



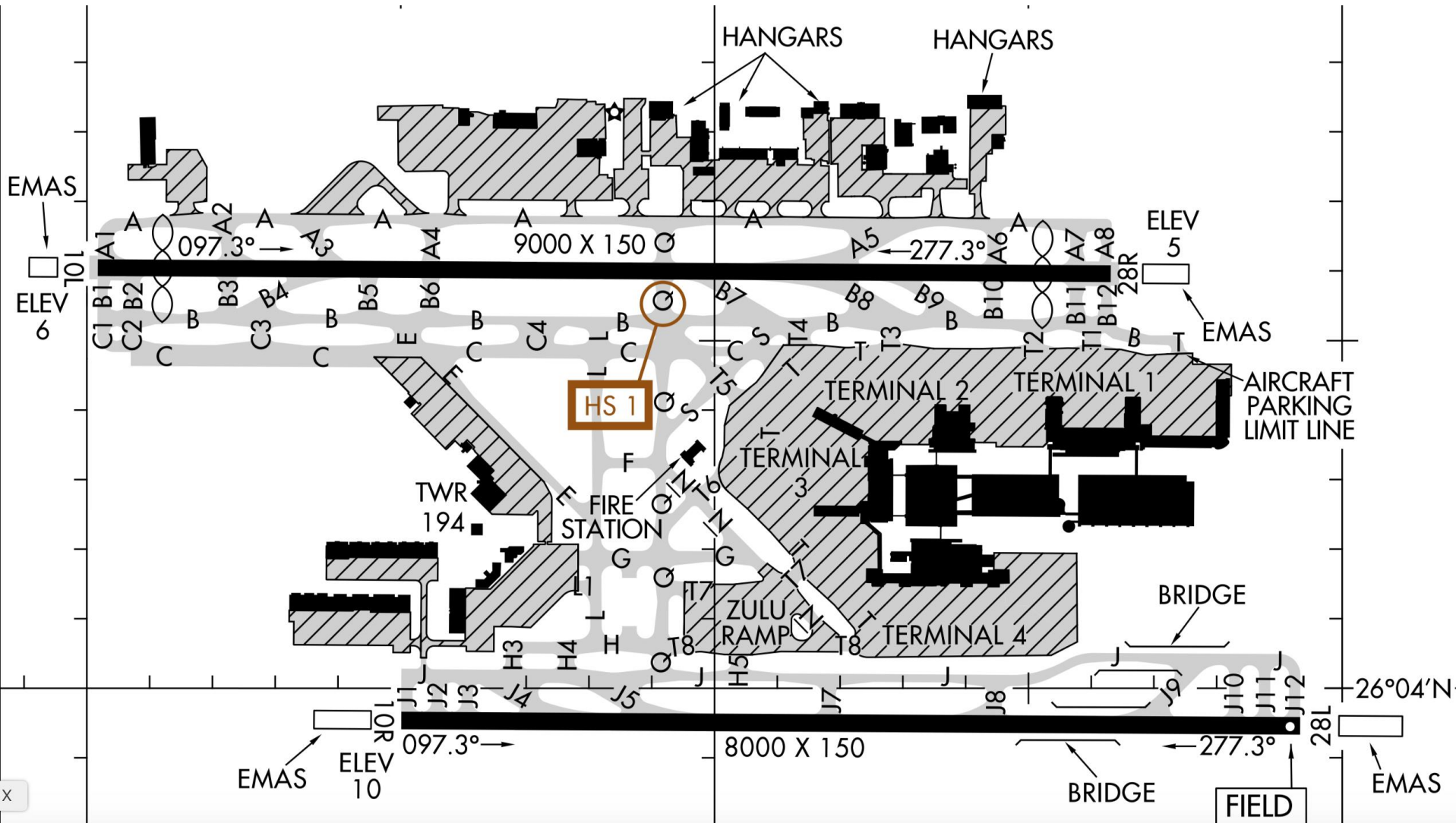
Weston Noise Analysis



JDA Aviation Technology Solutions
January 20, 2021



Fort Lauderdale Airport Diagram





Key Findings

- 29.6% of FLL Arrivals overfly Weston
- FLL operates in East flow 80% of the time (impacting Weston with straight in approaches)
- Most arrivals to Weston are flying below the altitude dictated by a 3 degree glideslope approach angle
- 94.2% of FLL Operations are Wake Vortex D and E Aircraft (large regional aircraft) on the lower end of the sound exposure level curves.
- 18% of FLL arrivals occur at night
 - 20% of FLL nighttime arrivals execute a trombone approach
 - 80% of FLL nighttime arrivals fly straight in approaches from west
 - 73.5% of nighttime Arrivals occur on runway 10L – the runway with higher impact on Weston residents
 - ILS Approach to 10L involved low altitude flights over Weston (2,200-2,500 feet)
- FLL operations are forecast to grow 48% by 2040

