Ensuring Continuing Operation of New York City Area Airports in the Presence of Coastal and Climate Change Hazards

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Overview

- 4 airports
  - LaGuardia
  - John F. Kennedy
  - Teterboro
  - Newark-Liberty

- Coastal flood risk assessments
  - present day and future year 1%-annual-chance events (2025, 2035, and 2055)
  - Flood hazard mapping
  - Flood depth analysis
  - Probabilistic evaluation of potential airport shutdown

- Mitigation strategy development
- Stormwater drainage analysis
Critical Assets

- Infrastructure elements, facilities, and equipment that, if inundated, may limit full airport operation or cause the airport to shut down for at least 24 hours after flood waters have receded.
Flood Risk Assessment

- Present day
  - Leveraged FEMA Region II coastal flood study data
  - Re-delineated using 2013 LiDAR collected by PANYNJ OEM
Sea Level Rise Projections

These curves are based on the 50th and 90th percentile projections published by the New York Panel on Climate Change (2013). Those projections were referenced to a 2000-2004 base period and have been adjusted here so they are referenced to the 2013 base year of the Project.

New York City Panel on Climate Change (2013)
Flood Risk Assessment

- Present day
  - Leveraged FEMA Region II coastal flood study data
  - Re-delineated using 2013 LiDAR collected by PANYNJ OEM
- Sea level rise in future years
  - Direct analysis approach applied to modify present day flood study data
- Wave hazards evaluated at LGA & JFK
- Flood depths and inundation frequencies established for each critical asset
Flood Hazard Mapping (JFK)

Present Day
Flood Hazard Mapping (JFK)

Upper SLR Projection at 2055

Flood Hazard Assessment for John F. Kennedy International Airport
Jamaica, New York

Flood Hazard Mapping
1% Annual Chance Event
Future Year 2055 - 90th Percentile SLR
Critical Assets - All Features

Legend
- JFK Study Boundary

Flood elevations are labeled in feet referenced to NAVD88.

Flood Hazard Areas
- 1% annual chance FHA, wave height > 3 ft
- 1% annual chance FHA
- 1% to 0.2% annual chance FHA

Notes:
- This figure displays flood hazard areas for the Future Year 2055, 90th percentile SLR 1% annual chance coastal flood event
- Flood elevation indicates the level of flooding in a given area measured in feet, referenced to NAVD88
- Mapping shown in this figure is not intended for regulatory or flood insurance purposes. Inundation areas are intended specifically for use in the Flood Risk Assessment for John F. Kennedy International Airport. Please see the local Flood Insurance Rate Map for official flood zone designations.
Minimum Asset Failure Probability (JFK)

- Given the range of potential flood elevations and corresponding frequencies, what is the annual probability that a critical asset will be impacted?

<table>
<thead>
<tr>
<th>Sea Level Rise Condition</th>
<th>Estimated Minimum Asset Failure Probability</th>
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<tr>
<td>Present Day (2013)</td>
<td>7%</td>
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<tr>
<td>No SLR</td>
<td>not applicable</td>
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<tr>
<td>Median Projection</td>
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<tr>
<td>Upper Projection</td>
<td>not applicable</td>
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</tbody>
</table>

Future Year

- 2025: 7%
- 2035: 9%
- 2055: 28%
Key Flood Risk Assessment Conclusions

- **Teterboro**
  - Nearly entire airport is inundated for present day 1%-annual-chance event

- **LaGuardia**
  - Perimeter dike is ineffective for present day 1%-annual-chance event
  - Wave hazards worsen in future years
LaGuardia Airport – Perimeter Dike
Key Flood Risk Assessment Conclusions

- **Teterboro**
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- **John F. Kennedy**
  - Significant jump in inundation by future year 2055 relative to other airports
  - Subsurface backwater flooding issues

- **Newark Liberty**
  - To be determined…
Next Steps: Mitigation Strategy Development
Thank you for your time!

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