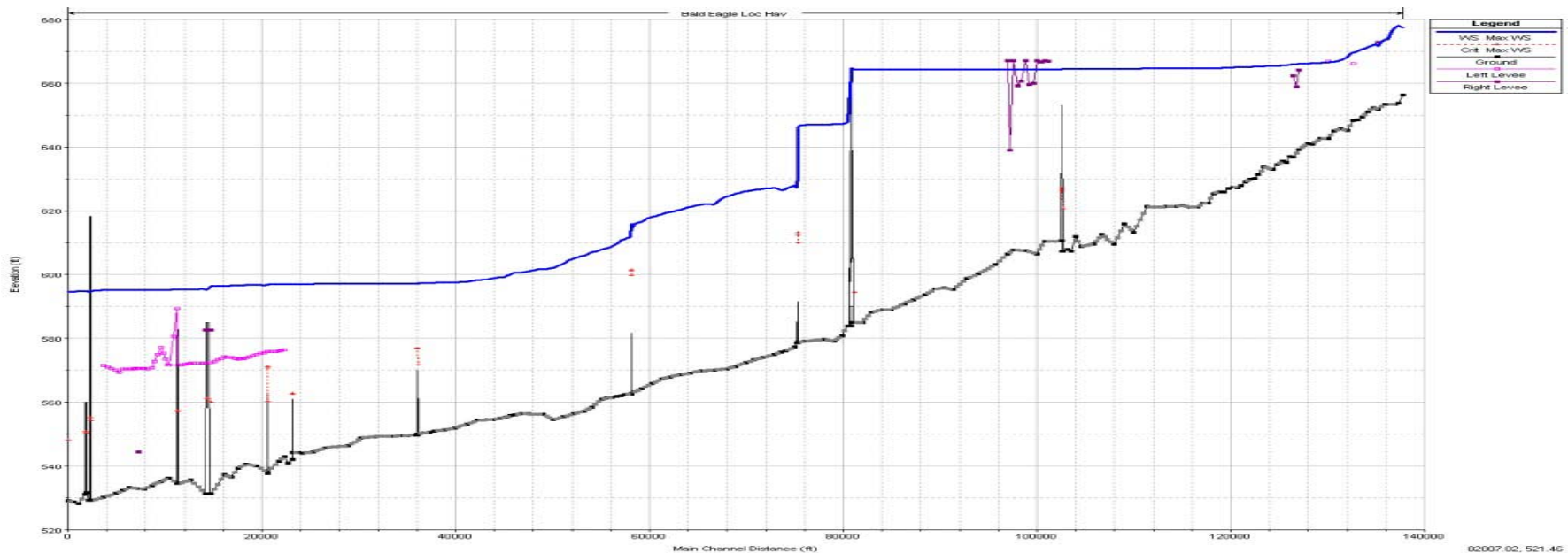


44 CFR 65.10 Requirements



■ Freeboard

- Detailed hydrologic and hydraulic analysis @ 1% annual chance (100-year) standard
- Standard Minimum – 3 feet minimum overall; 4 feet within 100' of structures; + ½ foot at upstream end of levee based on “expected” flow
- Absolute Minimum – 2 feet minimum for “expected” flow with uncertainty analysis which considers:
 - Discharge-frequency uncertainty (i.e. confidence limits);
 - Stage-discharge uncertainty (i.e. roughness & geometry); and
 - Sensitivity to downstream assumptions, sediment transport, and debris/ice jams.



44 CFR 65.10 Requirements



■ Closures

- All openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice
- Structural and mechanical evaluation



44 CFR 65.10 Requirements



■ Embankment Protection

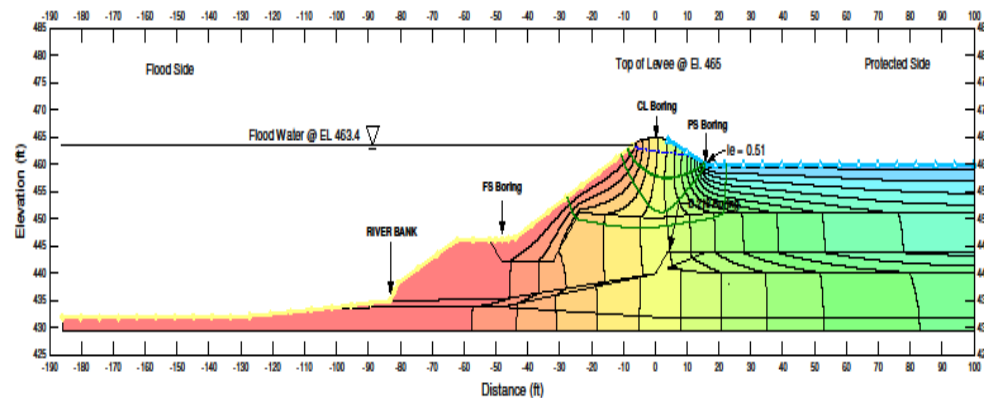
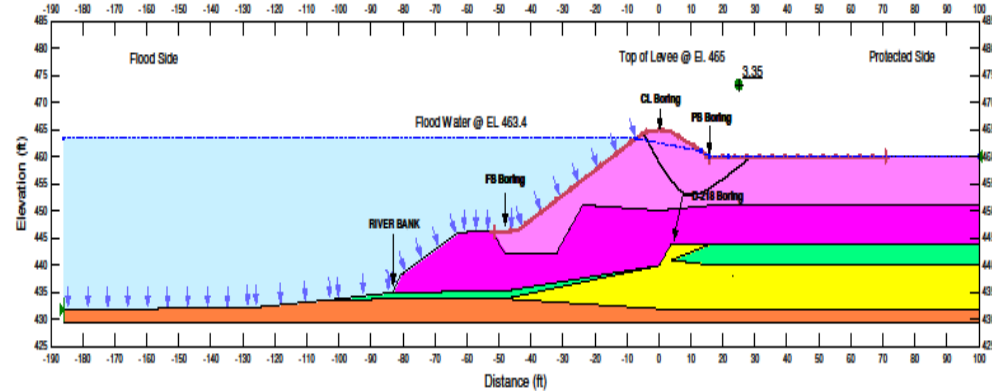
- No appreciable erosion during 1% flood from currents, waves, ice loading, impact of debris, flood duration, and bends
- Anticipated erosion will not result in embankment or foundation failure