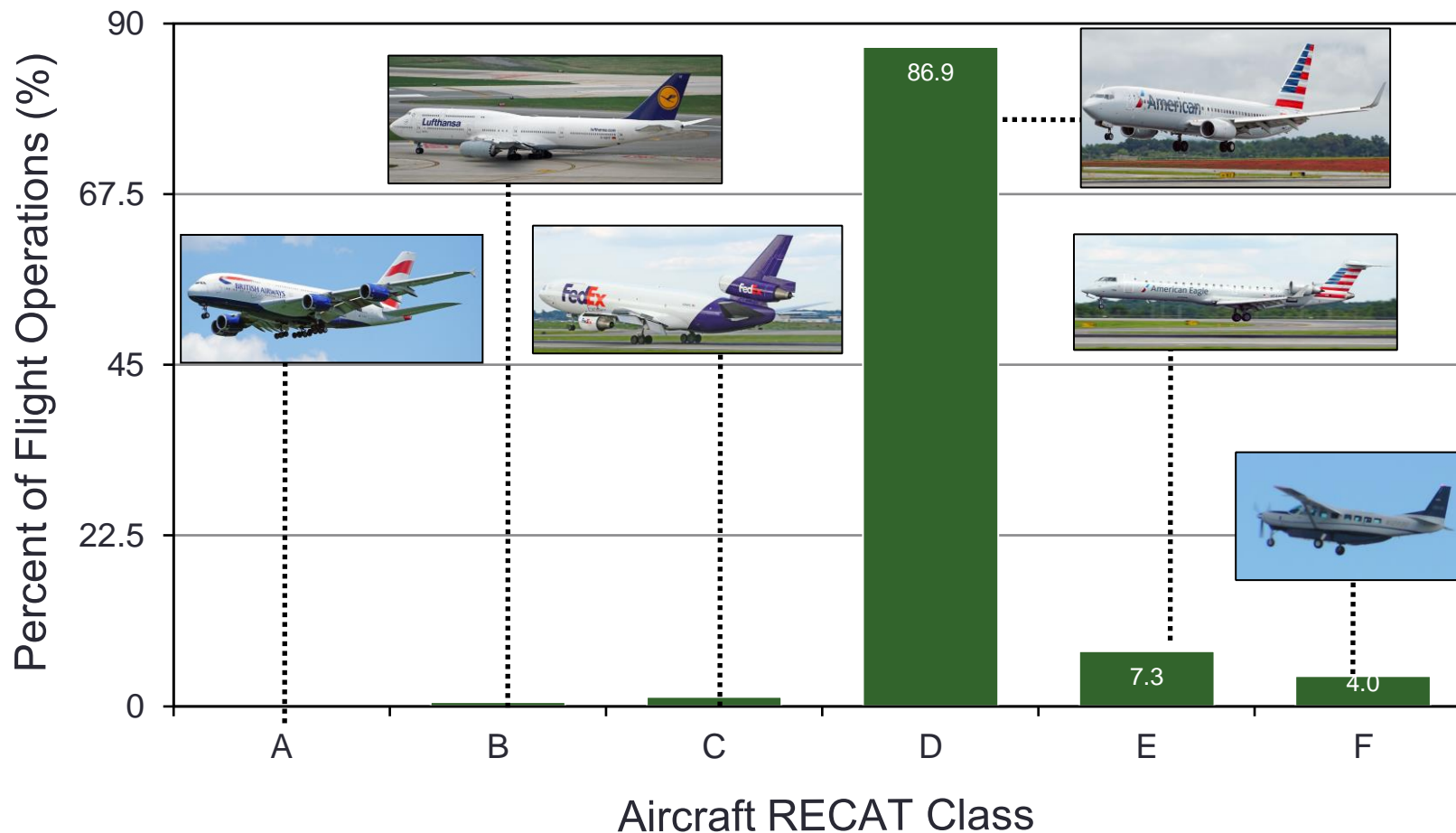


Recommended Mitigation Options

4. Raise Arrival Altitudes over Weston to a 3 degree or 3.5 degree glide slope
6. Utilize the RNP/RNAV approach to FLL when possible
8. Use Vectoring and standard trombone approaches to disperse traffic over larger areas



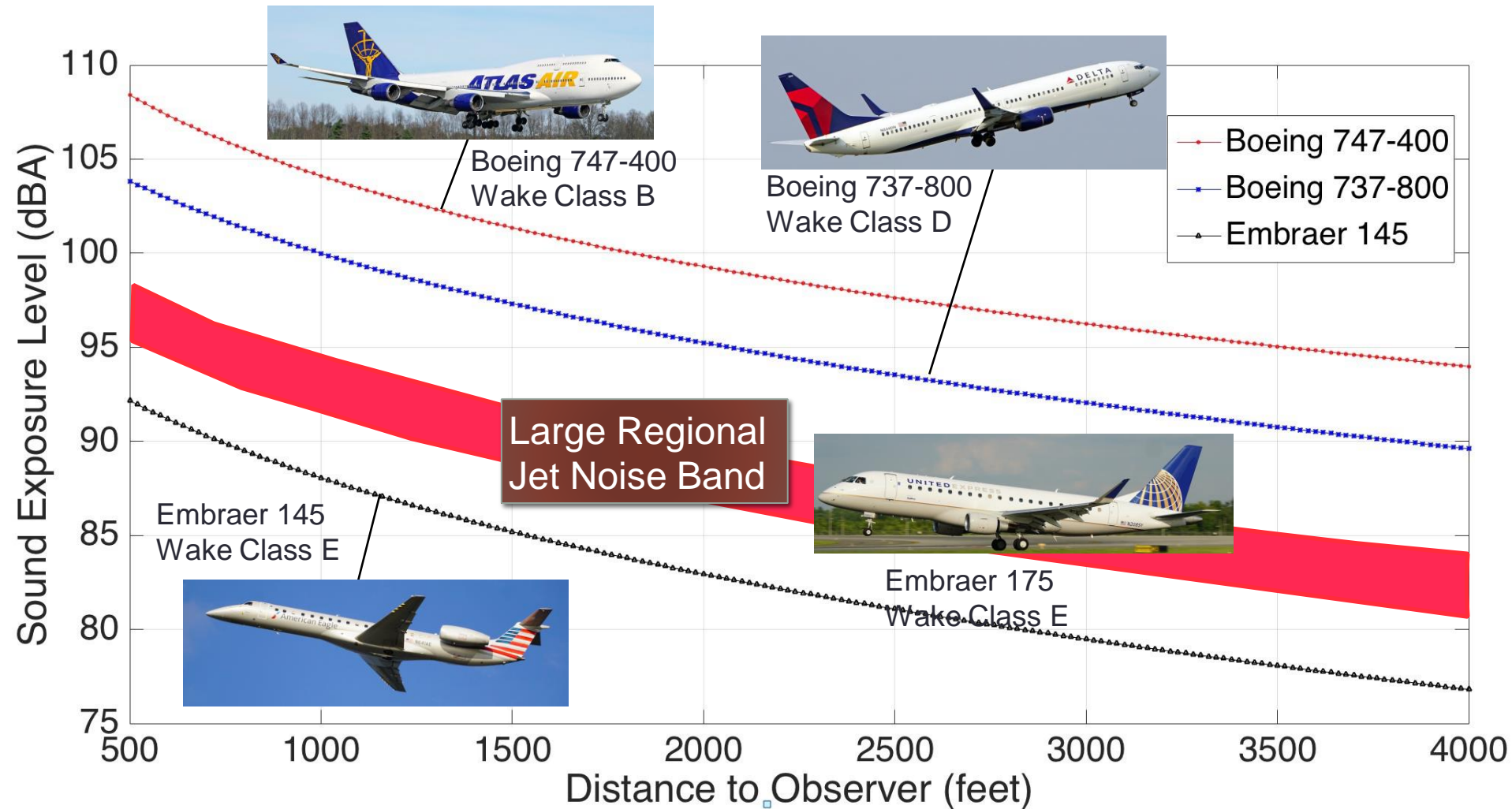
94.2% of the Operations at FLL International are Wake Vortex Classes D and E



