GLOSSARY

Air Traffic Control (ATC): A service operated by the appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

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

Arrival and Departure Procedures: Refers to a published procedure. Once the procedure is assigned, the procedure is designed to be flown with minimal to no communication with Air Traffic Control (ATC).

Decibel: 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.

Day Night Sound Level (DNL): DNL is a measure of the annual average noise in a 24-hour day. It is the 24-hour, logarithmic- (or energy-) average, A-weighted sound pressure level with a 10-decibel penalty applied to the nighttime events that occur between 10:00pm and 7:00am.

DNL Contour: The "map" of noise exposure around an airport. FAA defines significant noise exposure as any area within the 65dB DNL contour; that is the area within an annual average noise exposure of 65 decibels or higher.

Fixes: In aviation, a fix is a virtual navigational point that helps aircraft maintain their flight path. Fix is a generic name often interchanged with waypoint or intersection.

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

Frequency Weightings: Used to allow a sound level meter to measure and report noise levels that represent what humans hear. These are electronic filters within a sound level meter that are used to adjust the way in which the instrument measures the noise. The most commonly used Frequency Weightings are ‘A’, ‘C’ and ‘Z.’DNL incorporates only “A” weighted decibels.

Glide Slope: Generally a 3-degree angle of approach to a runway. Provides vertical guidance for aircraft during approach and landing.

Ground Track: The path an aircraft flies over the ground.

Hold Procedure (Holding): A predetermined maneuver which keeps aircraft within a specified airspace while awaiting further clearance from ATC.

Instrument Flight Rules (IFR): Rules governing the procedures for conducting instrument flight.

NextGen: An encompassing term for the ongoing, wide-ranging transformation of the United States' national airspace system. It has sometimes been described as an evolution from a ground-based system of air traffic control to a satellite-based system of air traffic management.

Night Time Hours shall use the DNL Measurement Rule as being from 10pm to 7am.

Noise Shifting: NO DEFINITION EXISTS – DO WE NEED ONE?

Optimized Profile Descent (OPD): An arrival procedure that is designed to allow aircraft to use idle engine power and reduce level-offs during descent.

Procedures, general: A published, standardized set of instructions that an aircraft can fly with minimal input from ATC. Procedures are designed with strict separation criteria from other procedures.

Runway: A long strip of land or water used by aircraft to land on or to take off from. For aircraft arriving to San Francisco International Airport, the primary Runways used are Runway 28 Right (28R) and 28 Left (28L), which are parallel to each other.

Sequencing: The lining up of aircraft into a single flow by ATC so that all aircraft are separated to appropriate criteria. This is normally mentioned in association with landing.

Standard Instrument Departure (SID): A published IFR departure procedure from an airport printed for pilot/controller use in graphic form to provide obstacle clearance.

Speed Brakes: Moveable aerodynamic devices on aircraft that reduce airspeed during descent and landing.

Standard Terminal Arrival Route (STAR): A published IFR arrival procedure to an airport printed for pilot/controller use in graphic form.

Time Based Flow Management: TBFM uses time instead of distance to help air traffic controllers sequence air traffic by directing aircraft to be at a specific location at a specific time, which optimizes arrival flow.

Terminal Radar Approach Control (TRACON): FAA air traffic facility that uses radar and non-radar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility.

Vector: A heading issued to an aircraft to provide navigational guidance by radar; i.e., a series of instructions from ATC directing an aircraft between two end points.

Visual Flight Rules (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term “VFR” is also used to indicate weather conditions that are equal to or greater than the minimum VFR requirements.

Waypoint: A waypoint is a predetermined reference point in physical space used for purposes of navigation. It is also known as a fix.

1.2 Feasibility Group 2: Transition the SERFR Standard Terminal Arrival Route (STAR) Back to the BSR Ground Track Prior to EPICK

Feasibility Group 2 contains proposals to move the arrival procedure from the south, back west to a similar ground track previously used for the BSR procedure. This design would put the SERFR flight path back over the BSR ground track, roughly 3-4 miles to the west of where the path currently reaches the Santa Cruz County coastline (near the City of Capitola) (see Appendix C: Map of BSR and SERFR). However, it should be noted that even with a "return to the BSR ground track," aircraft would not actually fly the same conventional procedure as the previous BSR. The BSR procedure predated NextGen and did not use satellite-based navigation. NextGen uses satellite navigation and Optimal Profile Descents (OPD). These Optimal Profile Descents include some waypoints with an altitude control "window" providing a range of altitudes (from lowest to highest; e.g., 7,000 feet to 9,000 feet) that aircraft must be within when crossing the waypoint. In addition, and speaking generally, the pre-NextGen flights were relatively dispersed as compared to present-day NextGen procedures which consolidate, to a greater degree, flights along a narrower path.

