SFO COMMUNITY ROUNDTABLE

Meeting Packet
Regular Meeting

Meeting No. 307
Wednesday, June 7, 2017 - 7:00 p.m.

David Chetcuti Community Room – Millbrae City Hall
450 Popular Avenue – Millbrae, CA 94030

Note: To arrange an accommodation under the Americans with Disabilities Act to participate in this public meeting, please call (650) 363-1853 at least 2 days before the meeting date.

AGENDA

1. Call to Order / Roll Call / Declaration of a Quorum Present
ACTION
Elizabeth Lewis, Roundtable Chairperson

2. Consideration and Approval of the Technical Consultant Ad-Hoc Subcommittee Recommendation
ACTION
Elizabeth Lewis, Roundtable Chairperson

- Memorandum pg. 13

3. Public Comments on Items NOT on the Agenda
INFORMATION
*Speakers are limited to two minutes. Roundtable members cannot discuss or take action on any matter raised under this item.

CONSENT AGENDA ITEMS

All items on the Consent Agenda are approved/accepted in one motion. A Roundtable Representative can make a request, prior to action on the Consent Agenda, to transfer a Consent Agenda item to the Regular Agenda. Any items on the Regular Agenda may be transferred on the Consent Agenda in a similar manner.

4. Review of Roundtable Regular Meeting Overview for April 5, 2017 and Special Meeting Corrected Overview for January 12, 2017.
ACTION
1. April 5, 2017 Regular Meeting Overview pg. 15
2. January 12, 2017 Special Meeting Corrected Overview pg. 19

REGULAR AGENDA

5. Review of Airport Director's Reports & New Report Format Update
ACTION
Bert Ganoung, Manager - Aircraft Noise Abatement Office

1. March 2017 Airport Director's Report (old format) pg. 25
2. March 2017 Airport Director's Report (new format) pg. 33
3. April 2017 Airport Director's Report (old format) pg. 39
4. April 2017 Airport Director's Report (new format) pg. 47

REGULAR AGENDA (continued)

6. Review of SFO FlyQuiet Report for Q1 2017
INFORMATION
Bert Ganoung, Manager - Aircraft Noise Abatement Office

- FlyQuiet Report for Q1 2017 pg. 53
- FlyQuiet Report for Q1 2017 (presentation slides) pg. 68

7. Airport Director's Comments
INFORMATION
Ivar Satero, Director – San Francisco International Airport

8. Status, FAA Initiative Response
INFORMATION
Elizabeth Lewis, Roundtable Chairperson

9. Review/Discussion of Monitoring Report for Woodside, Portola Valley, and Brisbane
INFORMATION
Bert Ganoung, Manager - Aircraft Noise Abatement Office

1. Woodside Noise Aircraft Noise Monitoring for Q1 2017 pg. 81
2. Portola Valley Noise Aircraft Noise Monitoring for Q1 2017 pg. 99
3. Brisbane Noise Aircraft Noise Monitoring for April 2017 pg. 115
4. Supplemental Aircraft Noise Terminology and Metrics pg. 164

10. Update from the Roundtable's Legislative and Work Program Subcommittees
INFORMATION
Elizabeth Lewis, Roundtable Chairperson

- Memorandum pg. 22

11. Upcoming Technical Working Group, Operations and Efficiency Subcommittees Meetings
INFORMATION
Elizabeth Lewis, Roundtable Chairperson

OTHER MATTERS

12. Member Communications / Announcements
INFORMATION
Roundtable Members and Staff

13. Adjourn
ACTION
Elizabeth Lewis, Roundtable Chairperson

Additional Resources

1. Welcome pg. 3
2. About the Roundtable pg. 4
3. Roundtable Member Roster pg. 5
4. Glossary of Acoustic & Air Traffic Control Terms pg. 7

SFO COMMUNITY ROUNDTABLE

Welcome

The Airport/Community Roundtable is a voluntary committee that provides a public forum to address community noise issues related to aircraft operations at San Francisco International Airport. The Roundtable encourages orderly public participation and has established the following procedure to help you, if you wish to present comments to the committee at this meeting.

- You must fill out a Speaker Slip and give it to the Roundtable Coordinator at the front of the room, as soon as possible, if you wish to speak on any Roundtable Agenda item at this meeting.
- To speak on more than one Agenda item, you must fill out a Speaker Slip for each item.
- The Roundtable Chairperson will call your name; please come forward to present your comments.

The Roundtable may receive several speaker requests on more than one Agenda item; therefore, each speaker is limited to two (2) minutes to present his/her comments on any Ag1enda item unless given more time by the Roundtable Chairperson. The Roundtable meetings are recorded. Copies of the audio file can be made available to the public upon request. Please contact the Roundtable Coordinator for any request.

Roundtable Meetings are accessible to people with disabilities. Individuals who need special assistance or a disability-related modification or accommodation to participate in this meeting, or who have a disability and wish to request an alternative format for the Agenda, Meeting Notice, Meeting Packet, or other writings that may be distributed at the meeting, should contact the Roundtable Coordinator at least two (2) working days before the meeting at the phone or e-mail listed below. Notification in advance of the meeting will enable Roundtable staff to make reasonable arrangements to ensure accessibility to this meeting.

AIRPORT/COMMUNITY ROUNDTABLE OFFICERS & STAFF

Chairperson:

ELIZABETH LEWIS
Representative, Town of Atherton
elewis@ci.atherton.ca.us

Vice-Chairperson:

MARK ADDIEGO
Representative, City of South San Francisco
Mark.Addiego@ssf.net

Roundtable Coordinator:

JAMES A. CASTAÑEDA, AICP
County of San Mateo
Planning & Building Department
jcastaneda@sforoundtable.org

SFO COMMUNITY ROUNDTABLE

About the Roundtable

The Airport/Community Roundtable was established in May 1981, by a Memorandum of Understanding (MOU), to address noise impacts related to aircraft operations at San Francisco International Airport (SFO). The Airport is owned and operated by the City and County of San Francisco, but it is located entirely within San Mateo County. This voluntary committee consists of 22 appointed and elected officials from the City and County of San Francisco, the County of San Mateo, and several cities in San Mateo County (see attached Membership Roster). It provides a forum for the public to address local elected officials, Airport management, FAA staff, and airline representatives, regarding aircraft noise issues. The committee monitors a performance-based aircraft noise mitigation program, as implemented by Airport staff, interprets community concerns, and attempts to achieve additional noise mitigation through a cooperative sharing of authority brought forth by the airline industry, the FAA, Airport management, and local government officials. The Roundtable adopts an annual Work Program to address key issues. In 2017, the Roundtable is scheduled to meet on the first Wednesday of the following months: February, April, June, August, October and December. Regular Meetings are held on the first Wednesday of the designated month at 7:00 p.m. at **the David Chetcuti Community Room at Millbrae City Hall, 450 Poplar Avenue, Millbrae, California** unless noted. Special Meetings and workshops are held as needed. The members of the public are encouraged to attend the meetings and workshops to express their concerns and learn about airport/aircraft noise and operations. For more information about the Roundtable, please contact Roundtable staff at (650) 363-1853.

POLICY STATEMENT

The Airport/Community Roundtable reaffirms and memorializes its longstanding policy regarding the "shifting" of aircraft-generated noise, related to aircraft operations at San Francisco International Airport, as follows:

> **"The Airport/Community Roundtable members, as a group, when considering and taking actions to mitigate noise, will not knowingly or deliberately support, encourage, or adopt actions, rules, regulations or policies, that result in the "shifting" of aircraft noise from one community to another, when related to aircraft operations at San Francisco International Airport."**
> *(Source: Roundtable Resolution No. 93-01)*

FEDERAL PREEMPTION, RE: AIRCRAFT FLIGHT PATTERNS

The authority to regulate flight patterns of aircraft is vested exclusively in the Federal Aviation Administration (FAA). Federal law provides that:

> "No state or political subdivision thereof and no interstate agency or other political agency of two or more states shall enact or enforce any law, rule, regulation, standard, or other provision having the force and effect of law, relating to rates, routes, or services of any air carrier having authority under subchapter IV of this chapter to provide air transportation."
> *(Source: 49 U.S.C. A. Section 1302(a)(1)).*

SFO COMMUNITY ROUNDTABLE

Member Roster

June 2017

CITY AND COUNTY OF SAN FRANCISCO BOARD OF SUPERVISORS
Ahsha Safaí, Supervisor

CITY AND COUNTY OF SAN FRANCISCO MAYOR'S OFFICE
David Takashima, (Appointed)
Alternate: Edwin Lee, Mayor

CITY AND COUNTY OF SAN FRANCISCO AIRPORT COMMISSION REPRESENTATIVE
Ivar Satero, Airport Director (Appointed)
Alternate: Doug Yakel, Public Information Officer

COUNTY OF SAN MATEO BOARD OF SUPERVISORS
Dave Pine, Supervisor
Alternate: Don Horsley, Supervisor

CITY/COUNTY ASSOCIATION OF GOVERNMENTS AIRPORT LAND USE COMMITTEE (ALUC)
Adam Kelly, ALUC Chairperson (Appointed)

TOWN OF ATHERTON
Elizabeth Lewis, Mayor
Alternate: Bill Widmer, Council Member

CITY OF BELMONT
Douglas Kim, Council Member
Alternate: Eric Reed

CITY OF BRISBANE
Terry O'Connell, Council Member
Alternate: Madison Davis, Council Member

CITY OF BURLINGAME
Ricardo Ortiz, Council Member

CITY OF DALY CITY
Glenn Sylvester, Mayor

CITY OF FOSTER CITY
Sam Hindi, Council Member

CITY OF HALF MOON BAY
Harvey Rarback, Council Member

TOWN OF HILLSBOROUGH
Alvin Royse, Council Member
Alternate: Shawn Christianson, Council Member

CITY OF MENLO PARK
Peter Ohtaki, Council Member

CITY OF MILLBRAE
Ann Schneider, Council Member

CITY OF PACIFICA
Sue Digre, Mayor

TOWN OF PORTOLA VALLEY
Ann Wengert: Council Member
Alternate: Maryann Derwin, Council Member

CITY OF REDWOOD CITY
Janet Borgens, Council Member

CITY OF SAN BRUNO
Ken Ibarra, Council Member
Alternate: Rico Medina, Council Member

CITY OF SAN CARLOS
Matt Grocott: Council Member
Alternate: Bob Grassilli, Council Member

CITY OF SAN MATEO
David Lim, Council Member
Alternate: Rick Bonilla, Council Member

CITY OF SOUTH SAN FRANCISCO
Mark Addiego, Council Member
Alternate: Pradeep Gupta, Council Member

TOWN OF WOODSIDE
Deborah Gordon, Council Member
Alternate: Thomas Shanahan, Council Member

ROUNDTABLE ADVISORY MEMBERS

AIRLINES/FLIGHT OPERATIONS
Captain James Abell, United Airlines
Glenn Morse, United Airlines

FEDERAL AVIATION ADMINISTRATION
Thann McLeod, NORCAL TRACON
Tony DiBernardo, FAA Sierra-Pacific District

ROUNDTABLE STAFF
James A. Castañeda, AICP, Roundtable Coordinator

SAN FRANCISCO INTERNATIONAL AIRPORT NOISE ABATEMENT STAFF
Bert Ganoung, Noise Abatement Manager
David Ong, Noise Abatement Systems Manager
Ara Balian, Noise Abatement Specialist
John Hampel, Noise Abatement Specialist
Nastasja Gjorek, Noise Abatement Specialist
William Brown, Noise Abatement Specialist
Joyce Satow, Administration Secretary

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San Francisco International Airport

Aircraft Noise Abatement Office

Glossary of common Acoustic and Air Traffic Control terms

A

ADS-B - **Automatic Dependent Surveillance – Broadcast** – ADS-B uses ground based antennas and in-aircraft displays to alert pilots to the position of other aircraft relative to their flight path. ADS-B is a key element of NextGen.

Air Carrier - A commercial airline with published schedules operating at least five round trips per week.

Air Taxi – An aircraft certificated for commercial service available for hire on demand.

ALP - Airport Layout Plan – The official, FAA approved map of an airport's facilities.

ALS – Approach Lighting System - Radiating light beams guiding pilots to the extended centerline of the runway on final approach and landing.

Ambient Noise Level – The existing background noise level characteristic of an environment.

Approach Lights – High intensity lights located along the approach path at the end of an instrument runway. Approach lights aid the pilot as he transitions from instrument flight conditions to visual conditions at the end of an instrument approach.

APU - Auxiliary Power Unit – A self-contained generator in an aircraft that produces power for ground operations of the electrical and ventilation systems and for starting the engines.

Arrival – The act of landing at an airport.

Arrival Procedure - A series of directions on a published approach plate or from air traffic control personnel, using fixes and procedures, to guide an aircraft from the en route environment to an airport for landing.

Arrival Stream – A flow of aircraft that are following similar arrival procedures.

ARTCC – Air Route Traffic Control Center - A facility providing air traffic control to aircraft on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

ATC - Air Traffic Control - The control of aircraft traffic, in the vicinity of airports from control towers, and in the airways between airports from control centers.

ATCT – Air Traffic Control Tower - A central operations tower in the terminal air traffic control system with an associated IFR room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe, expeditious movement of air traffic.

Avionics – Airborne navigation, communications, and data display equipment required for operation under specific air traffic control procedures.

Altitude MSL –Aircraft altitude measured in feet above mean sea level.

B

Backblast - Low frequency noise and high velocity air generated by jet engines on takeoff.

Base Leg – A flight path at right angles to the landing runway. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.

C

Center – See ARTCC.

CNEL – Community Noise Equivalent Level - A noise metric required by the California Airport Noise Standards for use by airport proprietors to measure aircraft noise levels. CNEL includes an additional weighting for each event occurring during the evening (7;00 PM – 9:59 PM) and nighttime (10 pm – 6:59 am) periods to account for increased sensitivity to noise during these periods. Evening events are treated as though there were three and nighttime events are treated as thought there were ten. This results in a 4.77 and 10 decibel penalty

penalty for operations occurring in the evening and nighttime periods, respectively.

CNEL Contour - The "map" of noise exposure around an airport as expressed using the CNEL metric. A CNEL contour is computed using the FAA-approved Integrated Noise Model (INM), which calculates the aircraft noise exposure near an airport.

Commuter Airline – Operator of small aircraft (maximum size of 30 seats) performing scheduled (maximum size of 30 seats) performing service between two or more points.

D

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. An increase of ten dB is perceived by human ears as a doubling of noise.

dBA - A-weighted decibels adjust sound pressure towards the frequency range of human hearing.

dBC - C-weighted decibels adjust sound pressure towards the low frequency end of the spectrum. Although less consistent with human hearing than A- weighting, dBC can be used to consider the impacts of certain low frequency operations.

Decision Height – The height at which a decision must be made during an instrument approach either to continue the approach or to execute a missed approach.

Departure – The act of an aircraft taking off from an airport.

Departure Procedure – A published IFR departure procedure describing specific criteria for climb, routing, and communications for a specific runway at an airport.

Displaced Threshold - A threshold that is located at a point on the runway other than the physical beginning. Aircraft can begin departure roll before the threshold, but cannot land before it.

DME - Distance Measuring Equipment - Equipment (airborne and ground) used to measure, in nautical miles, a slant range distance of an aircraft from the DME navigational aid.

DNL - Day/Night Average Sound Level - The daily average noise metric in which that noise occurring between 10:00 p.m. and 7:00 a.m. is penalized by 10 dB. DNL is often expressed as the annual-average noise level.

DNL Contour - The "map" of noise exposure around an airport as expressed using the DNL metric. A DNL contour is computed using the FAA-approved Integrated Noise Model (INM), which calculates the aircraft noise exposure near an airport.

Downwind Leg – A flight path parallel to the landing runway in the direction opposite the landing direction.

Duration - The length of time in seconds that a noise event lasts. Duration is usually measured in time above a specific noise threshold.

E

En route – The portion of a flight between departure and arrival terminal areas.

Exceedance— Whenever an aircraft overflight produces a noise level higher than the maximum decibel value established for a particular monitoring site, the noise threshold is surpassed and a noise exceedance occurs. An exceedance may take place during approach, takeoff, or possibly during departure ground roll before lifting off.

F

FAA - The Federal Aviation Administration is the agency responsible for aircraft safety, movement and controls. FAA also administers grants for noise mitigation projects and approves certain aviation studies including FAR Part 150 studies, Environmental Assessments, Environmental studies, Environmental Assessments, Environ Impact Statements, and Airport Layout Plans.

FAR – Federal Aviation Regulations are the rules and regulations, which govern the operation of aircraft, airways, and airmen.

FAR Part 36 – A Federal Aviation Regulation defining maximum noise emissions for aircraft.

FAR Part 91 – A Federal Aviation Regulation governing the phase out of Stage 1 and 2 aircraft as defined under FAR Part 36.

FAR Part 150 – A Federal Aviation Regulation governing noise and land use compatibility studies and programs.

FAR Part 161 – A Federal Aviation Regulation governing aircraft noise and access restrictions.

Fix – A geographical position determined by visual references to the surface, by reference to one or more Navaids, or by other navigational methods.

Fleet Mix – The mix or differing aircraft types operated at a particular airport or by an airline.

Flight Plan – Specific information related to the intended flight of an aircraft. A flight plan is filed with a Flight Service Station or Air Traffic Control facility.

FMS – Flight Management System - a specialized computer system in an aircraft that automates a number of in-flight tasks, which reduces flight crew workload and improves the precision of the procedures being flown.

G

GA - General Aviation – Civil aviation excluding air carriers, commercial operators and military aircraft.

GAP Departure – An aircraft departure via Runways 28 at San Francisco International Airport to the west over San Bruno, South San Francisco, Daly City, and Pacifica.

Glide Slope – Generally a 3-degree angle of approach to a runway established by means of airborne instruments during instrument approaches, or visual ground aids for the visual portion of an instrument approach and landing.

GPS - Global Positioning System – A satellite based radio positioning, navigation, and time-transfer system.

GPU - Ground Power Unit – A source of power, generally from the terminals, for aircraft to use while their engines are off to power the electrical and ventilation systems on the aircraft.

Ground Effect – The excess attenuation attributed to absorption or reflection of noise by manmade or natural features on the ground surface.

Ground Track – is the path an aircraft would follow on the ground if its airborne flight path were plotted on the ground the terrain.

H

High Speed Exit Taxiway – A taxiway designed and provided with lighting or marking to define the path of aircraft traveling at high speed from the runway center to a point on the center of the taxiway.

I

IDP - Instrument Departure Procedure - An aeronautical chart designed to expedite clearance delivery and to facilitate transition between takeoff and en route operations. IDPs were formerly known as SIDs or Standard Instrument Departure Procedures.

IFR - Instrument Flight Rules -Rules and regulations established by the FAA to govern flight under conditions in which flight by visual reference is not safe.

ILS - Instrument Landing System – A precision instrument approach system which normally consists of a localizer, glide slope, outer marker, middle marker, and approach lights.

IMC – Instrument Meteorological Conditions - Weather conditions expressed in terms of visibility, distance from clouds, and cloud ceilings during which all aircraft are required to operate using instrument flight rules.

Instrument Approach – A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

J

K

Knots – A measure of speed used in aerial navigation. One knot is equal to one nautical mile per hour (100 knots = 115 miles per hour).

L

Load Factor – The percentage of seats occupied in an aircraft.

Lmax – The peak noise level reached by a single aircraft event.

Localizer – A navigational aid that consists of a directional pattern of radio waves modulated by two signals which, when receding with equal intensity, are displayed by compatible airborne equipment as an “on-course” indication, and when received in unequal intensity are displayed as an “off-course” indication.

LDA – Localizer Type Directional Aid – A facility of comparable utility and accuracy to a localizer, but not part of a complete ILS and not aligned with the runway.

M

Middle Marker - A beacon that defines a point along the glide slope of an ILS, normally located at or near the point of decision height.

Missed Approach Procedure – A procedure used to redirect a landing aircraft back around to attempt another landing. This may be due to visual contact not established at authorized minimums or instructions from air traffic control, or for other reasons.

N

NAS – National Airspace System - The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, manpower and material.

Nautical Mile – A measure of distance used in air and sea navigation. One nautical mile is equal to the length of one minute of latitude along the earth's equator. The nautical mile was officially set as 6076.115 feet. (100 nautical miles = 115 statute miles)

Navaid – Navigational Aid.

NCT – Northern California TRACON – The air traffic control facility that guides aircraft into and out of San Francisco Bay Area airspace.

NDB – Non-Directional Beacon - Signal that can be read by pilots of aircraft with direction finding equipment. Used to determine bearing and can "home" in or track to or from the desired point.

NEM – Noise Exposure Map – A FAR Part 150 requirement prepared by airports to depict noise contours. NEMs also take into account potential land use changes around airports.

NextGen – The Next Generation of the national air transportation system. NextGen represents the movement from ground-based navigation aids to satellite-based navigation.

NMS – See RMS

Noise Contour – See CNEL and DNL Contour.

Non-Precision Approach Procedure – A standard instrument approach procedure in which no electronic glide slope is provided.

O

Offset ILS – Offset Parallel Runways – Staggered runways having centerlines that are parallel.

Operation – A take-off, departure or overflight of an aircraft. Every flight requires at least two operations, a take-off and landing.

Outer Marker – An ILS navigation facility in the terminal area navigation system located four to seven miles from the runways edge on the extended centerline indicating the beginning of final approach.

Overflight – Aircraft whose flights originate or terminate outside the metropolitan area that transit the airspace without landing.

P

PASSUR System – Passive Surveillance Receiver - A system capable of collecting and plotting radar tracks of individual aircraft in flight by passively receiving transponder signals.

PAPI – Precision Approach Path Indicator - An airport lighting facility in the terminal area used under VFR conditions. It is a single row of two to four lights, radiating high intensity red or white beams to indicate whether the pilot is above or below the required runway approach path.

PBN –Performance Based Navigation - Area navigation based on performance requirements for aircraft operating along an IFR route, on an instrument approach procedure or in a designated airspace.

Preferential Runways - The most desirable runways from a noise abatement perspective to be assigned whenever safety, weather, and operational efficiency permits.

Precision Approach Procedure – A standard instrument approach procedure in which an electronic glide slope is provided, such as an ILS. GPS precision approaches may be provided in the future.

PRM – Precision Runway Monitoring – A system of high-resolution monitors for air traffic controllers to use in landing aircraft on parallel runways separated by less than 4,300'.

Q

R

Radar Vectoring – Navigational guidance where air traffic controller issues a compass heading to a pilot.

Reliever Airport – An airport for general aviation and other aircraft that would otherwise use a larger and busier air carrier airport.

RMS – Remote Monitoring Site - A microphone placed in a community and recorded at San Francisco International Airport's Noise Monitoring Center. A network of 29 RMS's generate data used in preparation of the airport's Noise Exposure Map.

RNAV – Area Navigation - A method of IFR navigation that allows an aircraft to choose any course within a network of navigation beacons, rather than navigating directly to and from the beacons. This can conserve flight distance, reduce congestion, and allow flights into airports without beacons.

RNP – Required Navigation Performance - A type of performance-based navigation (PBN) that allows an aircraft to fly a specific path between two 3- dimensionally defined points in space. RNAV and RNP systems are fundamentally similar. The key difference between them is the requirement for on- board performance monitoring and alerting. A navigation specification that includes a requirement for on-board navigation performance monitoring and alerting is referred to as an RNP specification. One not having such a requirement is referred to as an RNAV specification.

Run-up – A procedure used to test aircraft engines after maintenance to ensure safe operation prior to returning the aircraft to service. The power settings tested range from idle to full power and may vary in duration.

Run-up Locations - Specified areas on the airfield where scheduled run-ups may occur. These locations are sited, so as to produce minimum noise impact in surrounding neighborhoods.

Runway – A long strip of land or water used by aircraft to land on or to take off from.

S

Sequencing Process – Procedure in which air traffic is merged into a single flow, and/or in which adequate separation is maintained between aircraft.

Shoreline Departure – Departure via Runways 28 that utilizes a right turn toward San Francisco Bay as soon as feasible. The Shoreline Departure is considered a noise abatement departure procedure.

SENEL – Single Event Noise Exposure Level - The noise exposure level of a single aircraft event measured over the time between the initial and final points when the noise level exceeds a predetermined threshold. It is important to distinguish single event noise levels from cumulative noise levels such as CNEL. Single event noise level numbers are generally higher than CNEL numbers, because CNEL represents an average noise level over a period of time, usually a year.

Single Event – Noise generated by a single aircraft overflight.

SOIA – Simultaneous Offset Instrument Approach Is an approach system permitting simultaneous Instrument Landing System approaches to airports having staggered but parallel runways. SOIA combines Offset ILS and regular ILS definitions.

STAR – Standard Terminal Arrival Route is a published IFR arrival procedure describing specific criteria for descent, routing, and communications for a specific runway at an airport.

T

Taxiway – A paved strip that connects runways and terminals providing the ability to move aircraft so they will not interfere with takeoffs or landings.

Terminal Airspace - The air space that is controlled by a TRACON.

Terminal Area – A general term used to describe airspace in which approach control service or airport traffic control service is provided.

Threshold – Specified boundary.

TRACON -Terminal Radar Approach Control – is an FAA air traffic control service to aircraft arriving and departing or transiting airspace controlled by the facility. TRACONs control IFR and participating VFR flights. TRACONs control the airspace from Center down to the ATCT.

U

V

Vector – A heading issued to a pilot to provide navigational guidance by radar. Vectors are assigned verbally by FAA air traffic controllers.

VFR – Visual Flight Rules are rules governing procedures for conducting flight under visual meteorological conditions, or weather conditions with a ceiling of 1,000 feet above ground level and visibility of three miles or greater. It is the pilot's responsibility to maintain visual separation, not the air traffic controller's, under VFR.

Visual Approach – Wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic facility and having an air traffic control authorization, may proceed to destination airport under VFR.

VASI – Visual Approach Slope Indicator - An airport lighting facility in the terminal area navigation system used primarily under VFR conditions. It provides vertical visual guidance to aircraft during approach and landing, by radiating a pattern of high intensity red and white focused light beams, which indicate to the pilot that he/she is above, on, or below the glide path.

VMC – Visual Meteorological Conditions - weather conditions equal to or greater than those specified for aircraft operations under Visual Flight Rules (VFR).

VOR - Very High Frequency Omni-directional Range – A ground based electronic navigation aid transmitting navigation signals for 360 degrees oriented from magnetic north. VOR is the historic basis for navigation in the national airspace system.

W

X

Y

Z

how to reach us

SFO Aircraft Noise Abatement Office mailing address is:
P.O. Box 8097, San Francisco, CA 94128

Phone:	**650.821.5100**
Fax:	**650.821.5112**
Noise Complaint Line:	**650.821.4736**
Toll Free Noise Complaint Line:	**877.206.8290**
Noise Complaint E-mail:	**sfo.noise@flysfo.com**
Airport Web Page:	**www.flysfo.com**
Noise Abatement Web Page:	**http://www.flysfo.com/community-environment/noise-abatement**
Roundtable Web Page:	**www.sforoundtable.org**

San Francisco International
Airport/Community Roundtable

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May 30, 2017

TO: Roundtable members and Interested Persons

FROM: James A. Castañeda, AICP, Roundtable Coordinator

SUBJECT: Roundtable Technical Consultant Ad-Hoc Subcommittee Recommendations

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At the end of 2016, the Roundtable's contract with BridgeNet International, technical consultant since October 2012, had expired. A Request for Proposal (RFP) was circulated in December 2016, which was revised and re-circulated in March 2017 to adequately reflect what the Roundtable requires from a technical consultant.

At the close of the latest RFP response period on April 17, 2017, two proposals were received. The respondents were CSDA Design Group, and Harris Miller Miller & Hanson (HMMH). On April 28, 2017, the two teams were interviewed by the Roundtable Technical Consultant Ad-Hoc subcommittee, which consist of Roundtable Chairperson Elizabeth Lewis Roundtable Vice-Chairperson Mark Addiego, San Mateo County Board of Supervisor Dave Pine, Supervisor Pine's Legislative Aid Linda Wolin, Airport Planning Director John Bergener, and myself.

While both teams we're well qualified and demonstrated knowledge and experience in the areas the Roundtable requires technical assistance with, the ad-hoc subcommittee concluded that HMMH was more qualified to meet the comprehensive needs of the Roundtable. Therefore, the ad-hoc subcommittee is recommending that the Roundtable select HMMH as the Roundtable's Technical Consultant for a term of three years.

If selected, the County of San Mateo's Planning and Department (who provides administrative services for the Roundtable) will proceed forward with the contracting process to have HMMH begin their service by the end of June/early July.

Copies of the RFP responses are available on the Roundtable's website (sforoundtable.org/rfp).

jc

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SFO Airport/Community Roundtable
Meeting No. 306 Overview
Wednesday, April 5, 2017

1. Call to Order / Roll Call / Declaration of a Quorum Present

Roundtable Chairperson, Elizabeth Lewis, called the Regular Meeting of the SFO Airport / Community Roundtable to order, at approximately 7:10 p.m., in the David Chetcuti Community Room at the Millbrae City Hall. James A. Castañeda, AICP, Roundtable Coordinator, called the roll. A quorum (at least 12 Regular Members) was present as follows:

REGULAR MEMBERS PRESENT
John Bergner – City and County of San Francisco Airport Commission
David Takashima – City and County of San Francisco Mayor's Office
Adam Kelly – C/CAG Airport Land Use Committee (ALUC)
Elizabeth Lewis – Town of Atherton
Douglas Kim – City of Belmont
Cliff Lentz – City of Brisbane
Ricardo Ortiz – City of Burlingame
Glenn Sylvester – City of Daly City
Harvey Rarback – City of Half Moon Bay
Peter Ohtaki – City of Menlo Park
Ann Schneider – City of Millbrae
Sue Digre – City of Pacifica
Ann Wengert – Town of Portola Valley
Janet Borgens – City of Redwood City
Matt Grocott – City of San Carlos
Rick Bonilla – City of San Mateo
Mark Addiego – City of South San Francisco

REGULAR MEMBERS ABSENT
City and County of San Francisco Board of Supervisors (Vacant)
County of San Mateo Board of Supervisors
Town of Hillsborough
City of San Bruno
Town of Woodside

ROUNDTABLE STAFF
James A. Castañeda, AICP – Roundtable Coordinator

SAN FRANCISCO INTERNATIONAL AIRPORT STAFF
Bert Ganoung, Noise Abatement Manager
Dave Ong, Noise Abatement Specialist
Nastasja Gjorek, Noise Abatement Specialist

2. Adoption of Resolution in Recognition of Cliff Lentz

Roundtable Chairperson Elizabeth Lewis read out the resolution prepared for City of Brisbane representative Cliff Lentz, former Roundtable Chairperson. Chairperson Lewis thanked and acknowledged Mr. Lentz for all his service to the Roundtable during his three years as chairperson. Kathleen Wentworth, aide to Congresswoman Jackie Speier's office, also provided a proclamation from the Congresswoman commending Mr. Lentz for his dedication and service

to the Roundtable. Mr. Lentz took a few minutes to thank the Roundtable members and express his appreciation for all their work during his time as chairperson.

ACTION: Janet Borgens **MOVED** the adoption of the resolution. The motion was seconded by Sue Digre and **CARRIED**, unanimously.

3. Public Comments on Items NOT on the Agenda

Palo Alto resident Marie-Jo Fremont requested an update on the status of the Airbus A320 fuel vent retrofit, as well as any update regarding the implementation of Ground-Based Augmentation System (GBAS) at SFO. Brisbane resident Tony Verreos encourage the Roundtable to put forth a resolution demanding new round of sound insulation to mitigate noise impacts to those homes that didn't receive such before. Brisbane resident Peter Grace suggested that the community noise monitoring reports compiled by the Noise Abatement Office and included in the Roundtable's meeting packet be discussed as an agenda item in the future. City of Brisbane representative Cliff Lentz and City of Daly City representative Glenn Sylvester both agreed and supported having such as an agenda item at the next Roundtable meeting.

4. Review of Roundtable Meeting Overviews for November 2, 2016, January 12, 2017, and February 1, 2017.

ACTION: Janet Borgens **MOVED** approval of the Roundtable meeting overviews. The motion was seconded by Rick Bonilla and **CARRIED** with one abstention (City of Daly City).

5. Review of Airport Director's Report for January and February 2017, New Summary Format update

Nastasja Gjorek, Noise Abatement Specialist, provided an overview of the new Airport Director's Report format introduced at the last Roundtable meeting in February.

DISCUSSION: Roundtable members asked a few questions regarding clarification and explanation of noise exceedance, which Bert Ganoung, Noise Abatement Manager, provided an overview. City of Redwood City representative Janet Borgens asked if there could be a mobile application (app) that could help take in noise complaints. Mr. Ganoung explained that there are several apps currently available, and that the noise abatement office has been focusing on facilitate reporting from these apps instead of developing an in-house app solution.

ACTION: Ricardo Ortiz **MOVED** the acceptance of the Airport Director's Reports. The motion was seconded by Janet Borgens and **CARRIED**, unanimously.

6. Airport Director's Comments

Airport Planning Director John Bergener provided a brief report on the airport's operations on behalf of Airport Director Ivar Satero.

7. Roundtable Technical Consultant Update

Roundtable Chairperson Elizabeth Lewis updated the members on the current status of the Roundtable technical consultant recruitment. An updated and re-circulated RFP was released in March and the window to submit proposals is currently open. It's anticipated to have an consultant on board by June assuming qualified proposals have been submitted for the ad-hoc technical consultant subcommittee to consider and interview.

Per the chairperson, item 9 was taken next out of order.

9. Status, Initiative Response Review Progress

Roundtable Chairperson Elizabeth Lewis indicted that no timeline has been established regarding an anticipated response the Roundtable's recommendations to the FAA Initiative.

DISCUSSION: Thann McLeod of NORCAL TRACON indicated that she also doesn't have an update nor timeline for a response, but that also regarding the FAA Initiative that the TRACON facility is not involved in the review/response to the recommendations made by the Roundtable. Ms. McLeod did provide an update regarding the Class B airspace update at the request of Chairperson Lewis. City of Pacifica Sue Digre expressed thanks to Ms. McLeod for her participation with the Roundtable.

8. Roundtable Subcommittees

Roundtable Chairperson Elizabeth Lewis asked for volunteers for the four Roundtable standing subcommittees which is anticipated to start meeting in May.

DISCUSSION: Assigned to the Work Program subcommittee is Ann Wengert, Ann Schneider, Sam Hindi, and Sue Digre. Assigned to the Operations and Efficiencies subcommittee is Doug Kim, Matt Grocott, Ricardo Ortiz, and Peter Ohtaki. Assigned to the Legislative subcommittee is Sue Digre, Janet Borgens, David Takashima, Harvey Rarback, Deborah Gordon, and Mark Addiego. The Technical Working Groups will include all available Roundtable members to participate when those meetings occur.

10. Discussion, Allow an Appointee Representative to Fill City and County of San Francisco Board of Supervisors Roundtable Vacant Seat

City and County of San Francisco Mayor's Office representative David Takashima explained the purpose of the discussion item and possible consideration of amending the Roundtable's Memorandum of Understanding to allow an appointed representative to fill the vacant City and County of Board of Supervisor seat. Mr. Takashima explained that given the existing commitments of a Supervisor, it might be easier to have an appointed individual to take on the role to fill a seat that has been vacant for some time.

DISCUSSION: A few Roundtable members expressed concern over the possibility of having an appointed representative fill a Roundtable member seat that is expected to be an elected representative of that city. Both City of San Carlos representative Matt Grocott and City of South San Francisco/Roundtable Vice-Chairperson Mark Addiego indicated that all other Roundtable

members take the time to attend meetings to represent their constituents, and should be expect of the City and County of San Francisco Board of Supervisors. City of Burlingame representative Ricardo Ortiz indicated that this could set a precedence to allow appointed individuals represent elected officials on the Roundtable. City of Millbrae representative Ann Schneider indicated that if someone were to be appointed to that seat, it should be someone from the impacted areas of the city they're representing.

The item will be further discussed and considered in a future agenda item.

11. Post TRACON Field Trip recap

Randy Torrijos, Legislative Aide to County of San Mateo representative Supervisor Dave Pine, provided a brief statement regarding Supervisor Pine's attendance in the TRACON field trip the month prior. City of Redwood City representative Janet Borgens also provided comments regarding the trip.

DISCUSSION: Brisbane resident Peter Grace expressed disappointment in the trip and felt the treatment was unequal among those who were part of the trip which included members/individuals from the Oakland Noise Forum, as well as cut-off by TRACON staff when questions were being asked. Ms. Borgens did concur with Mr. Grace's accounts, but suggested perhaps a different trip and/or venue to answer many of the questions that Mr. Grace had, as it didn't seem it was done deliberately given the type of visit arranged. Ms. Borgens did expressed she got a lot of out of the visit, and that the attendees were well received.

As part of Mr. Grace's comments, it was indicated that text included in the January 12, 2017 Roundtable Special Meeting overview did not reflect his statements made during item 5 (Public Comment for Items Not on the Agenda), and felt it was a mischaracterization of what he was discussing. Chairperson Lewis indicated she would work with him after the meeting to correct the overview.*

**Chairperson Lewis received Mr. Grace's corrected statement, and is reflected in the "Meeting No. 304 Corrected Overview – Thursday, January 12, 2017" included in the June 7, 2017 Regular Meeting packet for approval.*

12. Member Communications / Announcements

None

13. Adjourn

Chairperson Elizabeth Lewis adjourned the meeting in memory of Terry Mullin at 8:47 p.m.

SFO Airport/Community Roundtable
Meeting No. 304 Corrected Overview
Thursday, January 12, 2017

1. Call to Order / Roll Call / Declaration of a Quorum Present

Roundtable Chairperson, Cliff Lentz, called the Special Meeting of the SFO Airport / Community Roundtable to order, at approximately 7:06 p.m., in the Terminal 2 Partnering Room at the San Francisco International Airport. James A. Castañeda, AICP, Roundtable Coordinator, called the roll. A quorum (at least 12 Regular Members) was present as follows:

REGULAR MEMBERS PRESENT
Ivar Satero – City and County of San Francisco Airport Commission
David Takashima – City and County of San Francisco Mayor's Office
Dave Pine – County of San Mateo Board of Supervisors
Adam Kelly – C/CAG Airport Land Use Committee (ALUC)
Elizabeth Lewis – Town of Atherton
Cliff Lentz – City of Brisbane
Glenn Sylvester – City of Daly City
Sam Hindi – City of Foster City
Harvey Rarback – City of Half Moon Bay
Alvin Royse – Town of Hillsborough
Peter Ohtaki – City of Menlo Park
Ann Schneider – City of Millbrae
Sue Digre – City of Pacifica
Ann Wengert – Town of Portola Valley
Janet Borgens – City of Redwood City
Ken Ibarra – City of San Bruno
Mark Addiego – City of South San Francisco

REGULAR MEMBERS ABSENT
City and County of San Francisco Board of Supervisors (Vacant)
City of Belmont
City of Burlingame
City of San Carlos
City of San Mateo
Town of Woodside

ROUNDTABLE STAFF
James A. Castañeda, AICP – Roundtable Coordinator

SAN FRANCISCO INTERNATIONAL AIRPORT STAFF
Bert Ganoung, Noise Abatement Manager
David Ong, Noise Abatement Specialist

2. Roundtable's FAA Initiative Reponses, Recap

Roundtable Chairperson Cliff Lentz thanked everyone for attending and for their efforts in participating and contributing to the development of the Roundtable's response to the FAA Initiative. Vice-Chairperson Elizabeth Lewis also thanked members for taking the time to attend a special meeting and the expressed the importance of continuing the dialog. Palo Alto resident Mark Shultz raised the concern on why the Roundtable's engagement is limited the County

boundary, and SFO needs to step up to the FAA. Roundtable members inquired about the Roundtable's Technical Consultant, and Roundtable Coordinator James Castañeda indicated that the contract with BridgeNet International (consultant to the Roundtable since 2012) ended in December. A RFP is currently out to retain services from a new consultant.

3. Initiative Response Review Progress Update

Steve Karnes, Senior Technical Advisor at the FAA's Western Service Center, provided the current status of the FAA review process. The documents produced by the Roundtable and Select Committee on South Bay Arrivals (Select Committee) have gone through the FAA Administrator's office, however delays are anticipated with roles changing with the recent departure of former Western Service Center administrator Glenn Martin. Mr. Karnes did indicate that they're ready to move on whatever recommendations may be approved. Pacifica representative Sue Digre inquired on what the timeline was for immediate solutions. Thann McLeod of the Norcal TRACON facility, outlined a number of adjustments coming online in February as a result of local initiatives to address noises. Ms. McLeod indicated she'll be attending future meetings and engaging more with the Roundtable to provide updates and gather feedback to analyze at the TRACON facility for any solutions they may address.

Millbrae representative Ann Schneider asked if the HUSHH and NITTE procedures will increase departures on RWY 1. Ms. McLeod responded that there should be no change expected with runway assignments. Chairperson Lentz asked Kathleen Wentworth, legislative aide to Congresswoman Jackie Speirs, for an update from the Select Committee. Ms. Wentworth indicated that with the conclusion of the Select Committee's meeting in November to finalize their response to the FAA Initiative, they have met their obligation to the Members of Congress and now disbanded. It was indicated that as part of their document, it was recommended that an ad-hoc committee be formed to follow-up on the Select Committee's recommendations, but would be discussed in the future. Chairperson Lentz also asked for an update regarding Glenn Martin's role as FAA Western Service Center Administrator. Mr. Karnes responded that Dennis Roberts will be filling Mr. Martin's role as Administrator, and is expected to transition into that position in February.

Woodside resident Raymonde Guindon expressed concern regarding additional Asia-Pacific flights at night and possible seasonal flights becoming permanent. Pacifica resident Ray Ramos asked if the Select Committee's issues will now become Roundtable issues since they are disbanded. San Mateo County Board of Supervisor representative Dave Pine expanded on Ms. Wentworth response regarding the recommendation to establish a committee to continue the work of the Select Committee. He encourage those curious to review the Select Committee's recommendation that discusses the matter, but that there is strong interest to establish an organization.

4. Priority Items and Performance Metrics Discussion

Roundtable Chairperson Cliff Lentz asked Steve Karnes how he envisions the FAA Western Service Center will stay involved. Mr. Karnes indicated that the FAA is committed to the process and has and will continue to allocate resources as able to continue outreach in the matter. Thann McLeod reiterated Norcal TRACON's commitment to report and gather feedback from

the Roundtable. Roundtable members were pleased to hear that Ms. McLeod will be participating in meetings, and look forward to her future attendance.

5. Public Comment on Items NOT on the Agenda

Steve Karnes with FAA's Western Service Center announced an upcoming Class B airspace workshop occurring in the coming weeks, and information would be available online. Kathleen Wentworth, legislative aide to Congresswoman Jackie Speirs, asked if any impacts to what the Roundtable has been working on be anticipated with the Class B adjustments. Ms. McLeod responded that there would not be.

Brisbane resident Peter Grace made a presentation comparing the number of noise events at the permanent noise monitors on the northern Peninsula and one temporary monitor between 2010 and 2015 using data from the Noise Abatement Office. Mr. Grace showed that noise has been concentrated and shifted with a 300% increase in the noise events at the Brisbane Ridge between 2010 and 2015. He also showed for the period 2010 to 2016, that flights off RWY 01L/01R are flying further up the bay, but turning over the Peninsula at a lower altitude. As a result, the noise foot print on the Peninsula was larger in 2016 than 2010. Mr. Grace concluded by asking whether these types of metrics would be useful to see in the Airport Director's reports or even reported on by the FAA.*

Other comments were received from residents of Pacifica, Daly City, Brisbane, San Francisco, Palo Alto, and Oakland. Daly City resident David Feldman expressed concerns regarding the impacts from aircraft using the BODGA arrival to SFO. Brisbane resident Jay Patel indicated that metric standards need to be re-evaluated. Other concerns raised were advocating for immediately results and provide relief quicker. Questions regarding future video streaming of Roundtable meetings was also raised. Roundtable Coordinator James Castañeda indicated it'll be happening soon, as there's a number of logistical details to sort out.

6. Adjourn

The meeting was adjourned at 9:11 p.m.

These minutes were approved at the April 5, 2017 Regular Meeting. An audio recording of this meeting is available on the Roundtable's website.

**This overview was subsequently corrected to reflect the information provided during item 5, specifically from Brisbane resident Peter Grace. This corrected meeting overview will be presented to the Roundtable for approval at their next Regular Meeting on June 7, 2017.*

San Francisco International
Airport/Community Roundtable

455 County Center, 2nd Floor
Redwood City, CA 94063
T (650) 363-1853
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www.sforoundtable.org

May 30, 2017

TO: Roundtable Representatives, Alternates, and Interested Persons

FROM: James A. Castañeda, AICP, Roundtable Coordinator

SUBJECT: Roundtable Legislative and Work Plan Subcommittee Meeting Summaries

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On May 4, 2017, both the Legislative and Work Plan Subcommittees convened their first meetings of the year at the San Mateo County Planning and Building Department offices in Redwood City. Both meetings served as a kick-off and introduction to their respective areas of focus due to the lapse in time since both subcommittees have assembled.

Legislative Subcommittee

Roundtable Members Present
Elizabeth Lewis, Town of Atherton (Roundtable Chairperson)
Sue Digre, City of Pacifica
Janet Borgens, City of Redwood City
David Takashima, City and County of San Francisco Mayor's Office

Staff & Advisory Present
James Castañeda, Roundtable Coordinator
Bert Ganoung, Noise Abatement Office, San Francisco International Airport
Kathleen Wentworth, Congresswoman Jackie Speier's Office
Linda Wolin, San Mateo County Supervisor Dave Pine's Office
Glenn Morse, United Airlines

Public Present
Jennifer Landesmann, City of Palo Alto resident
Reva Rabrikant, Save Our Skies East Bay

Meeting Summary

The meeting focused primarily on ways the Roundtable can further their goals and objectives through legislative influence, and tasks to facilitate the subcommittee's ongoing discussions on the matter. City of Pacifica representative Sue Digre encourage that the fundamental focus should be to insist upon congress to request that the FAA prioritize noise impacts over communities over efficiency. The subcommittee also discussed the status of the Quiet Skies Caucus and House Appropriations Transportation subcommittee, and thought of ways to utilize them as a resource.

Some of the tasks/next steps the group discussed and outlined to help to identify and facilitate the subcommittee's objectives include:

- Gather an updated list of Quiet Skies Caucus and House Appropriations Transportation subcommittee congressional members.
- Identify their district, local airport, and any local airport noise roundtable/forum and merge into a list.
- Distribute a list to the members of the subcommittee to research for discussion at the next Legislative Subcommittee meeting.

The objective of the tasks is to get as many congressional voices on both the Quiet Skies Caucus and House Appropriations Transportation subcommittee to help advocate for the Roundtable's objectives, and identify other efforts that may exist to encourage the FAA to prioritize health and safety of communities over efficiency.

Before ending the meeting, Elizabeth Lewis appointed City of Redwood City representative Janet Borgens as Legislative Subcommittee chairperson, and City of Pacifica representative Sue Digre as vice-chairperson.

The next Legislative Subcommittee meeting is tentatively scheduled for July 13, 2017.

Work Program Subcommittee

Roundtable Members Present
Elizabeth Lewis, Town of Atherton (Roundtable Chairperson)
Sue Digre, City of Pacifica
Janet Borgens, City of Redwood City
Ann Schneider, City of Millbrae
Ann Wengert, Town of Portola Valley

Staff & Advisory Present
James Castañeda, Roundtable Coordinator
Bert Ganoung, Noise Abatement Office, San Francisco International Airport
Kathleen Wentworth, Congresswoman Jackie Speier's Office
Linda Wolin, San Mateo County Supervisor Dave Pine's Office
Glenn Morse, United Airlines

Public Present
Jennifer Landesmann, City of Palo Alto resident
Reva Rabrikant, Save Our Skies East Bay

Meeting Summary

The meeting focused primarily on reviewing the last Roundtable Annual Work Plan that ran from July 2015 through June 2016. Roundtable Coordinator James Castañeda gave a brief overview of the purpose and importance of utilizing an annual Work Program, and how it can be utilize to further some of the items listed within the FAA Initiative response document.

As the subcommittee reviewed and discussed each of the existing items from the 2015-2016 Work Plan, some initial comments/additions/edits were provided. Some of those included:

- Create a dedicated FAA Initiative resources page on the Roundtable's website for (Addition to A1)
- Create a Communications Strategies administrative item.
- Add an item to coordinate with partners and regional noise forums.
- Expand on item AI-5 to develop relationship with other noise forums groups nationwide.
- Update the technical conferences available for Roundtable staff and/or members to attend listed in item AI-6.
- Expanded on involvement with N.O.I.S.E. (item AI-8).
- Add an item to included educational tasks/objectives.
- Add an item to study/investigate expanding the Roundtable membership to understand the opportunities, challenges, pros and cons associated with such.
- Re-evaluate research items, specifically to include study of backblast noise impacts and development of solutions, as well as ongoing NextGEN impacts.

The group will continue their review and discussion at the next Work Program subcommittee meeting, tentatively scheduled for July 13, 2017. This meeting will allow the Roundtable's new technical consultant to participate and contribute to the process. The goal is to present a 2017-2018 Work Plan to the Roundtable in August.

jc

Airport Director's Report

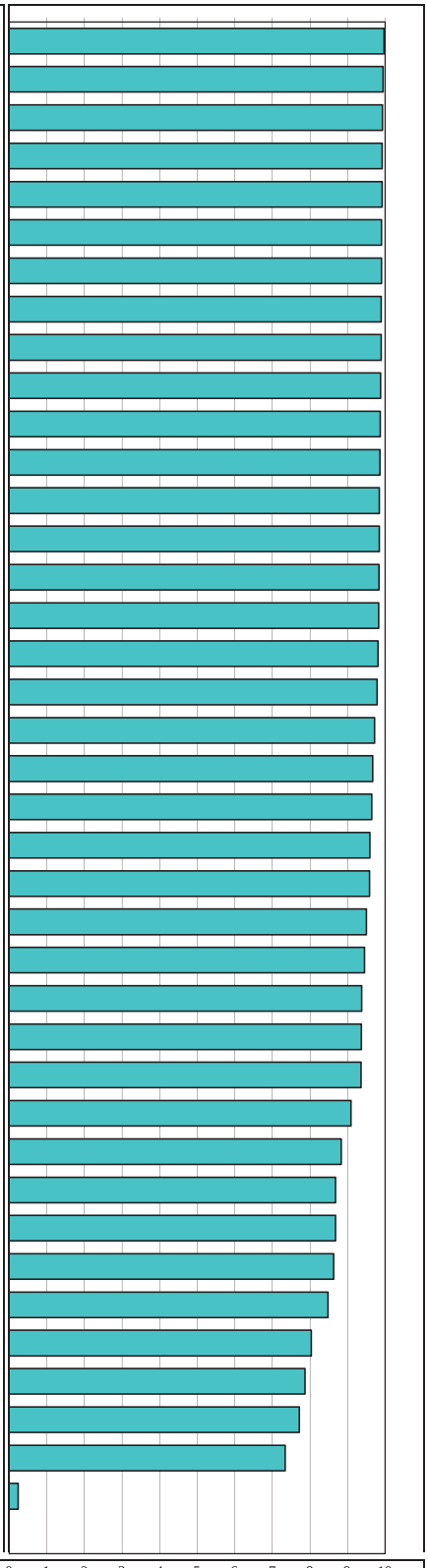
Presented at the June 7, 2017
Airport Community Roundtable Meeting

Aircraft Noise Abatement Office
March 2017

SFO San Francisco International Airport

Monthly Noise Exceedance Report
San Francisco International Airport -- Director's Report
Period: **March 2017**

Airline		Noise Exceedances: Total Noise Exceedances	Total Operations per Month	Exceedances per 1,000 Operations	Score	Noise Exceedance Quality Rating
SkyWest	SKW	46	6,680	7	9.97	
Frontier	FFT	3	254	12	9.95	
ANA	ANA	1	61	16	9.93	
Turkish Airlines	THY	1	55	18	9.92	
Compass	CPZ	15	802	19	9.92	
Aer Lingus	EIN	1	47	21	9.91	
Virgin America	VRD	75	3,438	22	9.91	
Delta	DAL	39	1,599	24	9.90	
Alaska	ASA	27	1,103	24	9.90	
JetBlue	JBU	28	1,023	27	9.88	
Air Canada	ACA	18	598	30	9.87	
Swiss	SWR	2	62	32	9.86	
Sun Country Airlines	SCX	2	57	35	9.85	
Volaris	VOI	2	56	36	9.85	
Southwest	SWA	101	2,707	37	9.84	
American Airlines	AAL	85	2,187	39	9.83	
United	UAL	473	10,653	44	9.81	
Lufthansa	DLH	6	122	49	9.79	
British Airways	BAW	8	123	65	9.72	
FedEx	FDX	7	92	76	9.67	
China Southern Airlines	CSN	5	61	82	9.65	
Copa Airlines	CMP	9	96	94	9.60	
Air China	CCA	8	83	96	9.59	
Etihad	ETD	3	26	115	9.51	
Hawaiian	HAL	16	126	127	9.46	
Air India	AIC	8	55	145	9.38	
Avianca	TAI	13	88	148	9.37	
WOW	WOW	7	47	149	9.36	
Aeromexico	AMX	37	175	211	9.09	
Nippon Cargo Airlines	NCA	15	55	273	8.83	
China Airlines	CAL	36	117	308	8.68	
EVA Air	EVA	41	133	308	8.68	
Singapore Airlines	SIA	40	125	320	8.63	
Asiana Airlines	AAR	28	79	354	8.48	
Atlas Air	GTI	50	109	459	8.03	
Cathay Pacific	CPA	73	147	497	7.87	
Philippines	PAL	33	62	532	7.72	
Korean Air	KAL	80	129	620	7.34	
Kalitta Air	CKS	41	18	2,278	0.24	
Qantas	QFA	112	48	2,333	0.00	
TOTAL		**1,595**	**33,498**	**10,085**		



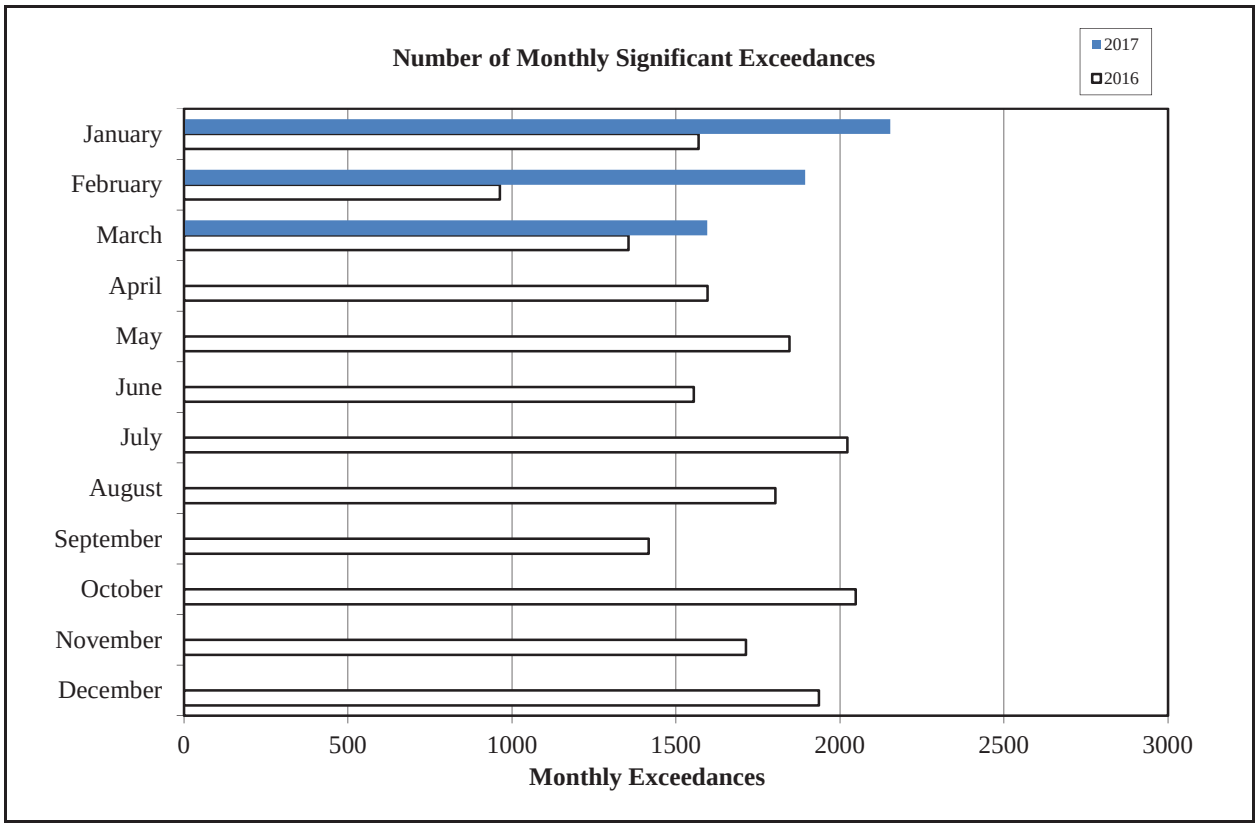
Source: SFO Noise Abatement Office

Historical Significant Exceedances Report
San Francisco International Airport -- Director's Report
Period: **March 2017**

San Francisco International Airport

Month	Number of Monthly Significant Exceedances 2013	2014	2015	2016	2017	Change from Last Year
January	1,428	1,184	1,204	1,569	2153	**584**
February	1,176	1,141	1,151	963	1894	**931**
March	1,671	1,345	1,384	1,355	1595	**240**
April	1,910*	1,362	1,475	1,596		
May	1,859*	1,515	1,718	1,846		
June	1,915	1,740	1,645	1,554		
July	1,647	1,619	1,763***	2,023		
August	1,638**	1,460	1,348	1,803		
September	1,352	1,111	994	1,417		
October	1,277	1,055	1,154	2,048		
November	1,262	1,245	1,133	1,713		
December	1,160	1,670	1,708	1,936		
Annual Total	18,295	16,447	16,677	19,823	5,642	
Year to Date Trend	**18,295**	**16,447**	**16,677**	**19,823**	**5,642**	**1755**

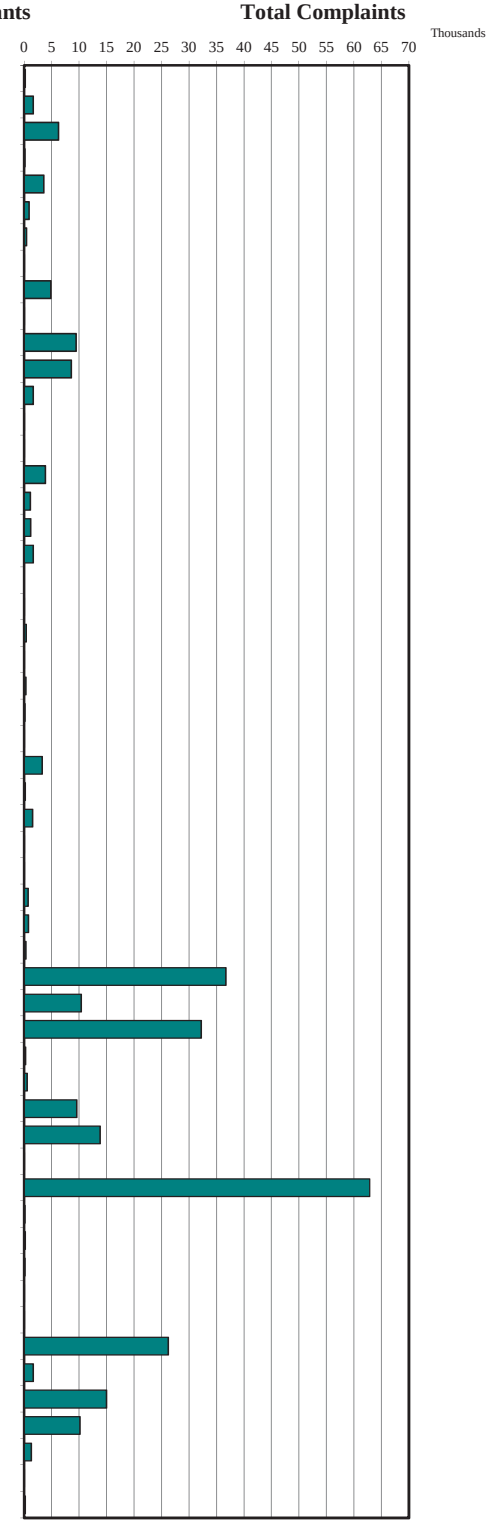
* Revised with correct amount of exceedance - 8/5/13
** No data available from Site 7, August 1-26
***No data available from Site 2 starting July 17



Monthly Calls by Community

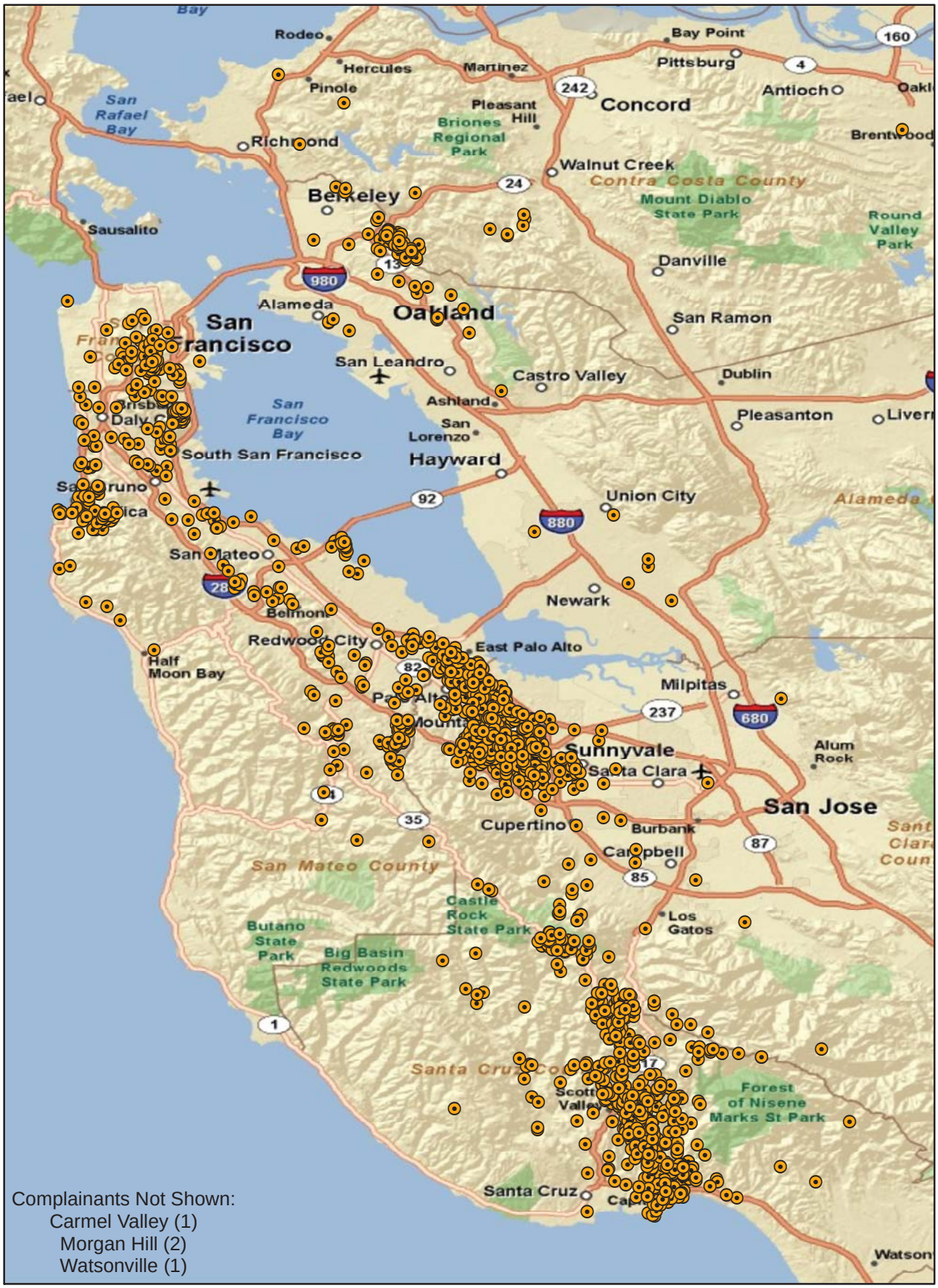
Source: Airport Noise Monitoring System

Community	Total Complaints	Total Number of Complainants
Roundtable Communities		
Atherton	220	7
Belmont	1,682	7
Brisbane	6,264	53
Burlingame	118	12
Daly City	3,573	16
Foster City	880	13
Half Moon Bay	412	7
Hillsborough	2	2
Menlo Park	4,831	41
Millbrae	11	3
Pacifica	9,435	64
Portola Valley	8,590	55
Redwood City	1,671	22
San Bruno	4	4
San Carlos	2	2
San Francisco	3,885	64
San Mateo	1,120	15
South San Francisco	1,213	21
Woodside	1,664	24
Other Communities		
Alameda	36	4
Aptos	357	10
Ben Lomond	39	4
Berkeley	343	8
Boulder Creek	132	8
Brentwood	6	1
Capitola	3,303	18
Carmel Valley	175	1
Cupertino	1,540	5
East Palo Alto	36	3
El Cerrito	1	1
Felton	754	12
Fremont	801	4
Lafayette	312	3
Los Altos	36,711	239
Los Altos Hills	10,369	38
Los Gatos	32,216	154
Moraga	236	3
Morgan Hill	540	3
Mountain View	9,568	82
Oakland	13,848	62
Orinda	1	1
Palo Alto	62,865	310
Piedmont	126	2
Richmond	178	1
San Jose	144	6
San Leandro	12	1
San Pablo	2	1
Santa Cruz	26,212	140
Saratoga	1,679	16
Scotts Valley	15,012	91
Soquel	10,136	96
Sunnyvale	1,287	28
Union City	2	1
Watsonville	205	2
	274,761	**1,791**



"Our software vendor's address validation relies on USPS-provided ZIP code look up table and USPS-specified 'default city' values."

Monthly Noise Complainant Summary Map March 2017

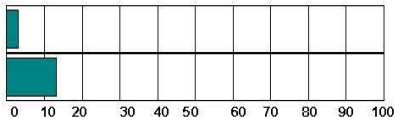


"Our software vendor's address validation relies on USPS-provided ZIP code look-up table and the USPS-specified 'default city' values"

Complainant Location

Monthly Nighttime Power Runups Report (85-06-AOB)
San Francisco International Airport -- Director's Report
Period : **March 2017**
Time of Day : From 10 pm through 7 am

Airline	Code	Number of Runups	Runups Per 1,000 Departures	Percentage of Runups
UNITED	UAL	4	0.8	22%
American Airlines	AAL	14	12.8	78%
Total		18		



A power runup is a procedure used to test an aircraft engine after maintenance is completed.
This is done to ensure safe operating standards prior to returning the aircraft to service.
The power settings tested range from idle to full power and may vary in duration.