Data Source: Virginia Tech/FAA Landing Events Database



Larger Aircraft Generate More Noise than Smaller Aircraft

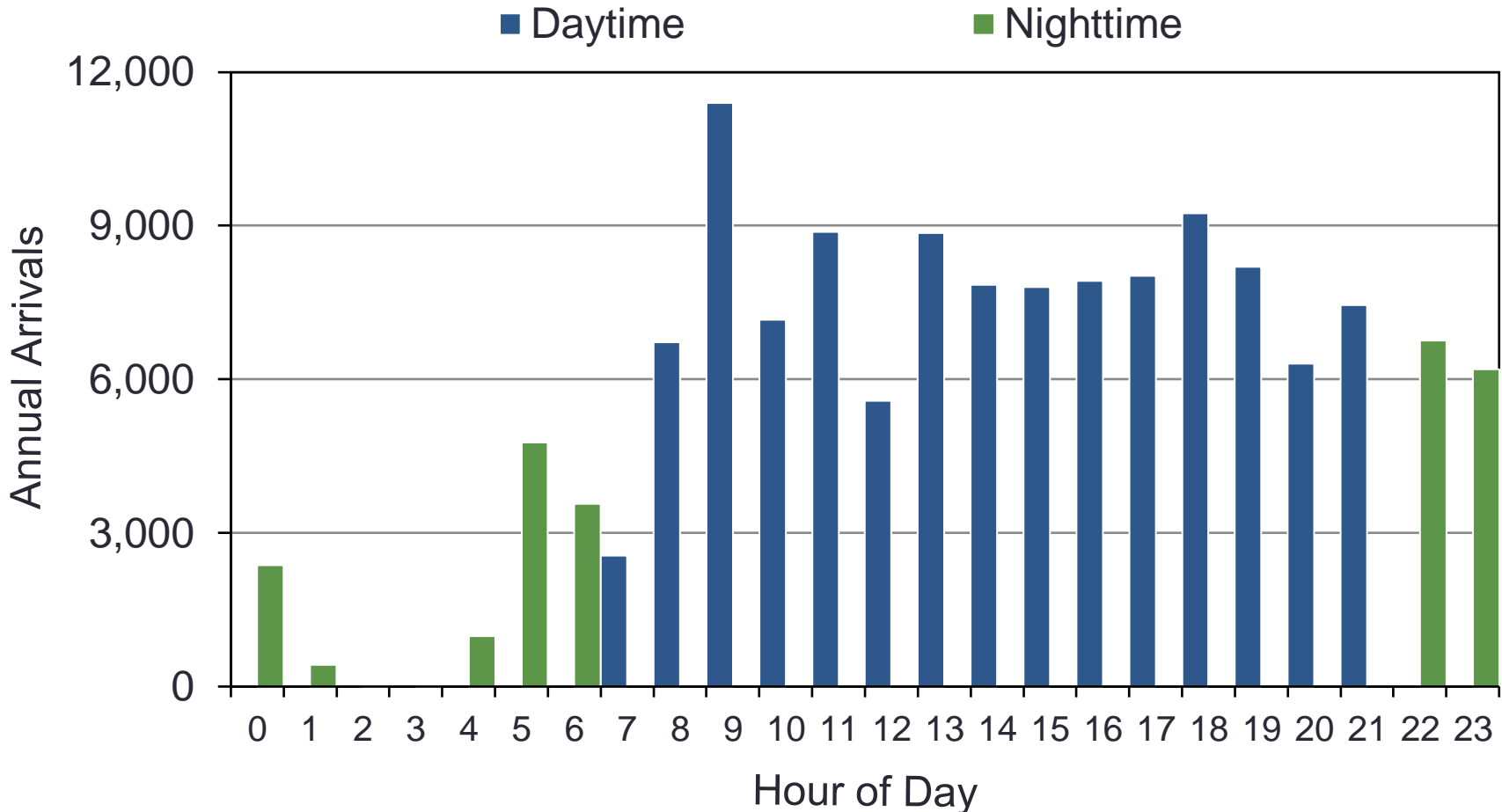


Departure Noise Levels

source: FAA Noise Model (AEDT 3d)



