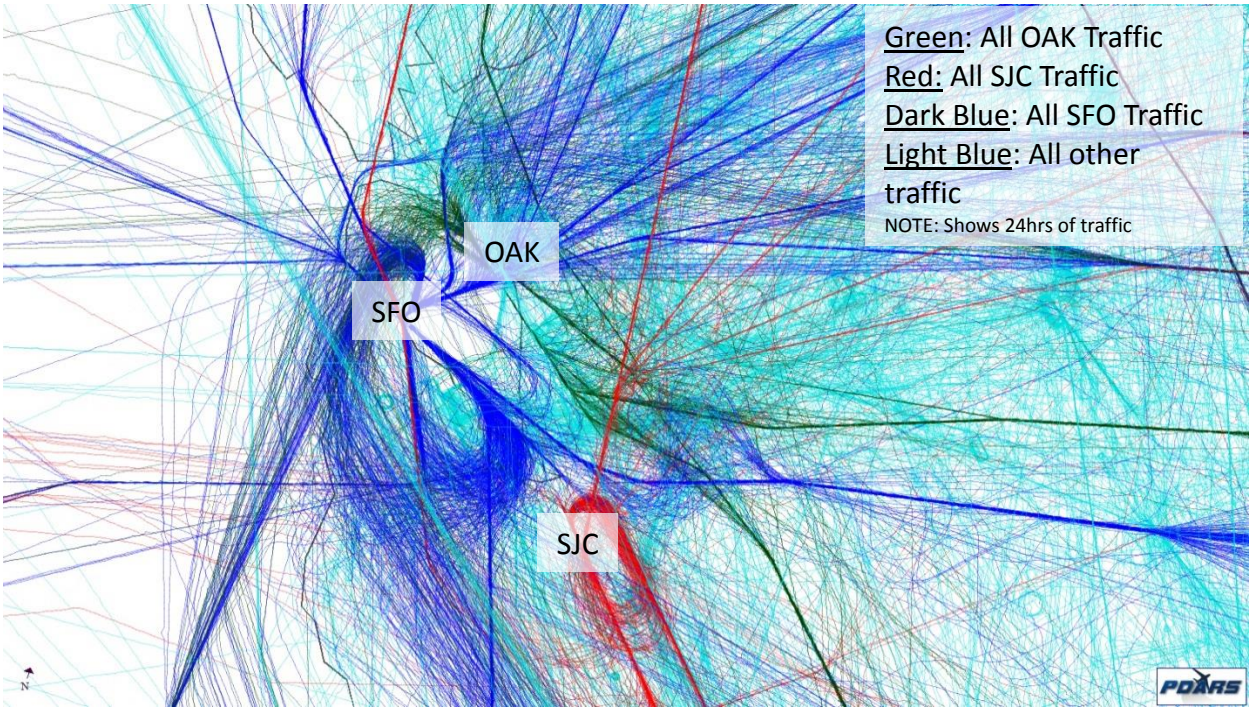
FAA Initiative to Address Noise Concerns of Santa Cruz/Santa Clara/San Mateo/San Francisco Counties

Compiled at the Requests of Representatives Farr, Eshoo and Speier

PHASE ONE



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INTRODUCTION

Status of the Initiative

In November 2015, the "FAA Initiative to Address Noise Concerns in Santa Cruz/Santa Clara/San Mateo/San Francisco Counties" was released. The initiative includes multiple recommendations to the published procedures serving the Northern California (NorCal) Airspace, as well as detailing the phases in which these recommendations will be considered by the FAA. These specific recommendations resulted from the FAA's attendance at member-hosted sessions and correspondence with congressional offices and local community representatives of Santa Cruz, Santa Clara, San Mateo and San Francisco Counties.

The "FAA Initiative to Address Noise Concerns in Santa Cruz/Santa Clara/San Mateo/San Francisco Counties" outlines a three phase approach to review and respond to the community proposals. This report documents the results of the first phase, a detailed analysis and preliminary feasibility study conducted by the FAA. This feasibility study focuses on flight procedures criteria and overall fly-ability of the proposed Performance Based Navigation (PBN) procedures, potential procedural modifications including speed/altitude adjustments, airspace changes and possibility of moving existing waypoints. Based on this analysis, the FAA also provides the possible next steps associated with the proposed actions.

During the second phase, the FAA will consider any amendments and/or new procedures that are determined to be initially feasible, flyable, and operationally safe in the first phase. As part of this effort, FAA will conduct the formal environmental and safety reviews, coordinate and seek feedback from affected industry, the National Air Traffic Controllers Association (NATCA) and the recently created Select Committee. This committee was initiated by Representatives Farr, Eshoo and Speier, and consists of representatives the Santa Cruz, Santa Clara, San Mateo and San Francisco Counties.

During phase three, using existing processes, the FAA will implement procedures, required airspace changes and additional negotiated actions that are determined feasible in Phase 1 and viable in Phase 2.

National Environmental Policy Act

In addition to its mandate to ensure the safe and efficient use of the NAS, the FAA complies with the requirements of the National Environmental Policy Act ("NEPA"). Although not specifically detailed within this initiative, the FAA's processes and standards for evaluating noise impacts associated with potential amendments to currently published procedures—consistent with FAA Order 1050.1F (effective July 16, 2015)—will be followed before implementing any airspace or procedural changes. Finally, this document does not constitute either a final decision of the FAA or a re-opening of the FAA's August 6, 2014 final decision for the NorCal Optimization of Airspace and Procedures in the Metroplex (OAPM).

Document Organization

In the following section, a table provides a brief response to the recommendations in the November 2015 "FAA Initiative to Address Noise Concerns in Santa Cruz/Santa Clara/San Mateo/San Francisco Counties," in the order these recommendations were provided (see the following graphic in Figure 1). As specified in the response to each recommendation, more detailed analysis supporting the response is found in the Appendices.