Late Night Preferential Runway Use Report
San Francisco International Airport -- Director's Report
Period: March 2017
Time of Day: Late Night (1 am to 6 am)

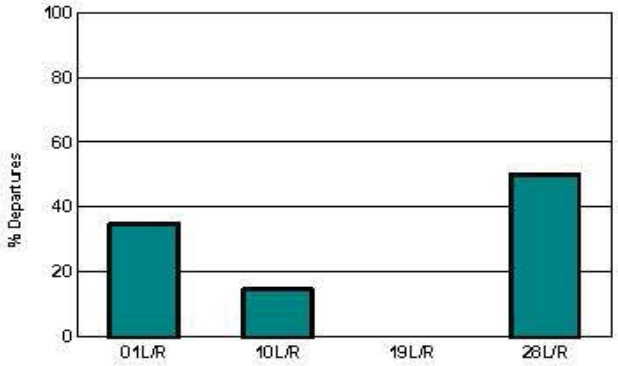
San Francisco International Airport

Runway Utilization (1 am to 6 am)

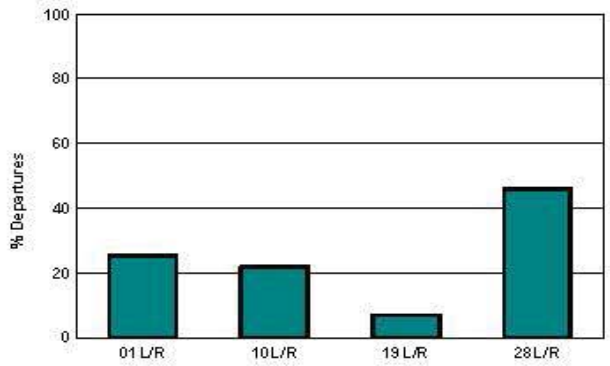
Monthly Jet Departures

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
01L/R	79	53	134	-	-	-	-	-	-	-	-	-	266
10L/R	85	88	57	-	-	-	-	-	-	-	-	-	230
19L/R	36	36	-	-	-	-	-	-	-	-	-	-	72
28L/R	204	88	192	-	-	-	-	-	-	-	-	-	484
Total	**404**	**265**	**383**	-	-	-	-	-	-	-	-	-	**1,052**
01L/R	20%	20%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%
10L/R	21%	33%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	22%
19L/R	9%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
28L/R	50%	33%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	46%

Current Month (1 am to 6 am)



Year-to-Date (1am to 6 am)



Current Month (1 am to 6 am)

Numbers rounded to nearest whole percentages

Year-to-Date (1 am to 6am)

Numbers rounded to nearest whole percentages

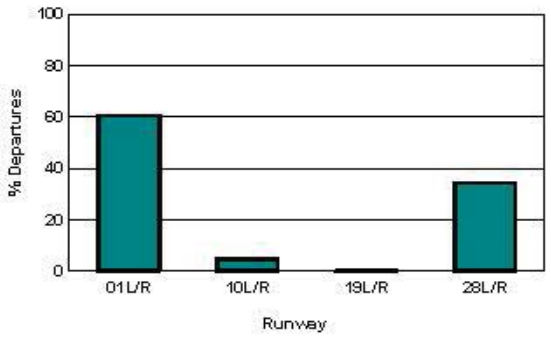
Air Carrier Runway Use Summary Report
San Francisco International Airport -- Director's Report
Period: March 2017
Time of Day : All Hours

Runway Utilization (All Hours)

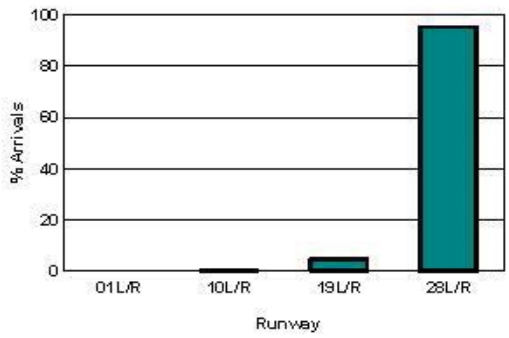
Source: Airport Noise Monitoring System

	Runway Utilization				Total
	01L/R	*10L/R*	*19L/R*	*28L/R*	
Total Monthly Operations					
Departures	10,367	836	9	5,896	17,108
Arrivals	0	1	822	16,367	17,190
Percentage Utilization					
Departures	60.6%	4.9%	0.1%	34.5%	100%
Arrivals	0.0%	0.0%	4.8%	95.2%	100%

Departures (All Hours)



Arrivals (All Hours)



Percentage Departure Utilization

Numbers rounded to nearest whole percentages

Percentage Arrival Utilization

Numbers rounded to nearest whole percentages

Airport Director's Report

Presented at the June 7, 2017
Airport Community Roundtable Meeting

Aircraft Noise Abatement Office
March 2017

SFO San Francisco International Airport

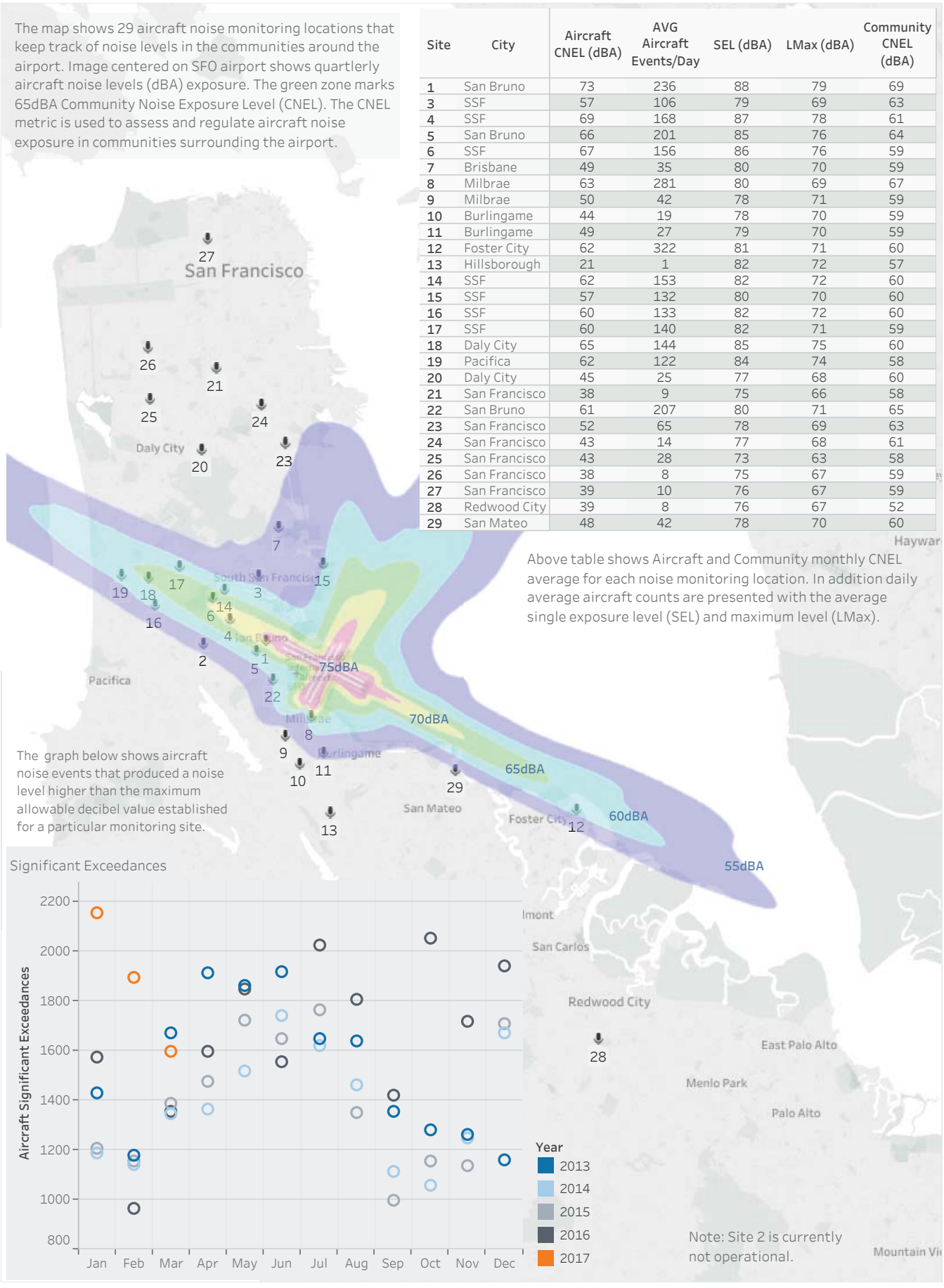
Aircraft Noise Monitoring System

March 2017

The map shows 29 aircraft noise monitoring locations that keep track of noise levels in the communities around the airport. Image centered on SFO airport shows quartlerly aircraft noise levels (dBA) exposure. The green zone marks 65dBA Community Noise Exposure Level (CNEL). The CNEL metric is used to assess and regulate aircraft noise exposure in communities surrounding the airport.

Site	City	Aircraft CNEL (dBA)	AVG Aircraft Events/Day	SEL (dBA)	LMax (dBA)	Community CNEL (dBA)
1	San Bruno	73	236	88	79	69
3	SSF	57	106	79	69	63
4	SSF	69	168	87	78	61
5	San Bruno	66	201	85	76	64
6	SSF	67	156	86	76	59
7	Brisbane	49	35	80	70	59
8	Milbrae	63	281	80	69	67
9	Milbrae	50	42	78	71	59
10	Burlingame	44	19	78	70	59
11	Burlingame	49	27	79	70	59
12	Foster City	62	322	81	71	60
13	Hillsborough	21	1	82	72	57
14	SSF	62	153	82	72	60
15	SSF	57	132	80	70	60
16	SSF	60	133	82	72	60
17	SSF	60	140	82	71	59
18	Daly City	65	144	85	75	60
19	Pacifica	62	122	84	74	58
20	Daly City	45	25	77	68	60
21	San Francisco	38	9	75	66	58
22	San Bruno	61	207	80	71	65
23	San Francisco	52	65	78	69	63
24	San Francisco	43	14	77	68	61
25	San Francisco	43	28	73	63	58
26	San Francisco	38	8	75	67	59
27	San Francisco	39	10	76	67	59
28	Redwood City	39	8	76	67	52
29	San Mateo	48	42	78	70	60

Above table shows Aircraft and Community monthly CNEL average for each noise monitoring location. In addition daily average aircraft counts are presented with the average single exposure level (SEL) and maximum level (LMax).



The graph below shows aircraft noise events that produced a noise level higher than the maximum allowable decibel value established for a particular monitoring site.

Significant Exceedances

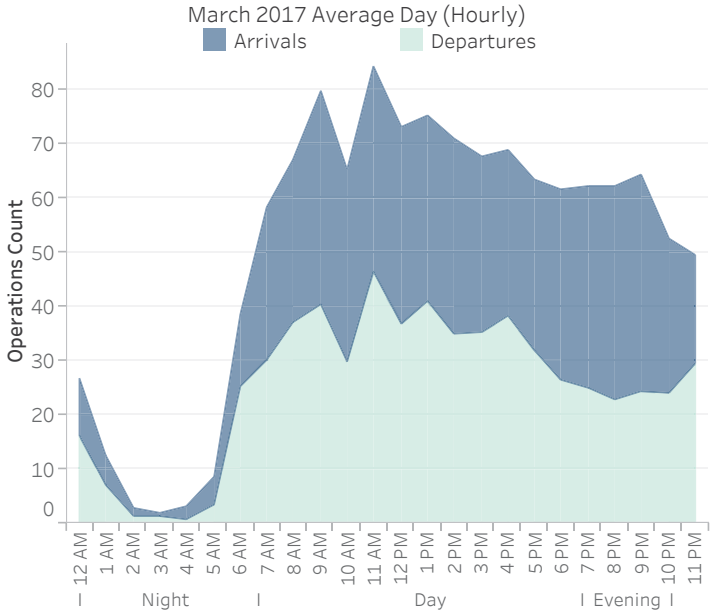
Note: Site 2 is currently not operational.

Monthly Operations Summary

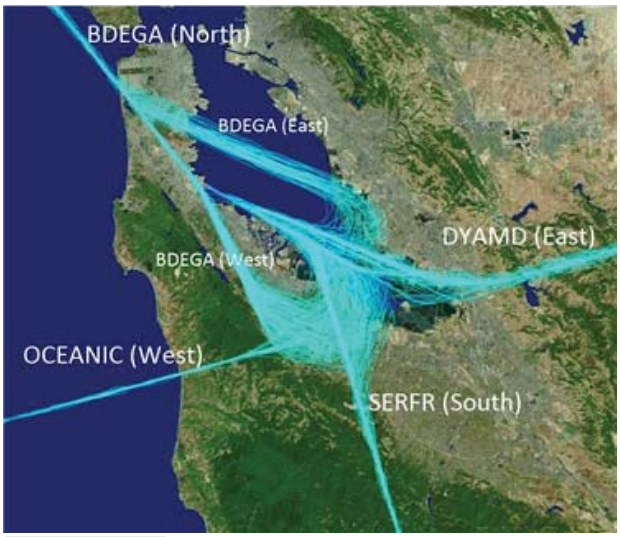
March 2017

36,541	1,179	37,043	1.4%
Monthly Operations	Average Daily Operations	12 Month AVG	YOY Growth

March 2017 Average Day (Hourly)



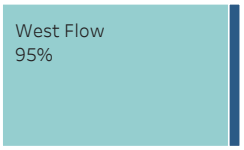
Major Arrival Routes (West Flow)



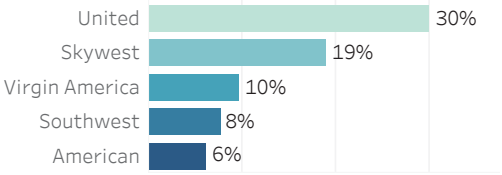
BDEGA	21%
DYAMD	40%
OCEANIC	7%
SERFR	32%

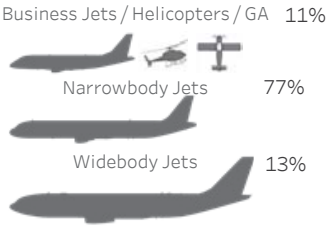
BDEGA East	31%
BDEGA West	69%

Top Destinations		
Los Angeles	Las Vegas	Seattle
10%	4%	4%

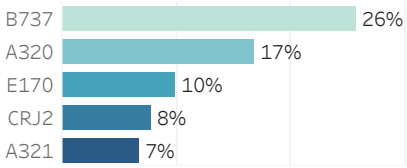


Airlines with the Most Operations

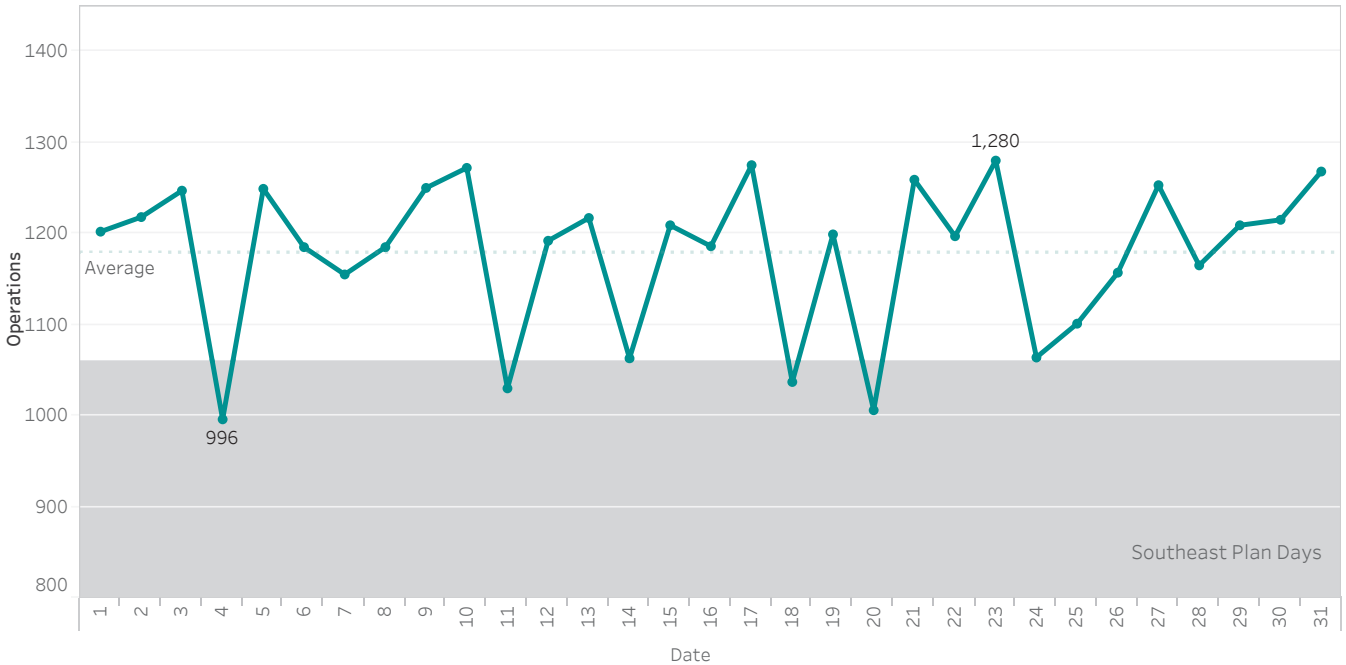




Most Utilized Aircraft Types

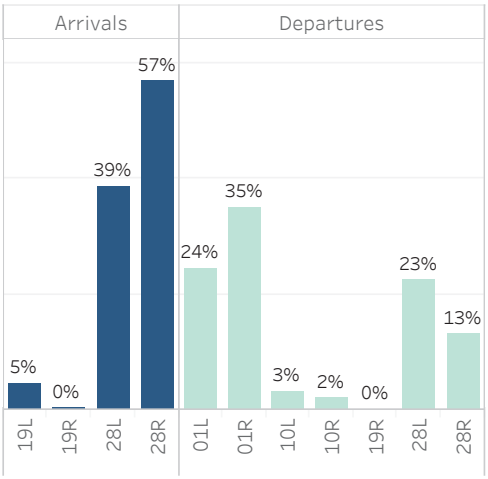


Daily Aircraft Operations



Runway Usage and Nighttime Operations

Monthly runway usage is shown for arrivals and departures, further categorized by all hours and nighttime hours. Graph at the bottom of the page shows hourly nighttime operations for each day. Power Runup locations are depicted on the airport map with airline nighttime power runup counts shown below.

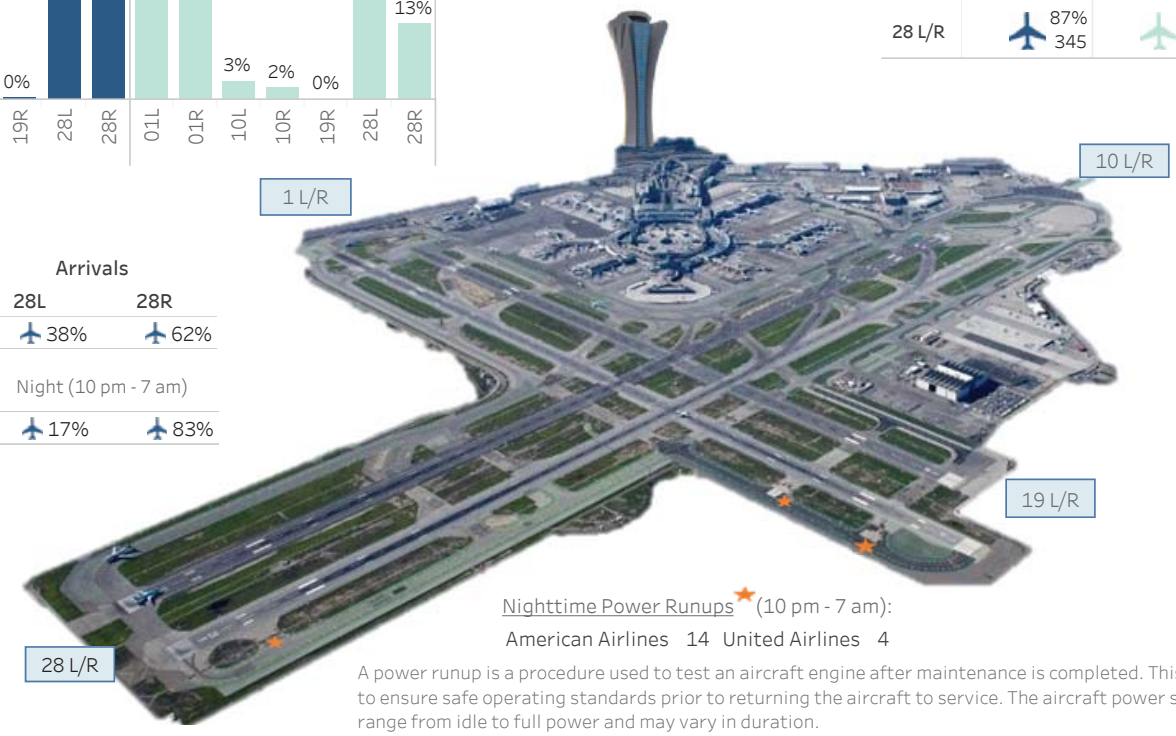


Runway Utilization (all hours)

	Arrivals	Departures
01 L/R		58%
10 L/R	0%	5%
19 L/R	5%	0%
28 L/R	95%	37%

Late Night Preferential Runway Use (1 am - 6 am)

	Arrivals	Departures
01 L/R		33% 107
10 L/R		16% 51
19 L/R	13% 53	
28 L/R	87% 345	52% 168



Arrivals

28L	28R
38%	62%

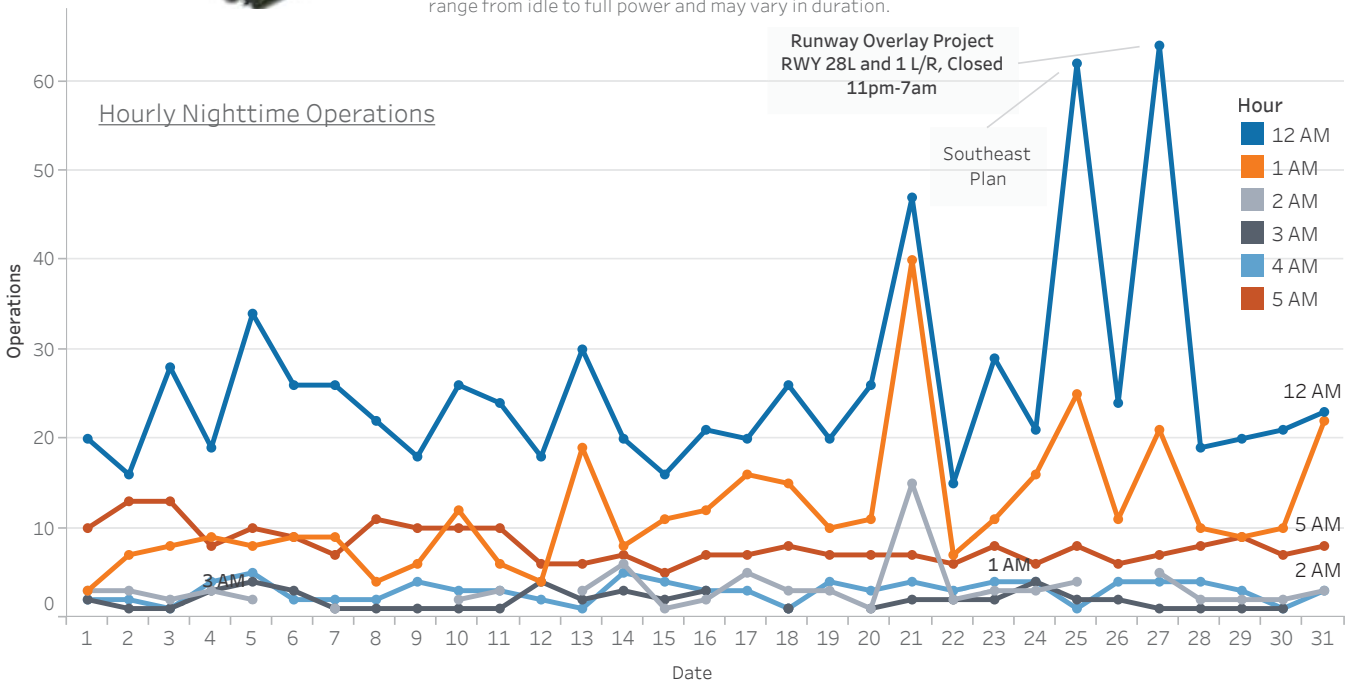
Night (10 pm - 7 am)

17%	83%

Nighttime Power Runups (10 pm - 7 am):

American Airlines 14 United Airlines 4

A power runup is a procedure used to test an aircraft engine after maintenance is completed. This is done to ensure safe operating standards prior to returning the aircraft to service. The aircraft power settings range from idle to full power and may vary in duration.



Noise Reports

March 2017

		Noise Reporters	Noise Reports
Roundtable Communities	Atherton	7	220
	Belmont	7	1,682
	Brisbane	54	6,268
	Burlingame	12	118
	Daly City	16	3,573
	Foster City	13	878
	Half Moon Bay	5	399
	Hillsborough	2	2
	Menlo Park	41	4,831
	Millbrae	3	11
	Pacifica	64	9,432
	Portola Valley	55	8,590
	Redwood City	24	1,677
	San Bruno	4	4
	San Carlos	2	2
	San Francisco	64	3,883
	San Mateo	15	1,110
	South San Francisco	21	1,213
	Woodside	24	1,664
Other Communities	Alameda	3	35
	Aptos	10	357
	Ben Lomond	4	39
	Berkeley	8	343
	Boulder Creek	8	132
	Brentwood	1	6
	Capitola	18	3,303
	Carmel	1	175
	Cupertino	5	1,540
	East Palo Alto	3	36
	El Cerrito	1	1
	Felton	12	754
	Fremont	4	801
	Lafayette	3	314
	Los Altos	239	36,699
	Los Altos Hills	38	10,369
	Los Gatos	154	32,205
	Montara	2	12
	Moraga	3	236
	Morgan Hill	3	540
	Mountain View	82	9,568
	Oakland	62	13,849
	Orinda	1	1
	Palo Alto	311	62,834
	Piedmont	2	126
	Richmond	1	178
	San Jose	6	144
	San Leandro	1	12
	San Pablo	1	2
	Santa Cruz	140	26,207
	Saratoga	16	1,679
	Scotts Valley	91	15,009
	Soquel	96	10,135
	Sunnyvale	28	1,287
	Union City	1	2
	Watsonville	2	205
Totals		1,794	274,692

2,044
Noise Reporters (12 month AVG)

284,722
Noise Reports (12 Month AVG)

99
New Reporters

Palo Alto
New Reporters Top City

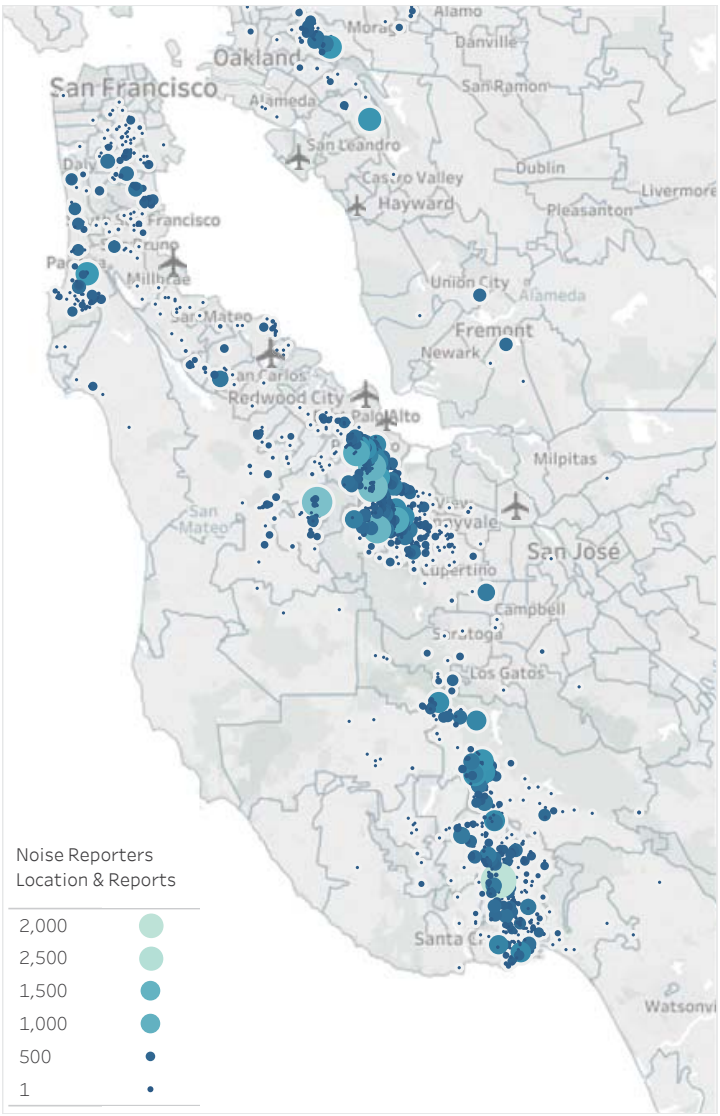
85 miles
Furthest Report

8
Reports/ SFO Operation

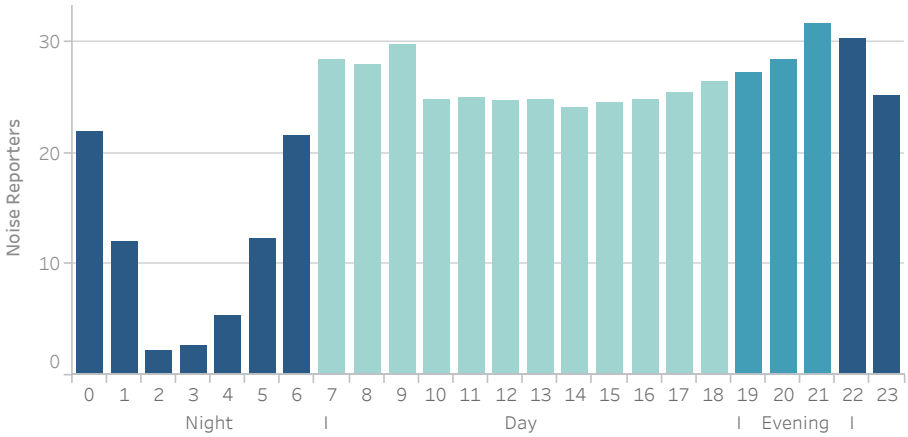
B737
A320
CRJ2
Top Aircraft Type

KAL213*
JBU736
CMP382*
Top Flight Number
*Night

Noise Reporters Location Map



March 2017 Average day (SFO Reporters by Hour of the Day)



99% of noise reports correlate to a flight origin/destination airport:

Our software vendor's address validation relies on USPS-provided ZIP code look up table and USPS-specified 'default' city values.

Source: San Francisco International Airport Noise Monitoring System

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Airport Director's Report

Presented at the June 7, 2017
Airport Community Roundtable Meeting

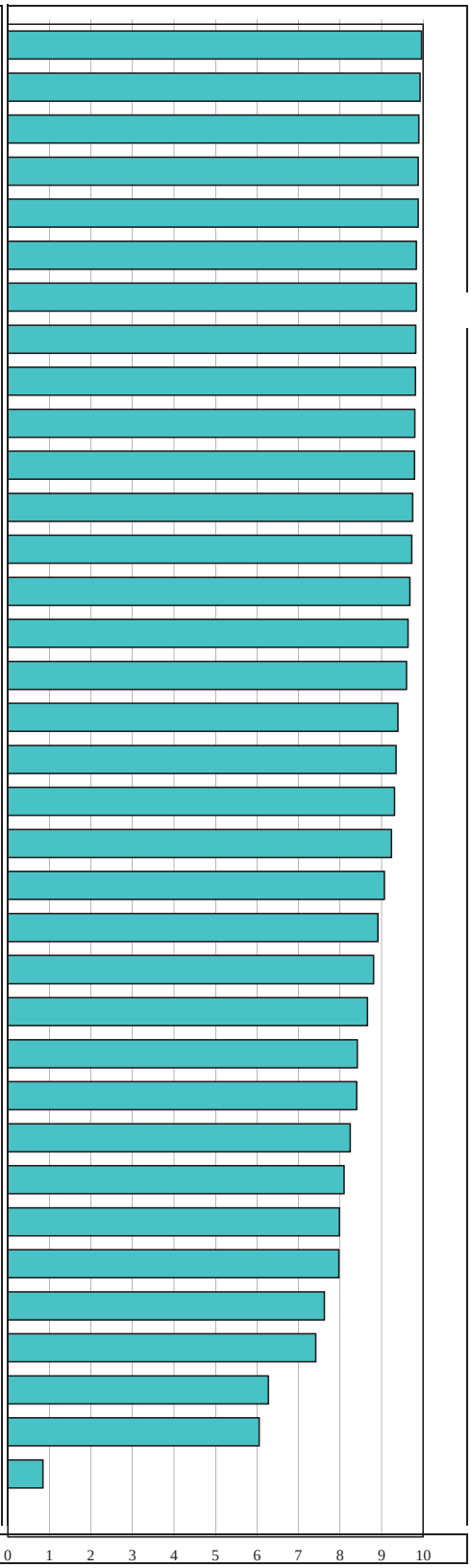
Aircraft Noise Abatement Office
April 2017

SFO San Francisco International Airport

Monthly Noise Exceedance Report
San Francisco International Airport -- Director's Report
Period: **April 2017**

Airline		Noise Exceedances: *Total Noise Exceedances*	*Total Operations per Month*	*Exceedances per 1,000 Operations*	***Score***
SkyWest Airlines	SKW	43	5,725	8	***9.96***
Emirates	UAE	1	62	16	***9.92***
sun country airlines	SCX	2	90	22	***9.89***
Alaska	ASA	26	1,074	24	***9.88***
Compass Airlines	CPZ	19	762	25	***9.88***
Virgin America	VRD	111	3,321	33	***9.84***
British Airways	BAW	4	119	34	***9.84***
jetBlue	JBU	38	1,006	38	***9.82***
Frontier Airlines	FFT	11	282	39	***9.81***
Southwest	SWA	107	2,576	42	***9.80***
Delta	DAL	81	1,877	43	***9.79***
American Airlines	AAL	109	2,057	53	***9.75***
United	UAL	587	10,348	57	***9.73***
Air Canada	ACA	38	570	67	***9.68***
Etihad Airways	ETD	2	26	77	***9.63***
FedEx	FDX	7	83	84	***9.60***
Hawaiian Airlines	HAL	15	118	127	***9.39***
Copa Airlines	CMP	13	95	137	***9.35***
Asiana Airlines	AAR	11	76	145	***9.31***
Nippon Cargo Airlines	NCA	8	50	160	***9.24***
Avianca	TAI	17	87	195	***9.07***
Aeromexico	AMX	44	193	228	***8.91***
China Southern Airlines	CSN	15	60	250	***8.81***
Singapore Airlines	SIA	33	117	282	***8.66***
Air India	AIC	17	51	333	***8.41***
Cathay Pacific	CPA	47	140	336	***8.40***
China Airlines	CAL	38	103	369	***8.24***
Air New Zealand	ANZ	24	60	400	***8.10***
WOW	WOW	25	59	424	***7.98***
Eva Air	EVA	55	129	426	***7.97***
Volga-Dnepr Group	VDA	3	6	500	***7.62***
Atlas Air	GTI	51	94	543	***7.42***
Korean Air	KAL	97	124	782	***6.27***
Philippines	PAL	68	82	829	***6.05***
Kalitta Air	CKS	50	26	1,923	***0.84***
Qantas	QFA	105	50	2,100	***0.00***
TOTAL		**1,922**	**31,698**	**11,151**	

Noise Exceedance Quality Rating



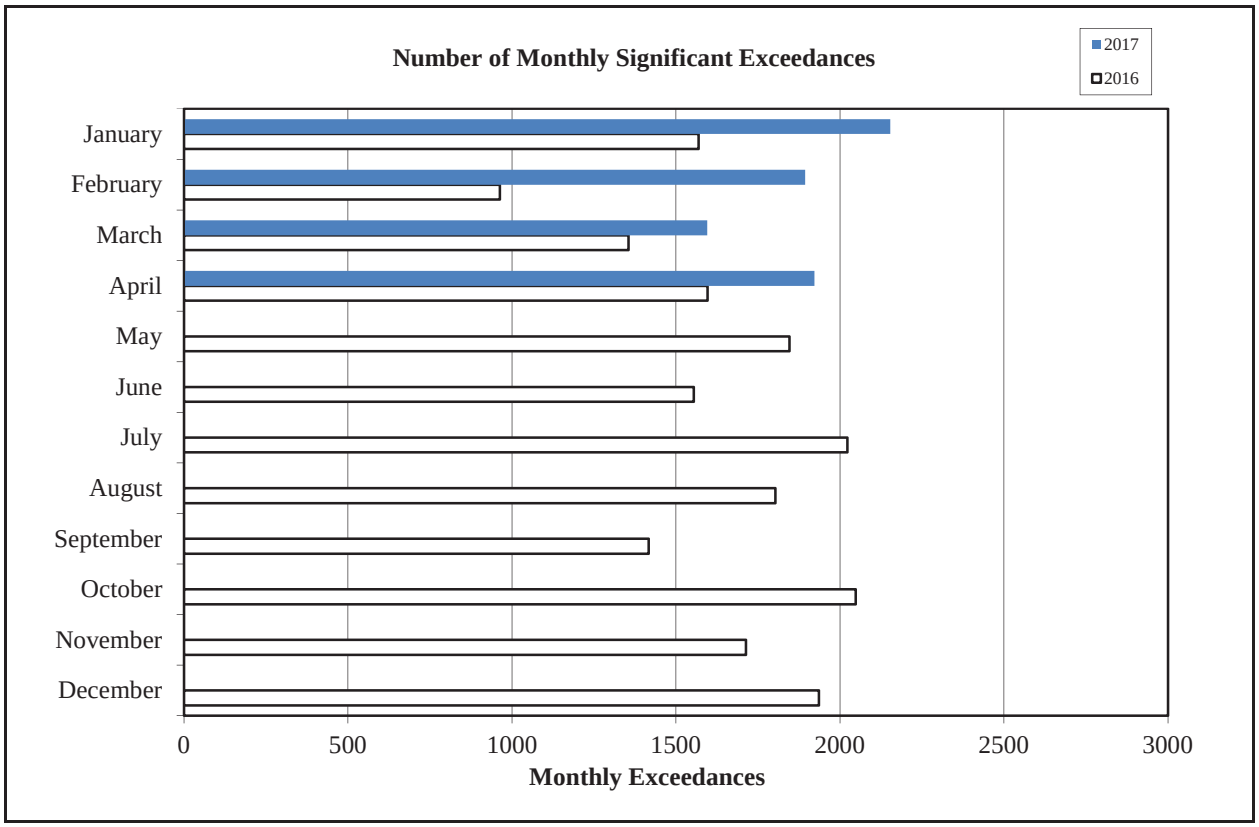
Source: SFO Noise Abatement Office

Historical Significant Exceedances Report
San Francisco International Airport -- Director's Report
Period: **April 2017**

San Francisco International Airport

Month	Number of Monthly Significant Exceedances 2013	2014	2015	2016	2017	Change from Last Year
January	1,428	1,184	1,204	1,569	2,153	**584**
February	1,176	1,141	1,151	963	1,894	**931**
March	1,671	1,345	1,384	1,355	1,595	**240**
April	1,910*	1,362	1,475	1,596	1,922	**326**
May	1,859*	1,515	1,718	1,846		
June	1,915	1,740	1,645	1,554		
July	1,647	1,619	1,763***	2,023		
August	1,638**	1,460	1,348	1,803		
September	1,352	1,111	994	1,417		
October	1,277	1,055	1,154	2,048		
November	1,262	1,245	1,133	1,713		
December	1,160	1,670	1,708	1,936		
Annual Total	18,295	16,447	16,677	19,823	7,564	
Year to Date Trend	**18,295**	**16,447**	**16,677**	**19,823**	**7,564**	**2,081**

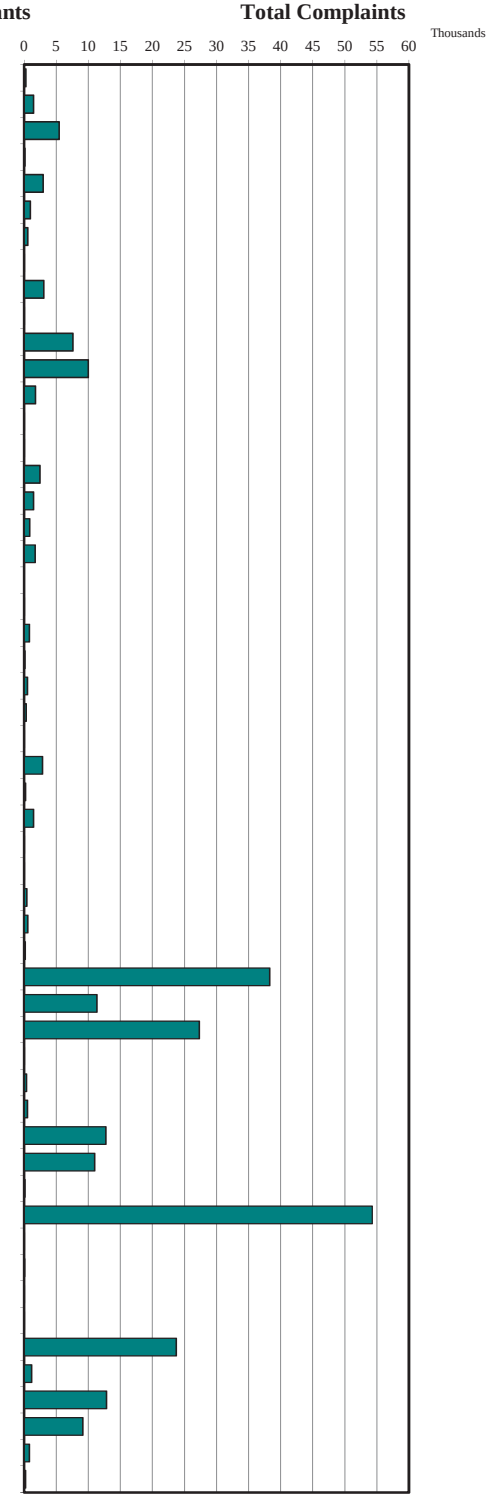
* Revised with correct amount of exceedance - 8/5/13
** No data available from Site 7, August 1-26
***No data available from Site 2 starting July 17



Monthly Calls by Community

Source: Airport Noise Monitoring System

Community	Total Complaints	Total Number of Complainants
Roundtable Communities		
Atherton	250	7
Belmont	1,485	3
Brisbane	5,462	45
Burlingame	115	10
Daly City	2,990	17
Foster City	957	14
Half Moon Bay	555	10
Hillsborough	4	2
Menlo Park	3,061	37
Millbrae	1	1
Pacifica	7,589	58
Portola Valley	9,997	61
Redwood City	1,770	20
San Bruno	7	2
San Carlos	1	1
San Francisco	2,494	50
San Mateo	1,458	15
South San Francisco	855	19
Woodside	1,733	23
Other Communities		
Alameda	18	2
Aptos	803	10
Ben Lomond	113	3
Berkeley	543	6
Boulder Creek	321	6
Brentwood	1	1
Capitola	2,861	22
Carmel Valley	203	2
Cupertino	1,470	6
East Palo Alto	32	2
El Sobrante	2	1
Felton	438	11
Fremont	573	4
Lafayette	160	2
Los Altos	38,305	250
Los Altos Hills	11,344	39
Los Gatos	27,325	163
Monte Sereno	20	1
Moraga	393	2
Morgan Hill	535	2
Mountain View	12,738	82
Oakland	11,011	55
Orinda	124	1
Palo Alto	54,280	299
Piedmont	38	1
San Jose	83	3
San Leandro	2	1
Santa Clara	1	1
Santa Cruz	23,738	135
Saratoga	1,177	12
Scotts Valley	12,858	86
Soquel	9,172	91
Sunnyvale	823	24
Watsonville	217	2
	252,506	**1,723**



"Our software vendor's address validation relies on USPS-provided ZIP code look up table and USPS-specified 'default city' values."

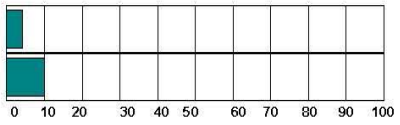
Monthly Noise Complainant Summary Map April 2017

"Our software vendor's address validation relies on USPS-provided ZIP code look-up table and the USPS-specified 'default city' values"

Complainant Location

Monthly Nighttime Power Runups Report (85-06-AOB)
San Francisco International Airport -- Director's Report
Period : **April 2017**
Time of Day : From 10 pm through 7 am

Airline	Code	Number of Runups	Runups Per 1,000 Departures	Percentage of Runups
UNITED	UAL	5	1.0	31%
American Airlines	AAL	11	10.7	69%
Total		16		



A power runup is a procedure used to test an aircraft engine after maintenance is completed.
This is done to ensure safe operating standards prior to returning the aircraft to service.
The power settings tested range from idle to full power and may vary in duration.

Late Night Preferential Runway Use Report
San Francisco International Airport -- Director's Report
Period: April 2017
Time of Day: Late Night (1 am to 6 am)

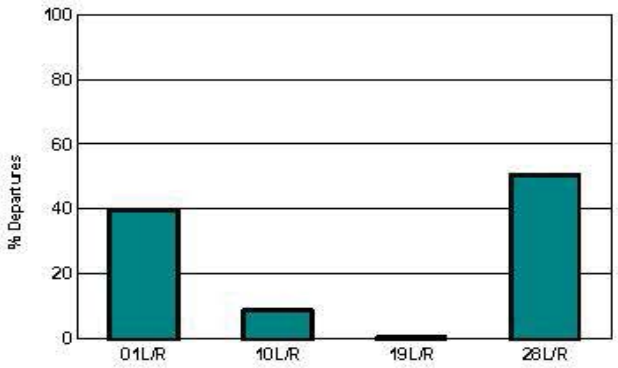
San Francisco International Airport

Runway Utilization (1 am to 6 am)

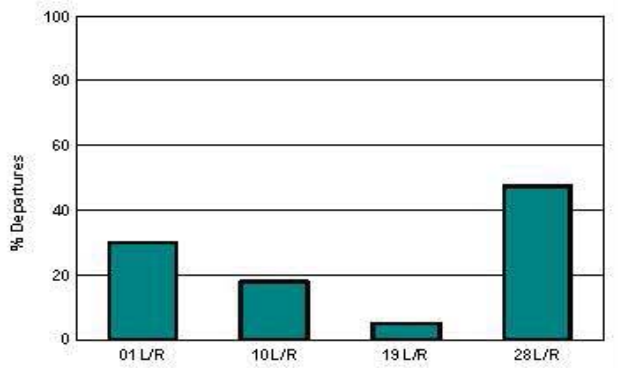
Monthly Jet Departures

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
01L/R	79	53	134	197	-	-	-	-	-	-	-	-	463
10L/R	85	88	57	44	-	-	-	-	-	-	-	-	274
19L/R	36	36	-	4	-	-	-	-	-	-	-	-	76
28L/R	204	88	192	250	-	-	-	-	-	-	-	-	734
Total	**404**	**265**	**383**	**495**	-	-	-	-	-	-	-	-	**1,547**
01L/R	20%	20%	35%	40%	0%	0%	0%	0%	0%	0%	0%	0%	30%
10L/R	21%	33%	15%	9%	0%	0%	0%	0%	0%	0%	0%	0%	18%
19L/R	9%	14%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	5%
28L/R	50%	33%	50%	51%	0%	0%	0%	0%	0%	0%	0%	0%	47%

Current Month (1 am to 6 am)



Year-to-Date (1am to 6 am)



Current Month (1 am to 6 am)

Numbers rounded to nearest whole percentages

Year-to-Date (1 am to 6am)

Numbers rounded to nearest whole percentages

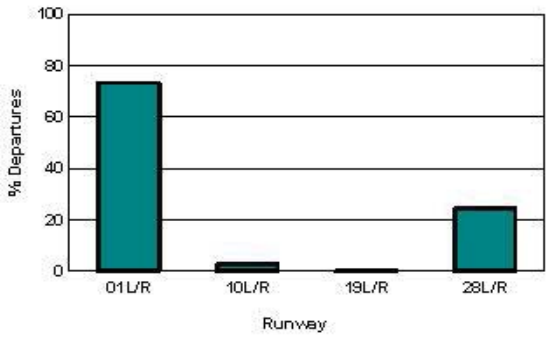
Air Carrier Runway Use Summary Report
San Francisco International Airport -- Director's Report
Period: April 2017
Time of Day : All Hours

Runway Utilization (All Hours)

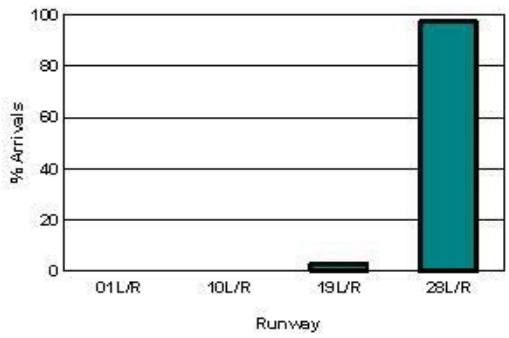
Source: Airport Noise Monitoring System

	Runway Utilization				Total
	01L/R	*10L/R*	*19L/R*	*28L/R*	
Total Monthly Operations					
Departures	11,957	406	12	3,959	16,334
Arrivals	0	0	430	15,955	16,385
Percentage Utilization					
Departures	73.2%	2.5%	0.1%	24.2%	100%
Arrivals	0.0%	0.0%	2.6%	97.4%	100%

Departures (All Hours)



Arrivals (All Hours)



Percentage Departure Utilization

Numbers rounded to nearest whole percentages

Percentage Arrival Utilization

Numbers rounded to nearest whole percentages

Airport Director's Report

Presented at the June 7, 2017
Airport Community Roundtable Meeting

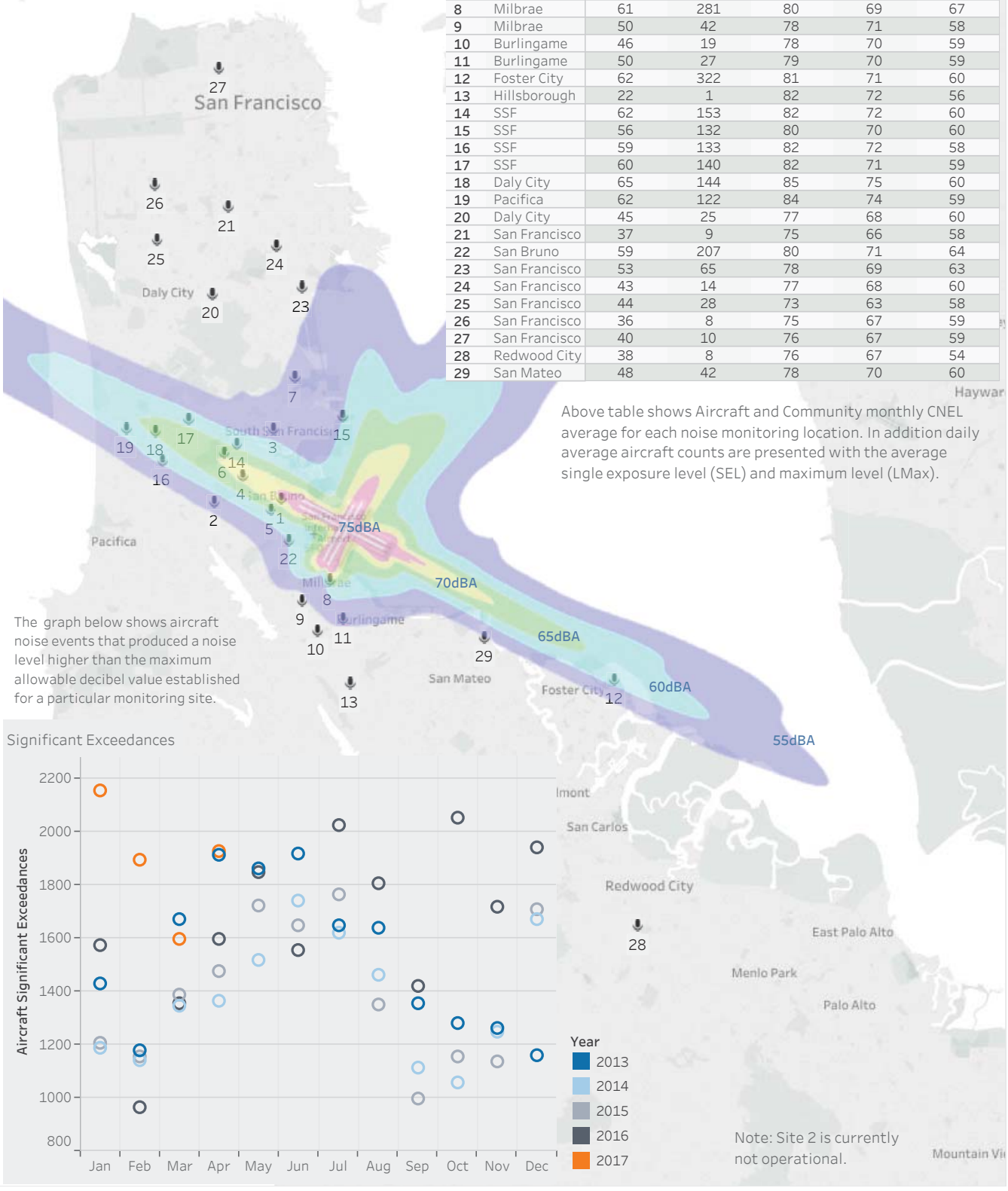
Aircraft Noise Abatement Office
April 2017

SFO San Francisco International Airport

Aircraft Noise Monitoring System

April 2017

The map shows 29 aircraft noise monitoring locations that keep track of noise levels in the communities around the airport. Image centered on SFO airport shows quartlerly aircraft noise levels (dBA) exposure. The green zone marks 65dBA Community Noise Exposure Level (CNEL). The CNEL metric is used to assess and regulate aircraft noise exposure in communities surrounding the airport.



Site	City	Aircraft CNEL (dBA)	AVG Aircraft Events/Day	SEL (dBA)	LMax (dBA)	Community CNEL (dBA)
1	San Bruno	72	236	88	79	68
3	SSF	55	106	79	69	62
4	SSF	68	168	87	78	60
5	San Bruno	66	201	85	76	63
6	SSF	66	156	86	76	59
7	Brisbane	49	35	80	70	59
8	Milbrae	61	281	80	69	67
9	Milbrae	50	42	78	71	58
10	Burlingame	46	19	78	70	59
11	Burlingame	50	27	79	70	59
12	Foster City	62	322	81	71	60
13	Hillsborough	22	1	82	72	56
14	SSF	62	153	82	72	60
15	SSF	56	132	80	70	60
16	SSF	59	133	82	72	58
17	SSF	60	140	82	71	59
18	Daly City	65	144	85	75	60
19	Pacifica	62	122	84	74	59
20	Daly City	45	25	77	68	60
21	San Francisco	37	9	75	66	58
22	San Bruno	59	207	80	71	64
23	San Francisco	53	65	78	69	63
24	San Francisco	43	14	77	68	60
25	San Francisco	44	28	73	63	58
26	San Francisco	36	8	75	67	59
27	San Francisco	40	10	76	67	59
28	Redwood City	38	8	76	67	54
29	San Mateo	48	42	78	70	60

Above table shows Aircraft and Community monthly CNEL average for each noise monitoring location. In addition daily average aircraft counts are presented with the average single exposure level (SEL) and maximum level (LMax).

The graph below shows aircraft noise events that produced a noise level higher than the maximum allowable decibel value established for a particular monitoring site.

Significant Exceedances

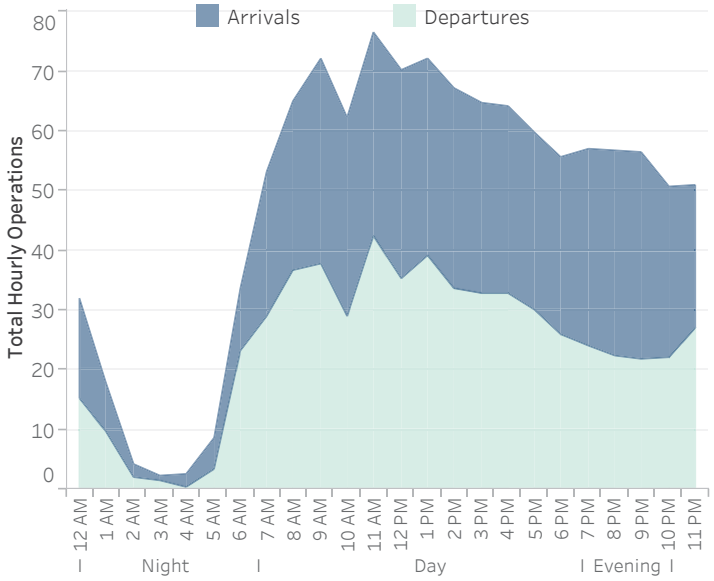
Note: Site 2 is currently not operational.

Monthly Operations Summary

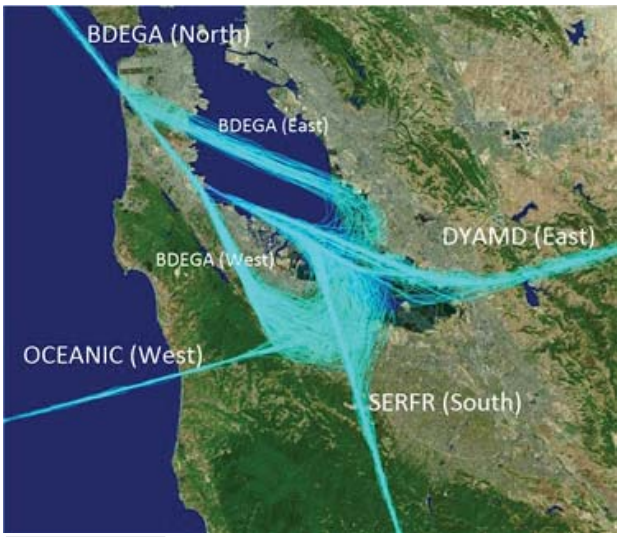
April 2017

34,652	1,155	36,943	-3.3%
Monthly Operations	Average Daily Operations	12 Month AVG	YOY Growth

April 2017 Average Day (Hourly)



Major Arrival Routes (West Flow)



BDEGA	23%
DYAMD	39%
OCEANIC	7%
SERFR	32%

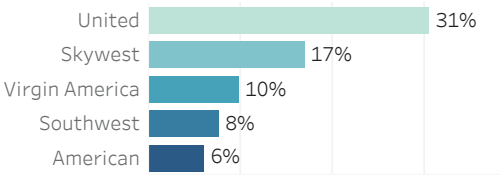
BDEGA East	24%
BDEGA West	76%

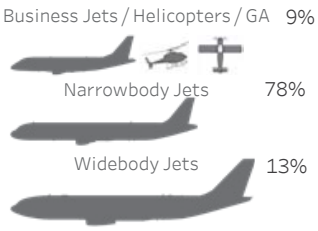
West Flow
97%

Top Destinations

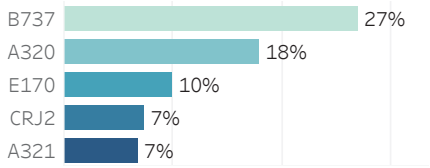
Los Angeles	Las Vegas	Seattle
10%	4%	4%

Airlines with the Most Operations

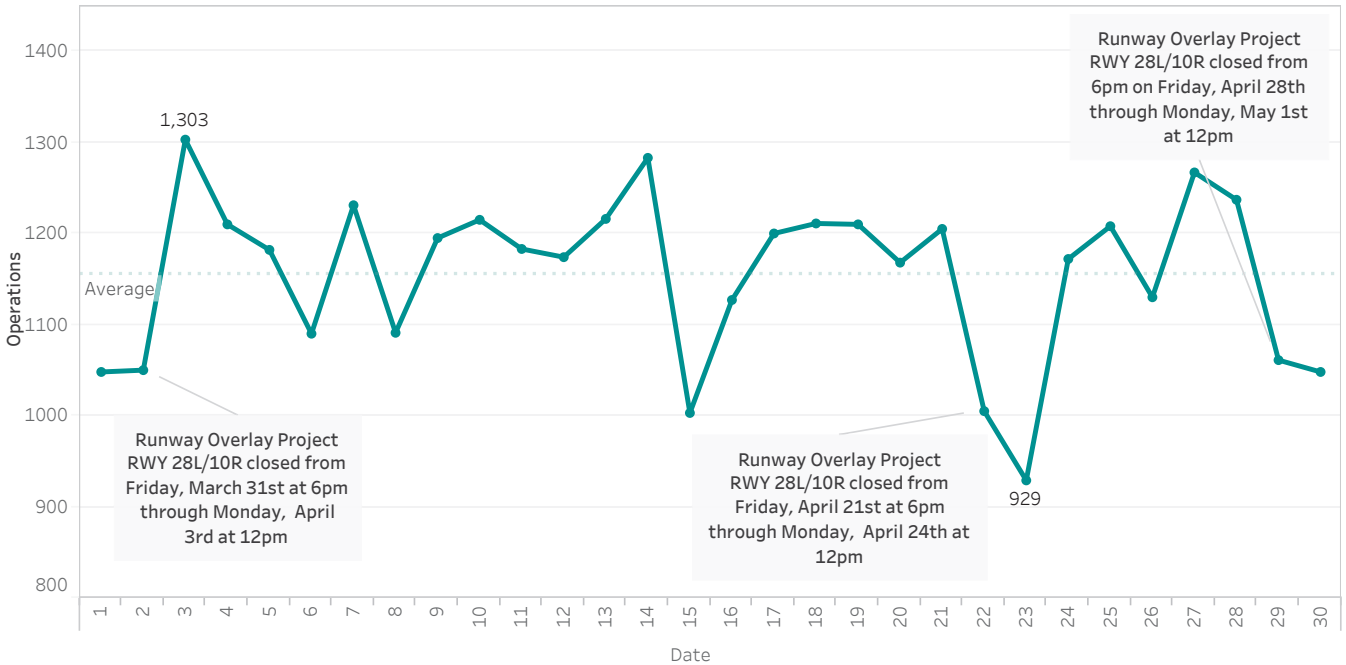




Most Utilized Aircraft Types

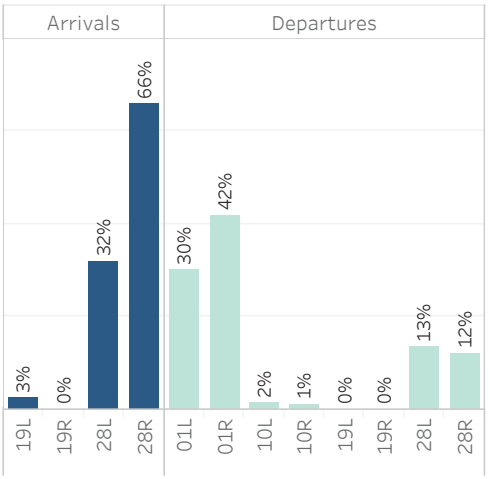


Daily Aircraft Operations



Runway Usage and Nighttime Operations

Monthly runway usage is shown for arrivals and departures, further categorized by all hours and nighttime hours. Graph at the bottom of the page shows hourly nighttime operations for each day. Power Runup locations are depicted on the airport map with airline nighttime power runup counts shown below.

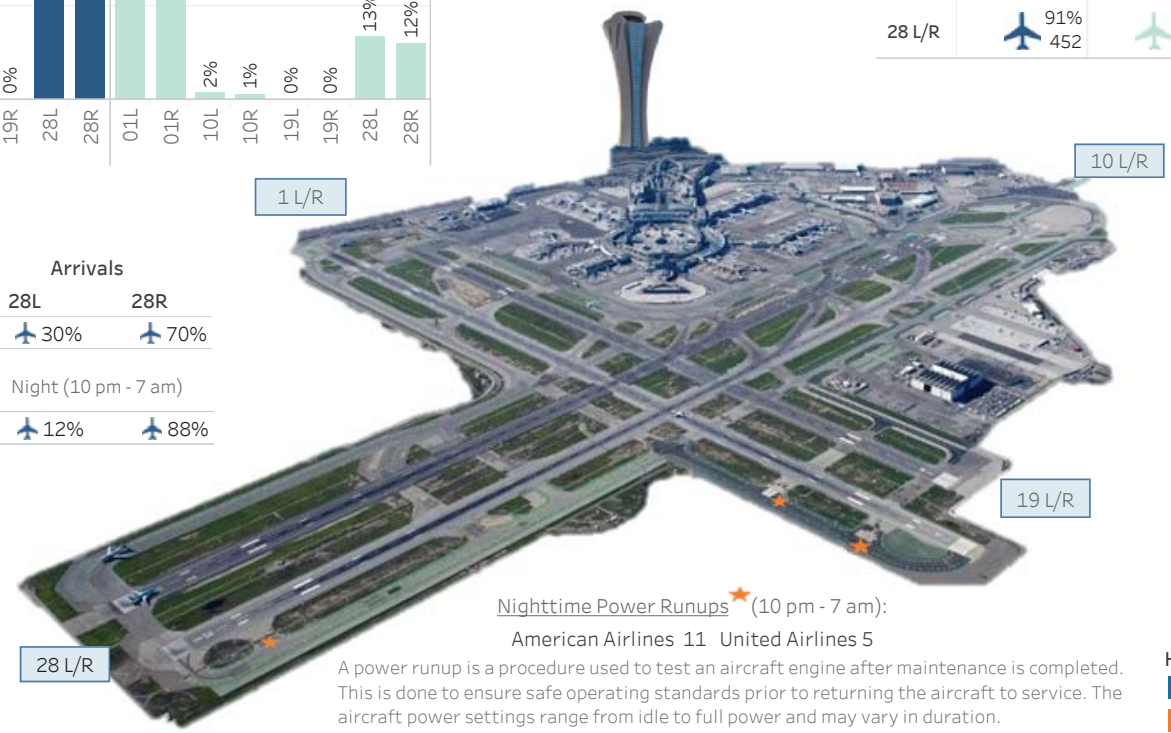


Runway Utilization (all hours)

	Arrivals	Departures
01 L/R		71%
10 L/R		2%
19 L/R	3%	0%
28 L/R	97%	27%

Late Night Preferential Runway Use (1 am - 6 am)

	Arrivals	Departures
01 L/R		35% 155
10 L/R		9% 41
19 L/R	9% 44	1% 4
28 L/R	91% 452	55% 240



Arrivals

28L	28R
30%	70%

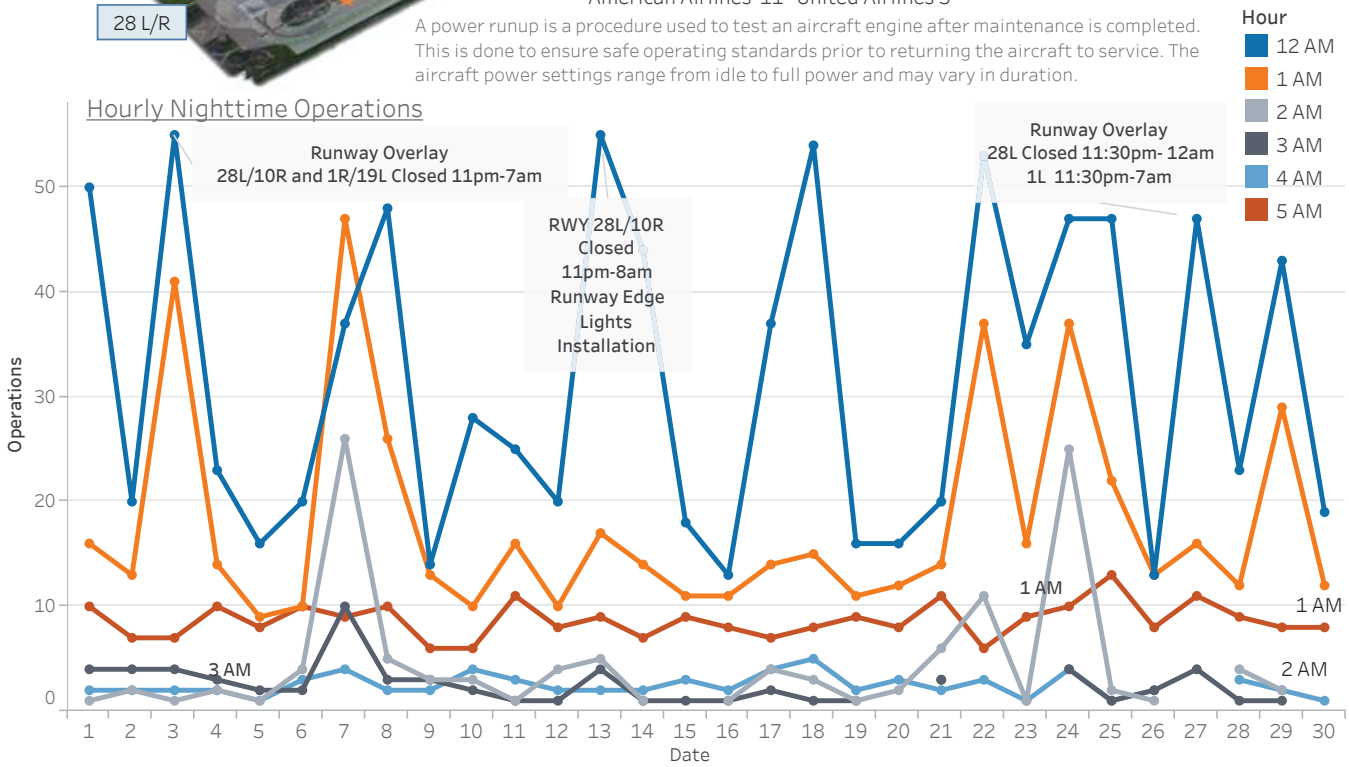
Night (10 pm - 7 am)

12%	88%

Nighttime Power Runups (10 pm - 7 am):

American Airlines 11 United Airlines 5

A power runup is a procedure used to test an aircraft engine after maintenance is completed. This is done to ensure safe operating standards prior to returning the aircraft to service. The aircraft power settings range from idle to full power and may vary in duration.