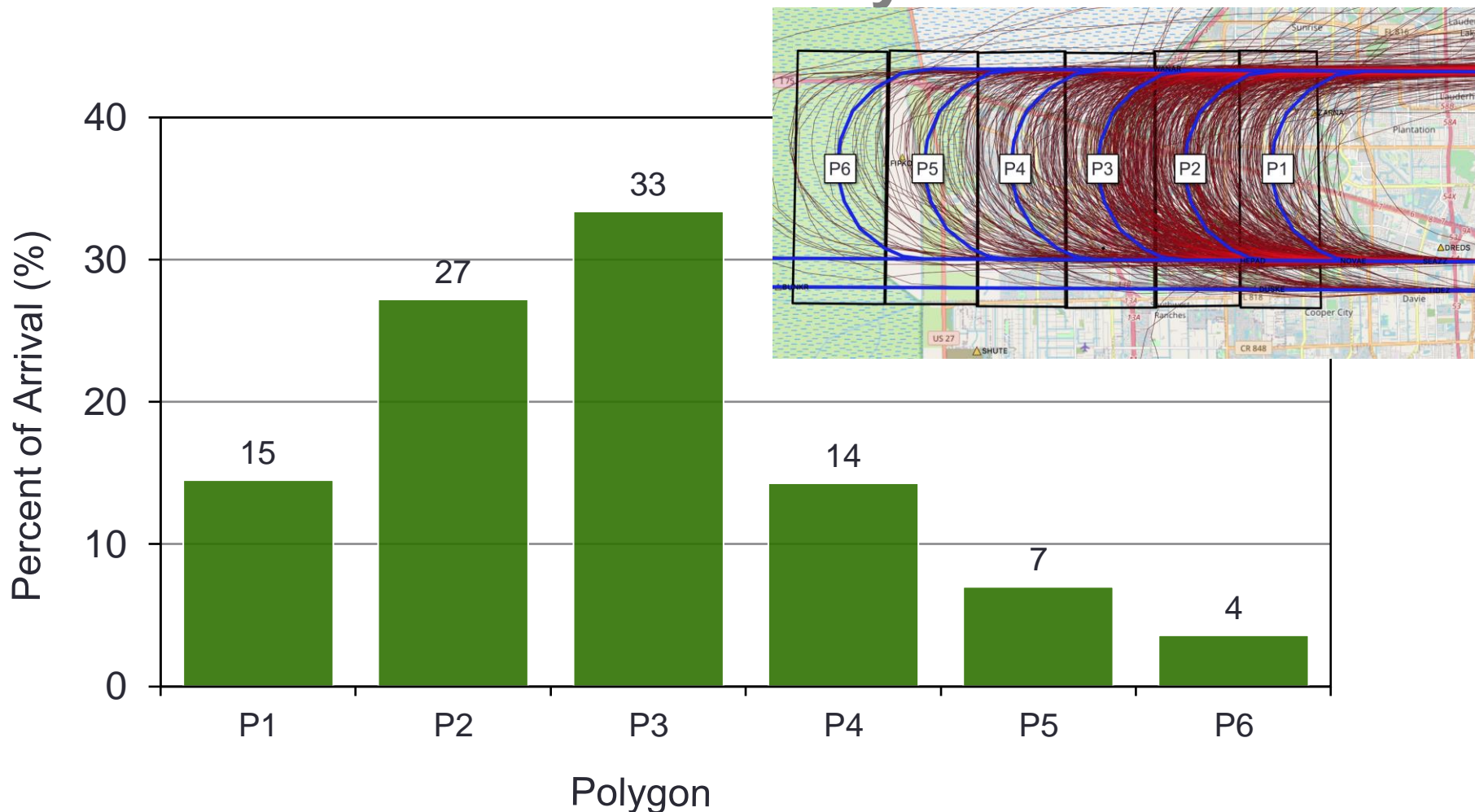
18% of the Arrival Operations at Fort Lauderdale are Nighttime Events



Source: FAA ASPM Data (year 2019)



29.6% of the Arrival Operations at Fort Lauderdale Overfly Weston



Source: FAA ASPM Data (year 2019)



Flight Patterns over Weston



Flight Track Data

- Collected from FAA and Flightaware
- A sample of five days available (> 5000 flights)
- Data is used to validate the South-Central Florida Metroplex proposed flight tracks
- Selected July 2019 days (July 20-21, 2019)
- Selected the month of July to observe lateral dispersion of flights subject to higher temperatures (i.e, reduced climb rates)
- Flight track data shows large dispersion of flight tracks
- **Detailed flight tracks collected extend up to the I-75 corridor or the East boundary of the City of Weston**
- Flight tracks show detail of overflight altitudes up to the I-75 corridor and 2 miles to the East
- Overflight altitudes over the City of Weston will be 200-500 feet higher depending upon the location of the observer



Review of Procedures Modeled in Metroplex Study



Current Departure Procedures that Affect Weston

Procedure	Overflights	Track Dispersion over Weston	Estimated Overflight Altitude (feet)	Potential Noise Impact	Number of Tracks Modeled (East Flow)	Overflight Tracks over Weston (East Flow)
WAVUN RNAV	Yes	High	2500-3800	High	446	228
CURSO RNAV	Yes	Moderate	3000-4000	High	145	110
BLUFI Conventional STAR	Yes	High	2500-3800	Low (due to low use of this procedure)	44	30
JINGL RNAV	Yes	High	3000-4000	High	579	439
DVALL Conventional STAR	Yes	Low	3000-4000	Low (due to low use)	79	52
DEKAL Conventional STAR	Yes	High	2500-3800	Moderate	229	22



Current Departure Procedures that Affect Weston

Procedure	Overflights	Track Dispersion over Weston	Estimated Overflight Altitude (feet)	Potential Noise Impact	Number of Tracks Modeled (East Flow)	Overflight Tracks over Weston (East Flow)
GISSH Conventional STAR	Yes	High	2500-3800	Low (due to low use)	86	22
FORTL Conventional STAR	Yes	Moderate	3000-4000	High	370	307
FISEL RNAV	Yes	High	2500-3800	Very High	908	288
Conventional Arrivals from the West	Yes	Moderate	3000-4000	Moderate (due to moderate use of procedure)	65	50
Conventional Arrivals from the North	Yes	High	2500-3800	Moderate (due to moderate use of procedure)	113	26
Conventional Arrivals from the East	Yes	High	2500-3800	Moderate (due to moderate use of procedure)	56	16



