



City of Malibu

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September 29, 2023

Federal Aviation Administration
800 Independence Ave., SW
Washington D.C., 20591

Reference: Comments on FAA Noise Policy Review, Docket No. FAA-2023-0855

Dear Sir/Madam-

Please find attached comments from the City of Malibu regarding the Federal Aviation Administration's Noise Policy Review, As requested by the Federal Aviation Administration on May 1, 2023, Docket No. FAA-2023-0855. Thank you for providing us the opportunity to comment on this important issue. If you have any questions or concerns regarding the comments, please feel free to reach me at the contact information listed above.

Sincerely,

/Steve McClary/

Steve McClary
City Manager



PUBLIC COMMENTS OF THE CITY OF MALIBU, CALIFORNIA
REGARDING THE FEDERAL AVIATION ADMINISTRATION'S NOISE POLICY
REVIEW
AS REQUESTED BY THE FEDERAL AVIATION ADMINISTRATION ON MAY 1,
2023
DOCKET NO. FAA-2023-0855

“The care of human life and happiness and not their destruction is the first and only legitimate object of good government.”

*-Thomas Jefferson,
“To the Republican Citizens of Washington County,
Maryland” (March 31, 1809)*

I. Introduction

As the Federal Aviation Administration seems to acknowledge in the Federal Register Notice requesting public comments on its proposed Noise Policy Review, aircraft noise is a public health concern that must be addressed sooner rather than later. The U.S. Supreme Court stated in *Burbank v. Lockheed Air Terminal*, 411 U.S. 624, 638-639 (1973) “[t]he Federal Aviation Act requires a delicate balance between safety and efficiency and the protection of persons on the ground.” (citations omitted). The City of Malibu believes that the current FAA’s Noise Policy and its Orders are out of balance. The current rules, regulations and orders have over-emphasized and prioritized “safety and efficiency” in the airspace while ignoring or downplaying the risks and effects of the safety and protection of persons on the ground.

There are several federal statutes that give the FAA the obligation to protect people on the ground from aircraft noise. These include the Noise Control Act of 1972, Title IV of the Clean Air Act, the Quiet Communities Act, and the National Environmental Policy Act. In its Federal Register Notice and the Foundational Document FAA claims it has limited authority to stop noise. The courts, however, have been unequivocal about FAA’s broad authority As United States Supreme Court Justice Jackson pointed out over 75 years ago: “[p]lanes do not wander about in the sky like vagrant clouds. They move only by federal permission, subject to federal inspection, in the hands of federally certified personnel and under an intricate system of federal commands. The moment a ship taxis onto a runway it is caught up in an elaborate and detailed system of controls. It takes off only by instruction from the control tower, it travels on prescribed beams, it may be diverted from its intended landing, and it obeys signals and orders.” *Nw. Airlines, Inc. v. Minnesota*, 322 U.S. 292, 303 (1944) (Jackson, J., concurring).

The FAA has broad authority and responsibility to regulate the operation of aircraft, using the navigable airspace and to establish safety standards for and regulate the certification of airmen, aircraft, and air carriers. (49 U.S.C. § 40104 et seq., § 40103(b)). The FAA's authority for this rule is contained in 49 U.S.C. § 40103 and § 44715. Under § 40103, the Administrator of the FAA has authority to “prescribe air traffic regulations on the flight of aircraft (including regulations on safe altitudes) for * * * (B) protecting individuals and property on the ground. (49 U.S.C. § 40103(b)(2)). In addition, § 44715(a), provides that to “relieve and protect the public health and welfare from aircraft noise,” the Administrator of the FAA, “as he deems necessary, shall prescribe ... (ii) regulations to control and abate aircraft noise ...” This was confirmed in *Helicopter Ass'n Int'l, Inc. v. FAA*, 722 F.3d 430 (D.C. Cir. 2013) (“*HAI*”). The court in *HAI* also pointed out that the Federal Aviation Act does not require that “air safety be the primary goal of all FAA regulations.”

While EPA has left regulation of noise up to state and local governments, FAA has been unequivocal that state and local governments cannot in any way affect the flight of aircraft to limit noise. FAA must either protect people on the ground with adequate, enforceable noise policy, or move out of the way and let state and local governments protect their residents from the public health crisis that is aircraft noise.

II. The Failure of the FAA’s Current Noise Policy to Protect the Public Health and Welfare of the City of Malibu Demonstrates the Need for an Updated Noise Policy.

A. The City of Malibu’s experience is indicative of the experience of other communities some distance from airport yet still harmed by aircraft noise.

Changes in flight paths implemented by the FAA over Southern California resulted in more flight paths moving directly over the City of Malibu and the surrounding areas. As reported in the Malibu Times, “in the past few years, the FAA has steadily been implementing its new application called NextGen that tracks flight paths across the country. Routes have been consolidated into narrower areas and, in some cases, the altitudes planes fly lowered.”¹ The FAA has maintained that

¹ Judy Abel, *Malibu Livid Over Jet Noise Increase*, Malibu Times, December 6, 2017.

“the narrowing of the flight paths makes it safer and noise will impact people on the ground less—it’ll be more environmentally friendly.”²

After conducting an Environmental Assessment, on August 31, 2016, the FAA signed a Finding of No Significant Impact and Record of Decision (“FONSI/ROD”) determining that the changes in aircraft flight paths and altitudes implemented under the NextGen procedures would cause no significant or reportable noise increases within the Southern California Metroplex (“SoCal Metroplex”) airspace. Based on the SoCal Metroplex Environmental Assessment (“EA”), FAA concluded in the FONSI/ROD that the NextGen flight plans would not “significantly” affect the quality of human environment nor exceed thresholds of significance for any environmental impact category under NEPA, including noise and air quality.

However, since the implementation of the NextGen flight procedures at LAX on April 8, 2017, the residents of Malibu have been severely affected by an increase in noise from aircraft arriving at LAX. Before the NextGen flight procedures were implemented, a larger number of aircraft arriving at LAX flew over unpopulated land and were spread out over a larger area. After NextGen, that is no longer the case. The NextGen flight procedures are now concentrated over Malibu. This change has been confirmed by graphics below, shown in Google Earth files supplied by the FAA on the website “metroplexenvironmental.com.” Figure 1 shows the original flight procedures published to fly above Malibu and the surrounding communities. After implementing the NextGen procedures, several additional flight procedures had been added to fly above the City of Malibu. Besides the previous waypoints WAKER, SADDE, GHART and BAYST, the SoCal Metroplex added new waypoints KEVVI, MOOS, KILIE and LADYJ – all over Malibu. *See* Figure 2 (new waypoints shown in red).

² *Id.*

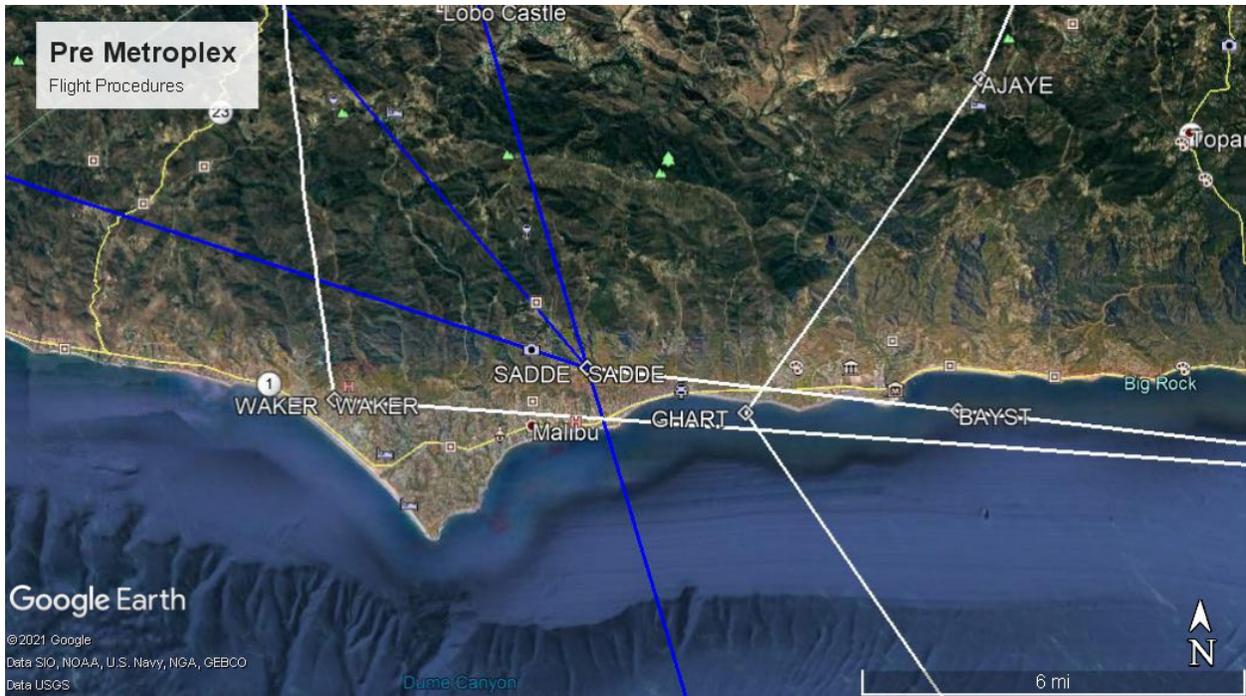


Figure 1 – Pre-Metroplex Flight Procedures above Malibu with waypoints (taken from Google Earth Files on <http://metroplexenvironmental.com>)