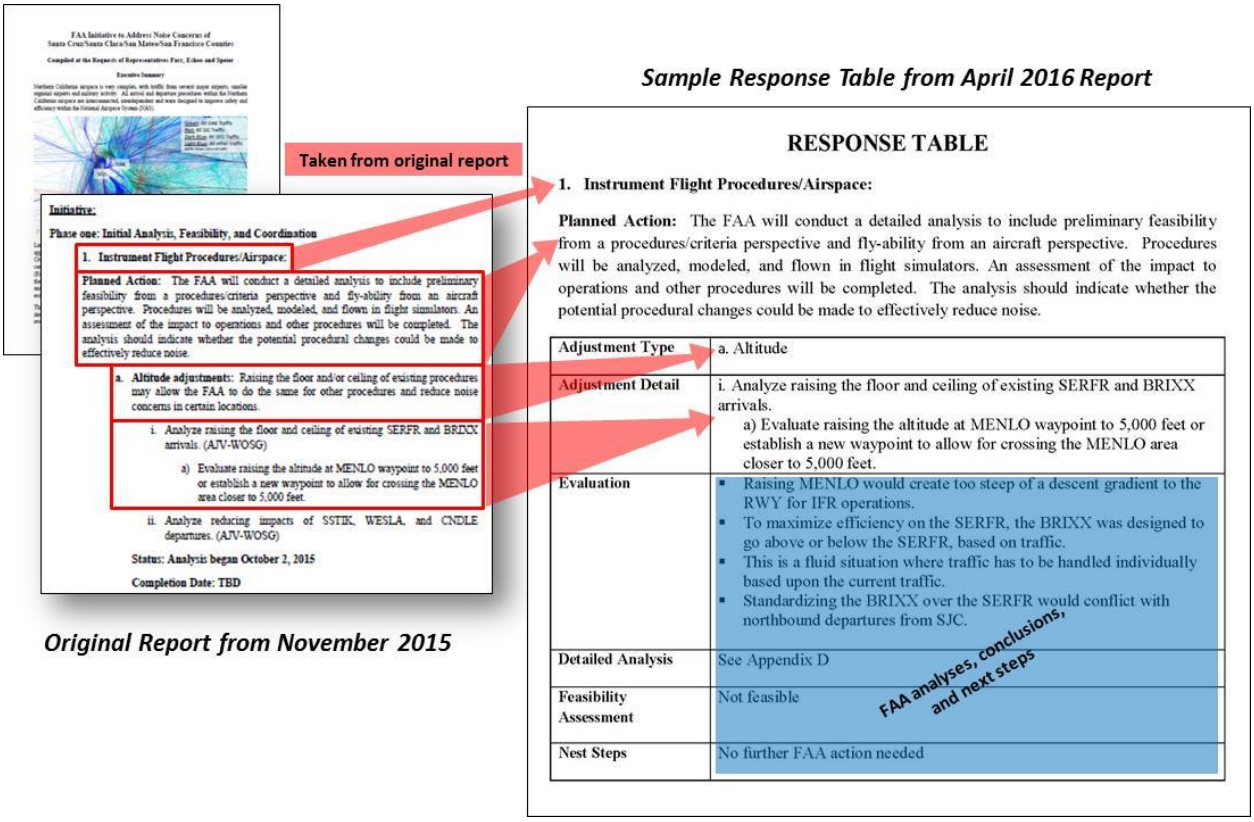

Figure 1: Crosswalk between Initial Proposals and Response Tables

RESPONSE TABLES

1. Instrument Flight Procedures/Airspace:

Planned Action: The FAA will conduct a detailed analysis to include preliminary feasibility from a procedures/criteria perspective and fly-ability from an aircraft perspective. Procedures will be analyzed, modeled, and flown in flight simulators. An assessment of the impact to operations and other procedures will be completed. The analysis should indicate whether the potential procedural changes could be made to effectively reduce noise.

Adjustment Type	a. Altitude
Adjustment Detail	i. Analyze raising the floor and ceiling of existing SERFR and BRIXX arrivals. a) Evaluate raising the altitude at MENLO waypoint to 5,000 feet or establish a new waypoint to allow for crossing the MENLO area closer to 5,000 feet.
Evaluation	• Raising MENLO would create too steep of a descent gradient to the RWY for IFR operations. • To maximize efficiency on the SERFR, the BRIXX was designed to go above or below the SERFR, based on traffic. • This is a fluid situation where traffic has to be handled individually based upon the current traffic. • Standardizing the BRIXX over the SERFR would conflict with northbound departures from SJC.
Supporting Analysis	See Appendix D
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	a. Altitude	b. Track
Adjustment Detail	ii. Analyze reducing impacts of SSTIK, WESLA, and CNDLE departures.	i. Analyze moving the SSTIK and PORTE departures more over water. ii. Analyze reducing the impacts of SSTIK, WESLA, and CNDLE departures

Evaluation	• Given the separation criteria required in designing procedures, one procedure cannot be moved without affecting all of the other procedures from which it was originally separated.
	• Adjusting one procedure potentially causes a domino effect, affecting all of the136 departure and arrival procedures associated with the major airports within the NorCal Airspace. Therefore before an adjustment is undertaken, a thorough investigation is necessary to evaluate any potential gains and losses resulting from the necessary adjustment of other procedures.
	• To maximize the use of Optimized Profile Descents (OPDs) on the most used arrivals, Air Traffic Control (ATC) vectors aircraft off of departures and lesser used arrivals. OPDs offer benefits for all stake holders. They provide efficient paths to the runway for arriving aircraft, which reduce carbon emissions. OPDs may reduce noise impacts, because they minimize level segments and allow engine idle descents along the same ground track of a procedure.
	• Due to the large capacity demands of the multiple airports served through the NorCal Airspace, departures to the south have historically been vectored as soon as possible.
	  • It is unlikely any procedural adjustment would significantly change the way the southern departures are actually flown.
	  • It may be possible to change the point at which the aircraft are typically vectored off the procedures, but there may be an increase in delays.	

Supporting Analysis	See Appendix B	
Feasibility Assessment	Feasible	
Next Steps	FAA will provide analysis of the proposed changes to the Select Committee for discussion and determination. Changes in where aircraft are routed will result in a shift of traffic, and potentially less track dispersion over residential areas.	

Adjustment Type	b. Track
Adjustment Detail	iii. Analyze moving the ILS/Visual Approach to RWY 28L offshore. iv. Analyze offsetting Visual Approaches until passing the San Mateo Bridge v. Analyze the impact of non-charted visual approaches to RWY 28

Evaluation	• Aircraft limitations require takeoffs and landings be into the wind. Historically, the winds favor RWY 28 for arrivals, with RWY 28R being the primary arrival RWY due to its flight path over water.
	• When weather permits, one of the preferred approaches by both airlines and ATC is a coded visual approach, called the FMS Bridge VISUAL APPROACH.
	  • The FMS Bridge VISUAL APPROACH is an exact replica of the offset Quiet Bridge VISUAL APPROACH which includes an offset until after the San Mateo Bridge.
	  • The fact the FMS Bridge is coded enables aircraft to smoothly transition from an RNAV Standard Terminal Arrival Route (STAR) to the approach, which enhances safety and is therefore preferred by both airlines and ATC.
	• RWY 28R is the primary arrival RWY, volume may necessitate the use of RWY 28L.
	• An offset approach to RWY 28L would conflict with the RWY 28R offset approach, making it untenable.

