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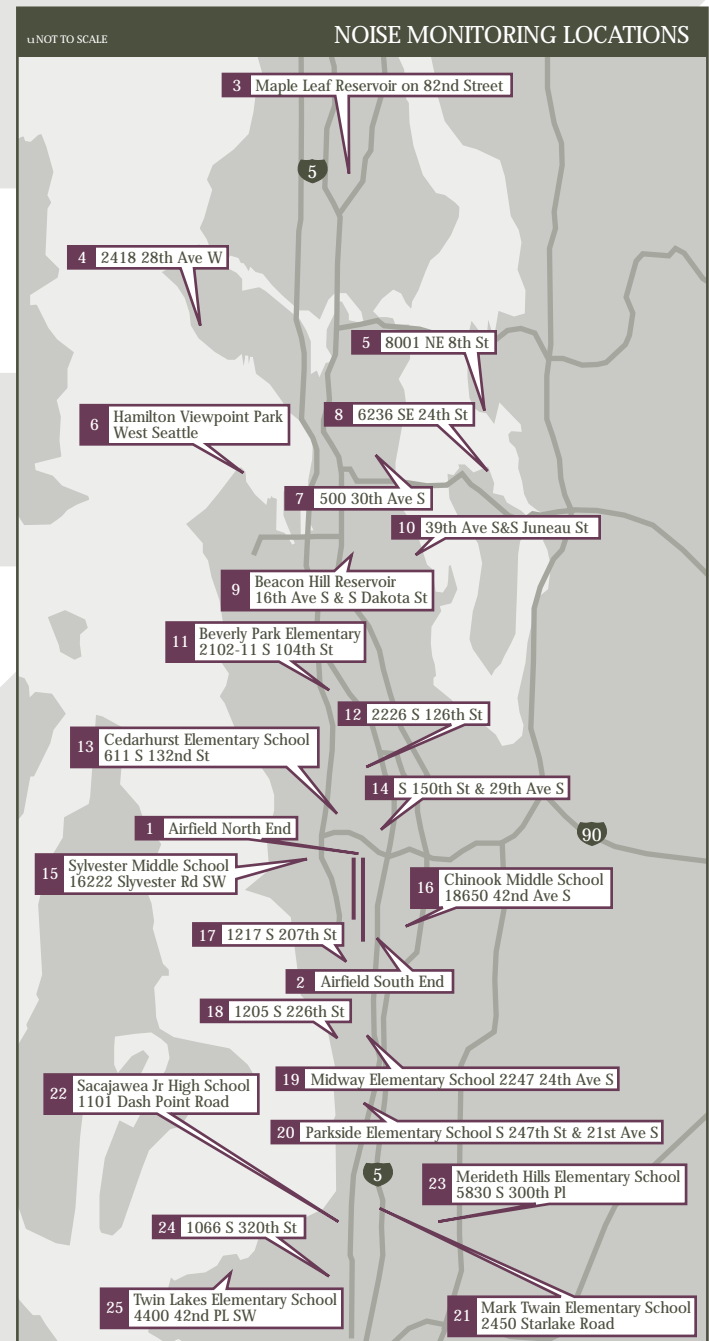
Noise Monitoring System  
**SEATTLE-TACOMA**  
 INTERNATIONAL AIRPORT

## Seattle-Tacoma International Airport Noise Monitoring System

Seattle-Tacoma International Airport has expanded and upgraded its noise monitoring system.

Replacing a system that had been in place for many years, the Port of Seattle has installed new equipment covering a much larger geographic area, including modern technology and analytical capabilities. By installing the latest in hardware and software, the Port of Seattle is reaffirming its long-established commitment to provide the highest standard of public information.

The noise monitoring system measures noise levels from individual aircraft and keeps track of many operations over time. As data from the monitors are accumulated and analyzed, a history of noise levels is maintained so that changes in the environment can be noted and trends identified



**Where Are the Monitors Located?**  
 The system has been expanded from 11 microphones to 25, resulting in a more complete geographic distribution of sites and a considerable increase in data. Whereas the original microphones were clustered fairly close to the Airport, the new sites range from as far south as Twin Lakes, as far north as Maple Leaf, as far east as Mercer Island and Medina, and as far west as Magnolia and West Seattle.

### How Were the Locations Chosen?

Noise monitor locations are determined by a complex set of criteria. Working together with a Citizens Advisory Committee who contributed direct knowledge of local neighborhoods, the Port identified a list of possible sites that were narrowed down based on practical considerations. Criteria used to identify these sites can be divided into two basic categories: proximity to the noise source and physical site requirements.

