USACE and FEMA
Levee Accreditation for the NFIP

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Discussion Topics

- History of New Guidance/Direction
- USACE Levee Safety Activities
  - Levee Inspections
  - Screening Level Risk Assessments
  - Higher Level Risk Assessments
- FEMA Coordination
Through Section 100226, FEMA and USACE are: …directed to convene a joint task force with USACE to “better align information and data collected” under ICW with NFIP levee accreditation so that

1. Data can be used interchangeably.
2. Information collected for ICW is sufficient to help answer the accreditation question.
Inspections + Screenings + Risk Assessment

PROPOSED ALIGNMENT DATA CONTRIBUTION

USACE
- Scenario 1: Inspection Data
- Scenario 2: Screening Data
- Scenario 3: Risk Assessment Data

Sponsor/FEMA
- Accreditation Request Data
- Accreditation Request Package Submission
## Task Force Recommendations

### NFIP Requirements and Relation to USACE Activities

<table>
<thead>
<tr>
<th>NFIP Requirements (44 CFR 65.10)</th>
<th>Compliance Can Be Determined Through</th>
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<tbody>
<tr>
<td><strong>CFR Criteria Category</strong></td>
<td><strong>CFR Criteria Subcategory</strong></td>
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<tr>
<td><strong>Design Criteria</strong></td>
<td>Freeboard (levee height)</td>
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<td>Closure devices for all openings</td>
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<td>Embankment protection</td>
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<td>Embankment and foundation stability</td>
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<td>Settlement</td>
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<td>Interior drainage</td>
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<td><strong>Operation Plans</strong></td>
<td>Closures</td>
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<td>Interior drainage systems</td>
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<td><strong>Maintenance Plans</strong></td>
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Where are we going?

Risk-Informed
Guiding Principles

- USACE is partnering with FEMA to develop their new guidance for NFIP evaluations
Guiding Principles

- Guidance will address how Levee Safety Activities will be used to evaluate levees for the NFIP – scalable decision making.

Provisions of 44 CFR 65.10

Accreditation Decision?

Higher Level Risk Assessment

SLRAs & SQRAs

RIs & PIs

Always make an Accreditation Decision

Provisions of 44 CFR 65.10
When Will USACE Perform Risk Assessments for NFIP

Levee Safety Routine Processes

Sponsor Request

Feasibility Studies
Why a USACE Levee Inspection Alone ≠ Accreditation for the NFIP

- Visual Inspection only
- No engineering analyses
  - Hydraulic/Hydrologic modeling
  - Potential performance
- Inspection information can inform the NFIP
Inspections

- Will assess certain provisions of 44 CFR 65.10 related to:
  - Operations and Maintenance Plans
  - Closure Operation and Interior Drainage
    - Flood Warning Procedures
    - Operation Plan
    - Periodic Exercise

<table>
<thead>
<tr>
<th>Inspection Checklist Item</th>
<th>O&amp;M Manual</th>
<th>Culvert Gates</th>
<th>Levee/Wall Closures</th>
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</table>

### Table: NFIP Finding

<table>
<thead>
<tr>
<th>44 CFR 65.10 Provision</th>
<th>65.10(c)(1)i</th>
<th>65.10(c)(1)ii</th>
<th>65.10(c)(1)iii</th>
<th>65.10(c)(2)i</th>
<th>65.10(c)(2)ii</th>
<th>65.10(c)(2)iii</th>
<th>65.10(c)(2)iv</th>
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Why a USACE Levee Risk Screening Alone ≠ Accreditation for the NFIP

- Screenings look at performance from a levee safety perspective – not just the 1%
- A screening level assessment uses best available information – not new analyses
- Level of rigor of analysis will not allow for an accreditation decision for all NFIP criteria
Screening Level Risk Assessments

Specific Performance Item / Failure Mode

Low Likelihood of Poor Performance
- Positive Finding
  - Specific Criteria of 65.10 is met
  - Sponsor can use information for accreditation

High Likelihood of Poor Performance
- Negative Finding
  - Specific Criteria of 65.10 is not met
  - Information relayed to FEMA and Sponsor
  - May or May not trigger de-accreditation

Inconclusive
- Information insufficient to link 65.10 criteria
Freeboard/Levee Height