Supporting Analysis	See Appendix C
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	c. Waypoint
Adjustment Detail	i. On the SERFR arrival, analyze moving EPICK waypoint south to approximately 36 54 52.8N and 121 56 32.7W, add restriction to speed of 280 knots and altitude of 15,000 feet.
Evaluation	• Moving EPICK waypoint south on the SERFR arrival is possible. However, the suggested altitude and speed restrictions would remove the option of executing an OPD for the entire SERFR STAR. • The increased descent gradient would likely require aircraft to utilize speed control devices, potentially impacting communities along the route.
Supporting Analysis	See Appendix D
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	c. Waypoint
Adjustment Detail	ii. Analyze making adjustments to PORTE departure to maximize offshore routing.
Evaluation	See response to Part 1 a.ii See response to Part 1 b.i See response to Part 1 b.ii
Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible
Next Steps	FAA will provide analysis of the proposed changes to the Select Committee for discussion and determination. Note, changes in where aircraft are routed will result in a shift of traffic, and potentially less track dispersion over residential areas.

Adjustment Type	c. Waypoint
Adjustment Detail	iii. Evaluate adding a new waypoint roughly over the Highway 17 summit area, between EPICK and EDDYY, with at least 10,000 feet and 250 knot restriction.
Evaluation	• Adding an additional waypoint on the SERFR STAR at the intersection of the SERFR and Highway 17 is possible. The proposed altitude and speed restrictions would eliminate the option of executing an OPD for the entire SERFR STAR. • The increased descent gradient would likely require aircraft to use speed control devices, potentially impacting communities. • Aircraft are likely to reduce speed prior to this proposed waypoint, potentially further impacting communities in the vicinity of the EPICK waypoint.
Supporting Analysis	See Appendix D
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	d. Speed
Adjustment Detail	i. Analyze moving speed adjustments over water instead of over land ii. Analyze reducing the speed on the current SERFR arrival.

Evaluation	• About 50% of flights on the SERFR fly the entire route as published.
	  • SERFR was designed as an OPD, where the aircraft maintain an idle descent from prior to EPICK to MENLO.
	  • Due to the lack of containment in the SFO Class B, ATC has been instructing aircraft to, "… descend via SERFR One except after EPICK maintain 8,000…"
	  • While this may keep the aircraft within the Class B, the OPD benefit of the STAR is diminished.
	  • If aircraft descend to a level altitude, speed brakes may be used for energy management.
	  • The SFO Class B is currently in the process of being amended to fully contain the SERFR STAR.
	  • Once this amendment is completed, the flights that fly the entire SERFR STAR could use the idle descent as intended through EPICK, which may alleviate some of the noise from speed adjustments in this area.
	• The other 50% of aircraft on SERFR are vectored off in order to sequence aircraft with other arrivals into SFO.
	  • A similar percentage of aircraft were historically vectored off the Big Sur (BSR) arrival. This operational requirement is not expected to change without increased ground delays at the departure airport.

Supporting Analysis	See Appendix E
Feasibility Assessment	Feasible
Next Steps	FAA is pursuing an amendment of the SFO Class B to contain all procedures, which is expected to improve the noise impacts associated with speed adjustments near the EPICK waypoint.

Adjustment Type	d. Speed
Adjustment Detail	iii. Analyze data to determine compliance with the requirement to maintain 250 knots or less below 10,000 feet Mean Sea Level (MSL).
Evaluation	• Aircraft speed observations using radar tracks and flight tracking websites are displaying aircraft ground speed and not Indicated Air Speed (IAS). Flight tracking websites are low fidelity and can be inaccurate. • An aircraft's IAS is displayed in the cockpit and is subject to federal regulations. • The difference between an aircraft's ground speed and IAS is a non-linear function of wind velocity, air pressure, and temperature. • Given the temporal and spatial variability in these factors, IAS is virtually impossible to calculate from ground speed data. • It is solely the pilot's responsibility to ensure compliance with the requirement to maintain 250 knots or less below 10,000 feet MSL.
Supporting Analysis	See Appendix E
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	e. Holding Patterns
Adjustment Detail	i. On the SERFR arrival, study current use of the holding pattern at EPICK and the possibility of moving the holding pattern to WWAVS.
Evaluation	• Currently, there are published holding patterns at EPICK and WWAVS. • Analysis contained in Appendix D indicates that the holding pattern at EPICK is used infrequently (0.31%). • It is possible to remove the holding pattern at EPICK, however removing the holding pattern is unlikely to change any of the noise concerns in this area. • Even with its relatively low frequency of use, maintaining the flexibility to assign holding at EPICK is an operational flexibility required to ensure the safe and efficient movement of the aircraft.
Supporting Analysis	See Appendix D
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	f. PBN Procedures
Adjustment Detail	i. Evaluate proposed PBN arrival procedures from local community groups for feasibility, fly-ability and safety concerns.

Evaluation	• A suggestion was to transition aircraft on the SERFR back to the BSR, prior to EPICK.
	  • Three waypoints were suggested on the BSR, one where aircraft join, and another two downstream. At all three new waypoints, altitude restrictions were suggested.
	  • This is possible, although having hard altitudes at the suggested waypoints on the BSR would remove the possibility of implementing an OPD.
	  • Adjusting one procedure potentially causes a domino effect. Therefore, before an adjustment is undertaken, a thorough investigation is necessary to evaluate any potential gains and losses resulting from the necessary adjustment of other procedures.
	• It was instead suggested that these altitudes be adjusted in order to allow for OPD.

Supporting Analysis	See Appendix D
Feasibility Assessment	Feasible
Next Steps	FAA will forward this proposal go to the Select Committee so that the communities under the BSR and SERFR can be in agreement regarding any potential movement.

