PHX East Report Q1, 2025

Introduction

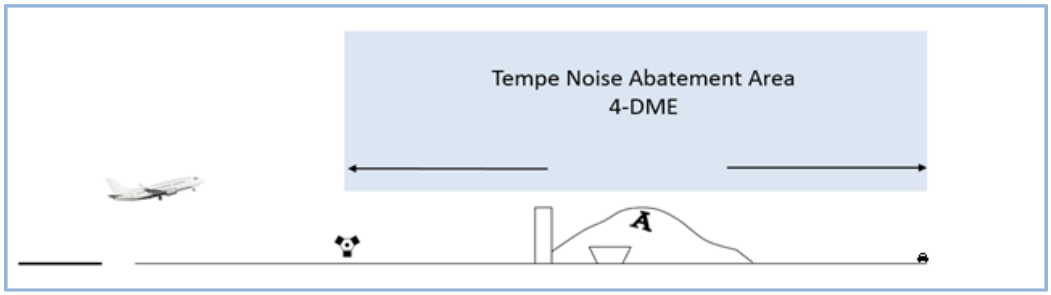
The City of Tempe is located directly east of Phoenix Sky Harbor International Airport (PHX) which is owned and operated by the City of Phoenix.

This report provides an account of how well PHX operations comply with noise mitigation flight procedures over the City of Tempe. The flight procedures are memorialized in an intergovernmental agreement between the two cities, and the Tempe Aviation Commission (TAVCO) documents the implementation of the agreement in quarterly reports followed by an annual summary.

Executive Summary

The noise mitigation flight procedures over Tempe are applicable to jet departures over Tempe and the departure flow east and west from the Phoenix Sky Harbor International Airport (PHX). Air traffic volumes from PHX were not as high in Q1 2025 as in the previous quarter. Thus, the number of violation notices issued to airlines and noise events attributed to aircraft were lower.

Aircraft noise complaints to the City of Tempe increased with one Tempe resident in area code 85282 reported several mornings with turboprop departures going southeast from PHX directly after take-off and occasional helicopter operations. Most complaints from Tempe residents are submitted to the City of Phoenix. Numbers were down from last quarter due to less complaints from one resident in area code 85283.



The Tempe and Phoenix Intergovernmental Agreement (IGA) from 1994, requires jet and large turboprop aircraft to stay on headings east within the Salt River (Rio Salado) riverbed and Tempe Town Lake to 4 nautical miles from a navigational aid (VORTAC) or 4-DME (Distance Measuring Equipment) before diverging to intercept PHX departure routes. 4-DME east is located at the SR-202 and SR-101 intersection. The FAA does not require large turboprop to fly the headings out to 4-DME. To measure how well airlines kept to the departure headings in the PHX Standard Instrument Departure (SID) procedures City of Phoenix developed an imaginary gate at 4-DME in the PHX Airport Noise and Operations Monitoring System (ANOMS) all jet departures over north Tempe had to pass through.

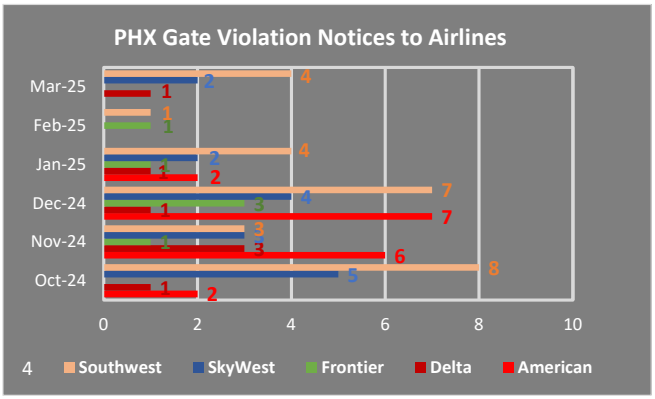


Figure 4: City of Phoenix violation notices to selected airlines

Figure 5: PHX 4-DME departure compliance 5,500' Gate,

Airlines with jet departures to the east that fail to pass through the PHX Gate receives e-mail Notices of Deviations (NODs) from the City of Phoenix. The gate is set up in the PHX Airport Noise & Operations Monitoring System (ANOMS) at 4-DME just west of the SR-202 and SR-101 interchange. It is 5,500 feet wide and runs parallel to the SR-101. PHX Gate compliance is published Noise Reports, see Updates & Reports | Phoenix Sky Harbor International.

