Part 150 Study Technical Review Committee

Meeting #6 | June 8, 2026

Port of Seattle®

TRC Welcome & Roll Call

TRC Members

- Alaska Airlines – Lynae Craig
- Delta Airlines – Kalena Glover
- King County – Susan McLain
- Burien – Liz Stead
- Des Moines – Jason Woycke
- SeaTac – Zack Shields
- Federal Way – Josh Hoff
- Normandy Park – Jeremy Hammar
- Tukwila – Neil Tabor

TRC Liaisons

- FAA
  - Seattle CEO – Sky Laron
  - Western Service Center ATO – Jason Poole
  - Western Service Center ATO – Joe Bert
  - SEA ATO – Rodney Lindbeck
- Port of Seattle
  - Tom Fagerstrom
  - Ryan McMullan
  - Paris Edwards
  - Tom Hooper

Agenda

- Welcome & Roll Call
- Summary of TRC Meeting #5
- Potential NCP Measures
  - Noise Abatement
  - Land Use
  - Program Management
- Project Schedule
- Future Meetings
- Questions

Summary of TRC Meeting #5

- Summary of Draft NEM Workshops and Stakeholder Outreach
- NCP Overview
  - Review and approval of NCP measures
  - 2014 Part 150 Study NCP recommendations
- NCP Working Session
  - Brainstorm noise abatement, land use, and program management measures
- Update on Project Schedule

Stakeholder Suggested NCP Measures

Noise Abatement

- Reduce nighttime flights/ noise
- Better disperse arrival and departure noise
- Reduce use of third runway (16R/34L)
- During south flow, increase departure aircraft altitudes before turning
- Move traffic over Eliott Bay
- Noise barriers
- Preferential runway use
- Steeper approach angles
- OPDs
- Incentivize procedure use by quieter aircraft
- Offset approaches
- Airspace study for efficiency/ optimization
- Nighttime Noise Flight Procedures

Land Use/Mitigation

- Expand sound insulation program
- Mitigation outside DNL 65 dB
- Sound insulation repair and replacement
- Amend building codes
- Noise sensitive land use zoning requirements
- Sound insulation for newly exposed to DNL 70dB
- Real estate disclosures
- Acquisition of non-compatible properties and relocation of residents
- Protection from encroachment

Programmatic

- Improve transparency on operations
- Incentives/ Punishment to reduce nighttime operations
- Additional noise monitors
- Additional education/insights into airport operation
- Non acoustical factors (outreach)
- Data sharing/ dashboards
- Real estate community
- Coordination among ATC/ Airlines
- Expand Fly Quiet Program

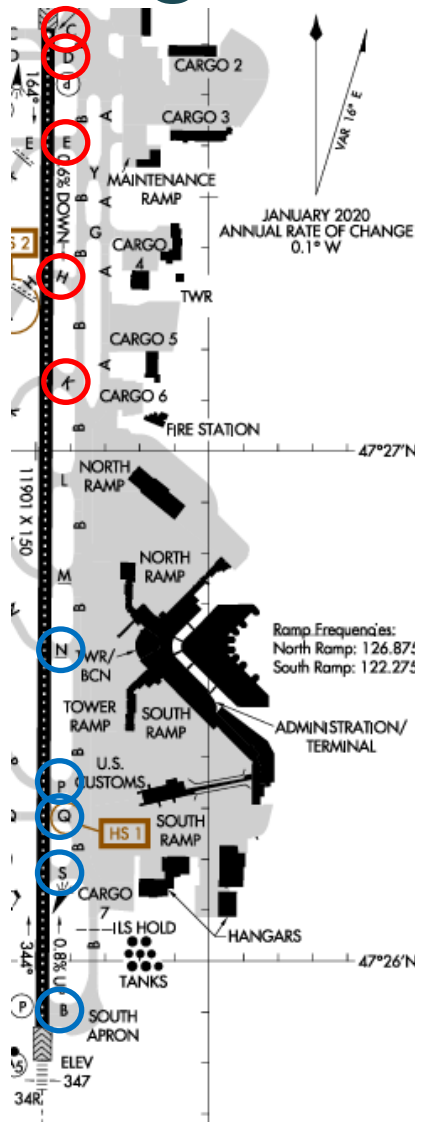
Noise Abatement Measures

Intersection Departures - Definition

- Aircraft occasionally takeoff from a taxiway intersection or runway intersection rather than from the end of the runway
  - Only occurs if the remaining runway length from the intersection meets safety standards
  - Can be requested by the aircraft or used by ATC to help increase airfield capacity by reducing aircraft taxi and/or departure wait times
- May provide noise benefits for noise sensitive land uses in the vicinity of the traditional start-of-takeoff-roll near the departure runway end
- May also result in noise increases for noise sensitive land uses off the opposite end of the runway due to:
  - Shifting the start-of-takeoff-roll down the runway
  - Lowering aircraft altitudes on initial departure

Intersection Departures – SEL Modeling

- Modeled Sound Exposure Level (SEL) contours for intersection departures from Runway 16L/34R
- Narrowbody aircraft with takeoff roll less than ~7,500 feet
- Intersections modeled:
  - 16L: Taxiways C,D,E,H, and K
  - 34R: Taxiways B,S,Q,P, and N
- For screening purposes, assessed changes and acreage for top two departure aircraft
  - 737800 makes up 33% of total fleet and 34% of departures on Runway 16L/34R
  - EMB175 makes up 25% of total fleet and 24% of departures on Runway 16L/34R
- Potentially reduce start-of-takeoff-roll noise and increase airfield capacity