Noise Reports

April 2017

		Noise Reporters	Noise Reports
Roundtable Communities	Atherton	7	250
	Belmont	3	1,485
	Brisbane	45	5,462
	Burlingame	10	115
	Daly City	17	2,985
	Foster City	14	957
	Half Moon Bay	8	546
	Hillsborough	2	4
	Menlo Park	37	3,061
	Millbrae	1	1
	Pacifica	58	7,589
	Portola Valley	61	9,997
	Redwood City	21	1,774
	San Bruno	3	9
	San Carlos	1	1
	San Francisco	50	2,495
	San Mateo	15	1,452
	South San Francisco	18	854
	Woodside	23	1,736
Other Communities	Alameda	2	18
	Aptos	10	803
	Ben Lomond	3	113
	Berkeley	6	543
	Boulder Creek	6	321
	Brentwood	1	1
	Capitola	22	2,861
	Carmel	2	203
	Cupertino	6	1,470
	East Palo Alto	2	32
	El Sobrante	1	2
	Felton	11	438
	Fremont	4	573
	Lafayette	2	160
	Los Altos	250	38,306
	Los Altos Hills	39	11,345
	Los Gatos	164	27,345
	Montara	2	7
	Moraga	2	393
	Morgan Hill	2	535
	Mountain View	83	12,740
	Oakland	55	11,011
	Orinda	1	124
	Palo Alto	300	54,277
	Piedmont	1	38
	San Jose	3	83
	San Leandro	1	2
	Santa Clara	1	1
	Santa Cruz	135	23,739
	Saratoga	12	1,177
	Scotts Valley	86	12,858
	Soquel	91	9,168
	Sunnyvale	25	823
	Watsonville	2	217
Totals		1,727	252,500

2,028
Noise Reporters (12 month AVG)

281,602
Noise Reports (12 Month AVG)

73
New Reporters

Palo Alto
New Reporters Top City

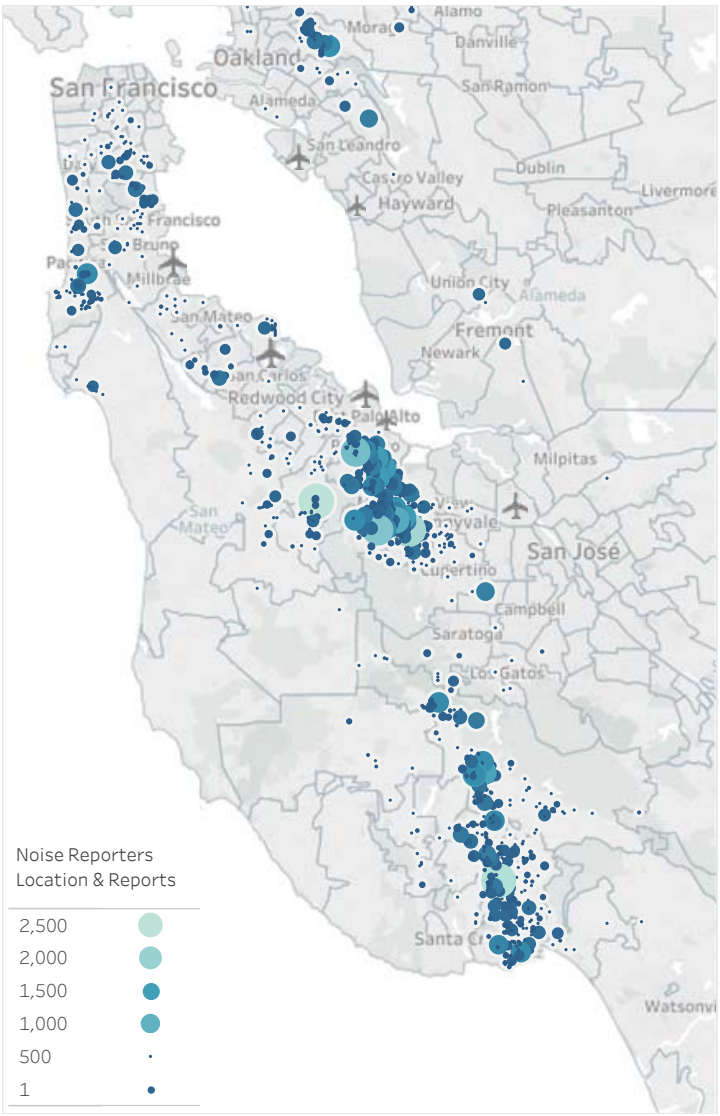
85 miles
Furthest Report

8
Reports/ SFO Operation

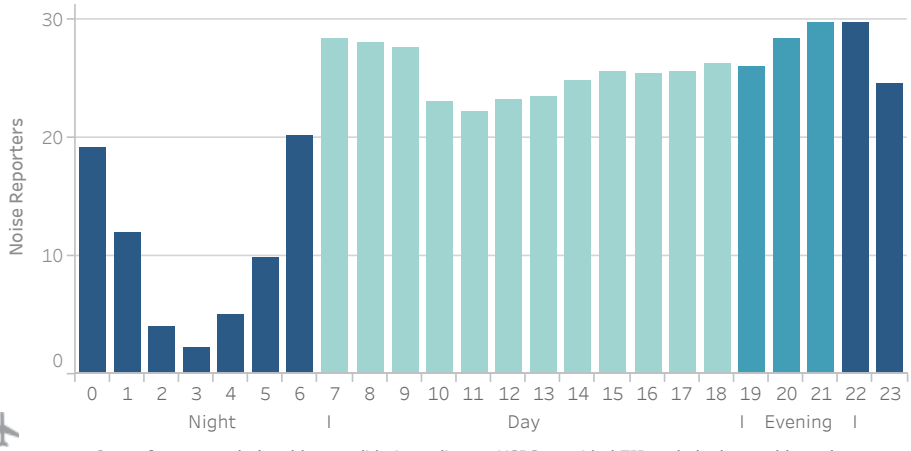
B737
A320
CRJ2
Top Aircraft Type

KAL213*
JBU736
CMP382*
Top Flight Number
*Night

Noise Reporters Location Map



April 2017 Average day (SFO Reporters by Hour of the Day)



99% of noise reports correlate to a flight origin/destination airport:

Our software vendor's address validation relies on USPS-provided ZIP code look up table and USPS-specified 'default' city values.

Source: San Francisco International Airport Noise Monitoring System

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Fly Quiet Report

Presented at the June 7, 2017
Airport Community Roundtable Meeting

Aircraft Noise Abatement Office
First Quarter 2017

SFO San Francisco International Airport

Fly Quiet Program

San Francisco International Airport's Fly Quiet Program is an Airport Community Roundtable initiative implemented by the Aircraft Noise Abatement Office. Its purpose is to encourage individual airlines to operate as quietly as possible at SFO. The program promotes a participatory approach in complying with noise abatement procedures and objectives by grading an airline's performance and by making the scores available to the public via newsletters, publications, and public meetings.

Fly Quiet offers a dynamic venue for implementing new noise abatement initiatives by praising and publicizing active participation rather than a system that admonishes violations from essentially voluntary procedures.

Program Goals

The overall goal of the Fly Quiet Program is to influence airlines to operate as quietly as possible in the San Francisco Bay Area. A successful Fly Quiet Program can be expected to reduce both single event and total noise levels around the airport.

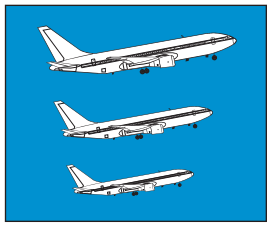
Program Reports

Fly Quiet reports communicate results in a clear, understandable format on a scale of 0-10, zero being poor and ten being good. This allows for an easy comparison between airlines over time. Individual airline scores are computed and reports are generated each quarter. These quantitative scores allow airline management and flight personnel to measure exactly how they stand compared to other operators and how their proactive involvement can positively reduce noise in the Bay Area.

Program Elements

Currently the Fly Quiet Program rates jets and regional jets on six elements : the overall noise quality of each airline's fleet operating at SFO, an evaluation of single overflight noise level exceedences, a measure of how well each airline complies with the preferred nighttime noise abatement runways, assessment of airline performance to the Gap and Shoreline Departures, and over the bay approaches to runways 28L and 28R.

SFO's Fly Quiet Ratings



Fleet Noise Quality

The Fly Quiet Program Fleet Noise Quality Rating evaluates the noise contribution of each airline's fleet as it actually operates at SFO. Airlines generally own a variety of aircraft types and schedule them according to both operational and marketing considerations. Fly Quiet assigns a higher rating or grade to airlines operating quieter, new generation aircraft, while airlines operating older, louder technology aircraft would rate lower. The goal of this measurement is to fairly compare airlines—not just by the fleet they own, but by the frequency that they schedule and fly particular aircraft into SFO.

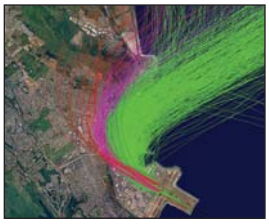
Noise Exceedance

Eliminating high-level noise events is a long-standing goal of the Airport and the Airport Community Roundtable. As a result the Airport has established single event maximum noise level limits at each noise-monitoring site. These thresholds were set to identify aircraft producing noise levels higher than are typical for the majority of the operations.

Whenever an aircraft overflight produces a noise level higher than the maximum decibel value established for a particular monitoring site, the noise threshold is surpassed and a noise exceedance occurs. An exceedance may take place during approach, takeoff, or possibly during departure ground roll before lifting off. Noise exceedances are logged by the exact operation along with the aircraft type and airline name.

Nighttime Preferential Runway Use

SFO's Nighttime Preferential Runway Use program was developed in 1988. Although the program cannot be used 100% of the time because of winds, weather, and other operational factors, the Airport, the Community Roundtable, the FAA, and the Airlines have all worked together to maximize its use when conditions permit. The program is voluntary; compliance is at the discretion of the pilot in command. The main focus of this program is to maximize flights over water and minimize flights over land and populated areas between 1:00 a.m. and 6:00 a.m. Fortunately, because airport activity levels are lower late at night, it is feasible to use over-water departure procedures more frequently than would be possible during the day. Reducing nighttime noise—especially sleep disturbance— is a key goal of SFO's aircraft noise abatement program.



Shoreline Departure Quality

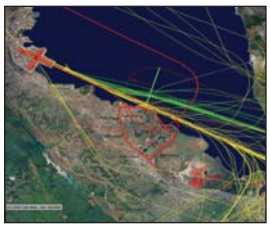
Aircraft departing SFO using Runways 28L and 28R are also considered by the Fly Quiet grading system whenever they use the Shoreline Departure Procedure. This predominately VFR (visual flight rules) departure steers aircraft to the northeast shortly after takeoff in an attempt to keep aircraft and aircraft noise away from the residential communities located to the northwest of SFO. By keeping aircraft east of Highway 101 the majority of the overflights will be experienced by industrial and business parks instead of residential areas.

In order to evaluate each airline's performance when flying a Shoreline Departure, a corridor was established using Interstate 101 (green colored flight tracks) as a reference point. The corridor runs north along 101, beginning approximately one-mile north-northwest of the end of Runways 28L and 28R and continuing up into the City of Brisbane. Departures west of 101 are scored marginal or poor depending on their location.

Gap Departure Quality

Aircraft departing SFO using Runways 28L and 28R frequently depart straight out using a procedure known as the Gap Departure. This procedure directs air traffic to fly a route that takes them over the area northwest of the airport over the cities of South San Francisco, San Bruno, Daly City, and Pacifica. In an attempt to mitigate noise in this specific area, the Gap Departure Quality Rating has been included as a category in the Fly Quiet Program.

Since "higher is quieter", aircraft altitudes are recorded along the departure route. Scores are assigned at specified points or gates set approximately one mile apart, with the higher aircraft receiving higher scores.



Foster City Arrival Quality

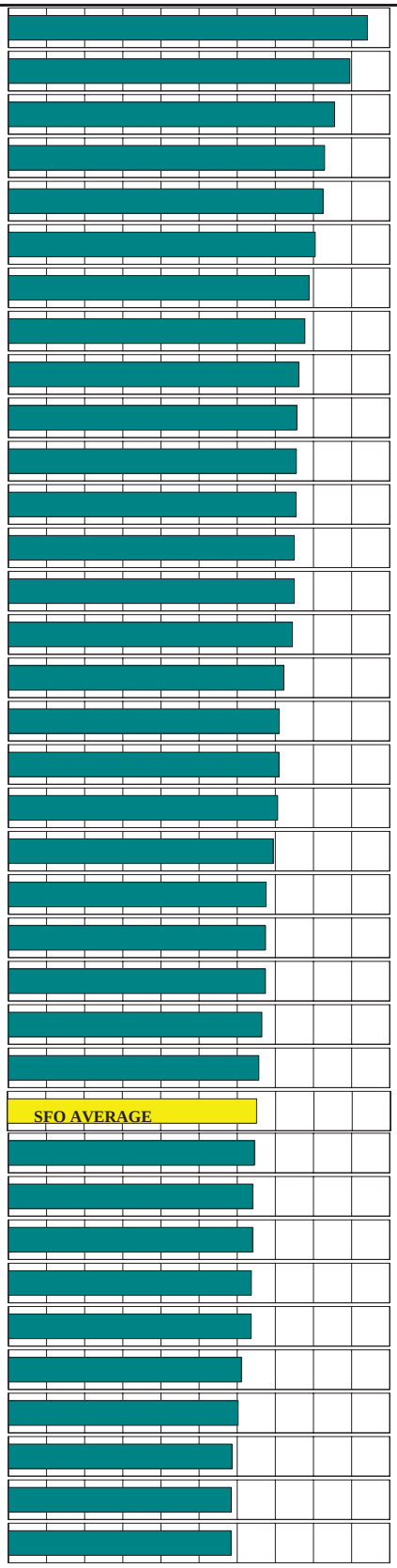
The Arrival Quality Rating is the latest addition to the Fly Quiet Program. In an effort to further reduce nighttime noise in neighboring communities, this rating is designed to maximize over-bay approaches to Runways 28 between 11:00 p.m. and 6:00 a.m. Airlines arriving to Runways 28 during these hours are assessed based on which approach flight path was used. Over-the-bay approaches are rated good (green colored flight tracks), versus over-the-communities which are rated poor.

Revised date: 5/15/09

Airline Fly Quiet Summary Report - 1st Quarter 2017

January 1 to March 31, 2017

Airline		Fleet Noise Quality	Noise Exceedance	Nighttime Runway Use	Departures Shoreline	Departures Gap	Arrivals Foster City	Final Score
virgin atlantic	VIR	9.43	10.00	-	-	8.81	-	9.41
中国南方航空 CHINA SOUTHERN AIRLINES	CSN	9.36	9.83	-	-	7.68	-	8.96
Lufthansa	DLH	9.04	9.75	-	-	6.87	-	8.55
ANA	ANA	7.15	9.93	-	-	7.80	-	8.29
NCA Nippon Cargo Airlines	NCA	9.81	8.70	10.00	-	7.16	5.58	8.25
Scandinavian Airlines	SAS	8.17	9.98	-	-	5.99	-	8.05
JAPAN AIRLINES	JAL	7.13	9.98	-	-	6.55	-	7.89
suncountry airlines	SCX	5.82	9.72	8.89	9.41	6.81	6.00	7.77
ETIHAD	ETD	7.15	9.22	-	-	6.49	-	7.62
中國東方航空 CHINA EASTERN	CES	6.15	9.98	-	-	6.56	-	7.56
SWISS	SWR	7.95	9.83	-	-	4.87	-	7.55
Compass Airlines	CPZ	10.00	9.89	3.96	9.72	6.42	5.26	7.54
SkyWest	SKW	10.00	9.97	6.25	7.67	5.86	5.24	7.50
AIRFRANCE	AFR	7.10	10.00	-	-	5.38	-	7.50
KLM Royal Dutch Airlines	KLM	9.30	10.00	-	1.15	9.33	-	7.44
FedEx	FDX	3.86	9.62	10.00	7.86	5.39	6.63	7.22
AIR CHINA	CCA	9.25	9.39	1.67	-	8.09	-	7.10
DELTA	DAL	6.35	9.80	5.56	6.68	6.79	7.39	7.10
AIR CANADA	ACA	5.51	9.75	5.71	8.61	5.92	6.86	7.06
AEROMEXICO	AMX	5.82	9.09	4.80	10.00	6.95	5.00	6.94
Southwest	SWA	5.80	9.84	3.23	9.51	5.78	6.38	6.76
jetBlue	JBU	4.79	9.85	6.19	6.95	5.07	7.61	6.74
Alaska	ASA	5.08	9.86	4.54	9.21	6.82	4.93	6.74
Virgin america	VRD	4.94	9.87	5.71	8.78	4.54	6.03	6.65
FRONTIER AIRLINES	FFT	5.24	9.76	5.92	8.45	2.66	7.38	6.57
								6.50 SFO AVERAGE
Avianca	TAI	4.95	9.07	4.25	8.33	6.40	5.71	6.45
volaris	VOI	4.85	9.83	2.78	-	9.58	5.00	6.41
American Airlines	AAL	4.89	9.78	5.67	7.73	3.13	7.24	6.40
UNITED	UAL	5.84	9.73	4.26	6.48	5.76	6.15	6.37
AIR INDIA	AIC	7.15	8.69	-	2.50	8.49	5.00	6.37
KOREAN AIR	KAL	9.66	7.18	2.77	-	5.94	5.00	6.11
Emirates	UAE	10.00	9.98	-	0.00	4.12	-	6.02
Aer Lingus	EIN	4.05	9.97	-	-	3.57	-	5.86
ATLAS AIR	GTI	4.71	8.61	5.71	3.00	7.32	5.71	5.84
AIR NEW ZEALAND	ANZ	6.61	9.81	0.00	-	6.93	-	5.84

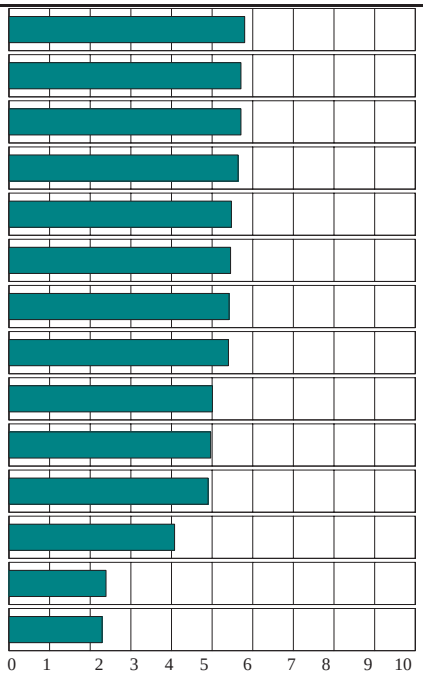


Airline Fly Quiet Summary Report - 1st Quarter 2017

January 1 to March 31, 2017

Airline		Fleet Noise Quality	Noise Exceedance	Nighttime Runway Use	Departures: Shoreline	Departures: Gap	Arrivals: Foster City	Final Score
WOW air	WOW	4.05	9.70	0.00	6.67	8.59	-	5.80
ASIANA AIRLINES	AAR	4.80	6.64	3.64	-	8.35	5.13	5.71
SINGAPORE AIRLINES	SIA	8.32	8.33	1.30	-	4.88	-	5.71
CATHAY PACIFIC	CPA	7.15	7.73	1.84	-	6.48	5.00	5.64
CHINA AIRLINES	CAL	5.58	8.42	1.92	-	6.46	5.00	5.48
BRITISH AIRWAYS	BAW	7.41	9.81	-	0.00	4.60	-	5.45
EVA AIR	EVA	6.95	8.30	2.08	-	4.74	5.00	5.42
CopaAirlines	CMP	5.82	9.19	3.54	4.58	3.74	5.54	5.40
FIJI AIRWAYS	FJI	4.05	8.66	0.00	-	7.32	-	5.01
HAWAIIAN AIRLINES	HAL	4.04	9.56	0.00	-	6.22	5.00	4.96
Philippines	PAL	7.24	8.14	0.00	-	4.13	5.00	4.90
TURKISH AIRLINES	THY	7.15	9.89	0.00	0.00	2.42	5.00	4.08
QANTAS	QFA	3.43	0.00	0.00	-	6.13	-	2.39
KALITTA AIR	CKS	3.43	0.73	0.00	-	2.31	5.00	2.29
SFO Average		6.58	9.01	3.59	6.23	6.09	5.72	6.50

Airline Fly Quiet Rating

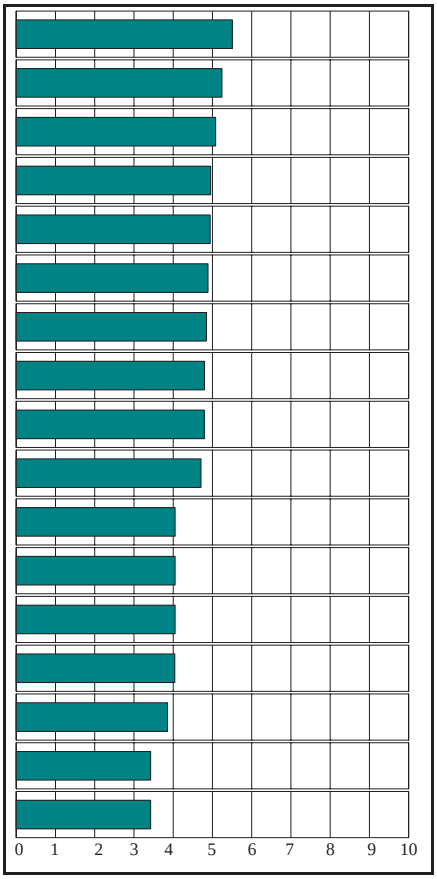


Fleet Noise Quality - 1st Quarter 2017

January 1 to March 31, 2017

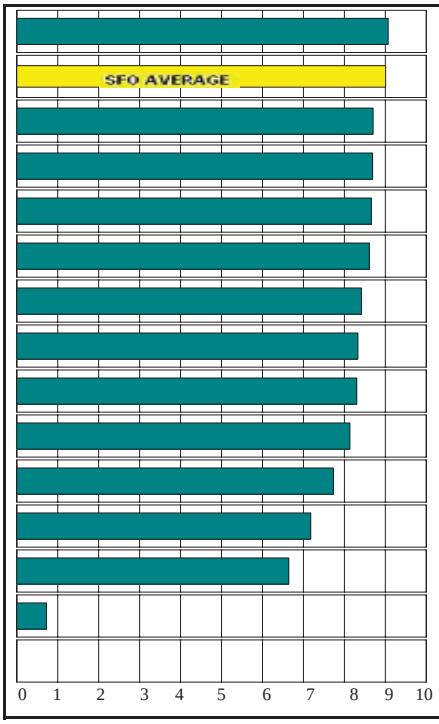
Airline		*Nationwide* *Fleet Noise Quality Rating*	*San Francisco* *Average Daily Jet Operations*	*Score*	Fleet Noise Quality Rating
Emirates	UAE	7.89	1	*10.00*	
SkyWest	SKW	10.00	85	*10.00*	
Compass Airlines	CPZ	10.00	13	*10.00*	
NCA Nippon Cargo Airlines	NCA	3.90	1	*9.81*	
KOREAN AIR	KAL	4.05	2	*9.66*	
virgin atlantic	VIR	5.84	2	*9.43*	
中国南方航空 CHINA SOUTHERN AIRLINES	CSN	5.64	1	*9.36*	
KLM Royal Dutch Airlines	KLM	4.67	1	*9.30*	
AIR CHINA	CCA	3.46	1	*9.25*	
Lufthansa	DLH	6.09	2	*9.04*	
SINGAPORE AIRLINES	SIA	5.93	2	*8.32*	
Scandinavian Airlines	SAS	4.96	1	*8.17*	
SWISS	SWR	5.17	1	*7.95*	
BRITISH AIRWAYS	BAW	4.34	2	*7.41*	
Philippines	PAL	5.09	1	*7.24*	
ANA	ANA	5.43	1	*7.15*	
CATHAY PACIFIC	CPA	4.18	2	*7.15*	
TURKISH AIRLINES	THY	6.80	1	*7.15*	
AIR INDIA	AIC	4.77	1	*7.15*	
ETIHAD	ETD	0.00	1	*7.15*	
JAPAN AIRLINES	JAL	4.20	1	*7.13*	
AIRFRANCE	AFR	5.49	1	*7.10*	
EVA AIR	EVA	5.05	2	*6.95*	
AIR NEW ZEALAND	ANZ	4.00	1	*6.61*	
				6.58	SFO AVERAGE
DELTA	DAL	4.92	23	*6.35*	
中國東方航空 CHINA EASTERN	CES	4.63	1	*6.15*	
UNITED	UAL	5.83	158	*5.84*	
AEROMEXICO	AMX	5.54	3	*5.82*	
CopaAirlines	CMP	6.46	2	*5.82*	
suncountry airlines	SCX	5.82	1	*5.82*	
Southwest	SWA	5.70	41	*5.80*	
CHINA AIRLINES	CAL	3.62	2	*5.58*	

Airline		Nationwide Fleet Noise Quality Rating	San Francisco Average Daily Jet Operations	San Francisco Score	Fleet Noise Quality Rating
AIR CANADA	ACA	6.75	9	5.51	
FRONTIER AIRLINES	FFT	6.41	4	5.24	
Alaska	ASA	5.10	17	5.08	
Avianca	TAI	5.18	1	4.95	
Virgin America	VRD	5.31	54	4.94	
American Airlines	AAL	3.94	35	4.89	
volaris	VOI	0.00	1	4.85	
ASIANA AIRLINES	AAR	3.93	2	4.80	
jetBlue	JBU	6.13	17	4.79	
Atlas Air	GTI	0.93	2	4.71	
Aer Lingus	EIN	4.05	1	4.05	
FIJI AIRWAYS	FJI	0.00	0	4.05	
WOW air	WOW	0.00	1	4.05	
HAWAIIAN AIRLINES	HAL	6.21	2	4.04	
FedEx	FDX	2.80	1	3.86	
KALITTA AIR	CKS	0.60	0	3.43	
QANTAS	QFA	3.47	1	3.43	
AVERAGE		**4.70**	**10**	**6.58**	



Airline		Noise Exceedances				Noise Exceedance Quality Rating
		Total Noise Exceedances	*Total Quarterly Operations*	*Exceedances per 1000 Operations*	***Score***	
AIRFRANCE	AFR	0	176	0	***10.00***	
KLM Royal Dutch Airlines	KLM	0	184	0	***10.00***	
virgin atlantic	VIR	0	310	0	***10.00***	
中国東方航空 CHINA EASTERN	CES	1	242	4	***9.98***	
Scandinavian Airlines	SAS	1	181	6	***9.98***	
Emirates	UAE	1	180	6	***9.98***	
JAPAN AIRLINES	JAL	1	179	6	***9.98***	
SkyWest AIRLINES	SKW	142	18,997	7	***9.97***	
Aer Lingus	EIN	1	131	8	***9.97***	
ANA	ANA	3	178	17	***9.93***	
Compass Airlines	CPZ	58	2,327	25	***9.89***	
TURKISH AIRLINES	THY	4	157	25	***9.89***	
Virgin america	VRD	289	9,774	30	***9.87***	
Alaska	ASA	95	2,972	32	***9.86***	
jetBlue	JBU	106	3,045	35	***9.85***	
Southwest	SWA	279	7,396	38	***9.84***	
SWISS	SWR	7	180	39	***9.83***	
volaris	VOI	7	180	39	***9.83***	
中国南方航空 CHINA SOUTHERN AIRLINES	CSN	7	179	39	***9.83***	
AIR NEW ZEALAND	ANZ	8	179	45	***9.81***	
BRITISH AIRWAYS	BAW	16	357	45	***9.81***	
DELTA	DAL	193	4,099	47	***9.80***	
American Airlines	AAL	329	6,284	52	***9.78***	
FRONTIER AIRLINES	FFT	43	755	57	***9.76***	
Lufthansa	DLH	20	342	58	***9.75***	
AIR CANADA	ACA	95	1,603	59	***9.75***	
UNITED	UAL	1,805	28,489	63	***9.73***	
sun country airlines	SCX	13	197	66	***9.72***	
WOW air	WOW	8	114	70	***9.70***	
FedEx	FDX	23	260	88	***9.62***	
HAWAIIAN AIRLINES	HAL	37	362	102	***9.56***	
AIR CHINA	CCA	34	241	141	***9.39***	
ETIHAD	ETD	20	110	182	***9.22***	
CopaAirlines	CMP	63	333	189	***9.19***	
AEROMEXICO	AMX	112	527	213	***9.09***	

Airline		Noise Exceedances				Noise Exceedance Quality Rating
		Total Noise Exceedances	*Total Quarterly Operations*	*Exceedances per 1000 Operations*	***Score***	
Avianca	TAI	57	263	217	***9.07***	
					9.01	SFO AVERAGE
NCA Nippon Cargo Airlines	NCA	42	139	302	***8.70***	
Air India	AIC	47	154	305	***8.69***	
Fiji Airways	FJI	5	16	313	***8.66***	
Atlas Air	GTI	94	290	324	***8.61***	
China Airlines	CAL	116	315	368	***8.42***	
Singapore Airlines	SIA	140	360	389	***8.33***	
Eva Air	EVA	151	382	395	***8.30***	
Philippines	PAL	86	198	434	***8.14***	
Cathay Pacific	CPA	222	420	529	***7.73***	
Korean Air	KAL	230	350	657	***7.18***	
Asiana Airlines	AAR	222	284	782	***6.64***	
Kalitta Air	CKS	54	25	2160	***0.73***	
Qantas	QFA	354	152	2329	***0.00***	



TOTAL	**5,641**	**94,568**		
SFO AVERAGE			**231**	**9.01**

Nighttime Preferential Runway Use - 1st Quarter 2017

January 1 to March 31, 2017

Airline		Nighttime Departures (1:00 am to 6:00 am)						Nighttime Runway Use Rating
		Total	*10L/R*	*28L/R Shoreline*	*01L/R*	*28L/R Straight*	***Score***	
FedEx	FDX	**1**	100%	0%	0%	0%	***10.00***	
NCA Nippon Cargo Airlines	NCA	**1**	100%	0%	0%	0%	***10.00***	
suncountry airlines	SCX	**3**	67%	33%	0%	0%	***8.89***	
SkyWest Airlines	SKW	**16**	50%	0%	38%	13%	***6.25***	
jetBlue	JBU	**14**	43%	21%	14%	21%	***6.19***	
FRONTIER AIRLINES	FFT	**67**	30%	28%	31%	10%	***5.92***	
ATLAS AIR	GTI	**7**	57%	0%	0%	43%	***5.71***	
AIR CANADA	ACA	**7**	43%	0%	43%	14%	***5.71***	
Virgin america	VRD	**7**	43%	14%	14%	29%	***5.71***	
American Airlines	AAL	**70**	34%	17%	33%	16%	***5.67***	
DELTA	DAL	**18**	22%	33%	33%	11%	***5.56***	
AEROMEXICO	AMX	**25**	36%	0%	36%	28%	***4.80***	
Alaska	ASA	**47**	11%	19%	66%	4%	***4.54***	
UNITED	UAL	**190**	17%	15%	47%	21%	***4.26***	
Avianca	TAI	**51**	27%	4%	37%	31%	***4.25***	
Compass Airlines	CPZ	**37**	16%	0%	70%	14%	***3.96***	
ASIANA AIRLINES	AAR	**44**	36%	0%	0%	64%	***3.64***	
							3.59	SFO AVERAGE
CopaAirlines	CMP	**49**	24%	16%	0%	59%	***3.54***	
Southwest	SWA	**31**	3%	0%	87%	10%	***3.23***	
volaris	VOI	**6**	17%	0%	33%	50%	***2.78***	
KOREAN AIR	KAL	**83**	28%	0%	0%	72%	***2.77***	
EVA AIR	EVA	**48**	21%	0%	0%	79%	***2.08***	
CHINA AIRLINES	CAL	**26**	19%	0%	0%	81%	***1.92***	
CATHAY PACIFIC	CPA	**38**	18%	0%	0%	82%	***1.84***	
AIR CHINA	CCA	**12**	17%	0%	0%	83%	***1.67***	
SINGAPORE AIRLINES	SIA	**23**	13%	0%	0%	87%	***1.30***	
AIR NEW ZEALAND	ANZ	**1**	0%	0%	0%	100%	***0.00***	
KALITTA AIR	CKS	**9**	0%	0%	0%	100%	***0.00***	
FIJI AIRWAYS	FJI	**1**	0%	0%	0%	100%	***0.00***	
HAWAIIAN AIRLINES	HAL	**1**	0%	0%	0%	100%	***0.00***	
Philippines	PAL	**2**	0%	0%	0%	100%	***0.00***	
QANTAS	QFA	**1**	0%	0%	0%	100%	***0.00***	
TURKISH AIRLINES	THY	**1**	0%	0%	0%	100%	***0.00***	

Nighttime Preferential Runway Use - 1st Quarter 2017

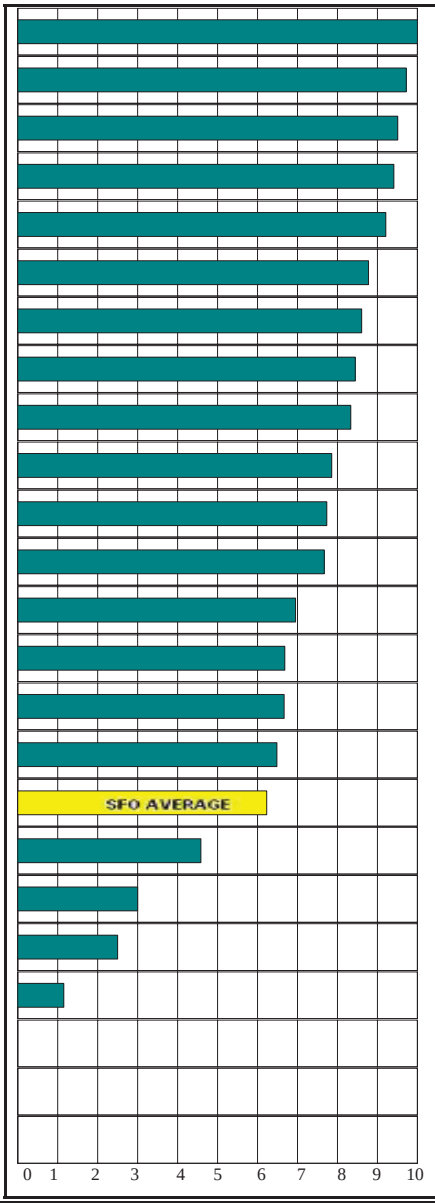
January 1 to March 31, 2017

Airline	Nighttime Departures (1:00 am to 6:00 am)						Nighttime Runway Use Rating
	Total	*10L/R*	*28L/R Shoreline*	*01L/R*	*28L/R Straight*	***Score***	
WOW	**1**	0%	0%	0%	100%	***0.00***	0 1 2 3 4 5 6 7 8 9 10
TOTAL	**938**						
SFO AVERAGE		**26%**	**6%**	**17%**	**51%**	**3.59**	

Shoreline Departure Rating - 1st Quarter 2017

January 1 to March 31,2017

Airline		Shoreline Departures					Shoreline Departure Rating
		Total	Successful	Marginal	Poor	Score	
AeroMexico	AMX	3	100%	0%	0%	*10.00*	
Compass Airlines	CPZ	18	94%	6%	0%	*9.72*	
Southwest	SWA	112	90%	10%	0%	*9.51*	
suncountry airlines	SCX	17	88%	12%	0%	*9.41*	
Alaska	ASA	152	86%	13%	1%	*9.21*	
virgin america	VRD	360	76%	24%	0%	*8.78*	
AIR CANADA	ACA	104	75%	22%	3%	*8.61*	
FRONTIER AIRLINES	FFT	74	69%	31%	0%	*8.45*	
Avianca	TAI	3	67%	33%	0%	*8.33*	
FedEx	FDX	14	57%	43%	0%	*7.86*	
American Airlines	AAL	450	58%	39%	3%	*7.73*	
SkyWest Airlines	SKW	736	69%	15%	16%	*7.67*	
jetBlue	JBU	146	41%	57%	2%	*6.95*	
DELTA	DAL	306	45%	43%	12%	*6.68*	
WOW air	WOW	6	33%	67%	0%	*6.67*	
UNITED	UAL	1,155	47%	36%	17%	*6.48*	
						6.23	SFO AVERAGE
CopaAirlines	CMP	12	25%	42%	33%	*4.58*	
ATLAS AIR	GTI	10	0%	60%	40%	*3.00*	
AIR INDIA	AIC	2	0%	50%	50%	*2.50*	
KLM Royal Dutch Airlines	KLM	13	8%	8%	85%	*1.15*	
BRITISH AIRWAYS	BAW	1	0%	0%	100%	*0.00*	
TURKISH AIRLINES	THY	1	0%	0%	100%	*0.00*	
Emirates	UAE	1	0%	0%	100%	*0.00*	
TOTAL		**3,696**					
SFO AVERAGE			**49%**	**26%**	**24%**	**6.23**	



Gap Departure Climb Rating - 1st Quarter 2017

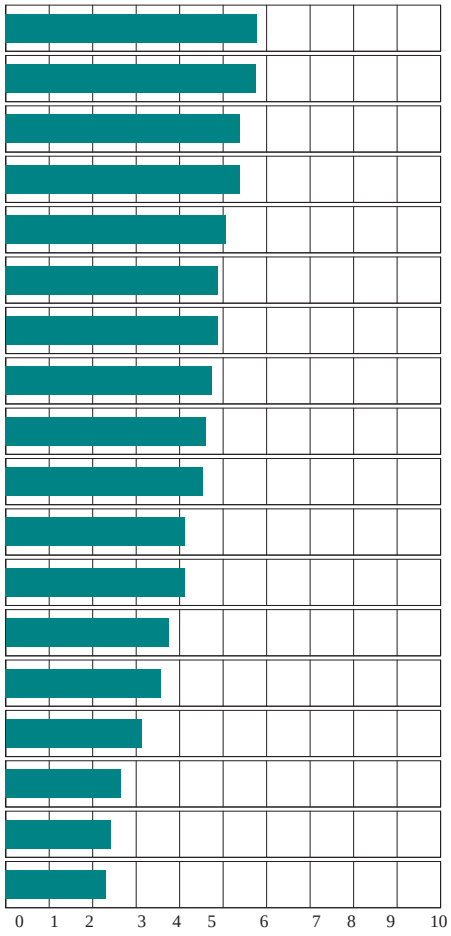
January 1 to March 31, 2017

Airline		Gap Departures		Gap Departure Quality Rating
		Total	Score	
volaris	VOI	24	9.58	
KLM Royal Dutch Airlines	KLM	13	9.33	
virgin atlantic	VIR	63	8.81	
WOW air	WOW	16	8.59	
AIR INDIA	AIC	63	8.49	
ASIANA AIRLINES	AAR	112	8.35	
AIR CHINA	CCA	102	8.09	
ANA	ANA	75	7.80	
中国南方航空 CHINA SOUTHERN AIRLINES	CSN	76	7.68	
FIJI AIRWAYS	FJI	7	7.32	
ATLAS AIR	GTI	49	7.32	
NCA Nippon Cargo Airlines	NCA	59	7.16	
AEROMEXICO	AMX	75	6.95	
AIR NEW ZEALAND	ANZ	79	6.93	
Lufthansa	DLH	149	6.87	
Alaska	ASA	197	6.82	
sun country airlines	SCX	9	6.81	
DELTA	DAL	177	6.79	
中國東方航空 CHINA EASTERN	CES	100	6.56	
JAPAN AIRLINES	JAL	71	6.55	
ETIHAD	ETD	46	6.49	
CATHAY PACIFIC	CPA	177	6.48	
CHINA AIRLINES	CAL	137	6.46	
Compass Airlines	CPZ	239	6.42	
Avianca	TAI	42	6.40	
HAWAIIAN AIRLINES	HAL	46	6.22	
QANTAS	QFA	64	6.13	
			6.09	SFO AVERAGE
Scandinavian Airlines	SAS	77	5.99	
KOREAN AIR	KAL	135	5.94	
AIR CANADA	ACA	73	5.92	
SkyWest AIRLINES	SKW	1450	5.86	

Gap Departure Climb Rating - 1st Quarter 2017

January 1 to March 31, 2017

Airline		Gap Departures		Gap Departure Quality Rating
		Total	Score	
Southwest	SWA	687	5.78	
UNITED	UAL	3901	5.76	
FedEx	FDX	16	5.39	
AIRFRANCE	AFR	72	5.38	
jetBlue	JBU	223	5.07	
SINGAPORE AIRLINES	SIA	151	4.88	
SWISS	SWR	76	4.87	
EVA AIR	EVA	166	4.74	
BRITISH AIRWAYS	BAW	131	4.60	
Virgin america	VRD	903	4.54	
Philippines	PAL	89	4.13	
Emirates	UAE	75	4.12	
CopaAirlines	CMP	120	3.74	
Aer Lingus	EIN	56	3.57	
American Airlines	AAL	487	3.13	
FRONTIER AIRLINES	FFT	24	2.66	
TURKISH AIRLINES	THY	62	2.42	
KALITTA AIR	CKS	13	2.31	

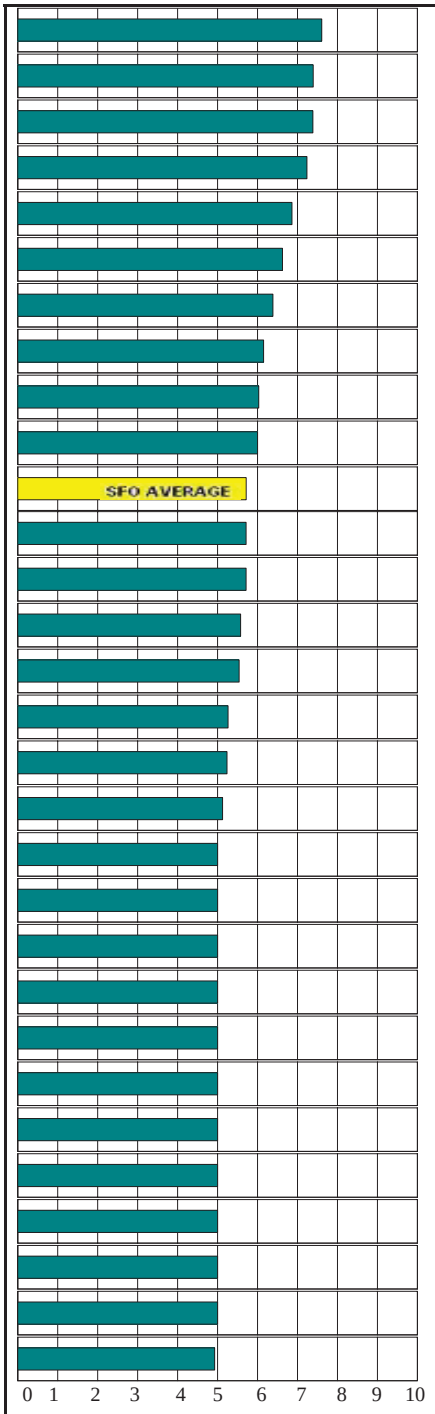


TOTAL	**11254**	
SFO Average		**6.09**

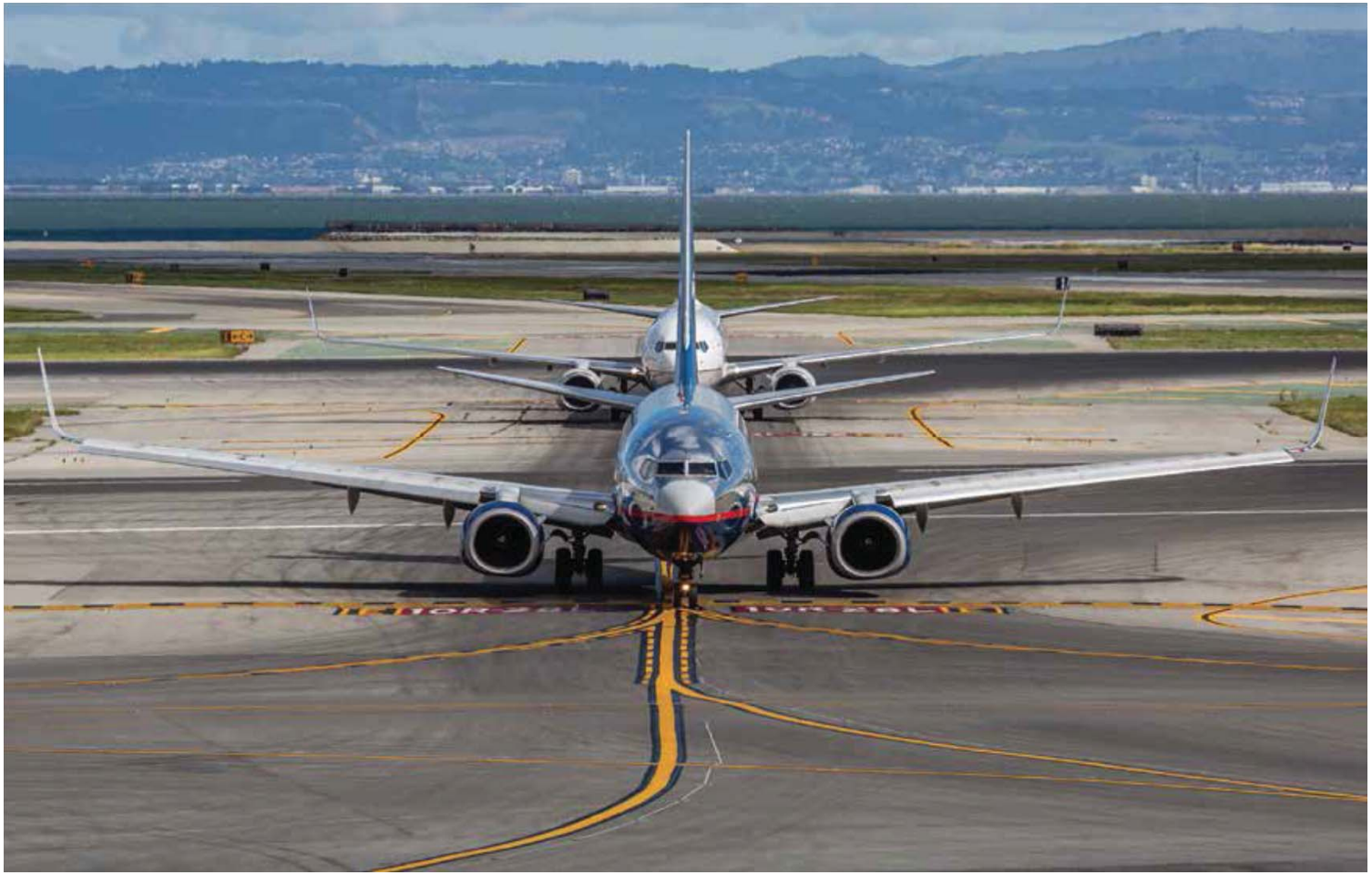
Foster City Arrival Rating - 1st Quarter 2017

January 1 to March 31,2017

Airline		Foster City Arrivals					Foster City Arrival Rating
		Total	*Successful*	*Marginal*	*Poor*	*Score*	
jetBlue	JBU	**186**	53%	47%	1%	*7.61*	
DELTA	DAL	**261**	48%	52%	0%	*7.39*	
FRONTIER AIRLINES	FFT	**65**	48%	52%	0%	*7.38*	
American Airlines	AAL	**409**	45%	55%	0%	*7.24*	
AIR CANADA	ACA	**94**	37%	63%	0%	*6.86*	
FedEx	FDX	**40**	33%	68%	0%	*6.63*	
Southwest	SWA	**195**	30%	68%	2%	*6.38*	
UNITED	UAL	**942**	24%	75%	1%	*6.15*	
Virgin america	VRD	**257**	21%	79%	0%	*6.03*	
sun country airlines	SCX	**5**	20%	80%	0%	*6.00*	
						5.72	SFO AVERAGE
ATLAS AIR	GTI	**56**	14%	86%	0%	*5.71*	
Avianca	TAI	**70**	14%	86%	0%	*5.71*	
NCA Nippon Cargo Airlines	NCA	**26**	12%	88%	0%	*5.58*	
CopaAirlines	CMP	**37**	14%	84%	3%	*5.54*	
Compass Airlines	CPZ	**95**	5%	95%	0%	*5.26*	
SkyWest AIRLINES	SKW	**127**	9%	87%	4%	*5.24*	
ASIANA AIRLINES	AAR	**40**	3%	98%	0%	*5.13*	
AIR INDIA	AIC	**15**	0%	100%	0%	*5.00*	
AEROMEXICO	AMX	**16**	0%	100%	0%	*5.00*	
CHINA AIRLINES	CAL	**3**	0%	100%	0%	*5.00*	
KALITTA AIR	CKS	**7**	0%	100%	0%	*5.00*	
CATHAY PACIFIC	CPA	**1**	0%	100%	0%	*5.00*	
EVA AIR	EVA	**1**	0%	100%	0%	*5.00*	
HAWAIIAN AIRLINES	HAL	**3**	0%	100%	0%	*5.00*	
KOREAN AIR	KAL	**72**	0%	100%	0%	*5.00*	
Philippines	PAL	**1**	0%	100%	0%	*5.00*	
TURKISH AIRLINES	THY	**1**	0%	100%	0%	*5.00*	
volaris	VOI	**5**	0%	100%	0%	*5.00*	
Alaska	ASA	**69**	0%	99%	1%	*4.93*	



TOTAL	**3,099**				
SFO AVERAGE		**15%**	**85%**	**0%**	**5.72**

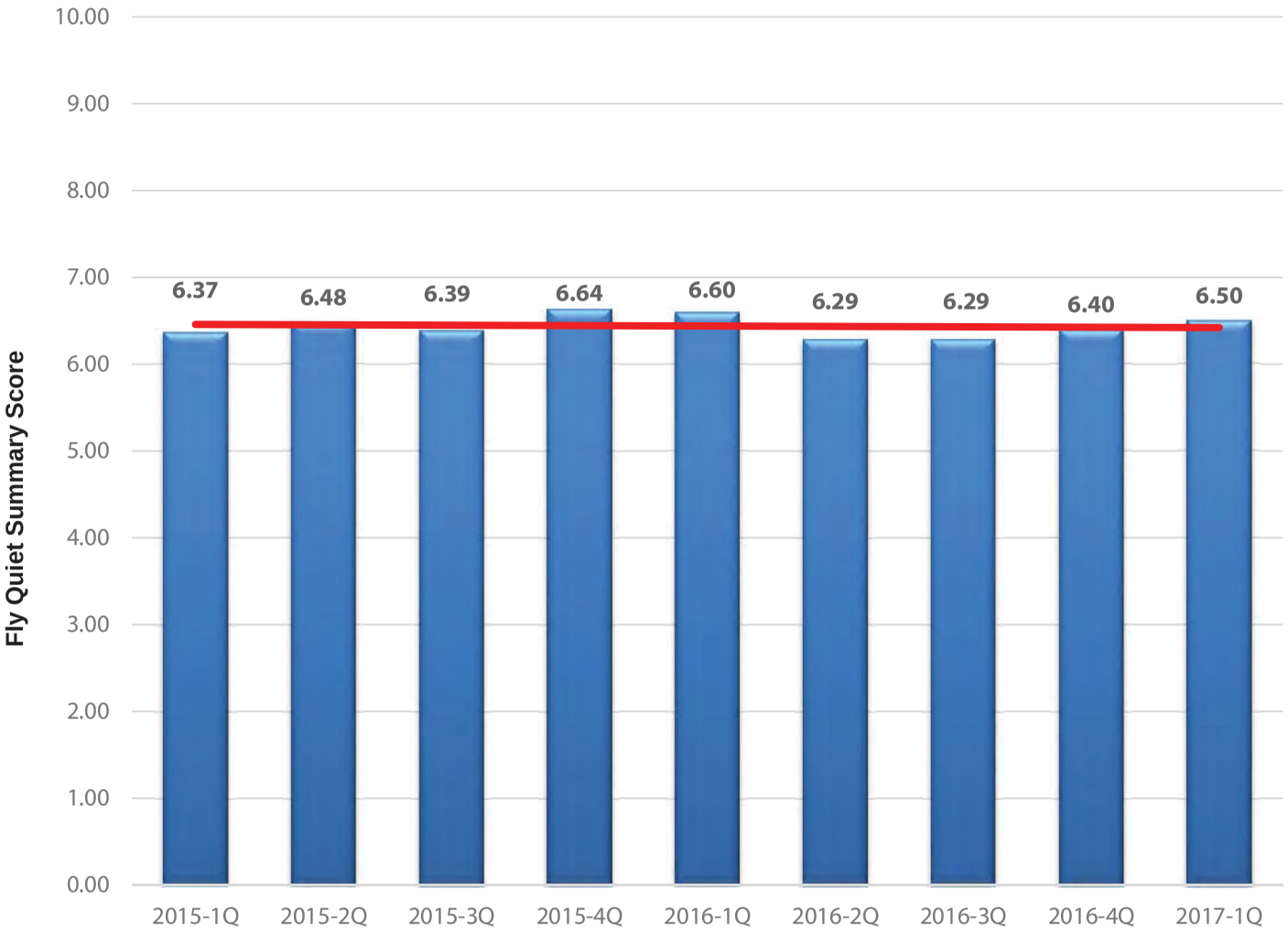


Fly Quiet Report

Presented at the June 7, 2017
Airport Community Roundtable Meeting
Aircraft Noise Abatement Office
First Quarter 2017

SFO San Francisco International Airport

Fly Quiet Summary Averages

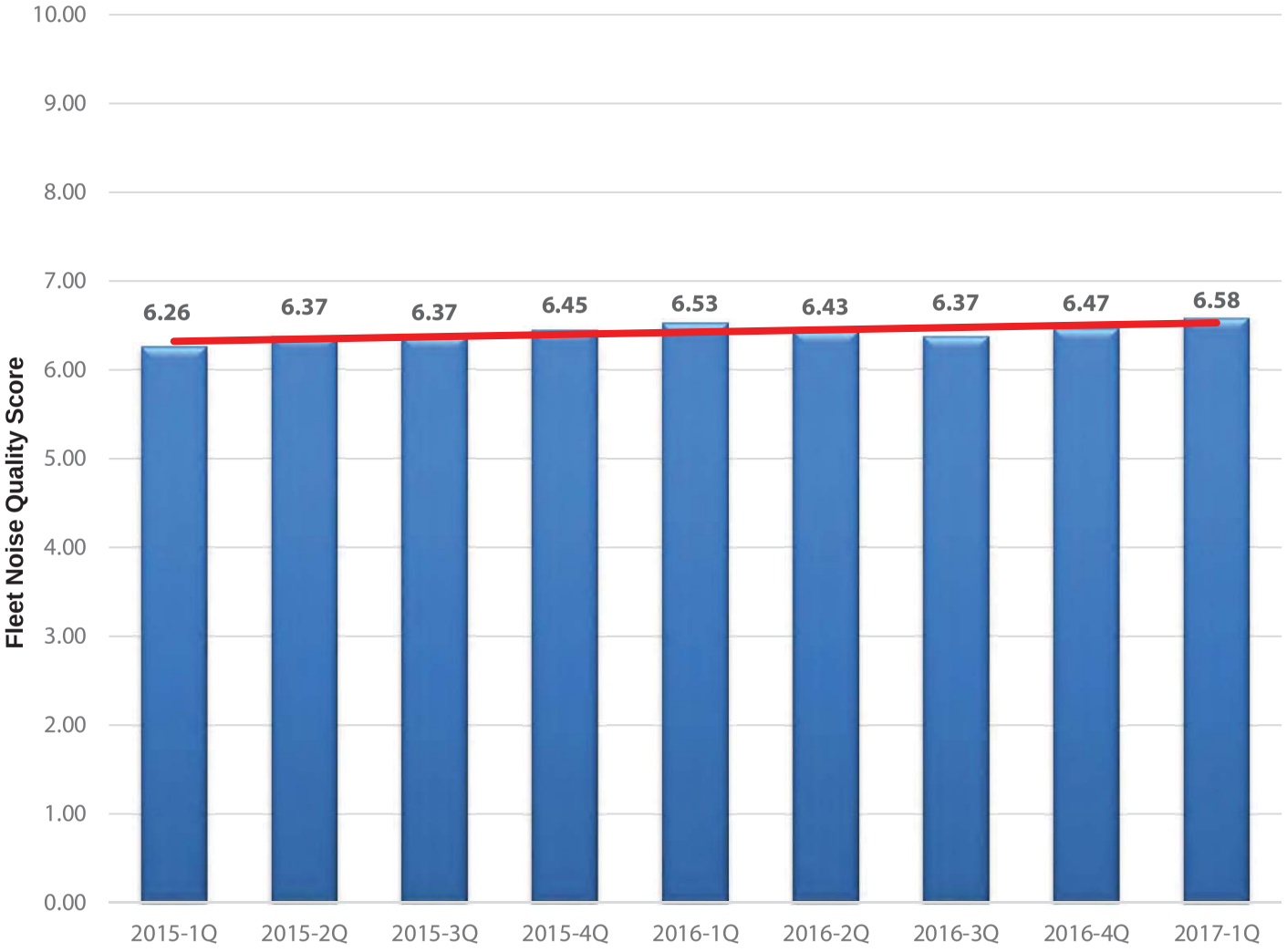


Top 5

Bottom 5

Average of Quarterly Averages, Airline Rankings are for top 5 and bottom 5 performers for this category for current quarter, new airlines to top and bottom 5

Fleet Noise Quality Averages



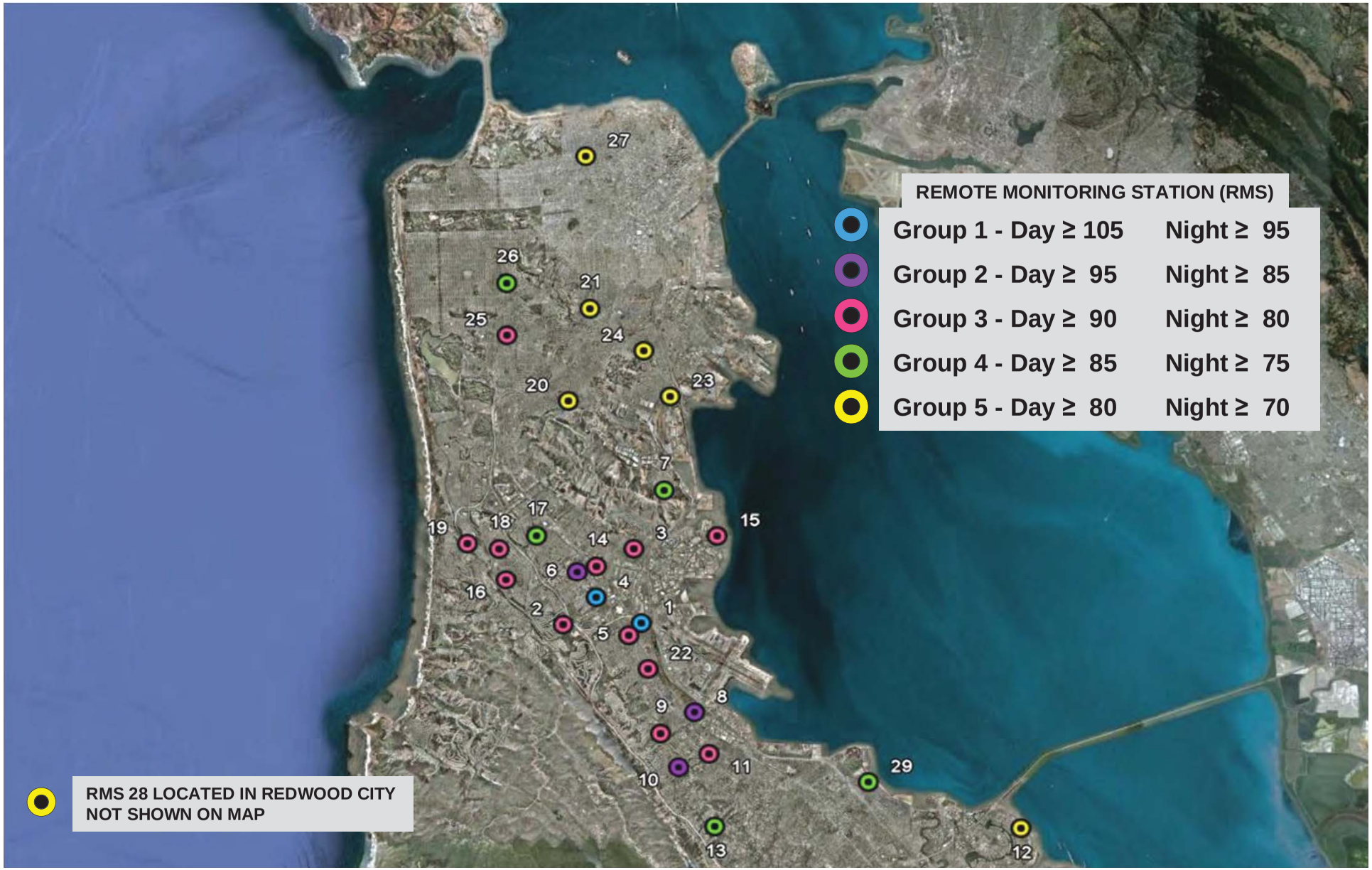
Top 5

Bottom 5

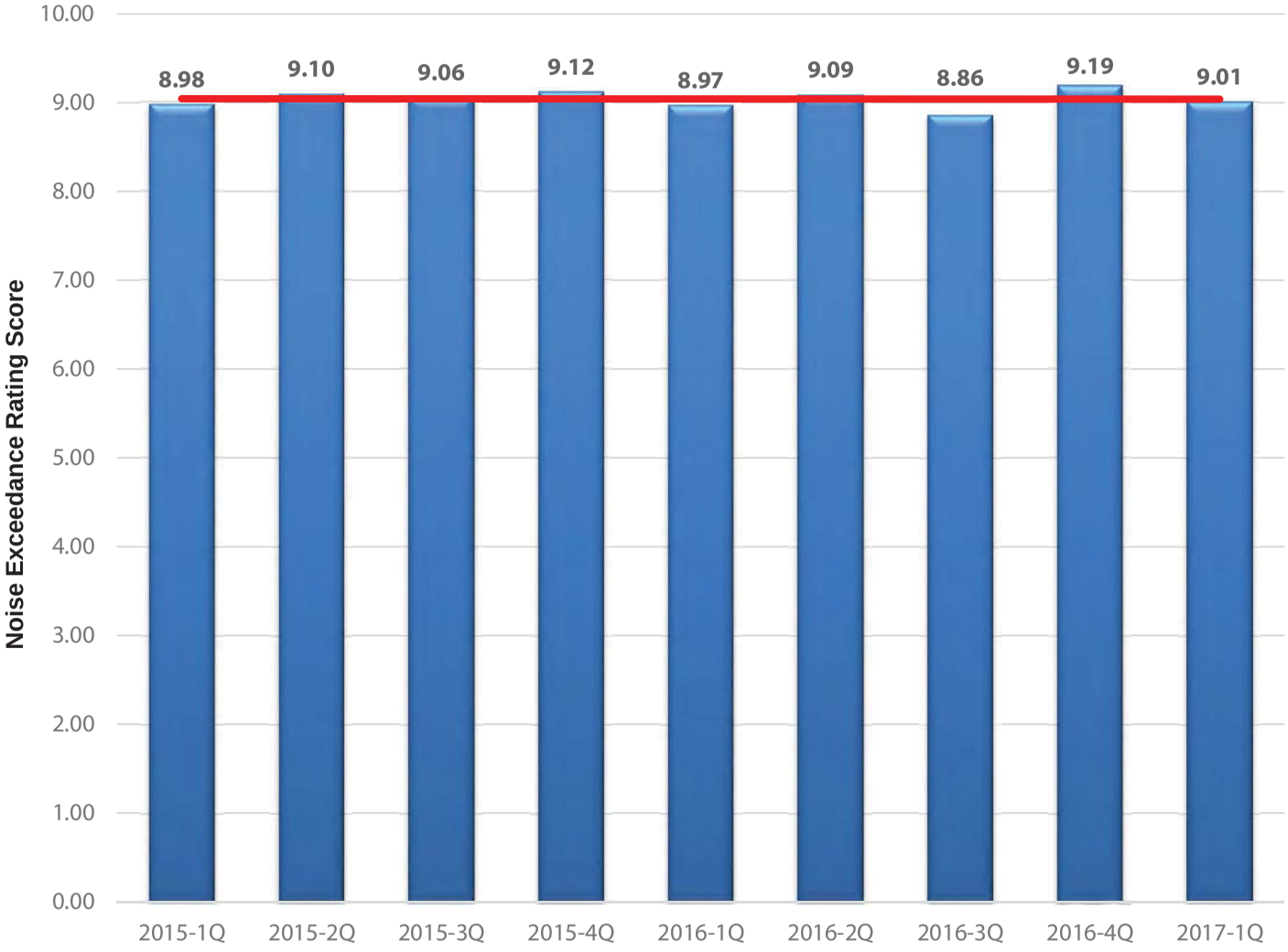
Average of Quarterly Averages, Airline Rankings are for top 5 and bottom 5 performers for this category for current quarter, new airlines to top and bottom 5