Adjustment Type	f. PBN Procedures
Adjustment Detail	ii. Evaluate the effect of dispersing flight tracks over a wider range.
Evaluation	• In order to accommodate the volume of traffic merging into the Bay Area airports without increasing ground delays, traffic is typically vectored off their respective procedure. • This vectoring is effectively a built in dispersion. For example, 50% of SERFR flights are already dispersed through vectoring. • ATC is constantly striving to standardize instructions and routes. Standardization improves predictability and repeatability of operations. Parallel routes may be a source of confusion and may be unsafe.
Supporting Analysis	See Appendix E
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	f. PBN Procedures
Adjustment Detail	iii. Study the feasibility of creating new transitions for the NIITE departure for airports to southbound destinations.
Evaluation	• The NIITE departure procedure is currently designed for northbound departures. • The corridor it utilizes is shared with HUSSH departures off OAK, as well as some SJC departures. • It may be operationally feasible to create a new south transition for the NIITE SID. • However, during periods of high departure demands - (typically 10 - 11 pm and 6 - 7am) moving south bound traffic onto the already saturated north bound departure would increase gate/taxiway congestion, the result being increased delays.
Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible
Next Steps	FAA will forward this proposal to the Select Committee for discussion. If approved by the Select Committee, the proponent will submit the proposal into the FAA's Performance Based Navigation (PBN) Implementation Process, as defined in the FAA Order 7100.41.

Adjustment Type	f. PBN Procedures
Adjustment Detail	iv. Study the possibility of new SFO RNP approaches which will serve RWYs 28 L/R and follow the BSR ground track, curved out over the Bay crossing MENLO at 5,000-6,000 feet (ft).
Evaluation	• The BSR and the SERFR arrivals transition into an RNP approach at MENLO. • Raising MENLO would create a steeper descent gradient to the RWY than is allowed by FAA procedural design criteria for IFR approaches. See Appendix D regarding suggested amendments to the SERFR STAR.
Supporting Analysis	See Appendix D
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

2. Air Traffic Control

Planned Action: The Western Service Center, on behalf of the Air Traffic Director of Operations, will work with the facilities to assess what opportunities exist to modify operations. Part of this assessment will include looking at the possibility of adjustments during reduced volume night operations, even if day operations cannot be changed. If changes can be made there will need to be a safety assessment, controller training, pilot briefings, , facility automation changes implemented, and the SFO community roundtable may need to be engaged.

Adjustment Type	a. Sequencing and Vector Points
Adjustment Detail	i. Analyze adjusting air traffic activity in the vicinity of Woodside VOR including altitudes.
Evaluation	• Most traffic over Woodside VORTAC (OSI) are oceanic arrivals, primarily into SFO. • According to NCT Standard Operating Procedures (SOP), FAA Order 7110.65E, oceanic jet arrivals should be no lower than 8,000 feet MSL over OSI. 83% of these arrivals are 8,000 ft MSL or higher. • There is a small portion of oceanic jet arrivals, mostly from overseas, which utilize Optimized Tailored Approach (OTA). o The OTA provides a guided OPD and is preferred by the operators. The OTA places aircraft at approximately 6,000 feet MSL over OSI. • While there are oceanic jet arrivals over OSI lower than 8,000 feet MLS; for safety reasons it is not feasible to raise these arrivals to 8,000 feet MSL.
Supporting Analysis	See Appendix F
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	a. Sequencing and Vector Points
Adjustment Detail	ii. Analyze adjusting air traffic to eliminate early turns over land. a) Focus on leaving aircraft over water as long feasible.
Evaluation	• The current interplay of departures and arrivals for SFO, SJC and OAK was extensively studied during the NorCal Metroplex. • As part of this process, moving procedures more over water was considered. Given the demand on the airspace is generally more than the procedures alone can accommodate. Procedures which allow aircraft the shortest route in or out of the NorCal Airspace were chosen to prevent extensive ground delays. • When demand lessens (for example during 1am – 6am) ATC has more flexibility to place aircraft on procedures which take aircraft on a longer path out or into the NorCal Airspace and over less noise-sensitive areas, without compromising safety or increasing ground delays. This is why the NIITE, HUSSH, FOGGG and the GNNRR departures were designed and implemented. During the period from 1am – 6am, these departures are used 88% of the time. • To accommodate the arrival and departure demands, ATC often needs to vector aircraft off procedures. While it is not feasible to re-design the procedures to allow aircraft to stay over water, it may be possible to change the point where aircraft are vectored off the procedure, without increasing ground delays. • Analysis indicates that aircraft are typically vectored off the NIITE and CNDEL procedures before reaching the NIITE and CNDEL waypoints respectively, minimizing how long these flights stay over water.
Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible
Next Steps	FAA will provide analysis of the proposed changes to the Select Committee for discussion and determination, noting that when aircraft are vectored off procedures a shift of traffic, and subsequently noise, can occur over residential areas.

Adjustment Type	a. Sequencing and Vector Points
Adjustment Detail	ii. Analyze adjusting air traffic to eliminate early turns over land. b) Keep aircraft on the SSTIK departure until the SSTIK waypoint before turning.
Evaluation	• The SSTIK Departure is an RNAV 1 departure. This means aircraft are considered to be on the procedure as long as they are within 1NM of the procedural track. • The FAA found that 99% of SSTIK departures are within 1NM of the procedure until at least the SSTIK waypoint. • The same analysis was repeated for the WESLA and the CNDEL departures. 98% of WESLA departures remain within 1NM of the procedure until at least the WESLA waypoint. 46% of CNDEL departures remain within 1NM of the procedure until at least the CNDEL waypoint. • It may be possible to change the point where aircraft are vectored off the CNDEL departure, without increasing ground delays.
Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible (CNDEL)
Next Steps	FAA will provide analysis of the CNDEL proposed changes to the Select Committee for discussion and determination. Note that when aircraft are vectored off procedures a shift of traffic, and subsequent noise, can occur over residential areas.

Adjustment Type	a. Sequencing and Vector Points
Adjustment Detail	ii. Analyze adjusting air traffic to eliminate early turns over land. c) Keep aircraft on the NIITE departure to at least the NIITE Waypoint as much as possible.

Evaluation	• Traffic permitting, night time procedures, such as the NIITE departure are switched on between the hours of 10pm – 7am. These nighttime procedures are designed for periods of lesser operational demand, where ATC has the flexibility to keep aircraft in their airspace longer without compromising safety or increasing ground delays.
	  • The same percentage of SFO daily departures (9%) occur between 10 pm - 12 am, as do between 12 am – 6 am.
	  • During 10 pm -12 am, although the NIITE departure is commonly used, it is not used as designed given the higher demand of the airspace.
	• Analysis indicated that 27% of SFO departures on the NIITE departure are vectored off the procedure prior to the NIITE waypoint.
	  • Approximately a quarter of these vectored flights occur when the airspace demand is low between the hours of 12am – 6am.
	  • During this time, it is feasible that ATC increase the percentage of NIITE departures which remain on the procedure until at least the NIITE waypoint.

Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible
Next Steps	FAA will provide guidance to ATC facilities to develop guidance that emphasizes leaving aircraft on the noise abatement procedure until NIITE; traffic permitting.

Adjustment Type	b. Use of Descend Via
Adjustment Detail	i. Increase use of descend via procedures.
Evaluation	• The NorCal Metroplex was tasked with maximizing the use of OPDs ("descend via" procedures) and maximizing the efficiency of the airspace. • Given NorCal airspace demand and the desire to avoid increasing ground delays, it was understood not all arrival traffic would be able to stay on their respective procedure. • The NorCal Metroplex recognized this by designing the procedures so that the busiest routes were the most optimized. • In particular the SERFR STAR was optimized above other STARs – for example the BEDGA STAR was designed with level-offs in order to maintain separation with the SERFR STAR • Additionally, current Class B constraints do not allow for aircraft on the SERFR arrival to fly the OPD as published. Rather, ATC instruct aircraft to level off after EPICK to ensure they remain within the Class B before continuing their descent.
Supporting Analysis	Not applicable
Feasibility Assessment	Feasible
Next Steps	FAA is pursuing an amendment of the SFO Class B to contain all procedures, which would potentially allow as many aircraft as possible to utilize the OPD STAR.

Adjustment Type	c. Class B Containment
Adjustment Detail	i. Analyze current versus historic data to determine trends and risks to aircraft exiting and reentering Class B airspace.

Evaluation	• The primary purpose the air traffic control system is to prevent the collision of aircraft operating in the system. The first priority of an Air Traffic Controller is the separation of aircraft and issuing Safety Alerts.
	• ATC is required to advise the pilot if they will exit Class B airspace.
	• Any aircraft receiving separation services will continue to receive those services whether or not they are in Class B airspace.
	• ATC instructs SERFR arrival aircraft to maintain 8,000 feet after EPICK, which ensures the aircraft will remain within the Class B when their descent is resumed. Aircraft which exit and reenter Class B airspace are still within the TRACON's airspace and therefore will still be safely separated.
	  • FAR 14 CFR 91.1117(c) states that aircraft cannot fly more than 200 knots underlying Class B airspace. As a result, aircraft on the SERFR arrival which exit Class B are unable to maintain the OPD.
	  • ATC is moving towards less verbal communication with pilots in an effort to reduce miscommunications. To that end, ATC prefers to instruct SERFR arrival aircraft to maintain 8,000 feet after EPICK, which ensures the aircraft will remain within the Class B.

Supporting Analysis	Not applicable
Feasibility Assessment	Not applicable
Next Steps	FAA is pursuing an amendment of the SFO Class B to contain all procedures

Adjustment Type	c. Class B Containment
Adjustment Detail	ii. Analyze current RNAV arrival and departure procedures to determine necessity and feasibility of redesign.
Evaluation	The modification of SFO Class B to include all current procedures has already been started. There is no need to redesign the procedures to stay within the existing Class B.
Detailed Supporting Analysis	See Appendix G
Feasibility Assessment	Not applicable
Next Steps	FAA is pursuing an amendment of the SFO Class B to contain all procedures

Adjustment Type	c. Class B Containment
Adjustment Detail	iii. Analyze current RNAV arrival and departure procedures to determine necessity and feasibility of redesigning Class B airspace.
Evaluation	The SFO Class B is being redesigned to include all SFO procedures.
Supporting Analysis	Not applicable
Feasibility Assessment	Feasible
Next Steps	FAA is pursuing an amendment of the SFO Class B to contain all procedures

Adjustment Type	d. Speed Brakes
Adjustment Detail	i. Study the potential reduction and/or elimination of the use of speed brakes and conduct a track analysis to determine flight characteristics, utilizing the Aviation Safety Information Analysis and Sharing (ASIAS) database.
Evaluation	• The FAA analyzed track data to determine the ground speed characteristics of the SERFR STAR. This analysis found a reduction in the ground speed of aircraft on the SERFR STAR near the EPICK waypoint. • Due to the non-linear relationship between ground speed and IAS, it is not possible to derive what causes the slowing down from the ground speed data alone. The observed reduction in ground speed could have multiple causes.
Supporting Analysis	See Appendix E
Feasibility Assessment	Not feasible
Next Steps	No further FAA action.

Adjustment Type	d. Speed Brakes
Adjustment Detail	ii. Work with stakeholders to determine feasibility of reducing the use of speed brakes and other surface controls over land.
Evaluation	• According to stakeholders, speed brakes are a last choice in energy dissipation on an aircraft. • Aircraft that are vectored off the SERFR STAR, are commonly assigned an altitude and a speed which often results in use of speed brakes to comply.
Supporting Analysis	See Appendix E
Feasibility Assessment	Feasible
Next Steps	FAA is pursuing an amendment of the SFO Class B to contain all procedures

Adjustment Type	e. RWY Usage
Adjustment Detail	i. Study the feasibility of increasing the use of RWY 10.
Evaluation	• Runway usage at SFO is primarily dictated by the wind direction. • Given the dominate wind direction, RWY 10 is hardly used. • When the wind direction favors increased use of RWY 10, it is used more, such as in January 2016.
Supporting Analysis	See Appendix A
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	e. RWY Usage
Adjustment Detail	ii. Study the feasibility of increasing the use of RWY 01 for Departures. Study the feasibility of proceduralizing the 050 departure heading off RWY 01 at night.
Evaluation	• RWY 01 is already the preferred departure RWY since it is compatible with the dominate wind direction as well as maximizing efficiency with RWY 28 as the dominate arrival RWY. • During the day RWY 01 is used as much as possible. • The 050 heading is already proceduralized in the NCT SOP and is already used as much as possible during nighttime operations. • At night, departures are split between RWY 01 and RWY 28 while in west flow. It may be feasible to increase use of RWY 01 for departures at night when the demand on the airspace is low enough to allow ATC more flexibility to keep aircraft in their airspace longer.
Supporting Analysis	See Appendix A
Feasibility Assessment	Feasible
Next Steps	No further FAA action