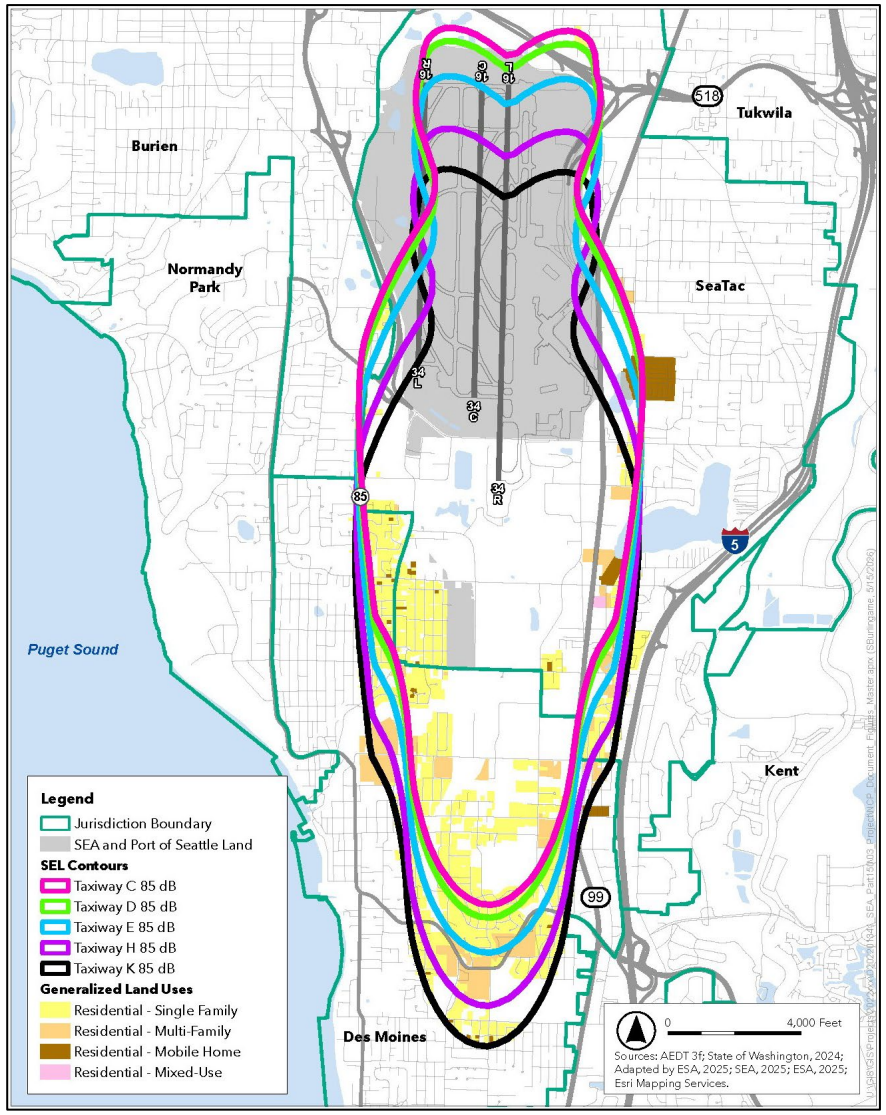


Intersection Departure 16L 737800 SEL Contours

B737-800 // Runway 16L – Housing Units					
Land Use	**Taxiway C**	**Taxiway D**	**Taxiway E**	**Taxiway H**	**Taxiway K**
Residential - Single Family	1,380	1,516	1,841	2,241	2,541
Residential - Multi-Family	1,837	1,927	2,665	3,787	3,976
Residential - Mobile Home	484	483	484	484	91
Residential - Vacant	1	1	1	1	1
Residential - Mixed-Use	1	1	1	1	1
	3,703	**3,928**	**4,992**	**6,514**	**6,610**
Total	**Difference**	**225**	**1,289**	**2,811**	**2,907**

B737-800 // Runway 16L – Population					
Land Use	**Taxiway C**	**Taxiway D**	**Taxiway E**	**Taxiway H**	**Taxiway K**
Residential - Single Family	3,772	4,165	5,102	6,152	6,906
Residential - Multi-Family	4,853	5,088	6,796	9,663	10,178
Residential - Mobile Home	800	798	801	801	275
Residential - Vacant	3	3	3	3	3
Residential - Mixed-Use	2	2	2	2	2
	9,430	**10,056**	**12,704**	**16,620**	**17,363**
Total	**Difference**	**625**	**3,274**	**7,190**	**7,933**

Note: Taxiway C represents full length departure. Difference calculated from Taxiway C.

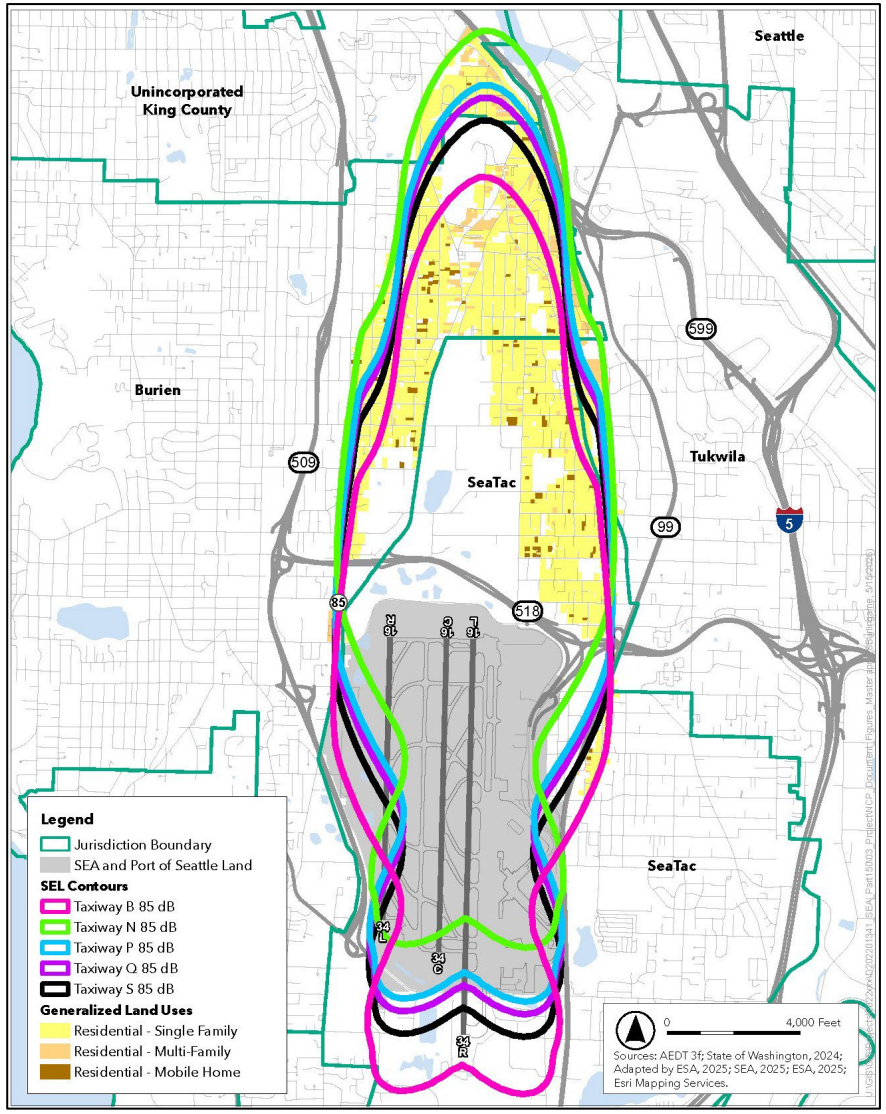


Intersection Departure 34R 737800 SEL Contours

B737-800 // Runway 34R – Housing Units					
Land Use	**Taxiway B**	**Taxiway S**	**Taxiway Q**	**Taxiway P**	**Taxiway N**
Residential - Single Family	2,612	3,083	3,342	3,502	3,851
Residential - Multi-Family	1,016	1,157	1,263	1,263	1,137
Residential - Mobile Home	68	73	81	82	86
Residential - Vacant	-	-	-	-	-
Residential - Mixed-Use	1	1	1	1	1
	3,697	**4,314**	**4,687**	**4,848**	**5,075**
Total	**Difference**	**617**	**990**	**1,151**	**1,378**

B737-800 // Runway 34R – Population					
Land Use	**Taxiway B**	**Taxiway S**	**Taxiway Q**	**Taxiway P**	**Taxiway N**
Residential - Single Family	7,447	8,823	9,596	10,083	11,120
Residential - Multi-Family	2,334	2,675	2,888	2,888	2,682
Residential - Mobile Home	192	206	230	232	244
Residential - Vacant	-	-	-	-	-
Residential - Mixed-Use	2	2	2	2	2
	9,975	**11,706**	**12,715**	**13,204**	**14,048**
Total	**Difference**	**1,732**	**2,741**	**3,230**	**4,073**

Note: Taxiway B represents full length departure. Difference calculated from Taxiway B.