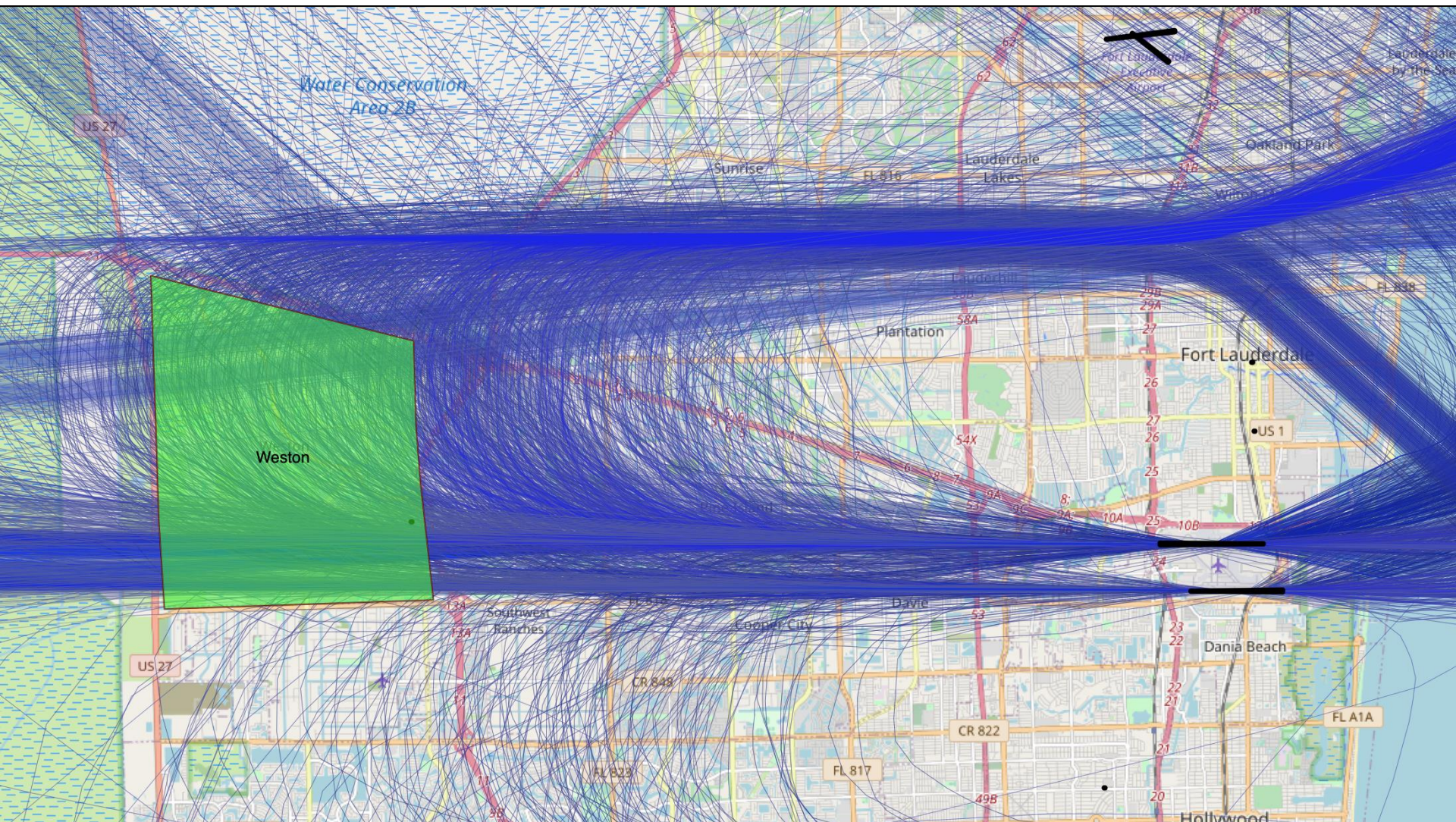
Observations

According to the South-Central Florida Metroplex Project:

- Future arrival flight tracks over the City of Weston will include many RNAV routes
- RNAV arrival routes concentrate the flight tracks over a smaller land area
 - Benefit: affect fewer population block groups on the ground
 - Dis-benefit: increase the noise levels for fewer people on the ground. This may cause more complaints among the groups affected.
- **In the future, the population in the City of Weston that lies in the straight-in arrival to runway 10L is likely to perceive higher noise levels compared to today.**