Noise Exceedance Rating

Noise Monitor Day/Night Thresholds



Noise Exceedance Rating Averages

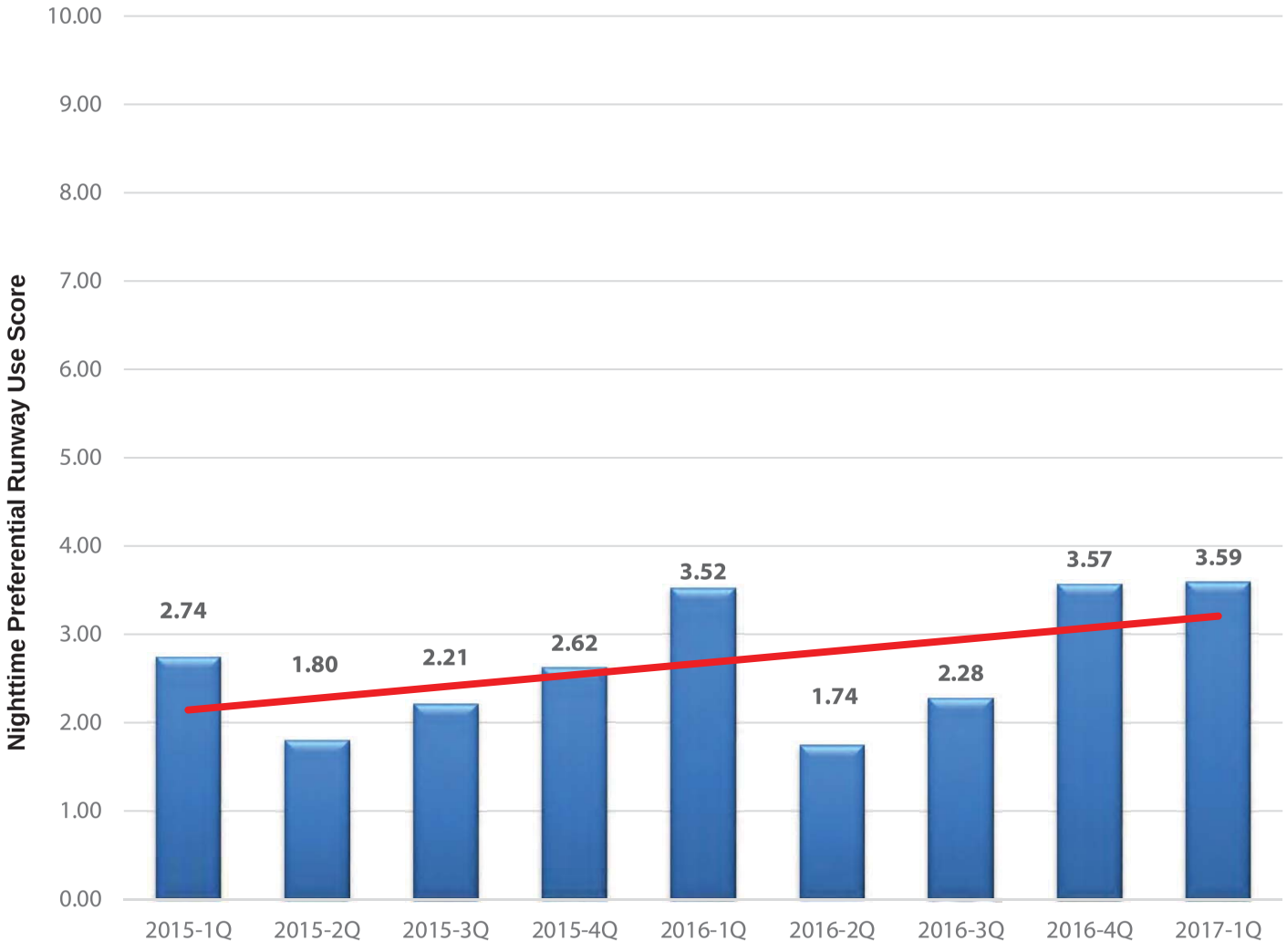


Top 5

Bottom 5

Nighttime Preferential Runway Use

Nighttime Preferential Runway Use Averages

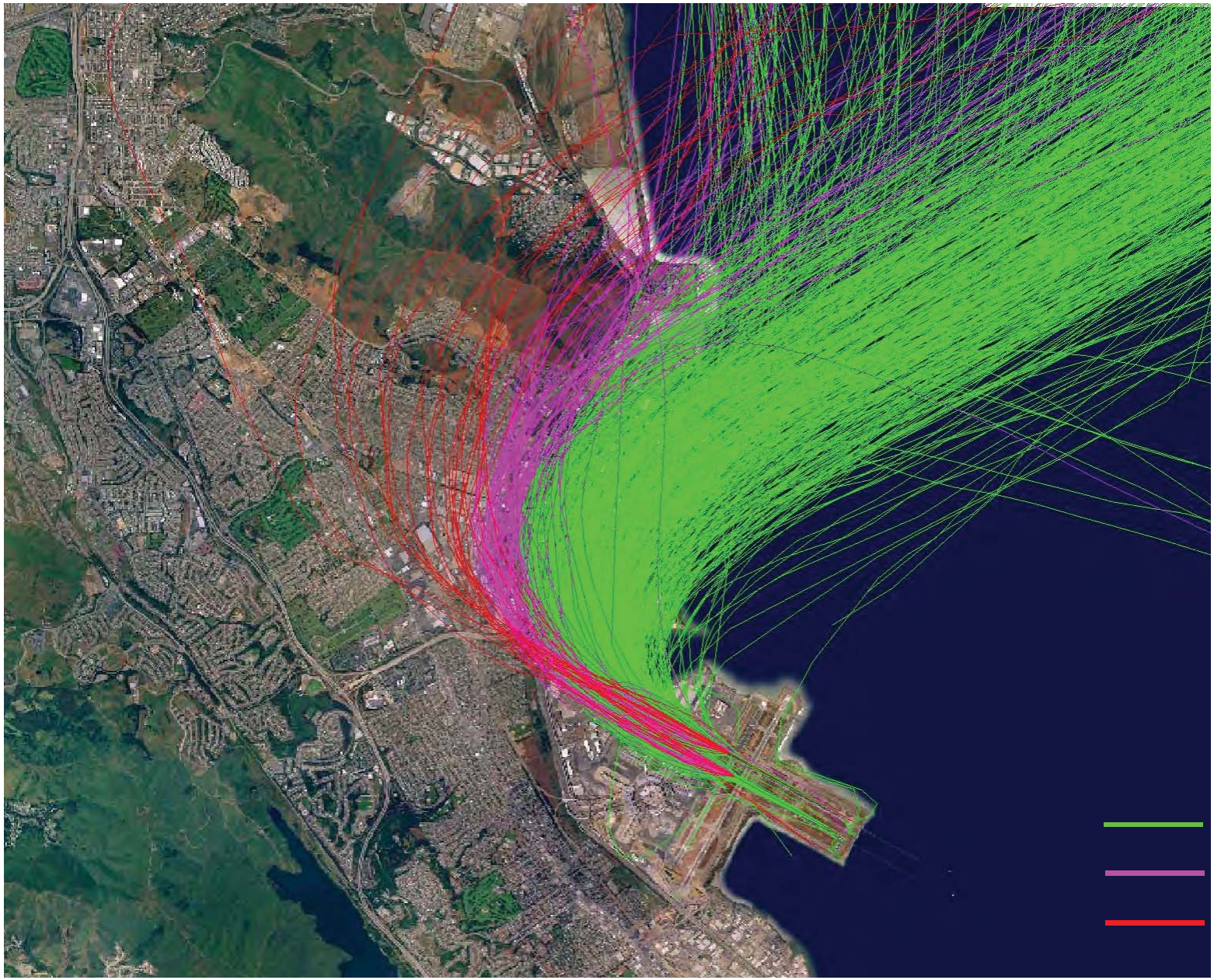


Top 5

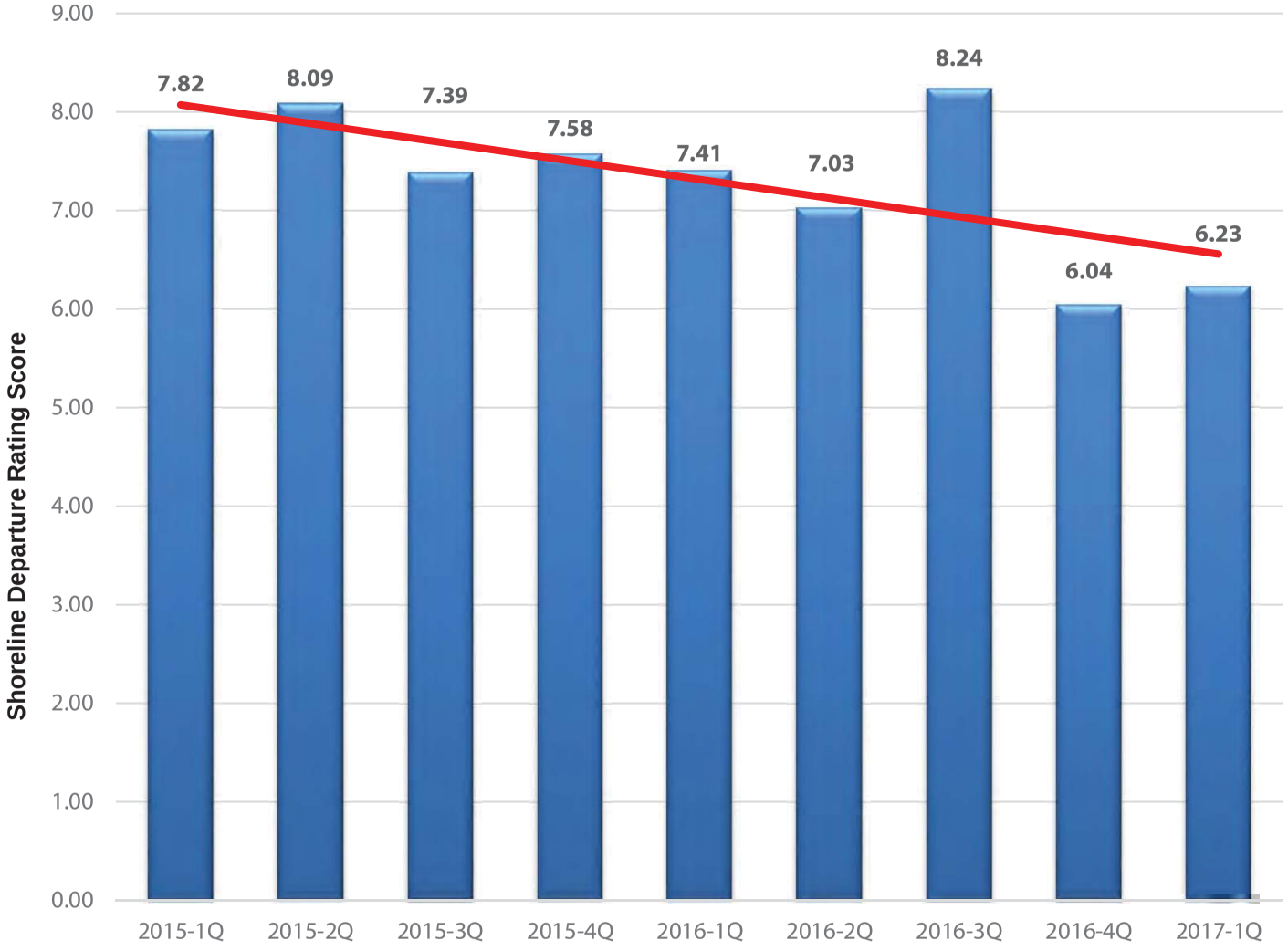
Bottom 5

Average of Quarterly Averages, Airline Rankings are for top 5 and bottom 5 performers for this category for current quarter, new airlines to top and bottom 5

Shoreline Departure Rating



Shoreline Departure Rating Averages

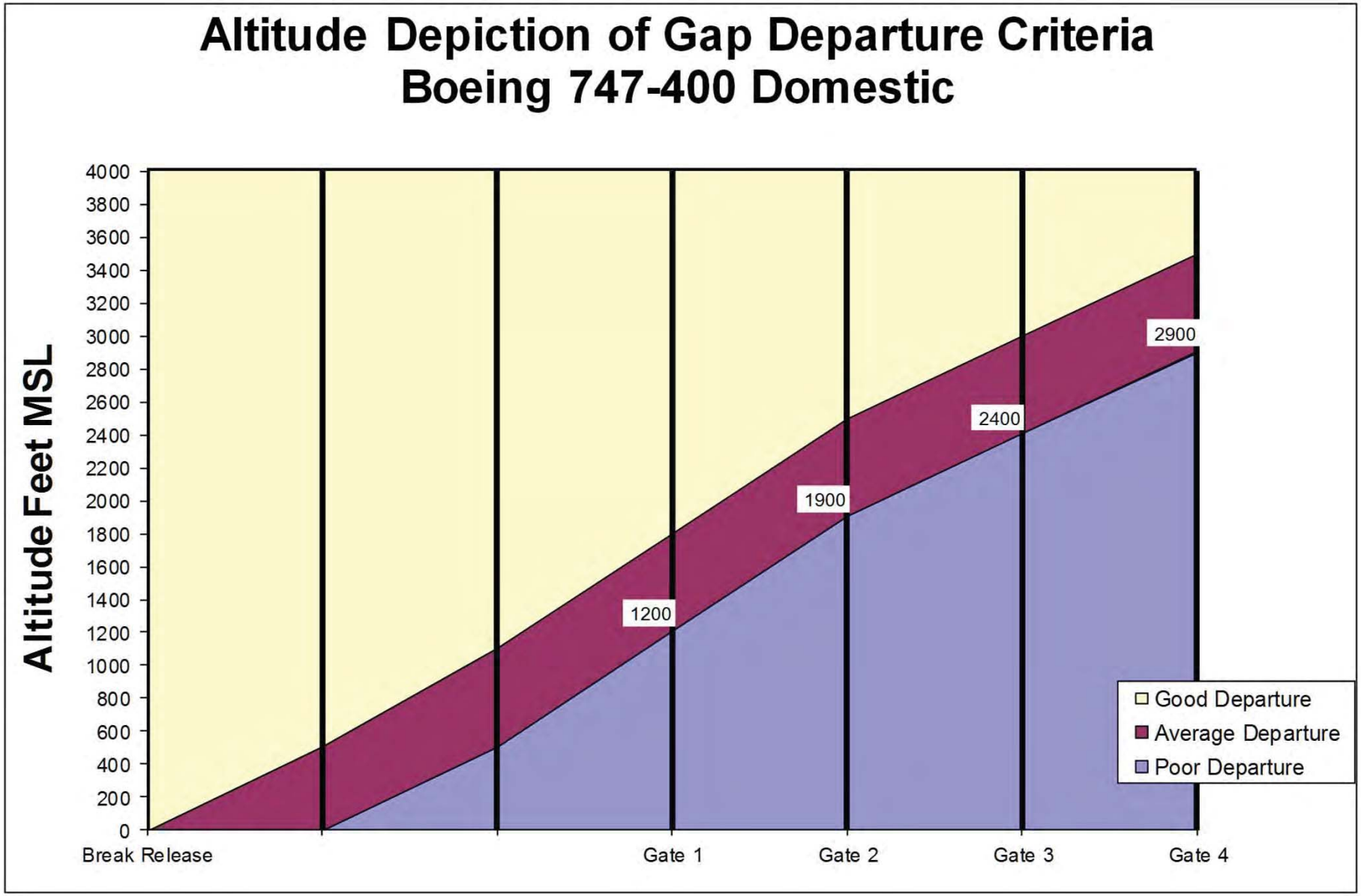


Top 5

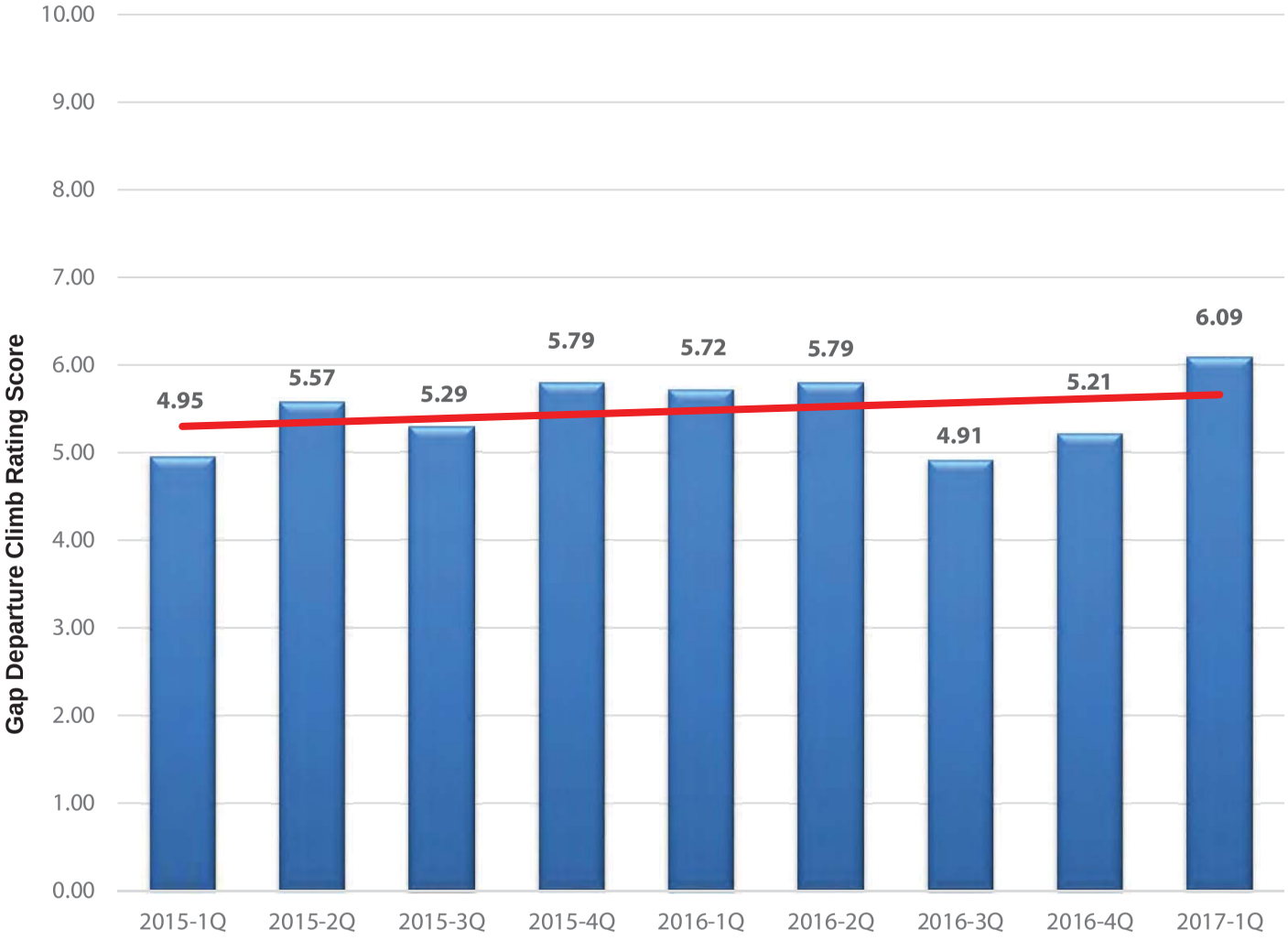
Bottom 5

Average of Quarterly Averages, Airline Rankings are for top 5 and bottom 5 performers for this category for current quarter, new airlines to top and bottom 5

Gap Departure Rating



Gap Departure Climb Rating Averages



Top 5

volaris

KLM Royal Dutch Airlines

virgin atlantic

WOW air

AIR INDIA

Bottom 5

Aer Lingus

American Airlines

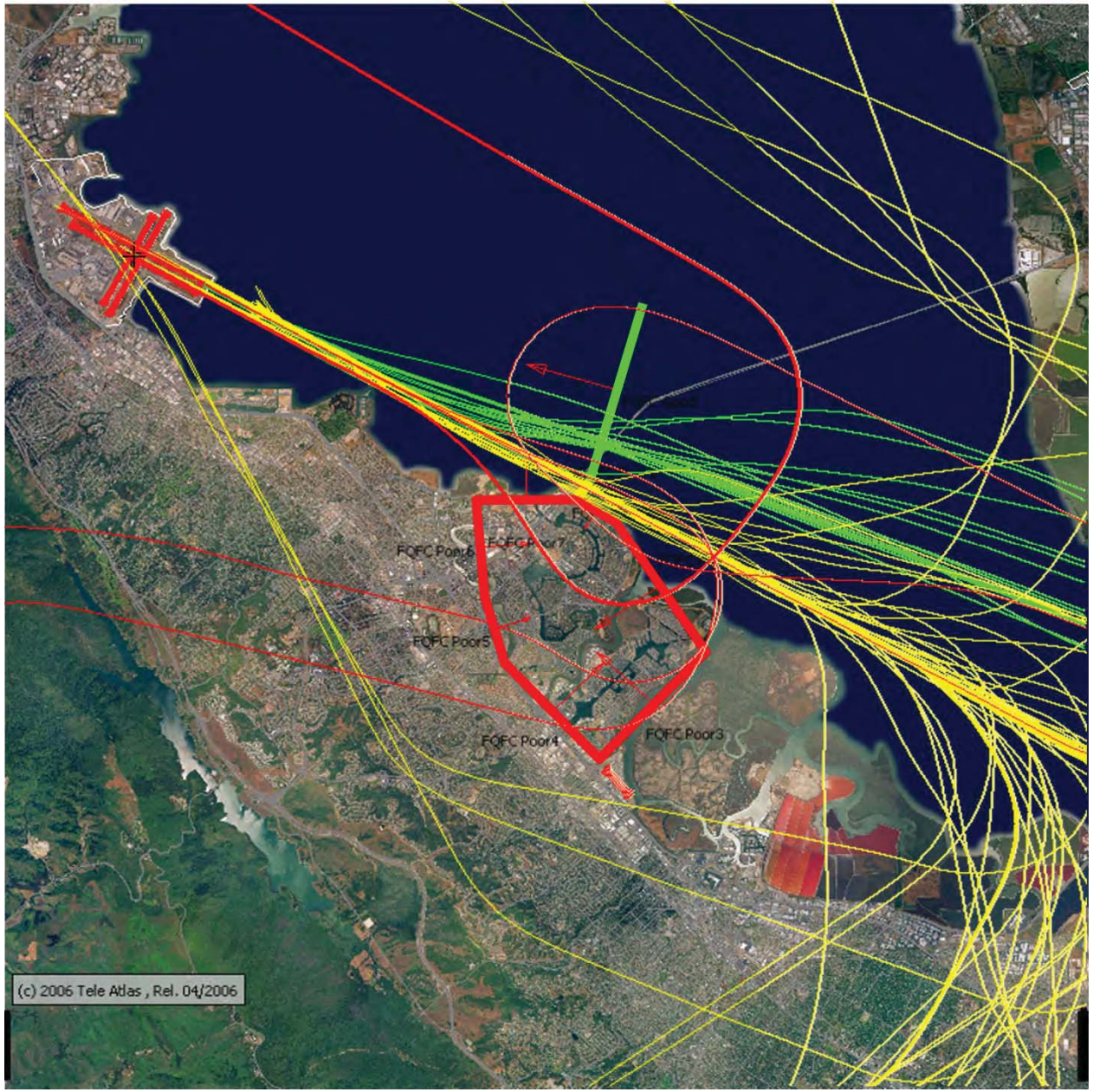
FRONTIER AIRLINES

TURKISH AIRLINES

KALITTA AIR

Average of Quarterly Averages, Airline Rankings are for top 5 and bottom 5 performers for this category for current quarter, new airlines to top and bottom 5

Foster City Arrival Rating

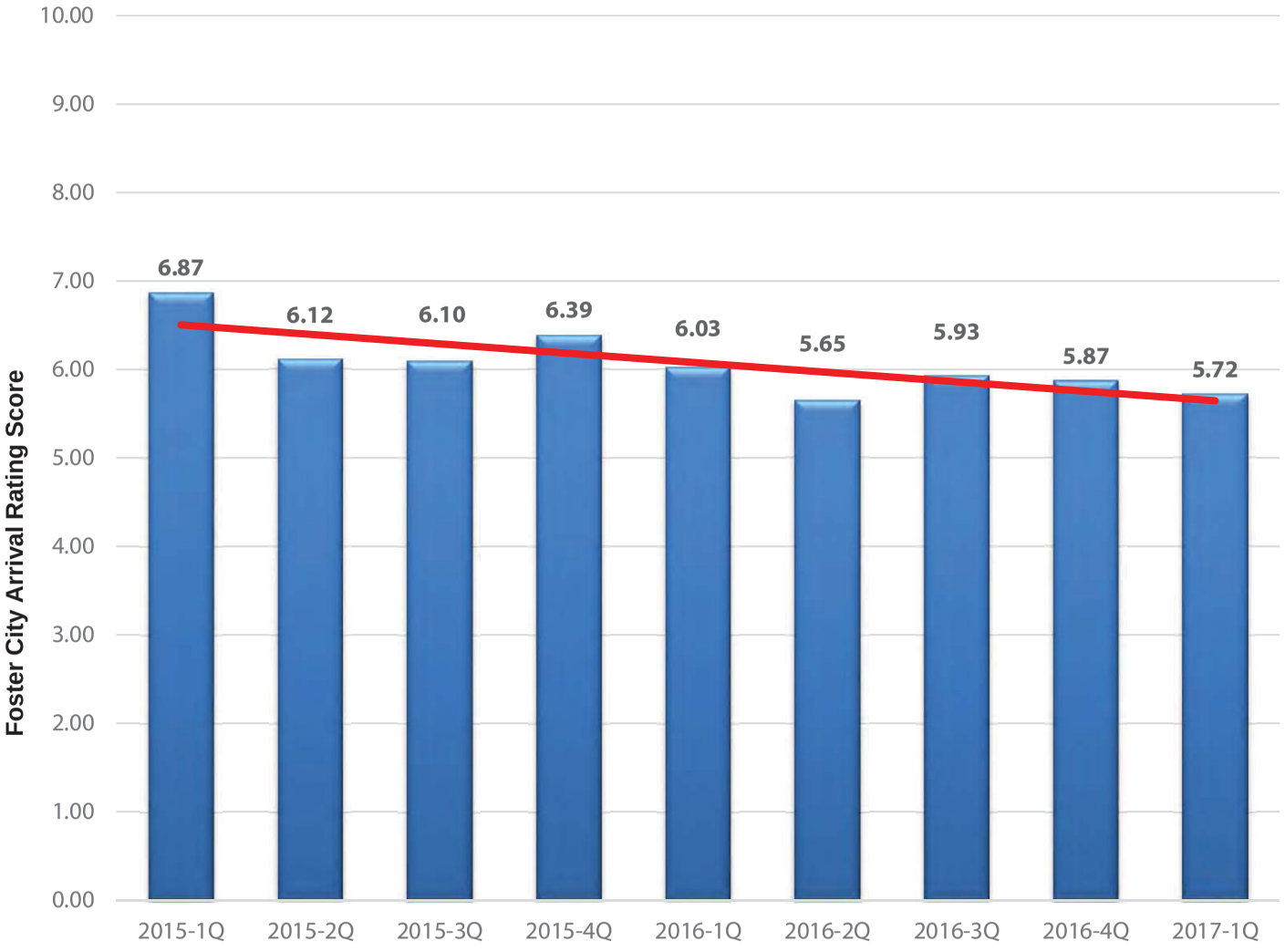


Good (+2 points)

Marginal (+1 points)

Poor (0 points)

Foster City Arrival Rating Averages



Top 5

Bottom 5

Average of Quarterly Averages, Airline Rankings are for top 5 and bottom 5 performers for this category for current quarter, new airlines to top and bottom 5

Woodside
Aircraft Noise Monitoring

Prepared by San Francisco International Airport
Aircraft Noise Abatement Office
Technical Report #042017-969

1st Quarter 2017

April 2017

Table of Contents

Executive Summary

The San Francisco International Airport (SFO) Aircraft Noise Abatement Office conducted aircraft noise monitoring in Woodside to determine the noise level within the community from aircraft operations at SFO. The monitoring location is at an airway facility that provides a fixed ground navigational aid used that commercial and general aviation pilots use to guide their aircraft. The monitoring was made possible with the assistance of the Federal Aviation Administration (FAA). The overall average daily noise level from all aircraft was 49dBA CNEL. The Community daily noise level was 64dBA CNEL. Noise from all aircraft over this location increased the total average daily noise level by 0.5dBA. SFO aircraft attributed 61% of all aircraft noise events over Woodside community.

Community and SFO Operations

Oceanic Arrivals destined to SFO and Oakland Intl Airport (OAK) typically fly over Woodside community with flight traffic crossing over a fixed ground radio beacon known as a VHF Omni Directional Radio Range (VOR). The Woodside VOR is located 1 mile west of Highway 84 off of Skyline Boulevard. Aircraft track to the Woodside VOR navigational aid which guide airplanes through the National Airspace System (NAS). VOR stations are gradually being decommissioned by the FAA as they incorporate more satellite based navigation procedures in the NAS.

Advances in Global Positioning Systems allows newer aircraft equipped with latest guidance and navigation technologies to fly Oceanic Tailored Arrivals (OTA). This arrival procedure allows an aircraft to fly a continuous decent from cruise altitude to touching down on the runway. Versus a conventional arrival procedure which requires an aircraft to descend, fly at a leveled altitude, then descend again in a stair-step fashion which can lead to increased use of the engine throttle over noise-sensitive areas. The OTA procedure is typically used during early morning hours when there is less traffic. OTA allows aircraft arriving from the west, over the Pacific Ocean to fly a constant rate of decent, and track the Woodside VOR to the runway. This procedure is quieter, produces less emission as less fuel is burned and increases air traffic efficiency.

In high traffic conditions or inclement weather days, Woodside community may experience more air traffic due to aircraft vectoring (FAA Air Traffic Controller instructs the pilot to fly specific headings), also known as delay vectoring. The headings are not the most direct path to the runways. Reasons why aircraft may be vectored include: adjusting the arrival sequence in order to maintain safe separation between aircraft (and aircraft of different size), maximizing use of available airspace, achieving an expeditious flow of aircraft, avoiding areas of known hazardous weather or known severe turbulence, and maneuvering an aircraft into a suitable position for a visual approach.

During the monitoring period there were wind/weather impacts that required use of reverse flow. Air traffic patterns are used to safely allow aircraft to land and depart airports. The report addresses the consequences of the reverse flow. Non aircraft noise sources include rain, wind and FAA back-up generator. The ambient noise in Woodside during this monitoring period was 57decibels.

Equipment

Woodside aircraft noise monitoring is conducted at the FAA Airway Facility every quarter, for a 14-day measurement period. The measurement period is performed during the same weeks during each quarter. This provides for a sufficient data sample to evaluate the overall noise climate similar to a permanent noise monitor site installation.

The equipment used to measure the sound level was an Environmental Monitor Unit 2200 noise monitor and Type 41DM-2 microphone manufactured by Bruel & Kjaer. The measurements consisted of monitoring the A-weighted decibels (dBA) in accordance with procedures and equipment which comply with International Electrotechnical Commission, and measurement standards established by the American National Standards Institute for Type I instrumentation. The microphone was calibrated prior to the start of the measurement. The monitor was housed in a weatherproof case and powered by a standard exterior electrical wall outlet. The microphone was mounted on a tripod at a height of 7 feet (see Figure 1). The sound levels at the site were continuously monitored, stored on the onboard memory and transferred to a removable memory stick for decoding. The decoded noise data was then processed in the Airport Noise and Operations Management System (ANOMS) for identification, noise to flight track matching and Community Noise Equivalent Level (CNEL) noise metric calculations.

Aircraft Noise Analysis

Noise measurements were taken at the Woodside VOR. This report evaluates 1st Quarter 2017 which consisted of 14 full 24 hour days. The noise monitor measures noise at the pre-defined sound level threshold of 52dBA (day) and 50dBA (night). This means that not every aircraft passing over Woodside VOR creates a noise event. During the monitoring period a total of 1,376 aircraft noise events were recorded of which 817 (59%) correlated to SFO operations (SFO Events) and 560 (41%) correlated to other Bay Area airports (Non-SFO Events). The average aircraft generated Maximum Noise Level (Lmax) was 61dBA, the average Sound Exposure Level (SEL) was 72dBA, and the average aircraft noise event duration was 27 seconds. Table 1 shows these values as daily energy averages together with the event counts (SFO Events, Non SFO Events and Community).

Table 1 - Noise Event

Date	SFO Events[1]	SEL (dBA)[2]	Lmax(dBA)[3]	Non- SFO Event	SEL (dBA)	Lmax (dBA)	Community	SEL (dBA)	Lmax (dBA)
2-1	69	70	60	31	70	60	132	70	59
2-2	17	70	59	53	69	59	334	67	56
2-3	54	74	62	59	74	61	1,053	76	62
2-4	47	72	62	30	72	62	100	67	59
2-5	41	73	62	49	75	66	584	73	61
2-6	136	70	59	53	71	60	1,044	70	58
2-7	56	71	61	28	80	65	769	86	70
2-8	102	75	60	26	71	60	535	80	64
2-9	78	73	60	67	74	61	795	80	64
2-10	82	72	62	35	71	61	245	87	70
2-11	46	69	59	37	72	63	26	63	56
2-12	19	69	60	28	73	64	9	67	57
2-13	27	72	63	30	72	63	19	66	59
2-14	47	71	60	34	71	62	5	65	59
AVG	**58**	**72**	**61**	**40**	**73**	**62**	**401**	**73**	**61**

[1] SFO Events are: Single SFO Aircraft, Multiple SFO Aircraft, Simultaneous SFO and Non-SFO Aircraft, and Simultaneous Community and SFO Aircraft.
[2] SEL - Sound Exposure Level of a noise event is measured over time between the initial and final points when the noise level exceeds a predetermined threshold and its energy is compressed into one second.
[3] Lmax - The maximum noise level is a measurement of the peak level of a noise event.

Table 2 – Daily SEL Comparison

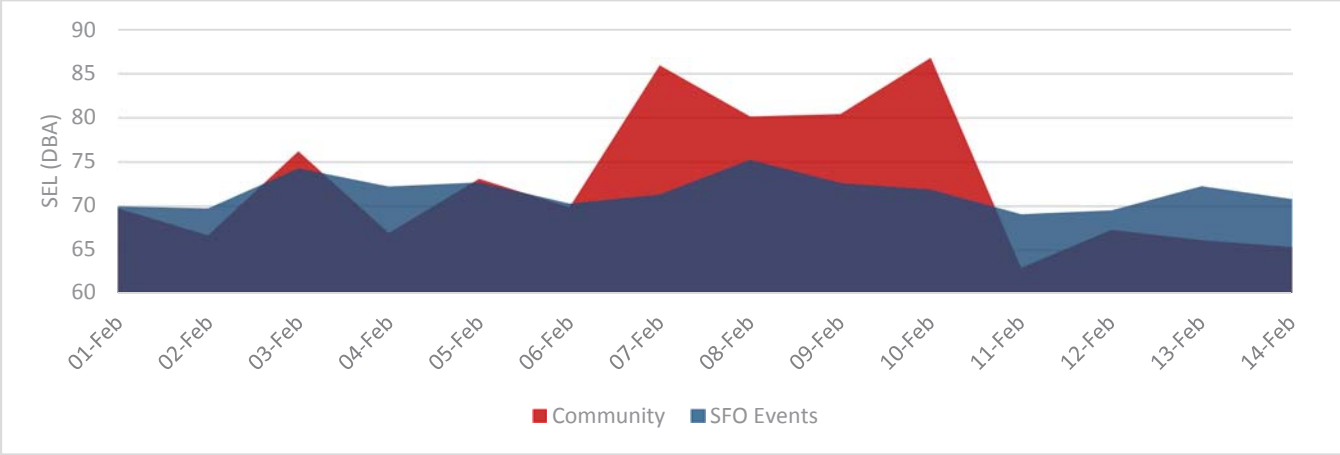


Table 2 shows a graphic comparison between the SEL of SFO Events and SEL of Community Events. For example, on February 11th, SFO aircraft events were on average 6dBA louder than the Community Events. While SFO Events were louder the ratio between the average amount of SFO Events and Community Events also varied (See Table 1). There were approximately twice as many SFO Events (46) than community events (26).

Table 3– SFO Events by Hour of the Day

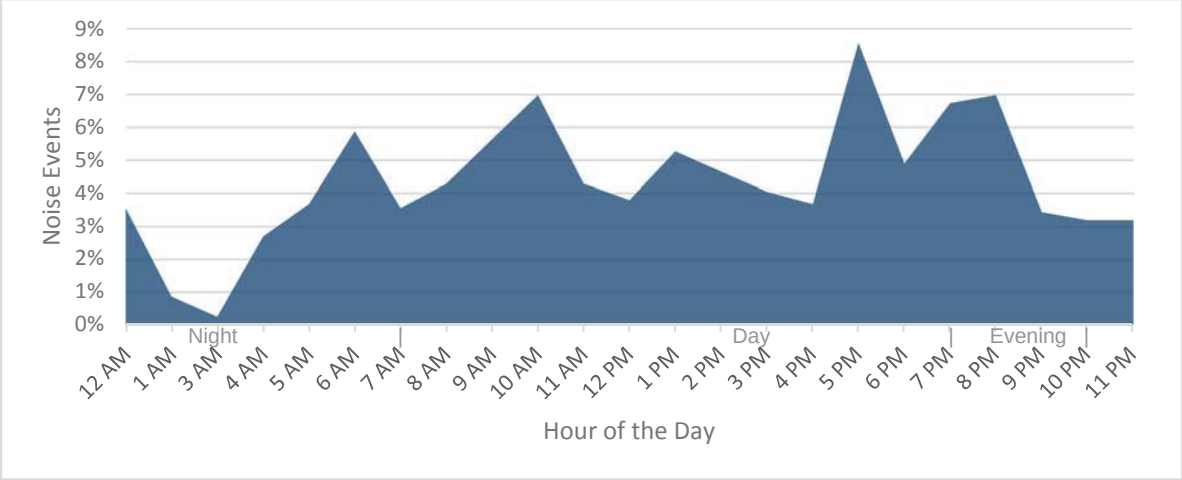
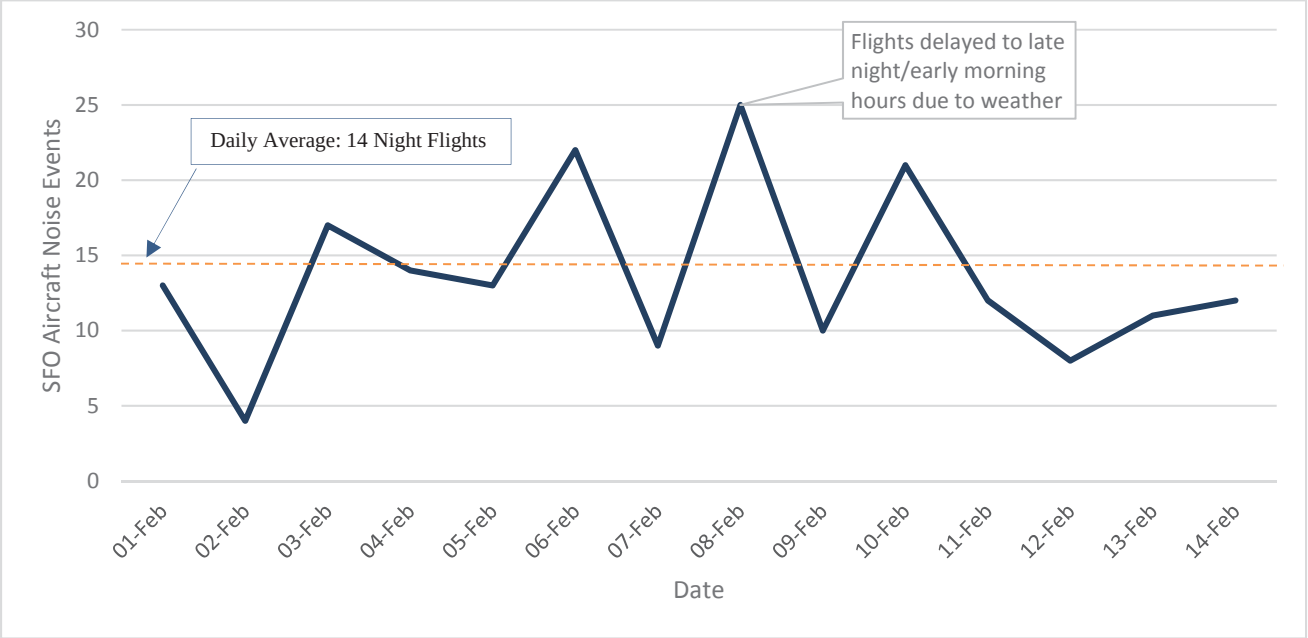


Table 4 – SFO Events by Daytime, Evening and Nighttime hours

SFO Aircraft Noise Data (Single Noise Events)			Lowest (dBA)	Highest (dBA)	Average (dBA)
Day (7:00 am- 7:00 pm)	487 events **60 %**	LMax	51	76	58
		SEL	53	90	68
		Duration	1 sec	60 sec	27 sec
Evening 7:00 pm- 10:00 pm)	140 events **17 %**	LMax	52	70	59
		SEL	58	80	70
		Duration	5 sec	60 sec	32 sec
Night (10:00 pm- 7:00 am)	190 events **23 %**	LMax	50	75	57
		SEL	57	84	67
		Duration	5 sec	60 sec	29 sec

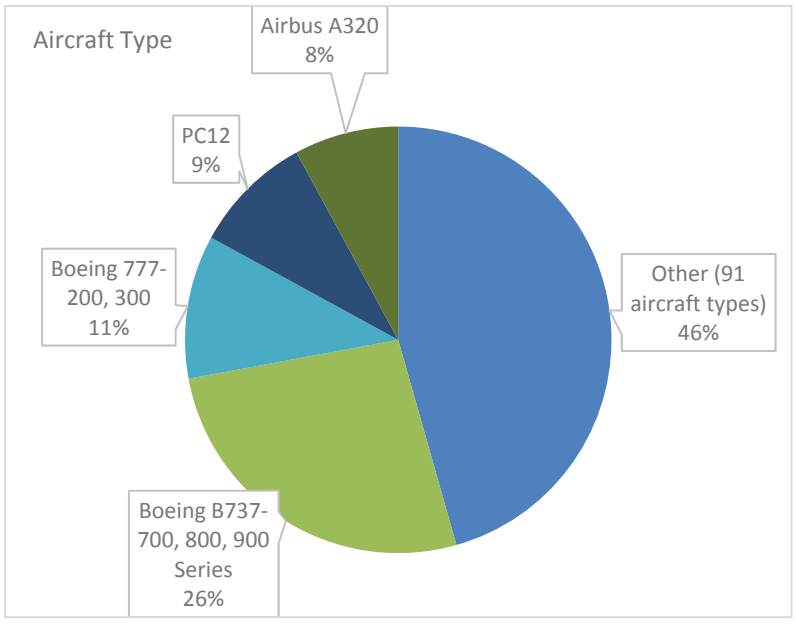
Table 5 – SFO Nighttime Noise Events 10:00 PM – 7:00 AM

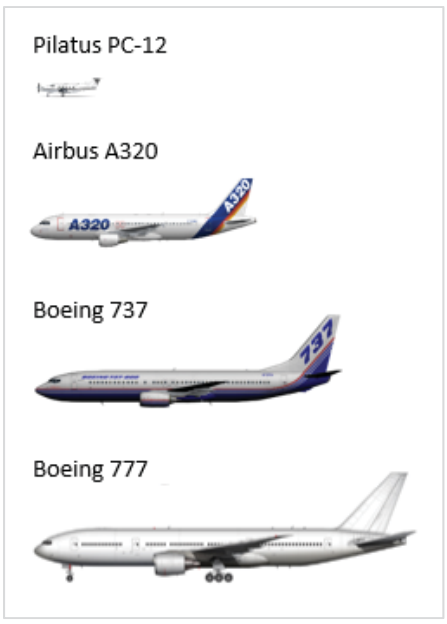


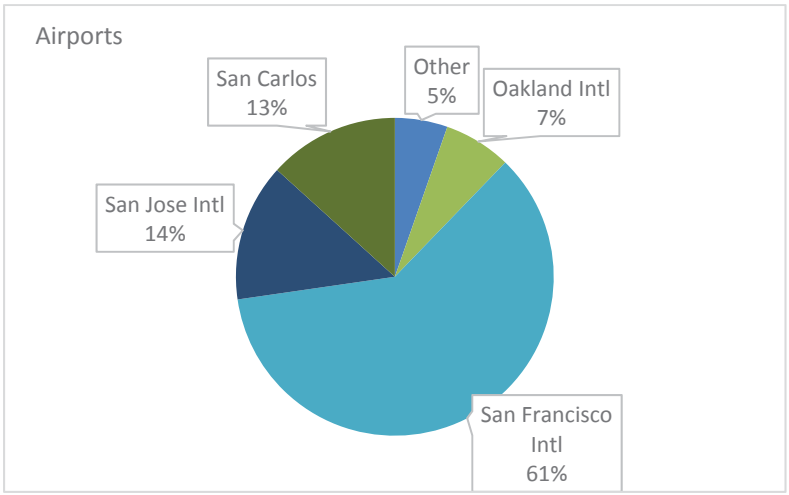
Aircraft Operations

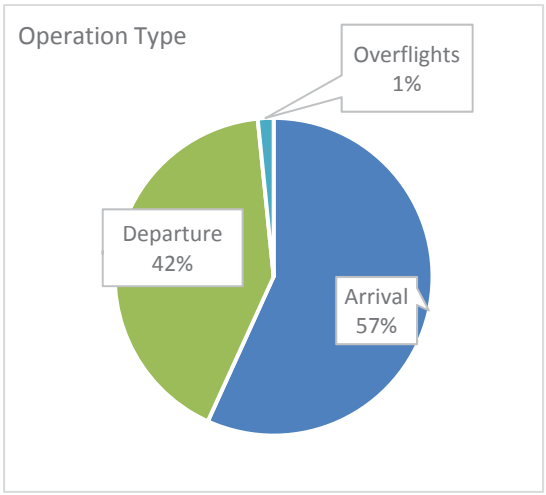
Aircraft operations that created a noise event were studied based on the aircraft type, airport origin, and operation type. SFO air traffic represented 61% of all correlated aircraft noise events, followed by San Jose International Airport (14%) and San Carlos Airport (13%). Moreover, 65% of SFO traffic were arrivals. 95 different aircraft types were tracked; 4 most frequent aircraft types account for 54% of all traffic (Appendix 3- Aircraft Type Reference Sheet). Three of these types are commercial aircraft operating out of SFO. The fourth is a general aviation Pilatus aircraft (PC12), operating out of San Carlos Airport.

Table 6 – All Aircraft Operations



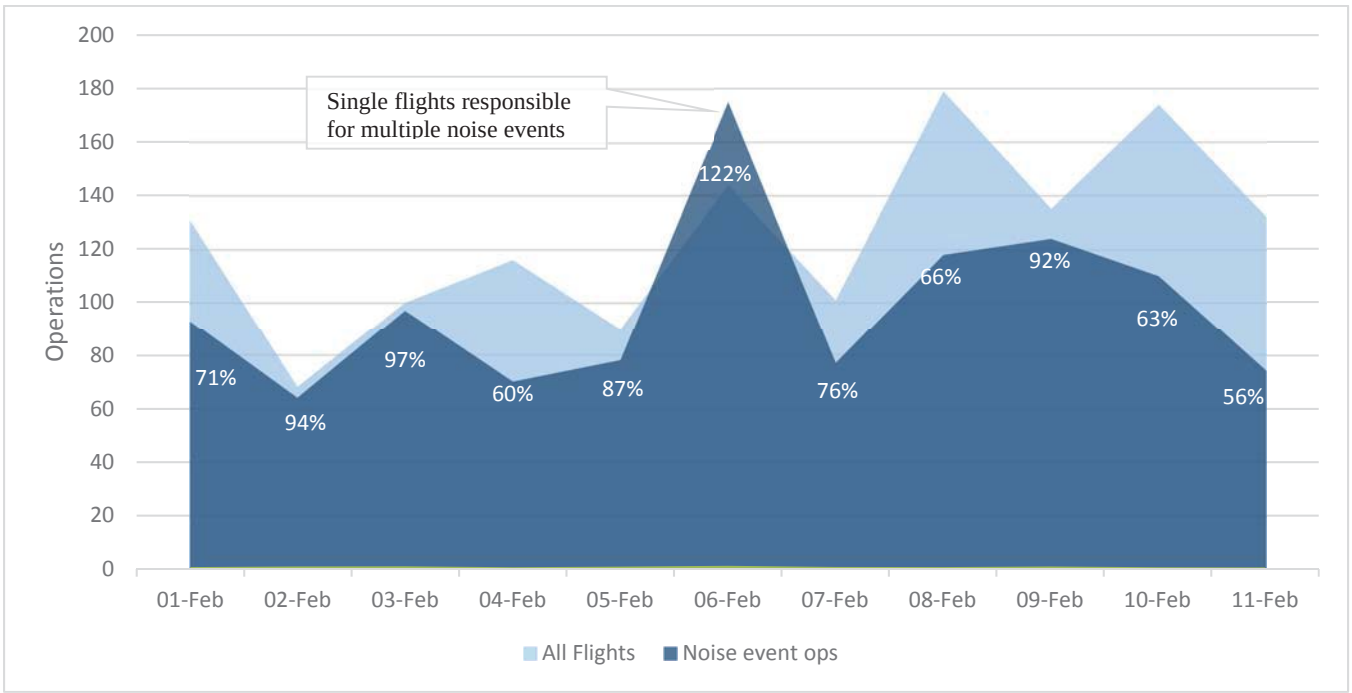




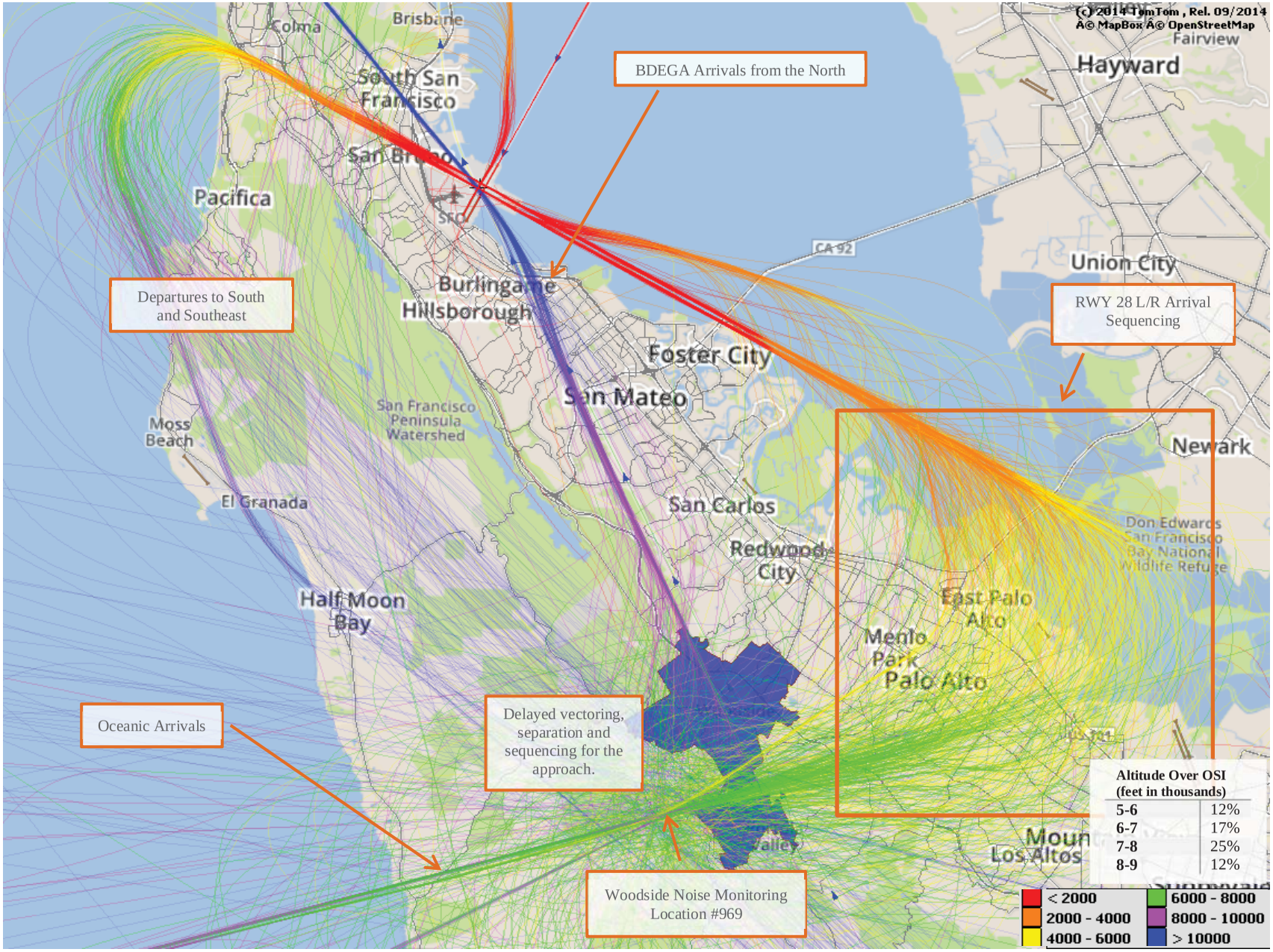


All aircraft which flew within a cylindrical airspace of 2 miles in radius and 15,000 feet in height, known as Point of Closest Approach (PCA); centered on the measurement location were evaluated for this measurement period. A daily average of 131 flights penetrated this airspace. An average of 68% of flights exceeded the threshold used to detect aircraft noise and registered events on the noise monitor. Appendix 3 lists these aircraft by type.

Table 7- All Operations vs. Aircraft Noise Events (%)



SFO Aircraft Noise Event Flights by Altitude



Noise Reporters

Analysis of noise reports includes all Woodside noise reporters and reports during the full monitoring days (Table 9). On average day each of the 7 people reported 32 flights. On February 10th, a day with the most amount of overflights there was only one reporter which submitted 3 noise reports. Nighttime reports between 10:00 PM and 7:00 AM account for 30% of all submitted noise reports. Table 10 depicts percentage of aircraft noise events and noise reports by hour of the day.

Table 9- Noise Reporters

February 2017	Noise Reporters	Noise Reports
1	7	30
2	7	16
3	9	32
4	10	35
5	9	71
6	9	49
7	6	20
8	3	9
9	6	30
10	8	83
11	5	15
12	5	16
13	7	20
14	8	18
Average	**7**	**32**

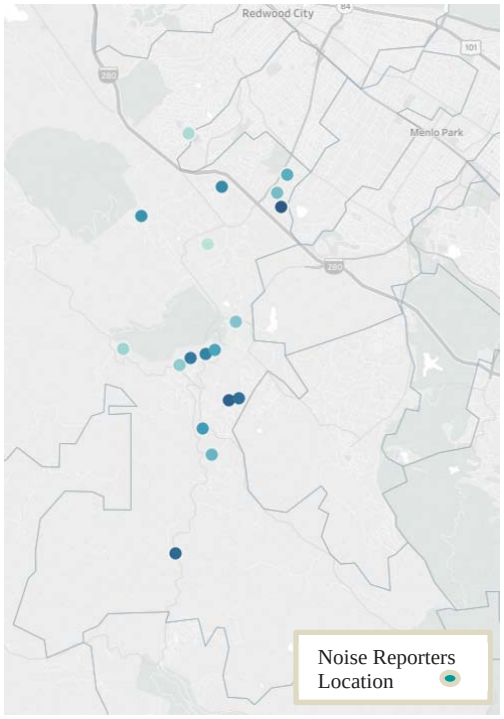
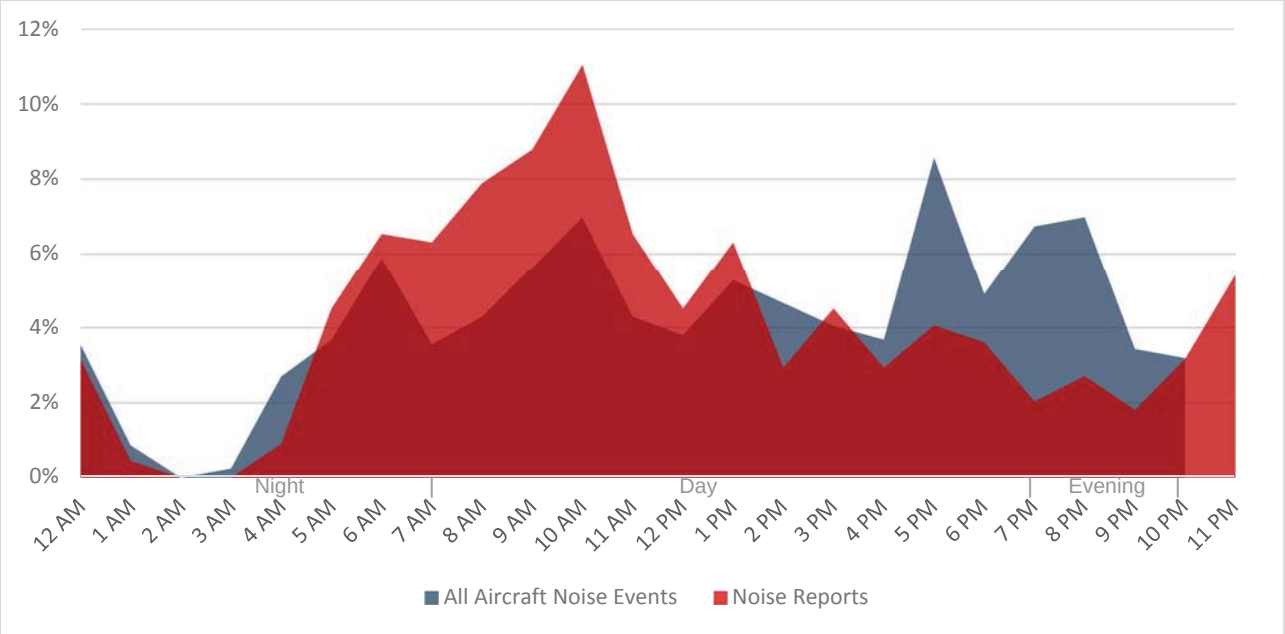


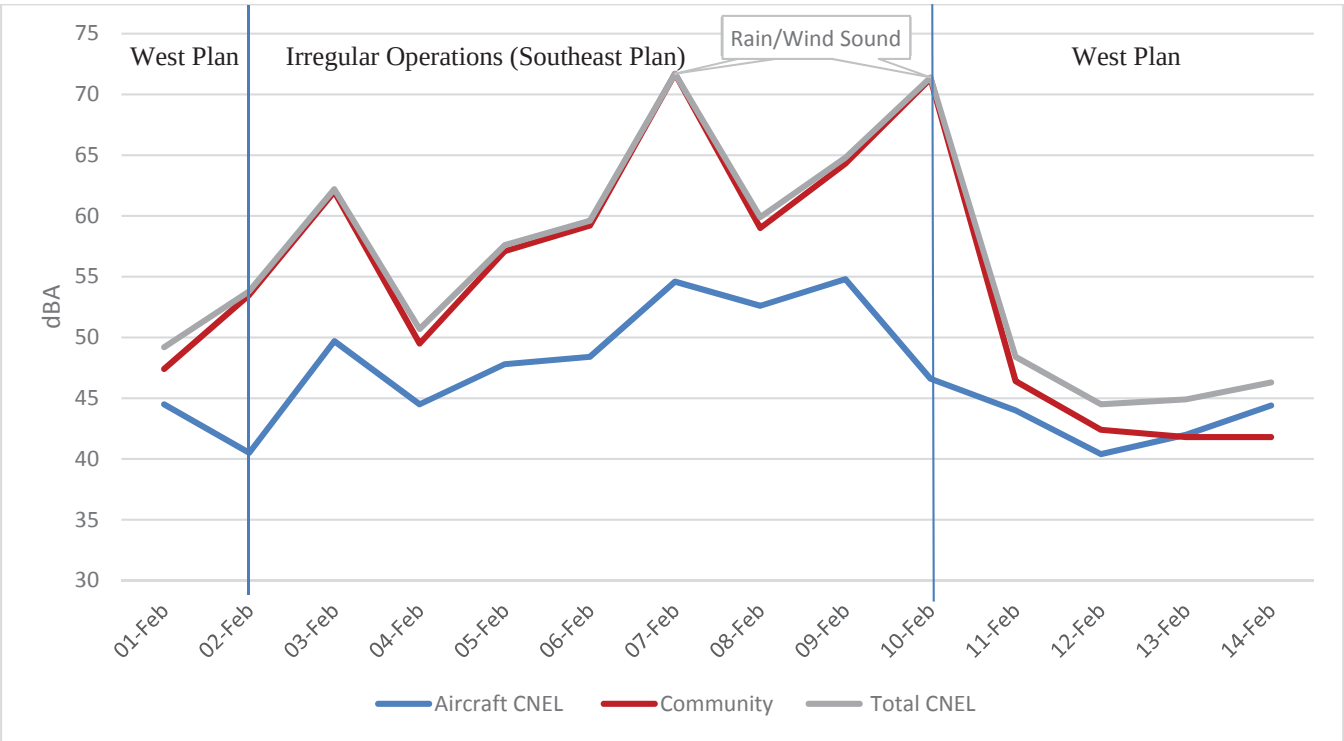
Table 10 –Average Noise Reports by Hour of the Day (%)



Conclusion

Aircraft noise levels were measured at the Woodside VOR, approximately 16 miles away from SFO. Flights above Woodside typically consist of arrivals to Bay Area airports. The computed level for the average **Aircraft CNEL** was 49dBA, the average **Community CNEL** was 64dBA. Overall aircraft noise measurements contribute 0.5dBA additional noise to the **Total** cumulative average noise level of 64dBA CNEL. During this quarter the community saw an increase of flights due to aircraft vectoring as a consequence of inclement weather conditions and flight delays (above average rainfall during the measurement period). More than half of the flights are associated with SFO operations. Air traffic is seasonal so it is important to compare the same yearly quarters. Comparing 1st Quarter 2017 CNEL to 1st Quarters in 2016 aircraft CNEL has increased 7dBA and is 5dBA above the 2-year average. Also noted was increase of SFO events when compared to previous quarters. Single event (72dB) and LMax (61dB) values are consistent with the 2-year average. Community daily CNELs were higher on inclement weather days due to rain/wind sound recorded on the monitor. Aircraft noise levels were also higher due to weather related delay vectoring. Woodside aircraft noise monitoring threshold for noise events is set at a monitor minimum level of 50dB. In view of the fact that the monitoring location in Woodside is located in a quiet suburban community with ambient noise in the low 40s, any aircraft noise above this threshold may become a nuisance for residents.

Table 8 –CNEL



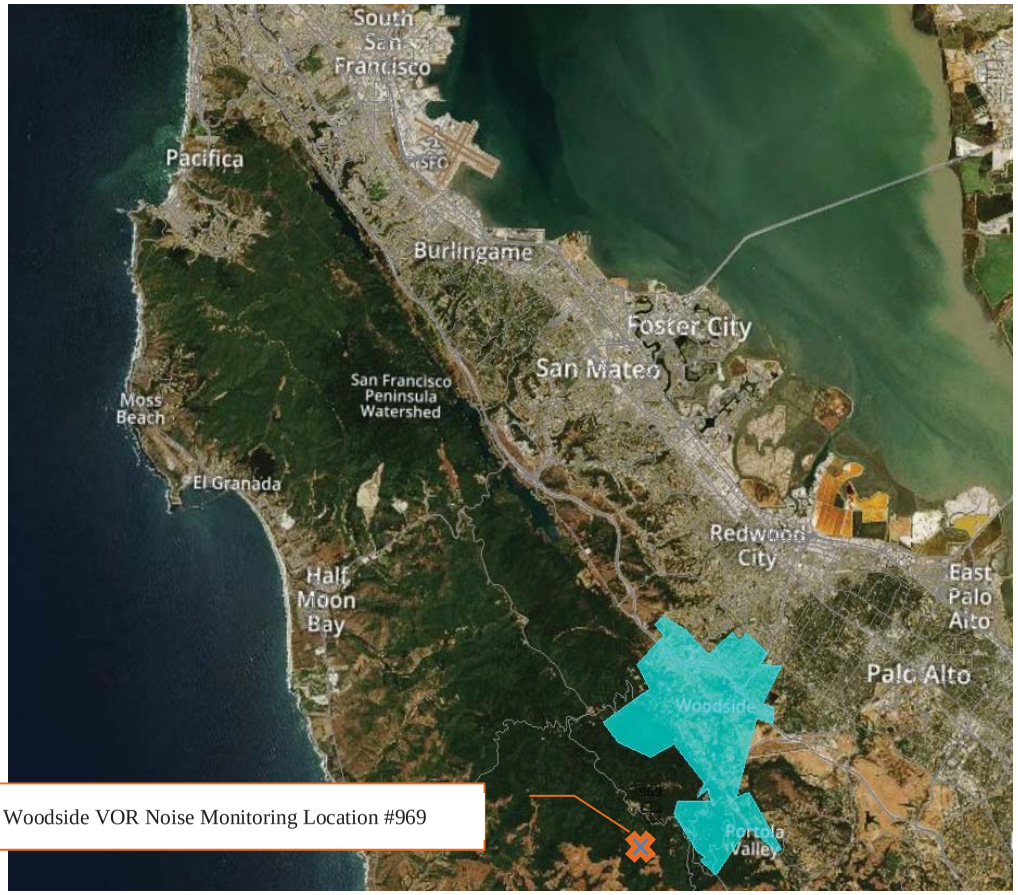
The California Code of Federal Regulations, Title 21, Division 2.5, Chapter 6, paragraph 5012 states, "The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels." Since the average Aircraft CNEL was measured at 49dBA for Woodside, this residential area has an acceptable level of aircraft noise as defined by state law. The extent of the 65dBA CNEL noise impact contour at SFO is shown in Appendix 3. This noise contour was generated using Federal Aviation Administration's Integrated Noise Model (version 7.0d). The Federal Aviation Administration accepted this map as part of the Noise Exposure Map update under Federal Aviation Regulations Part 150 on January 29, 2016. The results of the field monitoring validate the extent of the 65dBA CNEL noise impact boundary confirming Aircraft CNEL is less than 65dBA CNEL for this location.