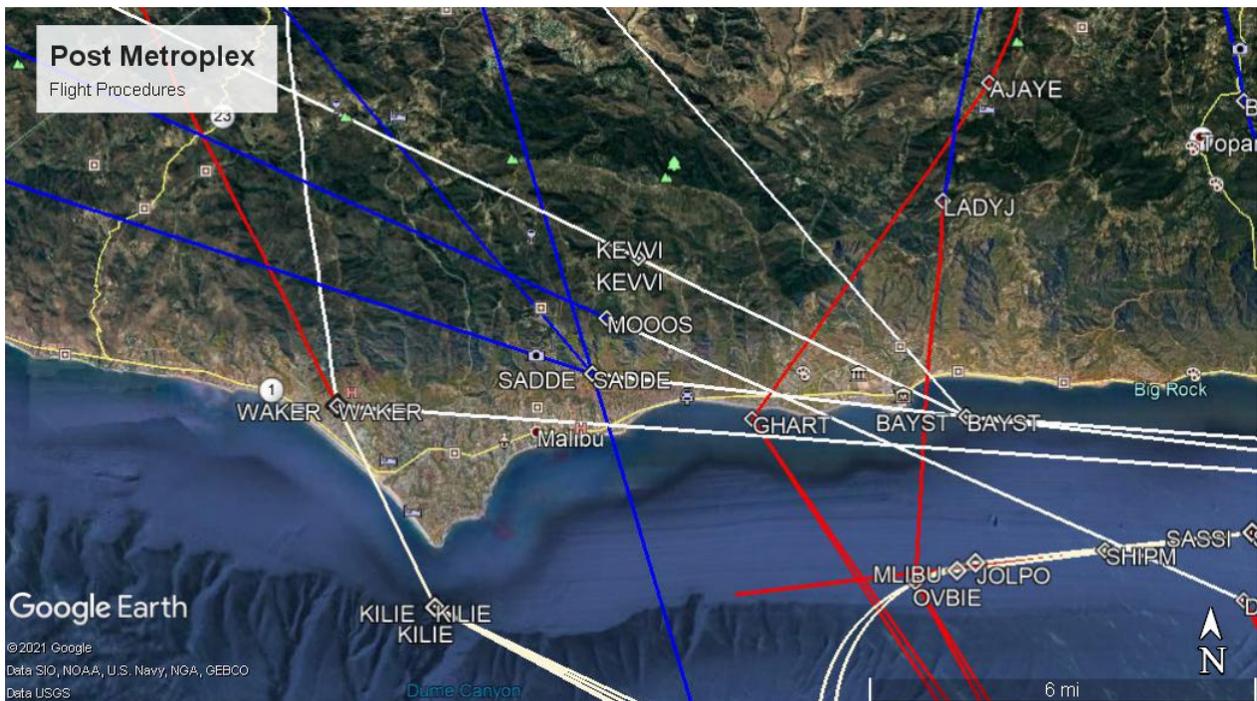


Figure 2 – Post Metroplex Flight Procedures above Malibu with waypoints (taken from Google Earth files on <http://metroplexenvironmental.com>)

To better understand the increase in aircraft traffic over Malibu, one need only look at the flight tracks supplied to the public by FAA as part of the SoCal Metroplex. Figure 3 represents the flight tracks as they existed before implementing NextGen. Figure 4 on the next page represents the flight tracks above Malibu after implementing the NextGen flight procedures. There is a noticeable increase in the number of flight tracks and concentration above Malibu.

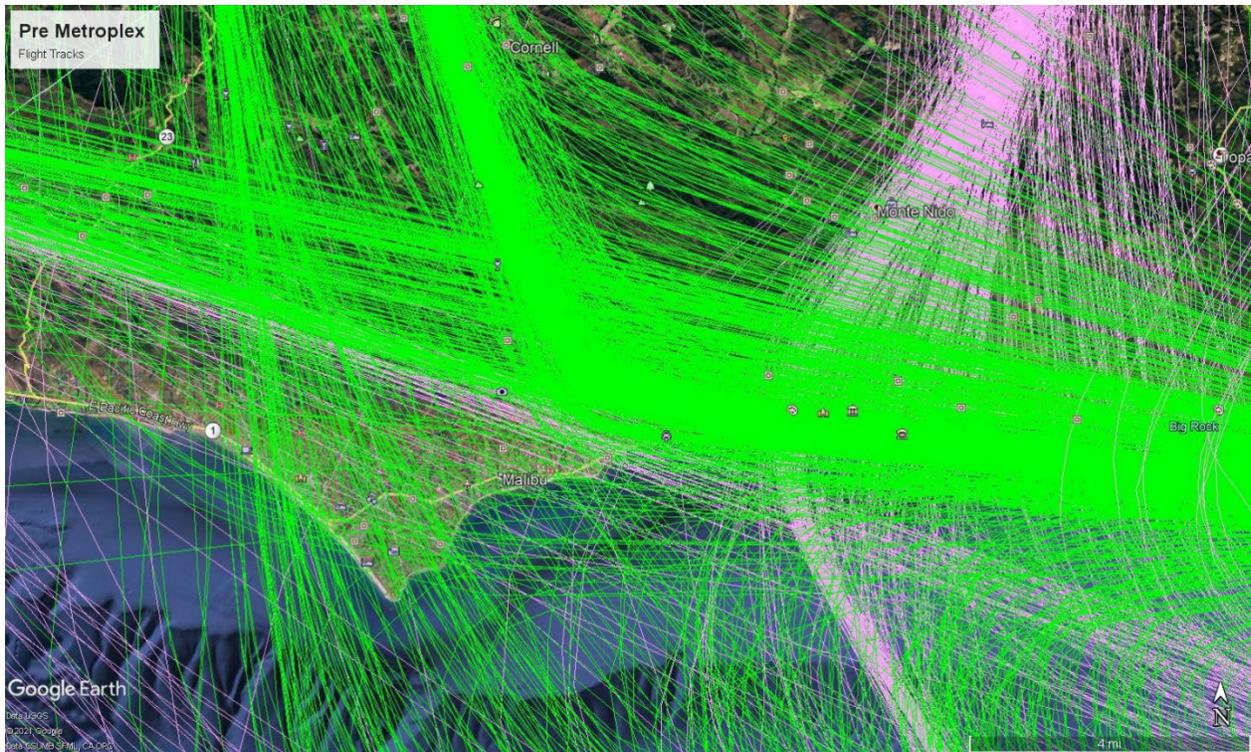


Figure 3 – Pre-Metroplex Flight Tracks Above Malibu - (taken from Google Earth files on <http://metroplexenvironmental.com>)

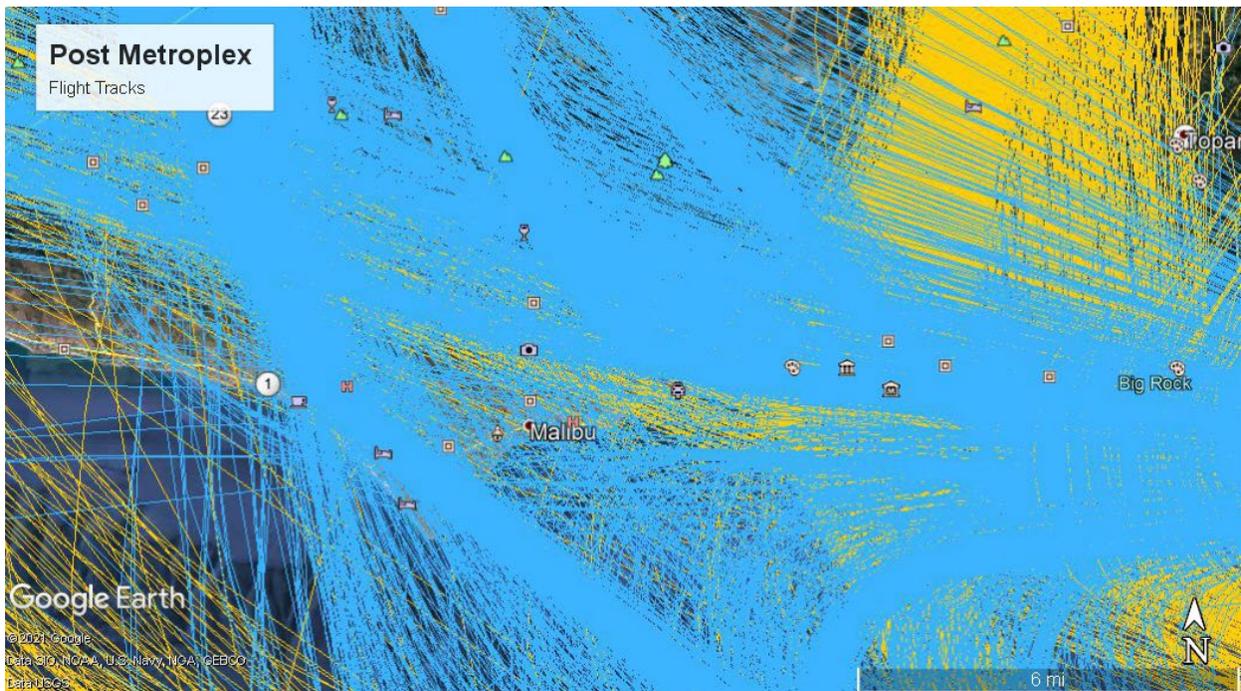


Figure 4 – Post-Metroplex Flight Tracks Above Malibu (taken from Google Earth files on <http://metroplexenvironmental.com>)

These graphics confirm the residents of Malibu’s experience. Since the implementation of the SoCal Metroplex project air traffic over Malibu and the surrounding communities has increased significantly. NextGen technology has altered the flight paths of aircraft operating to and from Los Angeles International Airport (LAX) and other surrounding airports, causing aircraft to fly directly over Malibu and the surrounding communities at lower altitudes. These changes to the flight paths have created a de facto “community in the vicinity of an airport.” While located approximately 27 air miles from LAX, Malibu is in immediate proximity to inbound aircraft as though Malibu was near the airport. The change in flight activity over Malibu has caused the residents of Malibu and the surrounding communities to experience an increased exposure to harmful airplane noise.

B. There Is a Disconnect Between the Findings in the Environmental Assessment for Southern California Metroplex and The Residents’ Experience on the Ground.

In adopting the FONSI/ROD, the FAA made an environmental determination that the SoCal Metroplex project (the “Project”) would not cause significant environmental impact. When FAA undertook the EA for the Project under FAA Order 1050.1E,³ it used the Noise Integrated Routing System (NIRS)⁴ to model the noise impacts for the Project because the Project involved a study area larger than the immediate vicinity of an airport, incorporates more than one airport, and includes actions above 3,000 feet AGL. The FAA applied its “criteria of significance” to determine whether the Project would cause a significant noise impact. Noise was analyzed during the year in which implementation of the Project would be initiated (2016) and projected for a five-year look-ahead (2021). The results identified the differences in DNL noise exposure between the two alternatives (Proposed Action

³ FAA Order 1050.1F replaced FAA Order 1050.1E on July 16, 2015 (“FAA Order 1050.1F”). It serves as the FAA’s policy and procedures for compliance with the National Environmental Policy Act (NEPA) and implementing regulations issued by the Council on Environmental Quality (CEQ). It updates FAA Order 1050.1E to provide a clear, concise, and up-to-date discussion of the FAA’s requirements for implementing NEPA and clarifies requirements to facilitate timely, effective, and efficient environmental reviews of FAA actions, including NextGen improvements.

