1 Purpose.

a. This advisory circular (AC) provides guidance on conducting an Airport Noise and Land Use Compatibility Planning Study in accordance with the Title 14 Code of Federal Regulations (CFR) Part 150 regulations. Commonly referred to as a Part 150 study, these studies consist of a combined Noise Exposure Map (NEM) and Noise Compatibility Program (NCP) with noise mitigation and abatement measures.

b. Part 150 is the primary means for the FAA to provide Airport Improvement Program (AIP) grants for noise abatement or mitigation measures outside of a specific development project, and to assess the effectiveness of an airport sponsor’s proposed noise abatement measures. Participation in the Part 150 process is voluntary for airport sponsors. However, once an airport chooses to participate, it must comply with the applicable statutory, regulatory, and Airport Improvement Program (AIP) grant assurances. The benefits to this participation are a structured and effective process to evaluate noise impacts and mitigation measures, and the potential for AIP funding. Airport sponsors determine whether to conduct a Part 150 study to evaluate noise abatement and land use compatibility issues surrounding their airports, or to achieve these ends outside of the Part 150 process.

c. FAA approval of Part 150 measures in an NCP does not constitute final approval to implement or provide federal funding for those measures. For instance, sponsors must have a favorable Safety Risk Management (SRM) finding before operational noise abatement flight tracks are implemented. Similarly, AIP eligibility for sound insulation funding is not determined until interior acoustical testing is completed for a structure within an impacted land use. An airport sponsor may also have to fulfill other statutory or regulatory requirements, such as National Environmental Policy Act requirements, before implementation.
Application.

a. This AC is intended for anyone responsible for preparing, updating, and reviewing Part 150 studies, and implementing approved NCP measures. This includes airport sponsors, consultants, local and state land use planners, FAA personnel, government officials, aircraft operators at the airport including airline and cargo operators, and members of the public that may participate in the Part 150 process.

b. This AC does not modify or supersede the Part 150 regulations. It implements those regulations by explaining the requirements and by providing guidance on how to conduct the tasks and prepare the materials required by Part 150.

c. The Federal Aviation Administration recommends the guidance in this publication for the Noise Control and Compatibility Planning Program. This AC does not constitute a regulation and is not legally binding in its own right. It will not be relied upon as a separate basis by the FAA for affirmative enforcement action or other administrative penalty. Conformity with this AC is voluntary, and nonconformity will not affect rights and obligations under existing statutes and regulations, except for the projects described in bullets below:

- The standards contained in this AC are specifications the FAA considers essential for evaluation of noise impacts and mitigation measures on and around airports.
- Use of these standards and guidelines is mandatory for projects funded under Federal grant assistance programs, including the AIP. See Grant Assurance #34.
- This AC is mandatory, as required by regulation, for projects funded by the Passenger Facility Charge (PFC) program. See PFC Assurance #9.

d. Referring to or using this AC does not establish eligibility or justification for AIP funding or PFC. For information on AIP or PFC eligibility and justification, refer to FAA Order 5100.38, Airport Improvement Program Handbook, and FAA Order 5500.1, Passenger Facility Charge Handbook.

Cancellation.

This AC replaces AC 150/5020-1, Noise Control and Compatibility Planning for Airports, dated August 5, 1983.

Principal Changes.

This AC:

a. Updates AC 150/5020-1, Noise Control and Compatibility Planning for Airports.

b. Includes updated information on preparing NEMs and NCPs since the previous version of this AC
Distribution.
This AC is available on the FAA Office of Airports website.

Feedback on this AC.
If you have suggestions for improving this AC, please use the Advisory Circular Feedback form at the end of the document.

Robert Craven
Director, Office of Airport Planning and Programming
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CHAPTER 1. GENERAL INFORMATION

1.1 Background.

1.1.1 The aviation industry has made major strides in lessening the environmental effects of aviation. For example, air travel has grown from 200 million to over 815 million annual passengers since 1975. However, the total area of land use that is not compatible with exposure to aircraft noise has declined more than 90 percent.1 A large part of the improvement resulted from the phase-out of noisier aircraft models (Stage 1 and 2 aircraft) through the 1990s and 2000s.

1.1.2 Despite this progress, aircraft noise remains one of the issues that most concerns airports and communities,2 and can affect efforts to increase airport capacity. Reaction to noise levels are expressed in terms of levels of annoyance. Part 150 processes offer a means to undertake noise abatement planning and implementation while considering the needs of the local communities. To be effective, the Part 150 study process should include these elements:

- An approach producing realistic and practical solutions, considering both aviation and community interests.
- FAA technical guidance and support from the Office of Airports (ARP) and Air Traffic Organization (ATO) personnel.
- Federal guidelines on land use standards showing uses that are normally compatible with various noise levels.
- Consultation and interaction with the airport sponsor, airport users, airport neighbors, local land use control jurisdictions, and the FAA. This consultation process is designed to openly communicate the program’s abilities and limitations. It seeks from all these parties an understanding of the program and the support essential for its implementation over the long term.
- Recognition of factors beyond an airport sponsor’s control, who may not have the authority to control local land uses. Some of these factors will strongly influence local land use decisions and the feasibility of measures that can be included in the program. Cooperation with the local land use authority is key to carrying out many Part 150 Study measures.

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1 Aviation Environmental and Energy Policy Statement, July 2012, available at: https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/apl/FAA_EE_Policy_Statement.pdf. The FAA uses the Average Day-Night Sound Level (DNL) 65 decibels (dB) and above in defining land use compatibility. DNL is a 24-hour, time-weighted, energy average noise level based on A-weighted dBs. A-weighted decibels, abbreviated dBA, dBA, or dB(a), express the relative loudness of sounds in air as perceived by the human ear.

Community and airport sponsor decisions that are chosen from a fully informed range of options, which consider their costs and benefits.

A viable framework for conducting efficient and constructive land use compatibility programs.