Figure 1 – Woodside Portable Noise Monitoring Comparison Table

	Yearly Quarters	Aircraft CNEL (dBA)	Community CNEL (dBA)	Total CNEL (dBA)	SFO Aircraft Events[1]	SFO SEL (dBA)	SFO Lmax (dBA)
2014	Qtr4	41	49	49	29	71	61
2015	Qtr1	-	-	-	-	-	-
	Qtr2	44	56	56	53	70	59
	Qtr3	42	45	47	29	70	60
	Qtr4	42	49	50	30	71	61
2016	Qtr1	42	54	54	33	71	62
	Qtr2	44	47	49	43	71	61
	Qtr3	43	52	52	30	70	59
	Qtr4	-	-	-	-	-	-
2017	Qtr1	49	64	64	58	72	61
Average		**44**	**56**	**57**	**38**	**71**	**61**

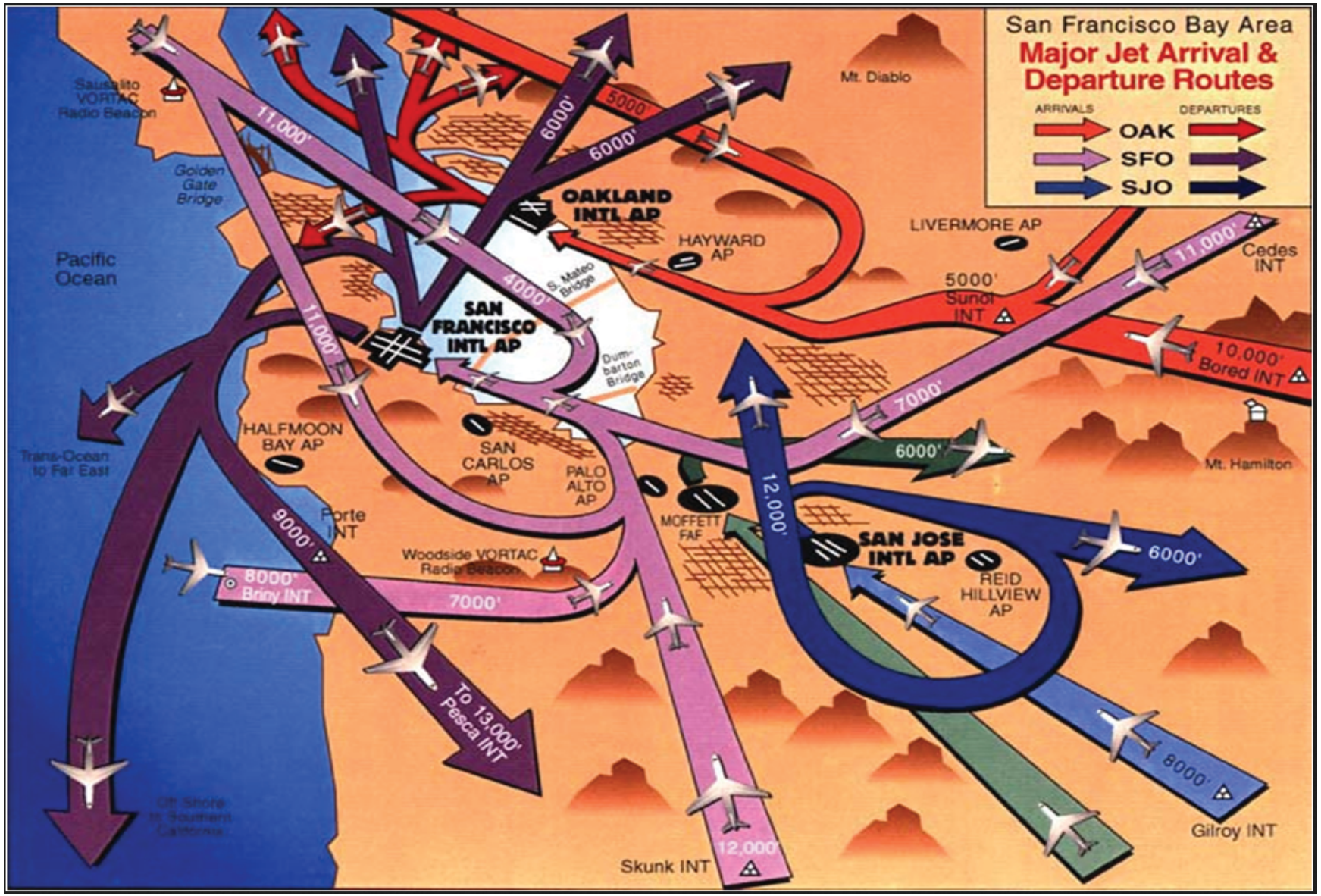
[1] Quarterly Daily Average

Figure 2 – Microphone mounted on tripod and Monitor at the Woodside VOR and Monitoring Location #969 at Woodside (blue zone)



Appendix 1 – San Francisco Bay Area Major Jet Arrival and Departure Routes

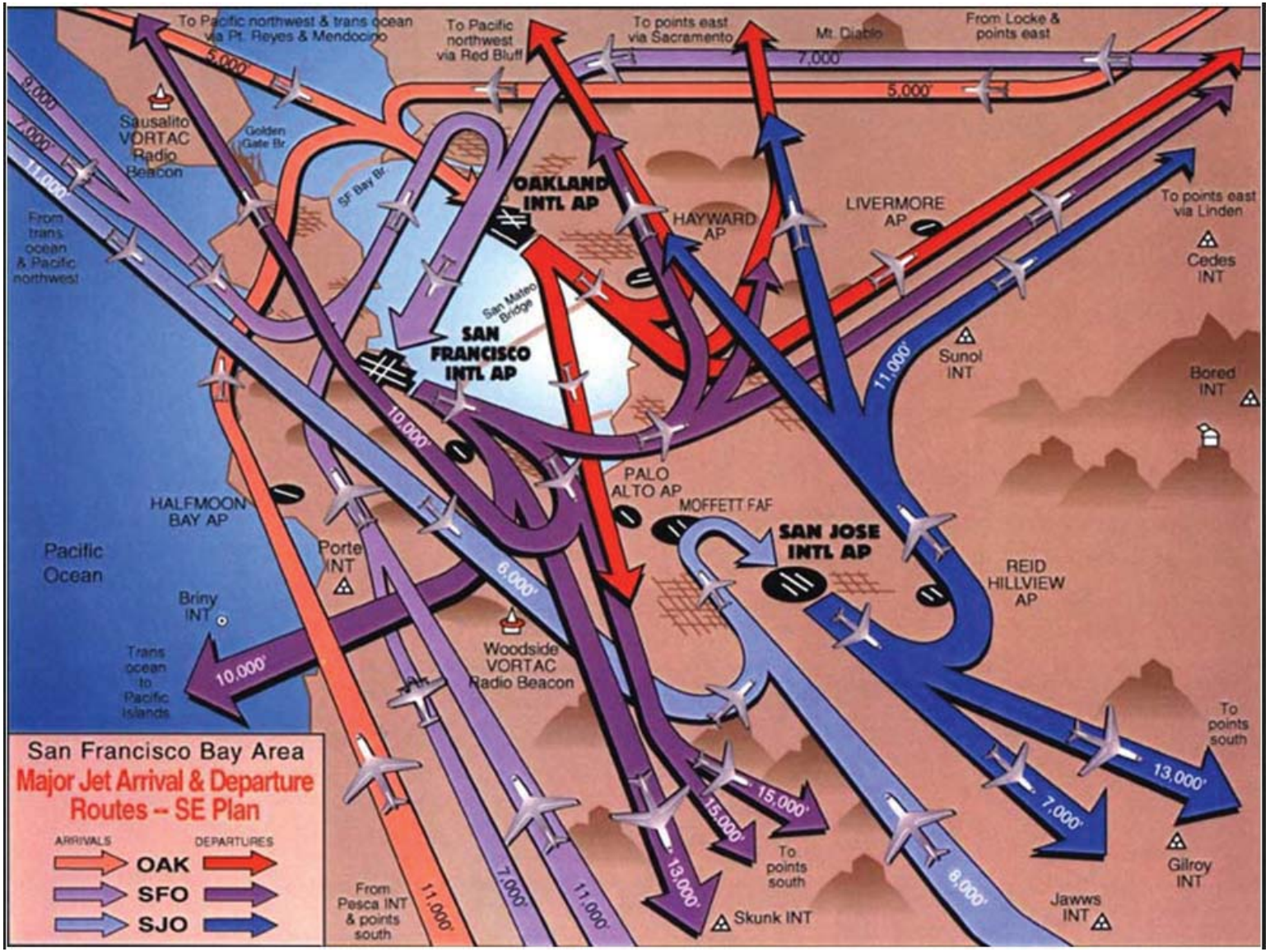
West Flow Plan



Note: Image not to scale and not all flights paths are shown.

Appendix 1 – San Francisco Bay Area Major Jet Arrival and Departure Routes

Southeast Flow Plan



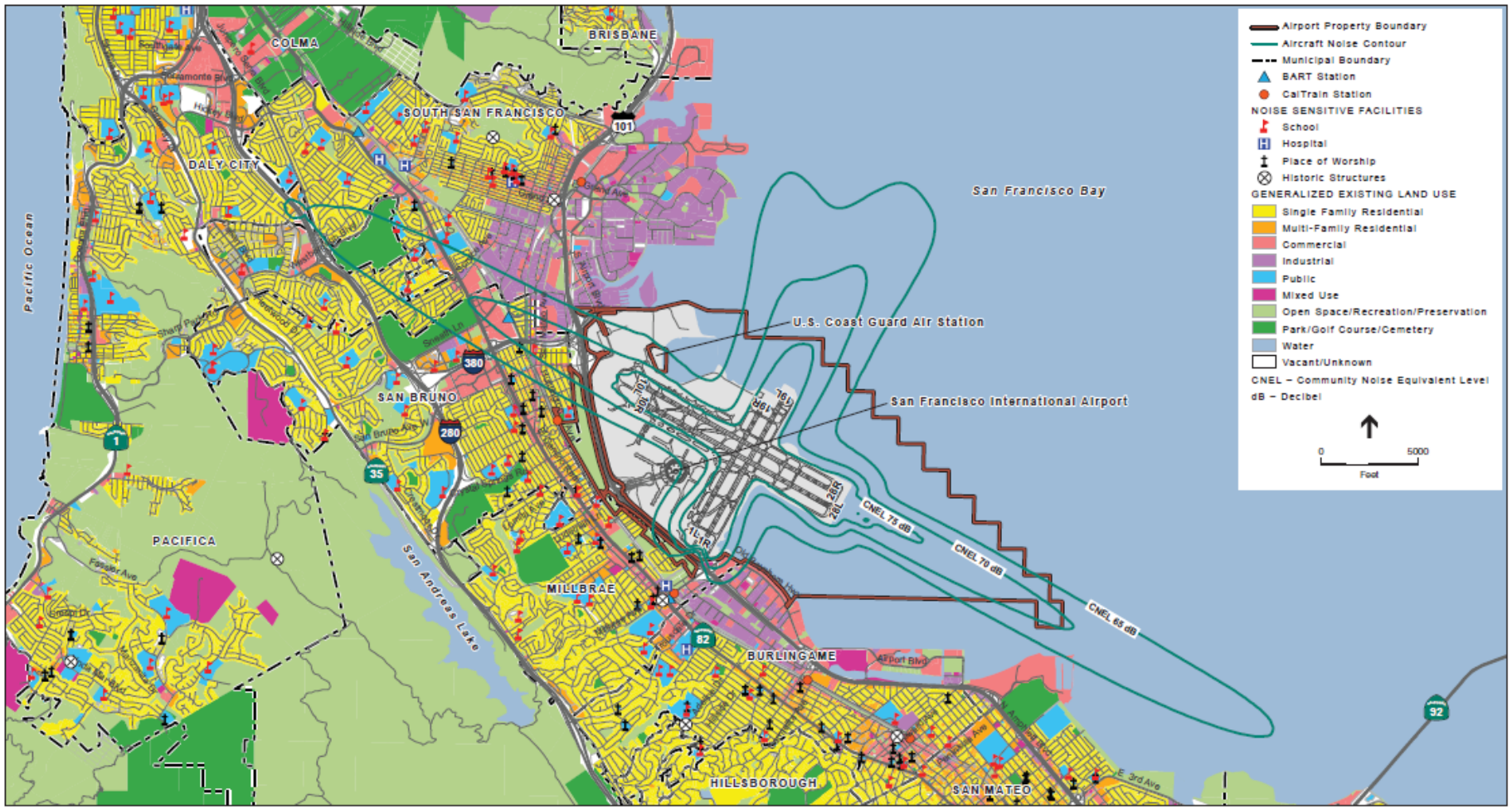
Note: Image not to scale and not all flight paths are shown.

Appendix 2 – Aircraft Type Reference Sheet

Aircraft Code	Description
Wide Body Jet	
A306	Airbus A300-600F
A332	Airbus A330-200
A333	Airbus A330-300
A343	Airbus A340-300
A346	Airbus A340-600
A359	Airbus A350-900
A388	Airbus A380-800
B744	Boeing 747-400
B748	Boeing 747-8
B762	Boeing 767-200
B763	Boeing 767-300
B772	Boeing 777-200
B77L	Boeing 777-200LR
B77W	Boeing 777-300ER
B788	Boeing 787-8
B789	Boeing 787-9
DC10	McDonnell Douglas DC-10
MD11	McDonnell Douglas MD-11
Narrow Body Jet	
A319	Airbus A319
A321	Airbus A321
B733	Boeing 737-300
B734	Boeing 737-400
B737	Boeing 737-700
B738	Boeing 737-800
B739	Boeing 737-900
B752	Boeing 757-200
B753	Boeing 757-300
CRJ2	Bombardier CRJ200
CRJ7	Bombardier CRJ700
CRJ9	Bombardier CRJ-900
DH8D	DeHavilland Dash 8
E135	Embraer ERJ-135
E145	Embraer ERJ-145
E45X	Embraer EMB-145XR
E170	Embraer EMB 170
E75L	Embraer ERJ 175 (Long Wing)
E75S	Embraer ERJ 175 (Short Wing)
MD83	McDonnell Douglas MD-83
Helicopter	
CH7	Kompress
EC35	Eurocopter 135
EC45	Eurocopter 145
EH1	AgustaWestland 101
HELO	Helicopter
General Aviation Aircraft	
BE33	Beechcraft Debonair
BE35	Beechcraft 35 Bonanza
BE36	Beechcraft 36 Bonanza
BE55	Beech 55 Baron
BE58	Beechcraft 58
BE65	Beechcraft 65
C162	Cessna C162
C172	Cessna Skyhawk
C180	Cessna Skywagon
C182	Cessna Skylane
C206	Cessna Stationair
DA40	Diamond DA-40
DA42	Diamond DA-42
LNC4	Lancair 4
M20P	Mooney M-20
M20T	Mooney M-20 (Turbo)
PA27	Piper Aztec
P28A	Piper 28A Cherokee
PA31	Piper PA-31 Navajo
PA46	Piper PA-46 Malibu
RV8	Vans RV-8
S22T	Cirrus SR22 Turbo
SR20	Cirrus SR-20
SR22	Cirrus SR-22
Business Aircraft	
BE9L	Beechcraft King Air
BE20	Beechcraft 200 King Air
BE40	Beech 400 Beechjet
C208	Cessna Caravan
C25B	Cessna Citation CJ3
C25C	Cessna Citation CJ4
C421	Cessna Golden Eagle
C525	Cessna CitationJet/M2
C550	Cessna Citation II
C560	Cessna Citation V
C56X	Cessna Citation Excel
C680	Cessna 680 Citation Sovereign
C750	Cessna 750 Citation X
CL30	Bombardier Challenger 300
CL35	Bombardier Challenger 350
CL60	Bombardier Challenger 600
GL5T	Bombardier Global Express
GLEX	Bombardier Global Express (twin-jet)
GLF4	Gulfstream GIV
GLF5	Gulfstream GV
GLF6	Gulfstream G650
E50P	Embraer Phenom 100
E55P	Embraer Phenom 300
EA50	Eclipse 500
F2TH	Falcon 2000 (Twin Jet)
MU2	Mitsubishi MU-2
P180	Piaggio P.180 Avanti
PC12	Pilatus PC-12
PRM1	Beechcraft/Raytheon Premier 1
TBM7	Socata TBM 700
TBM8	Socata TBM 850
SW3	Swearingen Merlin 3

Wide Body Jet (wide enough for two passenger aisles); **Narrow Body Jet** (wide enough for one passenger aisles); **Business Aircraft** (transportation for small groups of people); **General Aviation Aircraft** (Generally small, propeller-driven aircraft); **Helicopters** (Aircraft operated by rotor blades); **Military** (U.S Military Aircraft).

Appendix 3 – 2014 Noise Exposure Map



SOURCE: ESRI, 2014; San Mateo County Planning and Building Department, 2014; ESA Airports, 2014

SFO FAR Part 150 Noise Exposure Map Report . 120932

Exhibit 5-1
2014 Noise Exposure Map – San Francisco International Airport

Dave Ong (AIR)

From: Dave Ong (AIR)
Sent: Monday, May 15, 2017 12:10 PM
To: 'dcgordon@me.com'
Cc: 'James A Castañeda'; Bert Ganoung (AIR)
Subject: 1Q2017 Aircraft Noise Monitoring Results for Woodside VOR
Attachments: Woodside Aircraft Noise Monitoring 1Q 2017.pdf

Dear Honorable Deborah Gordon,

Please find attached the 1Q2017 Aircraft Noise Monitoring Report for noise measurements take at the Federal Aviation Administration airway facility located in Woodside.

Should you have any questions regarding this report please do not hesitate to call me or Bert Ganoung, Aircraft Noise Abatement Manager at the telephone number below.

Thank you,

David

David Ong
Noise Systems Manager | Planning, Design & Construction
San Francisco International Airport | P.O. Box 8097 | San Francisco, CA 94128
Tel 650-821-5100 | flysfo.com

Facebook | Twitter | YouTube | Instagram | LinkedIn

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Portola Valley
Aircraft Noise Monitoring

Prepared by San Francisco International Airport
Aircraft Noise Abatement Office

1st Quarter 2017

April 2017

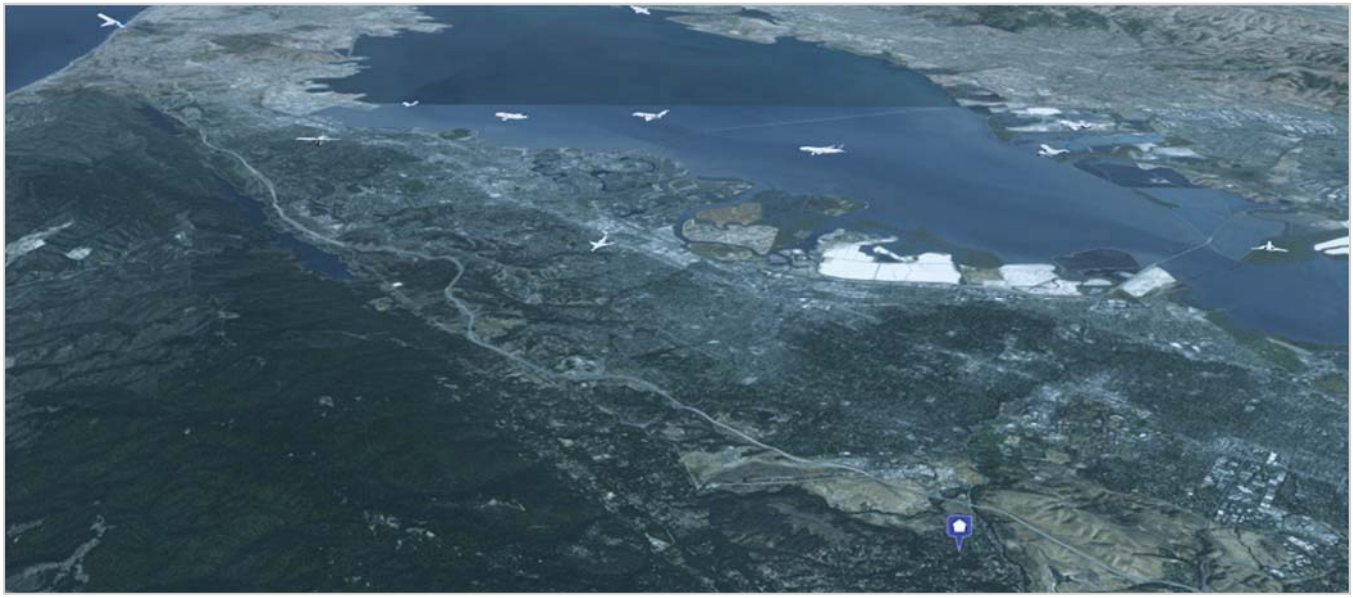
Table of Contents

Executive Summary

The San Francisco International Airport (SFO) Aircraft Noise Abatement Office conducted aircraft noise monitoring in Portola Valley to determine the noise level within the community from aircraft operations at SFO. The monitoring was made possible with the assistance of a Portola Valley resident, located in the northeastern part of Portola Valley. The overall average daily noise level from all aircraft was measured at 43dBA CNEL, the Community daily noise level was 46dBA CNEL. Noise from all aircraft over this location increased the total average daily noise level by 1.6dBA. SFO aircraft account for 69% of all aircraft noise events over the Portola Valley community.

Community and SFO Operations

Aircraft destined to SFO typically overfly Portola Valley during high traffic conditions or inclement weather days with aircraft vectoring. Also known as delay vectoring, is when an FAA (Federal Aviation Administration) Air Traffic Controller instructs the pilot to fly specific headings. The headings are not the most direct path to the runways. Reasons why aircraft may be vectored include: adjusting the arrival sequence in order to maintain safe separation between all aircraft, maximizing use of available airspace, achieving an expeditious flow of aircraft traffic, avoiding areas of known hazardous weather or known severe turbulence, and maneuvering an aircraft into a suitable position to accommodate a visual approach and landing. During the monitoring period there were wind/weather impacts that required use of reverse flow at SFO (Southeast Flow- Appendix 1). The report addresses the consequences of the reverse flow. Non aircraft noise sources include rain and wind. The ambient noise in Portola Valley during the monitoring period was 43 decibels.



Equipment

Portola Valley aircraft noise monitoring is conducted every quarter, typically for a 14-day measurement period. The measurement period is performed during the same time period each quarter. This provides a sufficient data sample to evaluate the overall noise climate similar to a permanent noise monitor site installation. The equipment used to measure the sound level was an Environmental Monitor Unit 2200 noise monitor and Type 41DM-2 microphone manufactured by Bruel & Kjaer. The measurements consisted of monitoring the A-weighted decibels (dBA) in accordance with procedures and equipment which comply with International Electrotechnical Commission and measurement standards established by the American National Standards Institute for Type I instrumentation. The microphone was calibrated prior to the start of the measurement. The monitor was housed in a weatherproof case and powered by two external battery packs. The microphone was mounted on a tripod at a height of 7 feet (see Figure 2). The sound levels at the site were continuously monitored, stored on the onboard memory and transferred to a removable memory stick for decoding. The decoded noise data was then processed in the Airport Noise and Operations Management System (ANOMS) for identification, noise to flight track matching and Community Noise Equivalent Level (CNEL) noise metric calculations.

Aircraft Noise Analysis

Noise measurements were performed in the northeastern part of Portola Valley during the first quarter 2017. Monitoring was analyzed from February 1st through the 4th and February 8th thought 14th. Quarterly monitoring period typically consists of 14 full 24 hour days; in this report we have only 11 complete days due to the limited power supply. The noise monitor measures noise at the pre-defined sound level threshold of 55dBA (day) and 50dBA (night). This means that not every aircraft passing over Portola Valley creates a noise event. During the monitoring period a total of 754 noise events were recorded. There were 590 (78%) aircraft noise events of which 405 (54%) were correlated to SFO operations (SFO Events) and 185 (25%) correlated to other Bay Area airports (Non-SFO Events). The average aircraft generated Maximum Noise Level (Lmax) was 61dBA, the average Sound Exposure Level (SEL) was 71dBA, and the average aircraft noise event duration was 21 seconds. The event counts (SFO Events, Non SFO Events and Community) in Table 1 are presented as daily values. SFO event counts colored green from February 3rd to 10th are high due to delay vectoring as a result of inclement weather and flight delays.

Table 1 - Noise Event Averages by Yearly Quarter

Date	SFO Events[1]	SEL (dBA)[2]	Lmax(dBA)[3]	Non- SFO Event	SEL (dBA)	Lmax (dBA)	Community	SEL (dBA)	Lmax (dBA)
2-1	31	69	59	10	71	62	9	66	57
2-2	15	76	66	5	71	21	8	74	62
2-3	**46**	70	61	10	70	21	84	66	56
2-4	**43**	70	60	14	72	63	-	-	-
2-8	**61**	68	59	9	67	58	-	-	-
2-9	**46**	71	61	18	69	59	48	68	60
2-10	**56**	71	61	12	72	60	5	74	64
2-11	43	72	61	45	73	64	4	68	63
2-12	23	67	57	34	72	64	4	63	59
2-13	19	68	58	7	74	64	-	-	-
2-14	22	71	59	21	72	63	1	58	51
AVG	**37**	**70**	**60**	**17**	**71**	**62**	**8**	**67**	**59**

[1] SFO Events are: Single SFO Aircraft, Multiple SFO Aircraft, Simultaneous SFO and Non-SFO Aircraft, and Simultaneous Community and SFO Aircraft. Counts are presented as Daily average of the monitoring period.
[2] SEL - Sound Exposure Level of a noise event is measured over time between the initial and final points when the noise level exceeds a predetermined threshold and its energy is compressed into one second.
[3] Lmax - The maximum noise level is a measurement of the peak level of a noise event.

Table 2 – SEL Comparison of Quarterly Averages

Table 2 shows a graphic comparison between the SEL of SFO Events and SEL of Community Events. For example, on February 2nd SFO aircraft events were on average 2dBA louder than the Community Events. While SFO Events were louder the ratio between the average amount of SFO Events (15) and Community Events (8) also varied (See Table 1).

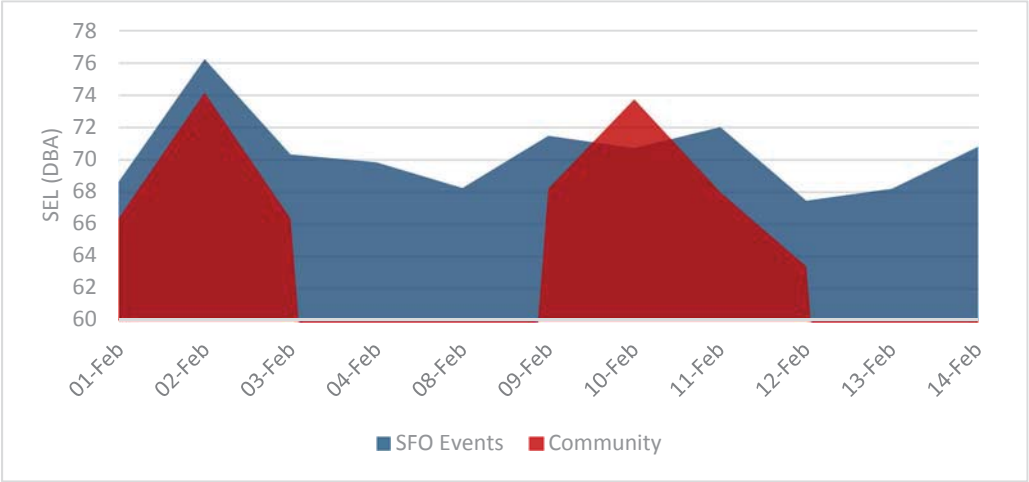


Table 3– Average SFO Noise Events by Hour of the Day

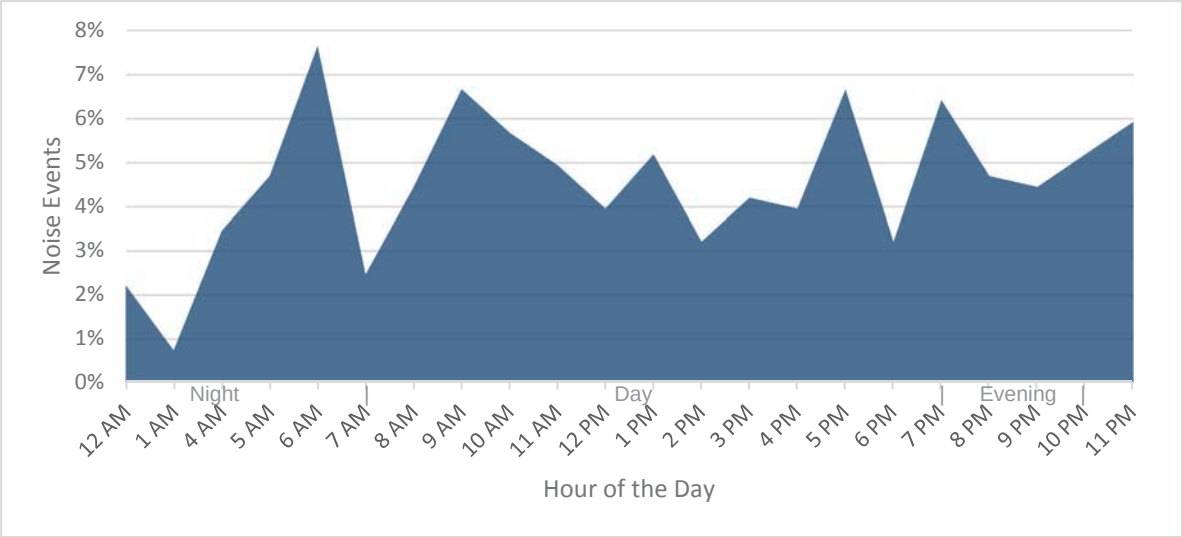
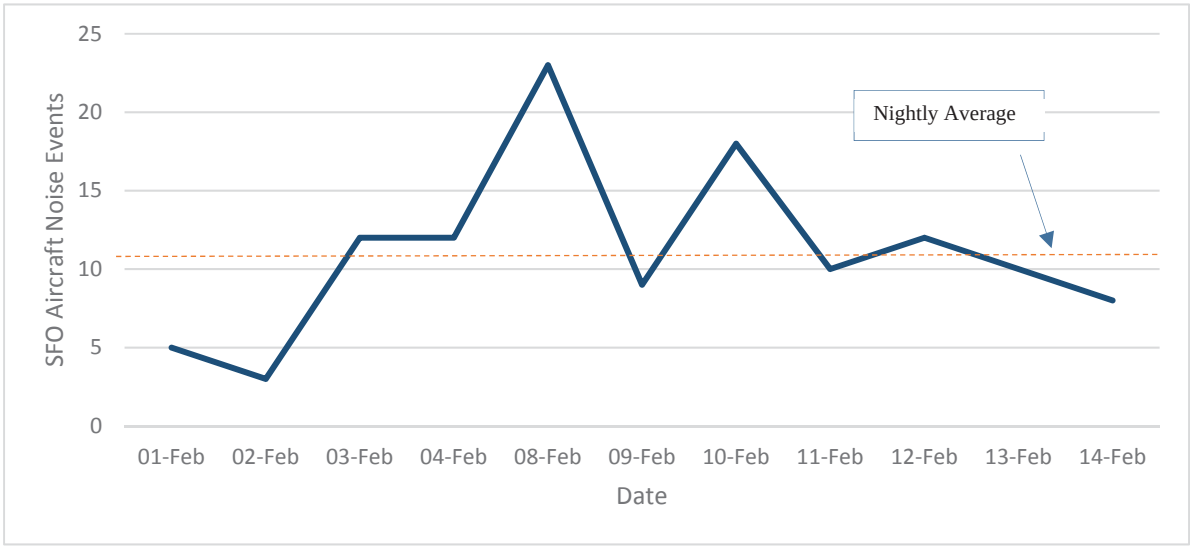


Table 4 – SFO Events by Daytime, Evening and Nighttime hours

SFO Aircraft Noise Data (Single Noise Events)			Lowest (dBA)	Highest (dBA)	Average (dBA)
Day (7:00 am- 7:00 pm)	221 events **55 %**	LMax	55	73	60
		SEL	61	82	69
		Duration	5 sec	57 sec	19 sec
Evening (7:00 pm- 10:00 pm)	63 events **16 %**	LMax	55	70	60
		SEL	60	80	69
		Duration	5 sec	47 sec	12 sec
Night (10:00 pm- 7:00 am)	121 events **30 %**	LMax	50	63	56
		SEL	57	76	66
		Duration	5	53	24

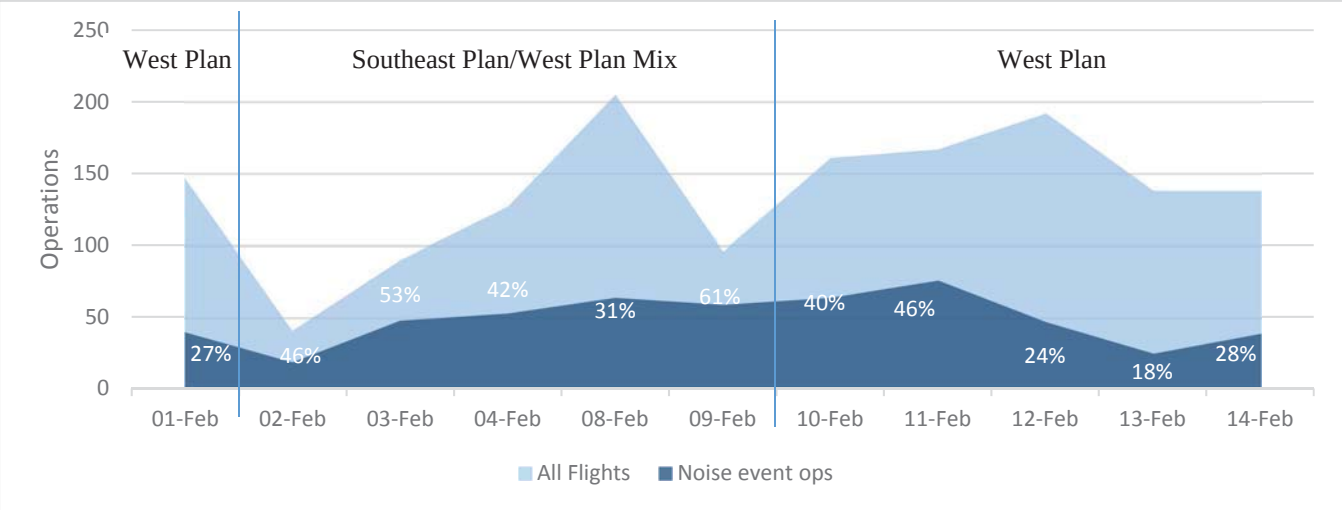
Table 5 – Average SFO Daily Nighttime Noise Events 10:00 PM – 7:00 AM



Aircraft Operations

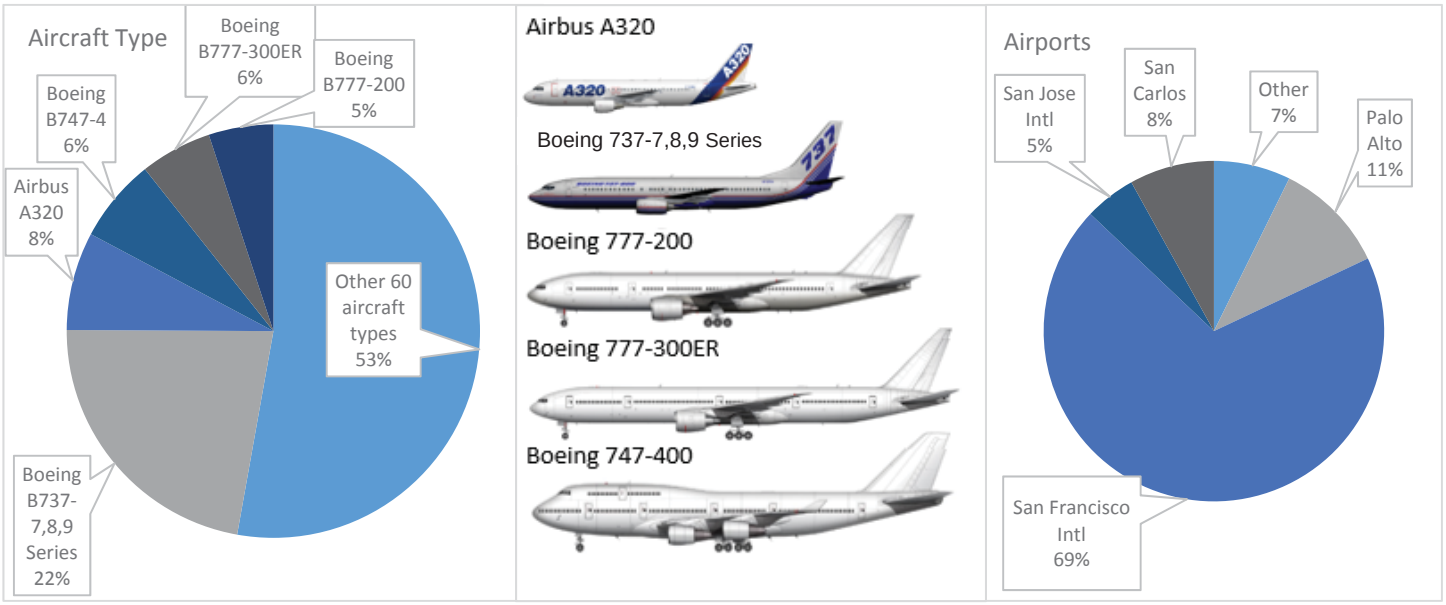
All aircraft which flew within a cylindrical airspace of 2 miles in radius and 15,000 feet in height, known as Point of Closest Approach (PCA); centered on the measurement location were evaluated for this measurement period. A daily average of 137 flights penetrated this airspace. An average of 38% of flights exceeded the threshold used to detect aircraft noise and registered events on the noise monitor. Appendix 3 lists these aircraft by type.

Table 6- All Operations vs. Aircraft Noise Events (%)



Correlated aircraft noise events were studied based on the aircraft type, airport origin, and operation type. SFO air traffic represented 69% of all correlated aircraft noise events, followed by Palo Alto (11%), San Carlos (8%) and San Jose International Airport (5%). Moreover, 68% of traffic were arrivals, 28% were departures and 4% were overflights. 65 different aircraft types (Appendix 3- Aircraft Type Reference Sheet) were tracked; top 5 aircraft types represent almost half of all traffic over Portola Valley.

Table 7 – All Aircraft Operations

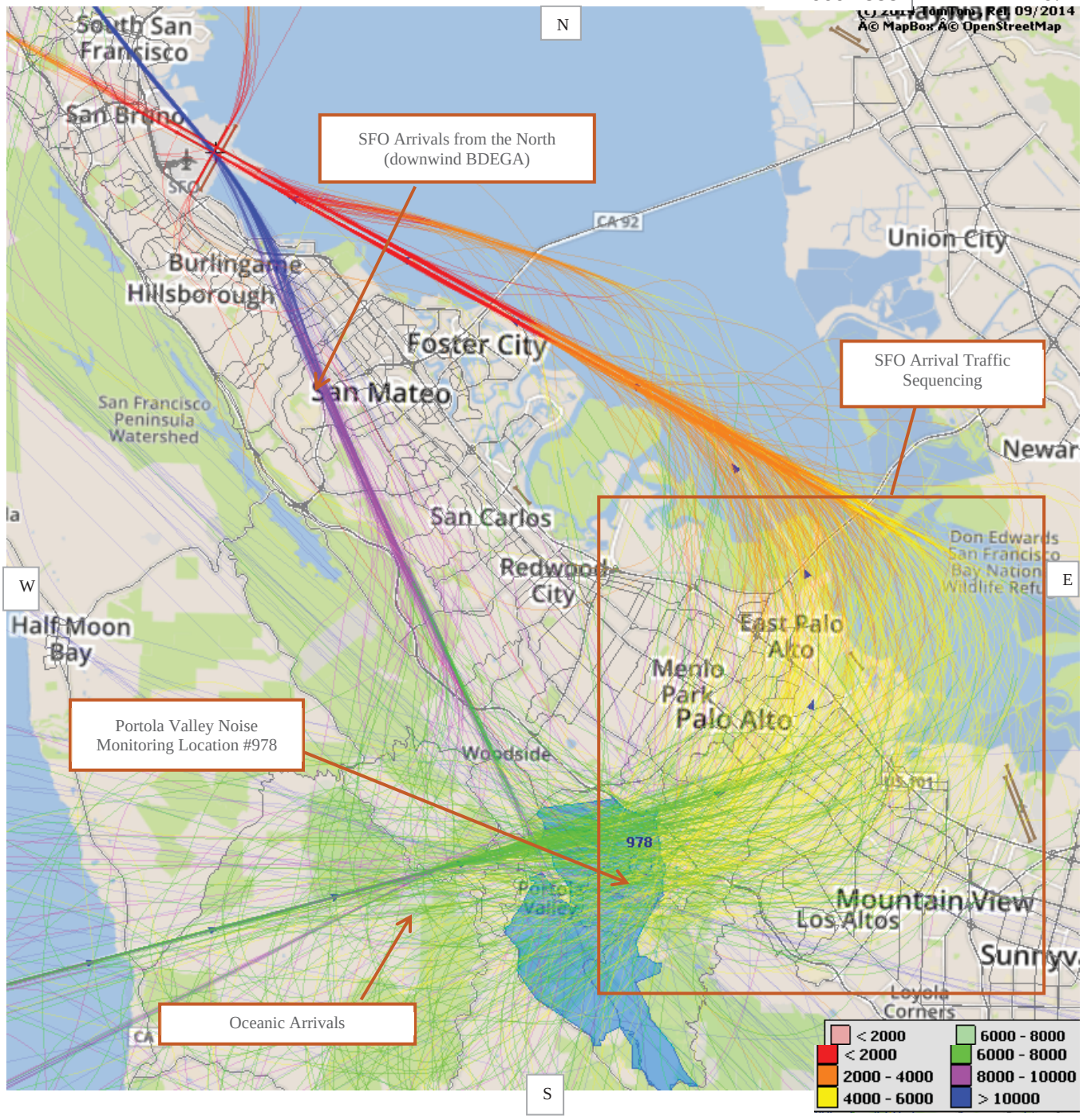


SFO Aircraft Noise Event Flights Altitude

The image below shows only SFO tracks that created a noise event during the monitoring period. Color depicts altitude of the flights in 1000-foot grouping. 60% of SFO aircraft that created a noise event overflew Portola Valley community at 5,000 to 7,000 feet range of altitude, while only 16% were in the 4,000 to 5,000 feet range (see Table 8).

Table 8 – SFO Aircraft Altitude

Altitude (ft)	
4000-4999	16%
5000-5999	34%
6000-6999	25%
7000-7999	6%



Noise Reporters

Analysis of noise reports includes all Portola Valley noise reporters and reports during the full monitoring days (Table 9). On average day each of the 20 people reported 11 flights. On February 8th, a day with the most amount of overflights there was only one reporter which submitted 3 noise reports. Nighttime reports between 10:00 PM and 7:00 AM account for 21% of all submitted noise reports. Table 10 depicts percentage of aircraft noise events and noise reports by hour of the day. During the evening hours there is noticeable spike of noise reports disproportionate with aircraft noise events. All things considered, it seems reasonable to assume that the evening hours are most disturbing to noise reporters.

Table 9- Noise Reporters

February 2017	Noise Reporters	Noise Reports
1	22	242
2	27	86
3	23	182
4	24	365
8	1	3
9	16	215
10	32	265
11	28	342
12	21	222
13	16	143
14	15	247
Average	**20**	**210**

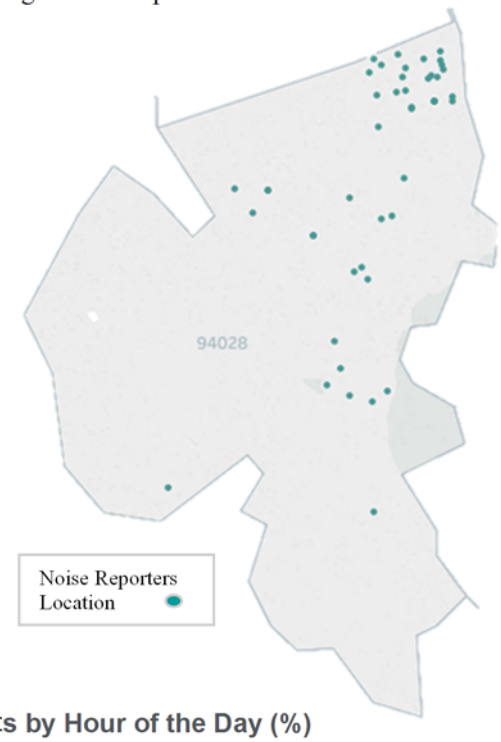
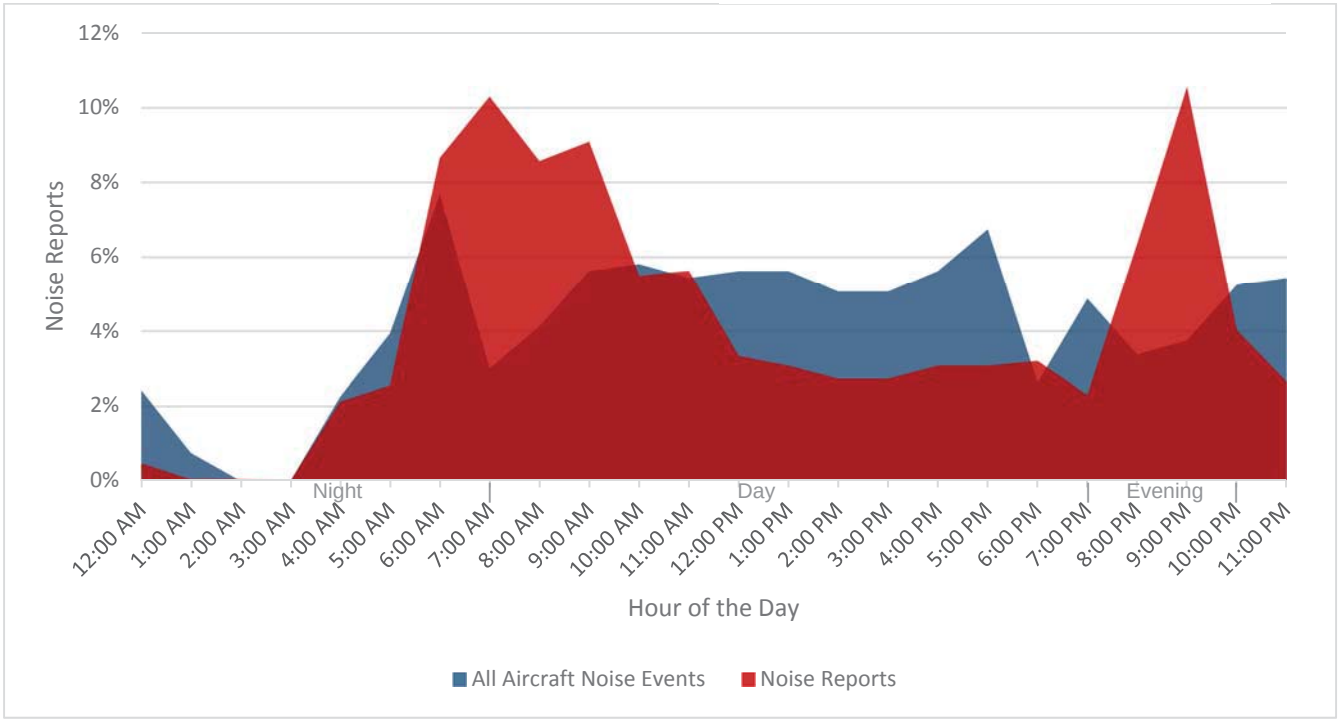


Table 10 –Average Noise Reports by Hour of the Day (%)



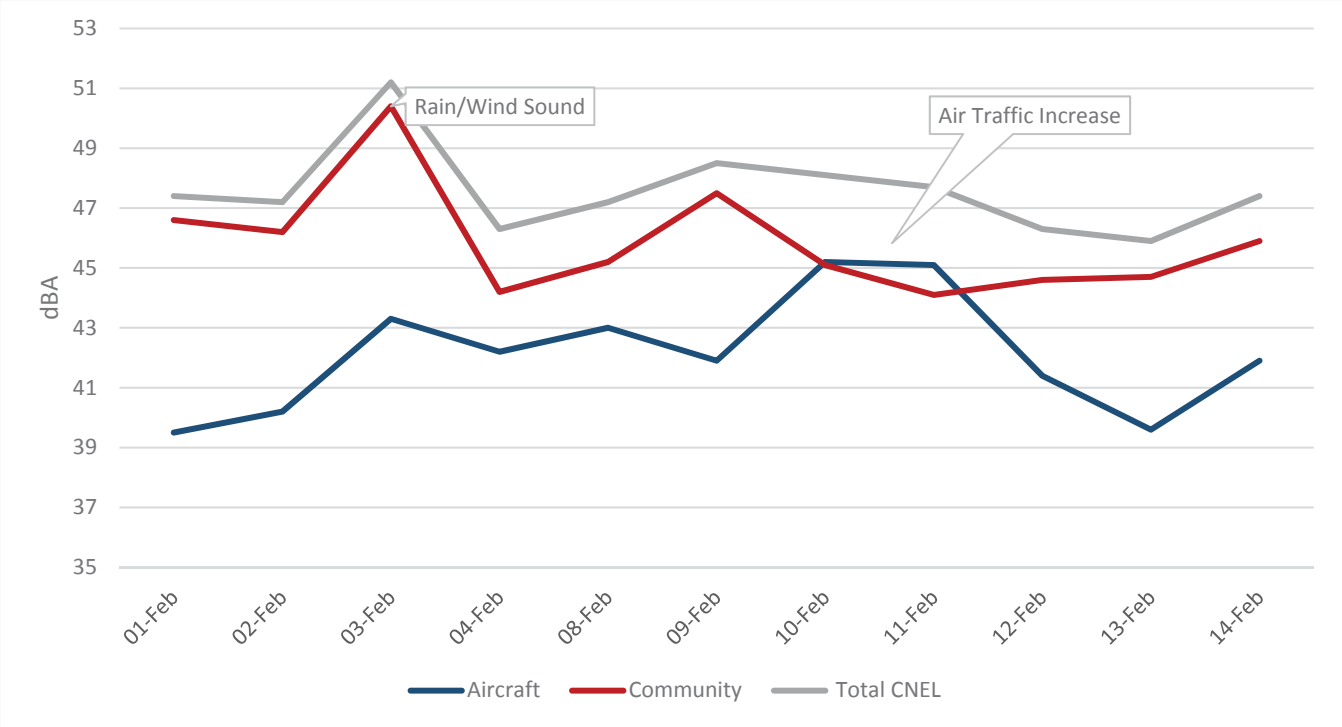
Conclusion

Aircraft noise levels were measured in Portola Valley, a quiet suburban community approximately 16 miles away from SFO. Flights above Portola Valley consist of arrival traffic to the Bay Area airports, SFO accounts for more than half of those flights. During this Quarter community saw increase of flights due to aircraft vectoring as a consequence of inclement weather conditions and flight delays.

The computed level for the average **Aircraft CNEL** was 43dBA, and the average **Community CNEL** was 46dBA. Overall aircraft noise measurements contribute 1.6dBA additional noise to the total cumulative average noise level of 48dBA CNEL. Air traffic is seasonal so it is important to compare the same yearly quarters. Comparing 1st Quarter 2017 CNEL values to 1st Quarters 2015 and 2016 aircraft CNEL has increased by 5dBA and 4dBA respectively and is 2dBA above 2-year average. On an average day there were 10 additional SFO aircraft events during 1st Quarter 2017. Single event (70dB) and LMax (60dB) values are consistent with the 2-year average.

Portola Valley aircraft noise monitoring threshold is set at a monitor minimum level of 50dB. In view of the fact that the monitoring location in Portola Valley is located in a quiet suburban community with ambient noise in the low 50s, consequently any aircraft noise above this threshold may become a nuisance for the residents.

Table 11 –CNEL



The California Code of Federal Regulations, Title 21, Division 2.5, Chapter 6, paragraph 5012 states, “The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels.” Since the average Aircraft CNEL was measured at 43dBA for Portola Valley, this residential area has an acceptable level of aircraft noise as defined by state law. The extent of the 65dBA CNEL noise impact contour at SFO is shown in Appendix 3. This noise contour was generated using Federal Aviation Administration’s Integrated Noise Model (version 7.0d). The Federal Aviation Administration accepted this map as part of the Noise Exposure Map update under Federal Aviation Regulations Part 150 on January 29, 2016. The results of the field monitoring validate the extent of the 65dBA CNEL noise impact boundary confirming Aircraft CNEL is less than 65dBA CNEL for this location.

Figure 1 - Monitoring Location #978 and Portola Valley (blue zone)

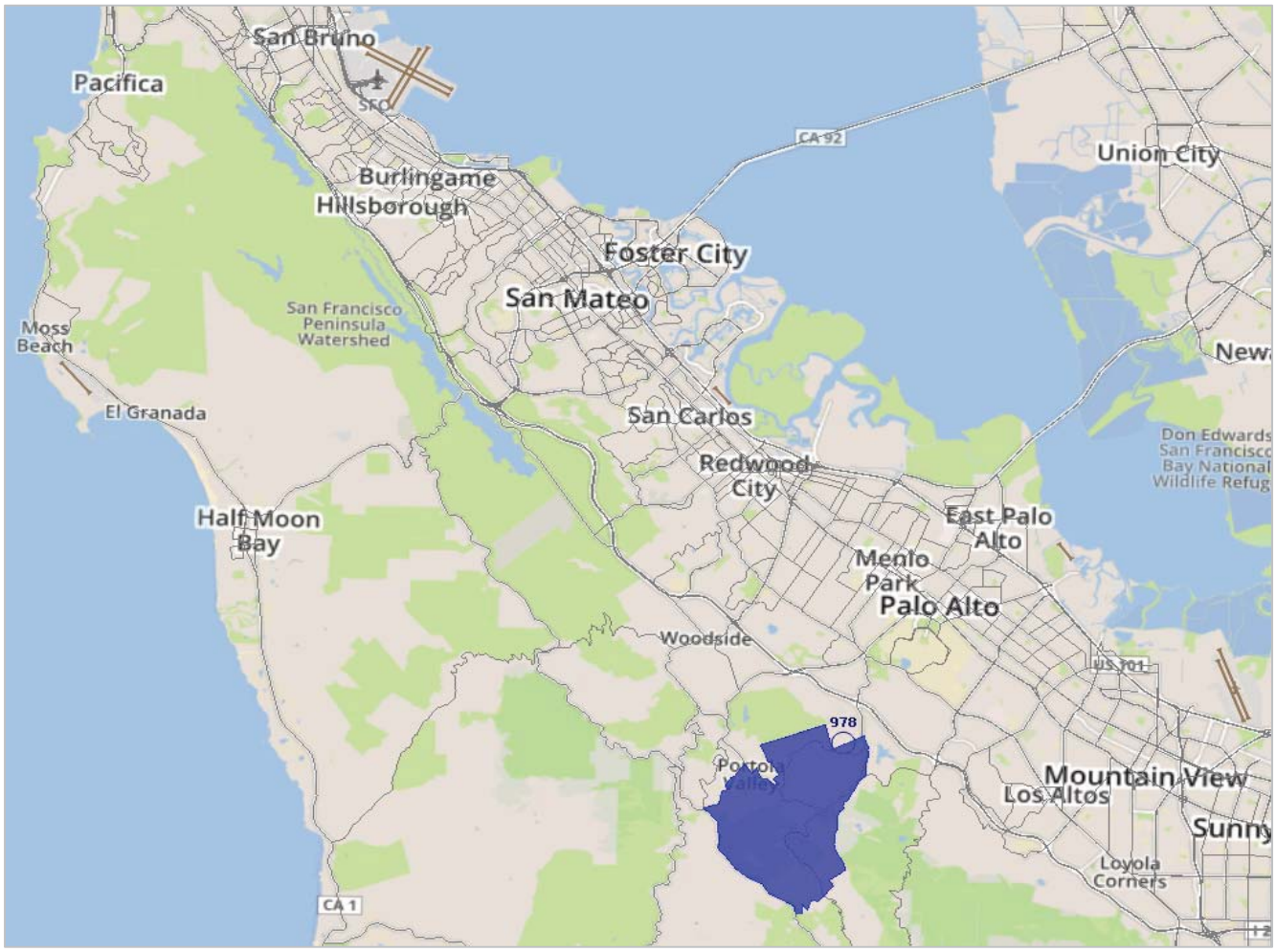


Figure 2 – Microphone, Tripod and Monitor at Portola Valley

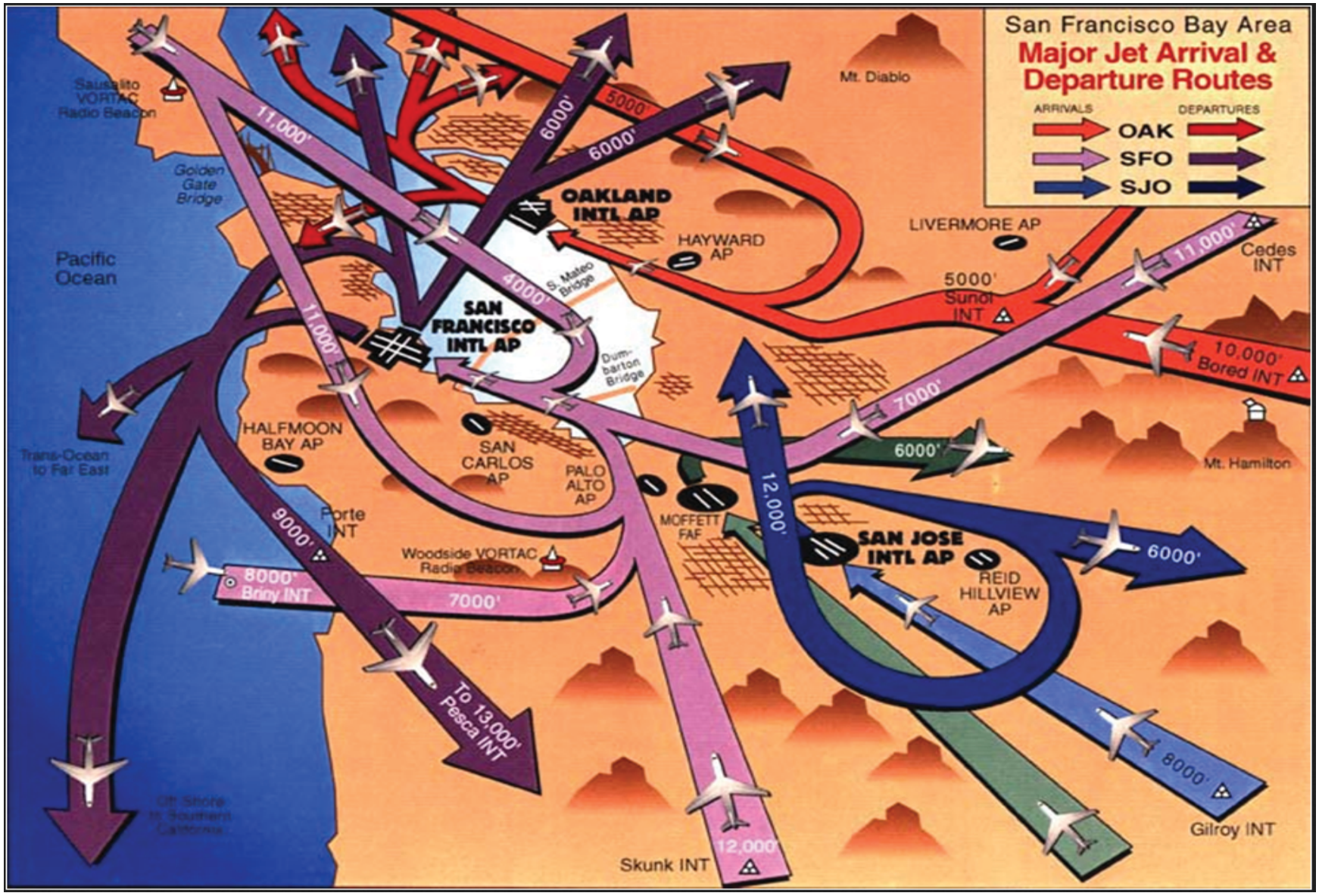
Figure 3 – Portola Valley Portable Noise Monitoring Comparison Table

	Yearly Quarters	Aircraft CNEL (dBA)	Community CNEL (dBA)	Total CNEL (dBA)	SFO Aircraft Events[1]	SEL (dBA)	Lmax (dBA)
2015	Qtr1	38	49	49	24	70	59
	Qtr2	42	44	46	55	69	59
	Qtr3	41	51	52	44	69	58
	Qtr4	41	46	47	41	70	60
2016	Qtr1	39	43	45	28	69	58
	Qtr2	41	44	46	47	70	59
	Qtr3	40	73	73	23	70	59
	Qtr4	40	47	48	28	70	60
2017	Qtr1	43	46	48	37	70	60
Average		**41**	**49**	**50**	**36**	**70**	**59**

[1] Quarterly Daily Average

Appendix 1 – San Francisco Bay Area Major Jet Arrival and Departure Routes

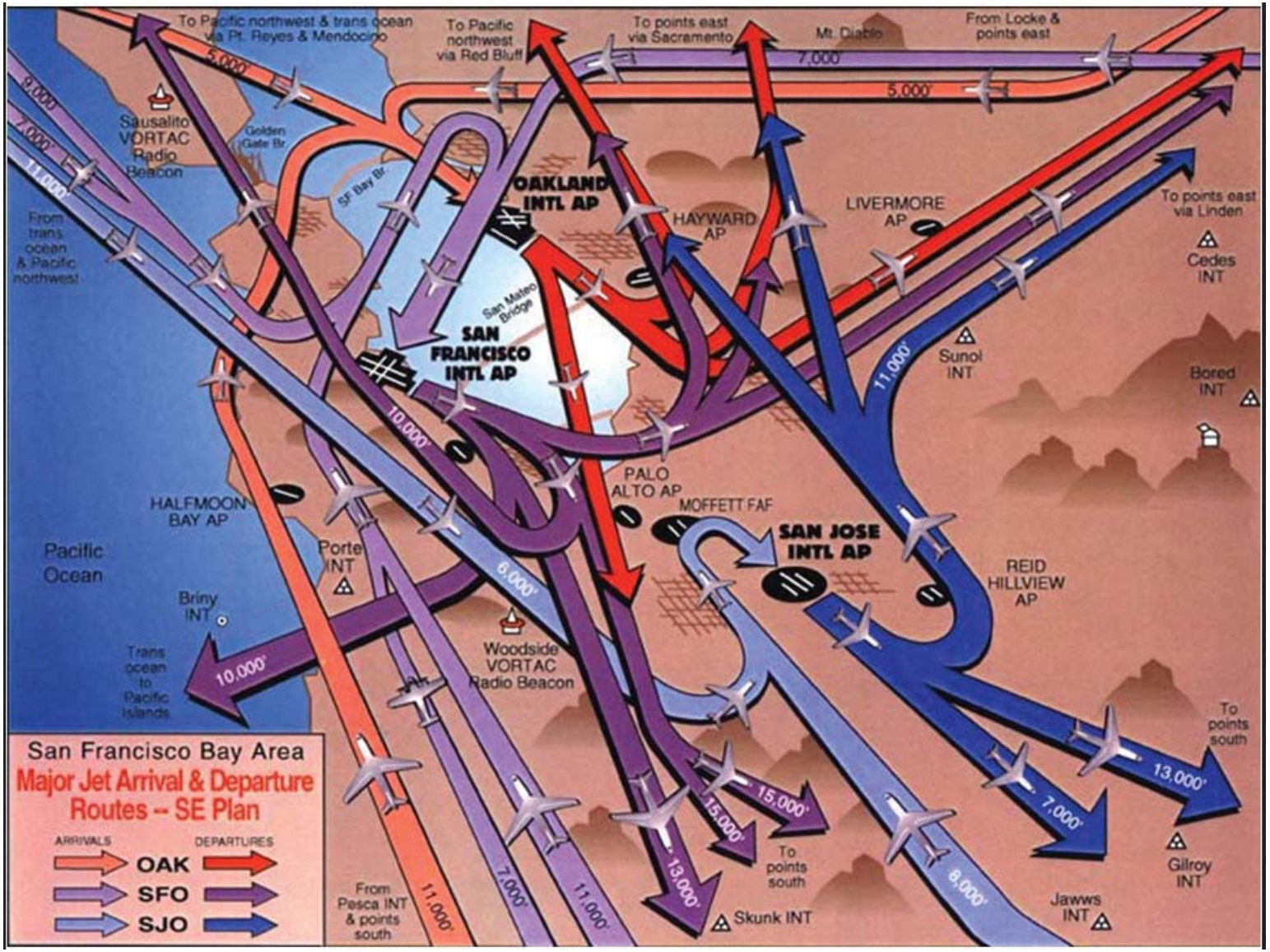
West Flow Plan



Note: Image not to scale and not all flights paths are shown.

Appendix 1- San Francisco Bay Area Major Jet Arrival and Departure Routes

Southeast Flow Plan



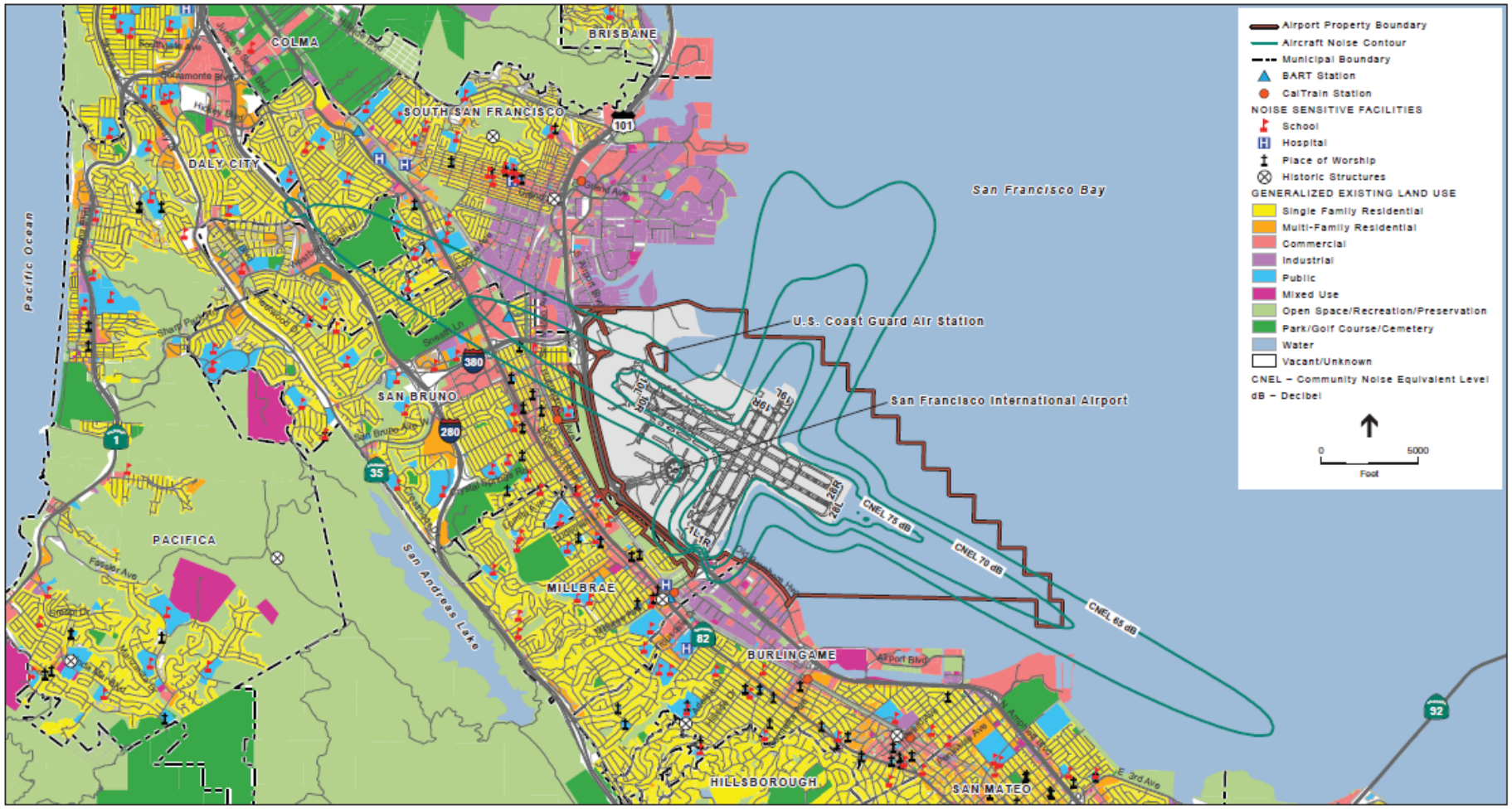
Note: Image not to scale and not all flight paths are shown.