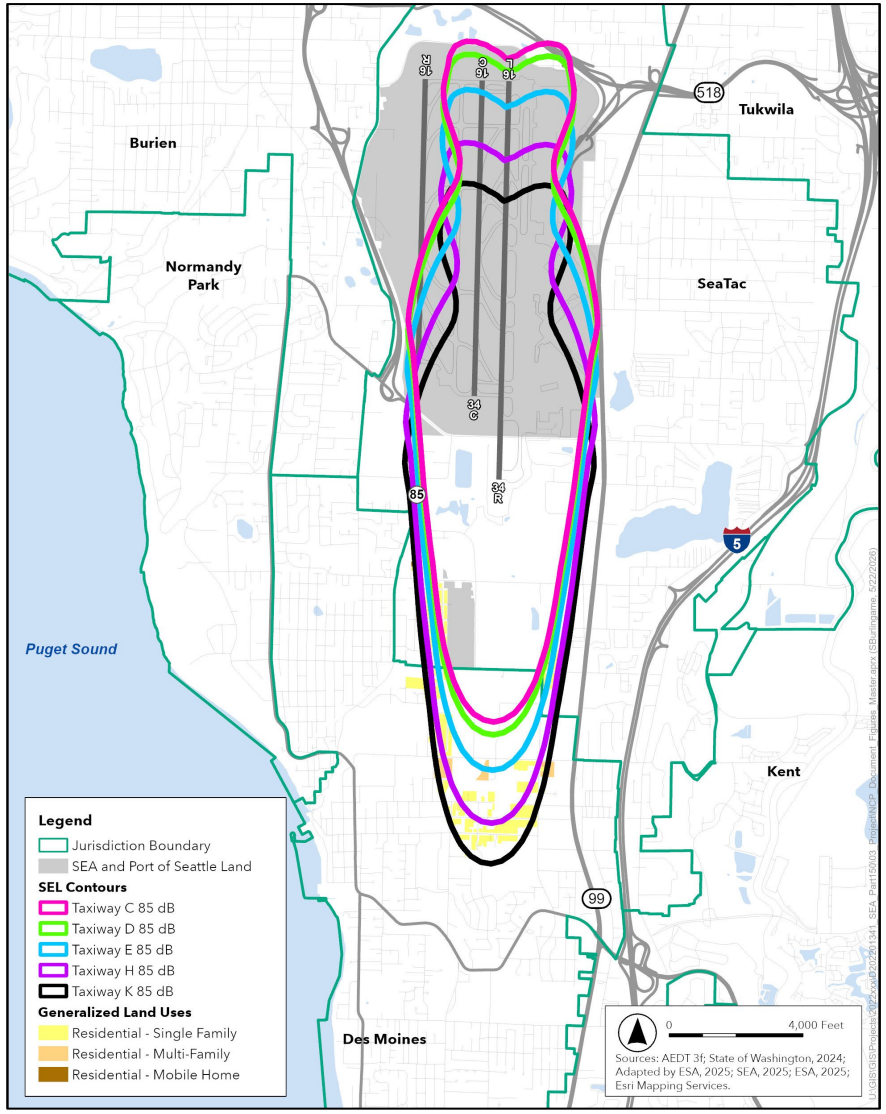


Intersection Departure 16L EMB175 SEL Contours

EMB175 // Runway 16L – Housing Units					
Land Use	**Taxiway C**	**Taxiway D**	**Taxiway E**	**Taxiway H**	**Taxiway K**
Residential - Single Family	52	72	137	283	441
Residential - Multi-Family	-	2	75	198	266
Residential - Mobile Home	1	1	2	2	4
Residential - Vacant	-	-	-	-	-
Residential - Mixed-Use	-	-	-	-	-
	53	**75**	**214**	**483**	**711**
Total	**Difference**	**22**	**161**	**430**	**658**

EMB175 // Runway 16L – Population					
Land Use	**Taxiway C**	**Taxiway D**	**Taxiway E**	**Taxiway H**	**Taxiway K**
Residential - Single Family	113	157	304	644	1,039
Residential - Multi-Family	-	5	192	508	680
Residential - Mobile Home	2	2	4	4	9
Residential - Vacant	-	-	-	-	-
Residential - Mixed-Use	-	-	-	-	-
	116	**164**	**500**	**1,157**	**1,728**
Total	**Difference**	**48**	**385**	**1,041**	**1,612**

Note: Taxiway C represents full length departure. Difference calculated from Taxiway C.

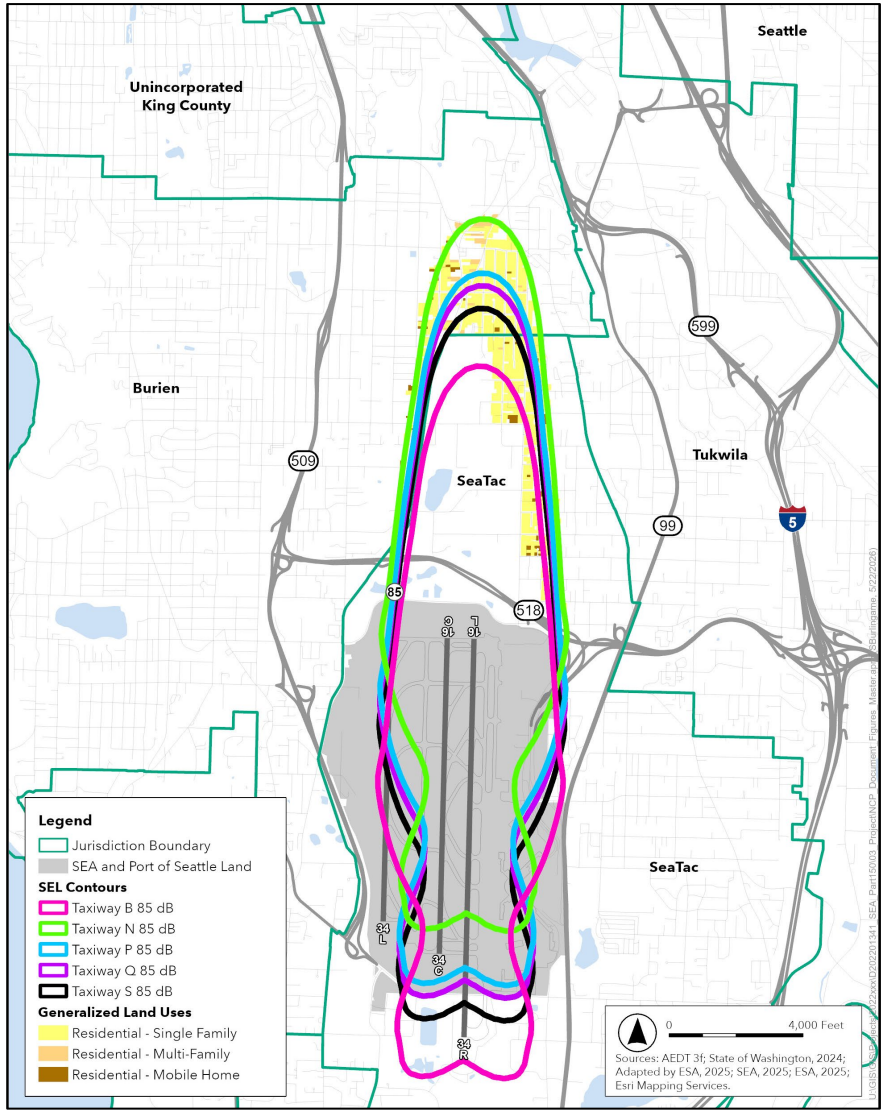


Intersection Departure 34R EMB175 SEL Contours

EMB175 // Runway 34R – Housing Units					
Land Use	**Taxiway B**	**Taxiway S**	**Taxiway Q**	**Taxiway P**	**Taxiway N**
Residential - Single Family	243	559	746	870	1,301
Residential - Multi-Family	8	27	41	50	412
Residential - Mobile Home	16	25	28	32	50
Residential - Vacant	-	-	-	-	-
Residential - Mixed-Use	-	-	-	-	-
	267	**611**	**815**	**952**	**1,763**
Total	**Difference**	**344**	**548**	**685**	**1,496**

EMB175 // Runway 34R – Population					
Land Use	**Taxiway B**	**Taxiway S**	**Taxiway Q**	**Taxiway P**	**Taxiway N**
Residential - Single Family	709	1,621	2,162	2,521	3,714
Residential - Multi-Family	23	78	119	143	960
Residential - Mobile Home	47	73	81	93	143
Residential - Vacant	-	-	-	-	-
Residential - Mixed-Use	-	-	-	-	-
	778	**1,771**	**2,362**	**2,757**	**4,817**
Total	**Difference**	**993**	**1,584**	**1,979**	**4,039**

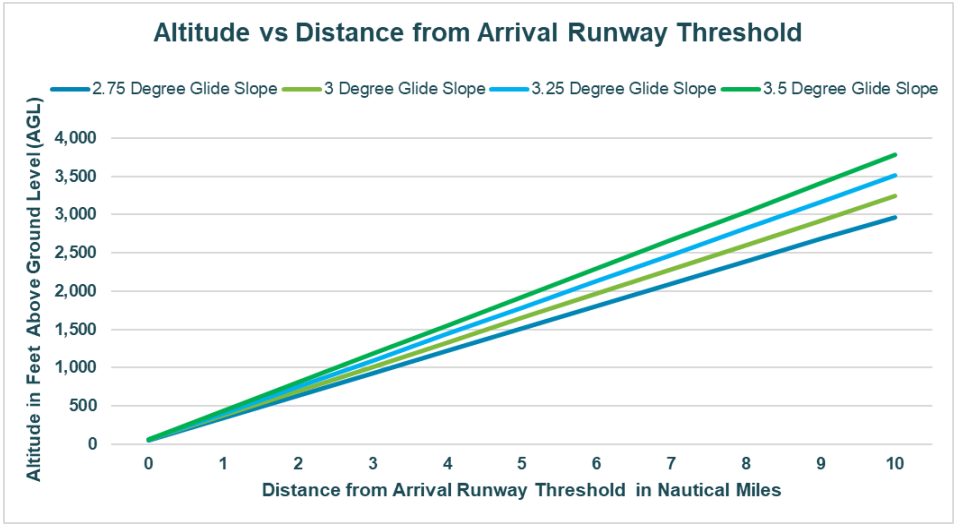
Note: Taxiway B represents full length departure. Difference calculated from Taxiway B.



