



# REPORT OF THE AD HOC ADVISORY COMMITTEE ON SOUTH FLOW ARRIVALS

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May 18, 2018

Dear Tony DiBernardo:

With this letter, I convey to you the final report of the Ad Hoc Advisory Committee on South Flow Arrivals.

These recommendations reflect the work of the fourteen-member Committee, over the course of eight meetings during the past six months.

The focus of this Committee has been the south flow arrival path into the Norman Y. Mineta San José International Airport (SJC). During times of inclement weather, some mornings, or during frontal passages, the wind at SJC will blow from the south. For safety reasons, aircraft must take off and land into these southerly winds, requiring the airport to operate in "south flow," an alternate arrival path into SJC that allows aircraft to land and take off into the wind.

During these times, aircraft have followed basic arrival and approach paths to the west of SJC over San José, Cupertino, Sunnyvale, Mountain View, Palo Alto and Santa Clara, before turning east to return to the airport. As weather changes - the airport returns to "north flow," the most common configuration, and Air Traffic Control begins directing aircraft to arrive over downtown San José.

The airspace over Santa Clara County and the entire San Francisco Bay Area is one of the most complex airspace for the Federal Aviation Administration (FAA) to conduct safe flight operations. There are three major international airports as well as numerous smaller airports. The interactions of all these facilities and weather play a part in the flight procedures that are used at SJC. The focus of this Committee is on the procedures that are used for south flow arrivals at SJC.

The Committee's recommendations can succinctly be prioritized as:

- Fly more dispersed Western approach;
- Explore other approaches;
- Modify procedures to reduce the ground noise generated by aircraft;
- Implement FAA Policy Changes;
- Avoid noisy flight maneuvers;
- Implement noise management measures at SJC;
- Explore single regional noise reporting system.

The Ad Hoc Advisory Committee reviewed and prioritized numerous noise mitigation recommendations (See Appendix A) and has listed the mitigations under the appropriate category.

Having conveyed these recommendations, we request that the FAA and SJC:

- Evaluate and report on the consequences and impact (including noise Aviation Environmental Design Tool (AEDT) impact assessment) of each mitigation measure in Appendix A.
- Provide a timeline for when the committee can expect documented responses
- Provide written responses documenting the FAA and SJC evaluation and conclusions on the feasibility of implementing what has been requested for each recommendation
- Prior to the implementation of any change, consult with the Committee/Cities Association to determine which appropriate recommendations to implement,
- Continue to prioritize safety of flight as its number one priority; and raise the priority of ground level per flight aircraft noise so that the FAA can better mitigate the impact to our residents

The Committee believes timely assessment, prioritization, and implementation of the recommendations will provide noise mitigation to the communities experiencing the impacts of noise from south flow arrivals.

Sincerely,



Glenn Hendricks  
Mayor, Sunnyvale

Chair, Ad Hoc Advisory Committee on South Flow Arrivals

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# Acknowledgements

The Committee would like to thank the San José City Council for initiating the Ad Hoc Advisory Committee on South Flow Arrivals, thereby demonstrating through the Committee their commitment to proactively identify mitigations to these challenges.

The Committee would also like to acknowledge and thank the Federal Aviation Administration (FAA), as they have attended every meeting with knowledgeable and committed staff. Through various presentations and guest speakers, the FAA demonstrated a real effort to share information and educate the Committee and public about the complexity of the airspace among other issues. The committee feels the FAA participated in these meetings as a willing partner in search of practical solutions.

The San José Airport staff has been fantastic and true partners in this effort. The Committee is appreciative of the meeting space and coordination provided by the staff. In particular, the Committee would like to recognize Matthew Kazmierczak, Manager of Strategy & Policy at San José International Airport for his outstanding knowledge support.

I want to thank all the members of the Committee for the countless hours spent trying to problem solve such a complex issue. The calm, rational thoughtfulness that the members brought to every meeting created a great collaborative environment.

Most important, the Committee wishes to thank the members of the public who attended these meetings and/or provided input. Our residents clearly showed a passion for this topic and a zeal for wanting to find transparent solutions that would work for all parties involved. They are focused on sharing their experiences, learning about the constraints and offering perspective on possible mitigations.

# Background

A series of flight path changes have been implemented by the FAA in early 2012 that have resulted in a major westward shift and concentration of air traffic corridors.

The level and intensity of aviation noise experienced by residents of Santa Clara County is dependent on various factors including proximity to existing flight paths, time of day, and weather conditions. The noise consequences from the implementation of NextGen and overall increase of flights in our region are having a negative impact on the quality of life of our residents. In response to growing community complaints and concerns about aviation noise, Committee members request that the FAA assess, prioritize and implement timely noise mitigation solutions, in conjunction with this Committee or a successor organization.

## WHAT ARE SOUTH FLOW OPERATIONS?

Normally, aircraft at SJC land descending from the south (over parts of downtown San José) and take off heading north. However, under certain weather conditions (mostly when the wind shifts direction at the Airport and flows from the south at higher speeds), for the sake of operational safety, the FAA requires pilots of arriving aircraft to follow an arrival procedure that can take descending aircraft over parts of San José, Cupertino, Sunnyvale, Mountain View, Palo Alto and other communities as they prepare to land at SJC approaching from the north flying south. When that arrival procedure is used, air operations are in “south flow.”

More recently, the use of the south flow procedure has increased significantly as wind conditions that cause the need for south flow operations have started earlier in the day and have been lasting longer. Since 2015, new air traffic control technology installed by the FAA and in aircraft have resulted in more precise and narrowly concentrated arrival patterns, especially over San José, Sunnyvale, Cupertino, Mountain View, and Palo Alto. Use of the NextGen technology has increased per-flight, noise for residents. While this may have reduced noise for some residents, noise has increased for those residents living directly under the more precise arrival and approach flight paths.

## SOUTH FLOW AND THE NORCAL METROPLEX

The FAA has testified that Northern California is the second most complicated metroplex location after New York City for air traffic given the proximity and flight patterns of its three primary airports: San Francisco (SFO), San José (SJC), and Oakland (OAK). For safety purposes, air traffic procedures are required to maintain a safe vertical and horizontal distance from other aircrafts, as well as approach and departure flight paths.

FAA staff has presented that a south flow arrival approach is a more complicated procedure than north flow given its proximity to other flight procedures for SFO traffic, and as such, it is a less preferred procedure when compared with north flow. The FAA stated that they only switch to south flow when wind and weather conditions require it. The preferred approach is north flow where planes approach SJC from the south flying north, as there is less air traffic from other airports.

