Local Priorities: Flood Risk Management

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Overview

- Flood History in Charlotte-Mecklenburg
- Key Strategies
  1. **New/existing Development**
  2. Flood Warning/Response
  3. Drainage System Maintenance
  4. Public Information
  5. Interagency Coordination
  6. **Hazard Mitigation Planning**
- “Top of the hill”
- 5% of City floodplain
- Urban, national average is 7.5% floodplain
Mecklenburg County Watersheds

- ~350 miles of FEMA streams
- 32 watersheds
- 2000+ miles of non-FEMA streams & open/piped drainage systems
- Flash flooding in 98% of County
Values:

- Greenways
- Improved Water Quality
- Open Space
- Promote Growth
Floodplain Management

Charlotte-Mecklenburg’s Floodplain Management Program includes:

1. Floodplain regulations and permits (Higher standards)
2. Floodplain map maintenance (Future looking)
3. Real-time flood notification system
4. Flood mitigation planning
5. Flood mitigation actions & buyouts
Floodplain Regulations & Permits

Floodplain Map Maintenance
STOP ADDING TO THE PROBLEM!

- Solid planning
- Better floodplain mapping
- Higher buildings standards (sustainable development)
- Partnerships
Sustainable development ideas:

- Freeboard
- Substantial Improvements
- Flood Increases on Existing Buildings
- Levee Limitations
- Parking Lot Requirements
- Access to Buildings During a Flood
Why are “Floodplains” Mapped

- Protecting Life and Property
- Community Sustainability & Resiliency
- Communicate & Reduce Flood Risk

**Uses for Flood Risk Information**
- Flood Insurance
- Regulate New Development
- Flood Preparedness
- Planning
- Mitigation
- And more.....
Floodplain Mapping Uses

• Flood Insurance
• Safe Development
• Risk Communications
• Protect Life & Property

Role of Local Governments in public safety and long term sustainability
Future Floodplains

- Philosophy: Floodplain meant to flood
- Upland land for flood storage in new construction
- Account for future hydrologic changes to 1% event

Lower future risk & Lower future flood insurance rates when maps increase!
Reduce Existing Flood Risk

Mitigation via Mapping
“Stop the Bleeding”

Mitigation via Projects (buyouts)
“Heal the Wounds”
Purpose of the Plan

• Recommend specific flood mitigation techniques at a **building level**
• Assist in planning and **prioritizing** future mitigation projects
• Use a dynamic and **holistic, risk** based approach
Flood Risk Property Score
- Flood Property Damage (Impacts)
- Storm Probability (Frequency)
- Structure Location

Risk Reduction Recommendations
- Evaluate all flood mitigation techniques
- Four recommendation categories

Mitigation Priority Scores
- Accounts for other community benefits & factors not included in flood risk
- Combined with Risk Score to prioritize:
  - Properties
  - Projects (groups)

Risk Assessment & Risk Reduction Plan
### Flood Risk Example

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Impact-based Factors</th>
<th>Storm Event</th>
<th>Points*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Flooding above the lowest finished floor of a building</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>Flooding of electrical and/or mechanical equipment</td>
<td>25-yr</td>
<td>48</td>
</tr>
<tr>
<td>C</td>
<td>Flood water is touching a portion of the building</td>
<td>10-yr</td>
<td>100</td>
</tr>
<tr>
<td>D</td>
<td>Property is completely surrounded by flood water</td>
<td>25-yr</td>
<td>44</td>
</tr>
<tr>
<td>E</td>
<td>Structure is completely surrounded by flood water</td>
<td>25-yr</td>
<td>20</td>
</tr>
<tr>
<td>F</td>
<td>Structure is completely surrounded by flood water and is a critical facility</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td>Structure is completely surrounded by flood water and is multi-family residential</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>H</td>
<td>Flood water touching building with structural damage as a result of cumulative flooding</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>I1</td>
<td>Flooding of significant exterior property improvements</td>
<td>10-yr</td>
<td>60</td>
</tr>
<tr>
<td>I2</td>
<td>Flooding of moderate exterior property improvements</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>J</td>
<td>Flooding around area where single-family residential vehicles are typically parked</td>
<td>10-yr</td>
<td>60</td>
</tr>
<tr>
<td>K</td>
<td>Flooding of any yard (any portion of parcel)</td>
<td>2-yr</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total Impact-based Score</strong></td>
<td></td>
<td></td>
<td><strong>347</strong></td>
</tr>
</tbody>
</table>

* Points are determined using the matrix provided in Appendix D.