Increase Glideslopes for Arrivals

- A steeper glide slope results in aircraft approaching at a higher altitude, which lowers noise exposure on the ground
- Generated custom profiles for each glideslope for the 737800
- Modeled SEL contours for 3, 3.25, and 3.5-degree glideslopes for Runway 16R/34L and 16L/34R
  - Runway 34R also includes 2.75-degree published glideslope
    - SAMP NTP Taxiway A/B Extension would include raising glideslope

Glideslope Altitudes				
Distance from Threshold (nm)	2.75-degree (ft AGL)	3.0-degree (ft AGL)	3.25-degree (ft AGL)	3.5-degree (ft AGL)
2	634	692	750	807
4	1,218	1,329	1,440	1,551
6	1,802	1,966	2,130	2,294
8	2,385	2,603	2,820	3,037
10	2,969	3,239	3,510	3,781



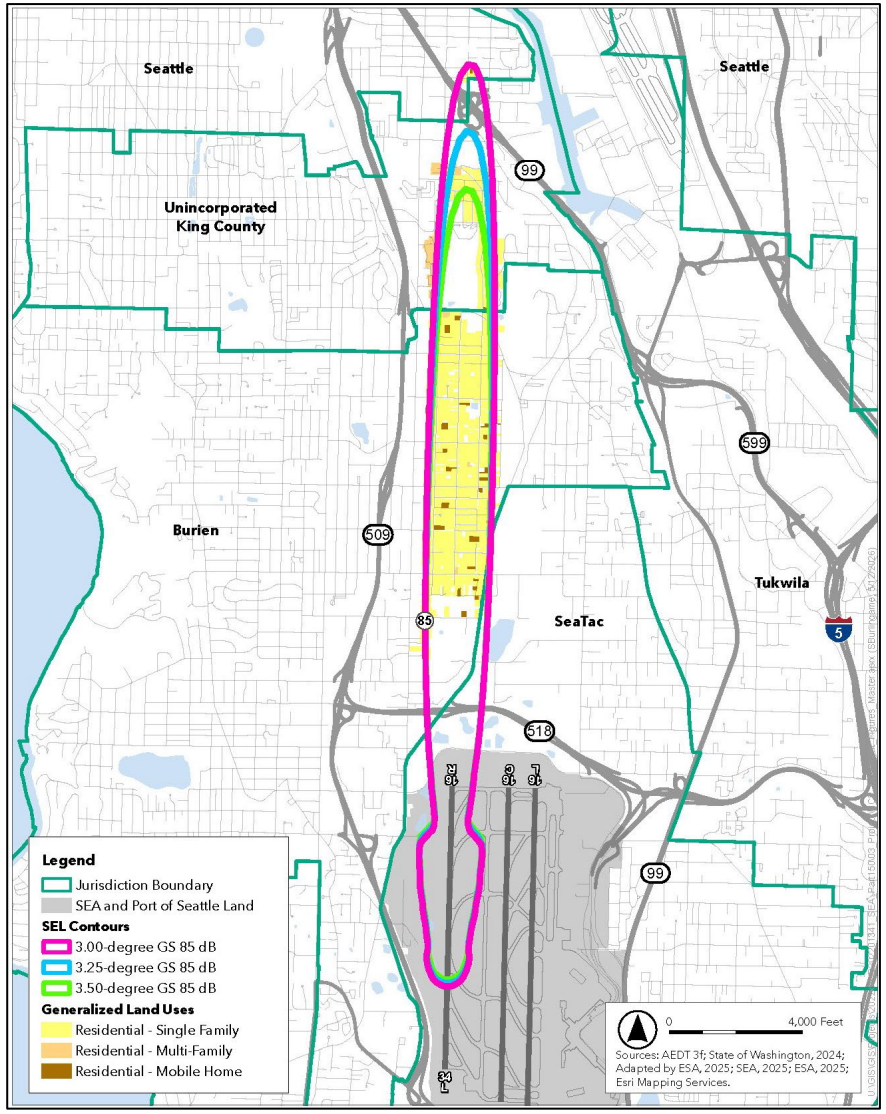
Increased Glideslope 16R 737800 SEL Contours

B737-800 // Runway 16R – Housing Units			
Land Use	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	1,322	1,231	1,114
Residential - Multi-Family	358	230	49
Residential - Mobile Home	43	39	36
Residential - Vacant	-	-	-
Residential - Mixed-Use	-	-	-
	1,723	**1,500**	**1,199**
Total	**Difference**	**(223)**	**(524)**

Note: Difference calculated from 3.0-degree glideslope.

B737-800 // Runway 16R – Population			
Land Use	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	3,623	3,390	3,047
Residential - Multi-Family	952	611	119
Residential - Mobile Home	120	109	99
Residential - Vacant	-	-	-
Residential - Mixed-Use	-	-	-
	4,695	**4,110**	**3,266**
Total	**Difference**	**(585)**	**(1,430)**

Note: Difference calculated from 3.0-degree glideslope.



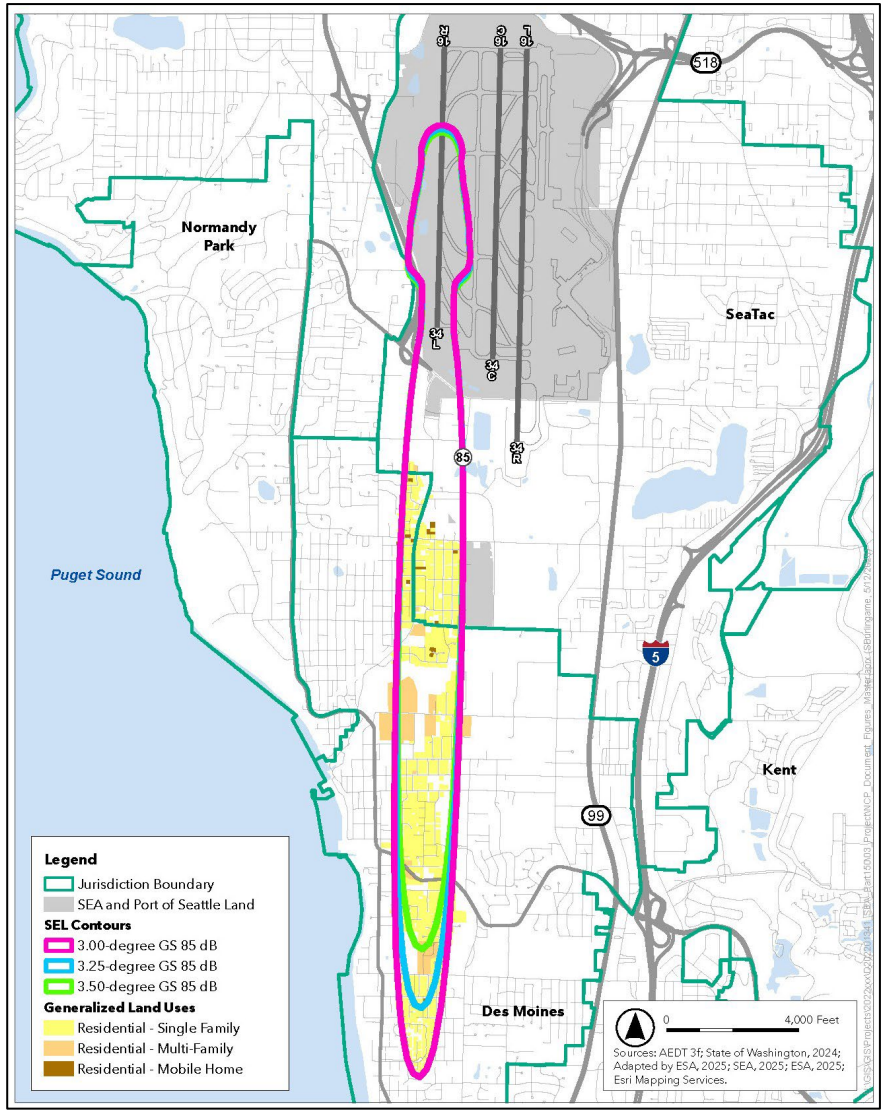
Increased Glideslope 34L 737800 SEL Contours