## FORMATION OF THE AD HOC ADVISORY COMMITTEE ON SOUTH FLOW ARRIVALS

In November 2016, Sunnyvale and Mountain View residents attended the SJC Airport Commission meeting to ask the Commission to address their noise concerns. The Commission requested staff to write the FAA to ask for solutions to address the south flow noise issue. While the FAA responded to staff's correspondence, the response offered no adjustments in the procedure.

Sunnyvale, Mountain View and Palo Alto residents returned to the Commission in February 2017 to request the Commission's support for the formation of a body to address south flow noise issues. In response, the Commission voted unanimously to recommend the formation of a body that included FAA participation.

In March 2017, the Airport hosted a meeting organized by Congressman Ro Khanna's office. Elected officials from Sunnyvale, Mountain View, Cupertino, San José, the FAA, and the Airport attended to discuss the south flow issue and possible solutions. There was consensus that it would be constructive to have public information and discussion forums to understand why the south flow procedure is used and to review possible solutions to reduce the noise for the most impacted residents. The FAA and the Airport agreed to participate in the forums.

In response to the SJC Commission's recommendation, Airport staff reviewed the formation and structure of the SFO Select Committee on South Bay Arrivals, which was an ad hoc noise committee formed in May 2016 by Congresswoman Anna Eshoo, Congresswoman Jackie Speier, and former Congressman Sam Farr. The Select Committee brought together elected officials from the jurisdictions of three counties to look at the noise impacts of the FAA's 2015 implementation of its NextGen technology. The Committee ultimately made a series of consensus-based recommendations before disbanding in November 2016. The three Congressional offices endorsed and transmitted the Committee's recommendations to the FAA for review.

In reviewing the Select Committee model, Airport staff determined that the ad hoc model is a good process for conducting a regional discussion on possible solutions to address the noise impacts of the south flow procedure at SJC. Based on this, the City of San José formed the Ad Hoc Advisory Committee on South Flow Arrivals to discuss possible solutions. The Committee is an advisory body with no legal authority. Its purpose is to provide potentially feasible and consensus-based recommendations to the FAA to mitigate the noise impacts of the south flow procedure.

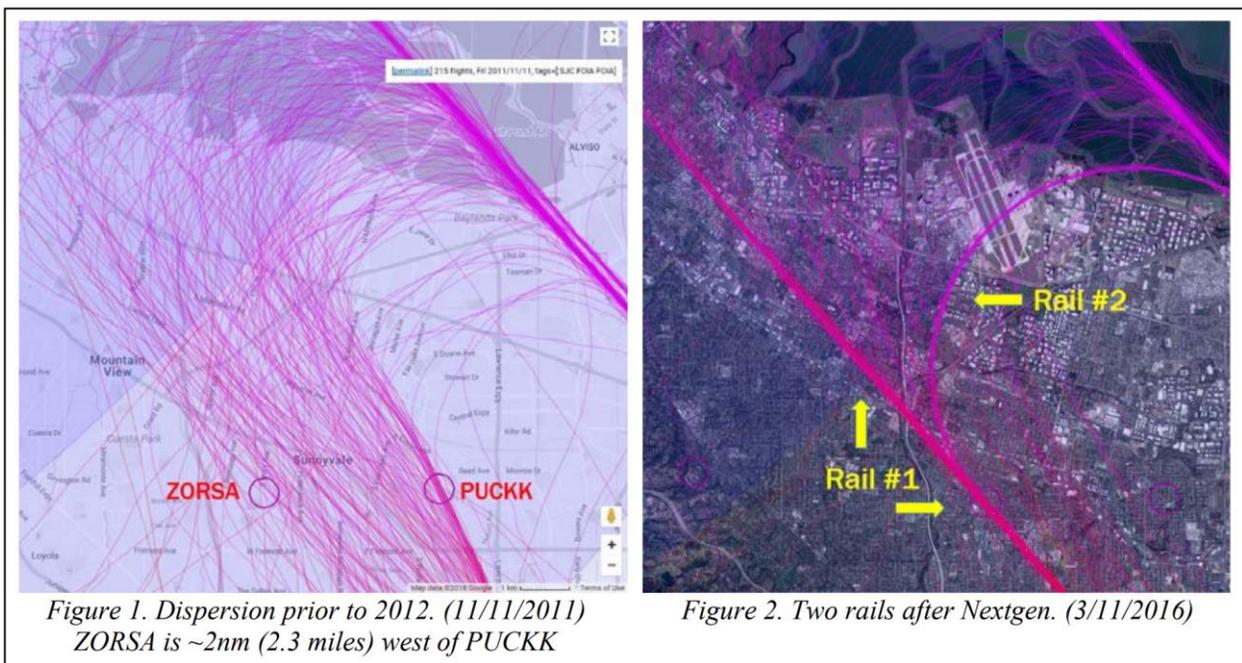
To encourage inclusiveness and consensus, all Santa Clara County cities were invited to participate on the Committee. FAA staff and San José Airport staff have also participated in the discussions with the FAA providing technical support and the Airport providing non-technical support.

These meetings have produced the recommendations that follow.

# Recommendation Areas

## FLY MORE DISPERSED WESTERN APPROACH

Prior to the implementation of Metroplex/NextGen, aircraft were dispersed over a broader area of air space thereby limiting concentrated negative effects on residents and neighborhoods. A dramatic increase in noise complaints resulted from the implementation of NextGen, a program which switched a radar-based approach to a GPS approach, which also resulted in the use of Required Navigation Performance (RNP) and Optimal Profile Descent (OPD). These tools and procedures create a concentration of flight paths, referred to as a “rail” over specific neighborhoods and homes as shown in Figure 2, where residents bear the brunt of ground effect noise.



The FAA has stated that having a predictable, repeatable and consistent set of procedures improves safety, workload and communication for aircraft preparing for landings. The Committee has reason to believe that if nothing is done to address dispersion, over time still more concentration will occur.

Appendix A identifies many suggestions for “how” to achieve a more dispersed Western approach. (See spreadsheet items Q through CC). The Ad Hoc Advisory Committee is requesting written responses from the FAA to these items.

**Request to the FAA 1:** The Ad Hoc Advisory Committee requests the FAA to explore options and procedure changes that will still allow for the safe landing of aircraft at SJC AND return to a more dispersed distribution of aircraft. (Using the success criteria listed below)

Dispersion of the existing air traffic can mean different things in each of the impacted cities. Directionally the Committee recommends that the FAA drive towards: 1) do not route airplanes over narrow rails; 2) reversion to ground noise patterns prior to 2012 in the same geographic proportions as before.

Without being prescriptive of “how” to achieve dispersion of the existing air traffic over each city, the following details will try and define success criteria for dispersion of aircraft over each city.