⁴ NIRS has since been replaced by the Aviation Environmental Design Tool (AEDT). According to FAA, “AEDT is a software system that dynamically models aircraft performance in space and time to produce fuel burn, emissions and noise. Full flight gate-to-gate analyses are possible for study sizes ranging from a single flight at an airport to scenarios at the regional, national, and global levels. AEDT is currently used by the U.S. government to consider the interdependencies between aircraft-related fuel burn, noise and emissions.”

compared to No Action Alternative)⁵ to determine if implementing the Proposed Action would cause “significant” noise impacts.

According to the FAA, only a DNL increase of 1.5 dB or higher in areas exposed to noise levels above DNL 65 dB is a “significant” increase that would give rise to a finding of “significant impact.” FAA’s Order 1050.1F does states that DNL increases of 3 dB or higher in areas exposed to noise levels between DNL 60 dB and 65 dB and DNL increases of 5 dB or higher in areas exposed to noise levels between DNL 45 dB and 60 dB constitute “reportable noise increases.” However, despite being “reportable,” FAA deems these increases not to be “significant” and, therefore, FAA does not mitigate them.

In the Environmental Assessment, FAA told residents that they had nothing to fear because the Project would not cause any “significant impact” to the environment. However, despite these assurances, the Project moved flight paths and lowered flight altitudes causing an increase in noise levels that inflicted and continues to inflict great distress and to negatively affect the health and quality of life of the residents of the City of Malibu and the surrounding areas. The disconnect between the FAA’s noise analysis and the experience on the ground raises two questions. One, if the FAA is using the best and most up-to-date scientific methods in determining the noise impacts on communities, why are so many communities being affected by increases in noise? And two, do FAA’s rules, regulations and orders properly protect persons on the ground from the health risks caused by aircraft noise and emissions? The outcry and evidence from those on the ground shows the answer is “no.”

III. All Elements of Aircraft Operations Should be Evaluated and Disclosed to Address the Concerns of both “Communities in the Vicinity of Airports” and “Fly-Over Communities.”

FAA’s current noise policy is divorced from reality. FAA models what it thinks the noise will be in the future. Decisions are made long before FAA discusses how its decisions will affect people on the ground. Moreover, once implemented, FAA provides no way to ensure that aircraft will not damage people on the ground, since FAA does not enforce any noise standards. By contrast, EPA has successfully protected people from polluted air and water by setting standards and enforcing them. It is not enough for FAA to plan and restrict engine noise. FAA *must* actively

⁵ The FONSI/ROD also considered an alternative project alongside the Project.

protect people on the ground. FAA has never taken the responsibility for developing noise regulations or implemented a noise policy that protects people on the ground. FAA is finally beginning to recognize the damage that aircraft noise causes (*see e.g.*, Literature Review in Foundational Document), but has not done anything to ensure that people on the ground are protected from that noise.

In the Federal Register Notice and the Foundational Document, FAA proposes a distinction between communities. First, there are communities in the “vicinity of the airport,” which FAA describes as communities within the 65 DNL contour. And then there are “flyover communities,” which are communities outside the 65 DNL, but underneath the flight paths of aircraft. This distinction needlessly separates communities since their concerns are the same. They both seek to be protected from the damage of aircraft noise. This is a distinction without a purpose. The division of communities is arbitrary – either a community is impacted by aircraft noise or it is not.

A. FAA’s Current Methods of Planning Fail to Protect Persons on the Ground from Increases in Aircraft Noise.

Nowhere is the failure of FAA’s current method of measuring and planning for noise more evident than in its handling of FAA’s Next Generation of Air Transportation (“NextGen”) initiative. FAA “in an effort to modernize the National Airspace System, has introduced The Federal Aviation Administration’s Next Generation of Air Transportation (“NextGen”) initiative included the development and implementation of “area navigation procedures” or “RNAV” procedures in various regions around the United States. In every single one of the Metroplexes that FAA examined it found that the new flight procedures would have “no significant impact” on the people on the ground. And yet, the implementation of FAA’s NextGen procedures at U.S. airports has caused widespread complaints of increases in aircraft noise from across the country⁶ and four Petitions for Review attempting to protect people on the ground from aircraft noise and pollution.. The

⁶ Anita Snow, *New Flight Paths Lead to Airplane Noise Complaints Across U.S.*, Associated Press, October 23, 2017. <https://apnews.com/article/2c040a68d76a4ab5b7420c0681a860e8>.

Amy Zipkin, *GPS for Air Travel Came with Big Downsides: Noise, Then Lawsuits*, The New York Times, November 18, 2019. <https://www.nytimes.com/2019/11/18/business/planes-noise-flight-paths.html>.

Ashley Halsey III, *Inspector general’s report says the FAA has bungled a \$36 billion project*, The Washington Post, March 8, 2018. https://www.washingtonpost.com/local/trafficandcommuting/inspector-generals-report-says-the-faa-has-bungled-a-36-billion-project/2018/03/08/5436c6ba-22f6-11e8-badd-7c9f29a55815_story.html.

residents and local governments in Baltimore⁷, Boston⁸, Chicago⁹, Denver¹⁰, Los Angeles¹¹, Phoenix¹², Portland, Maine¹³, San Diego¹⁴, Washington D.C.¹⁵, and various cities and towns in Northern California¹⁶ all called upon FAA to address the increase in aircraft noise caused by implementing NextGen flight procedures. FAA refused to address the complaints from many of the affected neighborhoods, claiming that safety and efficiency in the airspace trump the health and welfare of the people on the ground. For example, in the Southern California Metroplex, the FAA gave these answers to questions about increases in noise.

⁷ Colin Campbell, *New Flight Plans at BWI Bring Jets Lower, Cause Headaches for Neighbors*, The Baltimore Sun, September 10, 2016. <https://www.baltimoresun.com/maryland/anne-arundel/bs-md-bwi-noise-20160910-story.html>.

⁸ Fred Hanson, *Milton Meeting on Airplane Noise Draws Hundreds*, Patriot Ledger, December 4, 2015. <https://www.patriotledger.com/article/20151204/NEWS/151207919>.

⁹ Paul Meincke, *FAA pressured to reconsider O'Hare noise problem*, ABC 7 Eyewitness News, September 12, 2014. <https://abc7chicago.com/ohare-airport-noise-faa-federal-aviation-administration/306572/>.

¹⁰ John Aguilar, *As Feds Prepare to Shift DIA Air Traffic Patterns, Gilpin County Is the Latest Community to Dread Plane Noise*, The Denver Post, December 16, 2019. <https://www.denverpost.com/2019/12/16/denver-airport-noise-gilpin-metroplex-faa/>.

¹¹ LAX: Dakota Smith, *L.A. is suing the FAA as residents are fed up with noisy planes in their neighborhoods*, Los Angeles Times, June 24, 2019. <https://www.latimes.com/local/lanow/la-me-ln-flight-path-lax-faa-city-lawsuit-sue-noise-planes-20190624-story.html>.

BUR: Anthony Clark Carpio, *L.A. City Attorney Feuer Sues FAA Over Airplane Noise in South San Fernando Valley*, Burbank Leader, December 12, 2019. <https://www.latimes.com/socal/burbank-leader/news/story/2019-12-12/l-a-city-atty-feuer-sues-faa-over-airplane-noise-in-south-san-fernando-valley>.

¹² CBS This Morning, *FAA's New Air Traffic Control System NextGen Causing Major Noise Pollution*, January 30, 2015. <https://www.cbsnews.com/news/faa-new-air-traffic-control-system-nextgen-causing-major-noise-pollution/>.

Wayne Schutsky, *Residents Vent to FAA about Noisy Flight Paths*, Scottsdale Progress, April 30, 2019. https://www.scottsdale.org/city_news/residents-vent-to-faa-about-noisy-flight-paths/article_913341ac-6859-11e9-a939-5726b12c2632.html.

¹³ Peter McGuire, *Fed Up with Jetport Noise, Residents Ask FAA to Change Flight Paths*, Press Herald, August 1, 2019. <https://www.pressherald.com/2019/08/01/sen-collins-asks-faa-to-address-jetport-noise/>.

¹⁴ Joe Deegan, *Airport Noise – from La Mesa to La Jolla*, San Diego Reader, August 1, 2018. <https://www.sandiegoreader.com/news/2018/aug/01/cover-airport-noise-la-mesa-la-jolla/>.

¹⁵ Lori Aratani, *Arlington, Montgomery counties launch new effort in fight over airplane noise from National*, The Washington Post, November 7, 2020. <https://www.msn.com/en-us/news/us/arlinton-montgomery-counties-launch-new-effort-in-fight-over-airplane-noise-from-national/ar-BB1aNdiW>.

¹⁶ Los Altos: Bruce Barton, *Residents Make Noise with FAA Over Flight Paths*, Los Altos Town Crier, July 13, 2016. <https://www.losaltosonline.com/news/sections/news/199-city-affairs/53248>.

Palo Alto: Palo Alto Weekly Staff, *Editorial: Flawed new FAA NextGen air-traffic routing system needs reset*, Palo Alto Weekly, July 31, 2015. <https://www.paloaltoonline.com/news/2015/07/31/editorial-flawed-new-faa-nextgen-air-traffic-routing-system-needs-reset>.

Santa Cruz: Samantha Clark, *Santa Cruz NextGen flight path noise complaints get louder*, Santa Cruz Sentinel, June 5, 2015. <https://www.santacruzsentinel.com/2015/06/05/santa-cruz-nextgen-flight-path-noise-complaints-get-louder/>.

Q: Will the new procedures increase the noise generated from aircraft?