The Tempe Aviation Commission developed a virtual corridor in the PHX ANOMS covering the Rio Salado riverbed out to 4-DME based on procedure heading in the FAA's SID from the two runways. The corridor concept was adopted by the City of Tempe and was set up as an alternative compliance measuring tool in the original version of the PHX ANOMS. The corridor measure is no longer available in the new version of the PHX ANOMS, and the use of SIDs procedures that use ground based navigational aids are almost entirely gone out of use. Consequently, this report is generated using departure accuracy at two satellite-based navigation points, a so-called fly-over point at 4-DME and the first fly-by navigation point after 4-DME.
Most airline jets departing PHX use area navigation (RNAV). RNAV 1 flight procedures primarily developed for RNAV operations in the airport the terminal area. The lateral accuracy required for operating on RNAV1 procedures in the airport terminal area is 1 nautical mile, or three tenths of a nautical mile if the airline has FAA authorization. Required Navigation Performance (RNP) of 0.3 means the aircraft navigation system must be able to calculate the position accuracy down to three tenths of a nautical mile from the waypoint. The maximum cross-track deviation limit for aircraft operating on RNAV1 procedures is 0.5 nautical miles.

Because PHX SIDs to the east include procedures which direct departures to a waypoint at 4DME, and a few RNAV SIDs that do not, airline departure accuracy is separated into three categories in this report. The third category is accuracy with the classic SIDs which are in limited use. For the RNAV departures with a first fly-over waypoint at 4-DME, a circle with 0,3 NM radius is used. For RNAV departures to a first fly-by waypoint after 4-DME, a circle with 0.5 NM radius is used. The same 0.5 NM circle radius is used at the 4-DME waypoint for classic SID departures.

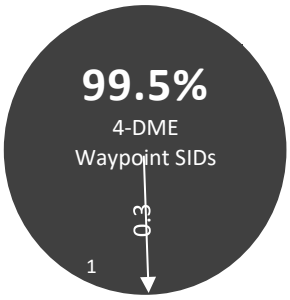


Figure 1: Departure accuracy for jets using RNAV SIDs, (7), with a fly-over waypoint at 4-DME (SPRKY)

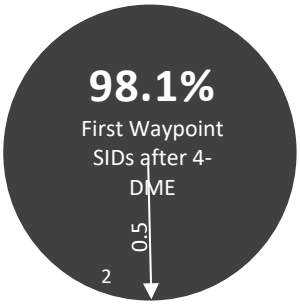


Figure 2: Departure accuracy for jets using RNAV SIDs with a first fly-by waypoint after 4-DME

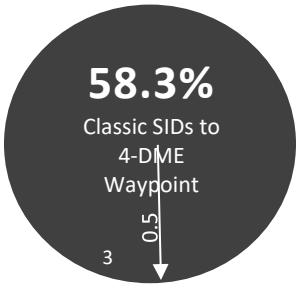


Figure 3: Departure accuracy for jets using procedures with headings the runways

During the first quarter the airlines flying RNAV SIDs with a first waypoint after 4-DME followed two flight procedures with a sharp turn south after 4-DME, which caused a majority to stay south of the waypoint, but still within the waypoint's circumference being used in this report. 2.0% of the departures lacked departure route ID and could not be included in the accuracy assessment.

Departure Equalization

The IGA calls for an even split of the noise burden from departing jet and large turboprop aircraft east and west of PHX parallel runways during daytime and nighttime hours. The FAA is expected to compensate for periodic changes in flight patterns as weather and air traffic allow ATC to accomplish equalization. In this report only jet departure equalization over the last twelve months is included. Large turboprops no longer have a presence at the airport.

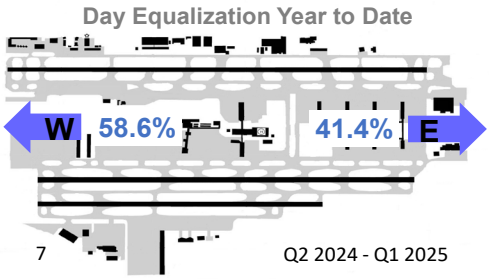


Figure 7: Annual Day equalization

Day equalization includes departures taking place between the hours of 7:00 a.m. and 10:00 p.m. Night equalization includes departures between 10:00 p.m. and 7:00 a.m.