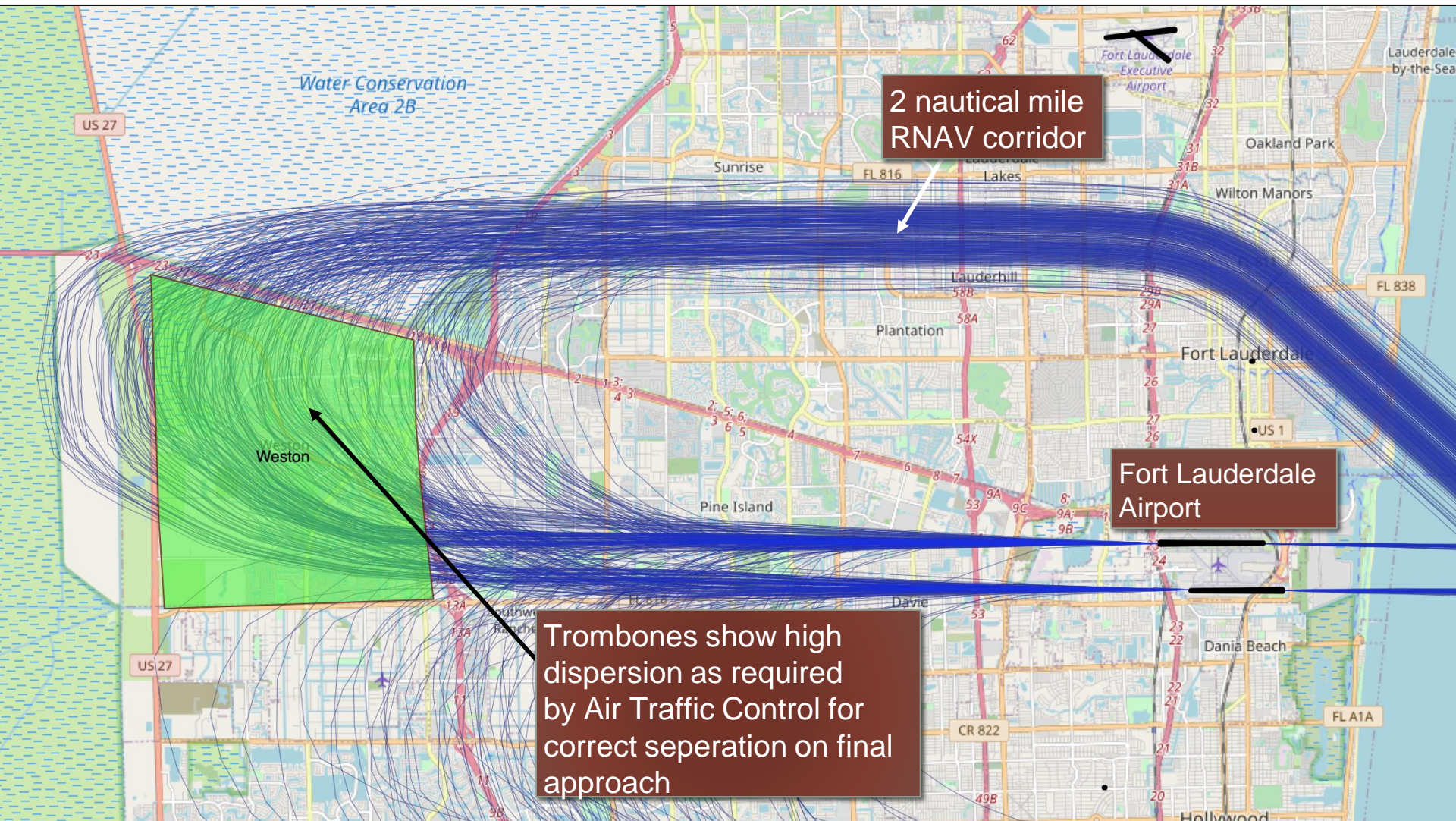
Future Fort Lauderdale Airport Flight Tracks over Weston



Source: South-Central Florida Metroplex Project



OLAHS Fort Lauderdale Airport RNAV Standard Terminal Arrival



Source: South-Central Florida Metroplex Project



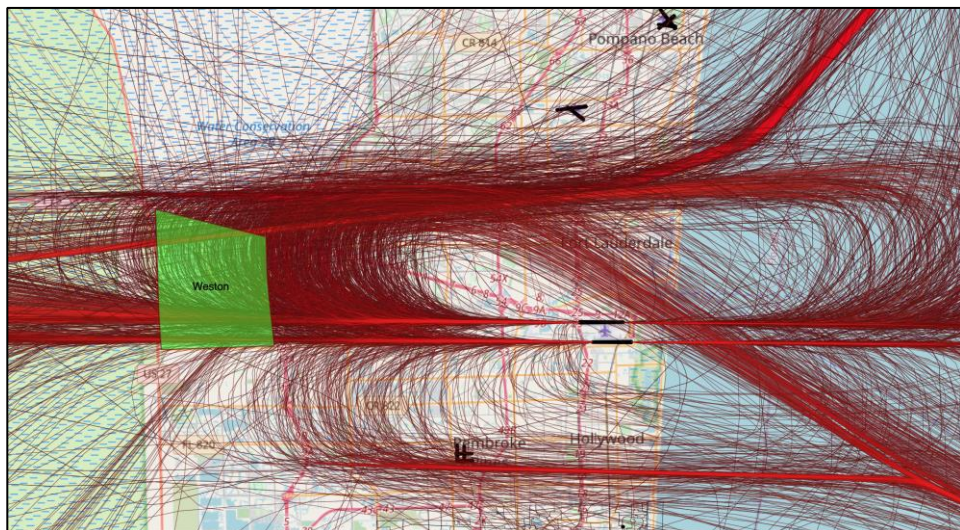
Future Arrival Procedures that Affect Weston

Procedure	Overflights	Track Dispersion over Weston	Estimated Overflight Altitude (feet)	Potential Noise Impact	Number of Tracks Modeled (East Flow)	Overflight Tracks over Weston (East Flow)
BAHIA RNAV	Yes	<i>Low</i>	<i>3000-4000</i>	<i>Moderate</i>	<i>208</i>	<i>176</i>
OLAHS RNAV	Yes	<i>High</i>	<i>2500-3800</i>	<i>High</i>	<i>406</i>	<i>204</i>
CUUDA RNAV	Yes	<i>High</i>	<i>2500-3800</i>	<i>High</i>	<i>897</i>	<i>299</i>
TEEKY RNAV	Yes	<i>Low</i>	<i>2500-3800</i>	<i>High</i>	<i>571</i>	<i>436</i>
TARPN RNAV	Yes	<i>High</i>	<i>2500-3800</i>	<i>Low (due to low use)</i>	<i>44</i>	<i>4</i>
Conventional Arrivals from the West	Yes	<i>Moderate</i>	<i>3000-4000</i>	<i>Moderate (due to moderate use of procedure)</i>	<i>65</i>	<i>50</i>
Conventional Arrivals from the North	Yes	<i>High</i>	<i>2500-3800</i>	<i>Moderate (due to moderate use of procedure)</i>	<i>200</i>	<i>49</i>
Conventional Arrivals from the East	Yes	<i>High</i>	<i>2500-3800</i>	<i>Moderate (due to moderate use of procedure)</i>	<i>56</i>	<i>15</i>