A: The FAA’s environmental analysis for the project calculated noise at more than 330,000 locations throughout the study area. It showed the Proposed Action would not result in any significant or reportable noise increases under the National Environmental Policy Act. Some people will experience slight noise decreases, some will see no changes, and some will experience small noise increases.

Q: What is the FAA going to do to mitigate the noise increases that some people will experience?

A: The project will not exceed thresholds of significance for any environmental impact category, so no mitigations are being proposed¹⁷

However, despite these assurances, the Project moved flight paths and lowered flight altitudes causing an increase in sound pressure levels that is creating great distress to and continues to negatively affect the health and quality of life of the residents across the United States. Because of the disconnect between the FAA’s noise analysis and the experience on the ground, two questions arise that need to be addressed in this noise policy review. One, if the FAA is using the best and most up-to-date scientific methods in determining the noise impacts on communities, why are so many communities being affected by increases in noise? And two, do FAA’s rules, regulations and orders provide enough guidance to protect persons on the ground from the health risks caused aircraft noise and emissions. The undeniable answer is “no.”

IV. FAA Must Consider the Health Impacts of Aircraft Noise on Public Health.

Another concern of all noise-damaged communities is health risk. FAA has now realized the substantial impact aircraft noise has on public health.¹⁸ FAA now

¹⁷ http://www.metroplexenvironmental.com/socal_metroplex/socal_questions.html

¹⁸ See 88 Fed.Reg. 26641 (May 1, 2023) (“FAA is reviewing research on the effects of exposure to aviation noise, including the correlation of exposure to aviation noise with adverse health impacts ...” See also *The Foundational Elements of the Federal Aviation Administration Civil Aviation Noise Policy: The Noise Measurement System, its Component Noise Metrics, and Noise Thresholds*, FAA, April 28, 2023.

must recognize that it must outline how FAA's projects are going to impact the health and well-being of the residents of the communities. Toward that end, as part of its revised noise policy, FAA must require a Health Risk Assessment be conducted in conjunction with every project under NEPA. The United States Environmental Protection Agency (EPA) uses Health Impact Assessments (HIA) as a tool to promote sustainable and healthy communities. EPA has long concluded that the foundation of a healthy community is strongest when built upon a decision-making process that balances environmental, social, and economic factors to promote the health and well-being of its members. Presumably, FAA wants to do the same. An HIA is a tool designed to investigate how a proposed program, project, policy, or plan may affect health and well-being and inform decision-makers of these potential outcomes before the decision is made.

The FAA should use an HIA to:

- Determine the potential effects of a proposed decision on the health of a population and the distribution of those effects within the population;
- Consider input from stakeholders, including those affected by the decision;
- Use different types of qualitative and quantitative evidence and analytical methods;
- Use such analytical methods that are flexible based on available time and resources; and
- Provide evidence and recommendations to decision-makers in a timely manner.

HIAs consider the full range of potential impacts of the proposed decision on health and the factors known to affect human health (known as health determinants) directly and indirectly. HIAs provide recommendations for maximizing the potential positive health impacts and minimizing and/or avoiding the potential negative health impacts of the decision. In addition to promoting human health considerations, HIAs also encourage democracy, health equity, a comprehensive approach to individual and community health, and sustainability in decision-making.

The FAA has a legal and moral duty to protect human health on the ground from the damaging effects of noise and the environment. Every day the FAA makes critical decisions about the risks of exposure to damaging aircraft noise. Yet, the FAA does not have a program that develops and applies state-of-the-science research to characterize impacts on human and ecological systems – whether they result from exposure to single, complex, or multiple physical, chemical, or biological stressors – to support and improve FAA’s risk assessment decisions. The FAA must develop a program that identifies, evaluates, and integrates existing and emerging information from diverse scientific disciplines to rigorously characterize hazard and evaluate exposure-response relationships supporting human health and environmental risk assessments.

V. DNL Inadequately Measures Noise Impacts and Therefore Should Not Be the Sole Noise Metric Used by the FAA.

DNL either needs to be revised to address the unique issues of aircraft noise, or it needs to be retired. DNL was created as a response to occupational issues at a workplace. It uses dBA, which discounts low frequency and is a growing issue with modern jet engines. Thus, it does not take into account the full experience that people on the ground have with respect to aircraft noise.

First, DNL is insensitive to short-term noise events. DNL is a 24-hour average noise metric, which means it can mask the effects of individual, short-duration, high-intensity aircraft noise events. For example, a few loud nighttime flights might not significantly impact the DNL value, even though they can be highly disturbing to people trying to sleep. As we now know from the multitude of studies performed, sleep disturbance can cause mental and physical health problems.

Second, weighting of nighttime noise is insufficient to properly gauge its impact. DNL places greater emphasis on noise occurring during nighttime hours (usually between 10:00 PM and 7:00 AM) by applying a 10 dB penalty. However, this does not account for the fact that disturbing the peace at night is still more damaging. CNEL, by contrast, creates a penalty for evening hours as well as night hours.

Third, DNL lacks any possibility of community feedback. DNL is based solely on noise measurements and calculations and does not incorporate community feedback or subjective evaluations of noise annoyance. This can be problematic because the

perceived impacts on health and disturbance from aircraft noise can vary widely among individuals and communities.

Finally, DNL results in an incomplete representation of noise variability. DNL provides a single, averaged value for a 24-hour period, which may not capture the full variability of aircraft noise throughout the day and night. Some noise impacted communities may experience periodic spikes in noise that are not well-represented by DNL. Moreover, DNL does not consider geographic elements on the ground that may affect the amount sound energy noise-impacted communities experience, such as topography and surface water.

In response to these limitations, some aviation and noise experts have advocated for the use of alternative noise metrics, such as the Community Noise Equivalent Level (CNEL) or the Lmax metric, to better address the specific concerns related to aircraft noise near airports. If FAA is going to use a single cumulative metric, CNEL, is more appropriate since it places more emphasis on evening and nighttime noise, which captures the impact of nighttime flights on residential areas.

Any cumulative metric, however, should not be used by itself since it tracks a single aspect of aircraft affecting noise-impacted communities. Since sleep disturbance looms large as a precursor to many of noise-related mental and physical health problems created by aircraft noise, a single event/operational metric should also be used. At the very least, “Number Above” (NA) and “Time Above” (TA) could be used to reference the number of times a person could be woken up during the evening and night hours. NA presents the total number of noise events above a specified noise level, whereas TA presents the total duration of noise events above a specified noise level. Research indicates that sleep disturbance begins to occur at a noise level of 40 dB. See, WHO Guidance, setting nighttime noise levels to 40 DNL.

VI. “Average Annual Day” Limits Decision-making.

DNL provides a cumulative description of the noise events expected to occur over the course of an entire year averaged into a representative day, described as an Average Annual Day (AAD). AAD is not an appropriate way to describe noise impacts. Aviation noise has unique characteristics and considerations that may not be fully captured by AAD alone. While AAD may provide a reasonable representation of long-term exposure, because it does not address short-term or episodic events, relying solely on an annual average may not adequately address

acute concerns. The appropriateness of AAD also depends on local conditions and public health considerations. What may be an acceptable level of noise exposure in one area might not be appropriate in another, depending on factors like population density, vulnerable populations, and existing health conditions.

It should be apparent, then, that AAD limits are most effective when used in conjunction with other policies and metrics. For example, aircraft noise can vary significantly between daytime and nighttime hours due to factors like flight schedules and reduced background noise at night. AAD does not distinguish between these periods, which can be problematic because nighttime noise often has a more pronounced impact on sleep and quality of life. Thus, combining AAD with a single event/operational metric that takes into short-term variations is necessary to address both long-term and short-term exposures adequately. In addition, different types of communities are impacted differently at different periods of the day. For example, daytime noise will have an impact on schools and outdoor activities, whereas nighttime noise will impact sleep, but not schools.

Moreover, aircraft noise includes peak noise events generated during takeoffs and landings. These events can be highly disruptive even if the AAD remains within acceptable limits. AAD may not adequately account for the effects of these individual noisy events. AAD typically provides an average noise level over an extended period. However, the human perception of noise is not solely based on averages but also on peak noise levels, duration, and frequency. People may be more affected by occasional loud aircraft noise than by a constant but lower-level background noise.

AAD may not capture the nuances of community annoyance and disturbance as well as seasonal variance. AAD does not consider volume of air traffic during a day, and DNL does a poor job of assessing evening and night impacts. Likewise, when people are outside in the summer, the impact of noise is greater because people have their windows open and are outside more often. Some do not have air conditioning to mitigate noise created by aircraft. It also does not take into changes in weather.

In order to create effective policy- and decision-making, AAD requires robust monitoring and enforcement mechanisms. Without adequate monitoring and enforcement, it is challenging to ensure that sources of noise are complying with AAD limits set by FAA. In addition, policies and decisions incorporating AAD

should be adaptable to changing circumstances and evolving scientific knowledge. If an AAD is set in stone, like 65 DNL is, it cannot account for new research or emerging health concerns, and AAD become outdated and ineffective over time. Likewise, it is crucial for policies based on AAD to involve public engagement and feedback. Noise-impacted communities should have a say in setting limits and assessing their adequacy based on their experiences and health outcomes. Finally, a noise policy that incorporates ADD should include provisions for implementing mitigation measure when those limits are consistently exceeded. DNL does none of these things, therefore AAD should be rejected as part of any FAA noise policy.

VII. DNL Should Not Be Used as the Sole Noise Metric for Decision-making and Enforcement.

Whatever metric is used, it needs to be verified against real-time noise measurement to ensure that the decision that were made are accurate.

DNL should be retired or completely overhauled to reflect the unique characteristics. If the idea of averaging is still feasible, CNEL – the method used in California – should replace DNL, although it, too, should be updated. Because night-time noise is a significant concern, CNEL is much more preferable to DNL.

First, CNEL places a greater emphasis on nighttime noise by applying penalties to noise events that occur during the evening (7:00 PM to 10:00PM, 5 dB penalty) and nighttime hours (10:00 PM -7:00 AM, 10dB penalty). This weighting recognizes that people are generally more sensitive to noise during these periods and that nighttime noise can have a more substantial impact on sleep and quality of life. Research has indicated that nighttime noise exposure can have more pronounced health effects, including sleep disturbances and increased risk of cardiovascular issues. CNEL, by focusing on nighttime noise, aligns with these health concerns and provides a better representation of the potential health impacts of noise pollution.