The FAA has advised the Committee that a new flight procedure that is GPS-based and that contains an OPD could be designed to fly the old BSR ground track, as suggested in the proposals in Feasibility Group 2. The FAA has presented to the Committee a "notional DAVYJ procedure," a notional concept of this new OPD over the BSR ground track. ~~Because the notional DAVYJ is an OPD route 3-4 miles to the west of SERFR, it has a profile similar to SERFR, at altitudes higher than the SERFR procedure and lower than the old BSR procedure.~~ The notional DAVYJ route has been described by the FAA as being "better", would be an OPD procedure that would be flown with higher altitudes and which would be quieter than the previous BIGSUR (BSR) approach track.

Accordingly, if:

- The FAA will provide a tool to accurately model the route (and be verifiable using noise monitoring data) that will include total noise on the ground, not excluding noise from other routes and that should include a faithful representation of impact from vectoring traffic. It should verify that the new procedure has the same or lower DNL to the same modeling of the BSR 2014 procedure and,
- The FAA will design the route such that the flight altitudes will be as high (and preferably higher) than the BSR 2014 procedure along its entire route and,
- The FAA will ensure that the crossing at MENLO will occur at >/= 5,000 MSL and will maintain idle power until HEMAN and,
- If the new design can/will not allow the conditions of higher and quieter to be attained, that the route, if implemented, will be returned to its predecessor (SERFR) should either of the two conditions (higher and quieter along the flight route) not be achieved in the implemented design, then:

Recommendation: If the above caveats are accepted, it is recommended that the DAVYJ route be selected as the desired ingress route over the existing SERFR routing.

~~Recommendation: The Select Committee recommends: ***TO BE DETERMINED***~~

(Vote: ___ Aye, ____ Nay, ____ Absent or Abstain)

Technical Note: Feasibility Group 2 encompasses two of the items in the Study: 1.f.i and 3.d.ii.

2.7 Increase the Altitude and Profile of Descents into SFO

An approach slope is the descent path that aircraft follow on final approach to land on a runway. An approach slope is also known as a glide slope, as the path is ideally a gentle downward slope. A commonly used approach slope in modern aviation is 3.0 degrees from the horizontal.

At SFO, the two main landing runways are 28L and 28R, and they are parallel to each other. Runway 28L has a glide slope of 2.85 degrees, while Runway 28R has a glide slope of 3.0 degrees. The variation in the glide slopes is a function of the two runways being parallel to each other. Other airports use a steeper glide slope. For instance, the Frankfurt airport is using 3.2 degrees while London City airport uses a glide slope of 5.5 degrees.

If the glide slope on both Runways 28L and 28R at SFO were increased, even if only by 0.15 degrees each, it would allow descending aircraft to begin their descent at a higher altitude, thereby reducing noise exposure on the ground.

Recommendation: The Select Committee recommends that the FAA determine the feasibility of increasing the glide slopes of SFO Runways 28R and 28L to the maximum extent consistent with safety and the Committee's goal of noise mitigation.

(Vote: _12__ Aye, __0__ Nay, __0__ Absent or Abstain)

If Runway 28 Left had a higher descent angle and Runway 28 Right had a lower descent angle, the change would allow airplanes coming from the Southwest and Peninsula areas to remain higher over populated areas. For example: Rwy 28R => 3.0 degrees, Rwy 28L => 3.15 degrees.

Recommendation 2: Reverse and increase the landing approach angles on Runways 28;

(Vote: Aye, Nay, Absent or Abstain)

2.13 Redirect Southern Arrivals (SERFR) to an Eastern Approach into SFO

As previously noted, SERFR is a southern arrival procedure/flight path into SFO (i.e., approaching SFO from the south over the Santa Cruz Mountains). Flights on the SERFR procedure include (among others) aircraft from the southwest, such as Phoenix and Houston. In June 2016, the SERFR carried an average of 183 aircraft per day, or 30 percent of the arriving aircraft into SFO.

It has been suggested by some that these aircraft from the southwest be removed from the SERFR arrival procedure, and instead use an eastern approach into SFO. Under this suggestion, aircraft would either use the existing DYAMD arrival procedure (which is for flights arriving at SFO from the east with a flight path that enters the Bay roughly between Fremont and Milpitas and San Jose), or use a new procedure crossing the FAITH waypoint (which is located at the intersection of Hostetter Road and Morrill Avenue, east of Interstate 680 in East San Jose) (See Appendix C: Map of BDEGA, OCEANIC, SERFR, and DYAMD).

The FAA has advised the Committee that this proposed solution raises a number of potential concerns. In June 2016, the DYAMD already carried the greatest percentage of daily air traffic into SFO, an average of 253 aircraft per day, or 41 percent of the arriving traffic into SFO. The DYAMD arrival procedure also shares the final approach path into SFO with aircraft arriving from the north (on the BDEGA procedure), specifically the 30 percent of BDEGA arrivals that use the San Francisco Bay approach (the so-called East leg). Increasing the aircraft load on the DYAMD procedure as suggested reduces the opportunity to shift aircraft from the BDEGA Peninsula (so-called West leg) approach onto the BDEGA San Francisco Bay approach (so-called East leg). ~~For that reason, the Select Committee has not endorsed this solution {see Item 2.2 in this Report [Northern Arrivals (BDEGA) into SFO]}.~~ However, prior DYAMD arrivals were used for early morning arrivals and have since been shifted to the SERFR route. It is also noted that the DYAMD arrivals in that time period are close to zero. The committee requests that those rerouted early morning flights be shifted back to the DYAMD arrival route.