Appendix 2 – Aircraft Type Reference Sheet

Aircraft Code	Description
Wide Body Jet	
A332	Airbus A330-200
A333	Airbus A330-300
A343	Airbus A340-300
A346	Airbus A340-600
A359	Airbus A350-900
A388	Airbus A380-800
B744	Boeing 747-400
B748	Boeing 747-8
B762	Boeing 767-200
B763	Boeing 767-300
B772	Boeing 777-200
B77L	Boeing 777-200LR
B77W	Boeing 777-300ER
B788	Boeing 787-8
B789	Boeing 787-9
Narrow Body Jet	
A319	Airbus A319
A321	Airbus A321
B733	Boeing 737-300
B734	Boeing 737-400
B737	Boeing 737-700
B738	Boeing 737-800
B739	Boeing 737-900
B752	Boeing 757-200
B753	Boeing 757-300
CRJ2	Bombardier CRJ200
CRJ7	Bombardier CRJ700
CRJ9	Bombardier CRJ-900
DH8D	DeHavilland Dash 8
E170	Embraer EMB 170
Helicopter	
CH7	Kompress
EC35	Eurocopter 135
EC45	Eurocopter 145
EH1	AgustaWestland 101
HELO	Helicopter
General Aviation Aircraft	
BE33	Beechcraft Debonair
BE36	Beechcraft 36 Bonanza
BE58	Beechcraft 58
BE65	Beechcraft 65
C162	Cessna C162
C172	Cessna Skyhawk
C182	Cessna Skylane
DA40	Diamond DA-40
DA42	Diamond DA-42
LNC4	Lancair 4
M20P	Mooney M-20
P28A	Piper 28A Cherokee
RV8	Vans RV-8
SR20	Cirrus SR-20
SR22	Cirrus SR-22
Business Aircraft	
BE9L	Beechcraft King Air
BE20	Beechcraft 200 King Air
C25B	Cessna Citation CJ3
C680	Cessna 680 Citation Sovereign
C750	Cessna 750 Citation X
CL30	Bombardier Challenger 300
GL5T	Bombardier Global Express
GLEX	Bombardier Global Express (twin-jet)
MU2	Mitsubishi MU-2
PC12	Pilatus PC-12
TBM7	Socata TBM 700

Wide Body Jet (wide enough for two passenger aisles); **Narrow Body Jet** (wide enough for one passenger aisles); **Business Aircraft** (transportation for small groups of people); **General Aviation Aircraft** (Generally small, propeller-driven aircraft); **Helicopters** (Aircraft operated by rotor blades); **Military** (U.S Military Aircraft).

Appendix 3 – 2014 Noise Exposure Map



SOURCE: ESRI, 2014; San Mateo County Planning and Building Department, 2014; ESA Airports, 2014

SFO FAR Part 150 Noise Exposure Map Report . 120832

Exhibit 5-1

2014 Noise Exposure Map – San Francisco International Airport

Dave Ong (AIR)

From: Dave Ong (AIR)
Sent: Monday, May 15, 2017 12:14 PM
To: 'awengert@portolavalley.net'
Cc: 'James A Castañeda'; Bert Ganoung (AIR)
Subject: 1Q2017 Aircraft Noise Monitoring Results for Portola Valley
Attachments: Portola Valley Noise Monitoring Report 1Q 2017.pdf

Dear Honorable Ann Wengert,

Please find attached the 1Q2017 Aircraft Noise Monitoring Report for noise measurements take in Portola Valley.

Should you have any questions regarding this report please do not hesitate to call me or Bert Ganoung, Aircraft Noise Abatement Manager at the telephone number below.

Thank you,

David

David Ong
Noise Systems Manager | Planning, Design & Construction
San Francisco International Airport | P.O. Box 8097 | San Francisco, CA 94128
Tel 650-821-5100 | flysfo.com

Facebook | Twitter | YouTube | Instagram | LinkedIn

Brisbane
Aircraft Noise Monitoring

Prepared by San Francisco International Airport
Aircraft Noise Abatement Office
Technical Report #042017

April 2017
Revision 1 – 4/26/2017

Table of Contents

Executive Summary

The San Francisco International Airport (SFO) Aircraft Noise Abatement Office conducted aircraft noise monitoring in the City of Brisbane, California to determine the noise level within the community from aircraft operations at SFO. The monitoring was made possible with the assistance of the City Manager and a Brisbane resident, utilizing one permanent and four temporary sites in Brisbane. The overall average daily noise level from all aircraft was 53 A-weighted decibels (dBA) Community Noise Equivalent Level (CNEL), the Community daily noise level was 56dBA CNEL. Noise from all aircraft over this location increased the total average daily noise level by 1.5dBA. SFO aircraft comprised 79% of all aircraft noise events over the Brisbane community.

Community and SFO Operations

Brisbane is located approximately 4.75 miles from the center of the runway intersections. The City typically experiences aircraft utilizing the SSTIK and OFFSHORE Departures. Aircraft departing SFO from Runways 01L/R (Left/Right) for destinations to the west, south and southeast typically overfly Brisbane. Occasionally when the winds on the airfield are stronger from the west, the TRUKN OR NIITE Departures will be utilized for destinations to the east. Departing aircraft from Runways 28L/R will initiate a right turn once the aircraft reaches the minimum altitude of 520 feet, however this may have some aircraft fly over the City of Brisbane. SFO traffic arriving from the north on the BDEGA, STINS or GOLDEN GATE Arrival on a typical day (West Plan) overfly Brisbane at 10,000 feet or higher. When the Southeast Plan is in use and aircraft are utilizing the WWAVS Arrival, parts of Brisbane may experience aircraft flying over at lower altitudes. SFO operated on a West Flow Plan (Appendix 1) for nine full days and partially on five days. The Southeast Plan, during the measurement period, was used partially on five different days. Non-aircraft noise sources include residential noise, vehicular traffic, rain and wind noise. The ambient levels within Brisbane during the monitoring period were as follows: Site 7 – 54dBA, Site 966 – 48 dBA, Site 988 -51dBA, Site 989 – 49dBA and Site 990 – 48dBA.

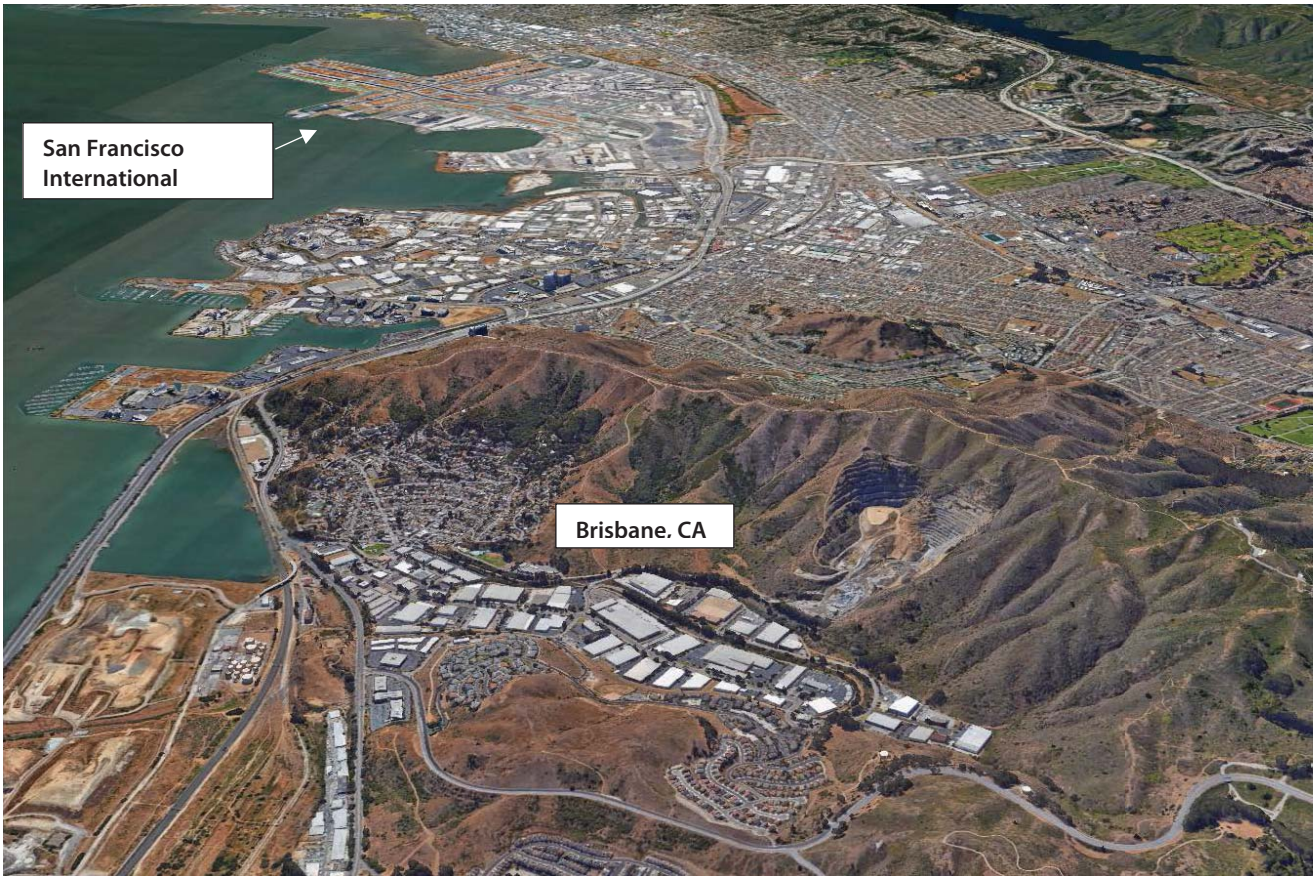
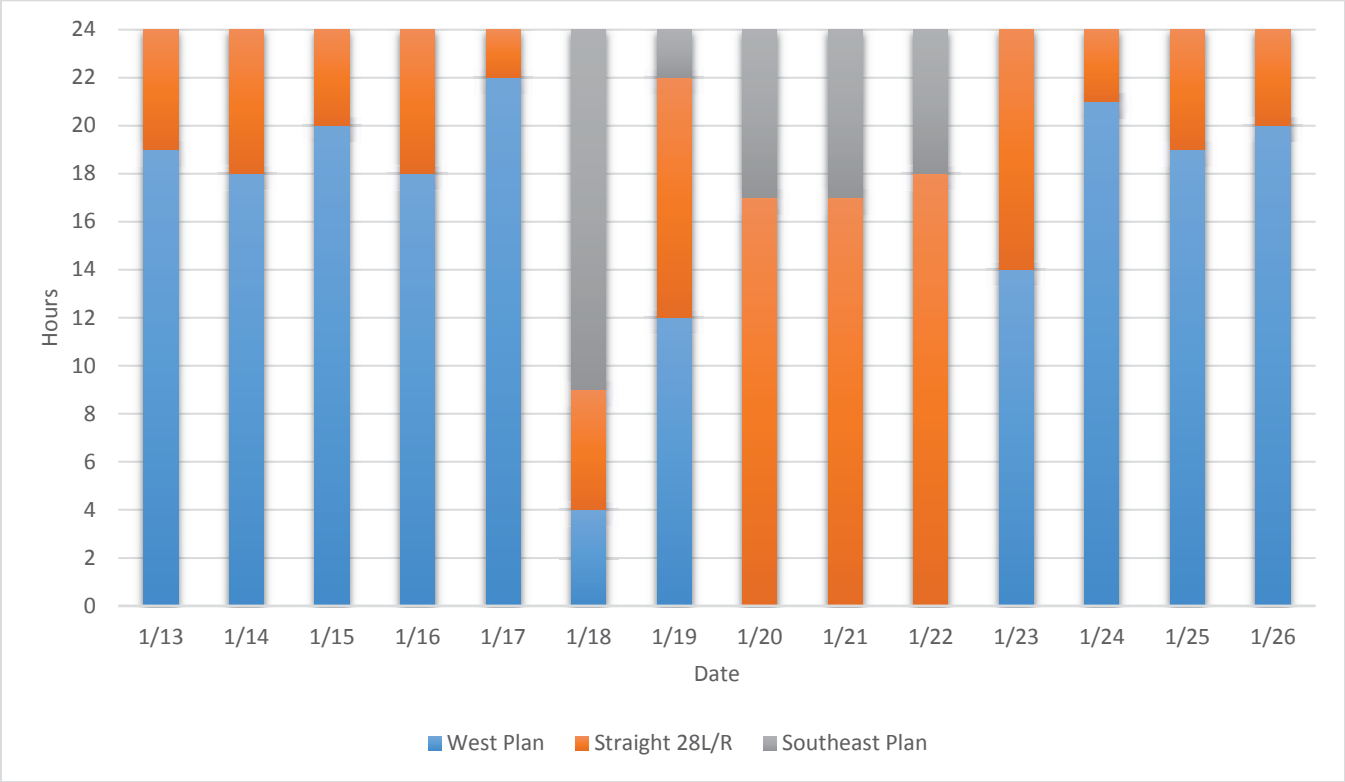


Table 1 – SFO Runway Operations



NOTE: Southeast Plan hours operated: 1/18/2017 – 6:00 a.m. to 9:00 p.m., 1/19/2017 – 10:00p.m. to 11:59 p.m., 1/20/2017 – 12:00 a.m. to 7:00 a.m., 1/21/2017 – 5:00 p.m. to 12:00 a.m. and on 1/22/2017 12:00 a.m. to 6:00 a.m.

Equipment

The equipment used to measure the sound levels were the Environmental Monitor Unit 2200 noise monitors and Type 41DM-2 microphones manufactured by Brüel & Kjær. The measurements consisted of monitoring A-weighted as well as C-weighted decibels (dBC) in accordance with procedures and equipment, which comply with International Electro-Technical Commission and measurement standards, established by the American National Standards Institute for Type I instrumentation. The microphones were calibrated prior to the start of the measurement. The portable monitors were housed in a weatherproof case and powered by available electrical outlets. The microphones were mounted on a tripod at a height of 7 feet (see Figure 1). The sound levels at the sites were continuously monitored, stored on the onboard memory and transferred to a removable memory stick for decoding. The decoded noise data was then processed in the Airport Noise and Operations Management System (ANOMS) for identification, noise to flight track matching and Community Noise Equivalent Level (CNEL) noise metric calculations.

Aircraft Noise Analysis

This Brisbane Aircraft Noise Monitoring Report evaluates the period of January 13-26, 2017, as this is when all four portable monitors were simultaneously deployed. Noise measurements were performed in five locations in Brisbane (Figure 2). At the request of those requesting the monitoring, four portable noise monitors measured noise at the pre-defined sound level threshold of 55dBA and the permanent site at 65dBA. These noise threshold settings help to differentiate aircraft from community noise events and are the reason not every aircraft over Brisbane creates a noise event. During the monitoring period a total of 14,745 noise events were recorded. There were 9,849 (67%) aircraft noise events of which 8,134 (83%) were correlated to SFO operations (SFO Events) and 1,715 (17%) correlated to other Bay Area airports (Non-SFO Events). The average aircraft generated Maximum Noise Level (Lmax) was 67dBA, the average Sound Exposure Level (SEL) was 77dBA, and the average aircraft noise event duration was 26 seconds. The event counts (SFO Events, Non SFO Events and Community) in Table 2 are presented as daily averages.

Table 2 - Noise Event Averages by Site

			Average						Average						Average		
Date	Noise Monitor	SFO Events[1]	SEL (dBA)[2]	Lmax (dBA)[3]	CNEL (dBA)[4]	Altitude	SFO Flow Pattern	Non-SFO Events	SEL (dBA)	Lmax (dBA)	CNEL (dBA)	Altitude	OAK Flow Pattern	Community Events	SEL (dBA)	Lmax (dBA)	CNEL (dBA)
	Average	**188**	**78**	**68**	**55**	**4,492**		**44**	**74**	**64**	**45**	**7,619**		**63**	**78**	**72**	**55**
	Site 7	72	81	71	56	3,492	West	1	75	66	35	7,786	West	2	82	77	60
	Site 966	199	77	66	53	4,756	West	53	72	60	45	8,018	West	29	67	60	51
01/13/2017	Site 988	268	78	66	56	4,697	West	64	74	63	47	7,410	West	214	74	64	57
	Site 989	211	77	67	53	5,159	West	58	74	65	46	7,461	West	47	75	68	50
	Site 990	189	78	69	55	4,358	West	45	72	61	44	7,420	West	22	78	73	51
	Average	**109**	**78**	**68**	**53**	**4,149**		**21**	**72**	**64**	**40**	**3,920**		**26**	**71**	**65**	**54**
	Site 7	52	80	70	55	3,461	West	3	75	68	33	1,439	West	-	-	-	58
	Site 966	119	77	66	50	4,565	West	30	71	61	41	5,040	West	8	68	63	50
01/14/2017	Site 988	131	77	66	53	4,031	West	28	71	60	41	4,056	West	27	71	62	55
	Site 989	125	76	66	50	4,688	West	20	72	63	40	4,580	West	35	71	64	49
	Site 990	119	78	68	53	4,000	West	25	71	64	40	4,486	West	34	72	69	48
	Average	**113**	**78**	**68**	**52**	**4,572**		**24**	**72**	**62**	**38**	**7,404**		**18**	**71**	**68**	**53**
	Site 7	37	81	72	54	3,320	West	-	-	-	0	-	-	-	-	-	57
	Site 966	134	76	65	49	5,113	West	27	71	61	39	7,245	West	9	70	66	49
01/15/2017	Site 988	146	77	65	53	4,685	West	30	71	61	39	7,286	West	17	66	59	54
	Site 989	128	76	65	49	5,225	West	21	73	63	39	7,595	West	21	71	64	49
	Site 990	120	77	67	53	4,518	West	19	72	61	38	7,489	West	24	74	72	48
	Average	**111**	**77**	**66**	**51**	**4,538**		**14**	**72**	**66**	**39**	**4,938**		**42**	**77**	**67**	**55**
	Site 7	26	80	70	52	3,739	West	1	74	66	27	1,445	West	-	-	-	59
	Site 966	131	75	63	49	4,878	West	21	69	59	41	6,304	West	39	82	69	53
01/16/2017	Site 988	165	75	63	53	4,488	West	25	70	60	40	6,663	West	94	70	58	56
	Site 989	126	74	64	49	5,204	West	13	74	69	38	6,005	West	25	73	67	50
	Site 990	108	76	66	52	4,380	West	9	73	67	41	4,274	West	11	70	67	50
	Average	**130**	**77**	**67**	**53**	**4,485**		**16**	**72**	**66**	**35**	**5,948**		**57**	**72**	**66**	**54**
	Site 7	30	80	71	54	3,132	West	3	76	69	32	1,154	West	-	-	-	58
	Site 966	139	76	64	50	4,959	West	13	68	58	33	7,872	West	15	68	61	51
01/17/2017	Site 988	211	76	64	54	4,584	West	33	69	69	39	7,089	West	159	75	64	56
	Site 989	153	76	66	51	5,280	West	18	70	61	36	6,742	West	41	72	65	50
	Site 990	115	76	66	53	4,472	West	12	70	64	33	6,885	West	14	72	70	48
	Average	**25**	**77**	**68**	**49**	**4,146**		**4**	**71**	**61**	**26**	**11,930**		**210**	**79**	**67**	**55**
	Site 7	7	81	72	49	2,614	West	-	-	-	0	-	-	52	85	72	59
	Site 966	18	75	65	47	5,502	West/Southeast	5	68	58	25	11,400	West	331	68	59	53
01/18/2017	Site 988	50	75	64	51	2,437	West/Southeast	5	71	58	28	12,396	West	248	72	63	56
	Site 989	26	73	64	44	5,674	West/Southeast	2	74	65	28	12,123	West	258	74	65	54
	Site 990	23	77	68	50	4,503	West/Southeast	3	68	59	24	11,801	West	160	72	64	51
	Average	**126**	**78**	**68**	**49**	**5,022**		**36**	**72**	**63**	**38**	**9,261**		**57**	**75**	**68**	**54**
	Site 7	23	81	71	46	3,996	West	-	-	-	0	-	-	4	79	70	56
	Site 966	149	76	66	49	5,392	West/Southeast	42	70	60	39	9,531	West/Southeast	31	66	60	51
01/19/2017	Site 988	190	77	66	51	5,194	West	42	72	61	40	9,300	West/Southeast	166	74	63	56
	Site 989	140	77	67	50	5,333	West	28	73	63	39	9,009	West/Southeast	55	73	66	51
	Site 990	127	76	67	48	5,196	West	33	72	65	39	9,202	West/Southeast	28	76	72	50
	Average	**62**	**77**	**69**	**49**	**4,197**		**37**	**77**	**67**	**42**	**10,093**		**158**	**81**	**73**	**62**
	Site 7	49	82	74	54	2,960	West	1	83	72	35	9,624	West	24	83	77	61
	Site 966	36	73	63	41	4,419	West	44	72	62	43	10,332	West/Southeast	131	78	70	60
01/20/2017	Site 988	115	75	65	49	4,230	West/Southeast	56	72	62	44	11,162	West/Southeast	278	78	69	62
	Site 989	27	72	63	41	5,587	West/Southeast	35	73	62	43	9,527	West	221	79	72	62
	Site 990	83	77	69	49	3,788	West	47	73	63	43	9,819	West/Southeast	136	83	73	64

[1] *SFO Events are Single SFO Aircraft, Multiple SFO Aircraft, Simultaneous SFO and Non-SFO Aircraft and Simultaneous Community and SFO Aircraft.*

[2] *SEL - Sound Exposure Level of a noise event is measured over time between the initial and final points when the noise level exceeds a predetermined threshold* and its energy is compressed into one second.

[3] Lmax - Maximum Noise Level is a measurement of the peak level of a noise events.

[4] CNEL - Community Noise Equivalent Level - Average sound level over a 24-hour period.

Table 2 - Noise Event Averages by Site (cont.)

			Average						Average						Average		
Date	Noise Monitor	SFO Events[1]	SEL (dBA)[2]	Lmax (dBA)[3]	CNEL (dBA)[4]	Altitude	SFO Flow Pattern	Non-SFO Events	SEL (dBA)	Lmax (dBA)	CNEL (dBA)	Altitude	OAK Flow Pattern	Community Events	SEL (dBA)	Lmax (dBA)	CNEL (dBA)
	Average	**36**	**76**	**67**	**48**	**4,090**		**20**	**72**	**63**	**42**	**9,270**		**42**	**73**	**67**	**56**
01/21/2017	Site 7	27	80	72	52	2,727	West	2	74	66	36	9,280	West	6	77	71	61
	Site 966	25	70	61	41	5,783	West/Southeast	28	69	61	42	9,427	West/Southeast	64	67	61	51
	Site 988	67	73	63	49	3,167	West/Southeast	25	71	62	43	9,094	West/Southeast	38	68	60	55
	Site 989	19	72	65	40	5,548	West/Southeast	21	73	65	43	9,259	West/Southeast	77	72	65	53
	Site 990	41	75	66	48	3,226	West	23	70	60	41	9,292	West/Southeast	27	75	70	51
	Average	**56**	**78**	**69**	**50**	**3,400**		**31**	**71**	**61**	**41**	**9,313**		**124**	**78**	**69**	**59**
01/22/2017	Site 7	41	81	73	53	2,813	West	-	-	-	0	-	-	29	80	73	61
	Site 966	40	75	65	44	3,719	West/Southeast	37	70	60	40	9,298	West/Southeast	128	74	67	57
	Site 988	97	78	69	51	3,106	West/Southeast	30	70	60	42	8,988	West/Southeast	82	79	70	60
	Site 989	41	74	65	44	3,654	West/Southeast	22	71	62	40	9,510	West/Southeast	227	75	65	59
	Site 990	60	77	67	49	3,709	West	36	73	62	43	9,456	West/Southeast	154	77	68	59
	Average	**192**	**78**	**68**	**56**	**4,638**		**37**	**73**	**62**	**45**	**8,863**		**54**	**77**	**70**	**56**
01/23/2017	Site 7	75	81	71	58	3,284	West	-	-	-	0	-	-	1	79	73	59
	Site 966	208	77	66	53	5,176	West	47	72	61	46	8,945	West	45	79	67	52
	Site 988	254	78	66	56	4,737	West	31	74	61	46	8,651	West	98	69	59	56
	Site 989	191	78	67	52	5,250	West	35	72	62	45	8,704	West	100	74	67	55
	Site 990	232	77	67	56	4,744	West	35	72	64	45	9,151	West	26	79	72	54
	Average	**173**	**78**	**67**	**54**	**5,085**		**28**	**73**	**63**	**44**	**7,915**		**58**	**74**	**68**	**55**
01/24/2017	Site 7	38	81	71	52	3,978	West	1	75	67	36	6,744	West	1	78	74	59
	Site 966	204	76	65	54	5,451	West	37	71	60	45	8,312	West	39	68	62	51
	Site 988	274	77	65	55	5,207	West	34	74	62	46	8,040	West	178	74	63	56
	Site 989	202	76	66	54	5,619	West	35	73	62	44	7,768	West	65	72	65	50
	Site 990	148	77	67	53	5,170	West	31	73	61	45	8,711	West	9	69	65	49
	Average	**132**	**78**	**68**	**53**	**4,580**		**20**	**74**	**64**	**40**	**6,115**		**43**	**75**	**69**	**54**
01/25/2017	Site 7	42	81	71	54	3,476	West	1	75	66	33	1,417	West	3	78	72	58
	Site 966	157	76	65	51	4,999	West	24	69	60	39	7,268	West	30	70	63	51
	Site 988	196	77	66	54	4,700	West	30	77	65	44	6,551	West	112	76	65	56
	Site 989	138	77	66	51	5,155	West	21	70	62	38	7,366	West	51	71	65	49
	Site 990	125	77	67	52	4,569	West	22	73	64	39	7,972	West	17	74	72	48
	Average	**175**	**78**	**68**	**53**	**4,646**		**38**	**74**	**64**	**43**	**6,685**		**70**	**72**	**65**	**55**
01/26/2017	Site 7	66	81	71	54	3,680	West	1	77	69	28	1,491	West	-	-	-	59
	Site 966	202	77	65	51	5,107	West	52	71	60	44	8,064	West	36	67	60	51
	Site 988	251	78	66	55	4,589	West	59	72	60	45	7,500	West	165	73	63	57
	Site 989	185	76	66	51	5,178	West	36	73	63	42	7,977	West	65	74	69	51
	Site 990	171	78	67	53	4,676	West	44	72	62	44	8,391	West	13	69	65	49
Total	**Total**	**8,134**						**1,715**						**4,896**			

[1] *SFO Events are Single SFO Aircraft, Multiple SFO Aircraft, Simultaneous SFO and Non-SFO Aircraft and Simultaneous Community and SFO Aircraft.*

[2] *SEL - Sound Exposure Level of a noise event is measured over time between the initial and final points when the noise level exceeds a predetermined threshold* and its energy is compressed into one second.

[3] Lmax - Maximum Noise Level is a measurement of the peak level of a noise events.

[4] CNEL - Community Noise Equivalent Level - Average sound level over a 24-hour period.

Table 3 – SFO Events by Date

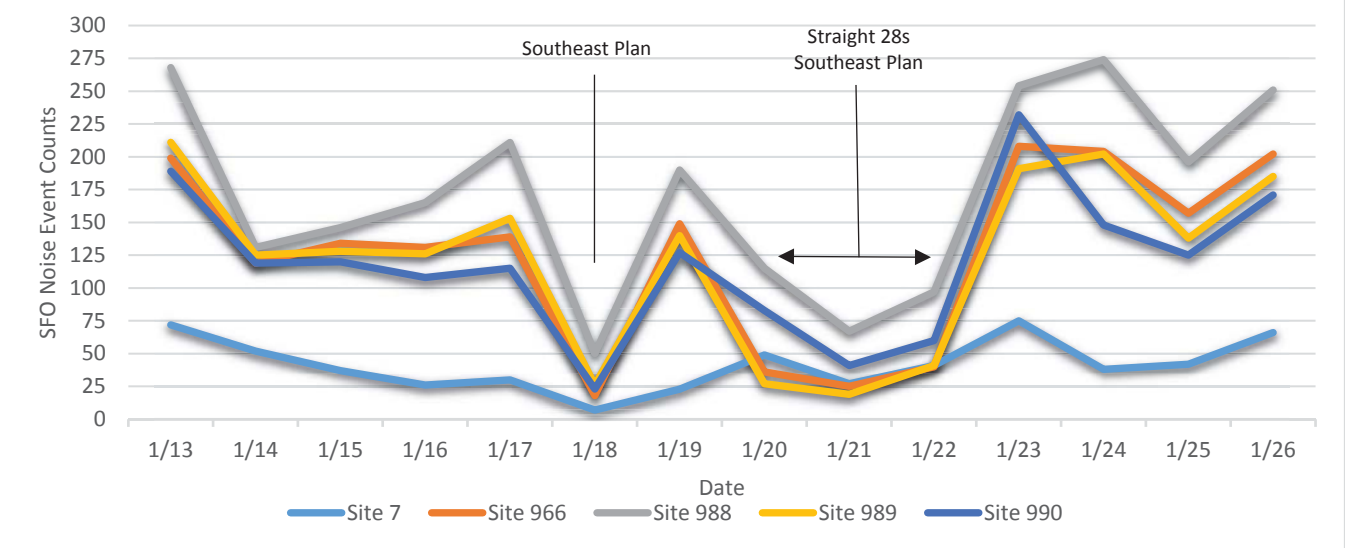


Table 4 – Average Lmax of SFO Aircraft by Date

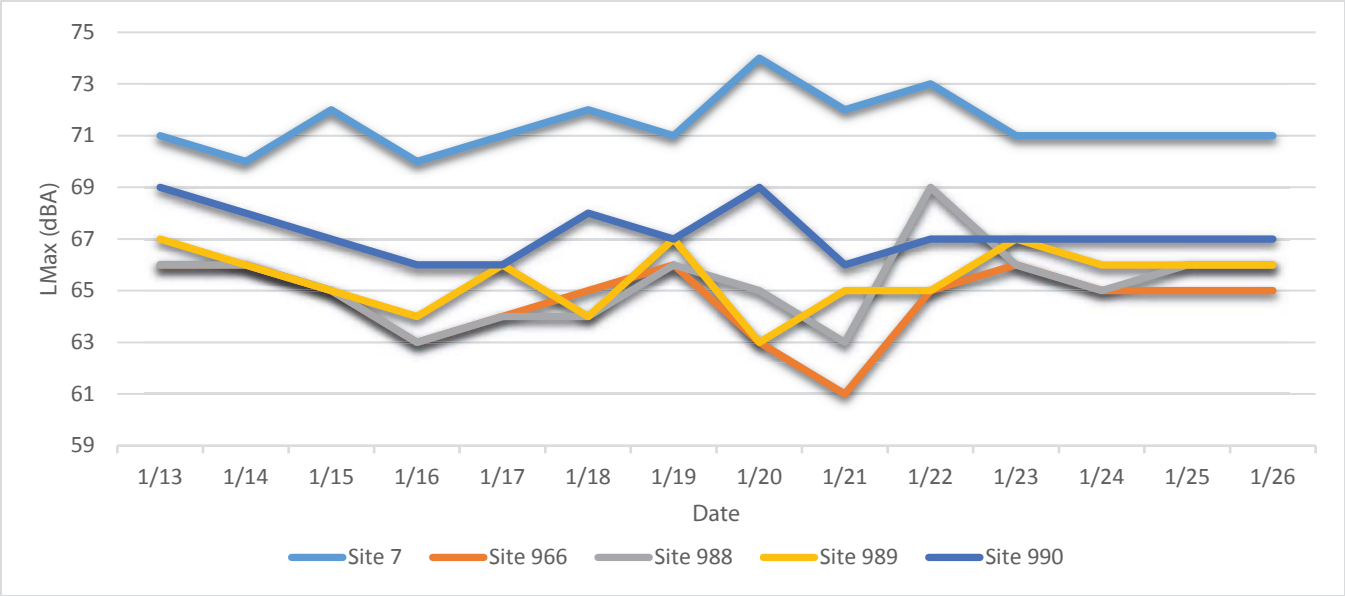
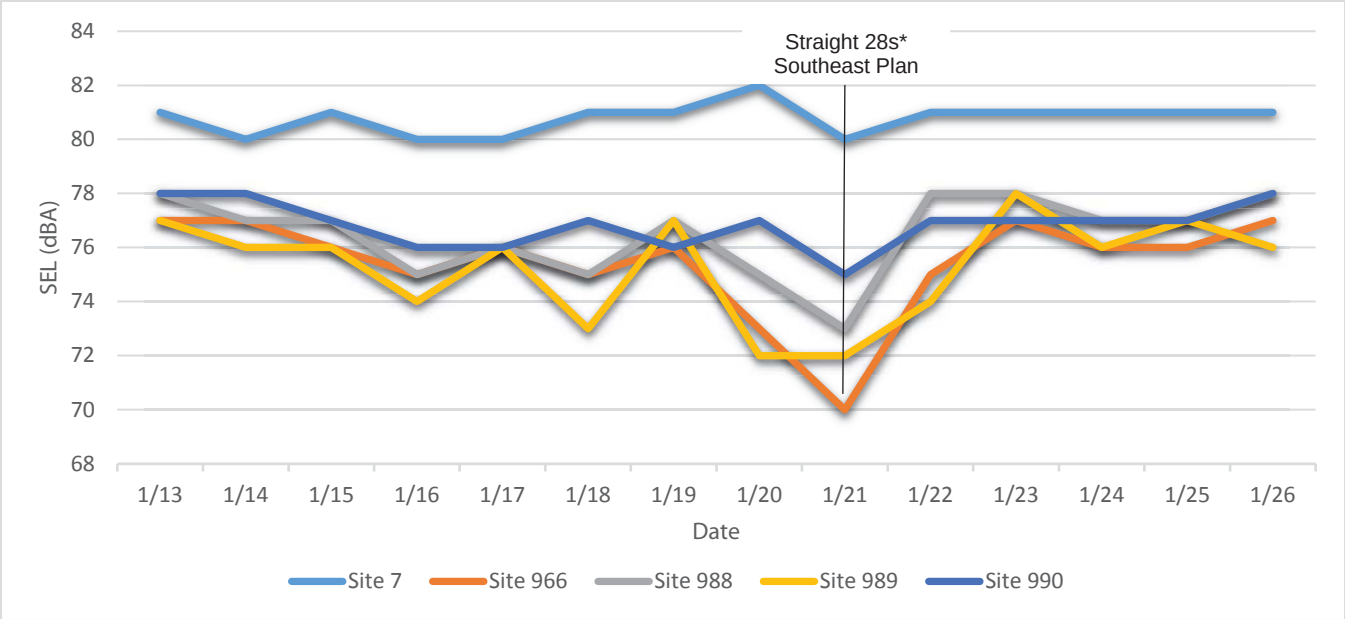


Table 5 – Average SEL of SFO Aircraft by Date



*Straight 28s – SFO arriving and departing traffic are utilizing Runways 28L/R only. Occurs when the winds are strong from the west or the crosswind component for departures from Runways 01L/R are exceeded or when OAK is operating in Southeast Plan, where their departing traffic is using Runway 12.

Table 6 shows a graphic comparison between the SEL of SFO Events and the SEL of Community Events. The SEL of SFO Events is the average value for all five monitoring locations. On January 20th, the community SEL peaked at 81 dBA. On further investigation it was found that this was caused by unsettled weather patterns. Weather reports showed wind throughout the day that varied considerably from calm to gusts as high as 49 Knots, thunder and a significant rain accumulation of ¾ inch over 1.5 hours in the late afternoon. The sounds of rain, wind and thunder collected by the monitors were grouped as Community Events. On January 23rd, the five monitoring sites averaged 192 SFO Events for the day in comparison with 54 Community Events for the same period, however aircraft were on average one decibel higher than community.

Table 6 – SEL Comparison of Daily Averages

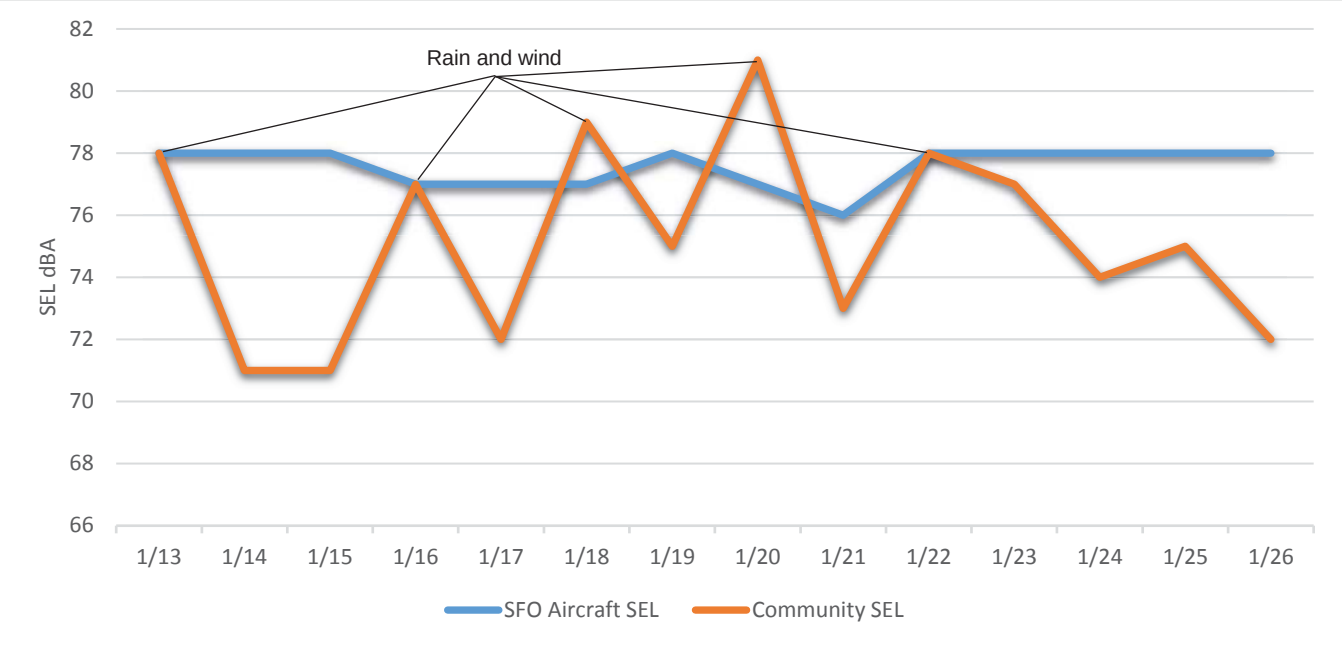
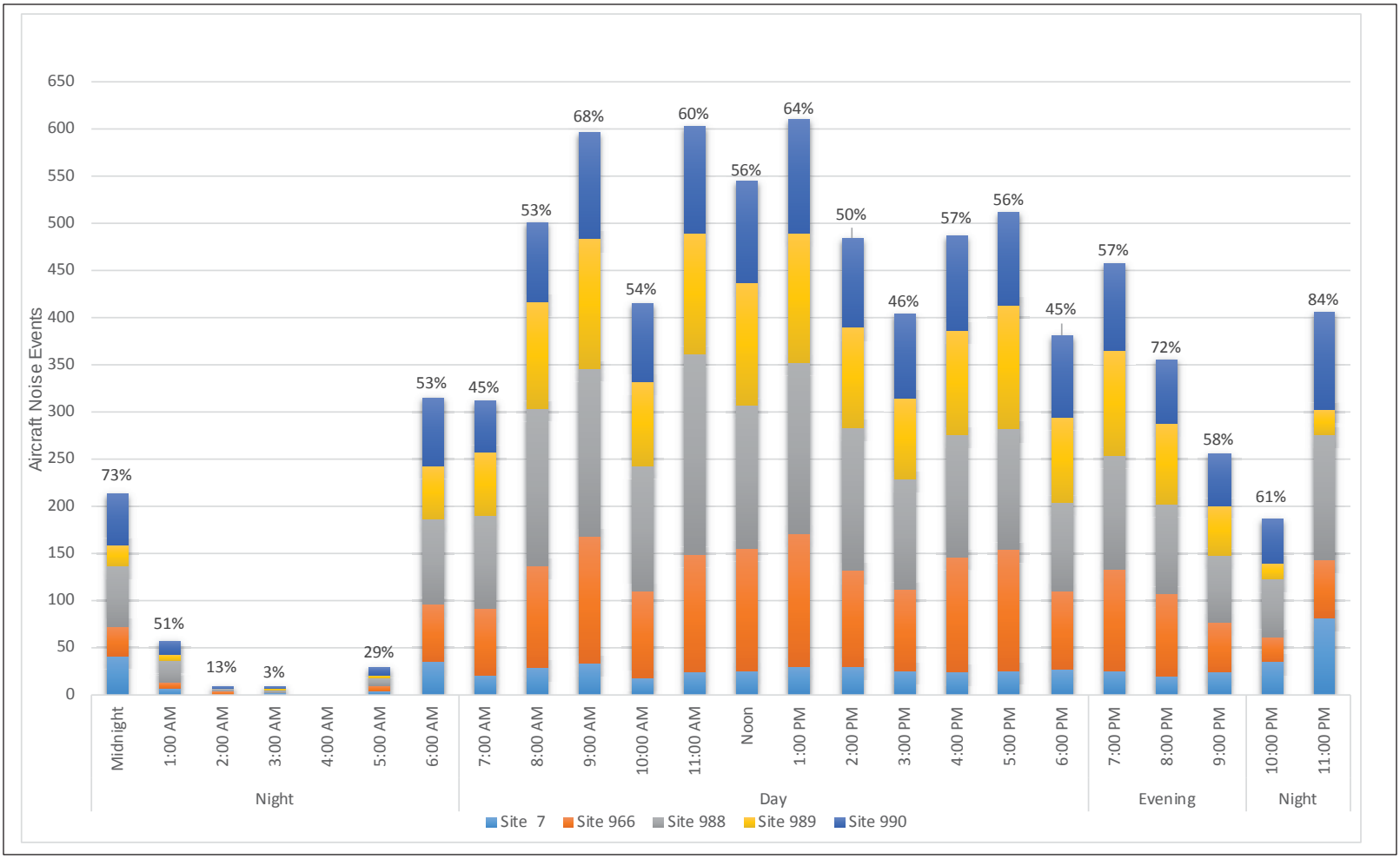


Table 7 – Total SFO Aircraft Noise Events by Hour of the Day



Note: The percent is the percentage of SFO aircraft noise events in that hour.

Table 8 – Total SFO Events by Daytime, Evening and Nighttime Hours

SFO Aircraft Noise Data (Single Noise Events)			Lowest (dBA)	Highest (dBA)	Average (dBA)
Day (7:00 a.m.- 7:00 p.m.)	5,847 Events (72%)	Lmax	55	84	67
		SEL	55	95	77
		Duration	1 sec.	120 sec.	31 sec.
Evening (7:00 p.m.- 10:00 p.m.)	1,067 Events (13%)	Lmax	55	78	67
		SEL	61	87	77
		Duration	5 sec.	72 sec.	31 sec.
Night (10:00 p.m.- 7:00 a.m.)	1,220 Events (15%)	Lmax	55	79	67
		SEL	62	89	77
		Duration	5 sec.	120 sec.	25 sec.

Table 9 below provides the resulting CNELs for this measurement period. The computed levels for the average **Aircraft CNEL** was 53dBA, the average **Community CNEL** was 56dBA, and the **Total CNEL** was 58dBA.

Table 9 – Community Noise Equivalent Level

Average Community Noise Equivalent Level (CNEL)	Lowest (dBA)	Highest (dBA)	Average (dBA)
Aircraft (All)	49	56	53
Community	53	62	56
Total	55	62	58

Aircraft Operations

All aircraft which flew within a cylindrical airspace, known as a Point of Closest Approach (PCA), centered on each measurement location four miles in diameter and 15,000 feet in height were evaluated during this measurement period. A daily average of 364 flights penetrated this airspace. Due to their close proximity the majority of sites experienced similar numbers in the number of PCA overflights; however, the greatest variation in the values would be between site 989 and site 7 as they were our furthest north and south monitoring locations respectively. Table 10 shows the daily ratio of overflights to noise events, along with the resulting aircraft noise climates for each monitoring site.

Table 10 – Aircraft Overflights versus Noise Events

Date	Monitor Location	Amount of PCA Overflights[3]	Amount of Aircraft Noise Events[4]	Aircraft CNEL (dBA)[5]	Range (dBA)		SFO Flow Pattern[8]
					Lmax[6]	SEL[7]	
01/13/2017 [1]							
	7	454	73	56	66-77	72-87	West
	966	486	252	54	55-73	61-83	West
	988	488	332	57	55-77	62-86	West
	989	485	269	54	56-84	64-89	West
	990	470	234	56	55-82	61-91	West
01/14/17							
	7	359	55	55	66-77	74-86	West
	966	363	149	51	55-72	62-82	West
	988	378	159	54	56-73	62-86	West
	989	354	145	50	57-72	64-83	West
	990	367	144	54	56-77	62-85	West
01/15/17							
	7	368	37	54	66-79	73-89	West
	966	397	161	49	55-71	61-82	West
	988	388	176	53	55-75	61-85	West
	989	394	149	49	56-72	64-82	West
	990	380	139	53	55-77	61-86	West
01/16/17							
	7	414	27	52	66-76	74-85	West
	966	461	152	50	55-71	61-86	West
	988	446	190	53	55-73	61-84	West
	989	463	139	49	56-79	64-83	West
	990	427	117	53	55-78	62-84	West

Table 10 – Aircraft Overflights versus Noise Events (cont.)

Date	Monitor Location	Amount of PCA Overflights[3]	Amount of Aircraft Noise Events[4]	Aircraft CNEL (dBA)[5]	Range (dBA)		SFO Flow Pattern[8]
					Lmax[6]	SEL[7]	
01/17/17							
	7	343	33	54	65-78	71-86	West
	966	387	152	50	56-73	62-83	West
	988	375	244	54	55-72	61-85	West
	989	383	171	51	56-81	64-88	West
	990	360	127	53	55-77	62-85	West
01/18/17							
	7	50	7	49	69-75	76-84	West & Southeast
	966	65	23	47	56-76	62-85	West & Southeast
	988	55	55	51	56-78	63-89	West & Southeast
	989	79	28	44	56-72	64-82	West & Southeast
	990	53	26	50	56-77	63-87	West & Southeast
01/19/17							
	7	326	23	46	65-76	72-86	West & Southeast
	966	358	191	49	55-74	61-84	West & Southeast
	988	347	232	51	55-74	62-85	West & Southeast
	989	362	168	50	56-74	64-85	West & Southeast
	990	334	160	48	55-78	61-85	West & Southeast
01/20/17							
	7	379	50	54	67-79	74-87	West & Southeast
	966	250	80	45	55-72	61-81	West & Southeast
	988	303	171	50	55-76	61-85	West & Southeast
	989	235	62	45	56-68	65-79	West & Southeast
	990	350	130	50	55-79	60-86	West & Southeast
01/21/17							
	7	236	29	52	66-78	72-86	West & Southeast
	966	156	53	45	55-70	61-79	West & Southeast
	988	200	92	50	56-70	62-80	West & Southeast
	989	152	40	45	55-73	63-79	West & Southeast
	990	219	64	49	55-75	60-84	West & Southeast
01/22/17							
	7	305	41	53	66-80	72-88	West & Southeast
	966	213	77	45	56-79	62-89	West & Southeast
	988	251	127	52	55-87	61-95	West & Southeast
	989	200	63	45	56-75	64-85	West & Southeast
	990	287	96	50	55-76	61-86	West & Southeast

Table 10 – Aircraft Overflights versus Noise Events (cont.)

Date	Monitor Location	Amount of PCA Overflights[3]	Amount of Aircraft Noise Events[4]	Aircraft CNEL (dBA)[5]	Range (dBA)		SFO Flow Pattern[8]
					Lmax[6]	SEL[7]	
01/23/17							
	7	517	75	58	65-76	73-86	West
	966	488	255	54	55-75	61-86	West
	988	529	285	57	55-77	61-86	West
	988	470	226	53	56-75	64-85	West
	990	526	267	57	55-78	61-86	West
01/24/17							
	7	422	39	52	65-77	73-86	West
	966	486	241	54	55-74	62-84	West
	988	465	308	56	55-76	55-90	West
	989	488	237	54	56-73	64-83	West
	990	443	179	54	56-78	62-86	West
01/25/17							
	7	446	43	54	65-77	73-86	West
	966	436	181	51	55-72	61-83	West
	988	448	226	54	55-80	61-87	West
	989	429	159	52	56-73	65-83	West
	990	446	147	53	55-75	60-84	West
01/26/2017 [2]							
	7	476	67	54	66-77	73-86	West
	966	503	254	52	55-74	61-84	West
	988	517	310	55	55-74	60-86	West
	989	495	221	51	56-75	64-84	West
	990	499	215	54	55-77	62-86	West
Daily Average		**364**	**141**	**53** [5]			

[1] 1/13/17 First Aircraft Noise Events for this survey were measured at:
Site 7 - 12:02 a.m.; Site 966 - 12:07 a.m.; Site 988 - 12:02 a.m.; Site 989 - 12:07 a.m.; Site 990 - 12:02 a.m.

[2] 1/26/17 Last Aircraft Noise Events for this survey were measured at:
Site 7 - 11:46 p.m.; Site 966 - 11:47 p.m.; Site 988 - 11:47 p.m.; Site 989 - 11:32 p.m.; Site 990 - 11:46 p.m.

[3] The Amount of PCA Overflights through a defined cylindrical airspace for a 24-hour period starting at midnight to 11:59:59 p.m. The cylindrical airspace was four miles in diameter and 15,000 feet in elevation, centered on each monitor location.

[4] Aircraft Noise Events include all SFO Aircraft, Multiple SFO Aircraft, Non-SFO Aircraft, and Simultaneous SFO & Non-SFO Aircraft.

[5] This value is an energy average.

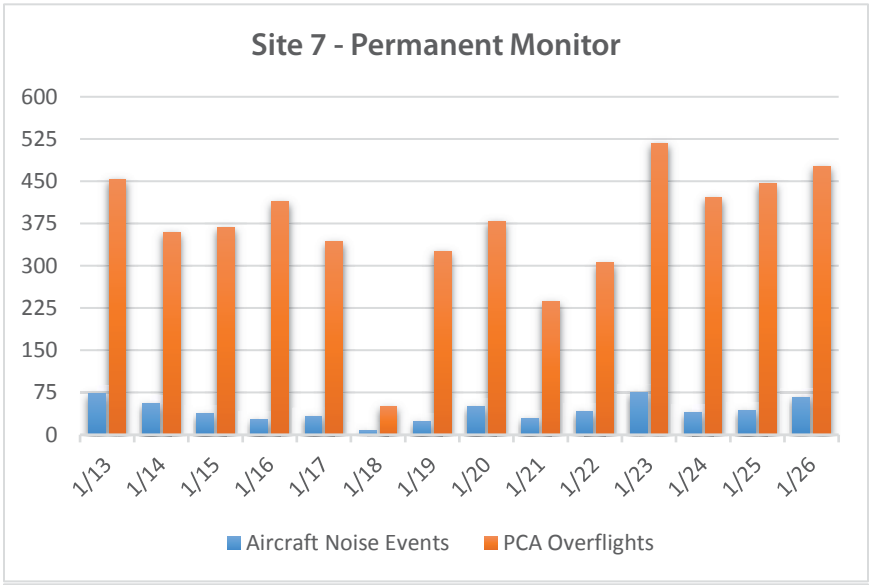
[6] Lmax - The maximum noise level is a measurement of the peak level of a noise event.

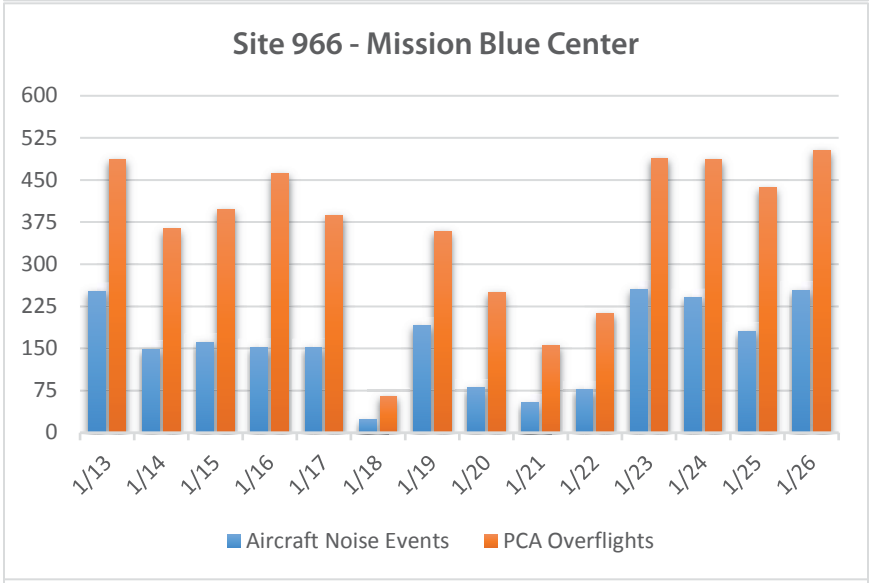
[7] SEL - Sound Exposure Level of a noise event is measured over time between the initial and final points when the noise level exceeds a predetermined threshold and it's energy is compressed into one second.

[8] Flow Pattern is the general flight pattern used by arriving and departing aircraft based on wind speed and direction.

See Appendices 1 and 2 for San Francisco Bay Area Major Jet Arrival and Departure patterns: West Flow Plan and Southeast Flow Plan.

Table 11 – Aircraft Overflights versus Noise Events by Site





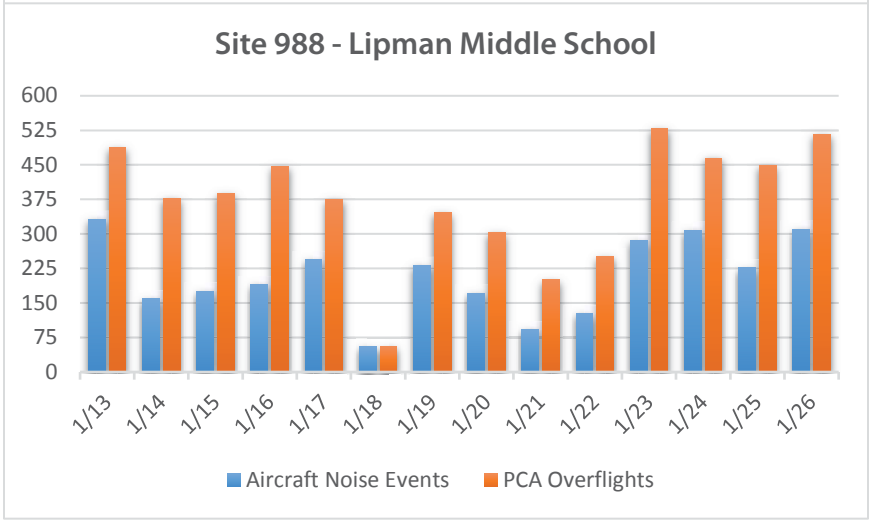


Table 11 – Aircraft Overflights versus Noise Events by Site (cont.)

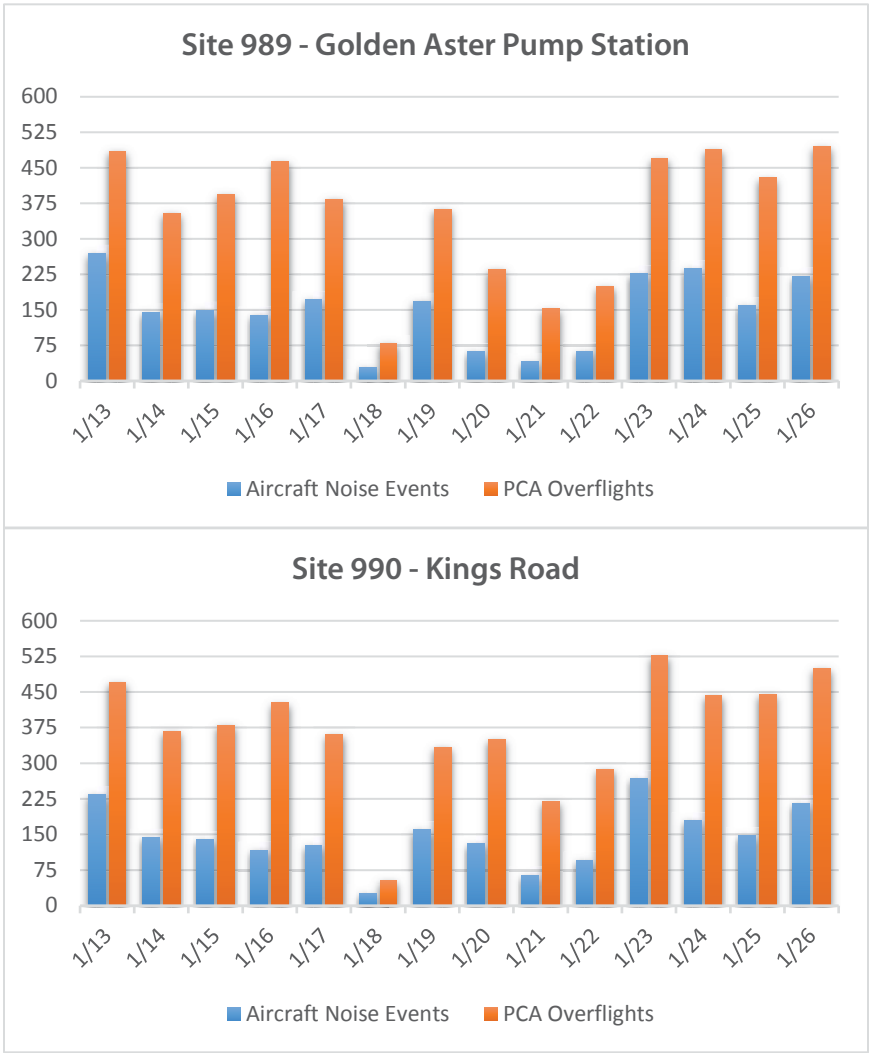
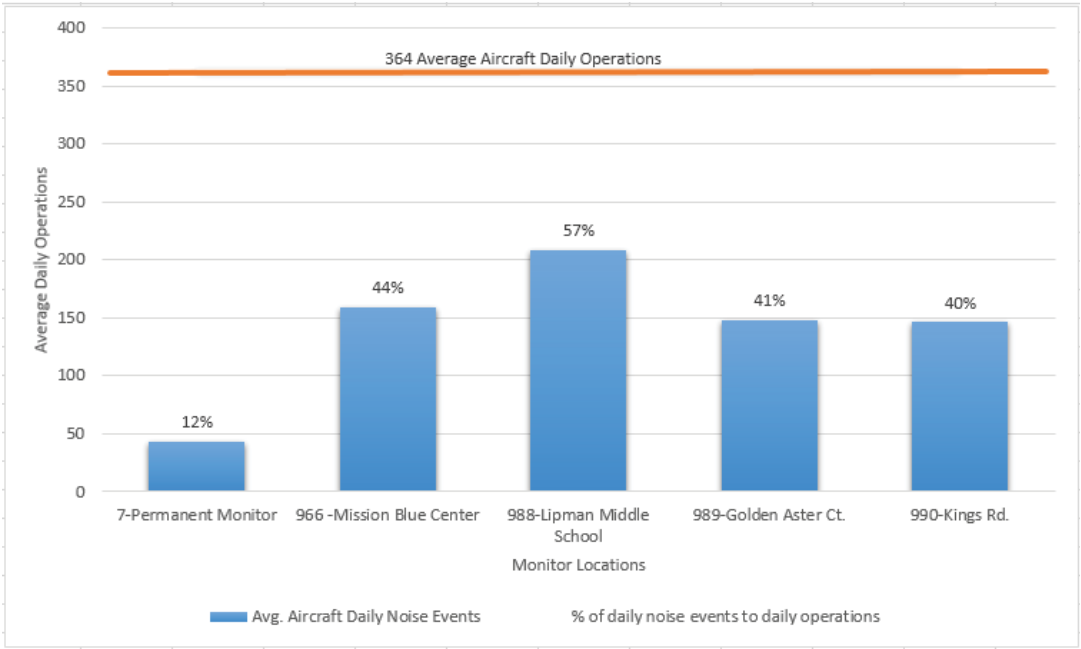
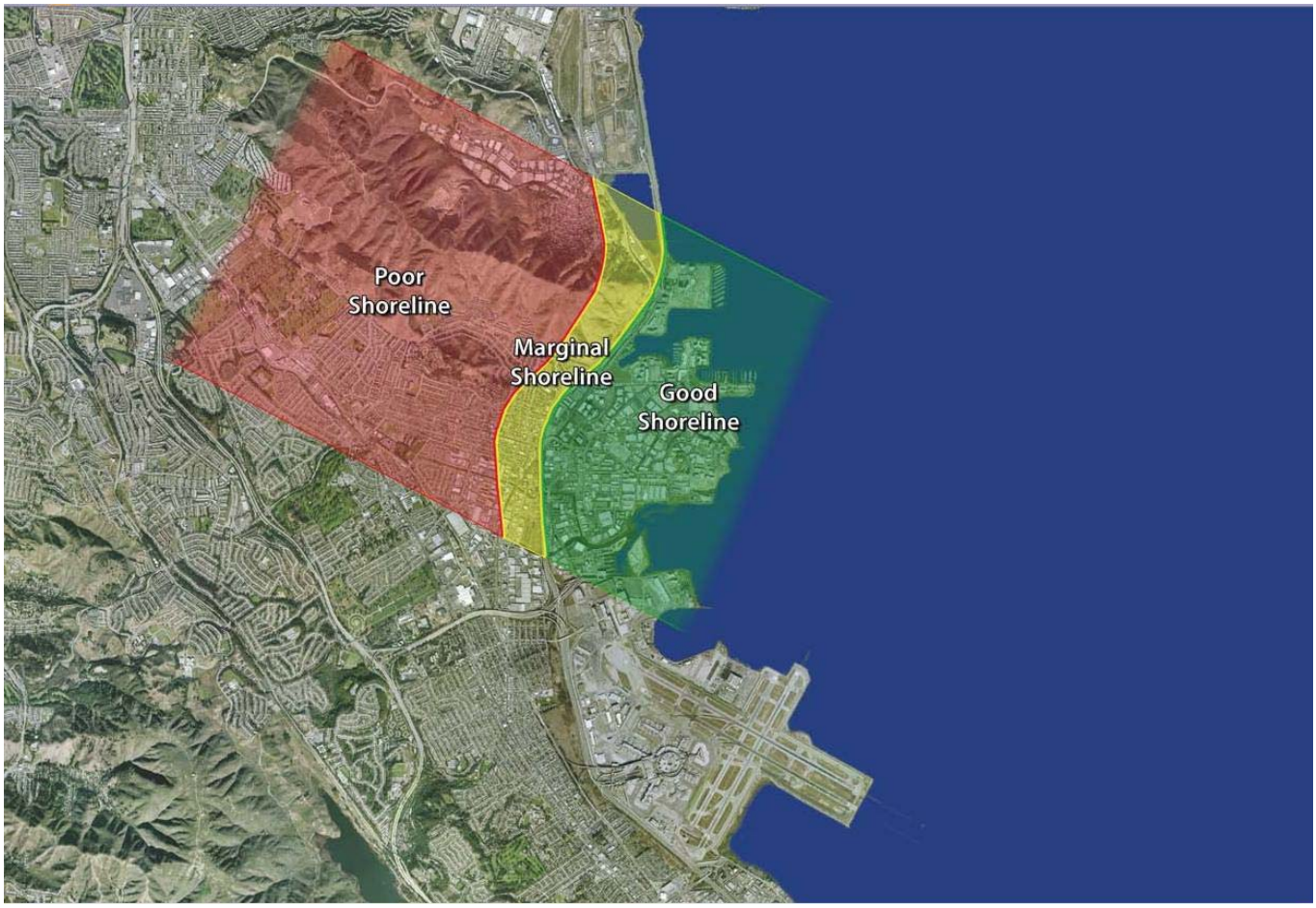


Table 12 – Daily Average of All Aircraft Operations versus Aircraft Noise Events



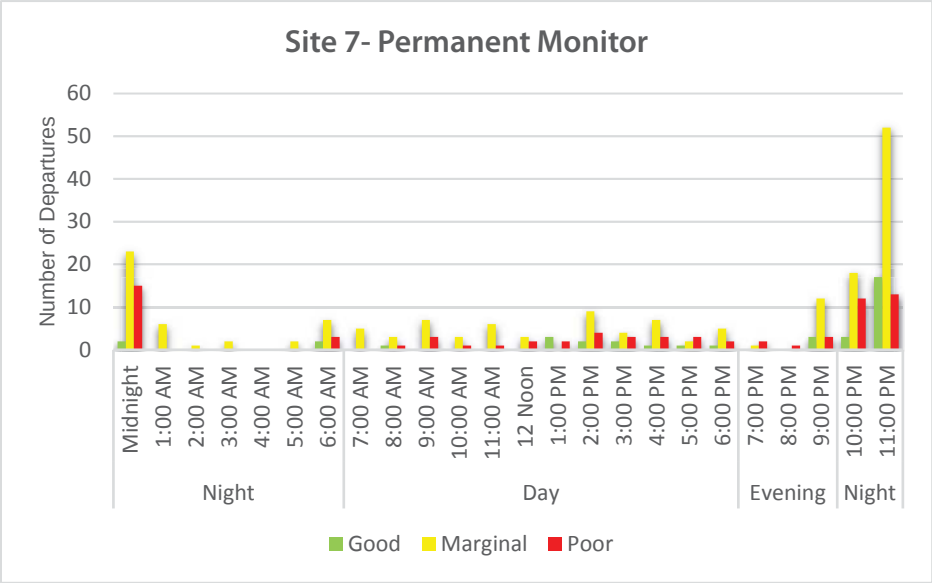
Runway 28L/R Departure Procedure Impact on Brisbane

Aircraft departing from Runways 28L/R that are assigned the TRUKN RNAV Departure (formerly the SHORELINE Departure) or the NIITE RNAV Departure perform a right turn after reaching a minimum altitude of 520 feet. As the aircraft performs the right turn that is called for within the procedure, the aircraft is graded on how well it performs the turn. The results are published quarterly within the Fly Quiet Report under the Shoreline Departure Rating. These departures are graded under three categories: 1) good – aircraft was able to remain east of Highway 101 throughout the turn 2) marginal – aircraft flew partly over Highway 101 3) poor – aircraft flew west of Highway 101 during the turn. The image below depicts the location of the three categories.



In Table 13, each graph represents the amount of Shoreline Departures that registered a noise event and the Fly Quiet grade that would be given at each site broken down by hour. Sites 966 and 989 did not capture the Shoreline Departure noise as much as did Sites 7, 988 and 990. It should be noted that the peaks in the number of departures in the 11:00 p.m. and midnight hours were caused by the combination of weather and late night easterly departures during this monitoring period. Typically, these flights are able to use the NIITE Departure procedure from Runways 01L and 01R proceeding up the bay and away from Brisbane.