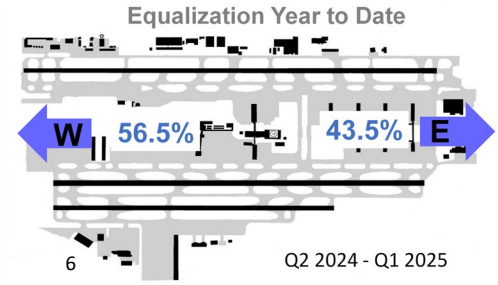


Figure 6: Annual equalization - Night and day

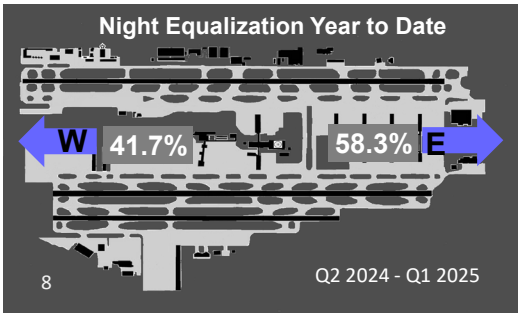


Figure 8 Annual Night equalization

Weather

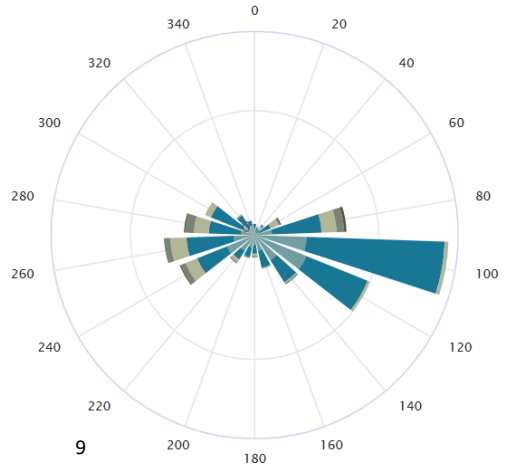


Figure 9: Wind directions.

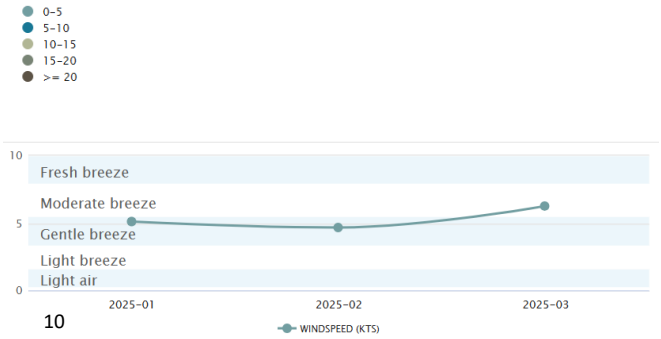


Figure 10: Wind speeds (knots).

The average wind speeds during the quarter was 5 knots. The majority of the higher wind speeds came from westerly directions. When weather conditions bring persistant winds from one direction, air traffic flows can be affected.

Tempe Citizens' Noise Complaints

Complaints are recorded as the number of phone calls, voicemails, and electronic messages received from residents calling in or using the Tempe 311 web complaint option.

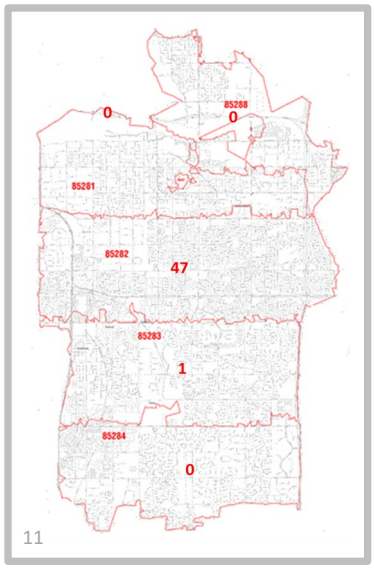


Figure 11: Aircraft noise complaints received by the City of Tempe through Tempe 311.

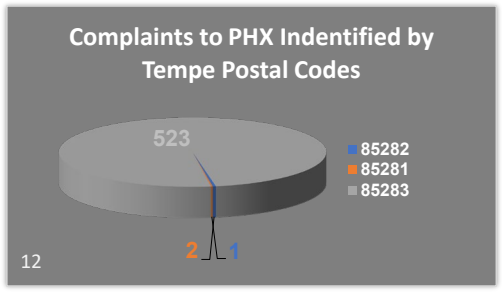


Figure 12: Aircraft noise complaints received by the City of Phoenix from Tempe addresses during the quarter.