B737-800 // Runway 34L – Housing Units			
Land Use	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	1,658	1,309	1,143
Residential - Multi-Family	988	984	980
Residential - Mobile Home	17	16	16
Residential - Vacant	-	-	-
Residential - Mixed-Use	-	-	-
	2,663	**2,309**	**2,139**
Total	**Difference**	**(354)**	**(524)**

Note: Difference calculated from 3.0-degree glideslope.

B737-800 // Runway 34L – Population			
Land Use	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	4,196	3,478	3,102
Residential - Multi-Family	2,461	2,451	2,439
Residential - Mobile Home	45	42	42
Residential - Vacant	-	-	-
Residential - Mixed-Use	-	-	-
	6,702	**5,971**	**5,583**
Total	**Difference**	**(731)**	**(1,119)**

Note: Difference calculated from 3.0-degree glideslope.



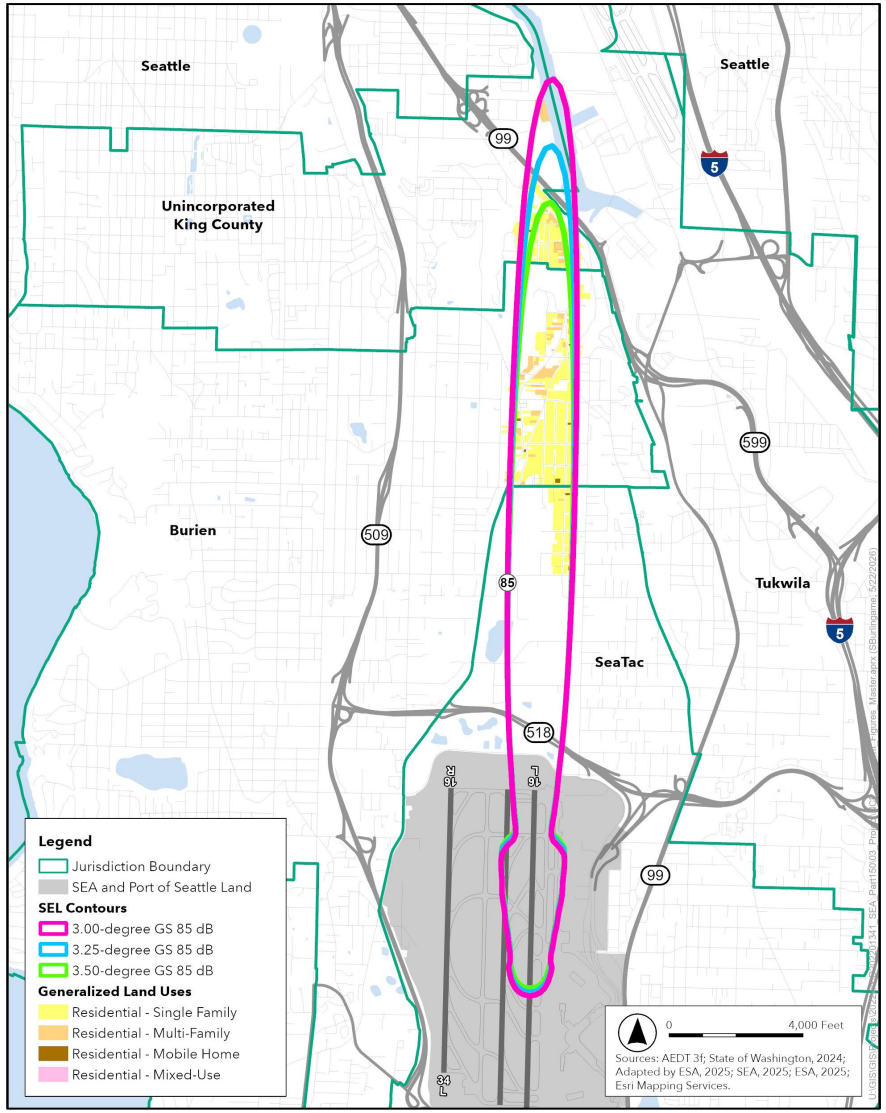
Increased Glideslope 16L 737800 SEL Contours

B737-800 // Runway 16L – Housing Units			
Land Use	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	773	732	659
Residential - Multi-Family	899	893	845
Residential - Mobile Home	8	8	7
Residential - Vacant	-	-	-
Residential - Mixed-Use	1	1	1
	1,681	**1,634**	**1,512**
Total	**Difference**	**(47)**	**(169)**

Note: Difference calculated from 3.0-degree glideslope.

B737-800 // Runway 16L – Population			
Land Use	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	2,151	2,030	1,808
Residential - Multi-Family	2,056	2,041	1,893
Residential - Mobile Home	23	23	20
Residential - Vacant	-	-	-
Residential - Mixed-Use	2	2	2
	4,232	**4,096**	**3,723**
Total	**Difference**	**(136)**	**(509)**

Note: Difference calculated from 3.0-degree glideslope.



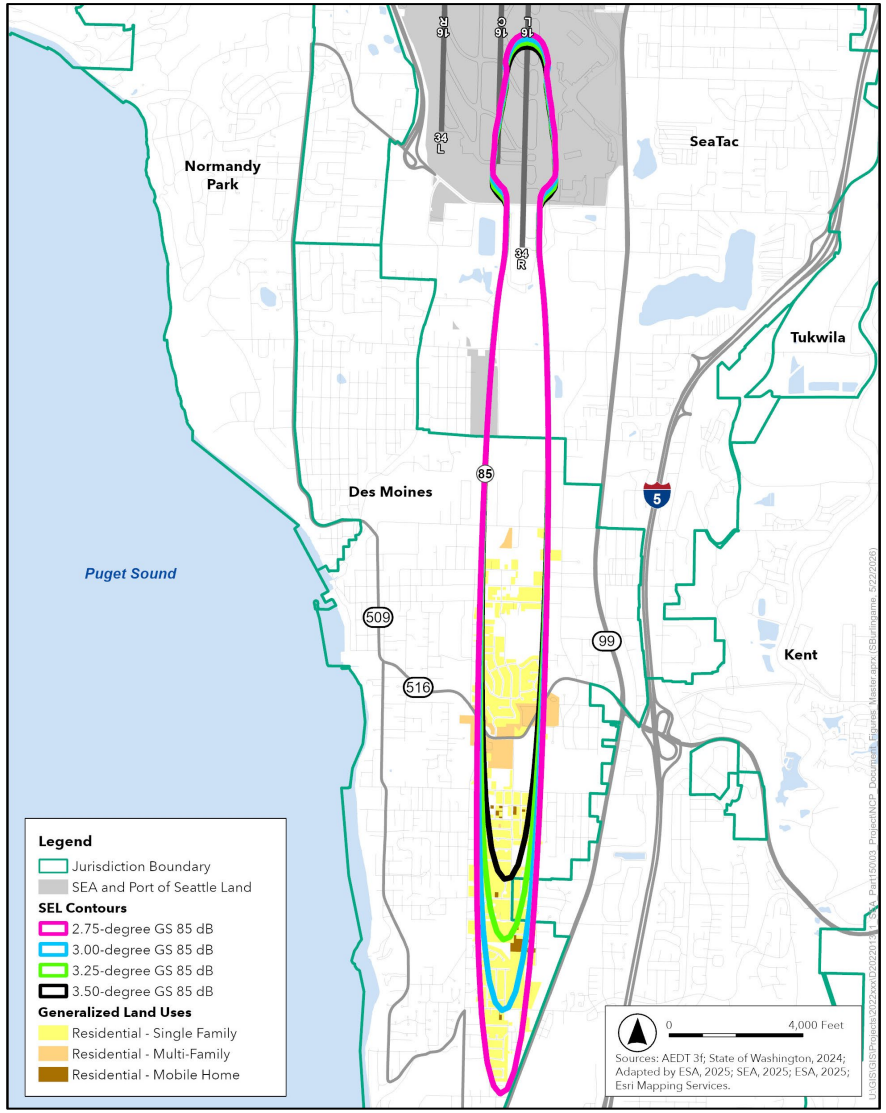
Increased Glideslope 34R 737800 SEL Contours