Moreover, by emphasizing nighttime noise, CNEL provides an incentive for noise mitigation measures that specifically target nighttime operations. This can lead to more effective noise abatement strategies and decisions. Some communities near airports or noisy industrial areas are particularly concerned about nighttime noise due to its potential to disrupt sleep. CNEL takes into account the concerns and sensitivities of these communities, providing a more tailored assessment of noise impacts. CNEL better reflects the real-world experience of people living in affected

areas. It is not just the average noise over a 24-hour period but also the nighttime noise that affects their quality of life and well-being.

In addition, in order to better incorporate community standards, ISO 1996-1:2016 should be used either instead of DNL or in addition to CNEL. To understand the disconnect between the FAA's methods and the experience on the ground, it is necessary to review why the FAA uses the methods it has. The Airport Safety and Noise Act ("ASNA") of 1979 (Public Law 96-193) required the Secretary of Transportation to identify a single, universally applicable aircraft noise measurement system. ASNA also required the Secretary of Transportation to "establish a single system for measuring noise that... has a highly reliable relationship between projected noise exposure and surveyed reactions of individuals to noise."¹⁹

Six years after Congress passed ASNA, the FAA formally endorsed the Environmental Protection Agency's (EPA's) cumulative 24-hour, time-weighted average measure of A-weighted sound levels in Part 150 of the Federal Aviation Regulations. The measure is known as the "Day-Night Average Sound Level" (DNL) and is represented symbolically in mathematical expressions as L_{dn} .²⁰

The rationale for FAA noise regulatory policy is described by the Federal Interagency Committee on Noise ("FICON") in 1992. FICON states that "...the percent of the exposed population expected to be highly annoyed (%HA) [is] the most useful metric for characterizing or assessing noise impact on people," and that "...the updated 'Schultz curve' remains the best available source of empirical dosage-effect information to predict community response to transportation noise." The "Schultz curve," in sum, is an early dosage-response curve method used to describe noise exposure annoyance relationships. The original analysis by Schultz has been revisited several times in subsequent decades and is now obsolete."²¹

FICON's reliance on the Schultz curve, which, experts agree had become obsolete by 1992 created dosage-response relationships that uses a descriptive approach to predict annoyance due to aircraft noise exposure that is blind to bona fide differences among communities regarding aircraft noise annoyance. Fidell's

¹⁹ "A Review of U.S. Aircraft Noise Regulatory Policy," Sanford Fidell (Fall 2015), <https://acousticstoday.org/wp-content/uploads/2015/11/Aircraft-Noise-Regs.pdf> (last accessed March 8, 2021).

²⁰ *Id.*, at p.28.

²¹ *Id.*, at p.28.

article, cited in footnote 54, argues that a “one-size-fits-all, regression-based dosage-response relationship can greatly overestimate annoyance in actual communities of greater than average tolerance for noise exposure. It also underestimates annoyance in actual communities of lesser than average tolerance for noise exposure.”²² The empirical data from the past few years shows that the FAA’s definitions of noise exposure do not protect the supposed percentage of people in most U.S. communities from exposure to highly annoying and detrimental aircraft noise. As Fidell points out “[t]he FAA’s constant numerical definition of significant noise impacts does not recognize empirically measurable differences in tolerance for noise exposure among communities, and thus does not provide a uniform effect on a national basis.”²³ In actual application, as evidenced by the plethora of noise complaints across the nation, the FAA’s definition of the significance of aircraft noise exposure affords little protection of noise-exposed populations in many communities from consequential degrees of annoyance and detriment due to aviation noise.

What is needed here is a method that analyzes population percentages in different communities associated with particular definitions of noise impacts. A method that can ascertain by specifying two parameters, the percentage of the population of a nominally average community to be protected from high annoyance and detriment, and the percentage of people in all communities to be similarly protected, can properly gauge the efficacy and efficiency of regulatory policies expressed in acoustic units. This method is ISO 1996-1:2016.

The International Organization for Standardization (ISO) produces international standards. An international standard “provides rules, guidelines or characteristics for activities or for their results, aimed at achieving the optimum degree of order in a given context.”²⁴ ISO 1996-1:2016 “Description, Measurement and Assessment of Environmental Noise – Part 1: Basic Quantities and Assessment Procedures,” was published in March 2016, five months *before* the publication of the SoCal Metroplex Environmental Assessment. ISO 1996-1:2016 defines the basic quantities to be used for the description of noise in community environments and describes basic assessment procedures. It also specifies methods to assess environmental noise and gives guidance on predicting the potential annoyance response of a community to long-term exposure from various types of environmental

²² *Id.*, at p.32.

²³ *Id.*, at p.33.

²⁴ <https://www.iso.org/deliverables-all.html>

noises. Application of ISO 1996-1:2016 to predict annoyance response is limited to areas where people reside and to related long-term land uses. ISO 1996-1:2016 and its companion ISO 1996-2:2016, have been approved for use by the ISO countries, which includes the United States. As with all ISO standards, ISO 1996-1:2016 represents the best scientific practices.

ISO 1996-1:2016 states in its introduction that “[its] broad aim . . . is to contribute to the international harmonization of methods of description, measurement, and assessment of environmental noise from all sources.” The introduction adds, “the aim of the ISO 1996 series is to provide authorities with material for the description and assessment of noise in community environments. Based on the principles described in this part of ISO 1996, national standards, regulations, and corresponding acceptable limits for noise can be developed. The methods and procedures described in Part 1 of the ISO 1996 are intended to be applicable to noise from various sources,”²⁵ not just those emanating from aircrafts.

Relevant passages in the findings of ISO 1996-1:2016 explain how governmental agencies should assess noise in affected communities:

- Annex A:
 - “It is usually found that for the same equivalent continuous sound pressure level, aircraft noise is more annoying than road-traffic noise.”
 - Discusses Community Tolerance Level variable in depth (“L_{CT}”) and adjustments to such variable.
- Annex D:
 - In newly created situations, especially when the community is not familiar with the sound source in question, higher community annoyance can be expected. This difference may be equivalent to up to 5 dB. Research has shown that there is a greater expectation for and value placed on “peace and quiet” in quiet rural settings. In quiet rural areas, this greater

²⁵ ISO Part 1 - Introduction

expectation for “peace and quiet” may be equivalent to up to 10 dB.

- A new, unfamiliar sound source cited in a quiet rural area can engender much greater annoyance levels than are normally estimated by these formulae. This increase in annoyance may be equivalent to adding up to 15 dB to the measured or predicted levels.
- Annex E: Estimated prevalence of a population highly annoyed as a function of adjusted day-evening-night or day-night sound levels using the community tolerance level formulation.
 - E.1 (Aircraft Noise), Table E.1 and Figure E.1.
- Annex F: Estimated prevalence of a population highly annoyed as a function of adjusted day-evening-night or day-night sound level using a regression formulation.
 - F.1 Aircraft Noise – introduces prevalence of high annoyance variable (P_{HA}).
- Annex H:
 - Theory-based approach to predict the growth of annoyance.
 - The community tolerance level is explained in Annex H to ISO Part 1 as part of a theory-based approach to predict the growth of annoyance.

Thus, ISO 1996-1:2016 corrects the deficiencies of the Schultz curve and the reliance on the Schultz curve. ISO 1996-1:2016 gives policymakers a much more accurate view of community tolerance levels of noise. The additional variable used in ISO 1996-1:2016 is the community tolerance level or (“ L_{CT} ”). This variable, as explained in ISO Part 1, is the “day-night sound level at which 50% of the people in a particular community are predicted to be highly annoyed by noise exposure.” Note 1 to ISO Part 1 states that L_{CT} is used as a parameter that accounts for differences between sources and/or communities when predicting the percentage of people in a community highly annoyed by noise exposure. It is worth reiterating

that Annex D to ISO 1996 Part 1 states that in newly created situations, especially when the community is not familiar with this sound source, higher community annoyance can be expected. This difference may equal up to 5 dB. Research has shown there is a greater expectation for and value placed on “peace and quiet” in quiet rural settings. In quiet rural areas, this greater expectation for “peace and quiet” may equal up to 10 dB. A new, unfamiliar sound source cited in a quiet rural area can engender much greater annoyance levels than are normally estimated by these formulae. This increase in annoyance may be equivalent to adding up to 15 dB to the measured or predicted levels.²⁶

Thus, based on the inherent value of ISO 1996-1:2016, FAA must be required to comply with ISO standards. All duly passed ISO standards concerning noise and its measurement should be required to be used by the FAA in its evaluation of environmental impacts required under the National Environmental Policy Act.

VIII. FAA Needs to Improve Its Communication with Noise-impacted Communities.

FAA record on communication with noise-impacted communities is abysmal. Effective communication is crucial for maintaining transparency, trust, and collaboration in addressing noise-related issues, all of which are lacking in FAA’s current approach to communicating with noise-impacted communities. While FAA plays lip service to keeping communities informed, it does not include them in any of the decision-making processes. They are excluded from the policy making committees where airlines, airports, and pilots have seats. This exclusion causes feelings of powerlessness and frustration among community members who are directly affected by aircraft noise. Inclusivity in decision-making is essential for ensuring that the concerns and perspectives of all stakeholders, including noise-impacted communities, are taken into account. For example, they are not included in the full “Working Group” under FAA Order 7100.41A. Noise-impacted communities are stakeholders in the decision-making process as well as in the enforcement process and should have a say in shaping policies, regulations, and mitigation efforts that impact their daily lives. Noise-impacted communities need to be “in the room where it happens.”