44 CFR 65.10 Requirements

■ Embankment and Foundation Stability

- Demonstrate that seepage into or through embankment will not jeopardize stability
- Factors include depth of flooding, embankment geometry, length of seepage path, materials, compaction, penetrations, drainage layers, woody vegetation, etc.



44 CFR 65.10 Requirements



44 CFR 65.10 Requirements



■ Settlement

- Demonstrate that minimum freeboard will be maintained with potential future settlement
- Analysis must consider embankment loads, compressibility of soil (embankment and foundation), age of levee, and compaction method during construction
- Analysis per USACE EM 1100-2-1904 must be submitted



44 CFR 65.10 Requirements



■ Interior Drainage

- An analysis must be submitted that identifies the sources of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevations of the 100-year flood
- Analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwater
- Mechanical and electrical evaluation
- Failure mode analysis



44 CFR 65.10 Requirements

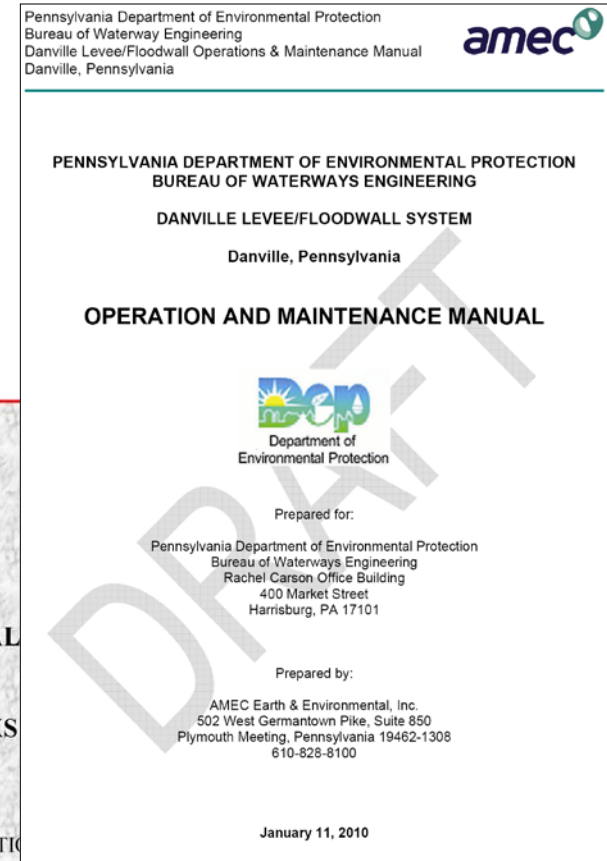
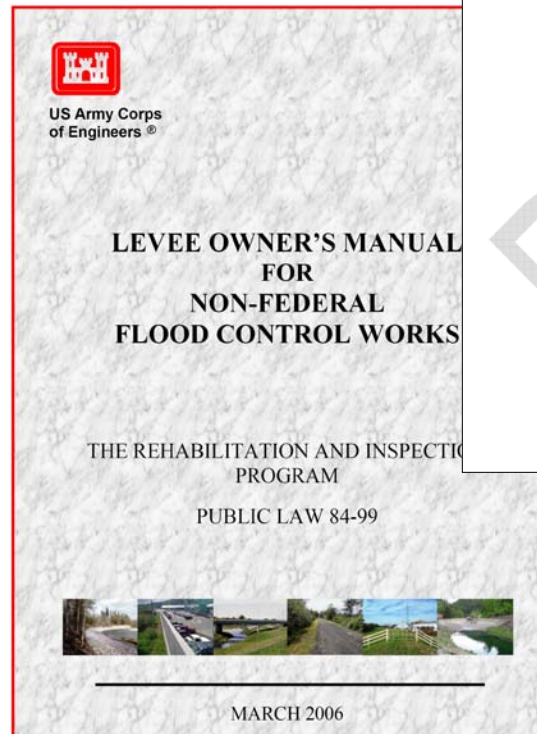


■ Operations Plans

- Closures
- Interior drainage systems (i.e. pumps, storage areas, backflow prevention, etc.)
- Flood warning systems
- Actions and assignments of responsible personnel
- Training
- Periodic testing and operation (1-year intervals maximum)

■ Maintenance Plans

- Maintain stability, height, and overall integrity of levee and associated structures
- Replacement of mechanical and electrical parts per manufacturers specifications





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