B737-800 // Runway 34R – Housing Units				
Land Use	**2.75-degree**	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	1,260	997	779	576
Residential - Multi-Family	957	913	863	803
Residential - Mobile Home	7	7	7	7
Residential - Vacant	-	-	-	-
Residential - Mixed-Use	-	-	-	-
	2,224	**1,917**	**1,649**	**1,386**
Total	**Difference**	**(307)**	**(575)**	**(838)**

Note: Difference calculated from 3.0-degree glideslope.

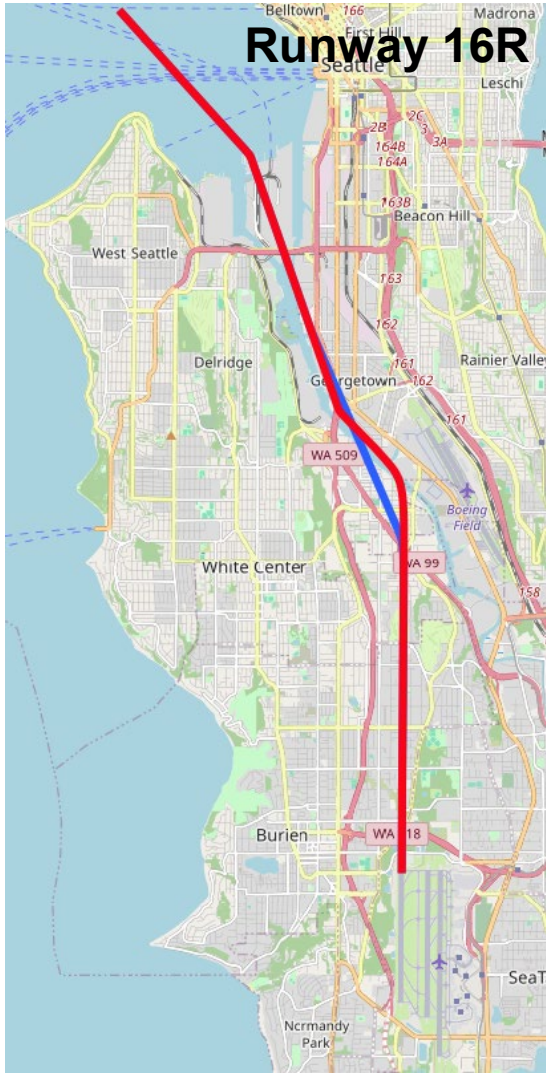
B737-800 // Runway 34R – Population				
Land Use	**2.75-degree**	**3.0-degree**	**3.25-degree**	**3.5-degree**
Residential - Single Family	3,580	2,771	2,100	1,527
Residential - Multi-Family	2,458	2,351	2,239	2,104
Residential - Mobile Home	19	19	19	19
Residential - Vacant	-	-	-	-
Residential - Mixed-Use	-	-	-	-
	6,057	**5,141**	**4,358**	**3,651**
Total	**Difference**	**(915)**	**(1,699)**	**(2,406)**

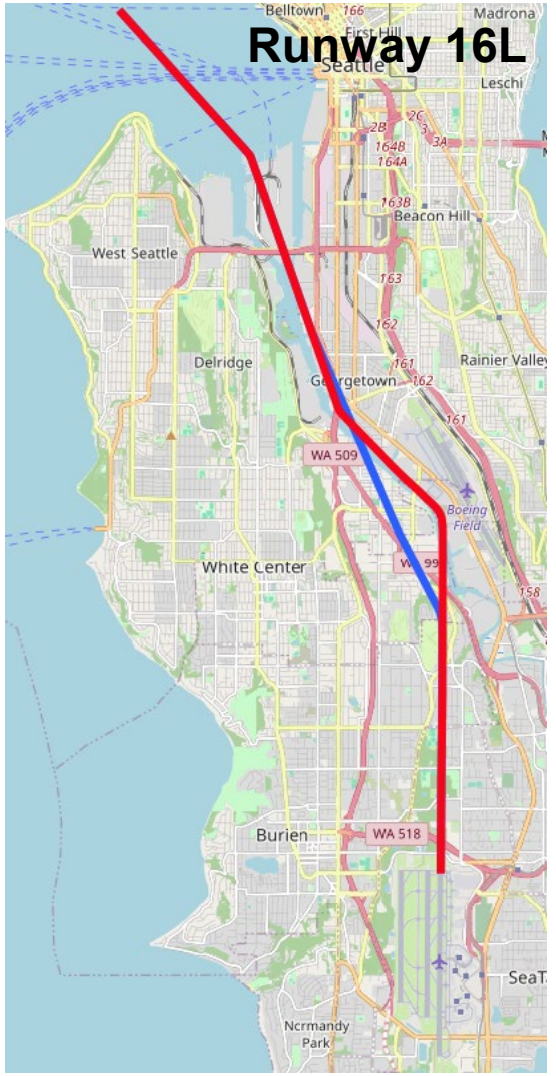
Note: Difference calculated from 3.0-degree glideslope.



Offset Approaches

- Modeled B737-800 SEL contours for two different offset approach options for Runways 16L and 16R
  - **Offset A** follows non-noise sensitive land uses more closely
  - **Offset B** is more direct (likely preferred), with some increase in flying over residential areas
- Offset approaches maximize flying over non-noise sensitive land uses north of the Airport





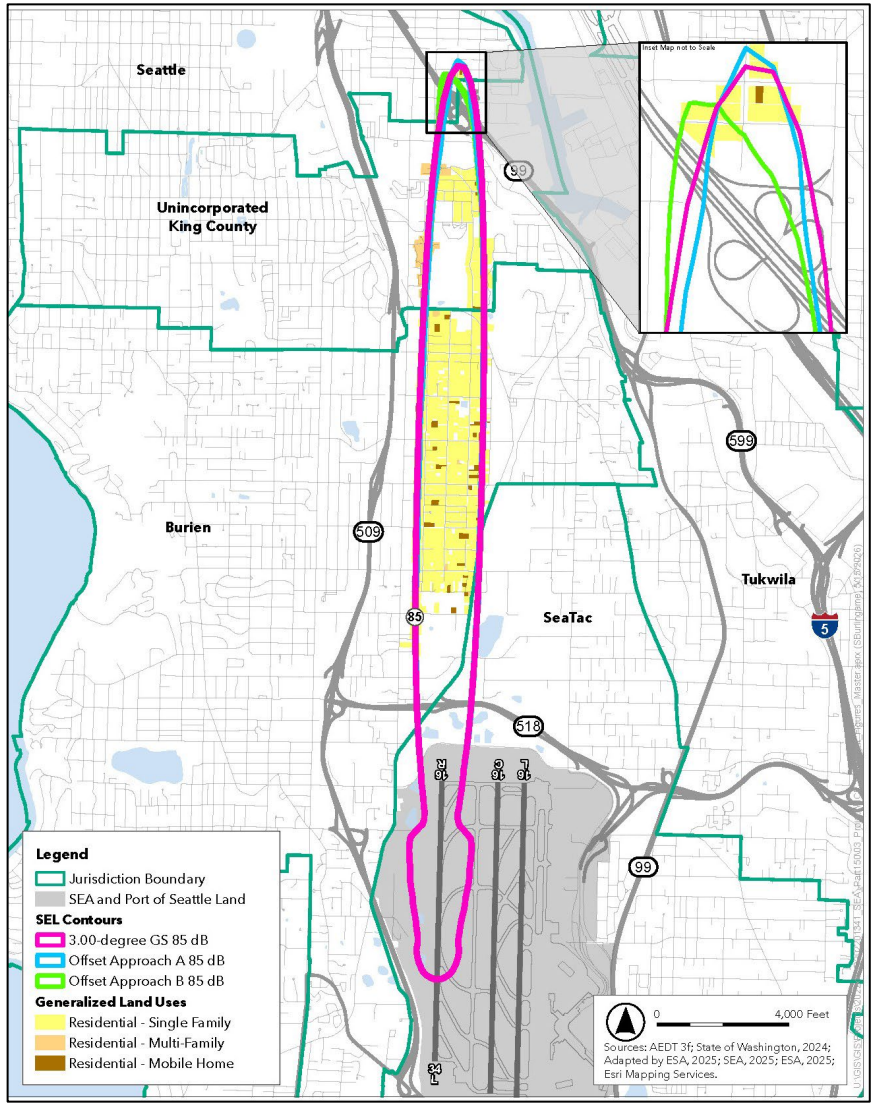
Offset Approach A and B 16R 737800 SEL Contours