No two airport situations are alike. The airport sponsor’s Part 150 Study will likely require a unique combination of noise abatement and mitigation measures to achieve an acceptable solution for communities, and to accommodate changes in aviation demand. At any given airport, a full range of possible measures, described in the Aviation Safety and Noise Abatement Act (ASNA) and Part 150, should be explored within the public participation process. The best combination of measures should be selected for detailed evaluation and carefully weighed before settling upon a final plan. The objective of this process is to reduce or prevent noncompatible land uses in the most efficient way. This objective is then balanced against the possible non-aviation (land use) solutions. Airports often seek a balance between realistic environmental goals and costs to the aviation system. Numerous options can address noise concerns, but restrictions on airport access should be proposed only as a last resort.³

The Aviation Safety and Noise Abatement Act of 1979.⁴ Recognizing national aviation noise issues, Congress enacted ASNA, which mandated the FAA to establish a single system of measuring noise⁵ in consultation with the Environmental Protection Agency. This system must have a highly reliable relationship between projected noise exposure and surveyed reactions of individuals to noise. It also must be applied uniformly in measuring noise at airports and the surrounding area. ASNA also established procedures for developing NEMs and NCPs, and authorized the FAA to provide grants to eligible airport sponsors to fund noise compatibility planning. In response to this mandate, the FAA adopted the day-night average sound level (DNL) noise metric in the early 1980s. DNL was reaffirmed in the 1990s as the system that meets this Congressional mandate.

Title 14 CFR Part 150, Airport Noise Compatibility Planning.

The FAA implements the ASNA requirements via Title 14 Part 150. The FAA enacted Part 150 as an interim regulation in 1981 and a final regulation in 1985. The FAA has amended the regulation four times, starting in 1988, to accommodate these changes:

- Including free-standing heliports.
- Making ARP’s Regional Airports Divisions the contacts for submitting Part 150 maps and programs.
- Addressing ANSA recodification.

⁳ See Title 14 CFR Part 161
⁴ ASNA, recodified at 49 United States Code (U.S.C.) Section 47501 et seq.
⁵ See 49 U.S.C. Section 47502
1.1.5.2 The scope and purpose of Part 150 comprises these considerations:

- Incorporating changes to ASNA, including ASNA’s public hearing requirement, noise exposure forecast map timeframes, map scale, and methods for addressing significant increases or decreases in noise exposure over sensitive land uses.

1.2 Related Materials.

This AC should be used with current versions of the documents listed throughout this AC. These include FAA Regulations, Orders, ACs, Policy Statements, Program Guidance Letters, and Reports summarized in the following paragraphs.

1.2.1 FAA Regulations.

Two FAA regulations are relevant to Part 150 studies:

1.2.1.1 Title 14 CFR Part 150.

Prescribes the procedures, standards, and methodology governing the development, submission, and review of NEMs and airport NCPs. It includes the FAA’s process for evaluating and approving or disapproving those programs.
1.2.1.2 Title 14 CFR Part 161, Notice and Approval of Airport Noise and Access Restrictions.
Establishes a process for notice, analysis, and review of mandatory airport noise and access restrictions on the operations of Stage 2 and Stage 3 aircraft and FAA approval of restrictions impacting Stage 3 aircraft. This regulation is in response to provisions in the 1990 Airport Noise and Capacity Act and is a major element of the national aviation noise policy required by that statute.

1.2.2 FAA Orders.
Several FAA Orders are relevant to Part 150 studies:

1.2.2.1 Order 1050.1, Environmental Impacts: Policies and Procedures.
This Order outlines FAA’s policies and procedures for compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) regulations.6

1.2.2.2 Order 5050.4, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.
This Order outlines FAA’s policies and procedures for NEPA compliance for airport actions, including certain actions that may result from an NCP. These include airport layout plan (ALP) changes and sound insulation affecting historic structures.

1.2.2.3 Order 5100.37, Land Acquisition and Relocation Assistance for Airport Projects.
This Order outlines the procedures FAA personnel and airport sponsors must follow for NCP measures that involve the acquisition of land or the displacement of persons, farm operations, or businesses. The Order describes how to address applicable procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act) under FAA and Department of Transportation regulations for airport projects receiving federal financial assistance.

1.2.2.4 Order 5100.38, Airport Improvement Program Handbook.
This Order outlines policy and procedures to be used when administering the AIP. FAA personnel, airport sponsors, and their consultants should refer to Order 5100.38 when determining whether recommended NCP measures comply with the requirements for AIP funding.

6 A final rule was issued in July of 2020 by CEQ amending various portions of the NEPA regulations, so to the extent any provisions in FAA’s orders are inconsistent with the new rule, the rule controls.
1.2.2.5 **Order 5500.1, Passenger Facility Charge.**
This Order provides guidance and procedures for ARP personnel administering the PFC program. It includes guidance on the application of PFCs to noise compatibility planning.

1.2.2.6 **Order 8400.9, National Safety and Operational Criteria for Runway Use Programs.**
This Order provides safety and operational criteria for runway use programs and parameters that must be used in the evaluation and approval of informal and formal runway use programs.

1.2.2.7 **Order 1050.11, Noise Control Planning.**
This order contains FAA policies and procedures and assigns internal FAA responsibilities for the review of airport noise control plans and programs, including noise abatement procedures and compatible land use controls around airports in accordance with 14 CFR Part 150, Airport Noise Compatibility Planning. It provides direction to FAA personnel in their responsibilities to review and, where appropriate, assist in the development of local aviation noise abatement procedures.

1.2.2.8 **Order 8000.369, Safety Management System.**
This order establishes the SMS policy and requirements for FAA organizations and the basic management principles to guide the FAA in safety management and safety oversight activities.

1.2.2.9 **Order 5200.11, FAA Office of Airports Safety Management System.**
This order defines ARP’s SMS requirements. Safety Risk Management (SRM) requirements apply to a number of FAA actions, including FAA approval of Part 150 noise compatibility programs and program changes that may affect aviation safety.

1.2.2.10 **Order 8260.43, Flight Procedures Management Program.**
This order defines the process for publishing new instrument and visual charted procedures in the Terminal Procedures Publication (TPP).

1.2.2.11 **Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS).**
This order defines the criteria used to develop safe and flyable charted procedures.

1.2.2.12 **Order 8260.61, Charted Visual Flight Procedures.**
This order defines the criteria and guidance for developing charted visual flight procedures (CVFPs). CVFPs are used by aircraft on IFR clearances and may be developed where PBN instrument procedures do not accommodate operational needs.
1.2.2.13 **Order 7100.41, PBN Implementation Process.**
This order defines the process for developing SIDs, STARs, or RNP (AR) procedures.

