Ad Hoc Cmte - Mitigation List

Suggestion	Ad Hoc Comm. Priority	Estimated Feasibility		Category of Proposed Change	High Level Description	Details	Map	Notes & Questions	Potential ++ Pros / – Cons
	LM/GW	LM/GW	MV/LA Consultant						
A	1	1	5	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.	--	Miniumum safe speed varies by airplane. It is the minium above the stall speed. MV/LA Consultant - The Aviation Environmental Design Tool (AEDT) does not allow the specification of min/max speeds. Rather it calculated speed based upon aircraft type and altitude restrictions. MV/LA Consultant - Current regulation, unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class C (SJC) or Class D airspace area at an indicated airspeed of more than 200 knots (230 mph). And unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 mph). Sec. 91.117 MV/LA Consultant - In a low power descent, airframe noise is greater than engine noise. The principle sources of airframe noise in commercial aircraft are leading edge slats, the side edges of flaps, the landing gear, the wheel well cavity (with landing gear extended), and speed brakes (or spoilers) when applied. The single event noise metric, SEL, used in the DNL descriptor for noise exposure, integrates the noise level and noise duration. The duration of a high speed flyover event is shorter than a low speed flyover, but the maximum noise level of the high speed flyover is greater. However, the shorter duration of the high speed flyover somewhat offsets its greater noise level.	
B	1	1	5	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.	--	Miniumum safe speed varies by airplane. It is the minium above the stall speed. MV/LA Consultant - Current regulation, unless otherwise authorized or required by ATC, no person may operate an aircraft at or below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class C (SJC) or Class D airspace area at an indicated airspeed of more than 200 knots (230 mph). And, unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 mph). Sec. 91.117 MV/LA Consultant - The single event noise metric, SEL, used in the DNL descriptor for noise exposure, integrates the noise level and noise duration. Therefore, the faster aircraft will produce slightly less noise exposure than would the same flyover with the same maximum noise level, thereby somewhat offsetting a noise increase from increased speed.	
C	1	1	n/a	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? MV/LV Consultant - FMS is in control; RNP procedures are designed to glide to a landing (i.e., OPD).	
D	1	4	n/a	Modify the way planes fly	Raise altitude	Raise altitude along the approach, provided airplanes do not have to fly dirtier or use jet thrust.	--	MV/LA Consultant - Can't feasibly raise altitudes without violating FAA design criteria (8260.58).	
E	3		n/a	Modify the way planes fly	Raise altitude at ZORSA	Return ZORSA to 3,200’ and make it a minimum altitude.	--	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. MV/LA Consultant - There is not a crossing altitude at ZORSA.	
F	1		n/a	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. MV/LA Consultant - Coded at 4000' for runway transition and to avoid SFO traffic.	

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G	1		n/a	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.	--	MV/LA Consultant - There is no speed restriction at HITIR.	
H	1		n/a	Modify the way planes fly	Optimize descent profile to HITIR (OPD?)	Enable pilots of vectored flights to optimize their descent profile by telling them where they will turn early enough so that they can choose the best altitude at HITIR.	--	MV/LA Consultant - Aircraft being vectored are NOT on an instrument descent profile or track. They are assigned a heading and altitude by ATC based on the sequence and surrounding aircraft separation requirements. Thrust adjustments are needed for stability.	