### *San José*

The City of San José does not have a prescription for the dispersion of aircraft on the western south flow approach to the SJC.

### *Cupertino*

For the City of Cupertino – dispersion would mean that flight paths are distributed and not concentrated over a narrow flight path. Current south flow flight paths appear to be from JESEN to ZORSA and not from JESEN to PUCKK, or from JESEN to any point between waypoints ZORSA and PUCKK. It would be preferable for flight paths to be more evenly distributed between JESEN/ZORSA flight paths and JESEN/PUCKK flight paths. Alternative flight paths from JESEN to any point between waypoints ZORSA and PUCKK may also be good options for achieving dispersion and avoiding narrow flight path concentrations

### *Sunnyvale*

For the City of Sunnyvale, dispersion would mean even distribution of the existing aircraft between the ZORSA and PUCKK waypoints. Not that aircraft would fly over these specific points, but rather use these waypoints (ZORSA and PUCKK) as an eastern and western outside logical boundary of where aircraft would fly over the city. Define a set of procedures, rules or processes, that would enable FAA to safely and equivalently distribute traffic over Sunnyvale between these two designated waypoints (measured over frequent interval).

### *Mountain View*

For the City of Mountain View – dispersion of aircraft is essential to a solution. Two rails (straight and semi-circular) have sharply concentrated noise over Mountain View in recent years. These rails come from use of an RNP approach and a new vectoring procedure. Mountain View would like to see the dispersion that existed before 2012, even if that means returning some control to pilots. Can airplanes that are capable of turns that are tighter than the RNP turn begin their turn prior to reaching ZORSA, dispersing traffic to the East of the RNP rail? Can traffic on the STAR procedures make their turn at or after JESEN at slightly different locations and with slightly different headings, perhaps by recreating PUCKK as the terminal waypoint (infrequently reached) on the arrival

procedure? This could ‘spray’ traffic across Sunnyvale and Mountain View and along the length of Hwy 101 as before. Would creation of a charted visual approach help? With different procedures, could ATC contribute to these ends? Recreating the long-standing traffic patterns that existed prior to 2012 would reduce complaints significantly.

### *Palo Alto*

Palo Alto wants to return to the same level of dispersion as the one that existed before NextGen and as illustrated by the Feb 2011 data presented by the FAA. It means that:

- Palo Alto should not get about 50% of the SJC south flow arrivals making their turn over residential communities, especially considering SFO arrivals that are highly concentrated near the MENLO waypoint due to NextGen changes
- Vectored flights are NOT always vectored in the exact same way (otherwise, it creates a rail corridor of vectored aircraft). Air Traffic Control (ATC) could use multiple headings to create separate vectoring paths and disperse noise.
- Every effort should be made to take advantage of compatible land use (e.g. industrial, commercial, water, uninhabited areas, freeways) to minimize noise over residential communities.
- The FAA should seek solutions at the Metroplex level to create opportunities to decrease noise substantially for the many residents that have been affected by the NextGen changes. See items PP, QQ, RR in the Excel file.

### *Santa Clara*

The City of Santa Clara is on the “Rail” in the North part of the City. The City is interested in determining how any changes would affect the City, but also finding modifications to the flight path to significantly decrease sound levels. One of the key inputs should be what an acceptable noise level is, and how can residents be empowered to have real-time information to assure that noise levels stay at acceptable levels. Are there better ways for residents to measure and report noise to the FAA (such as an App where residents can measure noise and report concerns immediately)?

## EXPLORE OTHER APPROACHES

When the south flow arrival pattern is initiated for SJC, most traffic flies toward and through the ZORSA waypoint over San José, Cupertino, Sunnyvale, Mountain View and Palo Alto makes a right-hand turn to intersect with the final approach pattern to land.

In reviewing radar data, there is some amount of traffic that lands at SJC during south flow that is vectored to land from the east. That traffic comes in and makes a left-hand turn to intersect the final approach.

The FAA has told the Committee that vectoring is only used to sequence airplanes and that they do not vector airplanes for noise. The Committee notes that if the FAA is successful at reducing the need for vectoring in the future, south flow traffic currently being vectored to the eastern approach will by default, be shifted to the western approach.

**Request to the FAA 2A:** The Ad Hoc Advisory Committee requests the FAA maintain the use of the Eastern vectoring for south flow arrivals as much as operationally feasible. This is an important tool in the controller's toolkit.

**Request to the FAA 2B:** The Ad Hoc Advisory Committee requests the FAA study the usage of the Eastern vectoring for south flow arrivals for the past 5 years and provide an explanation for any changes, increases and/or decreases.

**Request to the FAA 2C:** The Ad Hoc Advisory Committee requests the FAA to document why, when, and how an Eastern vectoring is used into SJC during south flow.

**Request to the FAA 2D:** The Ad Hoc Advisory Committee requests the FAA to explore a Chartered Visual Approaches from the east and west. See item V in Appendix A.

### *Milpitas*

Maintaining the current frequency of use of the Eastern approach ensures that we are not “just” moving ground level impacting noise to other residential communities. The Ad Hoc Advisory Committee requests that should there be increased flight volume at SJC, the FAA implement an equal dispersing of those flights to all approaches so that one zone or area of communities is not burdened.

### *San José*

The City of San José strongly opposes any prescription for dispersion that would move more aircraft towards an Eastern approach to SJC during south flow. A move to fly more aircraft than currently diverted onto an Eastern approach has the potential to put more aircraft over some of the lower-income communities of San José and could present environmental justice and socioeconomic fairness concerns. When aircraft are in the normal north flow approach to SJC, San José residents already experience the largest share of aircraft noise, some 85 percent of the time.

Appendix A identifies suggestions for “how” this might be accomplished. (See spreadsheet items M, N, and P). The Ad Hoc Advisory Committee is requesting written responses from the FAA to these items.

Regardless of the outcome of this evaluation, the Committee requests the FAA not lose or stop the vectored approach that some aircraft currently use to approach and land at SJC. It is important we do not reduce the amount of traffic using this path.

## **MODIFY PROCEDURES TO REDUCE THE PER FLIGHT GROUND NOISE GENERATED BY AIRCRAFT**

The objective the Ad Hoc Advisory Committee is to achieve the reduction and/or mitigation of ground level per flight impacting noise from aircraft. Items A through K from the spreadsheet are suggestions for how to achieve noise reduction.

Per information that was provided by the FAA at the April 13, 2018 Ad Hoc Advisory Committee meeting, the highest probability items to implement are D, E, F of the spreadsheet. (The FAA's comments were not a commitment that these items could be implemented or that they would achieve the desired results.)