1.2.3 **FAA Advisory Circulars.**
Several ACs may be useful for Part 150 studies. Some deal with land use planning and others with operational matters. For example, those listed below relate to noise abatement and mitigation, which are useful in the development and implementation of NCPs. Periodic searches of the FAA’s website are recommended to determine the latest FAA guidance from new ACs that may have been issued.

1.2.3.1 **AC 91-36, Visual Flight Rules (VFR) Flight Near Noise Sensitive Areas.**
This AC addresses VFR flight altitudes and routes near noise-sensitive areas. It encourages pilots making VFR flights near noise-sensitive areas to fly at altitudes higher than the minimum permitted by regulation and on flight paths that will reduce aircraft noise in such areas.

1.2.3.2 **AC 91-53, Noise Abatement Departure Profiles.**
This AC describes noise abatement departure profiles for turbo-jet aircraft weighing more than 75,000 pounds.

1.2.3.3 **AC 91-66, Noise Abatement for Helicopters.**
This AC presents guidelines for effective noise reduction when operating helicopters.

1.2.3.4 **AC 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects.**
This AC provides guidance to meet the requirements of the Uniform Relocation Assistance and Real Property Acquisition Act of 1970.

1.2.3.5 **AC 150/5050, Community Involvement in Airport Planning.**
This AC provides guidance on the appropriate level of public participation in a planning study, along with successful community involvement tools and techniques.

1.2.3.6 **AC 150/5000-9, Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations.**
This AC provides the guidance for conducting sound insulation programs that are either mitigation commitments as a result of NEPA studies or are sound insulation programs associated with a Part 150 program.

1.2.3.7 **AC 150/5190-4, Airport Land Use Compatibility Planning.**
This AC provides guidance to help a broad understand the effects of incompatible land use on the safety and utility of airport operations, and
identify compatible land use development tools, resources and techniques to protect surrounding communities from adverse effects associated with airport operations.

1.2.4 FAA Policy Statements.

The following FAA policy statements relate to Part 150 and compatible land use.

Periodically search the FAA website to see if new relevant policy statements have been issued on the subject.

Policy on Funding of Combined Part 150 and Part 161 Studies and Analyses (September 6, 1996).

This policy addresses funding eligibility for conducting a Part 161 analysis when combined with a Part 150 Study. Part 161 addresses the need for and requirements of implementing airport noise and access restrictions.


This policy establishes guidance for FAA personnel who are responsible for making funding decisions related to implementation of the Part 150 program. The policy emphasizes the distinction between remedial and preventive noise mitigation measures and states FAA policy on approval of actions with respect to “new” versus “existing” noncompatible development as of October 1, 1998. The policy also defines the conditions under which minor development on vacant or bypassed lots could be considered for noise mitigation.

Community Involvement Policy Statement (April 17, 1995).

The FAA Community Involvement Policy Statement emphasizes the importance of providing the public with the appropriate opportunities to participate in the FAA decision-making process. It communicates the FAA’s commitment to public participation in agency decisions that impact the community with an emphasis on early, effective communications.


This policy has been a foundational document for the present day 14 CFR Part 150 program. Since its issuance, the FAA published a draft revised policy in 2000 (65 Federal Register 43802-43824). Although it was never

7 Federal Register, Volume 63, No. 4, Friday April 3, 1998, Rules and Regulations. As of October 1, 1998, the FAA will approve under 14 CFR Part 150 only remedial noncompatible development and only preventive noise mitigation measures in areas of potential new noncompatible development. The FAA will not approve remedial noise mitigation measures for new noncompatible development that occurs in the vicinity of airports after the effective date of this final policy.

8 This policy statement is currently published as appendix 10 of Order 7100.2K, and can be accessed at: http://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.current/documentnumber/7400.2
formally adopted, these draft land use compatibility concepts are being
carried out informally in an effort to continue to improve the nation’s civil
aviation noise environment.

1.2.5 FAA Program Guidance Letters (PGLs).

The FAA publishes PGLs that provide instructions about how the FAA intends to apply
or interpret provisions authorizing legislation. The subjects may include changes to
existing policy and program guidance according to the provisions of new legislation.
The FAA has issued several program guidance letters about noise compatibility
planning, the latest version is accessible on the FAA website.

1.2.6 Other Guidance Material—Reports.

Several other reports provide guidance about the Part 150 Process and, unless another
website is indicated, are on the FAA website.

1.2.6.1 Community Involvement Manual, February 2016.

This manual provides advice on how to plan and carry out an effective
community involvement program. It recognizes community involvement
as an essential part of FAA programs and decisions. Available at:
https://www.faa.gov/about/plansreports/community-involvement-manual

1.2.6.2 Land Use Compatibility and Airports: A Guide for Effective Land
Use Planning, September 1999.

The report is published by the FAA Airports Division Southern Region
and provides guidance for effective land use planning. Available at:

1.2.6.3 FAA Airport Noise Compatibility Planning Toolkit.

This toolkit provides airport sponsors, land use jurisdictional agencies, and
FAA staff with guidance on improving airport land use compatibility and
planning. Available at:
https://www.faa.gov/about/office_org/headquarters_offices/apl/noise_emissions/planning_toolkit/

1.2.6.4 NoiseQuest.

This website summarizes the effects of aviation noise in many areas such
as annoyance, speech interference, sleep interference, real estate values,
and hearing loss. It also contains findings of literature on several related
topics. This website was developed to provide educational information on
aviation noise. The initial site development was supported by the FAA
through the PARTNER Center of Excellence under grants to researchers at
Pennsylvania State University and Purdue University. The ongoing
development and enhancement of NoiseQuest is supported by the FAA

9 See Noisequest site at: http://www.noisequest.psu.edu/noiseeffects-structures.html
through the ASCENT Center of Excellence under grants to researchers at Pennsylvania State University. Opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the FAA or NASA.