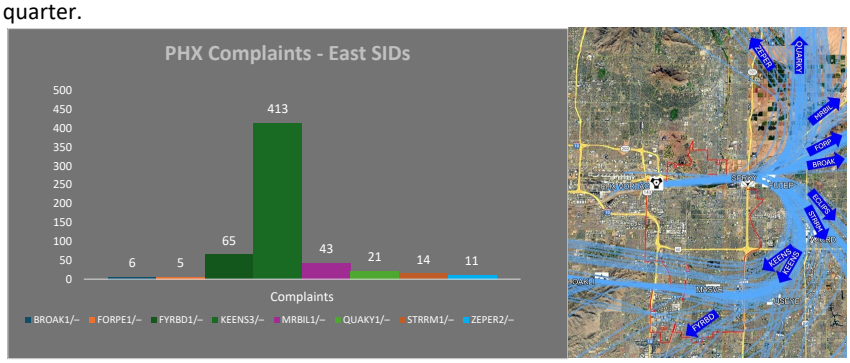


Figure 13: Aircraft noise complaints received by the City of Phoenix correlated to eastbound RNAV departures with departure route ID during the quarter.

North Tempe Noise Exposure

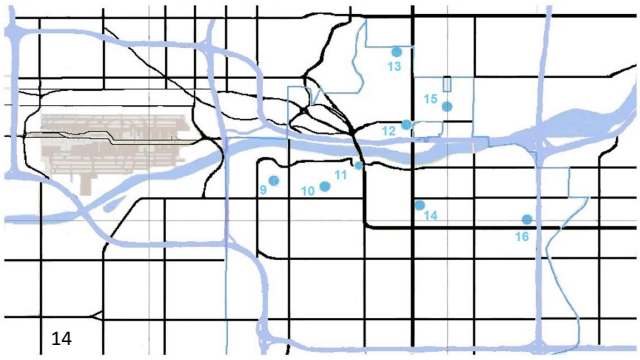


Figure 14: 8 PHX ANOMS fixed noise monitors located in Tempe

Aircraft sound exposure is measured by twenty fixed PHX ANOMS noise monitors of which eight are in North Tempe.

Average equivalent sound level (Ldn) or Day Night Level (DNL) is the metric used to determine exposure over time, calculated over a 24-hour period with a penalty of 10dB added for sound events occurring between 10:00 p.m. and 7:00 a.m. The PHX ANOMS provider Casper uses European metrics, Lden, Day-evening-night level, where evenings are given a separate 5dB penalty in addition to the night penalty of 10dB.

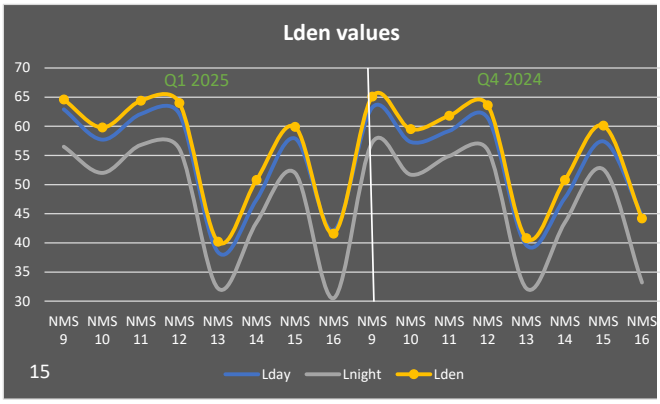


Figure 15: Lden values separated out for day and night and the equivalent averaged dB(A) level from the last two quarters.

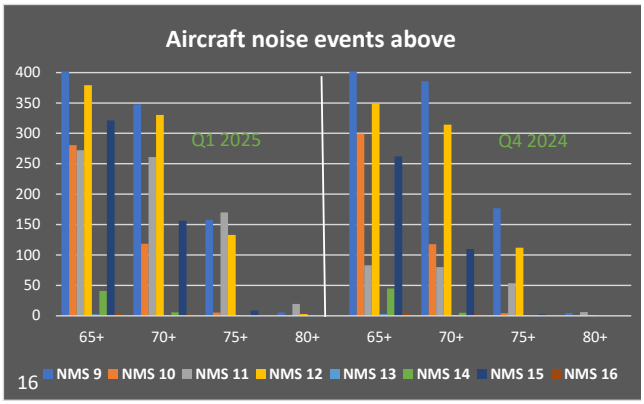


Figure 16: Number of events above 65 dB(A) attributed to aircraft at Tempe monitors during the last two quarters.

