Community Resilience through Grid Resilience

Developing a Flood Mitigation Program with a Utility

March 9, 2016
Agenda

- Mitigation Program Development
- Flood Risk Assessment and Prioritization
- Challenges & Best Practices
- The Key to Success
ASCE: The grid connects Americans with 5,800 major power plants and includes over 450,000 miles of high voltage transmission lines.
Grid Resilience & Storm Hardening

June 2011
• A Policy Framework for the 21st Century Grid (IL Legislature)

October 2011
• Energy Infrastructure Modernization Act (IL Legislature)

August 2013
• Economic Benefits Of Increasing Electric Grid Resilience To Weather Outages (Executive Office of The President)
• Severe Weather is the #1 Cause of Widespread Power Outages
• Annually Cost to US Economy for Weather-Related Outages: $18 - $33 billion

Today
• Illinois is on the Leading Edge of Smart Technology and Resilience
EIMA Begins, GRIP is added

Storm Hardening -> Grid Resiliency

Vegetation Management

New Technology
Grid Resilience Evolves

Flood Mitigation

FEMA National Flood Hazard Layer:
Red – Floodway
Orange – 100-yr Floodplain
Blue – 500-yr or other Shaded Zone X
Flood Mitigation Program

Analysis & Assessment
- Hydrologic and Hydraulic Analysis
- Threat and Hazard Identification
- Risk Assessment

Mitigation Planning
- Risk Prioritization
- Project Planning
- Hazard Mitigation Plan Development
- Mitigation Alternatives Analysis
- Feasibility Studies

Mitigation Action
- Mitigation Design
- Regulatory Coordination
- Local, State and Federal permitting
Hazard Assessment

GIS-Based Assessment Using Readily Available Data

Hazard = High, Moderate-to-High, Moderate and Low

- **High** = Floodway
- **Moderate-to-High** = 1% annual chance floodplain
- **Moderate** = 0.2% annual chance floodplain
- **Low** = Unshaded Zone X

Refined Hazard Analysis

- Unmapped waterways with flood risk associated
- Levee impacted areas

<table>
<thead>
<tr>
<th>Level of Risk</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td>20</td>
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<tr>
<td>Moderate to High</td>
<td>36</td>
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<tr>
<td>Moderate</td>
<td>19</td>
</tr>
<tr>
<td>Low</td>
<td>730</td>
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</tbody>
</table>
Risk Assessment

Consequence Factors
- Facility Type (CC, TSS, TDC, STA, RP, DC, SS, Terminal)
- Substation Security Tier
- Critical Station Designation
- Customers Served per Facility
- Critical Customers Served
- Key Equipment Impacted

Risk
- Severe
- Very High
- High
- Moderate-to-High
- Moderate
- Low

Risk = Hazard x Consequences
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Challenges

Educating a Utility’s Management About Flood Risk - 100 Year Flood, Low Risk not No Risk, Risk vs. Hazard, etc.

Identifying Meaningful Consequences in Assessing Risk

Getting Various Sides of the Utility on the Same Page During Alternatives Analysis

Cost is Major Driver

Resolutions

Prepare Slide Decks and Executive Summaries of All Reports – Work Summary with Background and Education on Flood Hazards and Risks

Close Coordination with Utility – Engineering and More

Carefully Present All Sides of a Case for Each Alternative – Civil Eng, Electrical Eng, Testing, Operations

Use Construction Expertise in Costing and Comparisons
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TSS 69
Flood Mitigation Design

Primera
And then...

We built it, everyone loved it, and they lived happily ever after.
Challenges

- Safety, Safety, Safety
- Preserve Substation Security
- Maintain Clearances
- Public Perception
- There’s a Reason it’s Cheap Land...

Resolutions

- Entry by Trained Personnel, Design for Constructability Around Electrical Hazards
- Design for Secure Entry, Ease of Operations and Rogue Rowboats
- Design Improvements when Necessary to Maintain or Attain Better Clearance
- Coordinate with Locals About Sensitivity, Conduct Public Meetings
- Expect a Great Deal of Regulatory Hoops, Be Prepared when Jumping through Them All
Federal, State and Local governments are Set Up to Serve the Public and Stakeholders.

Private Companies Answer to Customers, Boards, Executives, Commissions, Shareholders, and More.

Have Meetings Early and Often.

Communicate the Plan, the Design, the Methods.

Communicate the BENEFIT.

Accept that Perception is Someone’s Reality – and Manage the Project within that Perception

Leave the Area in Better Condition than when You Started – the Site, the Reach, the Watershed.

Closeout the Project as Partners in Mitigation.

The Key to Success: Collaboration