The Federal Aviation Administration (FAA) can take several steps to improve communication regarding changes in noise exposure, and these steps should be

²⁶ *Id.*, at Annex D - D4.4.

aimed at increasing transparency, inclusivity, and responsiveness to the concerns of noise-impacted communities. Here are some recommendations, along with the reasoning behind each:

1. **Regular and Timely Updates:** The FAA should provide regular and timely updates to noise-impacted communities about changes in noise exposure. This includes informing communities about changes in flight patterns, airport operations, or any planned modifications that may impact noise levels. Timely updates can help residents prepare for and understand any changes.
2. **Clear and Accessible Information:** The FAA should ensure that the information it provides is clear, accurate, and accessible to the public. This includes providing detailed maps, data, and explanations of changes in noise exposure. Accessibility is crucial to ensure that all community members can understand and engage with the information.
3. **Community Engagement:** Engaging with noise-impacted communities in a meaningful way is essential. The FAA should hold regular meetings and forums where community members can ask questions, voice concerns, and provide feedback. These engagements should be conducted in a way that is inclusive and allows for open dialogue. This needs to take place prior to any decision are made.
4. **Online Resources:** The FAA should maintain user-friendly online resources that provide up-to-date information on noise exposure and related topics. These resources should include interactive tools, data visualization, and frequently asked questions (FAQs) to help residents better understand noise impacts.
5. **Notification Protocols.** FAA must develop notification protocols to alert communities in advance of any significant changes in flight patterns, airport operations, or other factors that may affect noise exposure. Advance notice allows residents to prepare and adapt to changes, as well as propose alternatives that will not impact noise-impacted communities as much.

6. **Community Liaisons:** Designate community liaisons or ombudsmen who can serve as points of contact for affected communities. These liaisons can facilitate communication between the FAA and community members, helping to address concerns and clarify information. These ombudsmen must have the authority to effect change that will benefit noise-impacted communities and not be a receptacle for noise complaints.
7. **Regular Reporting:** FAA must publish regular reports summarizing noise monitoring data, trends, and any mitigation efforts. This helps residents track progress and understand the effectiveness of noise reduction measures.
8. **Public Meetings and Workshops:** Host public meetings and workshops in affected communities to explain proposed changes, gather input, and address concerns directly. These meetings should be conducted in a way that encourages active participation. FAA must actively participate in local noise roundtables.
9. **Collaboration with Local Authorities:** Collaborate closely with local authorities and community organizations to facilitate communication and outreach efforts. Local government officials often have direct connections to their constituents and can play a crucial role in relaying information. This also means that FAA must be aware of local ordinances and state laws that affect airports. And FAA and airports must not ignore the valid concerns of state and local governments.

Improving communication in these ways not only enhances transparency but also empowers communities to engage constructively in the decision-making process. It fosters trust and collaboration between the FAA and affected communities, ultimately leading to more effective noise management strategies and solutions that consider the needs and concerns of all stakeholders.

IX. Noise Thresholds for NEPA and Land Use Noise Thresholds Established Using DNL or for Another Cumulative Noise Metric.

NEPA at its core is a planning statute. FAA needs to be considering other statutes that would effectively enforce noise standards in order to protect people on the ground. If FAA cannot enforce noise standards, then it needs to get out of the

way so that state and local governments can protect their citizens from the substantial damage caused by noise.

That being said, there are methods that FAA could undertake to make NEPA decision-making process more accurately reflect the experience on the ground. First, the noise measurements contained in an Environmental Assessment need to be verified by real-time noise data. Time after time FAA underestimates the noise created by aircraft, concludes that there will be no significant impact, and washes its hands of what happens in the future. FAA decision-making is severely flawed when millions of people complain vehemently about the damage being done to them by aircraft noise after FAA concluded there was no significant impact. This disconnect is growing wider.

While the NES was a huge step in the right direction, it only scratches the surface of how noise-damaged communities feel about aircraft noise. “Highly annoyed” only begins to describe their feelings.

A. Using the Thresholds Established by the Schultz Curve and Extrapolating them to the NES Curve Creates New Thresholds.

The method for representing the community response to noise is known as the “Schultz Curve,” which is a dose-response curve developed in the 1970’s. The noise thresholds used for current FAA noise policy are informed by the “Schultz Curve.” While the “Schultz Curve” remains the accepted standard for describing transportation noise exposure-annoyance relationships, its original supporting scientific evidence and social survey data were based on information available in the 1970s. The last in-depth review and revalidation of the Schultz Curve was conducted in 1992 by the Federal Interagency Committee on Noise (“FICON Report”). More recent analyses have shown that aviation noise results in annoyance levels higher than other modes of transportation. Recent international social surveys have also generally shown higher annoyance than predicted by the Schultz Curve. See below. These analyses and survey data indicate that the Schultz Curve may not reflect the current U.S. public perception of aviation noise.

In 2015 and 2016, FAA conducted a nationwide survey to measure the relationship between aircraft noise exposure and annoyance in communities underneath flight paths. This survey captured the community response to a modern fleet of aircraft as they are being flown today and it used best practices in terms of

noise analysis and data collection. This survey has been called the “Neighborhood Environmental Survey” (NES).

For the NES, FAA surveyed over 10,000 residents living near 20 representative airports via a mailed questionnaire. The questionnaire asked the recipients about various environmental concerns that bothered, disturbed, or annoyed them. Noise from aircraft was one of the thirteen environmental concerns that the survey covered. Since the aircraft noise question was one of 13 environmental concerns listed, the recipient did not know whether this was an airport community noise survey. This was the largest survey of this type undertaken at one time. The data from the survey was used to calculate the new “National Curve” to replace the “updated Schultz Curve” in use by the FAA and provides a contemporary picture of community response to aircraft noise exposure. A follow up phone survey was also offered to the 10,000 mail survey respondents, and just over 2,000 elected to participate. The phone survey provided additional insights on how the mail survey respondents felt about aircraft noise.

The results of the survey showed that the updated Schultz Curve, as used in the FICON Report, was very outdated and no longer reflected the public’s response to aircraft noise exposure. Comparison of the FICON Report prepared using the updated Schultz Curve and NES prepared using the National Curve showed the following percentage of population highly annoyed by exposure to transportation noise:

- At a noise exposure level of DNL 65 dB, the FICON Report indicated 12.3% of people were highly annoyed, compared to between 60.1% & 70.9% from the NES.
- At a noise exposure level of DNL 60 dB, the FICON Report indicated that 6.5% of people were highly annoyed, compared to between 43.8% & 53.7% from the NES.
- At a noise exposure level of DNL 55 dB, the FICON Report indicated that 3.3% of people were highly annoyed, compared to between 27.8% & 36.8% from the NES.
- At a noise exposure level of DNL 50 dB, the FICON Report indicated that 1.7% of people were highly annoyed, compared to between 15.4% & 23.4% from the NES.

Extrapolating from the FAA's current "thresholds of significance," one concludes that the new "threshold of significance" should be around DNL 45 dB.

B. FAA Should Use the WHO Study as a Basis for Setting Noise Thresholds.

In October 2018, the World Health Organization Regional Office for Europe published its Environmental Noise Guidelines for the European Region. Those Guidelines found that aviation noise was connected to higher incidence of ischemic heart disease, hypertension, "prevalence of 'highly annoyed'" population, and a delay in reading skills and oral comprehension in children. As a result, WHO made the strong recommendation that average noise exposure noise levels produced by aircraft be reduced below 45 dB DNL, as aircraft noise above this level is associated with adverse health effects. WHO Guideline, p. xvii.

WHO also made the strong recommendation that noise levels produced by aircraft be reduced during nighttime below 40 dB DNL, as aircraft noise above this level is associated with adverse effects on sleep. WHO strongly recommended that to reduce health effects policymakers implement "suitable measures to reduce noise exposure from aircraft in the population exposed to levels above the guideline values for average and night noise exposure." WHO Guidelines p. xvii.

FAA and the U.S. lag way behind Europe in assembling epidemiological evidence of the effects of noise people's health and well-being. The attached declarations go a long way to informing FAA about noise-impacted communities' attitudes about noise and how it is damaging their health – both physical and mental. In addition, the WHO Guidelines are based on epidemiological studies. The decisions contained therein with respect to aircraft noise thresholds are threshold that it deemed to be healthy. There is no reason for FAA to repeat this comprehensive study before changing the threshold. It is a sufficient basis for changing the threshold.

X. FAA Should Use Noise Thresholds that Include Single-Event or Operational Metrics.

As an initial matter we need to point that the language FAA uses to describe the issues surrounding noise impacts is offensive to many people. For example, the

FAA stated in its questions that it “learned from the results of the NES, people are **bothered** by individual aircraft noise events, but their **sense of annoyance** increases with the number of those noise events.” There are people whose health have been irreparably damaged by aircraft noise. There are babies who have been born underweight because of aircraft noise. There are children who are struggling in school because of aircraft noise. And yet FAA talks about people who are “bothered” by noise and who are “annoyed” by aircraft noise. That is one aspect of aircraft noise. Aircraft noise is a public health issue. It should be treated as such. To reflect the seriousness of this issue, the above sentence should be revised to state “learned from the results of the NES, people are affected by individual aircraft noise events, but the impact – on their health and well-being – increases with the number of those noise events.”

XI. FAA Should Establish Noise Thresholds for Low-Frequency Events.

Low frequencies have always been associated with aircraft noise. However, the amount of low frequencies emitted from aircraft has risen substantially. This is from the fact that jet engines as they grew larger and more “quiet” traded higher frequencies for lower frequencies, which are not measured by DNL. Thus, reverberations from aircraft grew more frequent and FAA failed to measure them. If DNL or CNEL are used it should be modified to use either a full spectrum dB or at least dBC. Low frequencies travel further and have a more devastating impact when they reach a sufficient level.

XII. Miscellaneous.

When the FAA reviews its noise policy regarding noise metrics, the calculation methods, the establishment of noise thresholds, and communication of changes in noise exposure, it should consider a range of critical issues and topics to ensure a balanced and effective approach to addressing aviation noise impacts. Here are some key considerations along with explanations:

1. **Community Health and Well-Being:** The FAA should prioritize the health and well-being of communities affected by aviation noise. Noise exposure has been associated with various health issues, including sleep disturbances, cardiovascular problems, and stress-related conditions. Assessing and mitigating noise impacts should take into account the potential health consequences on affected residents.