**Request to the FAA 3:** The Ad Hoc Advisory Committee requests the FAA initiate a full procedure evaluation to implement item E and F, the purpose being to implement the concept of item D.

These items are based on the concept that all other things being equal, "altitude is our friend," as it relates to ground level per flight impact noise from aircraft. The higher the aircraft, the less its noise will impact residents on the ground.

If the FAA has additional suggestions on raising aircraft altitude, these should also be included in the evaluations.

The success criteria for this set of items is to safely land aircraft at SJC and keep the aircraft as high as possible for as long as possible without requiring added lift, brakes or jet thrust, while still allowing for safety, appropriate decent paths, and sequencing to land at the airport.

## IMPLEMENT FAA POLICY CHANGES

### Sound Monitoring in the Impacted Cities

Since the implementation of NexGen, the FAA has not changed how it reviews noise impacts to communities. Noise impacts due to changes in aviation paths and procedures have been reviewed using noise modeling technology instead of actual measurement of noise generated from aircraft. The Committee requests the FAA monitor actual noise generated and, furthermore, establish a benchmark to measure pre and post implementation of recommended changes, thereby making it easier to analyze effectiveness.

**Request to the FAA 4:** Implement aircraft noise monitoring (by appropriate entity) in areas throughout Santa Clara County to measure the effectiveness of noise mitigation solutions. Noise data captured by sound monitoring should be used by the FAA to validate the modeling tools the FAA uses as part of its environmental impact evaluations.

The point of noise modeling is to simulate real-world conditions. The noise models used by the FAA should be calibrated ground level noise under varying weather conditions. If certain south flow flight procedures have been optimized for sound, the procedure designers should ensure that they have calibrated their procedures to the weather conditions most prevalent when those procedures are to be deployed.

Appendix A identified suggestions for “how” this might be accomplished. (See items K, MM and OO).

**Request to the FAA 5:** The Ad Hoc Advisory Committee on South Flow Arrivals is aware that for each new potential aviation route into the San Francisco Metroplex a noise simulation and prediction is/was required. The Committee requests that the FAA provide those simulation results that include predicted noise levels and all other associated data.

Further, The Committee requests that when the FAA posts a procedure for public comment at the Instrument Flight Procedures (IFP) gateway, environmental analyses, including noise assessments, pertaining to that procedure shall be posted along with it, and at the same time.

### Improve Public Outreach

In April, it was discovered that the FAA was in the process of evaluating a new approach procedure for SJC Instrument Landing System (ILS), which would take effect in July of 2018. Neither the FAA meeting representatives, Committee, or the public were aware this change was being considered. The lack of public outreach to potential affected communities highlighted the need for transparency and improved public process and communication. Included in Appendix C are letters from the Mayors of Los Altos, Mountain View and Palo Alto concerning the lack of transparency on this issue.

**Request to the FAA 6A:** The Committee is requesting that the FAA improve the notification mechanisms to better alert potential affected communities when procedures are being reviewed. Simply posting to the FAA's IFP Gateway website at the National level is not sufficient to provide clear, layman understandable language and transparent information to the public. There needs to be better regional and local outreach process that informs public officials and members of the public when changes are being proposed in their region.

**Request to the FAA 6B:** The Committee is requesting the FAA to ask all affected Airlines to participate along with FAA, SJC, and interested public constituents when discussions regarding existing and proposed flight path changes are being considered for adoption.

## AVOID NOISY FLIGHT MANEUVERS

The Committee spent a considerable amount of time discussing and hearing from FAA, traffic control and airport officials on noise mitigation through airplane flight modifications. Committee members explored scenarios where changing airplane speed, altitude, and aircraft vectoring could have a noise reduction impact, below are the recommended mitigations:

Items: A, B, C, G, H, J, K

Given the technical complexity of these items, the Committee does not have a specific ranking recommendations. Instead, the success criteria is the same, which is to implement changes that allow for the continued safe flight operations of aircraft while reducing the impact of ground level per flight noise on impacted communities.

**Request to the FAA 7:** The Committee is requesting the FAA review these suggestions and provide a written response about the feasibility of implementation.

## IMPLEMENT NOISE MANAGEMENT MEASURES AT SJC

Mitigating noise should also be explored from an airport operator perspective. Operationally, consideration should be given to modifying arrival flight profiles and capitalizing on advanced navigational technologies, as well as reviewing noise curfews. Other noise management options include working with airlines and pilots to manage airplane noise, examples include the Fly Quiet Program, and creating a Pilot Awareness Program.

**Request to SJC A:** The Committee recommends that the San José Airport respond to the following recommendations and provide a response on feasibility of implementation. Prioritized items DD through LL.

San José Airport has provided additional information for items DD through LL in Appendix A. This information ranges from federal regulations of noise and landing requirements to the information contained in SJC's noise reports.

## EXPLORE SINGLE REGIONAL NOISE REPORTING SYSTEM

The existing noise complaint system is confusing and places a significant burden on the complaint reporter, requiring fields such as aircraft type and destination airport. Before a complaint can be processed, contact information for the specific airport must be researched. A separate process exists for submitting complaints on south flow aircraft noise. This is an undue burden placed on the residents reporting noise concerns that have already been clearly defined and documented as occurring.

**Request to the FAA 8A (or SJC, if they are the more appropriate body):** The Ad Hoc Advisory Committee requests the FAA to initiate a study to look at creating or adopting a single Aircraft Noise Reporting System for the area, including, but not limited to: Ease of reporting by the public; transparent agency analysis; agency response; and publicly access reporting results. The user interface for this system should minimize the number of “clicks” required to log a complaint.

**Request to the FAA 8B:** The Ad Hoc Advisory Committee requests that the FAA initiate a study to use the information collected in 8A to identify and analyze noise trends that should be addressed.

# Responses from the FAA

The Ad Hoc Advisory Committee on South Flow Arrivals was designed to be limited term, starting in January 2018 and sunseting in May 2018. The Committee believes it is important to define a contact protocol once the Ad Hoc Advisory Committee on South Flow Arrivals has concluded for the FAA to provide its response to the recommendations.