Developments in Noise Impacted Area

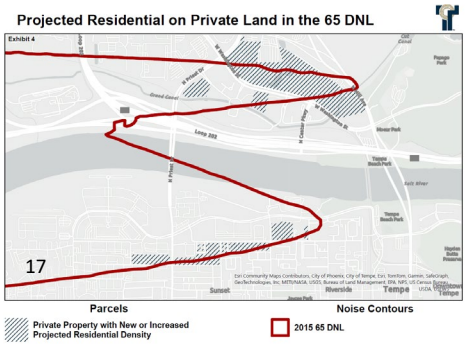


Figure 17: Exhibit #4, Noise Exposure Map (NEM) included in the 2024 IGA Amendment

According to the December 11, 2024, amendment to the 1994 IGA, there are specific restrictions and requirements for new developments on city owned land, and requirements on privately owned land located inside the PHX 65 DNL noise exposure contour.

There have been no new applications or actions taken by the city regarding new developments inside the noise exposure area during the quarter.

Attachment: Abbreviations

ABBREVATIONS

ANOMS Airport Noise Monitoring and Management System. Airport analytical tool to monitor air traffic and aircraft noise.
DME Distance Measuring Equipment. 4-DME means 4 NM from the measuring equipment, which in this report is the PHX VORTAC located close to the East Valley Bus Operations & Maintenance Facility in Tempe.
DNL Day-Night Noise Level. Averaged noise levels over 24 hours with a 10dB penalty for flights occurring between 10 p.m. and 7:00 a.m.
EQUALIZATION. Noise abatement measure to split the flow of departing jets equally east and west of PHX. The FAA expressed in a 1994 Record of Decision, (ROD), for the EIS that included environmental impacts of PHX Master Plan projects that included adding a third runway, that the appropriate period for the definition departure equalization is over a twelve-month period. Hourly or daily equalization were not considered to be reasonable goals due to factors like seasonal weather patterns, diurnal wind changes, air traffic conditions, and the density of aircraft operations at specific times of day with most aircraft operations occurring during daylight hours of a 24-hour period.
IFR Instrument Flight Rules. Set of rules with guidance for flights which need a flight plan and where reliance on flight instruments is needed to safely conduct the flight.
IGA Intergovernmental Agreement. In this report the IGA is the 1994 Cities of Tempe/Phoenix agreement on noise mitigation flight procedures.
LDN Averaged weighted noise level. Ldn for night and day combined equals the DNL.
LDEN Averaged weighted noise level with an added dB penalty for flights occurring in the evening in addition to the penalty for flights occurring at night.
NAVAID A navigational fix. For RNAV it is a waypoint that can be navigated to, from, or between airports or other navigational fixes.
NCP Noise Compatibility Program. FAA approved program for airport noise mitigation and recommendations for land use planning inside areas projected to be exposed to significant DNL exposure.
NEM Noise Exposure Map depicting noise exposure levels, (DNL), included in an airport's Noise Compatibility Program (NCP).
NM Nautical Mile.
NOD Notice of Deviation. Issued by the City of Phoenix to an airline which jet aircraft fail to pass through the PHX Gate on departure over north Tempe.
PHX Phoenix Sky Harbor International Airport.
PHX Gate Departure Compliance Measure. A 5,500 feet imaginary line at 4-DME east of PHX along Price Road at the SR101/202 intersection jet departures need to pass through to comply with a noise mitigation departure procedure agreed upon in the 1994 IGA.
RNAV Area Navigation.
RNP Required Navigation Performance.
ROD Record of Decision. Findings with conclusions about environmental impacts from proposed federal action(s) based on Environmental Impact Statements (EISs) made in compliance with National Environmental Policy Act (NEPA).
SEL Single Event Level.
SID Standard Instrument Departure. Flight procedure for the airport departure phase for an aircraft following an IFR flight plan. PHX SIDs are either RNAV SIDs or Classic SIDs which use traditional ground-based NAVAIDs.
SPRKY RNAV NAVAID, (fly-over waypoint), for PHX RNAV SIDs to the east, located at 4-DME in the center of the PHX Gate.
VORTAC Very High Frequency Omnidirectional Range Collocated Tactical Air. (See DME).
WAYPOINT Geographical position in space. In this report a waypoint is either a fly-over waypoint (NAVAID) that precludes any turn until the waypoint is overflown, or fly-by waypoint that requires the use of turn anticipation to avoid overshooting the next flight segment.