2. **Noise Metrics:** Evaluate the appropriateness of noise metrics used for assessing noise impacts. Consider metrics that not only measure average noise levels (e.g., DNL or CNEL) but also capture peak noise events and variations in noise levels over time. Different metrics may be more suitable for different contexts, so a flexible approach is crucial.
3. **Enforcement of Noise standards.** Noise metrics should be used for enforcement and not just for “decision-making.” There must be consequences for airlines and airports that allow aircraft noise to exceed the levels that were planned for.
4. **Thresholds and Standards:** Reevaluate noise thresholds and standards to ensure they are scientifically sound, protective of public health, and reflective of community concerns. Noise standards should be based on up-to-date research and consider the latest understanding of the effects of noise on communities.
5. **Community Engagement:** Engage with affected communities and stakeholders in the decision-making process. Seek input from residents, local governments, and community organizations when developing or revising noise policies. Community feedback can provide valuable insights into local noise concerns.
6. **Environmental Impact Assessments:** Conduct comprehensive environmental impact assessments (EIAs) for proposed changes in flight procedures or airport operations. These assessments should include detailed noise modeling and analysis, and the results should be communicated to the public to ensure transparency.
7. **Technological Advances:** Consider advancements in aviation technology that may impact noise levels, such as quieter aircraft engines or alternative flight procedures. Evaluate the feasibility of incorporating quieter technologies into the aviation fleet.

8. **Land Use Planning:** Collaborate with local governments and communities to develop land use planning strategies that minimize the exposure of residential areas to aviation noise. Promote compatible land use around airports to reduce the impact of noise on existing and future communities.
9. **Noise Abatement Procedures:** Implement noise abatement procedures and practices, such as optimized flight paths and curfews, where feasible and effective. Explore innovative approaches to reduce noise impacts on communities.
10. **Communication and Outreach:** Develop effective communication strategies to inform affected communities about changes in noise exposure. Use a variety of communication methods, including online resources, public meetings, and community liaisons, to ensure that information reaches residents and is easily understood.
11. **International Best Practices:** Review international best practices and lessons learned from other countries' approaches to aviation noise management. Collaborate with international aviation organizations to share knowledge and adopt effective strategies.
12. **Collaboration with Stakeholders:** Collaborate with airlines, airports, pilot associations, and other industry stakeholders to find mutually beneficial solutions that balance aviation needs with noise mitigation efforts.

By addressing these issues and topics, the FAA can develop a noise policy that is responsive to the concerns of affected communities, prioritizes health and well-being, and aligns with current scientific understanding and technological advancements in aviation. It should aim for a comprehensive and inclusive approach that fosters collaboration among all stakeholders.

XIII. Literature Review

FAA needs to research the effects of low frequency noise from aircraft on communities below flight paths. Here are some of the articles that may be instructive.

1. Pawlaczyk-Luszczyniska M, Dudarewicz A, Waszkowska M, Szymczak W, Sliwińska-Kowalska M. The impact of low-frequency noise on human mental performance. *Int J Occup Med Environ Health*. 2005;18(2):185-98. PMID: 16201210.
2. Araújo Alves, Juliana, Filipa Neto Paiva, Lígia Torres Silva, and Paula Remoaldo. 2020. "Low-Frequency Noise and Its Main Effects on Human Health—A Review of the Literature between 2016 and 2019" *Applied Sciences* 10, no. 15: 5205. <https://doi.org/10.3390/app10155205>
3. Berglund B, Hassmén P, Job RF. Sources and effects of low-frequency noise. *J Acoust Soc Am*. 1996 May;99(5):2985-3002. doi: 10.1121/1.414863. PMID: 8642114.
4. Araújo Alves, Juliana & Paiva, Filipa & Silva, Ligia & Remoaldo, Paula. (2020). Low-Frequency Noise and Its Main Effects on Human Health—A Review of the Literature between 2016 and 2019. *Applied Sciences*. 10. 39. [10.3390/app10155205](https://doi.org/10.3390/app10155205).
5. Javadi A, Pourabdian S, Forouharmajd F. The Effect of Low Frequency Noises Exposure on the Precision of Human at the Mathematical Tasks. *Int J Prev Med*. 2022 Feb 23;13:33. doi: 10.4103/ijpvm.IJPVM_244_20. PMID: 35392306; PMCID: PMC8980828.

APPENDIX A

PROPOSED REVISIONS TO FAA ORDERS AND REGULATIONS

**FAA ORDER 1050.1F AMENDED TO MAKE THE FOLLOWING CHANGES TO NOISE
THRESHOLDS OF SIGNIFICANCE**

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, shall be amended in the following sections to account for the changes suggested by the outcome of the Neighborhood Environmental Survey.

Exhibit 4-1, in the Chart under “Noise and Noise Compatible Land Use” in the “Significance Threshold” column:

The action would increase noise by DNL 1.5 dB or more for a noise sensitive area at or above DNL 45 dB noise exposure level, or that will be exposed at or above the DNL 45 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the time frame. For example, an increase from DNL 45.5 dB to 47 dB is considered a significant increase, as is an increase from DNL 43.5 dB to 45 dB.

And in the “Factors to Consider” column:

Special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR part 150 are not relevant to the value, significance, and enjoyment of the area in question. For example, the DNL 45 dB threshold does not adequately address the impacts of noise on visitors to areas within a national park or national wildlife and waterfowl refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.

Next, in § 11-5, “Definitions,” subsection (10), “Noise Sensitive Area,” should be amended to read:

An area where noise interferes with normal activities associated with its use. Normally, noise sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife and waterfowl refuges, and cultural and historical sites. For example, in the context of noise from airplanes and helicopters, noise sensitive areas include such areas within the DNL 45 dB noise contour. Individual, isolated, residential structures may be considered compatible within the DNL 45 dB noise contour where the primary use of land is agricultural and adequate noise attenuation is provided. Also, transient residential use such as motels should be considered compatible within the DNL 45 dB noise contour where adequate noise attenuation is provided. A site that is unacceptable for outside use may be compatible for use inside of a structure, provided adequate noise attenuation features are built into that structure (see table 1 in Appendix A of 14 CFR part 150, Airport Noise Planning, Land Use Compatibility Guidelines). The FAA recognizes that there are settings where the DNL 45 dB standard may not apply. In these areas, the responsible FAA official should determine the appropriate noise assessment criteria based on specific uses in that area (see also the 1050.1F Desk Reference for further guidance). In the context of facilities and equipment, such as emergency generators or explosives firing ranges, but not including aircraft, noise sensitive areas may include such sites in the immediate vicinity of operations mentioned immediately above, pursuant to the Noise Control Act of 1972, 42 U.S.C. §§ 4901–4918 (see state and local ordinances, which may be used as guidelines for evaluating noise impacts from operation of such facilities and equipment).

Third, the third sentence of the first paragraph of § B-1.3 “Affected Environment” shall be amended to read: “An airport environs study area must be large enough to include the area within the DNL 45 decibels (dB) contour and may be larger.” First bullet point after the fourth paragraph should read: “DNL contours

or noise grid points showing existing aircraft noise levels. Noise exposure contours must include DNL 45, 50, 55, 60-, 65-, 70-, and 75-dB levels (additional contours may be provided on a case-by-case basis).” The second bullet point on the same page and paragraph should read in its entirety: “The number of residences or people residing within each noise contour where aircraft noise exposure is at or above DNL 45 dB” (the remainder of the text in the current bullet point should be deleted).

Fourth, the second paragraph of § B-1.4 “Environmental Consequences.” shall be amended to read:

For proposed airport development and other actions in the immediate vicinity of an airport, the AEDT is used to provide noise exposure contours at the DNL 45, 50, 55, 60, 65, 70, and 75 dB levels (additional contours may be provided on a case-by-case basis). For all comparisons analyzed, the analysis will identify noise increases of DNL 1.5 dB or more over noise sensitive areas that are exposed to noise at or above the DNL 45 dB noise exposure level, or that would be exposed at or above the DNL 45 dB level due to a 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe.

The bullet points in the third paragraph of the same section shall amended to read:

- The number of residences or people residing within each noise contour where aircraft noise exposure is at or above DNL 45 dB and the net increase or decrease in the number of people or residences exposed to that level of noise;
- The location and number of noise sensitive uses in addition to residences (e.g., schools, hospitals, parks, recreation areas) exposed to DNL 45 dB or greater;
- The identification of noise sensitive areas within the DNL 40 dB contour that are exposed to aircraft noise at or above DNL 40 dB but below DNL 45 dB and are projected to experience a noise increase of DNL 3 dB or

- more, only when DNL 1.5 dB increases are documented within the DNL 45 dB contour;
- Discussion of the noise impact on noise sensitive areas within the DNL 45 dB contour; and
 - Maps and other means to depict land uses within the noise study area. The addition of flight tracks is helpful. Illustrations should be sufficiently large and clear to be readily understood.

The bullet points in the fifth paragraph of the same section on the same page should be amended to read:

- For DNL 45 dB and higher: +1.5 dB
- For DNL 40 dB to <45 dB: +3 dB
- For DNL <40 dB: +5 dB

The sixth paragraph of the same section should be amended to read:

The location and number of noise sensitive uses (e.g., schools, churches, hospitals, parks, recreation areas, etc.) exposed to DNL 45dB or greater must be disclosed for each modeling scenario that is analyzed.

Fifth, the first paragraph of § B-1.5, “Significance Determination” shall be amended to read:

Exhibit 4-1 of FAA Order 1050.1F provides the FAA’s significance threshold for noise: *The action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 45 dB noise exposure level, or that will be exposed at or above the DNL 45 dB level due to a 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe.* For example, an increase from DNL 45.5 dB to 47 dB is considered a significant impact, as is an increase from DNL 43.5 dB to 45 dB. The determination of significance must be obtained through the use of noise contours and/or grid point analysis along with local land use information and general guidance contained in Appendix A of 14 CFR part 150.

The last sentence of the second paragraph should be amended to read: “For example, the DNL 45 dB threshold may not adequately address the impacts of noise on visitors to areas within a publicly owned park or recreation area where other noise is very low and a quiet setting is a generally recognized purpose and attribute.”

Sixth, the third paragraph of § B-1.13. “Noise Mitigation,” shall be amended to read as follows:

When a noise analysis in the immediate vicinity of an airport identifies noise sensitive areas that would have an increase of DNL 3 dB or more from DNL 40 dB up to DNL 45 dB noise exposure, the potential for mitigating noise in those areas should be considered, including consideration of the same range of mitigation options available at DNL 45 dB and higher and eligibility for Federal funding. This is not to be interpreted as a commitment to fund or otherwise implement mitigation measures in any particular area.