Airport Cooperative Research Program (ACRP) Synthesis 9: Effects of Aircraft Noise: Research Update on Select Topics.
This document updates airport sponsors, stakeholders, and policy makers on information about aviation noise effects. Since FAA Report No. FAA-EE-85-2, Aviation Noise Effects, was first published in 1985, much has changed in the understanding of the effects of aviation noise on local communities. Research continues in the areas of health effects, annoyance, sleep disturbance, and potential effects on children’s learning abilities in schools. This document, available along with other noise-related research on the Transportation Research Board’s (TRB) website,\(^\text{10}\) synthesizes research since 1985 to update and complement the original FAA report.

This report explores ways to improve communications with the public about issues related to aircraft noise exposure. The report examines practices that characterize an effective communications program and provides basic information about noise and its abatement to assist in responding to public inquiries. Available at: [http://www.trb.org/Publications/Blurbs/162800.aspx](http://www.trb.org/Publications/Blurbs/162800.aspx)

State Guidance.
Many state Departments of Transportation (DOT) provide guidance material, especially in the area of compatible land use planning around airports. Sponsors should consult their local DOT website to determine if their state provides such guidance. Another source to consider is the National Association of State Aviation Officials (NASAO) at: [http://www.nasao.org](http://www.nasao.org).

\(^{10}\) See TRB site at: [https://www.trb.org/ACRP/Blurbs/160286.aspx](https://www.trb.org/ACRP/Blurbs/160286.aspx).

Note: ACRP publications are not FAA guidance and they cannot establish FAA policy. They can be used as a reference.
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CHAPTER 2. OVERVIEW OF THE PART 150 PROCESS

2.1 Process Flow.

2.1.1 Title 14 CFR Part 150 has a specific process for defining and addressing aircraft noise, and land use compatibility at airports. Figure 2-1 shows the most basic elements of the voluntary Part 150 process, beginning with an airport’s decision to initiate or update a Part 150 study, which includes defining the study area and determining the funding opportunities. This step is followed by preparation of the two primary elements of the Part 150 study: the NEMs and NCP. Once prepared, the sponsor and FAA analyze the NEMs to identify noncompatible land uses and noise impacts, and prepare the NCP that proposes solutions to mitigate those uses and impacts.

2.1.2 The Part 150 Process concludes with an FAA Record of Approval (ROA) and airport sponsor implementation of FAA-approved NCP measures. Section 150.23(e)(9) of Part 150 requires sponsors to evaluate whether to revise the NCP if NEMs change as part of NCP implementation.

2.1.3 Public participation is included through the process. Soliciting public input is an important and required aspect of a successful Part 150 study.

2.2 Study Definition, Funding, and Initiation.

2.2.1 Study Definition.

When an airport sponsor determines that a Part 150 Study would provide noise abatement or land use compatibility benefits, the next step should be coordinated with the FAA at the Airports District Office (ADO) level. This coordination should entail the status of any previous Part 150 studies conducted at the airport, the reasoning for deciding to conduct a Part 150 Study, and the expected benefits. The ADO makes the justification determination based on this information. The airport sponsor should then prepare a detailed scope of work and cost estimate for the study. The scope of work must be based on the Part 150 guidance provided and referenced in this AC. The FAA must approve the scope of work and provide a reasonableness determination on the cost estimate before work on the study begins.

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11 Funding eligibility decisions are not part of the Part 150 development process.
2.2.2  **Funding.**

Funding for Part 150 Studies is usually derived from one of two sources: the Airport Improvement Program (AIP) or Passenger Facility Charges (PFCs). Airport sponsors
can also fund studies through other sources, including airport or local government revenues.

2.2.2.1 **AIP Funding.**

AIP funding is authorized by Title 49 U.S.C. Chapter 471. The AIP provides funding for airport planning and development projects at airports included in the National Plan of Integrated Airport Systems (NPIAS). It can also fund noise compatibility planning and carrying out NCPs (Title 49 U.S.C. Sections 47501-47507).12

Title 49 U.S.C. Section 47103 requires the Secretary of Transportation to publish a national plan for the development of public-use airports in the U.S. The NPIAS identifies those airports that are considered important to the National Airspace System and outlines development during the planning period that is necessary to maintain a safe, secure, efficient, and integrated airport system that meets the needs of civil aviation, national defense, and the U.S. Postal Service. An airport must be included in this plan to be eligible to receive a grant under the AIP. The most current version of FAA Order 5100.38 contains a complete discussion of eligibility requirements. It is on the FAA website at: [http://www.faa.gov/airports/aip/](http://www.faa.gov/airports/aip/).

2.2.2.2 **Passenger Facility Charge Funding.**

The PFC program is authorized by 49 U.S.C. Section 40117. The PFC program provides a local source of funds to airport sponsors by authorizing airlines to impose a charge on each enplaned passenger. The airlines then provide those collections to the airport sponsor. The PFC program is implemented by 14 CFR Part 158, which was adopted on May 22, 1991 and amended on May 30, 2000. Part 150 studies are eligible for PFC funding. PFC funds can also be used instead of or along with AIP to fund the airport sponsor’s share of a Part 150 study that is primarily funded by the AIP. PFCs are considered local funds, not federal revenues. For specific guidance and procedures, airport sponsors interested in funding noise compatibility planning through PFCs should refer to FAA Order 5500.1, *Passenger Facility Charges*, on the FAA website at: [http://www.faa.gov/airports/pfc/](http://www.faa.gov/airports/pfc/).

2.2.3 **Initiation.**

The airport sponsor usually prepares a scope of services and establishes a schedule to conduct the Part 150 Study. Though the FAA does not require a consultant to conduct the study, airport sponsors often seek these technical and staff resources. Consultants should be selected in accordance with the guidance provided in AC 150/5100-14,

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12 This was initially set forth in ASNA, Public Law 96-143. Public Law 103-272 (July 5, 1994), Codification of Certain U.S. Transportation Laws at Title 49 U.S.C., repealed ASNA, as amended, and recodified it without substantive change at Title 49 U.S.C. Sections 47501-47507.
Architectural, Engineering, and Planning Consultant Services for Airport Grant Projects.

2.3 Preparing Noise Exposure Maps.

The Part 150 process requires airport sponsors to prepare two NEMs. The first NEM shows existing noise exposure. The second NEM is the estimated noise exposure at least 5 years in the future. As shown in the NEM process flow chart (Figure 2-2), NEM preparation begins with three major tasks that are usually undertaken at the same time: collecting and analyzing aircraft and airport operational data, collecting and mapping land use data, and establishing a public participation program. These three tasks, briefly summarized here, set the stage for preparing the NEMs and completing the required consultations. Later chapters of this AC explains these activities in detail.