Adjustment Type	e. RWY Usage
Adjustment Detail	iii. Study the necessity of extending nighttime operations at SFO. According to the SFO Standard Operating Procedure, the preferred RWY for operations between 0100 and 0600 local time is departing. RWY 10 and landing RWY 28.
Evaluation	• Night time procedures were designed for periods of low demand, allowing aircraft to be in the airspace longer without compromising safety or increasing ground delays. • Current night time procedures are assigned to aircraft from 10pm to 7am. Due to Bay Area weather conditions, day time traffic is often delayed until after 10pm, creating a push of arrivals and departures between 10pm – 12pm. There is another departure push between 6 – 7am. • A RWY 28/10 configuration is considered an Opposite Direction Operation (an aircraft departing towards an arriving aircraft). Due to the procedures which must be followed to mitigate this complex operation, it is rarely used. • During the NorCal Metroplex process, a RWY 10 transition was included on the original NIITE departure, but was removed after implementation due to safety concerns at SFO Air Traffic Control Tower (ATCT).
Supporting Analysis	See Appendix A
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	e. RWY Usage
Adjustment Detail	iv. When weather conditions permit, study the increase in use of the Shoreline 7 Departure off RWY 28R or 28L.
Evaluation	• The TRUKN RWY 28 departure was designed to mimic the Shoreline 7, but with better course guidance to ensure that aircraft stay east of Route 101. • Approximately 75% of the north/northeast departures were using Shoreline 7 in July 2014 and switched to using the TRUKN in July 2015. The other 25% use the NIITE departure between 10pm – 7am. However, RWY 28 is rarely used as the departure RWY as it is the primary arrival RWY. • Data indicates ground delays increase up to 40% when using the same RWY for both arrivals and departures • The TRUKN RWY 28 departure is used as much as is feasible.
Supporting Analysis	See Appendix A
Feasibility Assessment	Not feasible
Next Steps	SFO should update the SFO Fly Quiet Program's Shoreline Departure Quality rating.

Adjustment Type	f. Instrument Flight Procedures (IFP)
Adjustment Detail	i. Study the feasibility of creating new transitions for the NIITE departure for departures to southbound destinations.
Evaluation	• The NIITE departure procedure is currently designed for northbound departures. • The corridor it utilizes is shared with HUSSH departures off OAK, as well as some SJC departures. • It may be operationally feasible to create a new south transition for the NIITE SID. • However, during periods of high departure demands - (typically 10 - 11 pm and 6 - 7am) moving south bound traffic onto the already saturated north bound departure would increase gate/taxiway congestion, the result being increased delays. NOTE: Evaluation above is the same as Part 1 f.iii.
Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible
Next Steps	FAA will forward this proposal to the Select Committee for discussion. If approved by the Select Committee, the proponent will submit the proposal into the FAA's Performance Based Navigation (PBN) Implementation Process, as defined in the FAA Order 7100.41.

Adjustment Type	f. Instrument Flight Procedures (IFP)
Adjustment Detail	ii. When weather operations permit, study the use of the Shoreline7 Departure off of RWY 28R or 28L.
Evaluation	• The TRUKN RWY 28 departure was designed to mimic the Shoreline 7, but with better course guidance to ensure that aircraft stay east of Route 101. • Approximately 75% of the north/northeast departures were using Shoreline 7 in July 2014 and switched to using the TRUKN in July 2015. The other 25% use the NIITE departure between 10pm – 7am. However, RWY 28 is rarely used as the departure RWY as it is the primary arrival RWY. • Data indicates ground delays increase up to 40% when using the same RWY for both arrivals and departures • The TRUKN RWY 28 departure is used as much as is feasible. NOTE: Evaluation above is the same as Part 2 e.iv.
Supporting Analysis	See Appendix A
Feasibility Assessment	Not feasible
Next Steps	SFO should update the SFO Fly Quiet Program's Shoreline Departure Quality rating.

Adjustment Type	f. Instrument Flight Procedures (IFP)
Adjustment Detail	iii. Study the use of offset visual approaches in lieu of straight in visual approaches.
Evaluation	• Aircraft limitations require takeoffs and landings to be into the wind. Historically, the winds favor RWY 28 for arrivals, with RWY 28R being the primary arrival RWY due to its flight path over water. • When weather permits, one of the preferred approaches by both airlines and ATC is a coded visual approach, called the FMS Bridge VISUAL APPROACH. • The FMS Bridge VISUAL APPROACH is an exact replica of the offset Quiet Bridge VISUAL APPROACH which includes an offset until after the San Mateo Bridge. • The fact the FMS Bridge is coded enables aircraft to smoothly transition from an RNAV Standard Terminal Arrival Route (STAR) to the approach, which enhances safety and is therefore preferred by both airlines and ATC. • RWY 28R is the primary arrival RWY, volume may necessitate the use of RWY 28L. • An offset approach to RWY 28L would conflict with the RWY 28R offset approach, making it untenable. NOTE: Evaluation above is the same as Part 1 b.iii – v. • Offset arrivals to RWY 28 are already used as much as weather and arrival rate permit.
Supporting Analysis	See Appendix A
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	f. Instrument Flight Procedures (IFP)
Adjustment Detail	iv. Study the usage of GAP departure.
Evaluation	• The GAP departure has historically serviced those flights heading to the west, which is less than 10% of departing SFO traffic. • The GNNRR departure overlays the GAP departure and currently services these same flights.
Supporting Analysis	See Appendix B
Feasibility Assessment	Not feasible – Not applicable
Next Steps	SFO should update SFO Fly Quiet Program's Gap Departure Quality rating to show current procedures.

Adjustment Type	f. Instrument Flight Procedures (IFP)
Adjustment Detail	v. Study whether international and domestic aircraft are handled the same by Air Traffic Control.
Evaluation	• A study of how aircraft utilize the RNAV STARs into SFO, SJC and OAK was undertaken. • It was found there is no difference in how international and domestic carriers fly each of these RNAV STARs.
Supporting Analysis	See Appendix H
Feasibility Assessment	Not applicable
Next Steps	No further FAA action

Adjustment Type	f. Instrument Flight Procedures (IFP)
Adjustment Detail	vi. Study the feasibility of increasing the use of the SSTIK departure during the day and the NIITE departure at night.
Evaluation	• 87% of STTIK departures occur during the day. • 10% of the SSTIK departures that occur during the night occur between 10 pm – 12am. • As described in Part 2 e iii, due to Bay Area weather conditions, day time traffic is often delayed until after 10pm, creating a push of "daytime" arrivals and departures between 10pm – 12pm. • Data indicates the NIITE departure is the dominate departure to the north/north east between 10pm -7am. It is used by 75% of the north/north east departures. • The majority of the remaining flights are delayed daytime flights which leave after 10pm. • The SSTIK departure is used as much as is feasible during the day and the NIITE departure is used as much as is feasible during the night.
Supporting Analysis	See Appendix B
Feasibility Assessment	Not feasible – Already maximized
Next Steps	No further FAA action