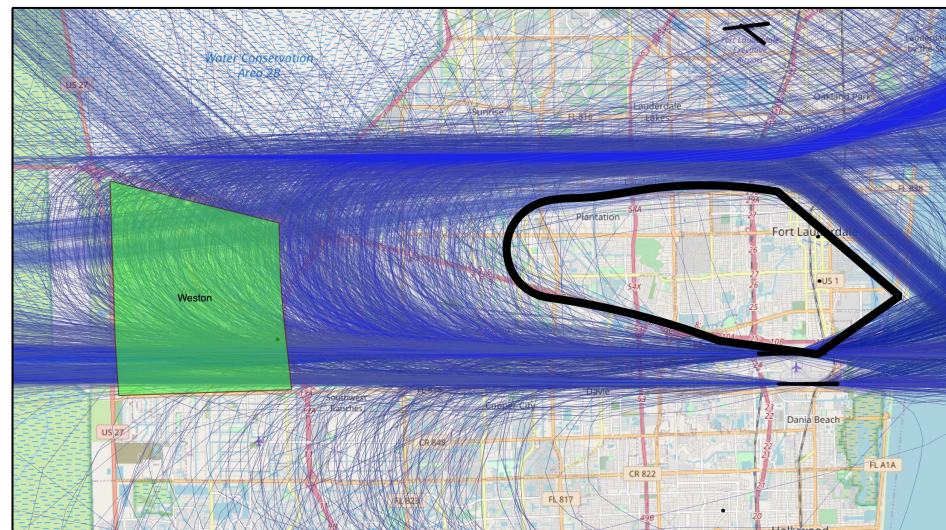


Assessment of Flight Tracks from Metroplex Study

- **Baseline case**
 - 51.0% of the modeled flight tracks overfly Weston
- **Future Metroplex plan**
 - 50.5% of the modeled flight tracks overfly Weston
- Most obvious changes are narrow flight corridors that avoid populated areas to the East of the City of Weston



Existing flight tracks



Metroplex flight tracks



Alternatives to Mitigate Noise for the City of Weston



Noise Mitigation Options for Weston

Alternative	Remarks	Effect on Overflights	Potential Noise Impact	Other Impacts	Modeled in AEDT-3D
Baseline	Do Nothing	None	High	None	Yes
1	Move a high percentage of the flight tracks to the West (over the Everglades)	<p>Reduces overflights for the Northern part of Weston</p> <p>Increases number of overflights for the Southern section of Weston</p>	<p>Reduction in noise levels on the Northeast side of Weston</p> <p>Increased noise levels on the South side of Weston</p>	<p>Increased fuel consumption (135 kilograms per flight typical for narrow-body aircraft)</p> <p>Increased travel time for flights affected (7.5 minutes typical)</p>	Yes
2	Move all downwind flight tracks 2 nm West of the boundary of Weston	<p>Reduces base leg crossover flight tracks over Weston</p> <p>Increases the number of overflights over the South side of Weston</p>	<p>Substantial reduction in noise levels on the North and Middle of Weston</p> <p>Increased noise levels on the South side of Weston</p>	<p>Increased fuel consumption (135 kilograms per flight typical for narrow-body aircraft)</p> <p>Increased travel time for flights affected (7.5 minutes typical)</p>	No

After modeling Alternative 1, we found the noise level changes over Weston would not yield benefits for Alternative 2 (not modeled)



Mitigation Options for Weston

Alternative	Remarks	Effect on Overflights	Potential Noise Impact	Other Impacts	Modeled in AEDT-3D
3	<i>Design arrival procedure to use the I-595 Corridor</i>	<i>Reduces overflights over Weston (some flights still have to transition to 10R)</i>	<i>Reduction in noise levels for Weston Moves noise impact to communities to the North of Weston</i>	<i>Visual or Instrument procedure with very high visibility minima (converging approaches) Requires extensive safety analysis with man-in-the-loop simulations Reduced runway capacity</i>	No
4	<i>Prescribe steeper approaches to runways 10L and 10R</i>	<i>Same number of overflights as baseline case Overflight altitudes increase slightly</i>	<i>Potential Sound Exposure Noise Level (SEL) reduction of 1.5 dBA due to higher flight altitudes over Weston (see graphic on next page)</i>	<i>Increases flyover altitude over Weston Requires longer downwind segments to allow pilots to intercept the glide-slope and have a stabilized approach (adds fuel consumption) Check the case of Lantana, Florida</i>	Yes
5	<i>Vector nighttime arrivals to the West</i>	<i>Provides relief to communities to the West of the airport at night</i>	<i>Overflies over South section of Weston would be impacted with higher DNL noise levels A single nighttime operation is equivalent to 10 daytime operations</i>	<i>Increased fuel consumption (135 kilograms per flight typical for narrow-body aircraft) Increased travel time for flights affected (7.5 minutes typical)</i>	No

Note: During the project, Alternative 4 was implemented by the FAA



Mitigation Options for Weston

Alternative	Remarks	Effect on Overflights	Potential Noise Impact	Other Impacts	Modeled in AEDT-3D
6	<p>Mandate RNP RNAV 10L Procedure for nighttime arrivals (short trombone)</p> <p>See graphic provided of the RNP/RNAV procedure</p>	<p>Reduces overflights over Weston</p> <p>A small number of non-equipped aircraft may not be able to execute the procedure</p>	<p>Reduction in noise levels to all Weston residents because aircraft do not overfly Weston</p>	<p>RNP/RNAV procedure has a higher ceiling minima compared to the ILS 10L procedure</p> <p>ILS minima is 200 feet and 3/4 of a mile</p> <p>RNP/RNAV is 400 feet and 1 nm visibility</p>	No
7	<p>Assign more straight-in arrivals to runway 10R</p> <p>Three of four terminals are located on the North of the airport favoring the use of runway 10L</p>	<p>Overflights landing on runway 10R generate slightly less noise for some areas of Weston (middle and northern section of town)</p>	<p>Small reduction of noise levels for middle and northern areas of Weston</p>	<p>Arrivals to 10R still overfly the souther communities of Weston</p>	No
8	<p>Vector Option and standard trombones</p>	<p>Introduces more randomness to arrivals</p>	<p>Spreads the noise around multiple communities</p>	<p>This alternative attempts to spread noise over larger number of communities</p>	No