**Recommendation:** When the FAA has any feedback on the Committee's requests or additional questions, the FAA should contact:

- Matthew Kazmierczak, Manager of Strategy & Policy at San José International Airport  
Matthew.Kazmierczak@sanjoseca.gov
- Glenn Hendricks, Mayor of Sunnyvale and Committee Chair Person  
mayor@sunnyvale.ca.gov
- Andi Jordan – Cities Association of Santa Clara County  
andi@citiesassociation.org

Depending on the information provided by the FAA, the designated contact representatives shall:

- Pass information on from the FAA to Committee members
- Post information on the Committee website hosted by SJC:  
[https://www.flysanjose.com/Ad\\_Hoc\\_Meetings](https://www.flysanjose.com/Ad_Hoc_Meetings)

Additionally, the contacts may:

- Convene an informal meeting of the former Committee members
- Provide responses to FAA questions
- Other actions, as may be deemed necessary

# List of Committee Members

- Councilmember Jeffery Cristina – Campbell
- Councilmember Savita Vaidhyanthan – Cupertino
- Mayor Jean (John) Mordo – Los Altos
- Councilmember Gary Waldeck – Los Altos Hills
- Councilmember Bob Nuñez – Milpitas
- Councilmember Rowena Turner – Monte Sereno
- Councilmember Rene Soring – Morgan Hill
- Vice Mayor Lisa Matichak – Mountain View
- Councilmember Lydia Kou – Palo Alto
- Mayor Mary-Lynne Bernald – Saratoga
- Councilmember Charles “Chappie” Jones – San José (Vice Chair)
- Councilmember Raul Peralez – San José
- Vice Mayor Kathy Watanabe – City of Santa Clara
- Mayor Glenn Hendricks – Sunnyvale (Chair)

## List of Committee Alternate Members

- Councilmember Liz Gibbons – Campbell
- Councilmember Steven Scharf – Cupertino
- Councilmember Barry Chang – Cupertino (Alternate to the Alternate)
- Vice Mayor Lynette Lee Eng – Los Altos
- Vice Mayor Marsha Grilli – Milpitas
- Vice Mayor Evert Wolsheimer – Monte Sereno
- Councilmember Larry Carr – Morgan Hill
- Mayor Leonard Siegel – Mountain View
- Vice Mayor Eric Filseth – Palo Alto
- Councilmember Howard Miller – Saratoga
- Councilmember Johnny Khamis – San José
- Councilmember Teresa O’Neill – City of Santa Clara
- Vice Mayor Larry Klein – Sunnyvale

## List of Meeting Dates

- November 27, 2016 – Organizational Meeting – City of San José Committee Room
- January 26, 2018 – City of San José Council Chambers
- February 23, 2018 – SJC, Boeing Conference Room
- March 9, 2018 – SJC, Boeing Conference Room
- March 23, 2018 - SJC, Boeing Conference Room
- April 13, 2018 – SJC, Boeing Conference Room
- April 27, 2018 – SJC, Boeing Conference Room
- May 18, 2018 – SJC, Boeing Conference Room

# Materials and Appendices

Appendix A: Noise Mitigation List

Appendix B: [Meeting Documents](#) (link)

Appendix C: [Public Comments](#) (link)

Links to YouTube videos of the Committee Meetings:

1/26/2018 - <https://www.youtube.com/watch?v=0dMAvbNpmkM>

2/23/2018 - <https://www.youtube.com/watch?v=PUBy6Hf0kyc>

3/23/2018 - <https://www.youtube.com/watch?v=u7yt72AMFeA>

Links to the audio recordings of the Committee Meetings are available at the SJC website:

[https://www.flysanjose.com/Ad\\_Hoc\\_Committee\\_Recordings](https://www.flysanjose.com/Ad_Hoc_Committee_Recordings)

## Appendix A: Noise Mitigation List

Appendix A: Noise Mitigation List from the Ad Hoc Advisory Committee

Suggestion	Category of Proposed Change	High Level Description	Details	Notes & Questions	FAA or SJC Response	Potential ++ Pros / -- Cons
A	Modify the way planes fly	Limit speed to slowest & safest possible	Limit speed to a minimum necessary for safety on approach. At 220kts, Airframe noise = Engine noise for departures. Since engine noise on arrivals is almost certainly lower than on departures for any given speed, the guidance would be to reduce the airframe noise as much as possible (until it reaches the engine noise): to do this, fly slower and cleaner.	Minimum safe speed varies by airplane. It is the minium above the stall speed. Within reason, favor lower peak noise levels over shorter noise duration. During south flow, people can be indoors with windows closed. Minimizing peak noise levels will reduce the number of noticeable events indoors.		
B	Modify the way planes fly	Limit speed to lowest possible when under 4000'	Limit speed to a maximum necessary for safety on approach when airplanes are 4000' or lower.	Minimum safe speed varies by airplane. It is the minium above the stall speed.		
C	Modify the way planes fly	Glide (OPD?)	Have planes glide to landing to eliminate noise from engines and minimize use of lift devices (flaps, slats) and braking devices.	Is FMS or pilot in control?		
D	Modify the way planes fly	Raise altitude	Raise altitude along the approach, provided airplanes do not have to fly dirtier or use jet thrust.			
E	Modify the way planes fly	Raise altitude at ZORSA	Return ZORSA to 3,200' and make it a minimum altitude, provided airplanes do not have to fly dirtier or use jet thrust.	Why not? - FAA safety standards? Is the altitude at ZORSA a Minimum En Route Altitude (MEA instead of a crossing altitude)? A commercial pilot reviewing the RNP AR Z approach said that he wouldn't be surprised if the 3000' altitude was programmed into the FMS. We should be able to determine this. The FAA Design Guide for OPD procedures advocates 'path flexibility' as a means to enable airplanes to descend efficiently and at a quiet idle. The fewer constraints in OPD paths and arrival procedures, the more freedom planes will have to descend efficiently and quietly.		
F	Modify the way planes fly	Relax altitude at HITIR	Relax the altitude requirements at HITIR from exactly 4000' to at or above 4000'.	Use the additional altitude to reduce the need for lift devices and thrust during the remainder of the approach over residential areas. The FAA Design Guide for OPD procedures advocates 'path flexibility' as a means to enable airplanes to descend efficiently and at a quiet idle. The fewer constraints in OPD paths and arrival procedures, the more freedom planes will have to descend efficiently and quietly.		
G	Modify the way planes fly	Relax altitude and speed at HITIR	Allow planes to arrive at HITIR at altitudes and speeds that allow them to reach the Bay without flying dirty or using thrust.	The FAA Design Guide for OPD procedures advocates 'path flexibility' as a means to enable airplanes to descend efficiently and at a quiet idle. The fewer constraints in OPD paths and arrival procedures, the more freedom planes will have to descend efficiently and quietly.		
H	Modify the way planes fly	Optimize descent profile to HITIR (OPD?)	The FAA should initiate R&D to enable ATC procedures that would encourage vectored airplanes to descend at a glide.			
I	Modify the way planes fly	Use gradual, smooth descent (OPD)	Have planes gradually descend along a smooth descent flight pattern to limit stepping and the need for engine changes to maintain altitude.	Need to determine the amount of stepping that is currently occurring and where it is occurring. Need to understand how low a plane should go over which areas even with no steps.		