Adjustment Type	g. Opposite Direction Operations (ODO)
Adjustment Detail	i. Review recent implementation of ODO procedures and their impacts in the San Francisco Bay Area. .
Evaluation	• In August 2013, ODO requirements in air traffic rules changed. • Since this time, due to the complexity of implementing ODO procedures and since RWY 28 is the preferential arrival RWY; RWY 10 is rarely used as a departure RWY.
Supporting Analysis	See Appendix A
Feasibility Assessment	Not feasible – Not applicable
Next Steps	SFO should update the SFO Fly Quiet Program* and the FAA should update the SFO Standard Operating Procedures, FAA Order SFO 7220.2J, CHG 1 to reflect that RWY 10 is not the preferential departure RWY at night. *http://www.flysfo.com/community-environment/noise-abatement/noise-abatement-procedure

Adjustment Type	g. Opposite Direction Operations (ODO)
Adjustment Detail	ii. Assess potential options for night operations.
Evaluation	There is one feasible possibility for a night time south departure: • Create a south transition on the NIITE departure (from RWY 28/01) The 050 heading is already proceduralized through the NCT SOP and is already used as much as possible at night.
Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible
Next Steps	The FAA will forward the NIITE south transition proposal to the Select Committee for discussion. If approved by the Select Committee, the proponent will submit the proposal into the FAA's Performance Based Navigation (PBN) Implementation Process, as defined in the FAA Order 7100.41.

3. Traffic Management

Planned Action: The Western Deputy Director of System Operations, on behalf of the Air Traffic Director of Operations, will work with the Western Service Center and local facilities to evaluate the actions and suggestions below. During the analysis, the focus will be on use of traffic management tools and initiative to ensure current practices are as effective and efficient as possible for the potential reduction of noise concerns.

Adjustment Type	a. Equitability. Opposite Direction Operations (ODO)
Adjustment Detail	i. Review the current nighttime operations to determine if they adequately address preferential RWY usage.

Evaluation	• Given the separation criteria required in designing procedures, one procedure cannot be moved without affecting all of the other procedures from which it was originally separated.
	• Adjusting one procedure potentially causes a domino effect, affecting all of the136 departure and arrival procedures associated with the major airports within the NorCal Airspace. Therefore before an adjustment is undertaken, a thorough investigation is necessary to evaluate any potential gains and losses resulting from the necessary adjustment of other procedures.
	• To maximize the use of Optimized Profile Descents (OPDs) on the most used arrivals, Air Traffic Control (ATC) vectors aircraft off of departures and lesser used arrivals. OPDs offer benefits for all stake holders. They provide efficient paths to the runway for arriving aircraft, which reduce carbon emissions. OPDs may reduce noise impacts, because they minimize level segments and allow engine idle descents along the same ground track of a procedure. , .
	• Due to the large capacity demands of the multiple airports served through the NorCal Airspace, departures to the south have historically been vectored as soon as possible.
	  o It is unlikely any procedural adjustment would significantly change the way the southern departures are actually flown.
	  o It may be possible to change the point at which the aircraft are typically vectored off the procedures, but there may be an increase in delays.
	
	NOTE: Evaluation above is the same as See response to Part 1 b.ii.
	
	• In order to accommodate the volume of traffic merging into the Bay Area airports without increasing ground delays, traffic is typically vectored off their respective procedure.
	• This vectoring is effectively a built in dispersion. For example, 50% of SERFR flights are already dispersed through vectoring.
	• ATC is constantly striving to standardize instructions and routes. Standardization improves predictability and repeatability of operations. Parallel routes may be a source of confusion and may be unsafe.
	
	NOTE: Evaluation above is the same as See response to Part 1 f.ii.

	• RWY usage is primarily dictated by wind and safety criteria such as ODO. • Currently what is being used does not match SFO Fly Quiet Program* and the SFO Standard Operating Procedures.
Supporting Analysis	See Appendix A
Feasibility Assessment	Not feasible – Not applicable
Next Steps	SFO should update the SFO Fly Quiet Program* and the FAA should update the SFO Standard Operating Procedures, FAA Order SFO 7220.2J, CHG 1 to reflect that RWY 10 is not the preferential departure RWY at night. *http://www.flysfo.com/community-environment/noise-abatement/noise-abatement-procedures

Adjustment Type	a. Equitability
Adjustment Detail	ii. Evaluate the effect of dispersing flight tracks over a wider range or developing multiple parallel RNAV procedures.
Evaluation	• In order to accommodate the volume of traffic merging into the Bay Area airports without increasing ground delays, traffic is typically vectored off their respective procedure. • This vectoring is effectively a built in dispersion. For example, 50% of SERFR flights are already dispersed through vectoring. • ATC is constantly striving to standardize instructions and routes. Standardization improves predictability and repeatability of operations. Parallel routes may be a source of confusion and may be unsafe. NOTE: Evaluation above is the same as Part 1 f.ii.
Supporting Analysis	See Appendix B and Appendix E
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	b. Interactions and agreements	c. Time Based Flow Management (TBFM)
Adjustment Detail	i. Review facility agreements for possible changes to aircraft set up and sequencing.	i. Review the current and projected status of using TBFM procedures.
Evaluation	• FAA controls the flow of traffic. • Aircraft can be spaced out more, but there would be additional delays and restrictions • The FAA is developing metering tools which may be used to better meter the SERFR. • This would mean that once SFO Class B is changed, more flights would be on the OPD.	
Supporting Analysis	Not applicable	
Feasibility Assessment	Feasible	
Next Steps	The FAA is currently pursing better ways to meter the traffic into SFO.	

Adjustment Type	b. Interactions and agreements
Adjustment Detail	ii. Review facility agreements to ensure they are effective and efficient with regard to routing and speeds.
Evaluation	• The current interplay of departures and arrivals for SFO, SJC and OAK was extensively studied during the NorCal Metroplex. • The intention was to provide a system of procedures which best minimized ground delays while complying with all safety criteria. • This was partially achieved by prioritizing the design of procedures to optimize the busiest routes. • Facility agreements were reviewed as part of the NorCal Metroplex to support these optimized procedures. • In addition, existing facility agreements undergo regular review and modification for improvement.
Supporting Analysis	Not applicable
Feasibility Assessment	Feasible
Next Steps	FAA is investigating potential improvement through better ways of metering traffic.