Proximity to the noise source criteria includes:

- n Relation to runway ends.
- n Relation to flight paths.
- n Distance from specific activities such as aircraft engine maintenance runups, taxi noise, and takeoff roll.

Physical site requirements include:

- n Absence of non-aircraft noise sources such as highways, industrial facilities, sirens, etc.
- n Absence of structures that would deflect, reflect, or otherwise distort noise.
- n Availability of public land.
- n Access to electrical power.
- n Accessibility for maintenance.

### What Do the Microphones Record?

Individual microphone sites are situated to record specific activities. For example, microphones #1 and #2, along side of the runways, are positioned to record engine maintenance run-ups. By contrast, the farther out microphones are situated near flight paths, so they are able to record arrival and/or departure noise.

### What Does the Data Say?

The noise monitoring system gathers a large quantity of data used for several purposes:

- n Measuring the noise of a single flight at a specific location
- n Keeping a record of hourly, daily, monthly, and annual average noise levels at each site.
- n Evaluating trends in noise levels at each site and around the airport.
- n Researching and answering questions from concerned citizens.
- n Comparing noise levels of different aircraft types
- n Monitoring aircraft adherence to noise abatement flight tracks.
- n Preparing reports for the public
- n Verifying computer generated noise contours as part of a public noise study.

On an annual basis, the Port of Seattle will produce a report of the previous year's data organized around each microphone site, as well as trends for the whole Puget Sound region. In addition, special reports will be produced to look at a variety of issues throughout the year.

NOISE MEASUREMENT DEFINITIONS

Decibel (dB) - In sound, decibels measure a scale from the threshold of human hearing, 0 dB, upward towards the threshold of pain, about 120-140 dB. Because decibels are such a small measure, they are computed logarithmically and cannot be added arithmetically. Humans perceive an increase of 10 dB for a single noise event as a doubling of noise.

Leq (Equivalent Noise Level)  $\bar{n}$  is a cumulative metric that averages noise levels over time - an hour, day, month, or year.

DNL - Day/night noise level  $\bar{n}$  is a cumulative metric that averages noise levels over time and penalizes noise occurring between 10:00 p.m. and 7:00 a.m. by adding 10 dB to each event. DNL is often expressed as annual average noise level.

SEL (Sound Exposure Level)  $\bar{n}$  is a single event measurement for one aircraft overflight over the period of time that the aircraft noise exceeds the background noise level.

Maximum Noise Level  $\bar{n}$  is the single highest dB measure recorded during one aircraft flyover.

Background or Ambient Noise Level  $\bar{n}$  is a measure of non-aircraft noise such as traffic, conversation, animals, machinery, and other noises in the environment around a microphone.

### How to Read the Reports


Comparative Noise Levels - When comparing noise levels between monitor sites, individual aircraft types, or aircraft and other noise sources, it is always important to be aware of whether the acoustic measurement is for a single event (one flight), or a cumulative number of events over time. Since all acoustic measurements are expressed in decibels, these comparisons can be confusing.

#### Examples of Various A-Weighted Decibel Sound Environments

dB(A)	OVER-ALL LEVEL Sound Pressure Level Approx. 0.0002 Microbar	COMMUNITY (Outdoor)
130		Military Jet Aircraft Takeoff with Afterburner from Aircraft Carrier @ 50 ft. (130)
120 110	UNCOMFORTABLY LOUD	Concorde Takeoff (113)
100		Boeing 747-200 Takeoff (101)
90	VERY LOUD	Power Mower (96) DC-10-30 Takeoff (96)
80		Car Wash @ 20 ft. (89) Boeing 727 Hushkit Takeoff (89)
70	MODERATELY LOUD	High Urban Ambient Sound (80) Passenger Car, 65 mph @ 25 ft. (77) Boeing 757 Takeoff (76)
60		Propeller Airplane Takeoff (67) Air Conditioning Unit @ 100 ft. (60)
50	QUIET	Large Transformers @ 100 ft. (50)
40		Bird Calls (44) Low Urban Ambient Sound (40)


#### Flight Tracks Illustration

NORTH FLOW DEPARTURES WITH NOISE MONITORING LOCATIONS



#### Flight Tracks Illustration

SOUTH FLOW DEPARTURES WITH NOISE MONITORING LOCATIONS



i Aircraft takeoff noise measured 6,500 meters from beginning of takeoff roll (Source: Advisory Circular AC-36-3G)i