Myths and Facts About Hurricane Evacuation Modeling

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COLLABORATIVE EFFORT TO PROJECT THE NEXT TEN YEARS OF GROWTH
Potential Outcomes for Ten Year Allocation

• Maintain the current allocation
• Decrease the allocation
• Re-distribute the allocation based on vacant land analysis
• Revise evacuation policies
• Expand mitigation approaches
STATUTORY

– Chapter 380.0552(9)(a)2., F.S.
  • Goals, objectives, and policies to protect public safety and welfare in the event of a natural disaster by maintaining a hurricane evacuation clearance time for permanent residents of **no more than 24 hours**.

– Principles for Guiding Development

– Chapter 163.3177, F.S.
  • Limit public expenditures that subsidize development of CHHA.
Past Efforts in the Keys

• Monroe County adopted 30-hour standard in the Comprehensive Plan with the long term goal to achieve 24 hours.

• Comprehensive Plan was challenged and the Final Order found that the maximum acceptable clearance time should be 24 hours.

• 24 Hours was consistent with forecasting capability
Stipulated Settlement Agreement

- Hurricane Carrying Capacity Concept
- Limit development based on ability to evacuate
- Provided time to acquire environmentally-sensitive land
- Limited impacts on habitat
- Limited Nutrients
## 20 YEARS OF GROWTH

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site-Built</td>
<td>34,494</td>
<td>44,729</td>
<td>46,185</td>
</tr>
<tr>
<td>Mobile Homes</td>
<td>11,721</td>
<td>6,888</td>
<td>8,768</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>46,215</strong></td>
<td><strong>51,617</strong></td>
<td><strong>52,764</strong></td>
</tr>
<tr>
<td>Hotels/Motels</td>
<td>9,918</td>
<td>15,257</td>
<td>15,697 (8000 rooms)</td>
</tr>
</tbody>
</table>
Changes in Units Over Time

Change in Units from 1990 – 2000

Increase of 5,402 units

Change in Units from 2000 – 2010

Increase of 1,147 units
1992 ROGO

- Allocation percentage based on platted lands
- 255 COUNTY
- 90 KEY WEST
- 345 X TEN YEARS  3450
- 6810 UNITS
- Layton, Key Colony not included
Misconceptions

• Myth: Model is worst case scenario
  – Fact: Model assumes 17,484 dwelling units are vacant
  – 2010 Census indicates there are 20,135 dwelling units that are vacant
    • Occupancy trends indicate decline of 14 percent over 20 years
  – Model assumes all tourists and mobile homes evacuated before the evacuation of permanent population
    • Model and policy assumes mobile home occupants have evacuated contrary to behavioral data
Building Permit Allocations

- Competitive point system
- Guides development toward scarified areas with sewer, paved roads, potable water, electricity, scarified/lack of vegetation
- Limits to number of permits issued annually in hardwood hammock

<table>
<thead>
<tr>
<th>Location</th>
<th>Permits</th>
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</thead>
<tbody>
<tr>
<td>Monroe County</td>
<td>197</td>
</tr>
<tr>
<td>Key West</td>
<td>90</td>
</tr>
<tr>
<td>Marathon</td>
<td>30</td>
</tr>
<tr>
<td>Islamorada</td>
<td>28</td>
</tr>
<tr>
<td>Layton</td>
<td>6</td>
</tr>
<tr>
<td>Key Colony Beach</td>
<td>10*</td>
</tr>
</tbody>
</table>
BASIC FACTS

• Number of evacuating vehicles
• Occupancy rate of site-built units
• Flow rate set by FDOT (how many cars can be processed / how many lanes)

Focus

• Storm characteristics are part of model
• Storm characteristics affect behavioral characteristics
Why a 24-hour evacuation standard?

- Forecasting capability
  - Hurricane warning issued 24 hours prior to landfall
- Tropical force winds occur 8-12 hours prior to landfall
- Forecasting capability
An Evacuating History...

• 2001 – Miller Consulting, Inc. and Florida Department of Transportation (FDOT) conducted the “Florida Keys Hurricane Evacuation Study”
  – Based upon 1990 Census data
  – Clearance Time – 25 hours and 32 minutes
An Evacuating History...

• 2001 Miller Model’s Recommendations
  – Coning/Additional lane(s) on US 1 at a variety of locations
  – Redesign of intersection of Card Sound Road and County Road 905
  – FDOT 5-YEAR PLAN
Flow Rate Improvement

- Clearance time improves by only **one hour** by adding one additional outbound lane in Islamorada (MM. 85-90), Key Largo and Florida City.
  - Road widening – environmental, community character
  - Transportation Management – reverse laning/temporary lanes require significant setup time (6-10 hours)
  - 18 Mile stretch law suit
An Evacuating History...

- 2003 Miller Model Update
  - Using the same parameters of 2001 Miller Model, clearance time is approximately 24 hours
  - Phased evacuation
An Evacuating History...

• 2005
  – Scenarios from this model had clearance times ranging from 18 – 35 hours

• Local Governments in Florida Keys* adopt phased evacuation approach

*Except for the City of Key West
Phased Evacuation

Tourists Ordered to Evacuate

- 48 hours before
- Mobile Home Residents Ordered to Evacuate
- 30 hours before
- Site-built Home Residents Ordered to Evacuate
- 24 hours before
- Predicted Tropical Storm Force Winds

- 18 hours before
- 12 hours before
- 6 hours before
- 0 hours before
An Evacuating History...

- 2009 – Florida Keys Hurricane Evacuation Technical Focus Group convenes
  - Discusses static versus Dynamic models;
  - Roadway links and sustainable capacity;
  - utilization of the DEM or Miller Model
An Evacuating History...

- 2010 – present – Statewide Regional Evacuation Study Program and the Transportation Interface for Modeling Evacuations (TIME) Model
  - New uniform statewide model for hurricane evacuation
  - Has been “adjusted” to conform to the unique constraints and factors regarding evacuation in Florida Keys
- Shift from Miller Model to TIME Model
  - Be more uniform with state
  - Best available data and technology for hurricane modeling
Current Clearance Times

• From DEM TIME Model scenarios
  – For phased evacuation:
    • Tourists and mobiles homes – 17 hours
    • 70% participation for permanent population – 22 hours and 30 minutes
    • 100% participation for permanent population – 31 hours
Modeling Assumption Conflicts

• Phased Evacuation
  – Under 380.0552(9)(a)2., Florida Statutes, the permanent population must be evacuated within 24 hours

• Terminus
  – Unlike rest of the state, terminus for evacuation for the Florida Keys is Florida City in Miami-Dade County, not the County line

• 2015 Roadway Improvements
  – Shoulder Improvements
  – Not included in TIME Model
  – FDOT – use as evacuation lanes (as reflected in Reid Ewing’s report)
  – DEM – use as lanes for disabled vehicles
• US Constitution
  – 5th Amendment
    • No person shall . . . be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

• Florida Constitution
  – Article X Section 6
    • No private property shall be taken except for a public purpose and with full compensation therefore paid to each owner or secured by deposit in the registry of the court and available to the owner.
Regulatory Takings

• Deprive the owner of all economically beneficial use of land
• Build Out Analysis
• Vacant lots increase local government exposure to liability claims for taking of land
Balancing Public Safety and Private Property Rights

Balancing Act

Private Property Rights

Public Safety
Thank you... Questions?