Table 13 – Shoreline Departures by Hour and Fly Quiet Grade



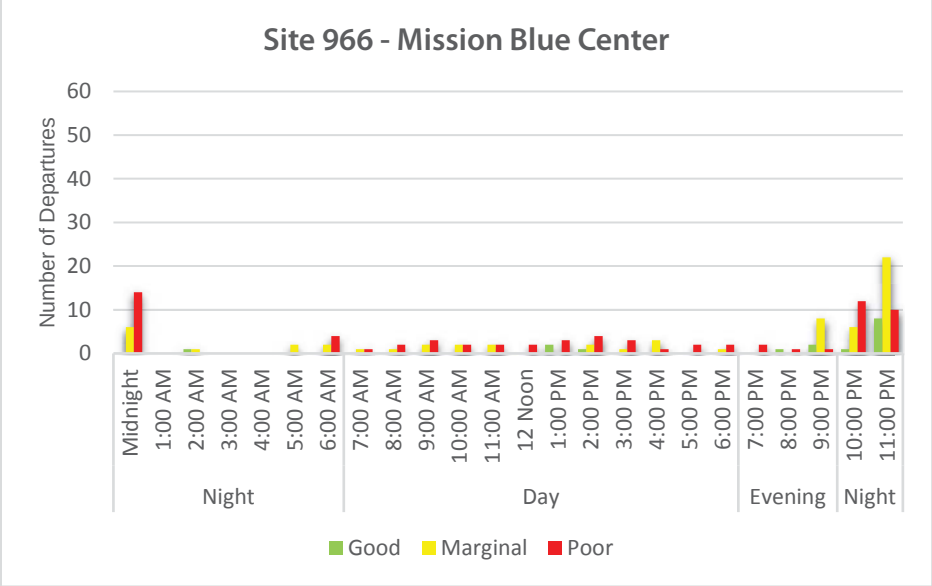
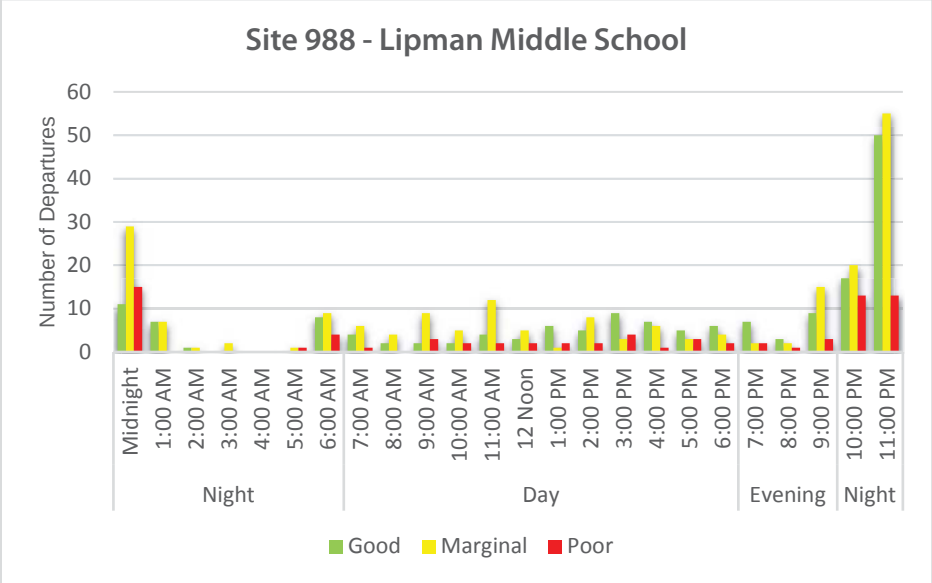
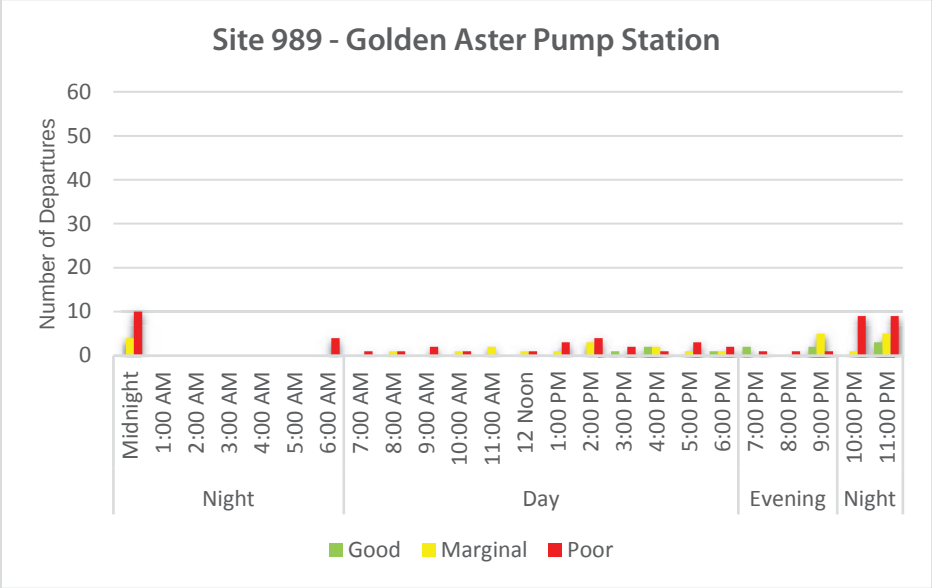
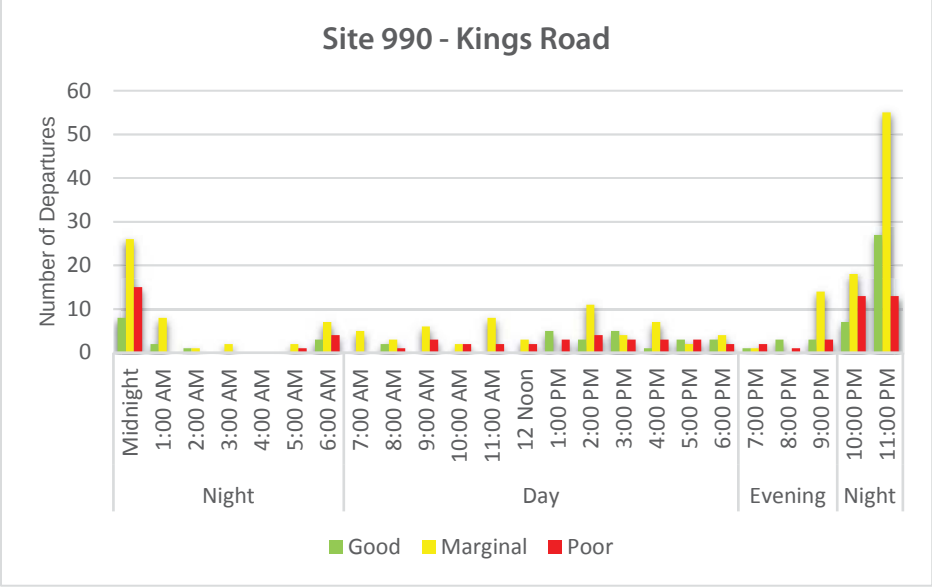


Table 13 – Shoreline Departures by Hour and Fly Quiet Grade (cont.)







Of concern to Brisbane residents during nighttime is the NIITE Departure procedure (formerly known as "Shoreline"). In addition to NIITE the TRUKN Departure procedure is typically used during daytime to route the traffic to the east from Runways 28L/R. Both procedures are virtually identical in their initial turn and how they impact Brisbane. The NIITE Departure procedure is used during the nighttime hours (10:00 p.m. – 7:00 a.m.) in order to reduce aircraft noise over the peninsula and maximize over water use. Instead of departing straight out Runway 28L/R aircraft will turn right, clip the south part of Brisbane and continue their flight north over the middle portion of the bay (see NIITE designation on the map). Almost all aircraft which flew the NIITE procedure registered noise events. During the noise monitoring period there were on average 45 departures each night using these procedures. During the 2010 and 2015 noise monitoring period average was 4 and 10, respectively. The increase of flights occurred primarily between 10:00 p.m. and Midnight (Table 15).

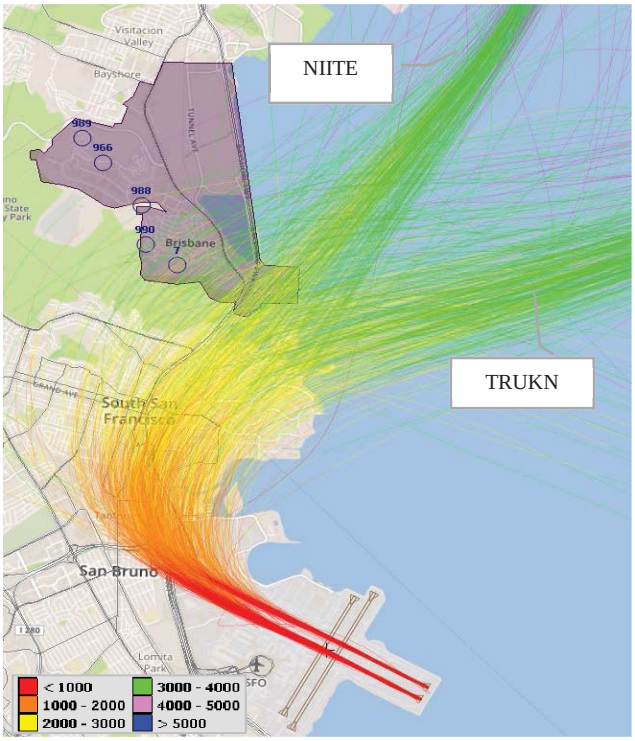
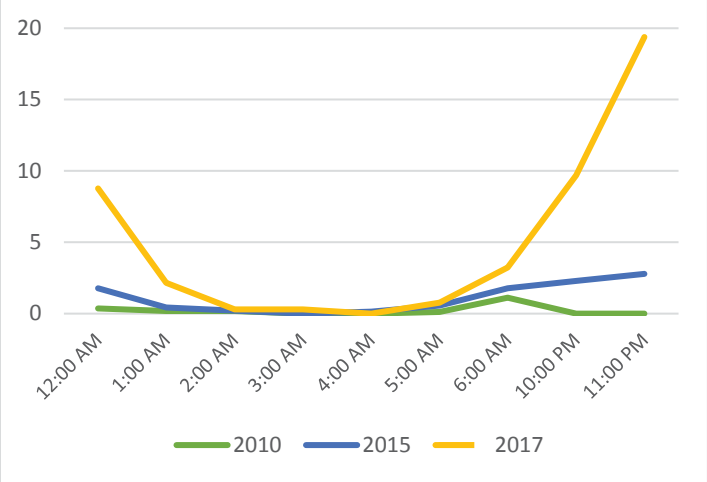


Table 14 – Shoreline Departures

1/13-1/26*	NIITE/TRUKN
7 a.m. – 7 p.m.	**300**
AVG	23
7 p.m. – 10 p.m.	**91**
AVG	7
10 p.m. – 7 a.m.	**580**
AVG	45

*No flights on 1/19, due to Oakland operating in Southeast Plan while SFO was operating in West Plan.

Table 15 – All Nighttime "Shoreline" Departures Hourly Average during each noise monitoring period



Although a daily average of 364 flights penetrated the airspace above Brisbane, 2,806 flights were identified to have registered at least one noise event at one of the noise monitor site during this measurement period. SFO operations represented 79% of this air traffic, followed by OAK (17%), then general aviation (4%) and San Jose International Airport (1%). Departure operations represented 90% of these flights, while Arrival operations accounted for 9%, and Overflights only 1%. The top four aircraft types were the Boeing 737 – Next Gen Family (35%), the Airbus A320 Family (28%), the Embraer E-jets Family (12%) and the Bombardier CRJ Family (7%). Please reference Appendix 4 - Aircraft Type Reference Sheet

Table 16 – Aircraft Operations

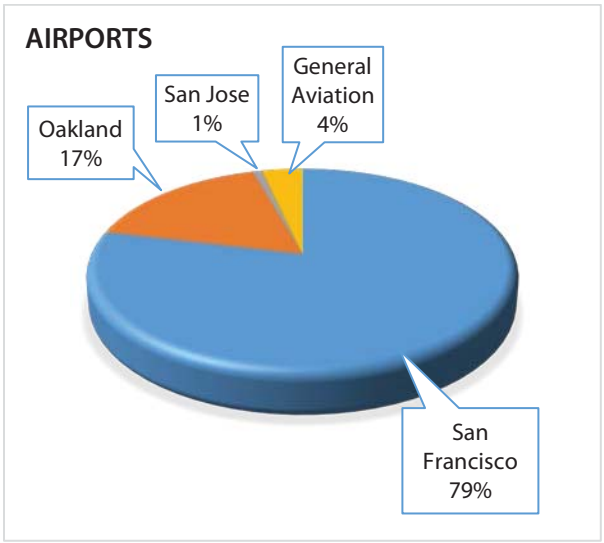


Table 17 – Aircraft Operations

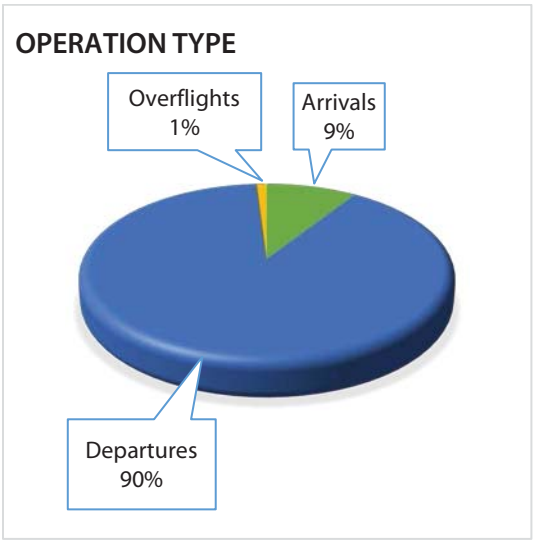
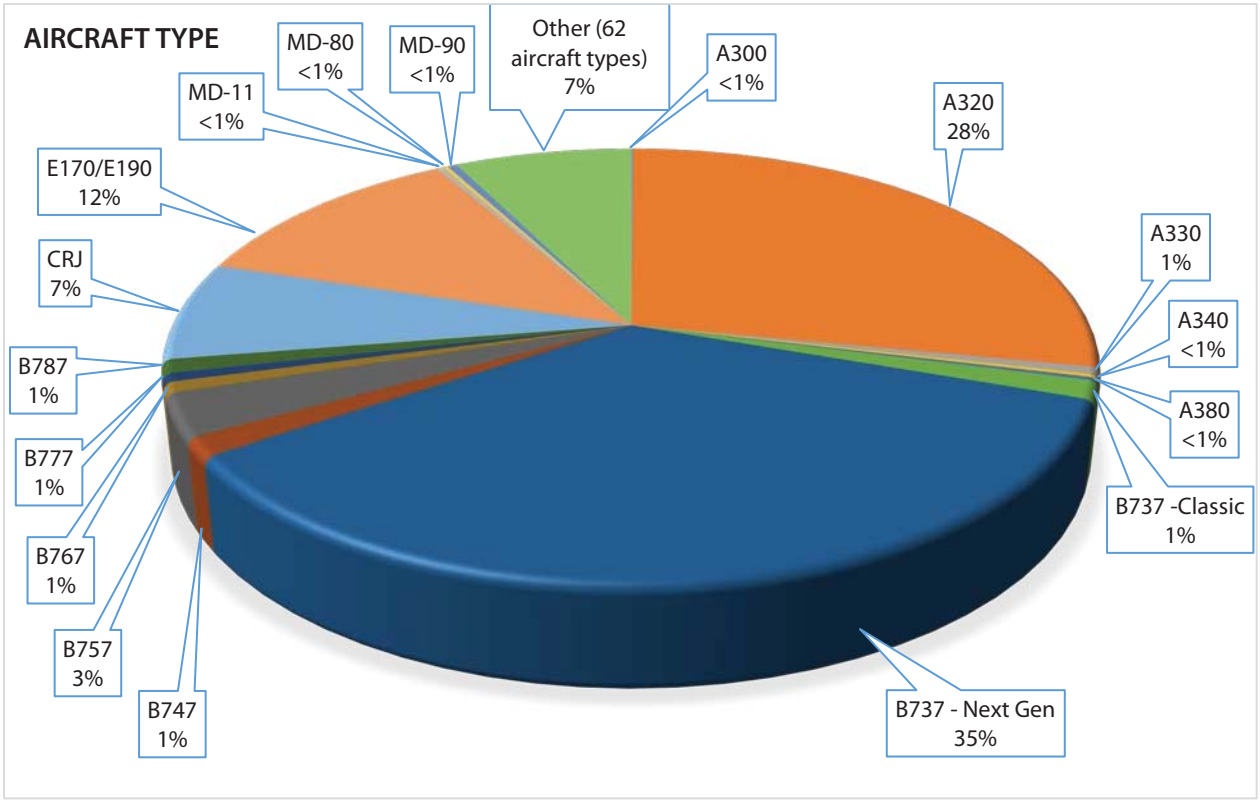
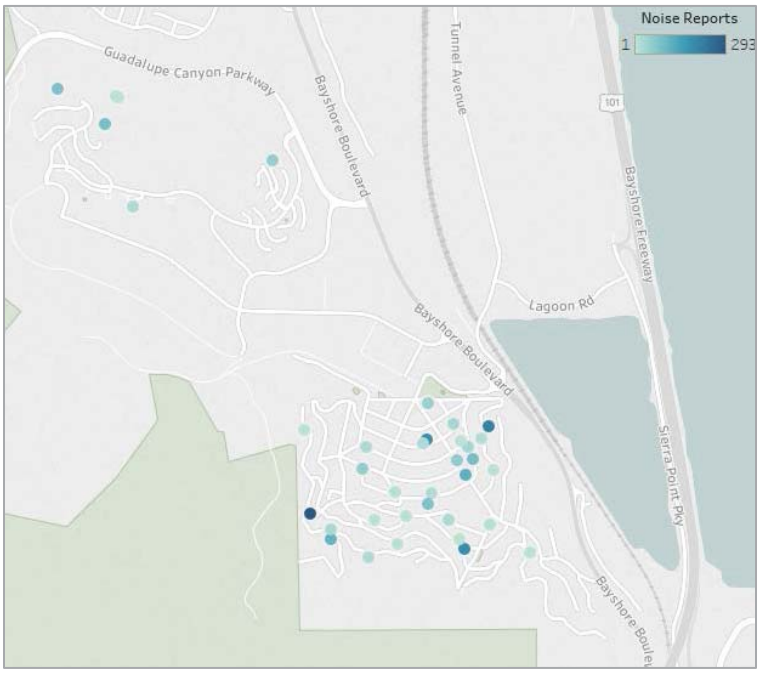


Table 18 – Aircraft Operations



Noise Reporters

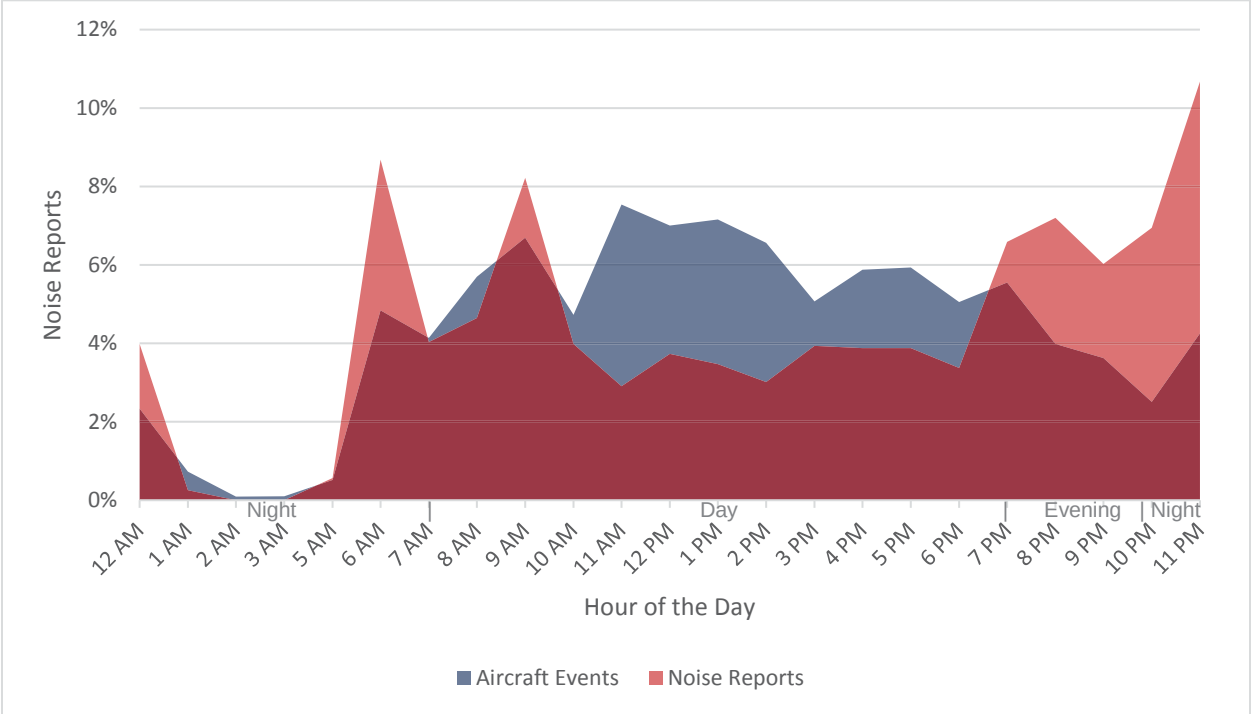
All noise reports received during the aircraft noise monitoring period were reviewed and correlated to aircraft noise events. Correlations are done using the Airport Noise Monitoring and Management System. Based on the reporters provided home address latitude and longitude, the system will look for flights within a 2-mile radius. The system will then assign a correlation ID to the noise report and any flight that matches closely to the disturbance time provided by the reporter. In summary, the correlations are done based on a disturbance time and location given by the reporter, and matched to the nearest flight at that time/location.



There were 1,958 noise reports from 38 noise reporters residing primarily in the southern portion of Brisbane (closest to the airport). Nighttime reports between 10:00 p.m. and 7:00 a.m. account for 31% of all submitted noise reports.

Table 19 depicts percentage of aircraft noise events and noise reports by hour of the day. During the evening hours there is a noticeable spike of noise reports disproportionate with aircraft noise events. All things considered, it seems reasonable to assume that the evening, night and early morning hours are most disturbing to noise reporters due to lower ambient noise levels and higher disturbance levels because of sleep.

Table 19 – Noise Reporters versus Aircraft Events



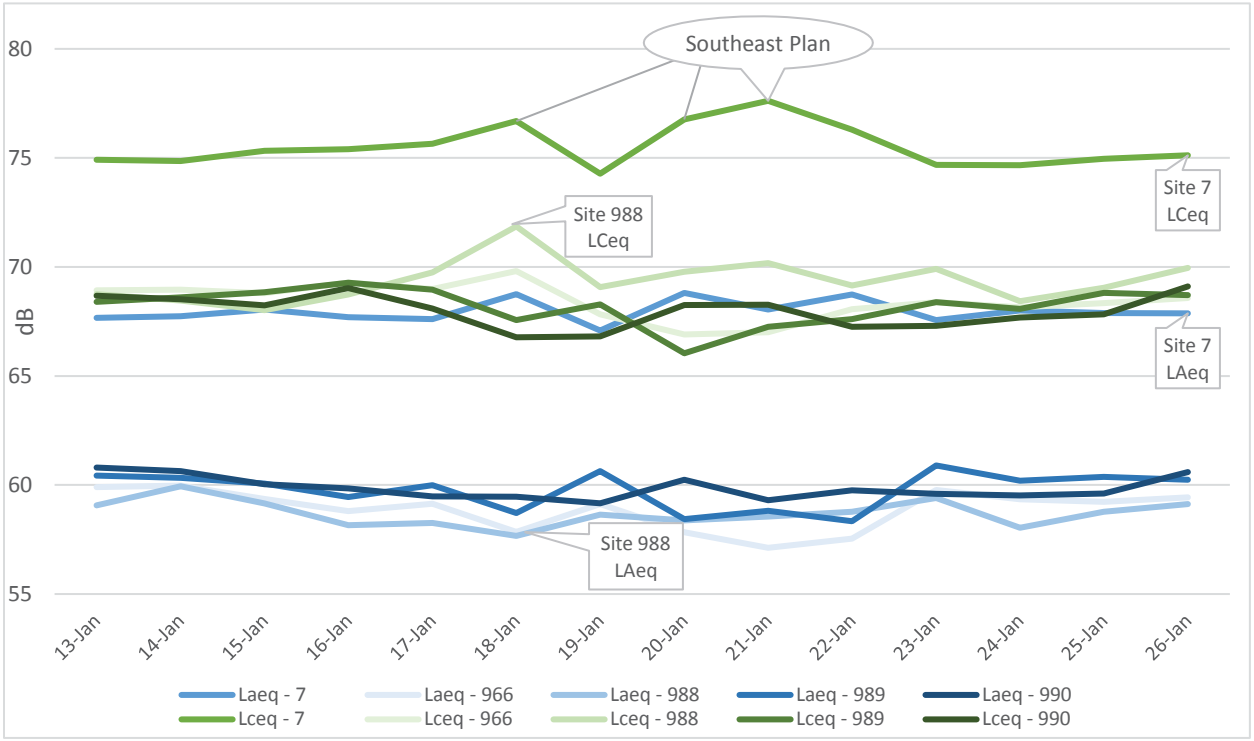
Low Frequency Noise Levels

In addition to A-weighted frequency, the Aircraft Noise Abatement office measured C-weighted frequency at the request of the City of Brisbane to determine impact of aircraft back-blast noise in Brisbane. Living close to the runway ends (Site 7 is located just 4 miles northwest of SFO) one may be impacted by back-blast noise under a certain set of conditions. These conditions are primarily when aircraft are departing Runway 10L/R, which occurs when SFO operates on a Southeast Plan (5% of the year) or during Nighttime Preferential Runway use; about half a dozen flights each night between midnight and 6:00 a.m. Although San Bruno Mountain is between the Airport and Brisbane, the Wyle Acoustics Group's "Status of Low-Frequency Aircraft Noise Research and Mitigation" report from August 15, 2001 explains that the low-frequency noise radiated by a jet engine is concentrated in a cone at about 45 degrees to the rear axis of the aircraft. Other factors such as wind, and temperature also impact sound propagation. During the noise monitoring period SFO operated on a Southeast Plan on January 18th, 20th, 21st. There is a slight increase in the C-weighted frequency on those days especially at Site 7 and 988.

The Wyle Acoustics Group study conducted at SFO in 2001 suggests that C-weighting is preferred over A-weighting to describe back-blast noise. Noise measurements from aircraft overflights typically use A-weighted decibels that measure sound levels in the mid to high frequencies. In the event of low frequency noise (airplane take-off, engine run-up) the duration and spectral content of the event is different from that of an aircraft overflight. The reduction of noise from air and ground absorption is small (Wyle, 2001). The same study also suggests that removing aircraft with LBPR (low bypass ratio engines) would be a mitigation measure to consider. Noise radiated to the rear of the aircraft is reduced significantly in the HBPR (high bypass ratio engines) installed on Stage 3 aircraft or greater. Consequently, SFO has phased out Stage 2 aircraft (Appendix 4).

During the monitoring period aircraft departing Runway 10 L/R created noise events at Site 988 (32) and 966, 989 (5 each). Site 988 had the majority of the events on the 18th (Southeast Plan). Others were during the Nighttime Preferential Runway Use hours. In consideration of the close proximity of Brisbane to SFO and its geographic location, we conclude that the back-blast noise does not significantly impact Brisbane residents.

Table 20 – A (LAeq) and C (LCeq) comparison of weighted equivalent sound pressure level (dB)



*LEQ describes sound levels that vary over time, resulting in a single decibel value which takes into account the entire energy of the aircraft noise event. The above graph allows comparison between A and C – weighted frequency.

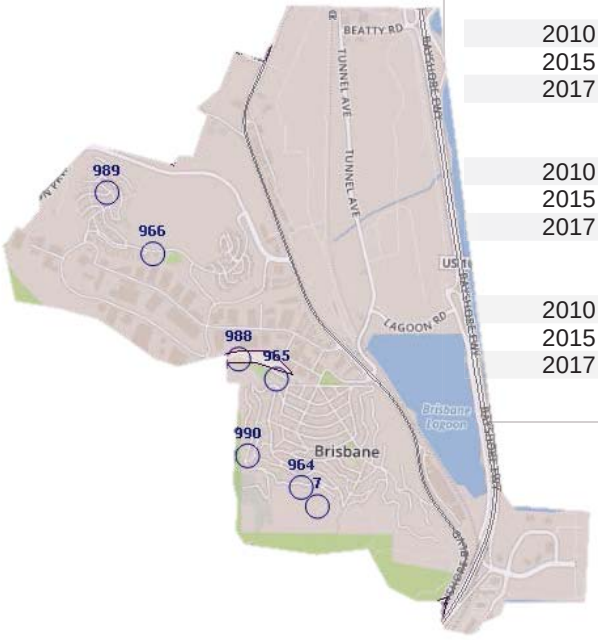
Noise Monitor Site Comparison

Table to the right shows the results of each monitoring period and noise sites in Brisbane. Site 7 is located permanently in Brisbane, while all others were done using portable monitoring units. Site 7 and 966 allows comparison for all three monitoring periods.

It is important to point out that aircraft noise event counts detected by the monitor are dependent on the pre-set threshold. As the portable noise monitor thresholds were set to a very low 55dBA in the 2015 and 2017 monitoring periods the Community levels and Aircraft levels are very close to each other and begin to merge into one another becoming extremely difficult to discern one from the other.

Table 21 – Noise Monitor Site Comparison (Daily Averages)

Site Number	7	964	965	966	988	989	990
Monitor Threshold (dBA)	65	64	64	62/64 – 2010 55 – 2015, 2017	55	55	55
Aircraft – CNEL							
2010	50		50	46			50
2015	49			52			
2017	54			51	54	50	53
Community CNEL							
2010	57		56	53			54
2015	61			53			
2017	59			53	57	55	55
Total CNEL							
2010	58		57	54			55
2015	61			56			
2017	60			55	59	56	57
Aircraft Noise Events AVG							
2010	46	51	58	36			
2015	25			140			
2017	43			157	214	148	145
SEL (dBA)							
2010	79	78	78	77			
2015	79						
2017	80			72	73	74	73
Lmax (dBA)							
2010	69	69	68	67			
2015	70			64			
2017	70			62	62	64	63
Duration (Sec)							
2010	17	16	17	14			
2015	14			30			
2017	16			28	35	28	26
Night SFO Events							
2010							
2015				14			
2017	16			14	27	10	23
Altitude (feet)							
2010	3,654	3,785	4,098	4,493			
2015	3,612			4,525			
2017	3,798			5,129	4,775	5,681	4,612



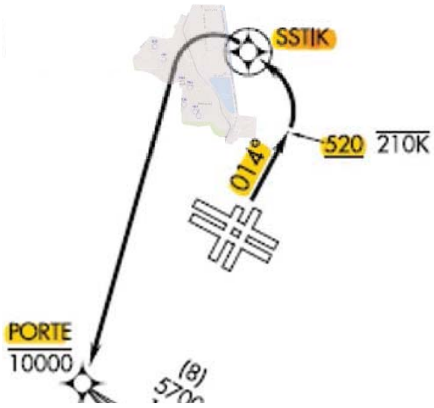
Site 7- Kings Road
Site 964 - Kings Road
Site 965 - Solana Ave
Site 966 - Mission Blue
Site 988 - Lipman Middle School
Site 989 - Golden Aster Pump Station
Site 990 - Kings Road

Aircraft Noise Measurement Periods:
2010 noise measurement: 10/28/2010 – 11/18/2010
2015 noise measurement: 4/29/2015 – 5/13/2015
2017 noise measurement: 1/13/2017 – 1/26/2017

SFO Runway 01L/R Departures – SSTIK Procedure

SFO Runway 01L/R departing aircraft that overfly Brisbane typically use the SSTIK Instrument Departure Procedure (SID). This departure route has been in place for several years (see Appendix 3 for the current procedure map) and is designed to assist in meeting air traffic capacity needs and provide obstacle clearance. SSTIK SID uses area navigation (RNAV) which increases flight accuracy.

The City of Brisbane is located inside the terminal airspace of San Francisco International Airport (see image on the right for Brisbane location compared to SSTIK procedure). Furthermore, San Francisco Bay Area airspace is very complex, with traffic from several major airports, smaller regional airports and military activity. All arrival and departure procedures within the airspace are interconnected, interdependent and were designed to improve safety and efficiency. Having said this, the Federal Aviation Administration Air Traffic Controller's primary responsibility is the safe and expeditious flow of aircraft. This is important to mention, as it relates to departure procedures in great detail. These procedures are designed to expedite aircraft through the terminal area. This also explains why not all aircraft continue all the way to PORTE. If there is a more efficient way to clear traffic outside the Bay Area air traffic control will do so.



As departing aircraft are in a left climbing turn over Brisbane, the ground path of each aircraft varies for several reasons; aircraft type and performance, weather (wind), speed, angle of bank, pilot or autopilot use and other aircraft traffic, etc.

In addition to SSTIK procedure, there is the OFFSHORE Departure procedure that uses a radio navigation aid (VOR) as a primary navigational tool. The OFFSHORE procedure has been largely reduced because the SSTIK SID uses new RNAV technology to guide aircraft on the procedure. Regardless of which procedure is used both waypoints off the coast of Brisbane are less than half a mile apart.

SSTIK Procedure

Does use of more SSTIK procedure reduce noise in Brisbane?

Aircraft departures off Runway 01L, which flew within one-fourth of a mile of SSTIK (Table 22), were evaluated for this measurement period. The daily average of 01L departures that flew within one-fourth of a mile of SSTIK was 44%, compared to 40% from the 2016 Brisbane Report (page 2, bottom table). An average of 65% of those operations registered a noise event at the noise monitor.

Data collected at Site 966 In 2015 was evaluated similarly on the SSTIK. The table below compares daily averages for both measurement periods.

Noise Monitoring Period Site 966	01L Departures	SSTIK	% of 1L Departure	Noise Events	%	SEL (dBA)	Lmax (dBA)	Duration	Altitude (ft.)
2015	145	57	40	37	64	75	65	32	4,951
2017	180	79	44	61	77	76	64	31	5,480

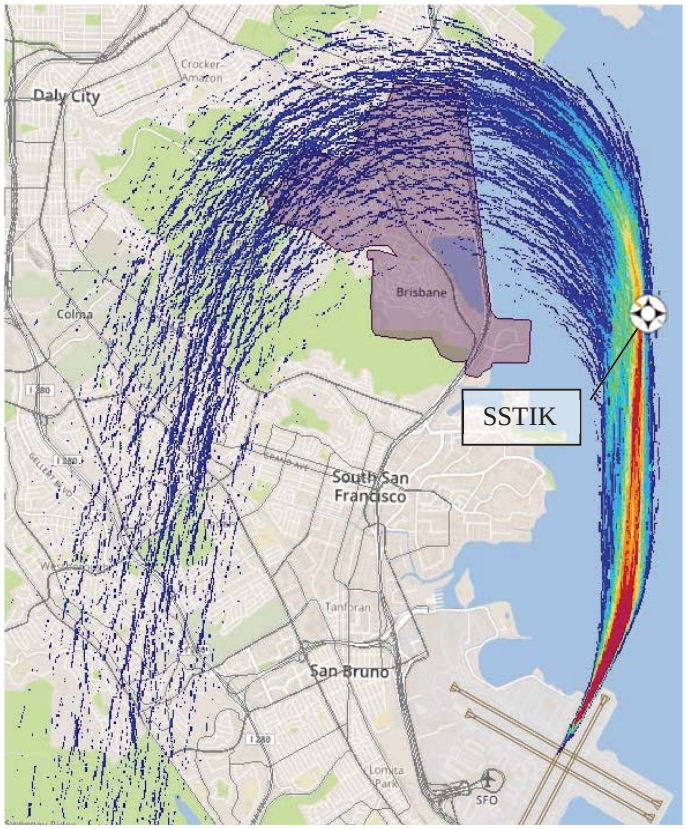
Table 22 – SSTIK Flights that created a Noise Event

Date	Flight Operations			SSTIK Noise Events						
	01L/R Departure	SSTIK (0.25 mi)	% of 01L/R Departure	Site	Count	Flight (%)	SEL (dBA)	Lmax (dBA)	Duration (Seconds)	Altitude (ft.)
1-13	193	67	35%	7	2	3%	77	67	13	4,455
				966	64	96%	76	64	31	5,293
				988	77	115%	74	63	31	5,096
				989	60	90%	77	67	32	5,295
				990	41	61%	74	66	24	5,025
1-14	140	52	37%	7	-	-	-	-	-	-
				966	33	63%	76	65	31	5,383
				988	29	56%	75	63	27	5,158
				989	41	79%	76	66	28	5,448
				990	21	40%	73	67	23	5,296
1-15	167	83	50%	7	-	-	-	-	-	-
				966	52	63%	76	64	32	5,556
				988	52	63%	74	62	27	5,375
				989	58	70%	76	65	30	5,585
				990	36	43%	73	64	22	5,526
1-16	208	90	43%	7	-	-	-	-	-	-
				966	49	54%	75	63	25	5,300
				988	52	58%	72	60	24	4,914
				989	46	51%	75	65	24	5,362
				990	17	19%	72	62	21	4,912
1-17	193	105	54%	7	1	1%	71	65	6	2,044
				966	68	65%	75	64	31	5,351
				988	99	94%	75	63	41	5,429
				989	82	78%	77	67	27	5,459
				990	40	38%	73	63	25	5,401
1-19	146	81	55%	7	2	2%	77	69	11	5,671
				966	74	91%	76	65	36	5,458
				988	97	120%	77	65	44	5,660
				989	73	90%	77	67	36	5,617
				990	62	77%	75	66	29	5,940
1-23	169	86	51%	7	1	1%	85	74	28	3,930
				966	80	93%	78	66	39	5,416
				988	89	103%	76	65	36	5,422
				989	82	95%	78	68	34	5,410
				990	70	81%	75	65	29	5,362
1-24	212	99	47%	7	1	1%	78	72	7	2,801
				966	82	83%	75	63	31	5,695
				988	118	119%	75	62	37	5,276
				989	84	85%	76	66	30	5,813
				990	42	42%	73	62	23	5,538
1-25	154	57	37%	7	-	-	-	-	-	-
				966	50	88%	74	64	28	5,703
				988	53	93%	76	66	35	5,341
				989	48	84%	76	66	29	5,884
				990	26	46%	71	62	18	5,660
1-26	214	72	34%	7	2	3%	78	72	9	3,636
				966	54	75%	75	64	32	5,647
				988	65	90%	76	64	46	5,428
				989	54	75%	76	65	31	5,549
				990	32	44%	74	63	28	5,662
Daily AVG	**180**	**79**	**44%**			**65%**	**75**	**65**	**28**	**5,221**

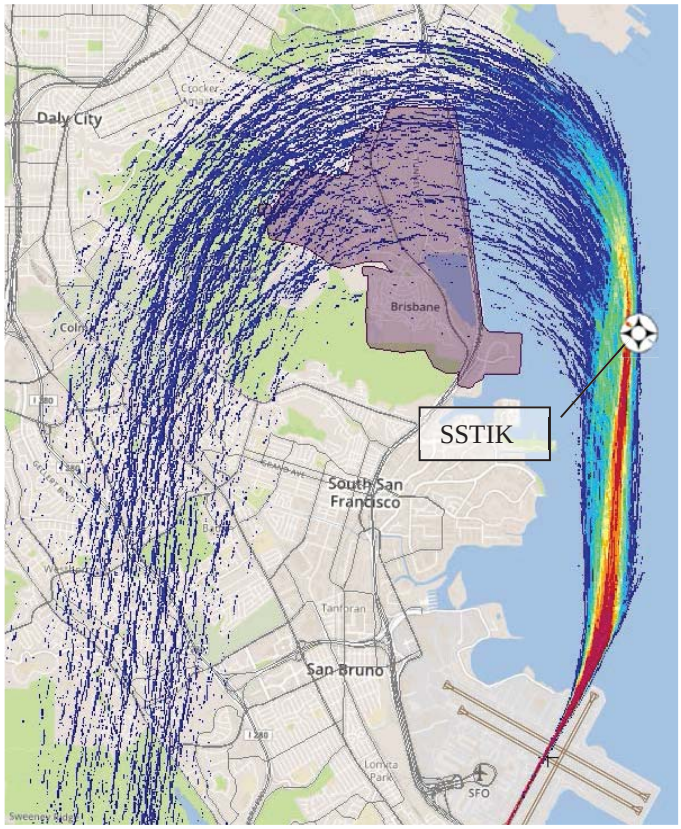
January 18, 20-22 did not have any 01L/R departures therefore no SSTIK overflights.

SSTIK Instrument Departure Procedure (SID) Track Density comparing flights during the 2015 and 2017 noise-monitoring period.

2015



2017

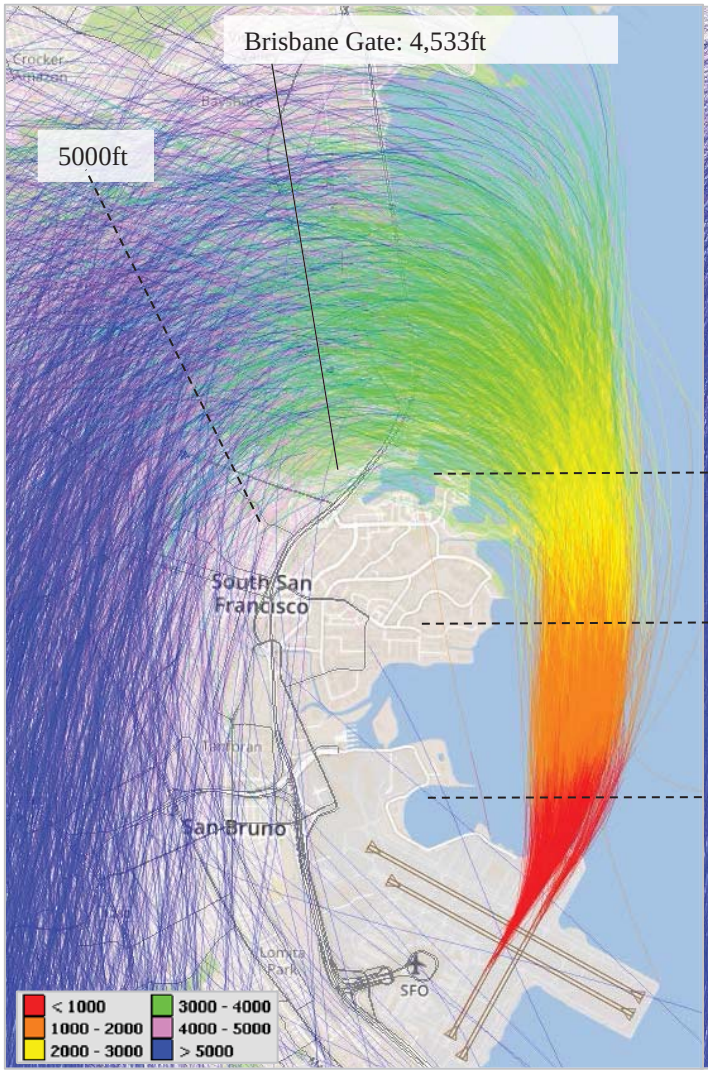


A track density plot is a grid, displayed over the map, and colored according to the number of flights that have passed through each grid point. It shows the density of flights using the same route in 2015 and 2017 with no discernable change to the route of flight. The warmer colors (red) indicate higher flight counts per grid versus the cooler colors (blue) that show fewer flights per grid.

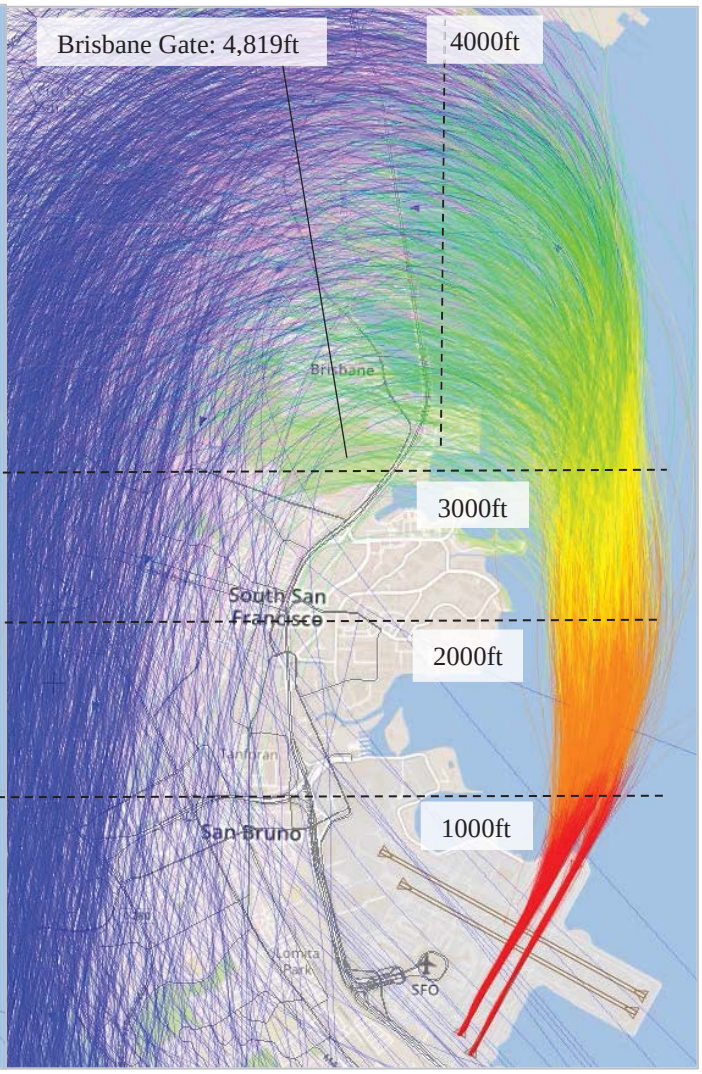
Before the SSTIK procedure was introduced on January 8, 2015 as part of the Northern California FAA Metroplex airspace redesign program the standard instrument departure procedure in place was the PORTE Departure. Comparing both procedures initial stages as they relate to Brisbane, we identified initial waypoints (SEPDY, SSTIK) off the coast of Brisbane which are less than half a mile apart and we found that the climb performance of the new SSTIK procedure does not increase the noise over Brisbane due to waypoint change and minimal altitude variances. In fact, flights that created noise events during the 2017 monitoring period were on average 300ft higher.

Both procedures have similar take off minimum climb rates. The minimum climb rate for PORTE is 535 feet per nautical mile (NM) and for the SSTIK is 500 feet per NM. Comparing flights that created a noise event during 2010 and 2017 noise monitoring period by altitude, we notice that the flights in 2017 are higher over Brisbane then they were in 2010. The rate of climb and noise footprint size of the newly introduced procedure does not negatively impact Brisbane.

2010

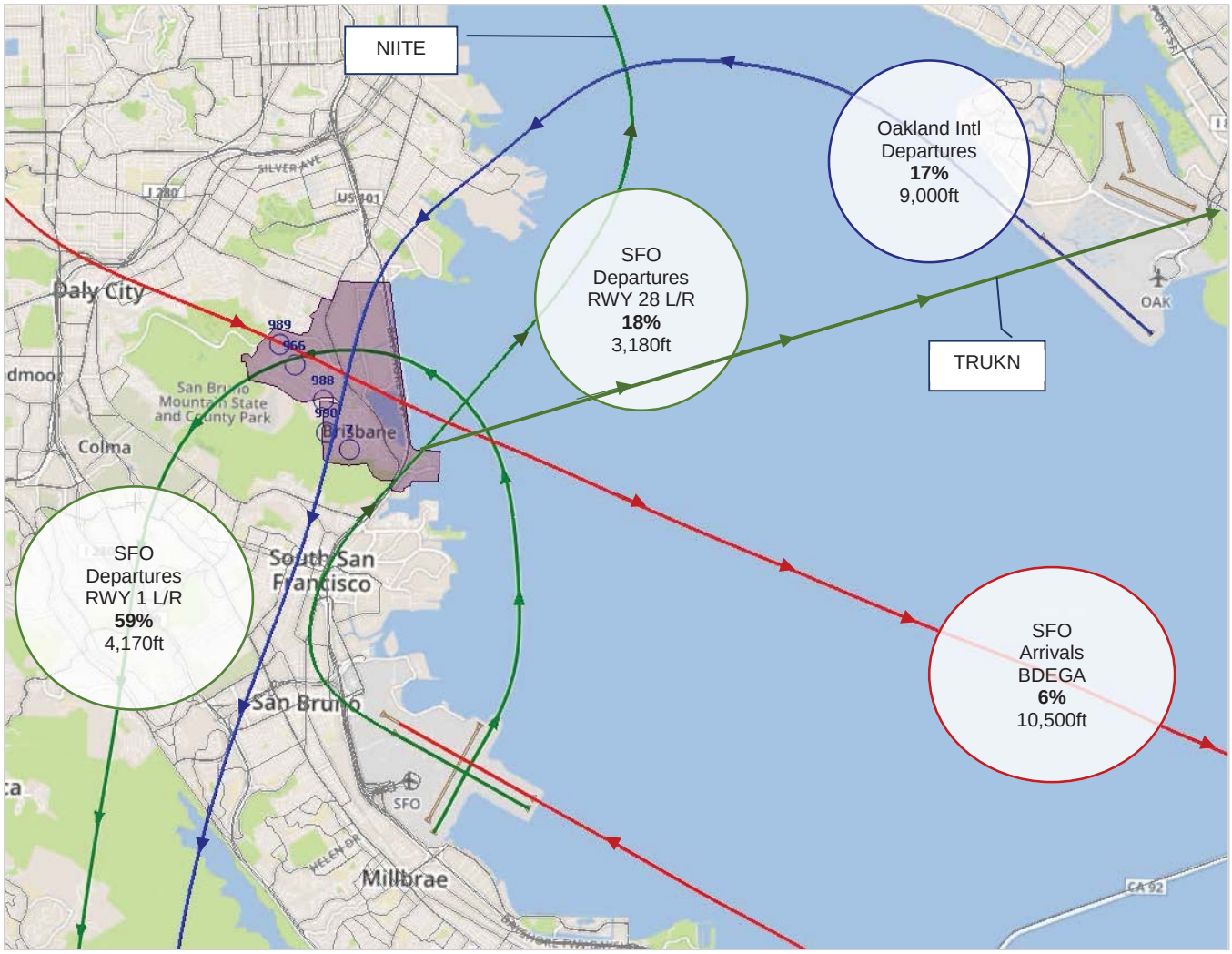


2017



Pathways and Altitudes over Brisbane

Flights that created a noise event at a minimum of one monitoring site were studied based on each of the four flight paths over Brisbane. Major flight paths over Brisbane are: SFO Runway 01 L/R departures turning left over Brisbane, SFO Runway 28 L/R departures turning right over Brisbane, Oakland Departures heading south and SFO BDEGA East arrivals. The map below depicts these paths together with the percentage of each flight path and average altitude over Brisbane.



Conclusion

Aircraft noise levels were measured in the City of Brisbane, California, an urban community approximately 4.5 miles from SFO. Flights above Brisbane consist primarily of departing SFO aircraft as SFO accounts for 79% of all aircraft noise events. During inclement weather when SFO operates in the Southeast Plan aircraft CNEL drops considerably while community CNEL increases due to wind and rain. The computed levels for the average **Aircraft CNEL** was 53dBA, and the average **Community CNEL** was 56dBA for all sites. Overall aircraft noise measurements contribute 1.5dBA additional noise to the total cumulative average noise level of 58dBA CNEL.

Table 23 – CNEL

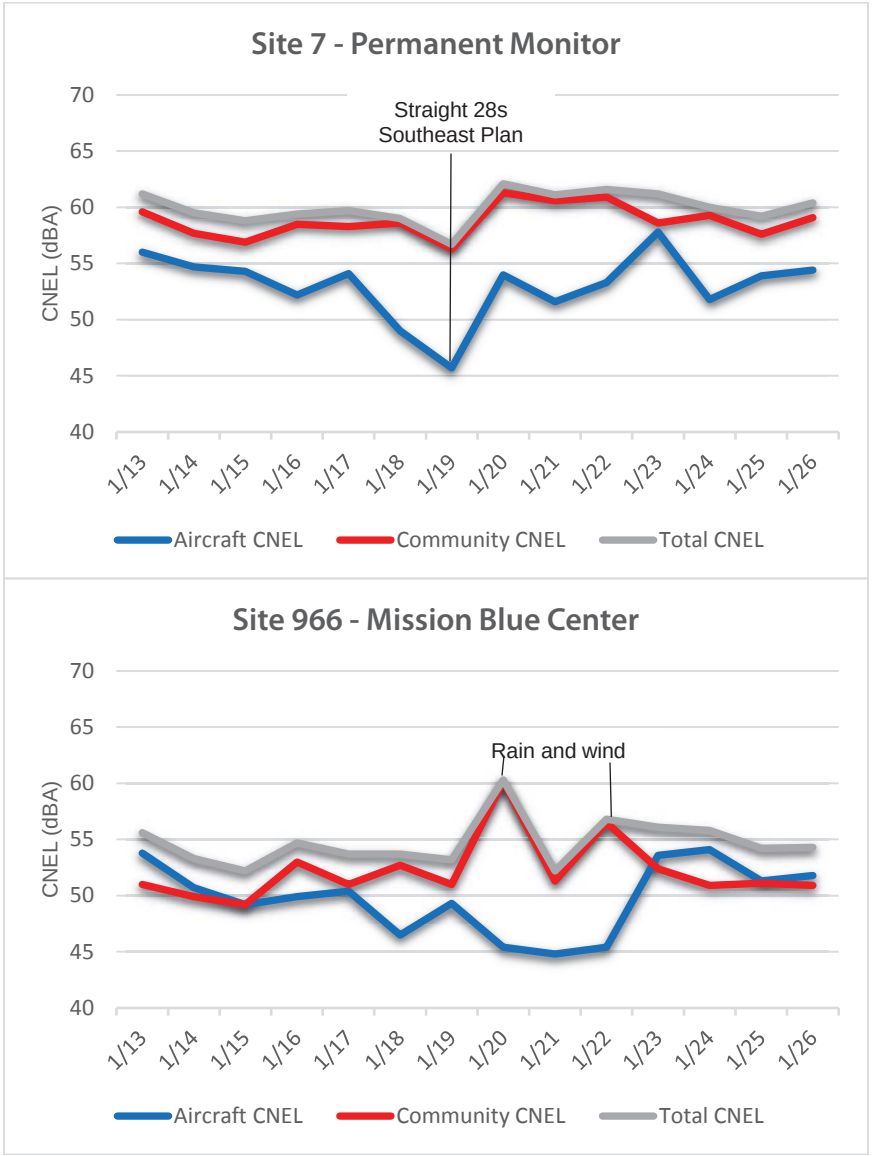
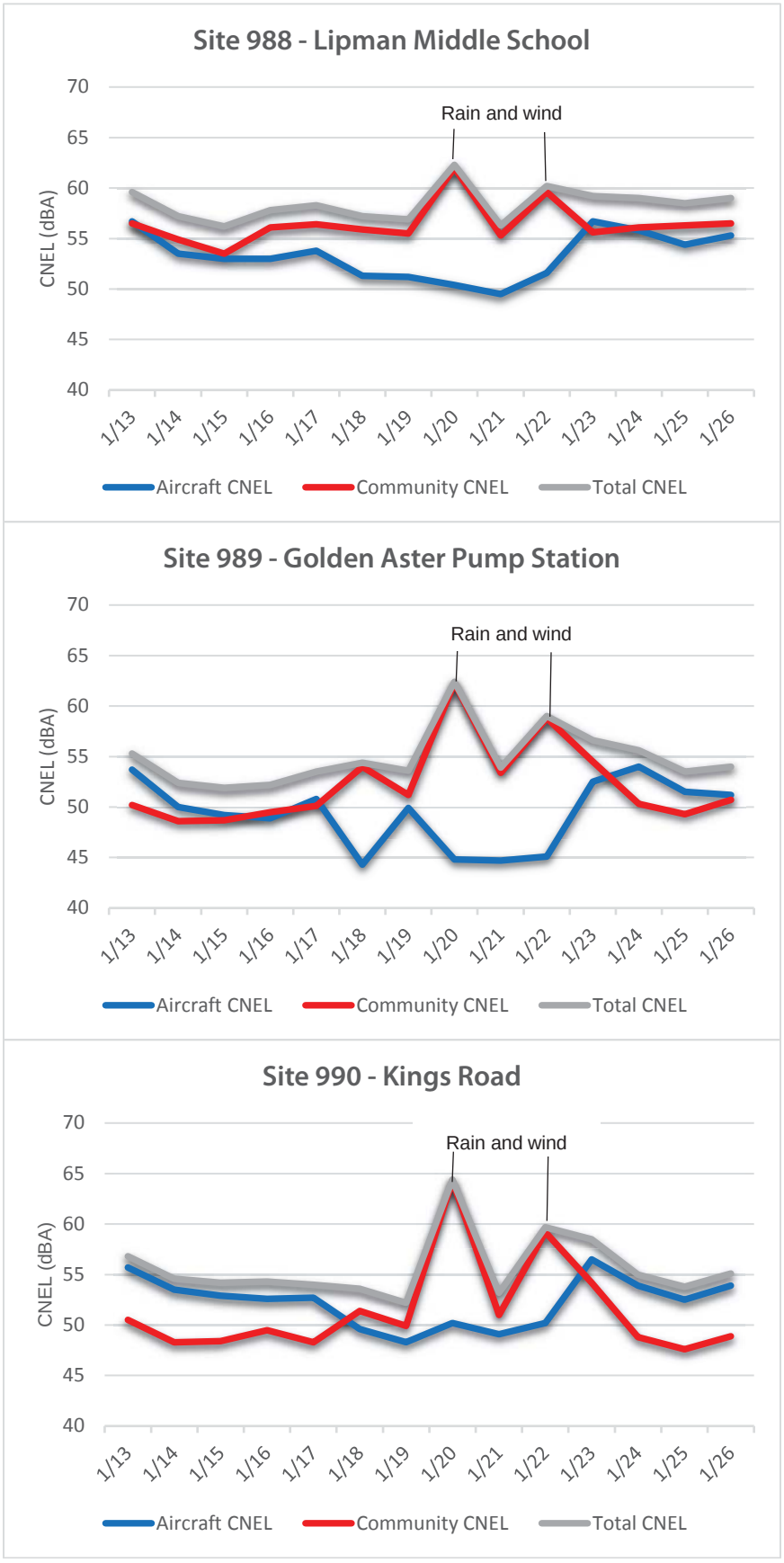
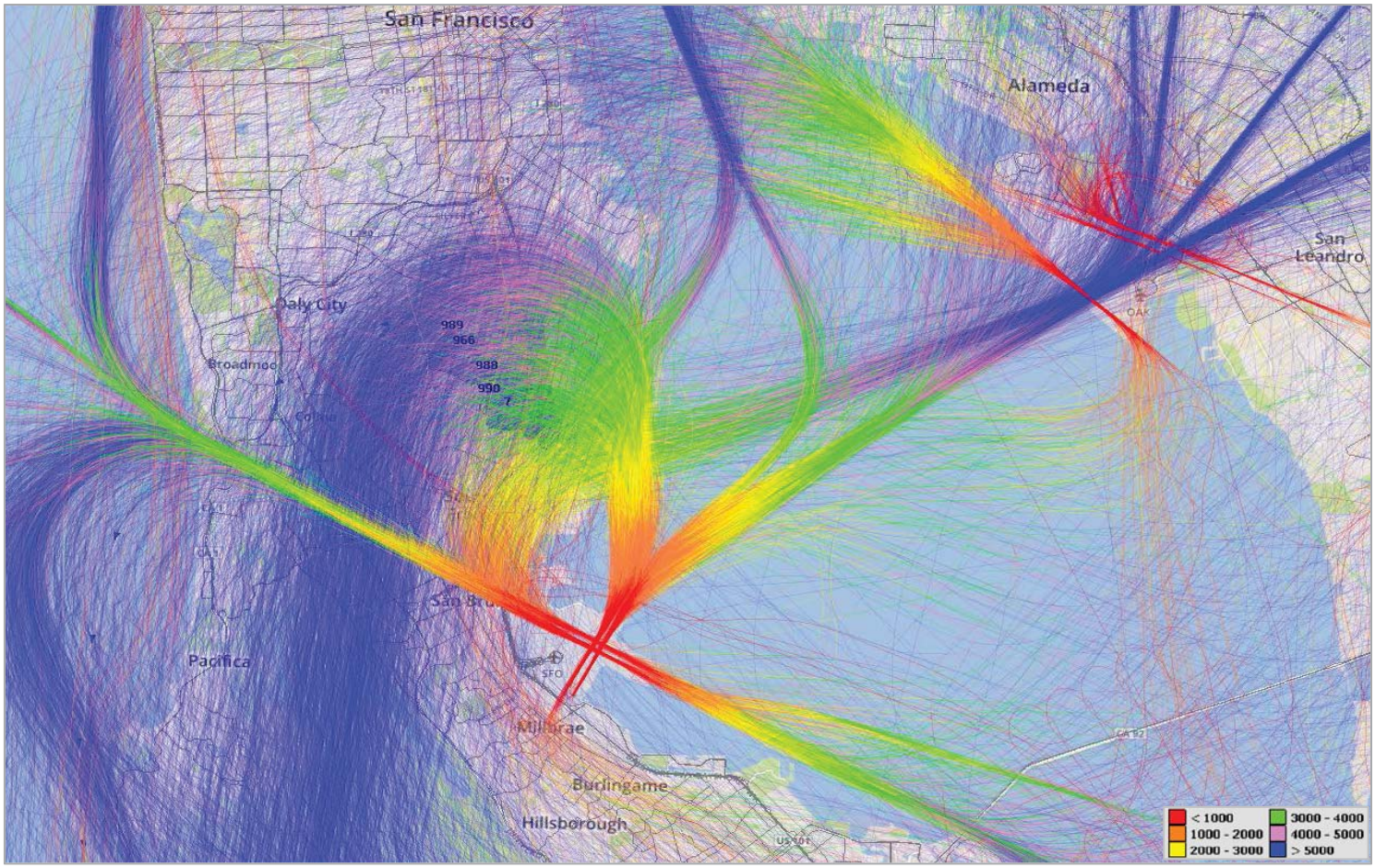


Table 23 – CNEL (cont.)



The California Code of Federal Regulations, Title 21, Division 2.5, Chapter 6, paragraph 5012 states, “The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels.” Since the average Aircraft CNEL was measured at 53dBA for Brisbane, this residential area has an acceptable level of aircraft noise as defined by state law. The extent of the 65dBA CNEL noise impact contour at SFO is shown in Appendix 5. This noise contour was generated using Federal Aviation Administration’s Integrated Noise Model (version 7.0d). The Federal Aviation Administration accepted this map as part of the Noise Exposure Map update under Federal Aviation Regulations Part 150 on January 29, 2016. The results of the field monitoring validate the extent of the 65dBA CNEL noise impact boundary confirming Aircraft CNEL is less than 65dBA CNEL for this community.

Table 24 – All flights that created noise events during the 2017 Brisbane Noise Monitoriong Period.
Color represents the flight altitude.



Note: Altitude coloration in 1,000 foot groupings.