Appendix A: Noise Mitigation List from the Ad Hoc Advisory Committee

Suggestion	Category of Proposed Change	High Level Description	Details	Notes & Questions	FAA or SJC Response	Potential ++ Pros / - Cons
J	Modify the way planes fly	Limit or defer flight procedures that are noisy	Design arrival and departure procedures to minimize noise. Establish noise monitors in entire low altitude areas around airport. Compare noise as measured on the ground under varying weather conditions for procedures when 1) flown by pilots and 2) flown by flight management systems. Report results, along with 3) the modeled noise prediction(s).	Are we measuring when FMS or pilot controls? What design data is available to route designers? Which flights are noisier? Why? The definition of a noisy procedure needs to be clarified - start with use of lift devices, braking devices and jet thrust. How will we measure this? We need to get long-term, reliable and government acknowledged noise monitoring. Per the FAA, the FAA's noise modeling tool, AEDT version 2d, is being improved. Later this year, AEDT version 3a is "Seeking to improve abilities at lower DNL. Improving takeoff weight and thrust modeling; Improving aircraft performance module". AEDT4 will "incorporate airframe noise more explicitly" in a post 2020 release. Source: Dr. James Hileman presentation, 2/27/18.		
K	Modify the way planes fly	Optimize procedures for noise	Optimize all arrival and approach procedures for noise assuming the weather expected when the procedures are to be deployed. Bring focus to the 75% of flights that do not fly the RNP approach.	How? One idea: Allow aircraft to arrive at different altitudes at HITIR. Use the additional altitude to reduce the need for lift devices and thrust during the remainder of the approach over residential areas. Especially appropriate for vectored flights. When optimizing for noise, procedure designers should factor in weather expectations, and should assume the wind direction, wind speed and temperature that are most common when the procedures are to be deployed. South flow is used in the cooler winter months and is only triggered when a tailwind of 5 knots or more is expected.		
L	Modify flight paths	Change RNP path	Move RNP path North (over Bay not over other cities) to reduce noise. Also disperse flights along rails (Western rail and turning rail.) Better yet, eliminate the RNP path which would eliminate the rail.	Preliminary DB meter noise readings are indicating that the RNP path is louder than the planes flying the ILS path. The tight turning radius seems to create more noise for many of these planes. If no mitigation is accomplished for the RNP, then more and more planes will be shifted to this very loud flight path. This flight path has been built on efficiency only, and disregards the excessive noise created for residents under this tight turning loop.		
M	Modify flight paths	Move turn over Bay	Move flights from the SW in their Northern turn over the Bay. Current, published flight path exists, but is no longer frequently used.	MV/LA consultant is working on a potential path. Expanding the Northern loop only helps if it also means altitude is raised over the cities.		-- Potential of moving noise over another city or different group of residents.
N	Modify flight paths	New path from East	Create a new path that approaches airport from the East.	An East approach leads to significantly less residential noise compared to South flow flights approaching from the West - flights approaching from the West fly over at minimum 15 miles of dense residential areas. Eastern approaches would be approx 1 mile of residential with the remainder generally industrial. In 2015, an analysis of FAA FOIA data shows that 32% of the South flow flights approached SJC from an easterly direction. This percentage is decreasing with time, and these planes are being "rolled" into the rail. These Eastern approaches need to be preserved, and not reduced. Examination of an East approach into SJC was recommended as a possible noise mitigation by the FAA The East route would shorten the path and increase flight efficiency for planes originating from the East side of the United States Planes already fly these East routes.		++ Moves South flow traffic from SJ, Cup, SV & MV to over the Bay.
P	Modify flight paths	Community defined flight paths	Where does the community want the planes to fly?	The community is united in asking for flights to be dispersed as they were prior to 2012.		

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Q	Disperse flights	Revert to pre-2012 paths and dispersion	Manually disperse flights paths to pre-2012 levels, or create and publish multiple flight paths that will accomplish similar dispersion such as reverting the waypoints back to pre-2012 waypoints/flight paths.	The FAA stated that safety will always be better with an RNAV approach than with vectoring. Is there a study that proves this claim? Also, health needs to be considered along with safety. The health effects of fine particulate matter from airplanes being concentrated on a narrow band of residents are being studied and those findings should be factored in. The prior dispersed flight paths were safe and successful for decades. The current flight mix and volumen at SJC is similar to the mix and volume that existe during the dot com boom so dispersion should be achievable again.		
R	Disperse flights	New parallel flight paths to West	Create additional flight paths to the West of current paths by vectoring planes toward different locations along the Bay.	The objective is to reduce the number of flights flying the rail that takes planes from JESEN to ZORSA and beyond along the same heading into Palo Alto. Planes would be vectored off this rail at different locations and with different headings, resulting in their crossing Hwy 101 at locations along its length.		-- Flights over the Santa Cruz mountains are more turbulent.
S	Disperse flights	New parallel flight paths to East (fan out flight paths)	On the STAR Arrival procedures, recast ZORSA and HITIR as fly-by waypoints. Relocate HITIR to be as close to JESEN as possible or perhaps eliminate it. If design criteria prohibit this, terminate the STAR procedures at JESEN.	A fly-over waypoint concentrates flights. Today ZORSA is located to accommodate the turning radius of the largest planes. As a fly-by waypoint, smaller planes could turn sooner, dispersing the flights. By moving or eliminating HITIR maximum dispersion would be possible after JESEN. Recasting ZORSA and HITIR as fly-by waypoints on the RAZRR and SILCN STAR procedures would permit airplanes to begin their turns to the Bay as soon as possible after JESEN, based on the turning radiuses of those airplanes and the programming of their FMS'es. This would reintroduce some dispersion as planes 'peel off the rail' early and at different places.		
T	Disperse flights	Automate dispersion	Modify the NextGen system to automatically disperse flights. Automated dispersion addresses safety, efficiency, and noise.	Automated dispersion addresses safety, efficiency, and noise. It will create safe dispersion. If flight dispersion is required, then technology to automate that dispersion will be developed. For effective noise mitigation, flight paths miles wide are needed (because of the way airplane noise travels). Dispersion will stop the rail from disproportionately impacting residents under the narrow flight paths. When residents purchased their homes, they made decisions based on historical flight paths, now those flight paths have been shifted into narrow rails over residents who previously had very few or no planes flying over thier homes. The rails need to be broken.		++ Addresses safety, efficiency, and noise.
U	Disperse flights	Use multiple flight paths	Define multiple flight paths across the historic corridor and rotate planes between them.	ATC would use each flight path in rotation so as not to burden any one neighborhood with all the flights. The period of rotation would be hours or maybe a day.		-- Too many routes to design.
V	Disperse flights	Charted visual flight procedures	Define a western charted visual flight approach with the turn over the Bay. Define an eastern charted visual flight approach.	FAA suggestion. Also an MV/LA consultant suggestion. Pilots have more discretion when flying a visual approach than when flying RNAV approaches. Issue: Many airlines issue instructions that the pilots must use the regular instrument approaches, however some airlines prefer a charted approach to pilots flying with no defined approach over an area (as is the case today for MV and Palo Alto for planes not flying the RNAV RNP approach).		++ Provides pilots with another flight path. ++ More likely to be endorsed by airlines and used by pilots. ++ Might align better with historical flight corridor because an RNAV visual approach permits a sharper turn than RNP does. -- Can only be used when visual approach can be used which may be limited when South flow is used and weather causes low visibility.