2.3.1 Collecting Aircraft and Airport Operational Data.

This task focuses on data needed to determine existing noise. It includes items such as the number and type of aircraft operations for the preceding 12-month period or preceding full calendar year, the percentage of daytime versus nighttime operations, runway use percentages, flight track configurations, and flight track use. Section 5.5 describes the activity to consider, data needed, and data sources.

2.3.2 Collecting and Mapping Land Use Data.

This task typically consists of identifying land by parcel and use and then confirming the information through windshield surveys (direct observations made from driving by the sites) or review of aerial photography. If high quality Geographic Information System (GIS) data are available, windshield surveys may not be needed. Other land use planning data such as identifying noise sensitive sites, zoning, and demographics (census data) are also typically collected. Land use data and the location of noise sensitive sites within a defined study area are then placed on base maps for plotting noise contours. Projected land use data are also collected for the Future Condition NEM. Section 5.2 provides more detail about collecting and mapping land use data.

2.3.3 Developing the Consultation and Public Participation Program.

2.3.3.1 Establishing a consultation and public participation program begins by identifying the participants in the planning phase and the desired methods of involving them in the study. A combination of committee meetings and public meetings usually accomplishes this task. The public participation program is usually launched with an initial round of consultation to introduce the various parties to the Part 150 process. Chapter 4 provides detailed guidance on public participation and consultation.
Figure 2-2. Noise Exposure Maps Process Flow Chart

COLLECT & ANALYZE AIRPORT & AIRCRAFT OPERATIONAL DATA

COLLECT & MAP LAND USE DATA

DEVELOP PUBLIC PARTICIPATION PROGRAM

PREPARE EXISTING CONDITION NOISE EXPOSURE MAP

PUBLIC PARTICIPATION

PREPARE FUTURE CONDITION NOISE EXPOSURE MAP

PUBLIC PARTICIPATION

FAA REVIEW OF NOISE EXPOSURE MAPS

FAA DETERMINES NOISE EXPOSURE MAPS ACCEPTABLE

PUBLISH PUBLIC NOTICE OF NOISE EXPOSURE MAPS

PERIODICALLY REVIEW TO SEE IF 1.5 DNL CHANGES OCCUR IN NON-COMPATIBLE LAND USE AREAS

*The airport sponsor may elect to submit the NEMs at the same time as the NCP documentation
2.3.3.2 The public’s participation is an important and required aspect of any Part 150 study, so devoting sufficient time and effort is needed to define the public consultation requirements of the Part 150. Chapter 5 of this AC discussed the specific elements of a public participation program.

2.3.4 Preparing Existing and Future Condition NEMs.

2.3.4.1 As shown in the NEM process flow chart (Figure 2-2), the preparation of the Existing Condition and Future Condition NEMs follows the three steps described in the previous paragraphs. These tasks consist of defining the existing and future noise contours on existing and future land use base maps and identifying jurisdictions and planning agencies within the DNL 65 dB contour that must be consulted. The 65 DNL dB contour is the threshold above which the FAA considers aircraft noise to be incompatible with residential areas. With the contours established, then the impacts to residences, people, and other noise sensitive sites can be calculated and the documentation of the impacts reviewed by study participants. Another round of public outreach provides the parties with the opportunity to review and comment on the NEMs.

2.3.4.2 Once airport sponsors receive the input from the study participants and the general public, they have two options: prepare the NEM documentation and submit it to the FAA for review or wait to submit the NEM documentation until the NCP is prepared. (Chapter 6 discusses the advantages and disadvantages of each approach.)

2.3.4.3 After reviewing the NEMs, the FAA issues a determination indicating whether the NEMs comply with Part 150 requirements. If they do, the FAA publishes its acceptance as a Federal Register Notice. Airport sponsors can then advertise that the maps are available to the public. More information on the procedure for public notice of the NEMs and the benefits of map publication is in Part 150 Section 150.21(f) and Section 4.2 of this AC.

2.3.4.4 If during the forecast period of the NEMs or during implementation of the NCP operation of the airport results in a substantial new noncompatible land use or significant reduction of noise over existing noncompatible uses, sponsors must prepare and submit a revised NEM, per Part 150 Sections 150.21(d)(1) and (2). See Section 7.25 of this AC for further discussion on periodically reviewing the effectiveness of the NCP given changes in the NEM.

2.4 Preparing the Noise Compatibility Program.

2.4.1 The flow chart in Figure 2-3 shows the NCP process. Preparing the NCP typically begins by identifying and evaluating operational, land use, and program management
measures that might most effectively reduce impacts within the 65 DNL and the noncompatible land uses identified by the NEMs. Study of both operational and land use measures can start simultaneously, although it is sometimes necessary to evaluate land use after the operational measures. Operational measures, such as changes in flight tracks and arrival and departure tracks, have the potential to change the area impacted by noise and so the appropriateness of a related land use measure. Identification of program management measures, typically follows operational and land use measures. Part 150 Section B150.7 describes the types of operational and land use measures that sponsors must consider. Chapter 7, of this AC explains these further.

Figure 2-3. Noise Compatibility Program Process Flow Chart
2.4.2 Public participation is again required at this point in the process to receive input on the measures being considered and to identify any other appropriate ones. From the list of recommended measures, the sponsor can begin to prepare a draft NCP implementation plan, which will also need to describe anticipated cost, funding source, and schedule, and identify the entities responsible for implementing each recommended measure.

2.4.3 The draft NCP is then made available for review and comment by all interested parties and sponsors must provide an opportunity for a public hearing even if one is not requested. The final NCP takes into account relevant input received during the consultation, public review of the draft NCP, and public hearings. It must include a summary of comments received at the hearing as well as a copy of all written material received during the preparation of the NCP. Written materials can include public comments, study committee meeting summaries, and notes of consultation meetings. The final NCP must include the sponsor’s responses to, and disposition of, public comments received during the Part 150 process on the formulation and adequacy of the NCP. Chapter 5 of this AC discusses public involvement in more detail.

