Community Resilience through Grid Resilience

Developing a Flood Mitigation Program with a Utility

June 22, 2016
Agenda

1. Grid Resilience
2. Mitigation Program Development
3. Flood Risk Assessment and Prioritization
4. Challenges & Best Practices
5. The Key to Success

Community Resilience through Grid Resilience | Developing a Flood Mitigation Program with a Utility
ASCE: The grid connects Americans with 5,800 major power plants and includes over 450,000 miles of high voltage transmission lines.
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<th>Date</th>
<th>Event</th>
<th>Features</th>
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| June 2011  | A Policy Framework for the 21st Century Grid (Executive Office of The President) | - Clean energy & renewables  
- Increase reliability and efficiency  
- Enable technological innovation |
| October 2011 | Energy Infrastructure Modernization Act (IL Legislature)                      | - $2.6 billion investment via ratepayer increase  
- Strengthen and modernize the state’s grid  
- Increase reliability and intelligence |
| August 2013 | Economic Benefits Of Increasing Electric Grid Resilience To Weather Outages (EOoTP) | - Severe Weather is the #1 Cause of Widespread Power Outages  
- Annual Cost to US Economy for Weather-Related Outages: $18 - $33 billion |
| Today      |                                                                        | - Illinois is on the Leading Edge of Smart Technology and Resilience  
- Community of the Future and Smart Cities |
EIMA Begins
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

Risk Assessment

Mitigation Action
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

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

Risk = Hazard x Consequences

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
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TSS 69 Flood Mitigation Design
Mitigation
Action
Challenges

Challenges

Safety, Safety, Safety
Preserve Substation Security
There’s a Reason it was Cheap Land...

Resolutions

Entry by Trained Personnel, Design for Constructability Around Electrical Hazards
Design for Secure Entry, Ease of Operations and Rogue Rowboats
Expect a Great Deal of Regulatory Hoops, Be Prepared when Jumping through Them All
And then...
We built it, everyone loved it, and they lived happily ever after.
Regulatory Challenges

Trust and relationships sometimes are more important than anything,
And sometimes it's not.
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. Understand each other’s constraints

Communicate the BENEFIT.

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

Establish a Project Charter

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