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W	Disperse flights	Revert final waypoint to PUCKK	Revert the final waypoint on the STAR procedure to PUCKK. (On JAWWS TWO) This was the final waypoint for SIC south flow in 2012.	Historically, planes missed the PUCKK waypoint far more than they hit it. The expectation is that, going forward, almost all planes would peel off the procedure before reaching PUCKK, recreating the earlier dispersion. Since JESEN was not a waypoint when PUCKK was in use, flights were centered on a point ~0.25nm east of JESEN.		
X	Disperse flights	Revert final waypoint to JESEN	Revert the final waypoint on the STAR procedure to JESEN (on JAWWS THREE). Remove HITIR, ZORSA and flight headings after JESEN from airplanes' Flight Management Systems databases. Encourage ATC to disperse flights.	Airplanes change heading after JESEN. The idea is to allow airplanes to turn at very slightly different times and possibly slightly different headings after JESEN to break up the rail.		
Y	Disperse flights	Relax waypoints	Give planes more flexibility around hitting the waypoints.	The FAA Design Guide for OPD procedures advocates 'path flexibility' as a means to enable airplanes to descend efficiently and at a quiet idle. The fewer constraints in OPD paths and arrival procedures, the more freedom planes will have to descend efficiently and quietly.		
Z	Disperse flights	Move, eliminate waypoints	Move or eliminate waypoints.	The FAA Design Guide for OPD procedures advocates 'path flexibility' as a means to enable airplanes to descend efficiently and at a quiet idle. The fewer constraints in OPD paths and arrival procedures, the more freedom planes will have to descend efficiently and quietly.		
AA	Disperse flights	Approach tailored to plane size	Define different approach paths for large and medium-to-small planes. An approach path could be created after JESEN suitable for medium-to-small planes. ZORSA could be used by large planes.	Large planes need a wider turning radius than small planes. Multiple flight paths based on size would introduce some dispersion.		-- Return to historic corridor over Sunnyvale. -- Too many routes to design.
BB	Disperse flights	Efficiency or not procedures	Define two sets of procedures – one for when efficiency is demanded (which is more noisy), one for when <u>efficiency is not required</u> (which is less noisy).	During non-peak hours, noise-optimized procedures would be used.		
CC	Disperse flights	Discourage concentration	Discourage narrow, concentrated (single line) flight paths. Stop eliminating discretionary paths.	Can ATC (Flight Controllers) do this? How?		
DD	Penalize noise	Expand noise curfew hours	Change curfew hours to 10:00 pm - 6:30 am (from 11:30 pm - 6:30 am) perhaps just when using South flow is being used.	Curfew hours only prohibit noisy flights from using the airport during those hours. Quiet flight can still use the airport during curfew hours. Exceptions exist for weather, mechanical, etc. issues. SJC is grandfathered into having a curfew. No new curfews can be established. Grandfathered curfews are not likely to be allowed to change. Which entity controls the curfew at the airport - SJC. What would be done with the money collected - SJC collects. How would changing the curfew impact the overall schedule for SJC - Very little.	Airport: Not directly related to south flow arrivals. The Federal Aircraft Noise Capacity Act (ANCA) of 1990 controls Noise Ordinances. This act does not permit the enactment of increased restriction to airport flight/noise restrictions without federal approval, which has been withheld in all cases to-date. Given this, the Airport does not have the authority to make the curfew more restrictive.	
EE	Penalize noise	Increase noise curfew violation fines		SJC defines the fines and fines exist. \$2,500 per occurrence, with many exceptions granted. Very few aircraft are not allowed to fly at night.	Airport: See answer to DD	
FF	Penalize noise	Base landing fees on noise generated during arrival		What would be done with the money collected? How do we determine the definition of noise that should be charged a fee? How can this be measured? Airport authority controls the landing fees at SJC.	Airport: See answer to DD	