<table>
<thead>
<tr>
<th>Multiplier</th>
<th>Location-based Factors</th>
<th>No/Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>Building located in high danger depth-velocity zone</td>
<td>No</td>
</tr>
<tr>
<td>1.3</td>
<td>Building located in medium danger depth-velocity zone</td>
<td>Yes</td>
</tr>
<tr>
<td>1.3</td>
<td>Building located near area impacted by frequent storm drainage overflows</td>
<td>No</td>
</tr>
<tr>
<td>1.1</td>
<td>Building located in Community Encroachment Area</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Flood Risk Property Score = 347 x 1.3 = 451**
## Risk Reduction Recommendations

<table>
<thead>
<tr>
<th>Technique</th>
<th>Recommendation</th>
<th>BCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Buyout</td>
<td>Highly Effective</td>
<td>2.636314</td>
</tr>
<tr>
<td>2. Demo Rebuild</td>
<td>Further Evaluation Needed</td>
<td></td>
</tr>
<tr>
<td>3. Relocation</td>
<td>Further Evaluation Needed</td>
<td></td>
</tr>
<tr>
<td>4. Buyout Re-Sale</td>
<td>Highly Effective</td>
<td>4.111281</td>
</tr>
<tr>
<td>5. Elevation</td>
<td>Highly Effective</td>
<td>6.913485</td>
</tr>
<tr>
<td>6. Fill Basement</td>
<td>Highly Effective</td>
<td></td>
</tr>
<tr>
<td>7. Dry Floodproofing</td>
<td>Further Evaluation Needed</td>
<td></td>
</tr>
<tr>
<td>8. Wet Floodproofing</td>
<td>Not Recommended</td>
<td></td>
</tr>
<tr>
<td>9. Audible Flood Warning</td>
<td>Highly Effective</td>
<td></td>
</tr>
<tr>
<td>10. Storm Water Detention Facilities</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Priority Factors</td>
<td>Mitigation Techniques That Apply*</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Life and human safety</td>
<td>1, 3, 4</td>
</tr>
<tr>
<td>2.</td>
<td>Cost Effectiveness (Benefit-Cost Ratio)</td>
<td>1, 3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>3.</td>
<td>Proximity to other mitigation projects</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>4.</td>
<td>Property added to flood zone</td>
<td>Any</td>
</tr>
<tr>
<td>5.</td>
<td>Repetitive loss structure</td>
<td>Any</td>
</tr>
<tr>
<td>6.</td>
<td>Property adjacent to publicly owned land</td>
<td>1, 3, 4</td>
</tr>
<tr>
<td>7.</td>
<td>Property located on five-year planned greenway trail</td>
<td>1, 3, 4</td>
</tr>
<tr>
<td>8.</td>
<td>Property located on five-year planned sanitary sewer route</td>
<td>1, 3, 4</td>
</tr>
<tr>
<td>9.</td>
<td>Property intersects with major system water quality buffer (Buffer that is ≥ 100’)</td>
<td>1, 3</td>
</tr>
<tr>
<td>10.</td>
<td>Property located in an Environmental Focus Area</td>
<td>1, 3</td>
</tr>
<tr>
<td>11.</td>
<td>Property covered by NFIP policy</td>
<td>Any</td>
</tr>
<tr>
<td>12.</td>
<td>Historic preservation and cultural asset protection</td>
<td>3, 5, 7, 8</td>
</tr>
<tr>
<td>13.</td>
<td>Other</td>
<td>Any</td>
</tr>
<tr>
<td></td>
<td>Total Flood Mitigation Priority Score</td>
<td></td>
</tr>
</tbody>
</table>
Measuring Risk Reduction

Flood Mitigation History - Risk Pool

- Potential future buyouts: ~750 buildings
- Mitigation Cost:
  - <$250/Point: 19%
  - $250 - $500/Point: 17%
  - $500 - $1,000/Point: 15%

Residual Risk and Floodproofing
Flood Mitigation Actions & Buyouts
<table>
<thead>
<tr>
<th>Program</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEMA Mitigation Grants (Buyouts, Elevation)</td>
<td>1999</td>
</tr>
<tr>
<td>QuickBuy Program (post-flood)</td>
<td>2003, 2008, 2011</td>
</tr>
<tr>
<td>Local Risk-Based Buyouts</td>
<td>2012</td>
</tr>
<tr>
<td>Flood-proofing building retrofits</td>
<td>2015</td>
</tr>
</tbody>
</table>
Protecting Life & Property

Since 1999

- Removed from Floodplain:
  - Over 320 buildings/homes
  - Over 550 families
- Floodplain restored:
  - 150 acres
- Actual Damage Avoided:
  - 100’s buildings
  - ~$25M in losses avoided
- No Disaster funding
Since 1996

- Creek Use Policy
- CIP Projects
  - Over 20 Floodplain miles
  - Over 550 families
- Development Ordinances
  - Buffers
  - LID & Post-Construction Controls
- Stream Walks
  - 280 miles per year
Residential Neighborhoods
Apartments
Urban Redevelopment
Quick Buy

Opportunity:
- Reduce future flood losses
- Acquire for less than pre-flood market value
- Provide flood victims an option
- Provide the County with contiguous land
Measuring Results

INVESTMENT/COST (ACT)

FUTURE LOSSES AVOIDED (EST)

$0M $20M $40M $60M $80M $100M $120M $140M $160M


$58M $306M $286M $272M