Figure 1 – Microphones/Tripods in Brisbane


Site 7 – Permament Monitor


Site 966 – Mission Blue Center


Site 988 – Lipman Middle School


Site 989 –Golden Aster Pump Station


Site 990 – Kings Road

Figure 2 - Monitoring Locations

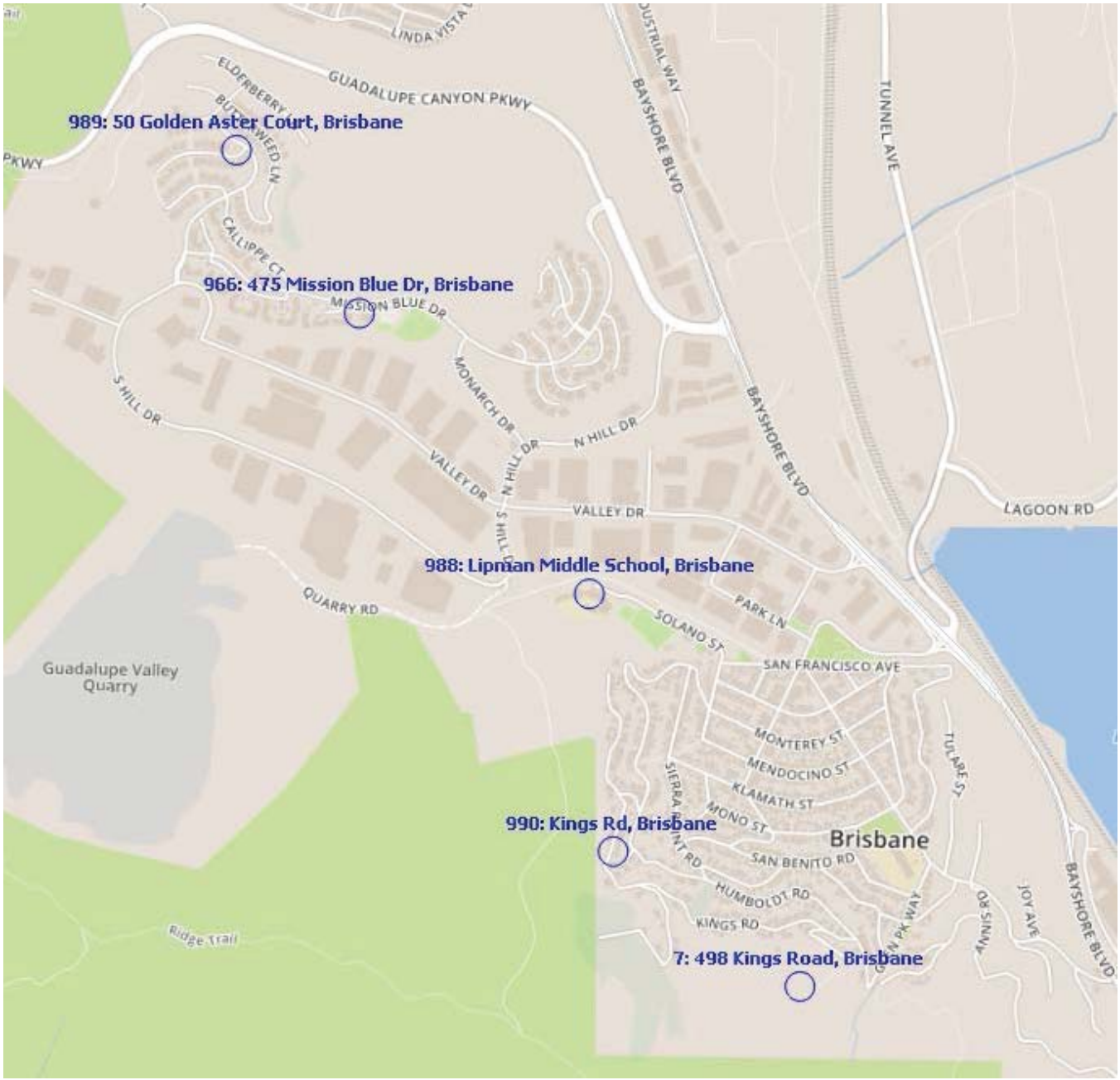
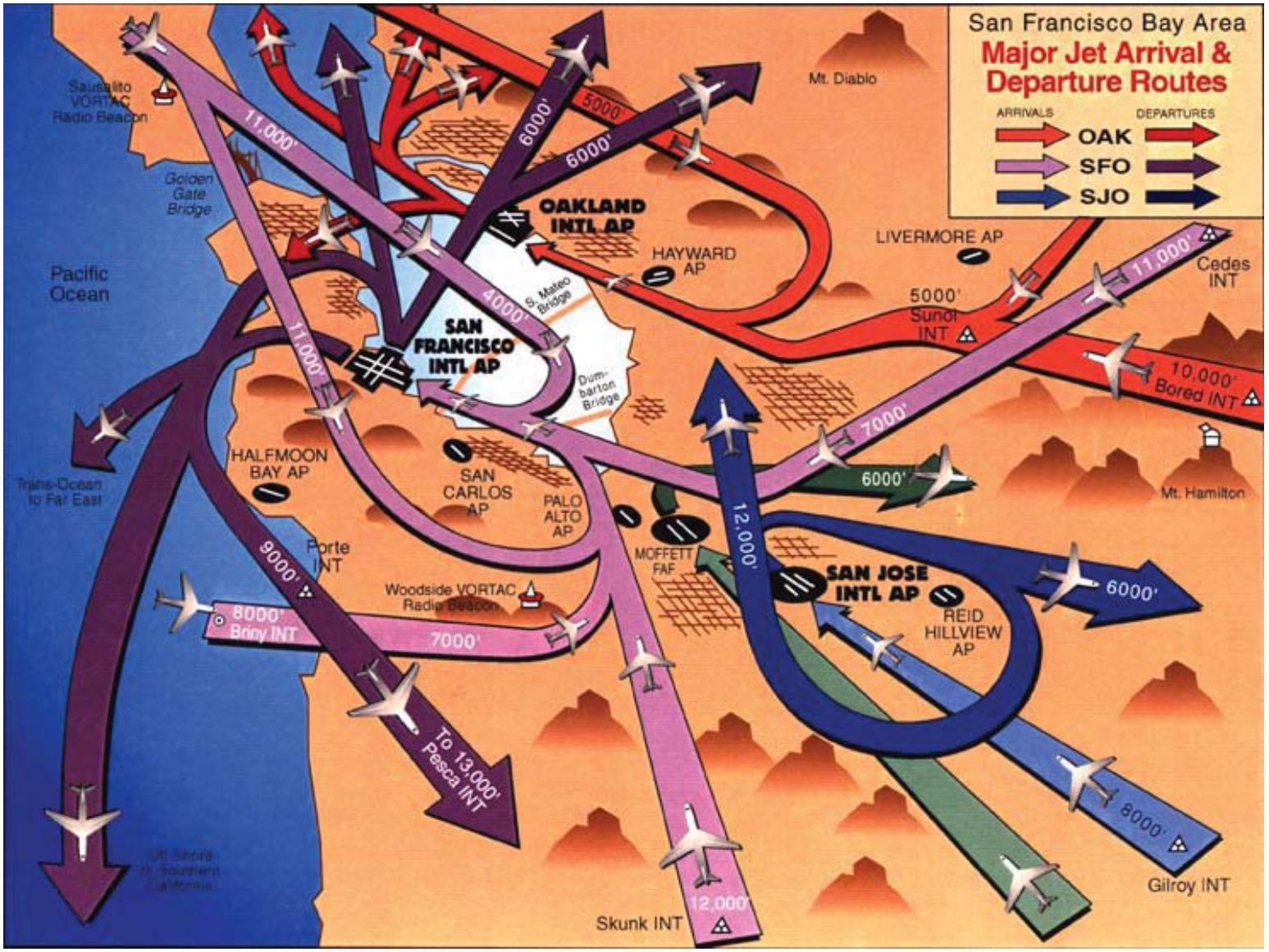


Table 24 – Noise Measurement Days

Sites	Location	Date	Number of monitoring days
7	Permanent-Margaret Tank	1/1/17 – 2/2/17	33
966	Mission Blue Center	1/8/17 – 1/26/17	19
988	Lipman Middle School	1/1/17 – 2/2/17	33
989	Golden Aster Pump Station	1/13/17 – 1/26/17	14
990	Kings Road	1/7/17 – 1/26/17	20

Appendix 1 – San Francisco Bay Area Major Jet Arrival and Departure Routes

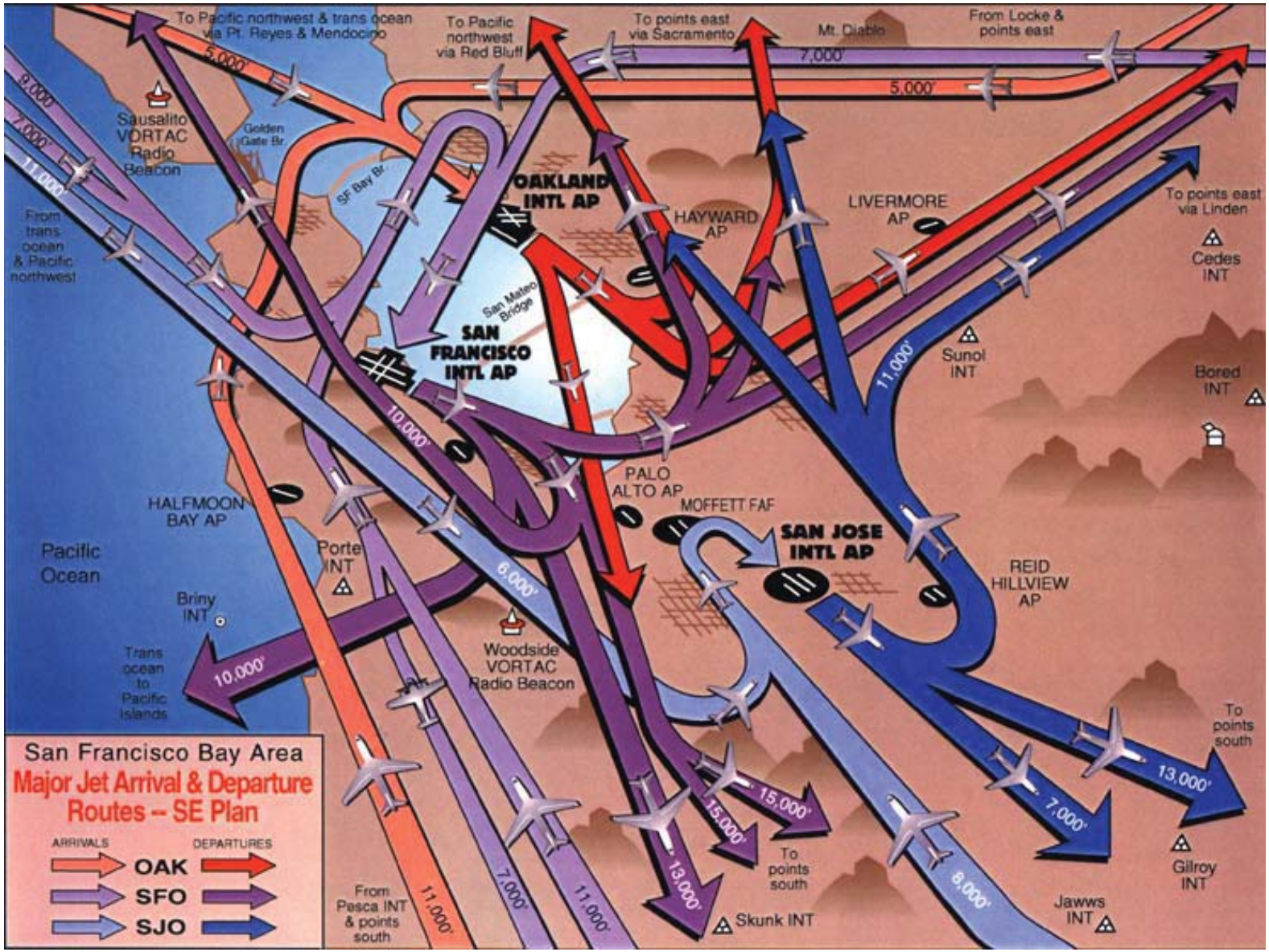
West Flow Plan



*note not all routes shown and image not drawn to scale

Appendix 2 – San Francisco Bay Area Major Jet Arrival and Departure Routes

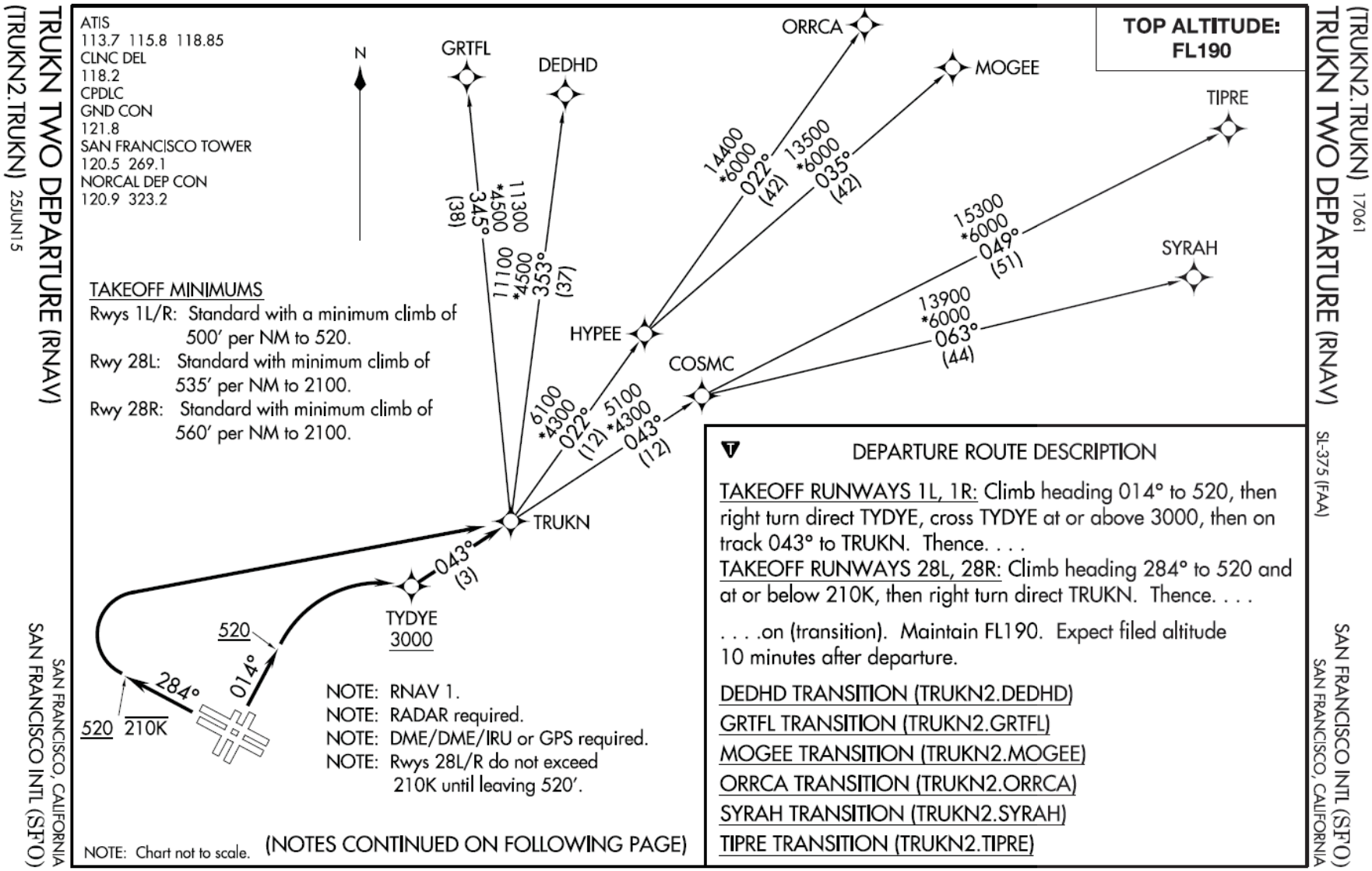
Southeast Flow Plan



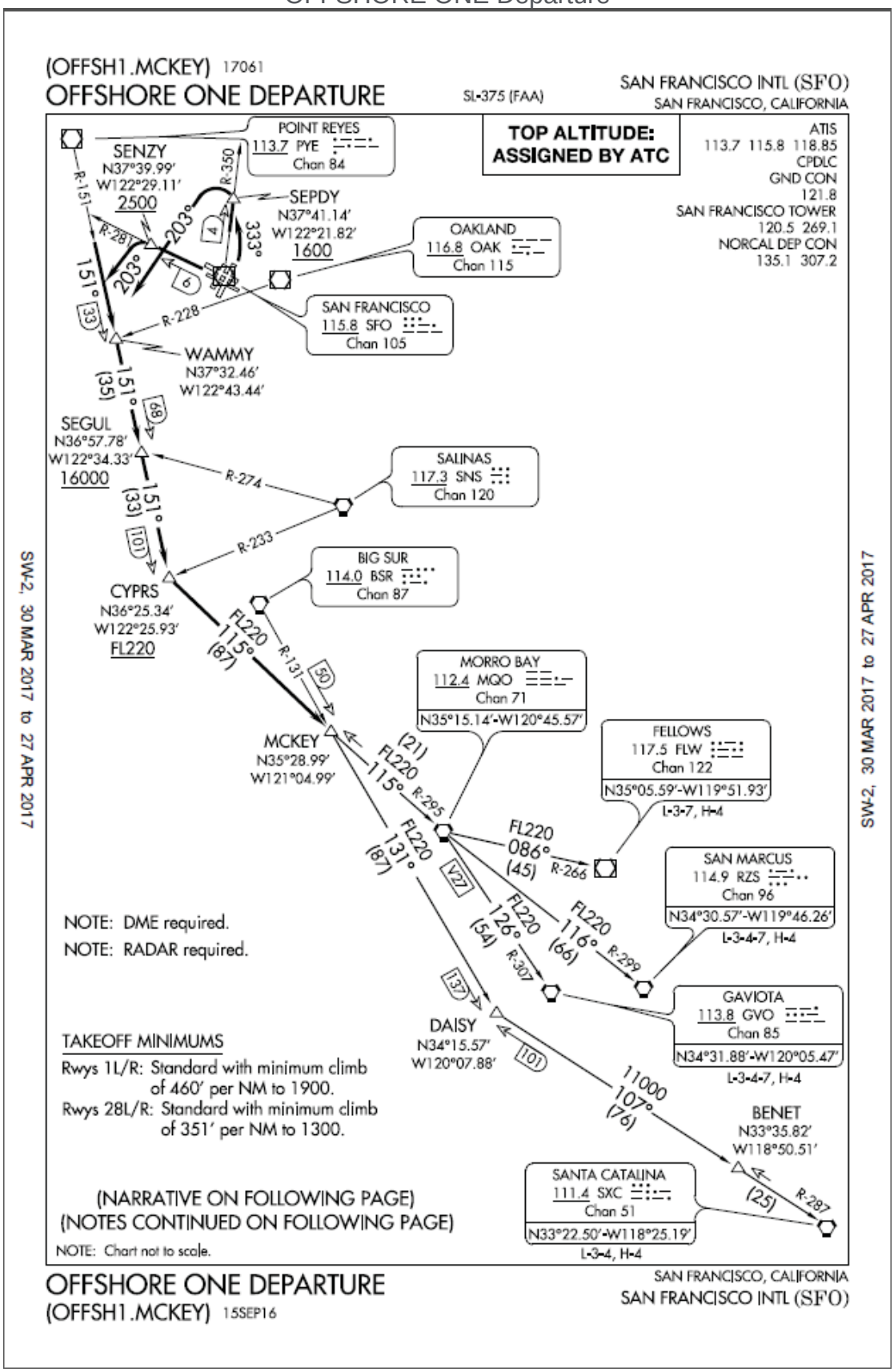
*note not all routes shown and image not drawn to scale

Appendix 3 – Air Navigation Charts
TRUKN TWO (RNAV) Departure

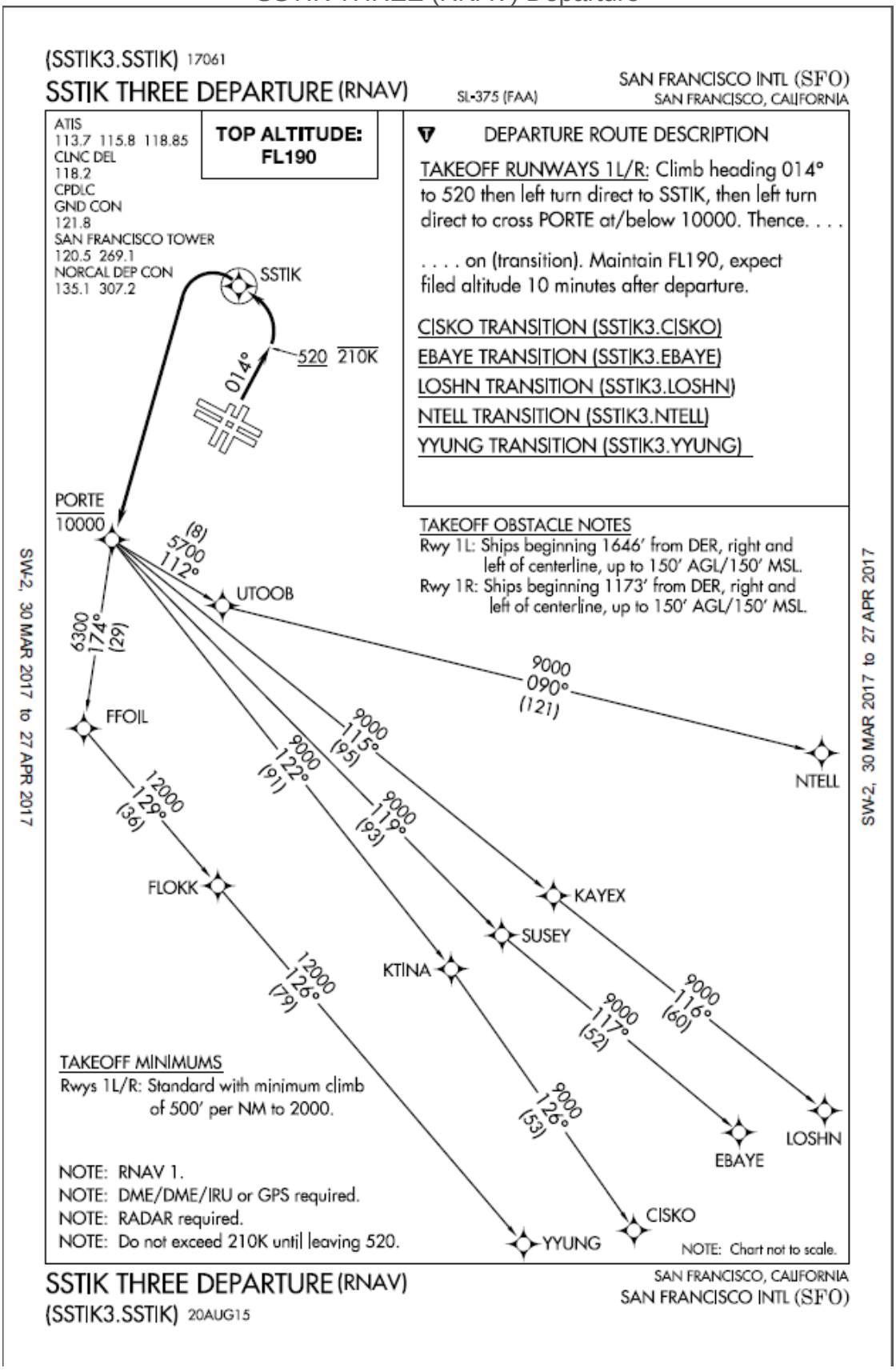
SW-2, 30 MAR 2017 to 27 APR 2017



Appendix 3 – Air Navigation Charts
OFFSHORE ONE Departure

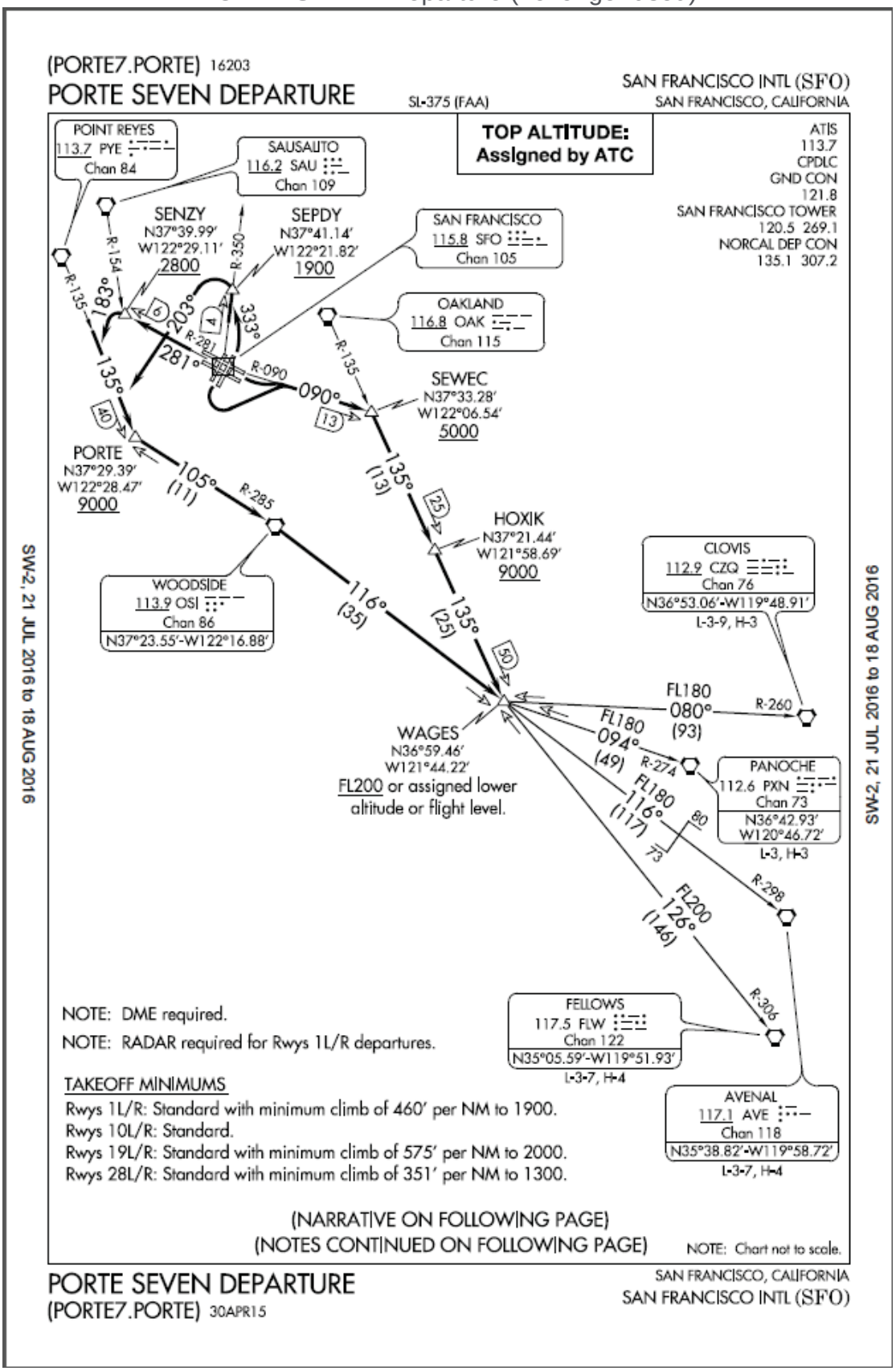


Appendix 3 – Air Navigation Charts
SSTIK THREE (RNAV) Departure

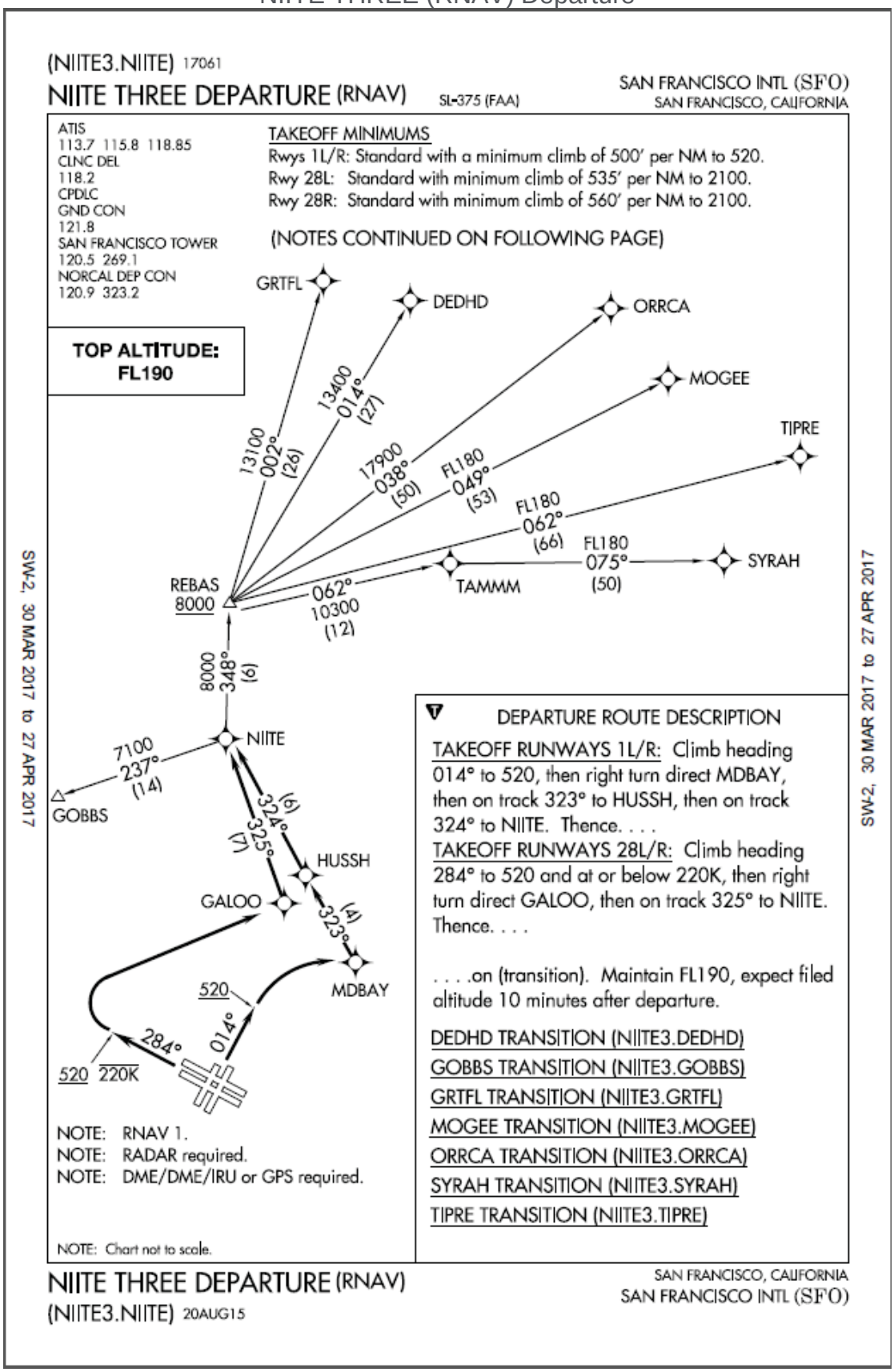


Appendix 3 – Air Navigation Charts

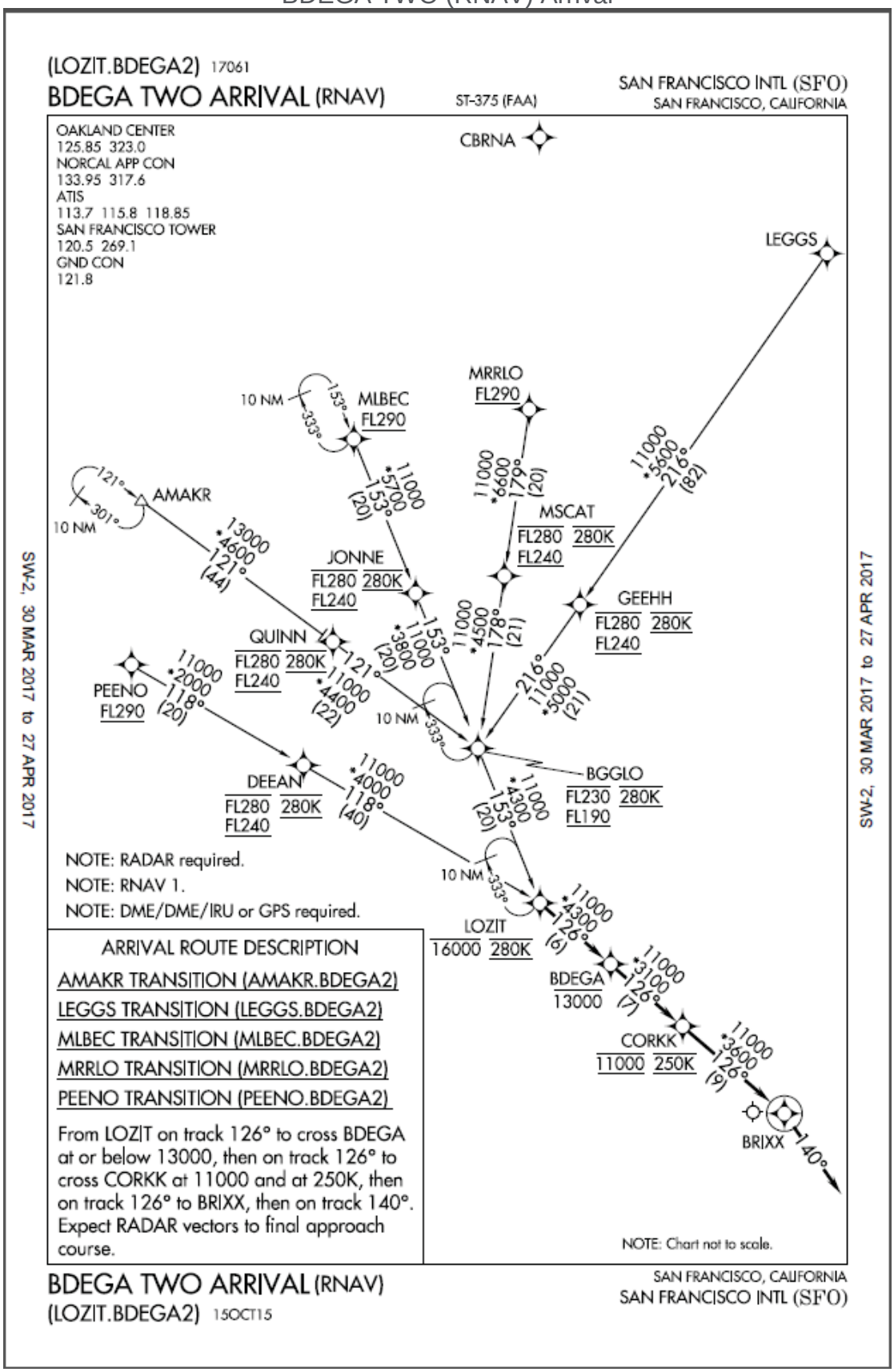
PORTE SEVEN Departure (no longer used)



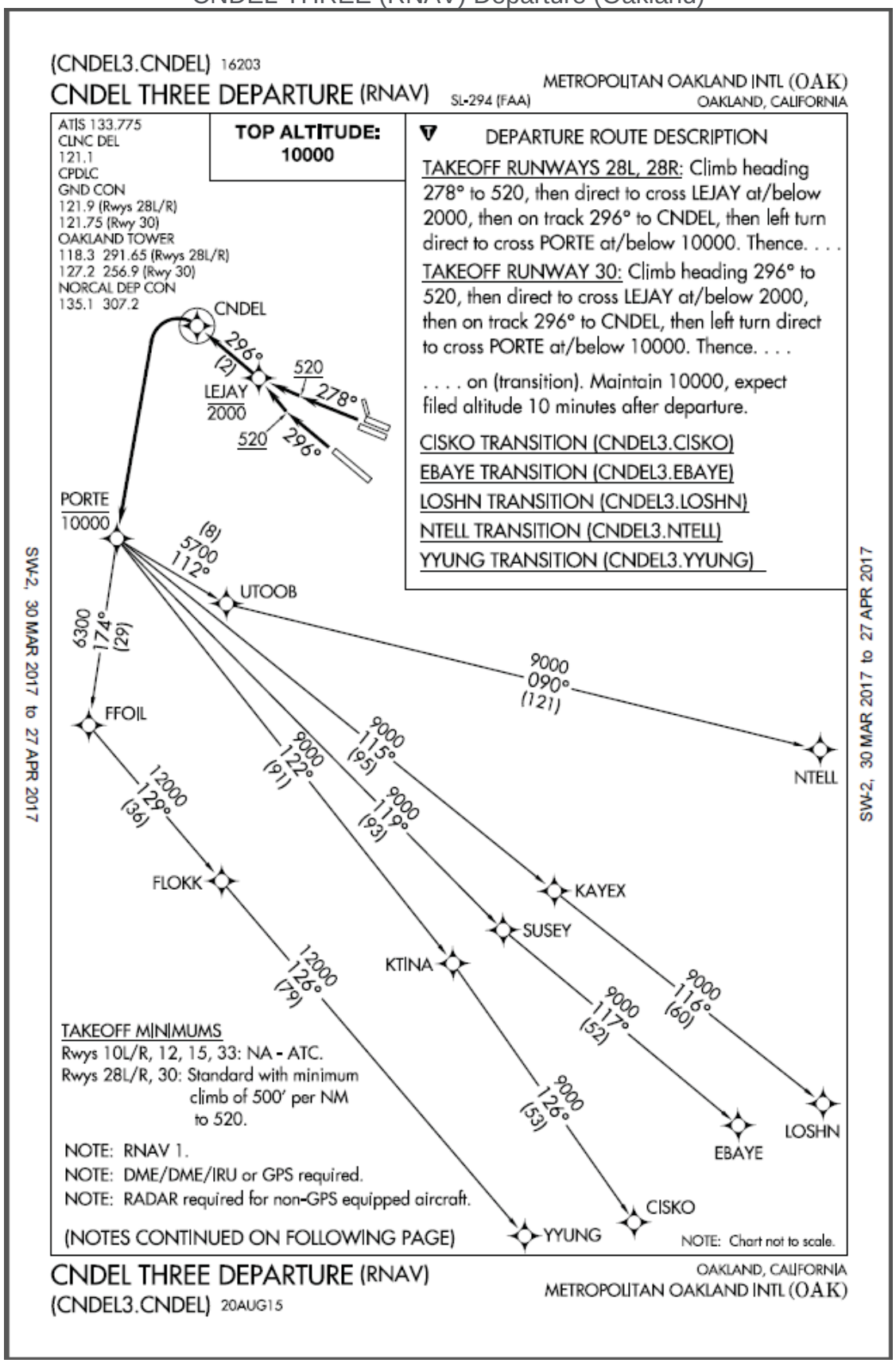
Appendix 3 – Air Navigation Charts
NIITE THREE (RNAV) Departure



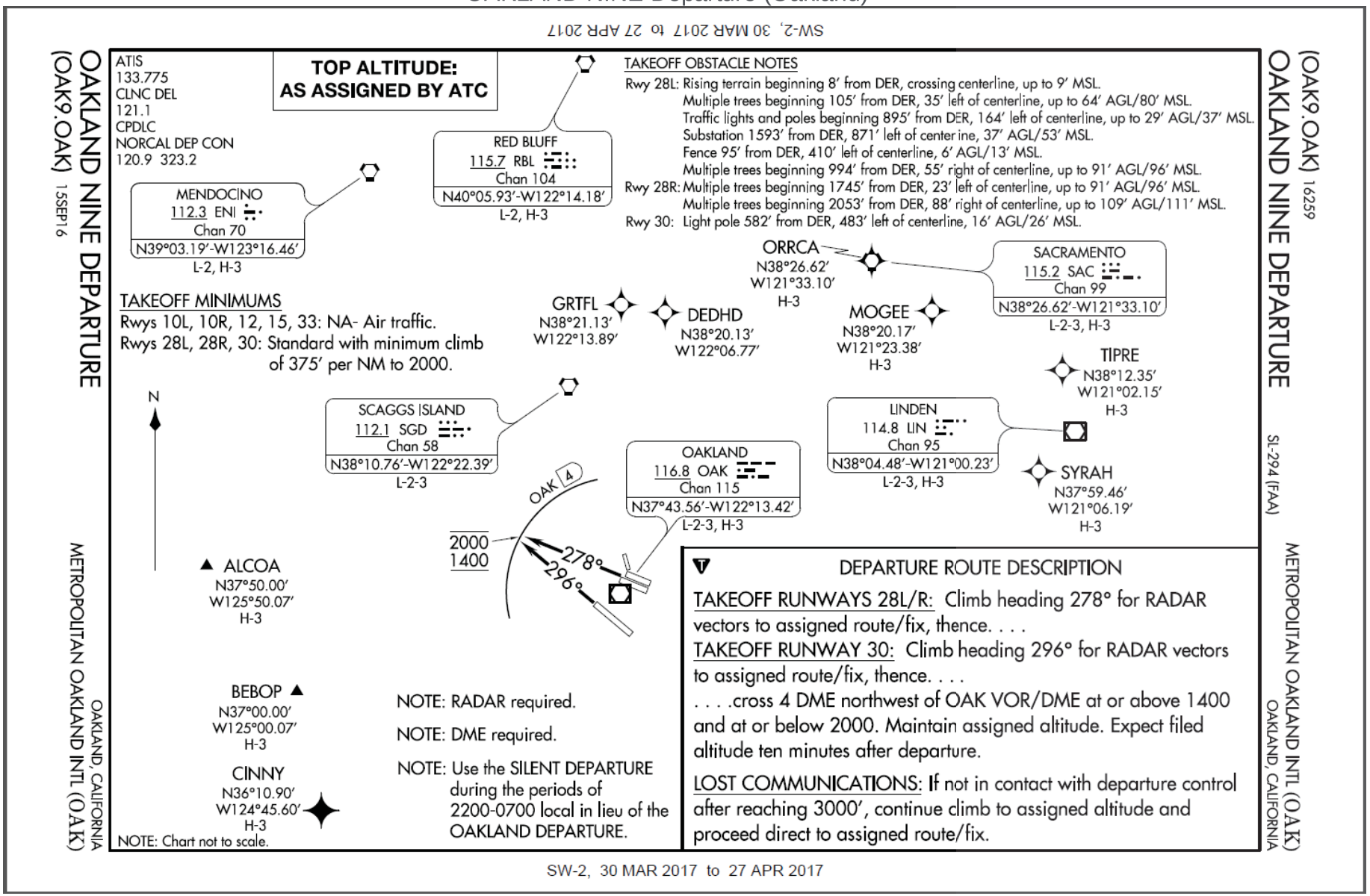
Appendix 3 – Air Navigation Charts
BDEGA TWO (RNAV) Arrival



Appendix 3 – Air Navigation Charts
CNDEL THREE (RNAV) Departure (Oakland)



Appendix 3 – Air Navigation Charts
OAKLAND NINE Departure (Oakland)

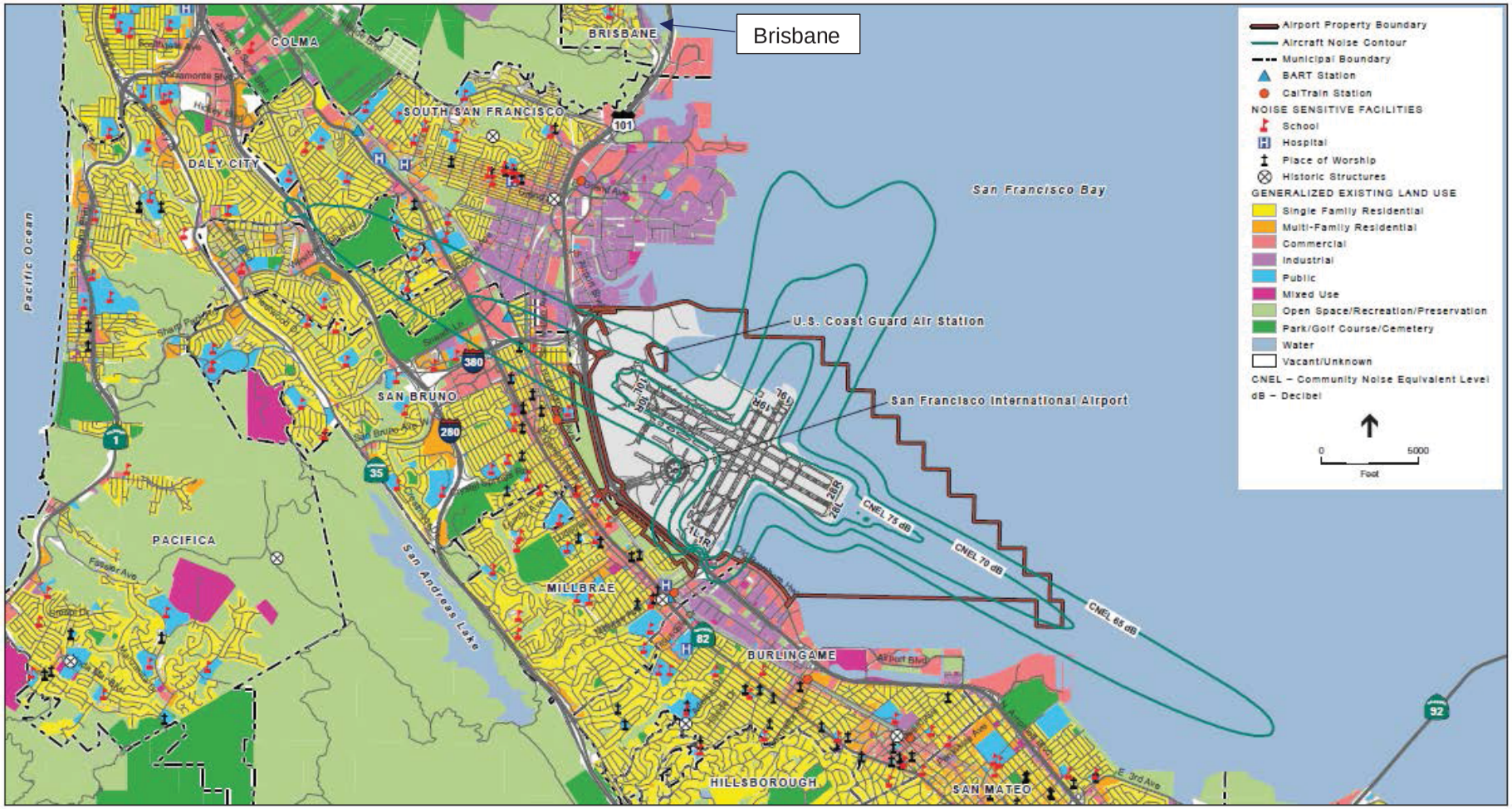


Appendix 4 – Aircraft Type Reference Sheet

Aircraft Code	Description	Aircraft Code	Description	Aircraft Code	Description	Aircraft Code	Description	Aircraft Code	Description
Wide Body Jet		Narrow Body Jet		Helicopter		General Aviation Aircraft		Business Aircraft	
A306	Airbus A300-600	**A319**	Airbus A319	**B206**	Bell Jet Ranger	**BE35**	Beech V35A	**BE20**	Beechcraft 200 King Air
A332	Airbus A330-200	**A320**	Airbus A320	**B407**	Bell Long Ranger	**B350**	Beechcraft King Air 350	**BE40**	Beechcraft Beechjet
A333	Airbus A330-300	**A321**	Airbus A321	**HELO**	Helicopter	**BE36**	Beechcraft 36 Bonanza	**C208**	Cessna 208 Caravan
A343	Airbus A340-300	**B733**	Boeing 737-300	**R44**	Robinson R-44	**BE58**	Beechcraft Baron	**C25A**	Cessna Citation CJ2
A346	Airbus A340-600	**B735**	Boeing 737-500			**C152**	Cessna C152	**C25C**	Cessna Citation CJ4
A388	Airbus A380-800	**B737**	Boeing 737-700			**C172**	Cessna Skyhawk	**C501**	Cessna Citation I
B744	Boeing 747-400	**B738**	Boeing 737-800			**C177**	Cardinal	**C510**	Cessna 510 Citation Mustang
B748	Boeing 747-8	**B739**	Boeing 737-900			**C180**	Cessna C180	**C550**	Cessna Citation II
B762	Boeing 767-200	**B752**	Boeing 757-200			**C182**	Cessna Skylane	**C560**	Cessna Citation V
B763	Boeing 767-300	**B753**	Boeing 757-300			**C206**	Cessna Stationair	**C56X**	Cessna 560XL Citation Excel
B772	Boeing 777-200	**CRJ2**	Bombardier CRJ200			**C210**	Cessna Centurion	**C650**	Cessna Citation III
B77L	Boeing 777-200LR	**CRJ7**	Bombardier CRJ700			**DA40**	Diamond DA-40	**C680**	Cessna 680 Citation Sovereign
B77W	Boeing 777-300ER	**CRJ9**	Bombardier CRJ-900			**DA42**	Diamond DA-42	**C750**	Cessna 750 Citation X
B788	Boeing 787-8	**DC93**	McDonnell Douglas DC-9-30			**EXPR**	Experimental	**CL30**	Bombardier Challenger 300
B789	Boeing 787-9	**DH8D**	DeHavilland Dash 8			**P28A**	Piper 28A Cherokee	**CL35**	Bombardier Challenger 350
MD11	McDonnell Douglas MD-11	**E135**	Embraer ERJ-135			**PA28**	Piper Cherokee 28B	**CL60**	Bombardier Challenger 600
		E170	Embraer E170			**PA28R**	Piper Cherokee	**E50P**	Embraer EMB-500 Phenom 100
		E190	Embraer E190			**SR22**	Cirrus SR-22	**E55P**	Embraer EMB-500 Phenom 300
		E45X	Embraer ERJ-145					**F2TH**	Dassault Falcon 2000
		E75L	Embraer E175					**FA900**	Dassault Falcon 900
		MD83	McDonnell Douglas MD-83					**GLAX**	IAI Gulfstream G200
		MD88	McDonnell Douglas MD-88					**GL5T**	Bombardier Global Express
		MD90	McDonnell Douglas MD-90					**GLEX**	Bombardier Global Express (twin-jet)
								GLF3	Gulfstream III
								GLF4	Gulfstream 4
								GLF5	Gulfstream 5
								HA4T	Hawker 400
								H25B	Raytheon/Hawker 800
								LJ35	Learjet 35
								LJ55	Learjet 55
								PAY2	Piper Cheyenne ii
								PC12	Pilatus PC-12
								PRM1	Beechcraft/Ratheon Premier 1
								FA50	Falcon 50

Wide Body Jet (wide enough for two passenger aisles); **Narrow Body Jet** (wide enough for one passenger aisles); **Business Aircraft** (transportation for small groups of people); **General Aviation Aircraft** (Generally small, propeller-driven aircraft); **Helicopters** (Aircraft operated by rotor blades)

Appendix 5 – 2014 Noise Exposure Map



SOURCE: ESRI, 2014; San Mateo County Planning and Building Department, 2014; ESA Airports, 2014

SFO FAR Part 150 Noise Exposure Map Report . 120832

Exhibit 5-1
2014 Noise Exposure Map – San Francisco International Airport

Addendum

List of changes for Revision 1 – 4/26/2017

Page 5) Corrected field names for “Flow Pattern” and added footnote information to Table 2.

Page 7) Added explanation for Straight 28s operations under Table 5.

Page 8) Provided explanation why Community SEL were higher on certain days. Added “On January 20th, the community SEL peaked at 81 dBA. On further investigation it was found that this was caused by unsettled weather patterns. Weather reports showed wind throughout the day that varied considerably from calm to gusts as high as 49 Knots, thunder and a significant rain accumulation of ¾ inch over 1.5 hours in the late afternoon. The sounds of rain, wind and thunder collected by the monitors were grouped as Community Events.”

Removed SEL table containing data from a different monitoring site.

Page 9) Changed Table 7 to show amounts of aircraft noise events per site versus cumulative total.

Page 10) Added clarification for Table 10 at end paragraph under Aircraft Operations, “Table 10 shows the daily ratio of overflights to noise events, along with the resulting aircraft noise climates for each monitoring site.”

Page 14) Table 12 is now on Page 14. Table 12 shows a line for “364 Average Aircraft Daily Operations” versus a bar graph. An explanation of what the percentage is provided now “% of daily noise events to daily operations.”

Page 16) Added explanation for Table 13. "Sites 966 and 989 did not capture the Shoreline Departure noise as much as did Sites 7, 988 and 990. It should be noted that the peaks in the number of departures in the 11:00 p.m. and midnight hours were caused by the combination of weather and late night easterly departures during this monitoring period. Typically, these flights are able to use the NIITE Departure procedure from Runways01L and 01R proceeding up the bay and away from Brisbane."

Page 19) Clarified first sentence in paragraph to make it less confusing.

Page 28) Added explanation in the conclusion’s first paragraph, "During inclement weather when SFO operates in the Southeast Plan aircraft CNEL drops considerably while community CNEL increases due to wind and rain.”

Page 43) Appendix 4 - Aircraft Type Reference Sheet has been simplified.

-----Original Message-----
From: Bert Ganoung (AIR)
Sent: Monday, April 03, 2017 5:56 PM
To: 'Holstine, Clay' <clayh@ci.brisbane.ca.us>
Cc: Ibarra, Angel <aibarra@ci.brisbane.ca.us>
Subject: RE: Response to Letter

Hello Clay,

I am please to present the Brisbane Portable Noise Monitoring Report from our portable noise monitoring performed in Brisbane for the period of January 13, 2017 through January 26, 2017.

I will follow this with a hard copy via U.S. Mail and include a disc with the raw data used in the report. As mentioned in my March 28, 2017 letter I will answer the remaining items not answered in our standard report format from your February 24, 2017 letter in a separate addendum document.

Sincerely,
Bert

Bert Ganoung
Aircraft Noise Abatement Manager | Planning, Design, & Construction San Francisco International Airport | P.O. Box 8097 | San Francisco, CA 94128 Tel 650-821-5100 | flysfo.com | flyquietsfo.com

Facebook | Twitter | YouTube | Instagram | LinkedIn

From: Bert Ganoung (AIR) [mailto:Bert.Ganoung@flysfo.com]
Sent: Monday, May 01, 2017 11:50 AM
To: Holstine, Clay
Cc: Ibarra, Angel; Dave Ong (AIR)
Subject: RE: Clay Holstine RE: Letter regarding Brisbane noise monitoring

Hello Clay,

Understood on the meeting tonight and the confusion.

We had some unfortunate issues with the report and our scramble to get the document out. To save time staff utilized a previous report and it apparently had quite a few remnants that stayed in after my edit and returned on printing to PDF. We recognized these after the fact and worked to clean these up and make any tables that may not have been clear since the publication and have created a revised report for you with a list of revisions attached. I have included this for you.

May apologies for the confusion.

Best,
Bert

Bert Ganoung
Aircraft Noise Abatement Manager | Planning, Design, & Construction
San Francisco International Airport | P.O. Box 8097 | San Francisco, CA 94128
Tel 650-821-5100 | flysfo.com | flyquietsfo.com

Facebook | Twitter | YouTube | Instagram | LinkedIn

From: Holstine, Clay [mailto:clayh@ci.brisbane.ca.us]
Sent: Monday, May 01, 2017 10:40 AM
To: Bert Ganoung (AIR) <Bert.Ganoung@flysfo.com>
Cc: Ibarra, Angel <aibarra@ci.brisbane.ca.us>
Subject: RE: Clay Holstine RE: Letter regarding Brisbane noise monitoring

Bert

I am meeting with our local group tonight and have told Peter that you have availed yourself to come to a future meeting and have a conversation with us.

Also, I curious on page 2 of the report you provided there is a table of contents. The table list pages for different items, however some of the pages have very high numbers, such as 211, 233 , etc while the report has 44 pages.

Can you clarify for us.

Thanks, Clay

March 28, 2017

Mr. Clay Holstine
50 Park Place
Brisbane, CA 94005-1310

Dear Mr. Holstine,

Thank you for your February 24, 2017 letter regarding the Brisbane portable noise monitoring project. This letter will serve as a formal reply to your letter and reiterate our telephone call on March 1, 2017 in which we discussed the complete aspects of your letter and our abilities to satisfy each point of the letter.

We are in the process of producing a standardized portable noise monitoring report for the City of Brisbane that I intend to publish on Friday, March 31, 2017. Included within will be the data from four portable noise monitors that were deployed at the Mission Blue Community Center (#966), Lipman Middle School (#988), the Golden Aster Pump Station (#989) and a private residence in the 100 block of Kings Road (#990). In addition, the data from our permanent noise monitor #7 at the Margaret Tank, 498 Kings Road was analyzed with the portable monitors for the period, January 13 - 26, 2017. At your request in 2015 and 2017 the noise event thresholds were set to 55 decibels A-weighted on each of the portable noise monitors. This caused a considerable amount of difficulty with the threshold being below the community noise level. It was necessary that staff manually review audio files to discern that they were properly attributed to aircraft or community events. Unfortunately, we were unable to honor your request that we change any settings at permanent noise monitoring sites due to the State of California certification of SFO's Noise Monitoring Plan under California Code, Title 21, Subchapter 6, Article 3. Each noise monitoring site requested in your letter will be provided with its threshold value and latitude/longitude location.

The intent of this report is to address our portable monitor findings in 2017 and address those made previously in 2010 and 2015. At your request detailed in your letter we have added analysis of C-weighted noise data and in-depth analysis of SFO's Runway 01L and 01R departures utilizing the PORTE, now known as the SSTIK Departure procedure, Runways 28L and 28R departures that utilize a right turn that was formerly known as a Shoreline Departure and BDEGA arrival procedure that was previously known as the Point Reyes Arrival. I also agreed to analyze the effects of the Oakland International Airport's CNDEL and OAKLAND

NINE Departure procedures. We will evaluate the number of "Shoreline" operations between 7:00 a.m. – 7:00 p.m., 7:00 p.m. – 10:00 pm and 10:00 p.m. – 6:00 a.m. following the Community Noise Equivalent Level (CNEL) noise metric time periods used in California.

I mentioned in our telephone call that we would not speak for the Federal Aviation Administration (FAA) as they are currently working on a response for the initiatives from the Select Committee on South Bay Arrivals (SCSBA) and the San Francisco International Airport/Community Roundtable through Representatives Jackie Speier, Anna Eshoo and Sam Farr. We are expecting the return of this document any day now. It is hoped that it should respond to all of the City of Brisbane's submitted requests. I have met with the FAA at a local level through the Northern California Terminal Radar Control Facility (TRACON) up until the SCSBA and Roundtable documents were submitted. During these meetings the SFO Noise Abatement Office requested many items though the top three that would immediately assist Brisbane are as follows:
A) That a waypoint be established overhead SFO for the Oakland CNDEL departure procedure be connected to, keeping these procedures off the peninsula. B) Utilizing a 050-degree heading following a right turn on night time departures keeping traffic off the peninsula. C) And, asking that Hawaiian Airlines be assigned straight out departures versus departing north towards the Bay then, turning left across the peninsula.

All items that are not addressed in the report and the supplemental raw data will be provided within two weeks following the report in an Appendix to the Brisbane Aircraft Noise Monitoring Report and DVD. Our Office is committed to working with the communities and doing what we can to mitigate noise impacts, this is part of our mission to provide an exceptional Airport in service to our communities.

Sincerely,

E. R. Ganoung Jr.

Bert Ganoung
Manager, Aircraft Noise Abatement

Aircraft Noise Terminology & Metric

Supplement

San Francisco International Airport Noise Abatement Office
P.O. Box 8097 San Francisco, CA 94128
(650) 821-5100

2014

Aircraft Noise Terminology & Metric

To assist in understanding the noise measurement results and the metric used in evaluating airport noise, this supplement provides a brief introduction to various acoustic terminologies used to express sound level. The terms discussed are the decibel (dB), A-weighted decibel (dBA), Maximum Noise Level (Lmax), Sound Exposure Level (SEL) and time-weighted, cumulative metric known as Community Noise Equivalent Level (CNEL).

The **decibel (dB)** is the unit used to represent the change in sound pressure as a direct measurement of changes in amplitudes on array of frequencies. Decibels measure a scale from the threshold of human hearing – 0 dB, 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. An increase of 10 dB is perceived by our ears as a doubling of noise. Most sounds we experience in our day-to-day lives vary between 30 dB and 100 dB. Figure 1 depicts decibel levels of common sounds.

A-weighted decibel (dBA) is sound pressure levels filtered with an "A" weighted filter de-emphasizing level changes that occur at lower frequencies (those below 500 Hertz) and also at very high frequencies above 10,0000 Hertz where people generally do not hear as well. The normal frequency range of hearing for most people is from a low of 500 Hertz to a high of 10,000 Hertz. This filter closely matches our ears' sensitivity to sound. As a result, an aircraft noise event with a higher A-weighted sound level is perceived to be louder than an aircraft noise event with a lower A-weighted sound level. This correlation with our perception of loudness is the reason that A-weighted sound levels are used to evaluate environmental noise sources.

The sound level heard during an arrival or departure of an aircraft varies as a function of the distance from the aircraft to the person hearing the noise and as a function of the direction of the aircraft noise source. As the aircraft approaches the person, the sound level increases and as the aircraft moves away from the person, the sound level decreases. The effect of noise exposure during such an event can be described in terms of either the Maximum Sound Level or the Sound Exposure Level of an individual aircraft noise event.

The **Maximum Sound Level (Lmax)** represents the highest instantaneous noise level heard during a single aircraft overflight. However, it provides no information on the duration (length) of the noise exposure. Thus, two events with the exact Lmax may produce completely different total exposures. While some people will be annoyed by events having shorter duration, majority of people are more likely to be highly annoyed with longer events continuing for extended period of time. To account for differing durations of an event, Sound Exposure Level is used to quantify total noise exposure for a single aircraft overflight.

The **Sound Exposure Level (SEL)** is the total sound energy above an established threshold for a single event considering both intensity and length of the event all compressed into 1 second. The SEL of any noise event is the entire event's total energy expressed in a reference period time as though it had occurred within one second. A noise event having a Lmax of 80 dbA and lasting 1 second would have a SEL of 80 dBA. But if that event lasted 2 seconds long, the SEL would be 83 dBA. Two events with the same intensity but different durations can be differentiated with the longer duration event having a higher SEL. For locations relatively close to an airport, the SEL for most aircraft departures will usually be about 10 decibels higher than the corresponding Lmax. For example, an aircraft departure producing a maximum sound level of 70 dB at a particular location would be expected to produce an SEL value of about 80 dB at the same location. SEL gives us a common basis for comparing noise events that matches our instinctive impression – the higher the SEL, the more annoying it is likely to be. Figure 2 is a graphic representation of a typical aircraft noise event along with these terminologies.

In the example below, the SEL is calculated for an aircraft noise event that has a duration of 5 seconds and a Lmax of 65 dBA. This noise event is numerically equivalent to a SEL of 69.6 dBA.

Sound Exposure Level Formula:

$$SEL = 10 * \log_{10}\left(\sum_{i=1}^{n} 10^{L_i/10}\right)$$

Where SEL = sound exposure level
L_i = sound level for a given one second time period
n = number of seconds during the measurement period

SEL calculation example:

The rows below list the 1 second decibel levels and the corresponding energy levels of the 5 seconds duration aircraft noise event. The energy levels are summed together in order to calculate the SEL value of the aircraft noise event.

Seconds	Sound Level	Energy
1	60 dB	1000000.0
2	63 dB	1995262.3
3	65 dB (LMax)	3162277.7
4	63 dB	1995262.3
5	60 dB	1000000.0
	Total Energy	9152802.3
	Aircraft Noise Event's SEL	**69.6 dB**

The **Community Noise Equivalent Level (CNEL)** metric is used to assess and regulate aircraft noise exposure in communities surrounding airports located in California. Federal Government approved and defined in the California Airport Noise Standards, this cumulative metric represents the average daytime noise level during a 24-hour day and adjusted to an equivalent level to account for increased sensitivity to aircraft noise during evening and nighttime periods relative to the daytime. CNEL applies a 4.77 dBA weighting to all aircraft events occurring during the 3 evening hours from 7:00 p.m. to 9:59:59 p.m. and a 10 dBA weighting to all aircraft events during the 9 nighttime hours from 10:00 p.m. to 6:59:59 a.m.

Aircraft CNEL is then derived using the SELs from all aircraft events for the 24 hour day. The Total CNEL will include all aircraft events as well as other noise events generated in the community during the corresponding time period. Typically, Total CNEL in our environment ranges from a low of 40-45 dBA in very quiet locations to 80-85 dBA immediately adjacent to an active noise source – busy traffic route or active airport. Figure 3 shows representative values of CNEL in typically different environments. Aircraft CNEL greater than 65 dBA CNEL within a residential property line is incompatible to airport operations. CNEL is calculated using the following formula:

$$CNEL = 10 * \log_{10}\left(\left[\sum_{i=1}^{n} 10^{SEL_i/10} + \sum_{i=n+1}^{m} 10^{(SEL_i+4.8)/10} + \sum_{i=m+1}^{r} 10^{(SEL_i+10)/10}\right]\right) - 49.4$$

Day Evening Night

CNEL calculation example showing 10 aircraft noise events in a 24 hour period:

Time of Day	Hour	SEL (dB)	Weighting (dB)	Weighted SEL (dB)	Energy
Night	Midnight	86.1	10	96.1	4073802778.0
Night	1:00 a.m.		10		
Night	2:00 a.m.		10		
Night	3:00 a.m.		10		
Night	4:00 a.m.		10		
Night	5:00 a.m.	90.0	10	100.0	10000000000.0
Night	6:00 a.m.	86.1	10	96.1	4073802778.0
Day	7:00 a.m.		0		
Day	8:00 a.m.	93.6	0	93.6	2290867652.8
Day	9:00 a.m.		0		
Day	10:00 a.m.	82.6	0	82.6	181970085.9
Day	11:00 a.m.		0		
Day	Noon	90.3	0	90.3	1071519305.2
Day	1:00 p.m.		0		
Day	2:00 p.m.		0		
Day	3:00 p.m.		0		
Day	4:00 p.m.		0		
Day	5:00 p.m.	94.8	0	94.8	3019951720.4
Day	6:00 p.m.		0		
Evening	7:00 p.m.		4.77		
Evening	8:00 p.m.		4.77		
Evening	9:00 p.m.	86.1	4.77	90.9	1221799660.2
Night	10:00 p.m.	85.2	10	95.2	3311311214.8
Night	11:00 p.m.	89.5	10	99.5	8912509381.3
				Total Energy	38157534576.7
				Aircraft CNEL	**56.4 dB**

Figure 1 – Common Sound Levels

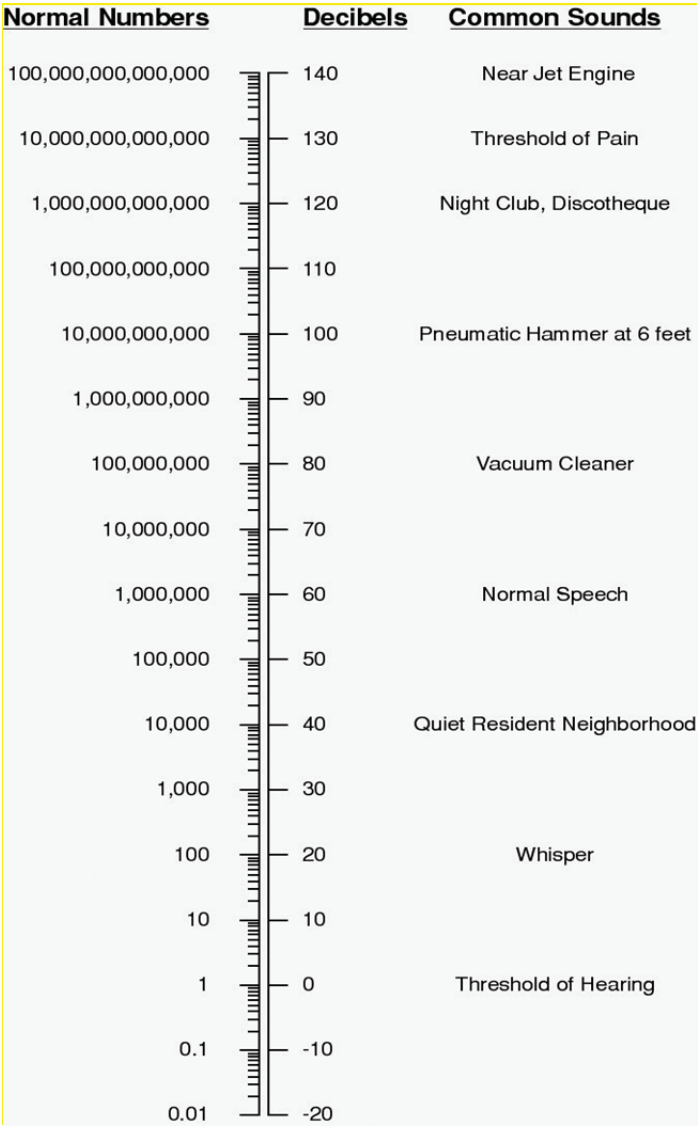


Figure 2 – Typical Aircraft Noise Event

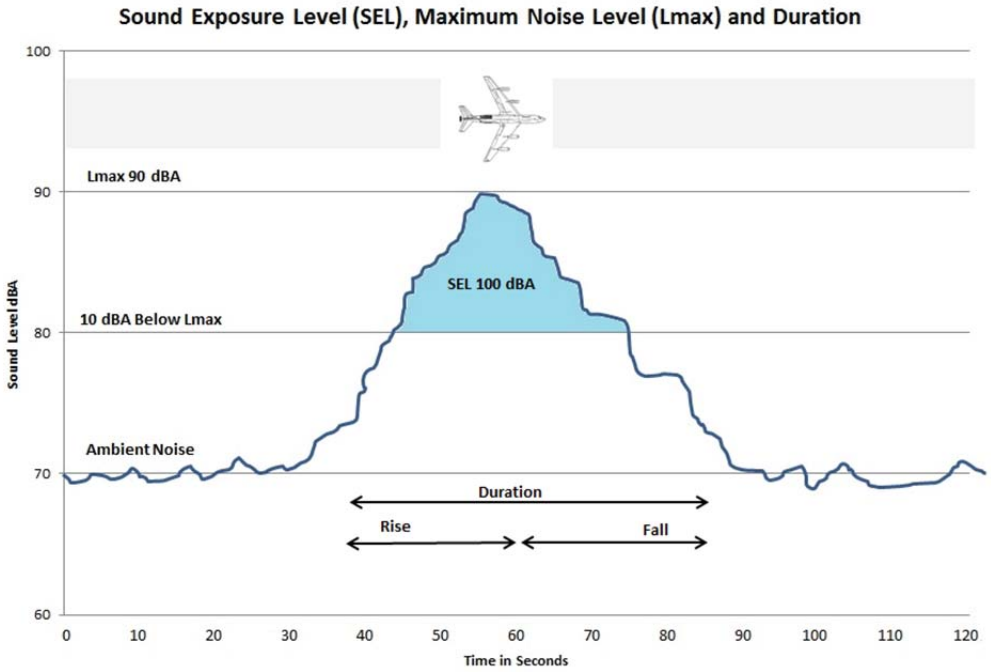


Figure 3 – Representative Cumulative Sound Levels