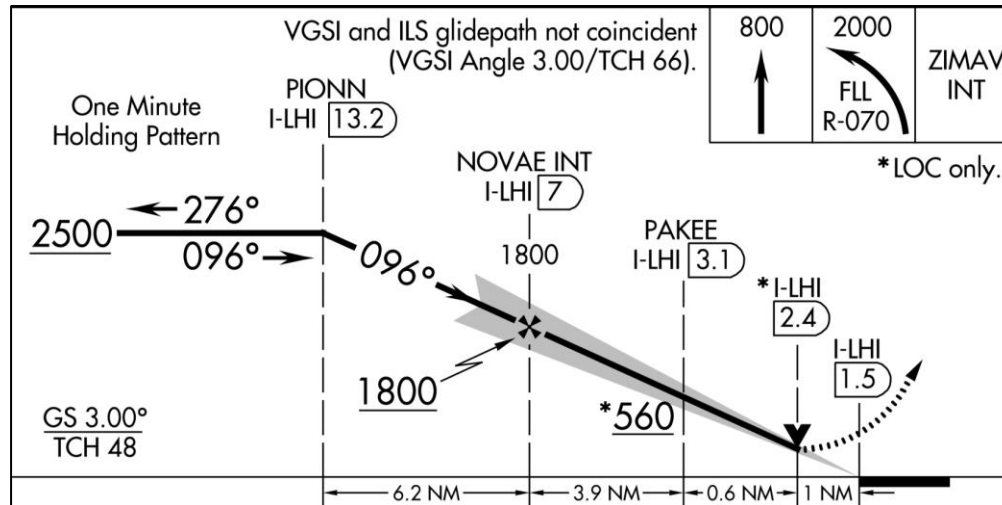
Recommended Mitigation Options

Alternative	Remarks	Effect on Overflights	Potential Noise Impact	Other Impacts	Modeled in AEDT-3D
4	Prescribe steeper approaches to runways 10L and 10R	Same number of overflights as baseline case Overflight altitudes increase slightly	Potential Sound Exposure Noise Level (SEL) reduction of 1.5 dBA due to higher flight altitudes over Weston (see graphic on next page)	Increases flyover altitude over Weston Requires longer downwind segments to allow pilots to intercept the glide-slope and have a stabilized approach (adds fuel consumption)	Yes
6	Mandate RNP RNAV 10L Procedure for nighttime arrivals (short trombone) See graphic provided of the RNP/RNAV procedure	Reduces overflights over Weston A small number of non-equipped aircraft may not be able to execute the procedure	Reduction in noise levels to all Weston residents because aircraft do not overfly Weston	RNP/RNAV procedure has a higher ceiling minima compared to the ILS 10L procedure ILS minima is 200 feet and 3/4 of a mile RNP/RNAV is 400 feet and 1 nm visibility	No
8	Vector Option and standard trombones	Introduces more randomness to arrivals	Spreads the noise around multiple communities	This alternative attempts to spread noise over larger number of communities	No

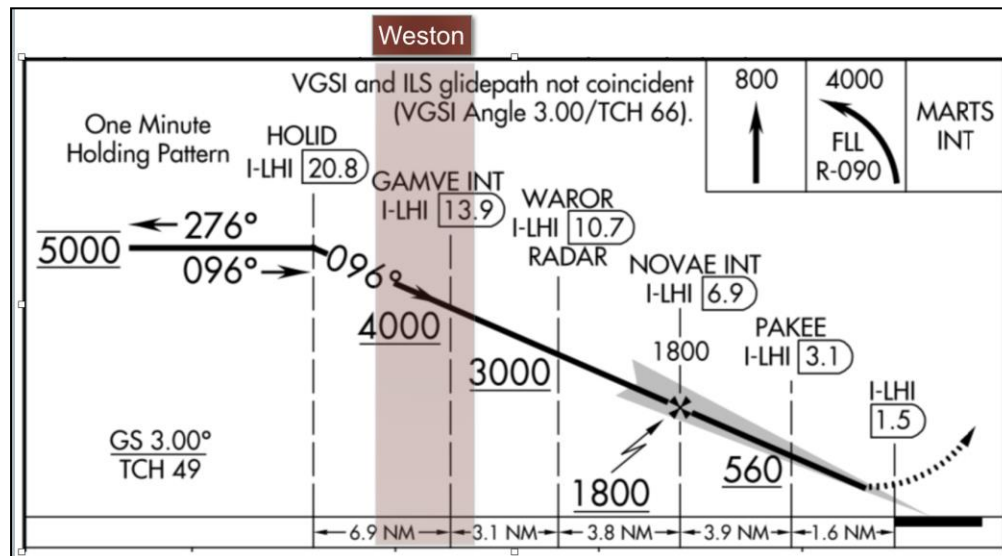
Note: During the project, Alternative 4 was implemented by the FAA



New ILS Arrival Procedure to Runway 10L Reduces Noise Over Weston by Increasing Crossing Altitudes by 1,200 to 1,800 feet



ILS (LOC) 10L June 2021



ILS (LOC) 10L November 2021



Conclusion

- New ILS runway 10L procedures have raised the crossing altitudes over Weston
- The new crossing altitudes at GAMVE (12.4 nm from the runway threshold) is now 4,000 feet
- Using the ILS and RNAV (GPS) approach procedures to runway 10L, aircraft to cross the City of Weston between 4,400 and 3,400 feet
 - Published ILS to runway 10L descent profile has a descent gradient of 325 ft/nm
 - The new altitudes over the City of Weston will help mitigate noise by 1-1.5 dBA
- Weston should also pursue Option 6 and 8 with the FAA during off peak and nighttime hours.