2.4.4 Sponsors send the final NCP to the FAA for its preliminary review to determine its conformance to Part 150 requirements. If the NCP conforms, the FAA begins a final review that is limited to 180 days. Review of changes to flight procedures (i.e., IFPs and CVFPs charted in the FAA’s Terminal Procedures Publication, or included in the ATCT Standard Operating Procedures (SOP)) are exempt from the 180-day period and so may be longer than 180 days. The review evaluates the NCP measures against Part 150 approval criteria, and the FAA issues a determination in the form of a ROA, that either approves or disapproves the individual recommended elements of the NCP.

2.5 NEM or NCP Submittals.

Airport sponsors should submit NEMs and NCPs to the FAA with a cover letter that indicates whether the NEM or NCP is being submitted for a formal FAA determination or for informal review and advice. The submittals should also clearly indicate whether it is an NEM, NCP, combined NEM and NCP, or an update and that it is the airport sponsor’s proposed program, not its consultant or other entity’s.

2.6 NEM or NCP Withdrawal or Revision.

An airport sponsor that wishes to withdraw or revise the NEMs or NCP after submitting it to the FAA for final review but before the FAA has issued a Federal Register Notice must provide written notification to the FAA. Consultants or third parties cannot provide this notice. Withdrawal of the NEMs will halt FAA review. For sponsors that withdraw or revise the NCP, the FAA will stop its 180-day review. A new 180-day period normally will begin with the submittal of the revised NCP.
2.7 FAA Review and Determinations.

2.7.1 The airport sponsor submits NEMs, an NCP, or both to the delegated ARP point of contact (POC) at the Regional Airports Division or the local ADO.

2.7.2 For NEM submittals, the FAA sends a letter acknowledging the receipt of the NEMs. The letter will also indicate whether the maps comply with Part 150 and if not, will identify the NEM deficiencies and required changes for resubmittal. For submittals that meet Part 150 requirements, the Regional Airports Division or ADO Manager will publish a notice of acceptance in the Federal Register along with information on where the public may review the maps and their associated documentation. These locations usually include the FAA Regional or ADO and the airport sponsor’s offices.

2.7.3 For NCP submittals, the FAA’s letter acknowledging receipt of the documentation and the start of its preliminary review to determine whether the NCP complies with Part 150 requirements. For NCPs that do not meet the requirements, sponsors are notified of the deficiencies and the revisions required. For the NCPs that meet the requirements, the FAA publishes a notice acknowledging this in the Federal Register and the start of the FAA’s 180-day NCP review period. The notice announces the NCP’s availability and invites the public to review and comment directly to the FAA at the beginning of the FAA’s review period. This public review period lasts for 60 days. The FAA considers all comments from the Federal Register before issuing a final decision on the NCP.

2.7.4 The 180-day review evaluates whether the NCP meets the regulatory goal of reducing existing noncompatible land uses or preventing future land use noncompatibility. The Part 150 regulations require each recommended program measure to meet specific approval criteria (explained in Chapter 7 of this AC). Approved NCP items meet these goals and other Part 150 requirements. Sometimes, the approval is for parts, rather than the entire NCP measure.

2.7.5 The FAA issues its determination approving or disapproving each element of the NCP. If the FAA does not take action on the NCP within 180 days, it is automatically approved by law. The one exception is for decisions related to the use of flight procedures (i.e., IFPs and CVFPs charted in the FAA’s TPP, or included in the ATCT SOP) for noise-control purposes, which may exceed the 180-day review. Part 150 Section 150.35 describes the FAA approval process. Chapter 8 of this AC explains in detail all of these activities in the review process.

2.8 Implementation.

2.8.1 Implementation should proceed in accordance with the schedule specified in the NCP implementation plan. For NCP items that anticipate AIP funding, sponsors should incorporate them into the airport’s capital improvement program (CIP) and then submit
2.8.2 The process of meeting necessary local government requirements to implement recommended land use changes should begin as soon as possible. These actions can require long lead times, and if land use controls such as zoning or overlay restrictions are not in place, additional noncompatible land uses can occur at any time.

2.8.3 Some recommended NCP measures may require a NEPA review and separate FAA actions before they can be implemented, such as approval of a change to the Airport Layout Plan (ALP), ATO charting of an IFP, and/or a new Letter of Agreement between the Airport and ATCT/TRACON and amending the ATC SOP. The NEPA process should be coordinated with the airport’s ARP POC. The CIP and NCP implementation schedules and budgets should reflect any required NEPA processes.

2.8.4 Sponsors need to consider the staffing required to implement the NCP, assessing whether existing airport staff has the expertise and time to implement applicable parts of the NCP and if consultant assistance is needed. Airports often consider consultant assistance for NCPs that propose large sound insulation programs or complex noise monitoring systems. Airport management may find other NCP measures easy to implement. Chapter 9 of this AC explains in detail all these implementation activities.

Figure 2-4. Noise Compatibility Program Plan Implementation and Update
CHAPTER 3. RELATIONSHIP TO OTHER PLANNING

3.1 Introduction.

3.1.1 Part 150 studies represent one aspect of planning for the airport environment. Other planning studies can influence a Part 150 study and vice versa. Furthermore, elements of an NCP may generate a need for a NEPA analysis to implement some proposed measures.

3.1.2 This chapter describes other studies to consider for integration with a Part 150 study along with other ongoing planning efforts, including planning studies by other local, state, and federal agencies.

3.2 Airport Master Plans.

3.2.1 Conducting a Part 150 Study and a Master Plan Update Concurrently.

Some airport sponsors choose to conduct a Part 150 Study concurrently with a master plan or master plan update. This enables a more comprehensive evaluation of the noise impacts of proposed capital improvements. For example, if the master plan proposes a near-term runway extension to meet aeronautical needs, the Part 150 Study might include the proposed longer runway in the Future Condition NEM, determine its associated noise contours, identify and quantify potential noncompatible land uses, and possibly recommend operational noise abatement measures to include in the NCP. Whether an airport sponsor conducts a Part 150 study concurrently or within a close timeframe with a master plan or update, it is important that the forecasts used are consistent.