B737-800 // Runway 16R – Housing Units			
Land Use	**Standard**	**Offset A**	**Offset B**
Residential - Single Family	1,322	1,291	1,272
Residential - Multi-Family	358	230	230
Residential - Mobile Home	43	41	41
Residential - Vacant	-	-	-
Residential - Mixed-Use	-	-	-
	1,723	**1,562**	**1,543**
Total	**Difference**	**(161)**	**(180)**

Note: Difference calculated from standard approach.

B737-800 // Runway 16R – Population			
Land Use	**Standard**	**Offset A**	**Offset B**
Residential - Single Family	3,623	3,544	3,496
Residential - Multi-Family	952	611	611
Residential - Mobile Home	120	115	115
Residential - Vacant	-	-	-
Residential - Mixed-Use	-	-	-
	4,695	**4,270**	**4,223**
Total	**Difference**	**(425)**	**(473)**

Note: Difference calculated from standard approach.



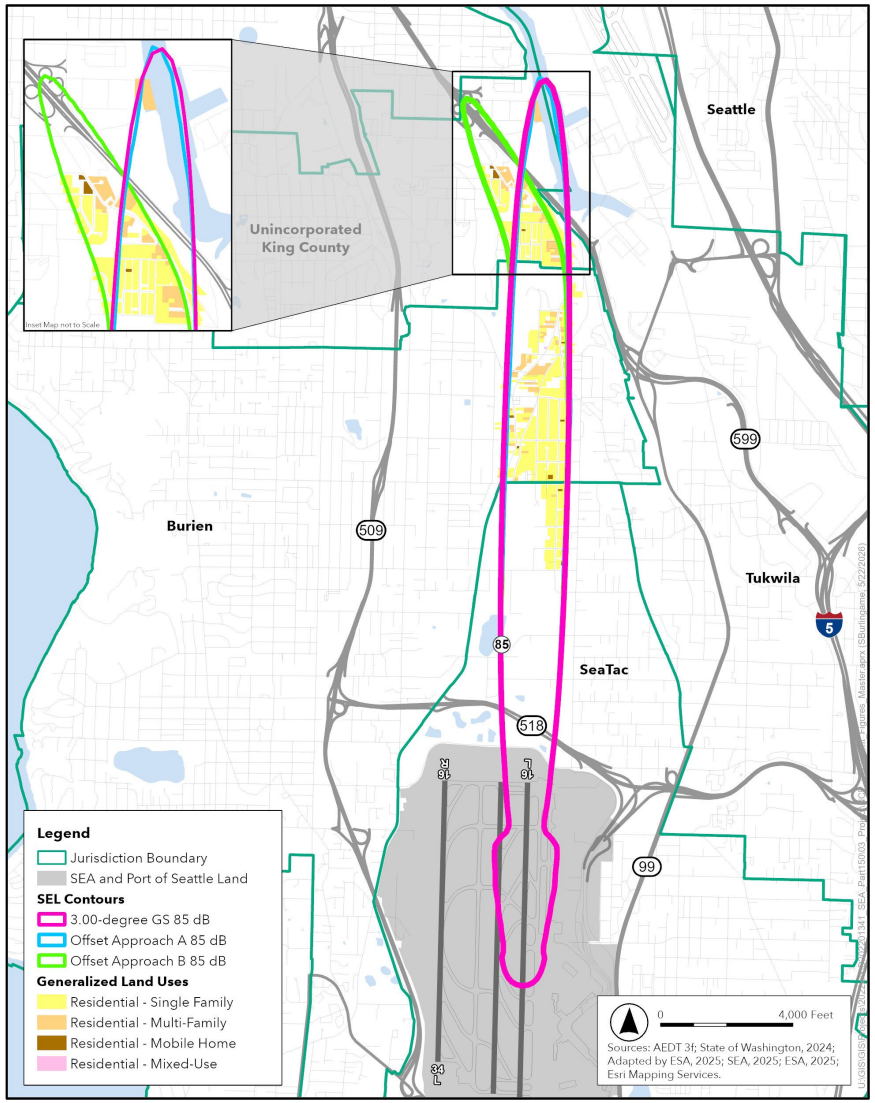
Offset Approach A and B 16L 737800 SEL Contours

B737-800 // Runway 16L – Housing Units			
Land Use	**Standard**	**Offset A**	**Offset B**
Residential - Single Family	773	750	787
Residential - Multi-Family	899	888	993
Residential - Mobile Home	8	8	11
Residential - Vacant	-	-	-
Residential - Mixed-Use	1	1	1
	1,681	**1,647**	**1,792**
Total	**Difference**	**(34)**	**111**

Note: Difference calculated from standard approach.

B737-800 // Runway 16L – Population			
Land Use	**Standard**	**Offset A**	**Offset B**
Residential - Single Family	2,151	2,082	2,230
Residential - Multi-Family	2,056	2,026	2,335
Residential - Mobile Home	23	23	34
Residential - Vacant	-	-	-
Residential - Mixed-Use	2	2	2
	4,232	**4,134**	**4,601**
Total	**Difference**	**(99)**	**369**

Note: Difference calculated from standard approach.



Nighttime Arrival Preferential Runway Use

- Evaluated shifting nighttime arrival operations from Runway 16R/34L to Runway 16L/34R during nighttime hours (10PM to 7AM)
- What would operations look like under different scenarios of shifting different percentages of arrival operations?

September 2024-August 2025 Nighttime Arrivals (10PM - 7 AM)			5% Shift of Nighttime Arrivals from 16R/34L to 16L/34R			10% Shift of Nighttime Arrivals from 16R/34L to 16L/34R		
Arrival Runway	**Operations**	**Percentage**	**Operations**	**Change in Operations**	**Revised Arrival Percentage**	**Operations**	**Change in Operations**	**Revised Arrival Percentage**
16L	1,947	6%	2,870	923	9%	3,793	1,846	12%
16R	18,461	60%	17,538	-923	57%	16,615	-1,846	54%
South Flow Total	**21,958**	**66%**	**21,958**	**-**	**66%**	**21,958**	**-**	**66%**
34L	6,987	23%	6,638	-349	22%	6,288	-699	21%
34R	728	2%	1,077	349	4%	1,427	699	5%
North Flow Total	**8,634**	**25%**	**8,634**	**-**	**26%**	**8,634**	**-**	**26%**

Other Noise Abatement Measures

- Move air traffic over Elliot Bay
  - Consider options to reduce the frequency of south-flow arrivals over residential areas north of Seattle
- Optimized Profile Descent Approach Procedure
  - Encourage use of approaches implemented under Greener Skies
- Encourage and expand preferential runway use, when possible
  - Aims to help lower aircraft usage of the third runway
- Modify PBN Standard Terminal Arrival Route (STAR) procedures
  - Aims to reduce noise for residential uses exposed to levels lower than DNL 65 dBA

Land Use Measures

Land Use Measures

- Sound Insulation Program
  - Continue program for eligible structures within the updated Noise Remedy Boundary
  - Expand program to include long-term transient lodging
- Real Estate Disclosures for Properties within DNL 65
  - WA State Law requires disclosure of “material facts or defects” but does not list aircraft noise in the standard disclosure form
  - Location within the NRB could be considered a material fact, but local jurisdictions would need to implement this measure
- Amend Building Codes
  - Airport noise-specific building codes have been adopted by SeaTac and Burien; would be implemented by local jurisdictions
  - Focus on interior noise level reduction and appropriately rated building materials

Land Use Measures, cont.