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I	1		n/a	Modify the way planes fly	Use gradual, smooth descent (OPD)	Have planes gradually descend along a smooth decent 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. MV/LA Consultant – OPD is in the current criteria for all RNAV/PBN instrument procedures FAA Order 8260.58.	
J	1		4	Modify the way planes fly	Limit or defer flight procedures that are noisy	Limit flight procedures that are noisy when pilot controls and when FMS controls. Design arrival & departure procedures to minimize noise. Establish noise monitors in entire low altitude areas around airport. Use flight simulator to compare actual pilot behaviors with those computed by the computer model.	--	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? Partial answer: 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. We need to get long-term, reliable and government acknowledged noise monitoring. Communities should decide.	
K	1		n/a	Modify the way planes fly	Optimize procedures for noise	Optimize all approach procedures for noise. 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. (Item H) MV/LA Consultant - The current RNP/RNAV tracks (demonstrating flight concentration) do not support the statement that 75% of flights do not use RNP.	
L	2		n/a	Modify flight paths	Change RNP path	Move RNP path North (over Bay not over other cities) to reduce noise, or eliminate path. Also disperse flights along rails (Western rail and turning rail.)	M	The tight turn, and concentration of flights on this path generates excessive noise. The RNP path is increasingly used. MV/LA Consultant - The current RNP Z RWY 12L/12R is OPD at thrust idle.	
M	2		2	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.	N	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	1	1	2	Modify flight paths	New path from East	Create a new path that approaches airport from the East.	O	Want information from the FAA if there is a formal eastern approach to SJC? What is it being used for today? What situations use this approach? FAA suggestion. Planes already fly these routes, but the number is decreasing.	++ Moves South flow traffic from SJ, Cup, SV & MV to over the Bay.
P	1	4	n/a	Modify flight paths	Community defined flight paths	Where does the community want the planes to fly?	--		
Q	2	5	5	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.	--	Unlikely - ATC would need to issue distinct commands to implement.	
R	2	5	5	Disperse flights	New parallel flight paths to West	Create additional flight paths to the West of current paths by vectoring planes at different locations along the Bay.	Q	Unlikely - Each charted route would mean a new procedure - very expensive to implement.	- - Flights over the Santa Cruz mountains are more turbulent.
S	1	1	5	Disperse flights	New parallel flight paths to East (Fan Out Flight Paths)	Create additional flight paths to the East of current paths. Do this by recasting ZORSA from a fly-over waypoint to a fly-by waypoint, and relocate HITIR to be as close to JESEN as possible or perhaps eliminate it.	R	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.	

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T	2	5	5	Disperse flights	Automate dispersion	Modify the NextGen system to automatically disperse flights.	--	Unlikely. MV/LA consultant indicated that the FAA may be working on this. And they are currently evaluating which method benefits the most number of people (dispersed or non-dispersed).	++ Addresses safety, efficiency, and noise.
U	2	5	5	Disperse flights	Use multiple flight paths	Define multiple flight paths across the historic corridor and rotate planes between them.	--	Unlikely - Will be a long time waiting.	-- Too many routes to design.
V	2	1	2	Disperse flights	Charted visual flight procedures	Create a charted visual flight procedure with the turn over the Bay. Many airlines issue instructions that the pilots MUST USE the regular Instrument Approaches	U	FAA suggestion. Also an MV/LA consultant suggestion. Pilots have more discretion when flying a visual approach than when flying RNAV approaches. Unlikely - Airlines often insist that only instrument approaches are used.	++ 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.
W	2	4	n/a	Disperse flights	Revert final waypoint to PUCKK	Revert the final waypoint on the STAR procedure to PUCKK. Smaller Airplanes?	--	Historically, planes missed the PUCKK waypoint more than they hit it. The result was more dispersed planes.	
X	3	3	n/a	Disperse flights	Revert final waypoint to JESEN	Revert the final waypoint on the STAR procedure to JESEN. Remove HITIR and ZORSA from airplanes' Flight Management Systems. Encourage ATC to disperse flights.	--	HITIR and ZORSA guide airplanes past JESEN so they need to be removed.	
Y	2	5	5	Disperse flights	Relax waypoints	Give planes more flexibility around hitting the waypoints.	--	Need more info and examples. How to do it?	
Z	4	5	n/a	Disperse flights	Move, eliminate waypoints	Move or eliminate waypoints.	--	Need more info and examples. Unlikely	
AA	2	5	n/a	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.	- - Return to historic corridor over Sunnyvale. - - Too many routes to design.
BB	5	5	n/a	Disperse flights	Efficiency or not procedures	Define two sets of procedures – one for when efficiency is demanded (which is more noisy), one for when efficiency is not required (which is less noisy).	--	During non-peak hours, noise-optimized procedures would be used.	
CC	1	5	n/a	Disperse flights	Discourage concentration	Discourage narrow, concentrated (single line) flight paths. Stop eliminating discretionary paths.	--	Can ATC (Flight Controllers) do this? How?	