3.2.1.1 Benefits of Conducting a Part 150 Study and Master Plan Concurrently.

Conducting a Part 150 study and a master plan concurrently provides certain efficiencies when preparing baseline existing and forecast data. For

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13 Concurrent preparation could provide the opportunity to analyze measures in the NCP to mitigate the projected noise impacts for the proposed airport layout plan (ALP) changes. Should the proposed ALP changes not receive NEPA approval in the form of a Finding of No Significant Impact (FONSI) or Record of Decision (ROD), the NCP measures could not be implemented in the Part 150.
example, up-to-date forecasts of aircraft operations, aircraft fleet mix, and daily aircraft operations are needed for both studies. Conducting the studies concurrently can avoid the cost of generating this type of data separately for each study. Both studies can also use a common set of forecast data, thereby avoiding the potential for conflicts and inconsistencies between the level of detail necessary for forecasts of the master plan and forecasts of the Part 150 Study.

3.2.1.2 **Scheduling Considerations.**

Conducting Part 150 studies and master plan concurrently can realize substantial benefits, but timelines for the studies can vary. NEM approval and NCP approval, as well as the additional steps required to implement some noise abatement or mitigation measures, require review periods that might not work with the schedule for the master plan/update or may not have the same forecast timeframes. The airport sponsor needs to consider whether these differences in review and approval timeframes are acceptable before undertaking the studies concurrently.

3.3 **Comprehensive Local Planning.**

Many counties, cities, and other municipalities prepare and regularly update comprehensive plans that provide a basis for long-range decision-making on issues such as land use, zoning, residential densities, and economic development. Comprehensive plans specify community goals and objectives for managing future growth and promoting desired outcomes.

3.3.1 **Coordinating a Part 150 Study and Comprehensive Planning.**

The Part 150 regulation requires airport sponsors to consult with public agencies and planning agencies if their area of jurisdiction is wholly or partially within the DNL 65 dB noise contour depicted on the NEMs. Airport sponsors who wish to adopt a noise level of less than DNL 65 dB as the basis of land use compatibility planning must work with local municipal jurisdictions with land use authority within that contour, since they are the ones ultimately responsible for making changes to their ordinances. Local comprehensive plans can be a key source of data for future land use plans, future zoning, and planned residential densities when analyzing the Future Condition NEM. Conversely, data produced by the Part 150 Study, such as the size, shape, and degree of noise generation, can be extremely useful to the development of a comprehensive plan or a noise overlay district (see Section 7.18 for a discussion of zoning restrictions).

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14 Land use compatibility determinations contained in Table 1 of the Part 150 regulations “do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.”
Therefore, close coordination of information from each effort is important to the success of the other.

### Consultation with Local Planning Agencies.

#### 3.3.1.1

Airport sponsors are required to consult with local land use planning agencies with jurisdiction over the land use within the DNL 65 and higher dB noise contour (or a lower standard if adopted). Consultation may involve multiple jurisdictions. This helps ensure that the recommendations of the Part 150 Study are consistent with the local agencies’ comprehensive plans, goals, and objectives. This consultation should take place at the start of the Part 150 Study during data collection and continue during the Part 150 Study’s development. Chapter 4 of this AC describes study committees and other consultation venues.

#### 3.3.1.2

**Following Up with Local Planning Agencies.**

Once the FAA approves the Part 150 Study, airport sponsors should follow up on a regular basis with local planning agencies to make sure the measures affecting local comprehensive plans recommended by the Part 150 Study are incorporated into the next local land use plan update. This is especially important for elements of the Part 150 Study related to land use and zoning, which require approvals from one or more political jurisdictions.

### Part 161 Studies.

#### 3.4

**Airport Noise and Capacity Act.**

In November 1990, the U.S. Congress enacted the Airport Noise and Capacity Act (ANCA) (recodified in 1993 at 49 U.S.C. Sections 47521-47533). ANCA directed the FAA to establish a national program to review noise and access restrictions on aircraft operations that are proposed by airport sponsors. The law also mandated phasing out after December 31, 1999, the operation of Stage 2 aircraft weighing more than 75,000 pounds, and after December 31, 2015, operation of Stage 2 aircraft less than 75,000 pounds.

#### 3.4.2

**Title 14 CFR Part 161.**

In carrying out ANCA’s directive, the FAA published Title 14 CFR Part 161 (Part 161), Notice and Approval of Airport Noise and Access Restrictions. Part 161 implements the law’s requirements for any newly proposed or modified airport noise or access restrictions that affect the operation of Stage 2 or Stage 3 aircraft, regardless of aircraft weight. For a Stage 2 restriction, Part 161 requires airport sponsors to provide notice of the proposed restriction and provide an analysis before implementing it. For a Stage 3 restriction, Part 161 requires sponsors to provide notice of the proposed restriction and provide an analysis, as well as seek FAA approval before implementation. The FAA will review and comment on appropriate elements of the analyses, including whether the proposal may impact the airport sponsor’s grant assurances, and will determine
whether the airport sponsor has met Part 161 requirements for restriction proposals. For Stage 2 and Stage 3 restriction proposals, the required analyses must include noise contours prepared in accordance with Part 150 map analysis criteria (see Part 161 Sections 161.9 and 161.11). Studies of Stage 2 and Stage 3 restriction proposals must include analysis of nonrestrictive and restrictive alternatives the airport sponsor considered and provide a broad notice and consultation process.

3.4.3 Incorporating the Part 161 Analysis in a Part 150 Study.

The Part 161 regulation allows airport sponsors considering a noise or access restriction to incorporate their Part 161 analysis as an element of a Part 150 study (see Part 161 Sections 161.211 and 161.321). This gives the FAA the opportunity to review the proposal for compliance with grant assurances and other federal laws. The Part 150 regulations recommend including a discussion about possible Stage 3 noise restrictions in the Part 150 NCP. NCP approval is not the same as a Part 161 approval, and therefore needs additional FAA analysis to complete the Part 161 process.