- H&H module, Design and NFIP tab
  - Is the height of the levee sufficient to meet the freeboard requirements of 44 CFR 65.10 and/or the assurance requirements of EC 1110-2-6067?“ (Yes/No/Inconclusive)
    - Update guidance on how to answer above question, for example
      - If levee evaluation complete, answer as appropriate, otherwise..
      - < 1/1000 then result is probably “yes”
      - > 1/100 then result is probably “no”
If "HL" and Yes, then Negative Finding
If "LL" then Positive Finding
All others “Inconclusive”
<table>
<thead>
<tr>
<th>44 CFR 65.10 Design Provision</th>
<th>Description</th>
<th>Relevant Screening Results</th>
<th>NFIP Finding</th>
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<tbody>
<tr>
<td>Freeboard</td>
<td>Levee meets H&amp;H requirements for NFIP levee evaluation consistent with EC 1110-2-6067</td>
<td>H&amp;H/Meet NFIP H&amp;H Requirements</td>
<td>YES</td>
</tr>
<tr>
<td>Closure devices for all openings</td>
<td>All openings must be provided with closure devices according to sound engineering</td>
<td>All ratings in closure performance module</td>
<td>LL/LL/LL/LL</td>
</tr>
<tr>
<td>Embankment protection</td>
<td>No appreciable erosion is expected during the base flood</td>
<td>Erosion performance mode - Erosion/Bank Caving factor</td>
<td>ML</td>
</tr>
<tr>
<td>Embankment and foundation stability</td>
<td>No seepage into or through the levee foundation and embankment will jeopardize the stability of the levee</td>
<td>Embank. and Found. Seepage and Piping/Seepage, Embankment Stability/Slope Stability, Floodwall Stability/Tilting, Sliding or Settlement, Floodwall Underseep. and piping/Seepage</td>
<td>ML/No</td>
</tr>
<tr>
<td>Settlement</td>
<td>Future settlement will not impact levee's ability to pass the base flood</td>
<td>H&amp;H/Global Settlement Concerns</td>
<td>No</td>
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</tbody>
</table>
What USACE levee activity can result in an NFIP accreditation decision?

Higher Level Risk Assessments
Risk Assessments

**Input – In General**

- **Likelihood of Loading**
  - H&H Analyses
  - Historical Events

- **Likelihood of Performance**
  - Inspection Observations
  - Review of Design Criteria
  - Past Performance

- **Consequences**
  - Population at Risk
  - Economic Impacts
  - Emergency Preparedness
Add an Event Tree and an Fn Chart to bring home the point that NFIP evals will look at y-axis not the x-axis (maybe show one with PFM plotted)
Questions to be answered by a Higher Level Risk Assessment

- What are the most likely failure modes?
- What are the primary risk drivers?
- What is the current estimated risk?
- What Risk Reduction Measures are appropriate?
- Is further investigation needed?
- New question added: Should the levee be accredited by FEMA?
Risk-Informed NFIP Evaluations

- **Current evaluation:**
  - Is the levee Tall Enough to exclude the base flood?
  - Is the levee Strong Enough to exclude the base flood?

If so, the leveed area is mapped “out of the 1% flood plain”

If not, the leveed area is mapped “in the 1% flood plain”

The BFE is based on the 1% ACE

Best Estimate
Base Flood Elevation (BFE)
1% ACE
Overtopping Assurance (aka CNP)

- The uncertainty in the 1% flood stage

- What is the probability (or how confident are we) that the 1% flood stage is below the top of the levee
  - In this example, about 90%
  - **Performance → Deterministic**
  - Guidance in 1110-2-6067
Risk-Informed NFIP Evaluations

- Risk Informed Evaluation:
  - Understand Hydraulic and Hydrologic Uncertainty
  - Develop System-Response (Fragility) Curves
  - In Any Given Year, What is the Confidence That the Levee Has Less than a 1% Chance of:
    - Overtopping
    - Breaching

Primary Risk Drivers

Full Range of Events

OT

PAR

PERFORMANCE
Risk Assessment Input

![Graphs showing risk assessment input data](image-url)

**2000-2009 RRL #01120**

- **Levee Overtopping**
- **Pf @ 0.01 ACE Stage**
  - 0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1, 0.2
OT/Performance Confidence
(AEP with Fragility)

- Probability that the levee will breach or overtop in a given year

- What is the probability (or how confident are we) that the annual chance of levee overtopping or breaching is less than 1%

- What is the probability (or how confident are we) that the leveed area is not in the 1% floodplain

- In this example, about 77%
Parametric Study
Benefits of a Risk Informed NFIP Evaluation

- The proposal to assess levees for NFIP accreditation against the 1% chance of flooding is based on:
  - The assumption that the intent of the NFIP for areas behind levees was to ensure the leveed area had less than a 1% chance of being inundated in a given year
  - A more complete risk-informed method
  - Evaluations against base flood don’t consider likelihood of performance for more frequent floods
  - Communication with the public – tells the story of “how likely is it that I will get wet” instead of “what frequency of event is the levee safe to”
Audience Feedback #1

- Any questions concerning the coordination that the two agencies are taking?
  - Any recommendations for improving coordination and outreach?
  - What will help you meet your challenges?
- Does this interagency cooperation meet your expectations; any concerns?
**Update to 1110-2-6067 Remaining Milestones**

<table>
<thead>
<tr>
<th>Task</th>
<th>Date</th>
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<tbody>
<tr>
<td>Complete Parametric Study</td>
<td>October 2015</td>
</tr>
<tr>
<td>Draft of ER 1110-2-XXXX</td>
<td>February 2016</td>
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<tr>
<td>USACE Internal Review (and potentially IEPR) of ER</td>
<td>March 2016</td>
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<tr>
<td>Comment Analysis and Resolution</td>
<td>July 2016</td>
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<tr>
<td>Publish ER 1110-2-XXXX</td>
<td>September 2016</td>
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<tr>
<td>Agency Roll Out (Webinars, PGL, etc.)</td>
<td>FY 2017</td>
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Questions?