With regard to creating a new procedure using the FAITH waypoint, the FAA has advised the Committee that this flight path has the potential to conflict with departures out of San Jose International Airport and move existing noise to another community (a community not represented by the congressional districts that established the Select Committee). For those reasons, the Select Committee has not endorsed this solution. However, it has been noted that the existence of an overnight curfew at San Jose International Airport might accommodate a new procedure using the FAITH waypoint as a potential solution in the overnight hours. The Committee suggests, however that t~~T~~he FAA may, therefore, wish to examine whether this proposed solution, or a variation thereof (e.g., at night), could be effectively implemented without shifting noise.

Recommendation: When possible, route arriving flights (from 4am to 8am) to the Eastern approach to SFO using the DYAMD route rather than the SW route (SERFR) that is now followed.

3.4 Traffic Volumes

When Time Based Flow Management (TBFM) is introduced, traffic volumes along any ingress/egress route will certainly increase.

Recommendation: The committee recommends that maximum number of flights along each of the SFO ingress/egress routes be capped at January 2014 levels.

(Vote: Aye, Nay, Absent or Abstain)

3.5 Aircraft Speed

Aircraft speeds are an important factor in the realization of noise on the ground. Aircraft speed is at least as important as altitude because airplane noise increases at about the sixth power of velocity. In practical terms, that means that if planes above MENLO were to fly 10% slower, they could abate as much noise as raising altitudes 800'-1000'. A 20% reduction could have the effect of raising altitudes 1700'-2000'.

NextGen raised speed limits in the Bay Area Metroplex. The speed limit at ZORSA above Sunnyvale was raised from 180 knots to 210 knots. The new speed limit for MENLO is 230 knots, 20 knots higher still. Because the wake is more of a problem at slower speeds, efficiency targets may need to be relaxed for speeds to be reduced safely.

Many of the citizen's noise complaints occur from both the higher speeds as well as the deployment of airplane speed brakes which are used to adhere to the slower aircraft speed limits as they approach SFO.

Recommendation: Reduce flight speeds to pre-NextGen levels on incoming flights over populated areas.

(Vote: Aye, Nay, Absent or Abstain)

3.5 Flight Procedures

Recommendation 1: Begin the STAR approach for flights coming from the Southern CA coast (now being used for SERFR) over Monterey Bay instead of at the coastline and impose slower speed limits on airplanes over Monterey Bay to avoid the speed brake induced noise over populated areas.

(Vote: Aye, Nay, Absent or Abstain)

Recommendation 2: The committee recommends that the FAA continue to look for the "BLUE LINE" (the SFO approach with the least impact on underlying citizens).

(Vote: Aye, Nay, Absent or Abstain)

3.6 Resurrect Older, Proven Routes:

The flight traffic on SERFR is from 32% to 64% higher than the old BIGSUR route. Before NextGen, two other routes from the coast were used to route traffic to SFO. They were both slightly north of the BIGSUR track.

Recommendation: Return the older routes to service as additional routes to SFO to decrease the volume of traffic along the (SERFR) (BIGSUR) (DAVYJ) routes to SFO.

(Vote: Aye, Nay, Absent or Abstain)

4.2 Need for Before/After Noise Monitoring

The lack of aircraft noise monitoring prior to the implementation of NextGen hampered the Committee's (and the public's) ability to measure and document the actual impacts of the changes that were implemented in March 2015. Looking ahead, the Committee is concerned that if the FAA fails to perform "before and after" noise measurements before and after related to the implementation of recommendations contained in this Report, there will likewise be an inability to measure, analyze and verify, and document the desired improvements. Accordingly, the Select Committee offers the following recommendation.

Recommendation: The Select Committee recommends that the FAA and/or SFO monitor and document noise exposure of any feasible solutions before and after implementation to ensure impacts are verified, and to determine whether results are of a discernible benefit.

(Vote: __12_ Aye, __0__ Nay, __0__ Absent or Abstain)

Recommendation 2: The committee recommends the implementation of a set of regional noise monitoring stations that will adequately monitor the airplane noise levels at all points in the San Francisco Bay Area. Collected data must be made available to citizens upon request.

(Vote: Aye, Nay, Absent or Abstain)

4.4 Technology Upgrades

The ILS technology now in use at SFO is both antiquated and, according to SFO operatives, is frequently out of service due to lack of parts and other failures.

Recommendation: Install GBAS navigation technology at SFO to take advantage of the technology's advanced navigation capabilities.

(Vote: Aye, Nay, Absent or Abstain)