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DD	1	1	5	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 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.	
EE	2	5	5	Penalize noise	Increase noise curfew violation fines		--	SJC defines the fines and f\ines exist. $2,500 per occurrence, with many exceptions granted. Very few aircraft are not allowed to fly at night.	
FF	3	5	5	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. MV/LA Consultant - A Part 161 study would be required, and the likelihood of approval is slim to none.	
GG	1	1	n/a	Penalize noise	Require Airbus 320 air deflectors	Require Airbus 320 family to install “wake vortex generators”	--	Other ities 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.	- - 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	5	5	3	Penalize noise	Require curfew violation reporting	Require flights landing during the noise curfew to report online what is causing them to violate the 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.	
II	5	5	5	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". MV/LA Consultant - This is the inverse of increased landing fees for noisy aircraft. It would be challenged by the FAA (Part 161).	

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JJ	4	5	n/a	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.	--	This may not be achievable because of the height of buildings in downtown SJ.	- - Very expensive
KK1	4	5	n/a	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 steeper landing paths.	--	Virtually same as JJ. Is this still at the beginning (experimental) phase? How long until this is ready for full use?	++ SJC - Initial reports indicate it could potentially lower noise around some airports due to steeper approaches. - - MV/LA consultant - Not all planes can use the system yet. - - MV/LA consultant - Airport capital investment is $10M+. - - MV/LA consultant - Current ILS for CAT I/II/III planes are in place and provide similar capabilities. - - MV/LA consultant - Noise improvement with GBAS is unlikely at SJC. - - MV/LA consultant – Steeper descents may reduce noise due to higher altitude, but increased airframe noise and use of speed brakes may negate higher altitude benefits.
KK2	3	3	5	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. MV/LA consultant - Unless otherwise agreed FAA Order 7110.65 directs the runway most aligned with the wind, direct tailwind not to exceed 5 knots unless the airport has established a "Preferential Runway Use Program;" SJC does not have a program similar to SFO. FAA Order 8400.9 (currently under revision), outlines the criteria for Runway Use Programs and FAA Order 1050.11A outlines Noise Control Planning.	
LL	1	1	1	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	1	4	4	Change FAA operations to reduce noise	Stricter rules for ground noise	Require stricter rules for ground noise when implementing future Procedure changes.	--	This might be a methodology change within the FAA process for review of procedure changes. MV/LA Consultant - FAA noise policy is outlined in FAA Order 1050.1 and is now allowing supplemental values for consideration under certain circumstances.	
NN	1	2	2	Change FAA operations to reduce noise	Change when information is provided to pilot	ATC must provides 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	1	3	3	Change FAA operations to reduce noise	Model changes for noise	Model all changes prior to implementation in order to minimize noise impact on residents.	--	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. MV/LA Consultant - Current development protocols already require these steps and the FAA does not monitor ground noise.	
PP	1	1	3	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.	--	Balanced Runway usage is the goal. But the reality is that if a quieter runway is free, they should use it. MV/LA Consultant - ATC manages the traffic based on demand. Nor Cal TRACON is aware of the imbalance on the BDEGA path. Traffic may conflict with the DYAMD STAR and descent to the ILS or LOC RWY 12R. Pending Nor Cal Work group.	
QQ	1	2	5	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.	O	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. MV/LA Consultant - NextGen protocols reduce track miles not increase. This type of suggestion was offered during the Select Committee and dismissed by the FAA. The SERFR could be routed Avenal direct FAITH/ILS RWY 28R but may conflict with SJC and SFO departures.	
RR1	1	1		Provide SJC with more airspace	Route SFO West oceanic arrivals to BDEGA over ocean	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.	--	This is the Golden Gate 7 approach Must be done with adequate time to reprogram FMS. MV/LA Consultant - When SJC is using South flow, 95% of the time SFO is still landing on RWYS 28 L/R. Less conflicted would be to Woodside or South. Pending Nor Cal work group.	++ Cost, if done soon after takeoff, would be almost non-existent. -- Last minute changes can impose errors.
RR2	1	1		Provide SJC with more airspace	Change vectors of 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).	--	This is the Golden Gate 7 approach. Must be done with adequate time to reprogram FMS. MV/LA Consultant - When SJC is using South flow, 95% of the time SFO is still landing on RWYS 28 L/R. Less conflicted would be to Woodside or South. Pending Nor Cal work group.	
SS	5	5	5	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. Possible safety Issues. Need to carefully model all possibilities.	-- SFO might ask for more of SJC airspace in return
TT			1	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?	