- Noise Overlay Zone/Noise Sensitive Zoning
  - Could only be recommended by POS and would have to be adopted by local jurisdictions or through interlocal agreements
- Encourage King County to Refine Assessor's Database for Airport and Other Noise Nuisance Rating
  - WA requires property assessments to be uniform at true and fair value. King County applies airport noise nuisance market adjustment factors to certain properties
  - Shows up on the assessor website, but is not well-defined
  - Promote consistent noise-nuisance rating methods across categories (e.g., airports, roadways) to improve clarity and transparency

Program Management Measures

Aircraft Noise Certification Overview

- Noise stage standards set by the International Civil Aviation Organization (ICAO), adapted by FAA
- Noise limits defined by three criteria:
  - Flyover (takeoff)
  - Sideline (lateral)
  - Approach (landing)
- Certification specific to each aircraft type
- Aircraft weight affect noise limits
  - Certification noise limits increase with aircraft weight
    - As a result, heavier aircraft have higher noise levels at each noise stage
    - Lighter aircraft have lower noise levels because of the lower weight

Noise Stage Comparisons

Noise Stage	Enacted	Weight Applicability	Noise Requirement	Notes
2	1977	>75,000 lbs. (later all)	Baseline (loudest)	Phased out by 2000 (>75k lbs.) and 2015 (<75k lbs.)
3	1977/1980s	All transport aircraft	~10 dB quieter than Stage 2	Still widely used
4	2006	All new designs	10 dB quieter than Stage 3	Standard for most modern aircraft
5	2018	All new designs	7 dB quieter than Stage 4	Current certification standard

Encouraging Fleet Optimization

- The existing fleet includes older Stage 3 aircraft and newer Stage 4/5 aircraft
- Stage 5 aircraft make up a smaller portion of the fleet but deliver the greatest noise reduction
- Transitioning to newer aircraft shifts the fleet toward quieter operations

Top Aircraft Noise Stage				
Airframe	Total Ops	Percent of Fleet	Noise Certification Stage	Estimated Equivalent Stage
737800	145,404	33%	3	4
EMB175	108,120	25%	3	4
7378MAX	64,967	15%	4	5
A321-232	32,169	7%	4	4
737700	29,115	7%	3	4
767300	6,800	2%	3	3
A330-343	5,053	1%	5	5
7879	4,531	1%	4	5
A350-941	4,147	1%	5	5
A320-211	4,087	1%	4	4
Total	**404,393**	**93%**	**-**	**-**

Encouraging Fleet Optimization

- Stage 3 aircraft are still widely used among airlines
- Stage 4 equivalent aircraft more prominent in larger commercial carriers
- Stage 5 aircraft are limited in existing fleet
- Regional carriers show limited adoption of Stage 4 or newer aircraft

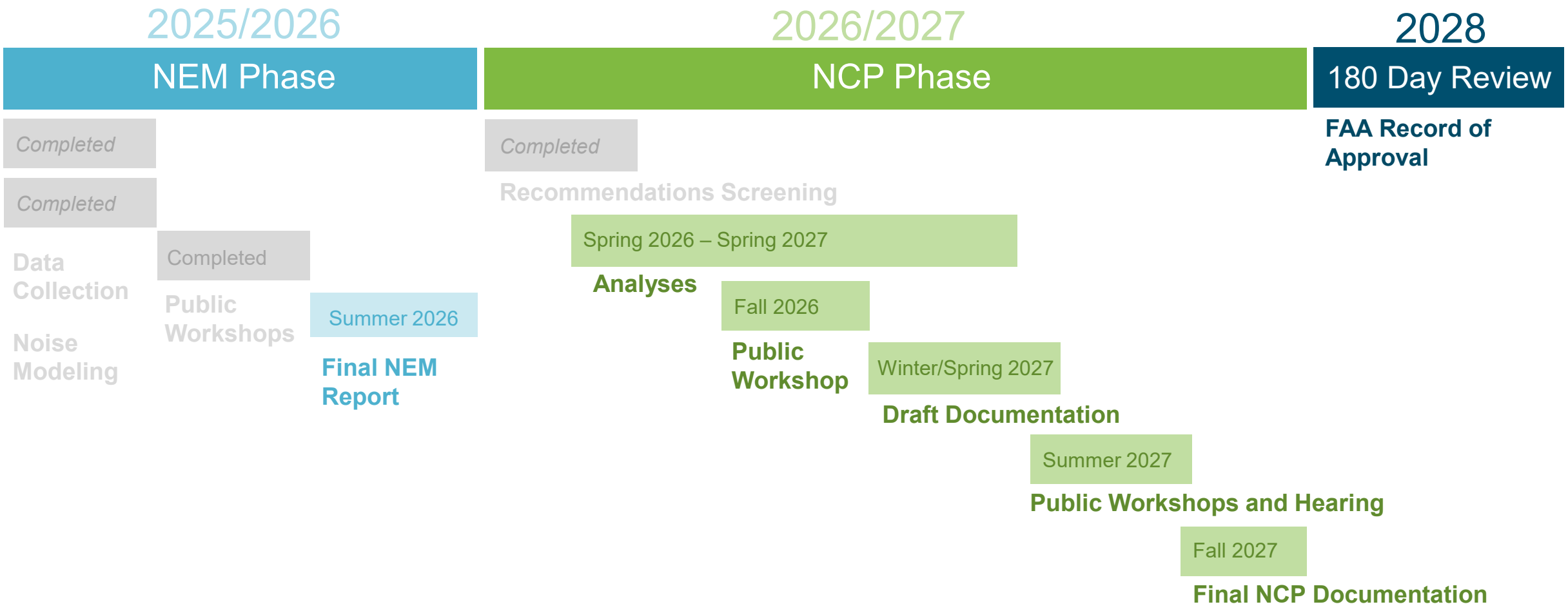
Aircraft Noise Stage By Airline								
Airline	Total Ops	Percent of Total Fleet	Noise Stage Certification			Estimated Equivalent Stage		
			3	4	5	3	4	5
Alaska	159,276	36%	67%	33%	0%	0%	67%	33%
Delta	70,752	16%	67%	25%	7%	0%	92%	7%
SkyWest	64,463	15%	100%	0%	0%	0%	100%	0%
Horizon	45,175	10%	100%	0%	0%	0%	100%	0%
United	18,610	4%	45%	55%	0%	0%	70%	30%

Program Management Measures

- Expand Fly Quiet Program
  - Identify additional incentives, potentially for late night noise operations
- Continued Stakeholder Engagement/Education/Outreach
  - Targeted educational materials/events for different stakeholders (airlines, pilots, real estate associations, etc.)
- Upgrade Noise and Operations Monitoring System (NOMS)
  - Upgrade system software, hardware, and public facing portal
- Real Time Data Dashboard
  - Could integrate with NOMS/Public Vue and add to SEA's noise program website
- Explore Opportunities to Support Research
  - FAA Center of Excellence (ASCENT) and Continuous Lower Energy, Emissions, and Noise (CLEEN)
  - Partner with academic institutions
  - Active noise control systems

Project Schedule

Part 150 Study Schedule



Next TRC Meeting

Technical Review Committee

- TRC Meeting #7 (Tentative)
  - Discuss status of NCP analysis
  - Provide information about Fall 2026 Workshops

August 2026

- Reminder notices will be sent out in advance of each meeting

- Following the meeting, TRC materials will be posted on the Project Website at www.seapart150.com

Questions?