Adjustment Type	c. Time Based Flow Management (TBFM)
Adjustment Detail	ii. Review the impact of using TBFM on current noise issues.
Evaluation	• If the FAA is successful in better metering traffic on the SERFR, then this would potentially increase the number of aircraft able to stay on the procedure. • This may reduce the possible noise associated with vectoring aircraft off the procedure around the EPICK waypoint. • Once the Class B is changed to contain the SERFR Arrival, this would mean that a greater percentage of arrivals would be able to execute the OPD as designed.
Supporting Analysis	Not applicable
Feasibility Assessment	Feasible
Next Steps	FAA will continue to investigate metering improvements and the SFO Class B updates.

Adjustment Type	d. Nighttime Offloads/Routes
Adjustment Detail	i. Review nighttime operations.
Evaluation	The evaluation of nighttime operations is covered in multiple areas within this document. See the following responses: • Part 1 f.iii • Part 2 a.ii a • Part 2 a.ii c • Part 2 e.i. • Part 2 e.ii. • Part 2 e.iii. • Part 2 f.iv • Part 2 f.vi. • Part 2 g.ii.
Supporting Analysis	See Appendix B
Feasibility Assessment	Feasible
Next Steps	FAA will provide current analysis of the proposed changes to the Select Committee for discussion and determination, noting that changes in where aircraft are typically vectored off procedures would result in a shift of traffic, and subsequently noise, over residential areas. If approved by the Select Committee, the proponent will submit the PBN procedure proposals into the FAA's Performance Based Navigation (PBN) Implementation Process, as defined in the FAA Order 7100.41.

Adjustment Type	d. Nighttime Offloads/Routes
Adjustment Detail	ii. Review cargo flight operations to determine if previous actions have adequately addressed all issues.
Evaluation	• It was found that very few cargo flights occur at night. • Cargo flights account for 2% of night time (10pm – 7 am) SERFR flights.
Supporting Analysis	See Appendix E
Feasibility Analysis	Feasible
Next Steps	FAA will provide current analysis of the proposed changes, as summarized in Part 3.d.i, to the Select Committee for discussion and determination, noting that changes in where aircraft are typically vectored off procedures would result in a shift of traffic, and subsequently noise, over residential areas. If approved by the Select Committee, then the proponent will submit the PBN procedure proposals into the FAA's Performance Based Navigation (PBN) Implementation Process, as defined in the FAA Order 7100.41.

Adjustment Type	d. Nighttime Offloads/Routes
Adjustment Detail	iii. Review utilizing the current BSR for late night cargo arrivals.
Evaluation	• Approximately 2% of nighttime (10pm – 7am) flights on the SERFR are cargo flights. • Analysis indicates that moving cargo flights to the BSR would result minimal change.
Supporting Analysis	See Appendix E
Feasibility Assessment	Not feasible
Next Steps	No further FAA action

Adjustment Type	d. Nighttime Offloads/Routes
Adjustment Detail	iv. Review the current nighttime operations to determine if they adequately address preferential RWY usage.
Evaluation	• Given the separation criteria required in designing procedures, one procedure cannot be moved without affecting all of the other procedures from which it was originally separated. • Adjusting one procedure potentially causes a domino effect, affecting all of the136 departure and arrival procedures associated with the major airports within the NorCal Airspace. Therefore before an adjustment is undertaken, a thorough investigation is necessary to evaluate any potential gains and losses resulting from the necessary adjustment of other procedures. • To maximize the use of Optimized Profile Descents (OPDs) on the most used arrivals, Air Traffic Control (ATC) vectors aircraft off of departures and lesser used arrivals. OPDs offer benefits for all stake holders. They provide efficient paths to the runway for arriving aircraft, which reduce

	carbon emissions. OPDs may reduce noise impacts, because they minimize level segments and allow engine idle descents along the same ground track of a procedure. , .
	• Due to the large capacity demands of the multiple airports served through the NorCal Airspace, departures to the south have historically been vectored as soon as possible.
	  o It is unlikely any procedural adjustment would significantly change the way the southern departures are actually flown.
	  o It may be possible to change the point at which the aircraft are typically vectored off the procedures, but there may be an increase in delays.
	
	NOTE: Evaluation above is the same as See response to Part 1 b.ii.
	
	• In order to accommodate the volume of traffic merging into the Bay Area airports without increasing ground delays, traffic is typically vectored off their respective procedure.
	• This vectoring is effectively a built in dispersion. For example, 50% of SERFR flights are already dispersed through vectoring.
	• ATC is constantly striving to standardize instructions and routes. Standardization improves predictability and repeatability of operations. Parallel routes may be a source of confusion and may be unsafe.
	
	NOTE: Evaluation above is the same as See response to Part 1 f.ii.
	
	• RWY usage is primarily dictated by wind and safety criteria such as ODO.
	
	Currently what is being used does not match SFO Fly Quiet Program* and the SFO Standard Operating Procedures.
	
	NOTE: Evaluation above is the same as Part 3 a.i.

Supporting Analysis	See Appendix B
Feasibility Assessment	Not feasible – Not applicable
Next Steps	No further FAA action

4. Operators

Planned Actions: AJV will engage Airlines for America (A4A) and The International Air Transport Association (IATA) nationally to solicit perspective and input into defined issues. Operator involvement needs to be discussed, especially if the FAA does not utilize the roundtable concept to work issues with stakeholders. It is assumed that the Office of the Associate Administrator for Airports (ARP) would want some level of input or engagement as SFO should also be involved directly in these conversations.

Adjustment Type	Evaluation	Supporting Analysis	Feasibility Assessment	Next Steps
a. Use of speed brakes	See Appendix I			No further FAA action
b. RWY choices				
c. IFP choices				
d. Nighttime Offloads/Routes				
e. Early Turns				
f. International air carrier execution of Optimized Profile Descents (OPDs)				

5. Community Engagement

Adjustment Type	a. Community Forums
Evaluation	The Select Committee has been formulated by Representatives Farr, Eshoo and Speier covering the Santa Cruz, Santa Clara, San Mateo and San Francisco Counties.
Next Steps	FAA will work with the Select Committee to continue to address noise concerns in Northern California area.

Adjustment Type	b. San Carlos Airport
Evaluation	TBD
Next Steps	TBD