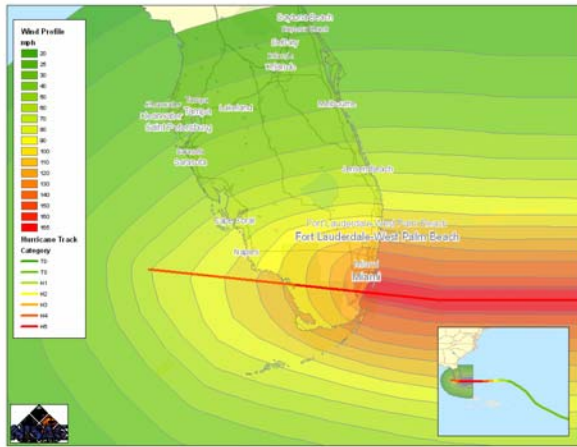




# Office of Infrastructure Protection Miami Area Hurricane Analysis Summary



## Storm Characteristics

- Category 5
- Maximum sustained winds >150 mph
- Estimated storm surge of 16 feet
- Landfall: Miami, FL
- Major cities most impacted: Miami, Fort Lauderdale, West Palm Beach, Homestead, and Naples (all in FL)

		Population	
<b>Population within Potential Surge Zones</b> (depth of water estimated in residential areas)	> 10 feet	0.45 M	
	> 5 feet	1.1 M	
	In any surge	1.7 M	
<b>Population Impacted by Potential Power Outages</b> (widespread power outages expected in Miami area, localized outages expected Orlando, Kennedy Space Center, Tampa) Times to restoration are after damage assessment	Affected	5 M	
	10 days	80% restored	
	2 weeks	Fully restored	
Estimated Economic Impacts			
Direct costs for business interruptions		\$3 - 5 billion	
Total costs for business interruptions		\$9 -15 billion	
Facilities / Issues of Interest			
<b>Population</b> (large population in areas of projected flooding and power outage)	<ul style="list-style-type: none"> <li>• Surge likely in populated coastal areas</li> <li>• Approximately 50% of residents in surge are either &lt;12 years old, &gt;65, or below poverty line</li> </ul>		
<b>Expected Major Airport Closures</b> (surge inundation likely to cause lengthy closures)	<ul style="list-style-type: none"> <li>• Miami Intl; Fort Lauderdale Intl</li> <li>• Most traffic can be accommodated by alternative regional airports</li> <li>• Resultant changes in hubs increased pass-through traffic in Houston, St Louis</li> </ul>		
<b>Commodity Transportation</b> (precautionary measures limit damage)	<ul style="list-style-type: none"> <li>• Port of Miami, damage to roofs, cruise terminals and warehouses</li> </ul>		
<b>Water and Wastewater Treatment Facilities</b> (impacted by storm surge)	<ul style="list-style-type: none"> <li>• Two water filtration and seven wastewater treatment plants expected to be impacted by storm surge. Power disruptions expected to be &lt; 4 days</li> </ul>		

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## Impacts by Infrastructure Sector

Infrastructure	Level	Impacts	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span> -Low	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span> -Medium	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">H</span> -High
Ag: Production	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>Potential increase energy costs for continued trajectory into the impacts the cost of production of major grain crops, corn in particular</li> <li>Hurricanes and tropical storms are major factors in the spread of crop diseases</li> </ul>			
Ag: Food Distribution	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>Potential for impacts due to the long-term power outage, potential degradation in transportation capacity and high-density population in the impacted areas</li> </ul>			
Banks & Finance	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>No long-term impacts expected due to backup systems</li> </ul>			
Chemical: Plants	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>Minor impacts expected. Temporary loss of ammonia phosphate production in Tampa area expected to be mitigated by stockpiles</li> </ul>			
Commercial Facilities	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>Damage expected to Port of Miami, impact to cruise lines</li> </ul>			
Dams	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>A 16,000 square mile flood control project, the Central and Southern Florida Project, is operated and maintained by the United States Corps of Engineers and the South Florida Water Management District</li> </ul>			
Defense Industrial Base		<ul style="list-style-type: none"> <li>Not analyzed</li> </ul>			
Emergency Services	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>Emergency response delays expected due to transportation, electrical power, and telecommunications disruptions</li> <li>Communications disruptions could impact 911 service</li> </ul>			
Energy: Electric Power	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">H</span>	<ul style="list-style-type: none"> <li>Widespread power outages expected in Miami, Fort Lauderdale</li> <li>Localized outages expected in Orlando, Tampa</li> <li>80% restoration 10 days after damage assessment (Coastal areas first)</li> <li>Full restoration 2 weeks after damage assessment</li> </ul>			
Energy: Natural Gas	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>No major impacts expected for natural gas pipelines or LNG sites</li> </ul>			
Energy: Petroleum	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>Impacts may be locally or regionally significant</li> </ul>			
Government Facilities	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>Impacts may be locally or regionally significant</li> </ul>			
Information Technology	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>Impacts may be locally or regionally significant</li> </ul>			
National Monuments	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>Impacts may be locally or regionally significant</li> </ul>			
Nuclear Facilities	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">L</span>	<ul style="list-style-type: none"> <li>One nuclear power plant located within potential surge zone: Turkey Point Units 3-4</li> <li>These units are also within the 75-100 percent power outage zone</li> </ul>			
Postal & Shipping	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>Expect delays due to transportation impacts</li> </ul>			
Hospitals & Nursing Homes	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>Evacuations and potential closure of some facilities in impacted area will increase demand on neighboring regional facilities</li> </ul>			
Telecomm: Wireline	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">H</span>	<ul style="list-style-type: none"> <li>Expect damage to telecommunications infrastructure (poles and overhead lines)</li> <li>Restoration of full service may take weeks</li> </ul>			
Telecomm: Wireless		<ul style="list-style-type: none"> <li>Not analyzed</li> </ul>			
Transport: Road/Rail	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">H</span>	<ul style="list-style-type: none"> <li>Ground transportation impacts due to flooding and debris</li> </ul>			
Transport: Airports	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">H</span>	<ul style="list-style-type: none"> <li>Impacts expected at Miami Intl, Fort Lauderdale Intl. Most traffic can be accommodated by alternative regional airports</li> <li>Resultant changes in hubs increased pass-through traffic in Houston, St Louis</li> <li>Homestead Air Force Reserve Base, at risk for damage and flooding from storm surge; has been used by FEMA as a primary staging point for supplies for this area</li> </ul>			
Transport: Seaports	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>Expect damage or disruption at Port of Miami</li> </ul>			
Water: Drinking Water	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>Two water filtration plants are expected to be impacted by storm surge</li> <li>Power disruptions to water plants expected to be &lt; 4 days</li> <li>Likely need for boil orders and/or bringing water into the area</li> </ul>			
Water: Wastewater	<span style="border: 1px solid black; border-radius: 50%; padding: 2px;">M</span>	<ul style="list-style-type: none"> <li>Seven wastewater treatment plants expected to be impacted by storm surge</li> </ul>			

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