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GG	Penalize noise	Require Airbus 320 air deflectors	Require Airbus 320 family to install "wake vortex generators"	Other cities have done this. Who controls the authority to require this? UA started their retrofit in Nov 2017. SJC can impose limits of use & fines. At a recent SFO Roundtable, SFO staff suggested they had some ideas for how to encourage airlines to install vortex generators if they were initially reluctant. Discuss with them.	Airport: The SFO Select Committee made a recommendation that the FAA require operators of the A320 family to install "wake vortex generators", however the FAA response was that this was outside their area of authority. SJC estimates that roughly 6.7% of south flow flights are from this family of aircraft.	-- A given airline would have to do this to their entire fleet of the aircraft type as they don't know which aircraft will end up on a specific flight.
HH	Penalize noise	Require curfew violation reporting	Require flights landing during the noise curfew to report online what is causing them to violate the noise curfew in advance of their landing.	How will they know that a problem exists? What is a quiet vs. a noisy procedure? What is definition to use? What would they do if it did? Need to model noise and use model to decide if exceeded. Easy to say that a 'safety' issue caused it. At the Airplane Noise Symposium in Long Beach in late February, it was reported that one airport had success with this approach.	Airport: Noise curfew violations are posted online. <a href="https://www.flysanjose.com/noise-reports">https://www.flysanjose.com/noise-reports</a>	
II	Reward quiet	Incentives	Provide incentives to airlines to fly quieter.	Need to define definition of quieter. What incentives and how are they funded? dBA is the accepted unit of measurement. Individual cities have their own limits FAA has limits too, but allows "emergency procedures".	Airport: See answer to DD	
JJ	Change SJC operations to reduce noise	Remove displaced runway designation	Remove the displaced runway designation at SJC in order to make use of full runway so that reverse flow might not need to be used so often.	This may not be achievable because of the height of buildings in downtown SJ. And, the community does not want a longer runway to lead to bigger airplanes.		-- Very expensive
KK1	Change SJC operations to reduce noise	Use GBAS	GBAS (Ground-Based Augmentation System) is a system that augments the primary airport systems and provides enhanced management of all phases of approach, landing, departure and surface operations. It can result in differentiated landing positions on a runway.	Is this still at the beginning (experimental) phase? How long until this is ready for full use?	Airport: According to an FAA report dated September 2017 Honeywell has an operational CAT I GBAS system available at Newark and Houston as Non-Federal systems (airport sponsored). Current airlines utilizing this system at these two airports which also operate at SJC are United, Delta, Lufthansa and British Airways. However, only select planes have the necessary equipment to utilize the system and runway length matters. It's still very much in development and testing. CAT II/III systems are not yet operational. Boeing is also testing a GBAS system. Airport: Initial reports are that if a runway is long enough, it may lower overall noise impacts in some communities due to the shifting of the approach path. It's probably important to understand that the installations currently using GBAS or piloting GBAS are all large hub airports, which serve as a hub for a commercial airlines or are participating as part of R&D. As an example EWR and IAH are both hubs for United Airlines, as is SFO, which is currently conducting a pilot program. Since this is a non-federal program the airlines and airports are paying not only for the installation but also the maintenance of GBAS. These costs may be prohibitive for a medium hub airport, especially one without an airline hub.	== SJC - While GBAS may potentially lower noise around some airports, given the flight path and runway length, it is questionable if GBAS is feasible for SJC.
KK2	Change SJC operations to reduce noise	Trigger when greater than 5 knots	Trigger South flow operations when wind is at 6 knots, or 7 knots, or 8 knots, or 9 knots, or 10 knots. (Use highest safe value)	MV/LA consultant has indicated that the FAA is looking at increasing the trigger to 10 knots at all airports. There should be a special study commissioned by the FAA for SJC to determine whether a limit of 6, 7 or more knots could be feasible given SJC's specific runway length and other constraints.	FAA: The wind and FAA Order 7110.65 determine the active runway at SJC. In accordance with paragraph 3-5-1 of FAA Order 7110.65, when there is a tailwind of 5 knots or more, SJC Tower must utilize RWY 12. This is the least favorable configuration for both the Tower and TRACON and it is not utilized more than is necessary.	
LL	Change SJC operations to reduce noise	Monitor noise	Monitor noise North, East and West of the airport at various distances from the airport on an ongoing basis.	It is essential to understand noise (from monitors)		

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MM	Change FAA operations to reduce noise	Stricter rules for ground noise	FAA to change its procedure development process to introduce optimization of proposed flight plates for noise, even for changes that are not judged to be 'significant'.	This might be a methodology change within the FAA process for review of procedure changes. Draft flight plates should be reviewed by a team of noise specialists to see if their proposals can be further optimized for noise before publishing them for review. The Committee heard from an FAA procedure designer that if a procedure is not at risk of violating FAA noise thresholds, the designers need not optimize for noise.		
NN	Change FAA operations to reduce noise	Change when information is provided to pilot	ATC must provide information to pilot sooner.	What information? How will this impact noise to our residents? Is a safety consideration - need to keep pilot load light as possible on approach and landing.		
OO	Change FAA operations to reduce noise	Model changes for noise	Model all changes prior to implementation in order to minimize noise impact on residents. Assume varying weather conditions. Ground noise monitors should be used to validate the models.	Use theoretical models and compare computer predicted flight maneuvers with actual flight simulators to align with what pilots are really doing. Ground monitors should be used to validate the simulation predictions. To understand the real-world noise impact, varying weather conditions must be assumed, particularly given the tight constraints imposed by Precision Based Navigation (PBN).		
PP	Provide SJC with more airspace	Reduce SFO BDEGA West arrivals into SFO	Route more SFO arrivals through the BDEGA East over the Bay so that there are fewer BDEGA West arrivals from the North. If moving SFO traffic provides more space for SJC, utilize this for dispersion purposes.	Balanced Runway usage is the goal. But the reality is that if a quieter runway is free, they should use it.		
QQ	Provide SJC with more airspace	Route SFO SERFR South arrivals over South East corner of Bay	Have SERFR South arrivals join DYAMD or fly a similar route parallel to and/or above DYAMD. If moving SFO traffic provides more space for SJC, utilize this for dispersion purposes.	Could also address the noise problem of SJC BRIXX arrivals since BRIXX altitude could be increased because SERFR would no longer be a constraint. BRIXX is a SJC arrival route that flies under SERFR.		
RR	Provide SJC with more airspace	Route SFO West oceanic arrivals to BDEGA over ocean and change vectors of BDEGA West arrivals	Have SFO oceanic arrivals from the West join BDEGA over the ocean West of the Golden Gate Bridge rather than use MENLO. SJC South Flow would then only compete with BDEGA West arrivals. Vector BDEGA West arrivals to maximize vertical and lateral separations for aircraft flying in opposite directions (BDEGA flights going North and SJC flights going South). If moving SFO traffic provides more space for SJC, utilize this for dispersion purposes.	This is the Golden Gate 7 approach Must be done with adequate time to reprogram FMS.		++ Cost, if done soon after takeoff, would be almost non-existent. -- Last minute changes can impose errors.
SS	Provide SJC with more airspace	SJC use SFO space when SFO changes pattern	Allow SJC to use some SFO airspace when SFO changes their landing pattern, since SFO flights are at high altitudes when they are close to SJC.	Needs to be coordinated with Nor Cal TRACON. Need to carefully model all possibilities.		-- SFO might ask for more of SJC airspace in return

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TT	Other	Create technical working group	Create technical working group to study each of the proposals in conjunction with the FAA. Present findings and recommendations during ad hoc committee meetings for full discussion and final recommendations.	Roundtable at Cities Association which includes Santa Clara and Santa Cruz counties. Should it also include Alameda county so cities in the East Bay that currently have SJC traffic are included?		
UU	Other	Airlines requests	Ask the FAA to share what the airlines requested when they asked for new procedures			
VV	Other	Environmental Assessment report	Ask the FAA to share the Environmental Assessment report (data, analyses, and conclusions) for the changes in the SJC south flow procedures			
WW	Other	Vectoring over Palo Alto	Ask the FAA if the SJC south flow flights that are vectored north to turn over Palo Alto come in and out of SJC airspace	1) Do some of the SJC south flow arrivals that make their turn over Palo Alto come in and out of the SJC Class C airspace? If yes, please specify the order of magnitude (% of flights) and whether these flights are reported in some Safety Reports. 2) Does the proximity of the PAO airport create a safety risk for SJC south flow arrivals that make their turns at very low altitudes (at times below 2000 ft) over parts of Palo Alto?		