FAA ORDER 1050.1F AMENDED TO REQUIRE THE USE OF ISO 1996-1:2016

Section 11.1.3, “FAA Aircraft Noise Screening Tools and Methodologies,” shall be amended to include a bullet requiring the use of ISO 1996-1:2016 in assessing noise impact on communities.

- ISO 1996-1:2016, *Acoustics — Description, measurement and assessment of environmental noise.*

Community response to noise can vary differently among sound sources that are observed to have the same acoustic levels. ISO 1996-1:2016 defines the basic quantities to be used for the description of noise in community environments and describes basic assessment procedures. It also specifies methods to assess environmental noise and gives guidance on predicting the potential annoyance response of a community to long-term exposure from various types of environmental noises. The sound sources can be separate or in various combinations. FAA will apply this method to predict annoyance response in communities affected by aircraft noise.

FAA ORDER 1050.1F AMENDED TO INCLUDE REQUIRING A HEALTH IMPACT ASSESSMENT

FAA Order 1050.1F shall be amended to include a section 18 requiring the development of a Health Impact Assessment during any environmental analysis of FAA projects that are not categorically excluded.

18. Health Impact Assessment Required.

18.1 Purposes.

The purposes of a Health Impact Assessment are—

- 18.1.1 to facilitate the involvement of tribal, State, and local public health officials in decisions affecting the airspace environment to identify any potential health concern or health benefit relating to an activity or proposed activity;
- 18.1.2 to provide for an investigation of any health-related issue of concern raised in a planning process, an environmental impact assessment process, or policy appraisal relating to a proposed activity;
- 18.1.3 to describe and compare alternatives (including no-action alternatives) to a proposed activity to provide clarification with respect to the potential health outcomes associated with the proposed activity and, where appropriate, to the related benefit-cost or cost-effectiveness of the proposed activity and alternatives;
- 18.1.4 to contribute, when applicable, to the findings of a planning process, policy appraisal, or an environmental impact statement with respect to the terms and conditions of implementing a proposed activity or related mitigation recommendations, as necessary;
- 18.1.5 to ensure that the disproportionate distribution of negative impacts among vulnerable populations is minimized as much as possible; and
- 18.1.6 to engage affected community members and ensure adequate opportunity for public comment on all stages of the Health Impact Assessment.

18.2 Activities

18.2.1 In General. FAA shall conduct an evaluation of any proposed activity to determine whether it will have a significant adverse or positive effect on the health of the affected population based on the criteria described in 18.2.2.

18.2.2 Criteria. The criteria described in this subparagraph include, as applicable to the proposed activity, the following:

18.2.2.1 Any substantial adverse effect or significant health benefit on health outcomes or factors known to influence health, including the following:

18.2.2.1.1 Physical activity.

18.2.2.1.2 Injury.

18.2.2.1.3 Mental health.

18.2.2.1.4 Accessibility to health-promoting goods and services.

18.2.2.1.5 Respiratory health.

18.2.2.1.6 Chronic disease.

18.2.2.1.7 Nutrition.

18.2.2.1.8 Land use changes that promote local, sustainable food sources.

18.2.2.1.9 Infectious disease.

18.2.2.1.10 Health disparities; and

18.2.2.1.11 Existing air quality, ground or surface water quality or quantity, or noise levels.

18.2.2.2 Other factors that may be considered, including—

18.2.2.2.1 the potential for a proposed activity to result in systems failure that leads to a public health emergency;

18.2.2.2.2 the probability that the proposed activity will result in a significant increase in tourism, economic development, or employment in the jurisdiction of the eligible entity;

18.2.2.2.3 any other significant potential hazard or enhancement to human health, as determined by the eligible entity; or

18.2.2.2.4 whether the evaluation of a proposed activity would duplicate another analysis or study being undertaken in conjunction with the proposed activity.

18.3 Factors for Consideration.

In evaluating a proposed activity under 18.2, FAA shall take into consideration any reasonable, direct, indirect, or cumulative effect that can be clearly related to potential health effects and that is related to the proposed activity, including the effect of any action that is—

18.3.1 included in the long-range plan relating to the proposed activity;

18.3.2 likely to be carried out in coordination with the proposed activity;

18.3.3 dependent on the occurrence of the proposed activity; or

18.3.4 likely to have a disproportionate impact on high-risk or vulnerable populations.

18.4 Requirements.

A Health Impact Assessment shall incorporate the following, after conducting the screening phase:

18.4.1 Scoping. Identifying which health effects to consider and the research methods to be utilized.

18.4.2 Assessing Risks and Benefits. Assessing the baseline health status and factors known to influence the health status in the affected community, which may include aggregating and synthesizing existing health assessment evidence and data from the community.

18.4.3 Developing Recommendations. Suggesting changes to the proposed activity to promote positive or mitigate adverse health effects.

18.4.4 Reporting. Synthesizing the assessment and recommendations and communicating the results to decisionmakers.

18.4.5 Monitoring and Evaluating. Tracking the decision and implementation effect on health determinants and health status.

18.5 Plan.

FAA shall develop and implement a plan for meaningful and inclusive stakeholder involvement in all phases of the Health Impact Assessment. Stakeholders may include community-based organizations, youth-serving organizations, planners, public health experts, State and local public health departments and officials, health care experts or officials, housing experts or officials, and transportation experts or officials.

18.6 Submission of Findings.

FAA shall submit the findings of any Health Impact Assessment activities to the Administrator prior to making any decision regarding the proposed activity and make these findings publicly available.

18.7 Assessment of Impacts.

FAA shall ensure the assessment of the distribution of health impacts (related to the proposed activity) across race, ethnicity, income, age, gender, disability status, and geography.

18.8 Conduct of Assessment.

To the greatest extent feasible, a Health Impact Assessment shall be conducted under this section in a manner that respects the needs and timing of the decision-making process it evaluates.

18.9 Methodology.

In preparing a Health Impact Assessment under this subsection, an eligible entity or partner shall follow the guidance developed and published by the United States Environmental Protection Agency.

**CHANGES TO USAGE OF AIRSPACE: CREATION OF SYSTEM OF AVIATION NOISE
MONITORS AND ENFORCEMENT OF NOISE STANDARDS.**

[93.XX1 Applicability

This subpart prescribes air traffic rules for aircraft conducting VFR operations below 10,000 feet AGL Special Flight Rules Area.

93.XX2 Description of area.

TBD.

93.XX3 Aircraft Operation

- (a) Each person piloting an aircraft within the [Airspace] shall remain on the route at the published altitude.
- (b) Pilots may deviate from the route and altitude requirements of paragraph (a) of this section only when necessary for safety, or weather conditions.
- (c) Each person piloting an aircraft within the [Airspace] shall comply with the rules established in 93.XX5.

93.XX4 – Noise Monitoring within the [Airspace].

93.XX4(a) Definitions.

- (i) *Commercial Air Carrier Aircraft*, for the purposes of this Division, shall mean those aircraft operated as a federally certificated air carrier.
- (ii) *dB*, A-weighted sound pressure level or A-level shall mean, for the purposes of this Division, the sound pressure level as measured using the slow dynamic characteristic for sound level meters specified in American National Standard Specification for Sound Level Meters, (ANSI S 1.4-1983, Type 1 for Aircraft Noise Measurement), which is hereby incorporated by reference. The A-weighting

characteristic modifies the frequency response of the measuring instrument to account approximately for the frequency characteristics of the human ear. The reference pressure is 20 micronewtons/square meter (2×10^{-4} micro- bar).

(iii) *General Aviation Aircraft*, for the purposes of this article, shall mean all other aircraft operated within the [Airspace], except those exempted under Section 93-XX4(d).

(iv) *Single Event Noise Exposure Level ("SENEL")*: The single event noise exposure level, in decibels, for the purposes of this Division, shall mean the noise exposure level of a single event, such as an aircraft flyby, measured over the time interval between the initial and final times for which the noise level of a single event exceeds a predetermined threshold noise level. Specific SENEL limitations, for purposes of this article, shall be determined at each noise monitoring station without "trade-offs" between noise monitoring stations.

93.XX4(b) Commercial airline operations.

(i) No person may engage in commercial airline operations within the [Airspace] if such aircraft generate a SENEL level at or above 86.6 dB at any of the noise monitoring stations ("NMS").

(ii) The location of the NMS shall be located at terrestrial coordinates for each waypoint located within the [Airspace]. If a waypoint is located within the [Airspace] but over water or otherwise inaccessible, then the noise monitoring station will be located at the nearest suitable point on land due north of the waypoint.

93.XX4(c) General aviation operations

(i) No person shall operate any general aviation aircraft within the [Airspace] if it generates a SENEL level at or above 86.6 dB, at any of the NMS.

(ii) The location of the noise monitoring stations shall be located at terrestrial coordinates for each waypoint located within the [Airspace]. If a waypoint is located within the [Airspace] but over water, then the noise monitoring station will be located at the nearest suitable point on land due north of the waypoint.

93.XX4(d) Exemption.

The following categories of aircraft shall be exempt from the provisions of Sections 93.XX5(b) and 93.XX5(c):

(i) Aircraft operated by the United States of America or by a state or territory of the United States;

(ii) Law enforcement, emergency, fire or rescue aircraft operated by any county or city of any state or territory;

(iii) Aircraft used for emergency purposes during an emergency which has been officially proclaimed by competent authority pursuant to the laws of the United States, said State, or the County;

(iv) Civil Air Patrol aircraft when engaged in actual search and rescue missions;

(v) Emergency aircraft flights for medical purposes by persons who provide emergency medical care, provided written information concerning dire emergency is submitted to the FAA Administrator for all emergency aircraft flights within

seventy-two (72) hours prior to or subsequent to the departure or arrival of the aircraft.

93.XX4(e) Enforcement officials.

The FAA Administrator, and such other FAA employees as are designated by the FAA Administrator and who are acting under the direction and control of the FAA Administrator are authorized to enforce the provisions of this Division.

93.XX4(f) Enforcement procedures.

Violation of Section 93.XX5(b) or 93.XX5(c) of this Division shall be a violation of the Federal Aviation Regulations and enforcement of these regulations shall follow the procedures set forth in 14 C.F.R. Part 13, Investigative and Enforcement Procedures, including the allowance for a civil penalty pursuant to 49 U.S.C. § 46301 for violations of these regulations.