3.4.4 Part 161 Studies and Federal Funding.

3.4.4.1 Part 161 studies can be eligible for federal funding through the AIP or with PFCs if they are conducted as part of a Part 150 study. A Part 161 analysis can be eligible as a Part 150 study measure if it meets these three conditions:

- The airport sponsor’s NCP recommends further study of a noise compatibility problem through the Part 161 Study that the Airport Sponsor cannot address in the Part 150 Study.
- The measure meets Part 150 approval criteria and is approved under Part 150 for further study.
- The Part 161 analysis is incorporated into a Part 150 Study update under either of these two conditions.
- After the airport sponsor completes all of the applicable Part 161 requirements (including FAA approval for a Stage 3 restriction proposal).

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15 All Stage 2 airplanes have been banned from the U.S. fleet as of December 31, 2015. ANCA mandated that after Dec. 31, 1999, no person may operate a civil subsonic turbojet airplane certificated at more than 75,000 pounds in the contiguous U.S. unless it meets Stage 3 noise levels. The 2012 FAA Reauthorization, which phased out Stage 2 airplanes of 75,000 lbs or less, used the same language. Airplane means an engine-driven fixed-wing aircraft heavier than air that is supported in flight by the dynamic reaction of the air against its wings (see 14 CFR 1.1). Section 172 of the 2018 FAA reauthorization allowed for limited use of Stage 2 aircraft under certain circumstances but no qualified applicants have expressed interest in this to date. The phase out did not apply to helicopters, because they do not meet the regulatory definition of an airplane. Aircraft means a device that is used or intended to be used for flight in the air (see 14 CFR Section 1.1) and thus helicopters are aircraft. ANCA/Part 161 applies to restrictions on Stage 2 or Stage 3 aircraft. Although there were separate processes for adopting certification standards for helicopters and fixed-wing airplanes, both include classifications for Stage 2 or Stage 3.
• By following the same public notice and comment opportunity procedures required for an initial study in Part 161 Section 161.211 for a Stage 2 restriction proposal, or Part 161 Section 161.321 for a Stage 3 restriction proposal.

3.4.2 A Part 150 study does not have to be conducted before a Part 161 analysis, nor is federal funding required to conduct a Part 161 analysis. Airport sponsors should be aware, however, of the stringent requirements of Part 161 and should consider the assistance of consultants and legal counsel before undertaking one, whether as an independent Part 161 analysis or as part of a Part 150 study.

3.5 NEPA Environmental Analysis.

Some proposed noise abatement measures require compliance with NEPA before they can be implemented. Examples include changes to flight procedures or certain changes to an airport layout plan. When direct federal action or federal approvals are implicated, the noise abatement measure may not be implemented until after the FAA has complied with NEPA.

3.5.1 NEPA Requirements.

NEPA requires an environmental analysis and supporting documentation to determine whether a federal action has the potential to significantly impact the human or natural environment. FAA Order 1050.1, Environmental Impacts: Policies and Procedures, implements the provisions of NEPA for FAA actions. FAA Order 5050.4, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, provides specific guidance for FAA actions pertaining to airports. Depending on the scale of the project or operational action and its potential for causing significant environmental impacts, NEPA environmental documentation may involve a Categorical Exclusion (CatEx), an Environmental Assessment (EA) and subsequent Finding of No Significant Impact (FONSI), or an Environmental Impact Statement (EIS) and its Record of Decision (ROD).

3.5.2 Environmental Documentation.

3.5.2.1 Approval of an NCP measure under Part 150 means that the measure meets Part 150 criteria, including reducing and/or preventing noncompatible land uses (see Part 150 Section 150.35 for a detailed description of Part 150 approval criteria). The approved NCP is considered an airport land use compatibility planning document. All measures implemented using federal financial assistance (i.e. AIP grants or PFC) will require compliance with NEPA. Approved NCP measures may require environmental evaluation before implementation. For example, if constructing a noise barrier requires a change to the ALP, and that change to the ALP is one over which the FAA has approval authority, the NEPA process must be completed and the change to the ALP approved (which is a federal action) before implementing or receiving a federal
grant for the measure. Any change to IFPs, visual flight tracks at towered airports and other air traffic management (i.e., ATC) practices, including those designed to reduce noise, requires environmental evaluation. The ROA from FAA that approves or disapproves measures will indicate what measures require additional analysis before implementation. FAA Order 1050.1 describes the policies and procedures for environmental actions, while FAA Joint Order 7400.2, Procedures for Handling Airspace Matters, provides guidance on the ATO actions requiring environmental assessment or documentation.

3.5.2.2 Combining an EIS or EA with a concurrent Part 150 update can be challenging because these studies look at different factors. Part 150 asks whether there is a noncompatible land use, while NEPA documents look at whether a particular project will result in a significant noise impact. For NEPA, a significant impact is a 1.5 DNL increase inside the 65 DNL noise contour. The Part 150 study concerns when the noncompatible land use is located inside the 65DNL dB or higher noise contour.

3.5.2.2.1 Incorporating a Part 150 Study Data into Associated Environmental Documents.
Information from a Part 150 study, such as noise contours and land use data, can be used to supplement the noise section of environmental documents if operational assumptions, baseline data, and forecasts remain valid. Since this shared use can reduce the complexity and cost of environmental documentation, it is encouraged whenever possible. For sharing forecasts, however, airport sponsor’s forecasts for a Part 150 Study need to be reasonably consistent with the Terminal Area Forecast (TAF) in accordance with FAA Advisory Circular 150/5070-6, Airport Master Plans, before they can be used for NEPA studies. To be certain about what information can be shared across different studies, it is best to consult with the ARP POC.

3.5.2.2.2 Part 150 Study Mitigation and NEPA Projects.
- Airport development NEPA documents will include appropriate mitigation for a proposed project’s environmental impacts. For noise

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16 Be cautious when combining an EIS or EA with a Part 150 update. There are essentially two different standards/thresholds for noise. The FAA’s significant noise threshold under NEPA is a 1.5DNL increase inside the 65 DNL noise contour. The Part 150 regulations consider land use compatibility related to the DNL 65 dB noise contour, not significance of noise impacts. In addition to these basic differences, the timeframe of existing and future years differ in the NEPA and Part 150 contexts. The existing condition is not a concept used in the NEPA context, but is generally incorporated into the concept of the “affected environment” as defined in the NEPA regulations. FAA’s practice for NEPA purposes is to define the affected environment based on the last 12 consecutive months of available data, while the future condition under FAA’s NEPA implementing instructions is the year in which the proposed action is in place and operational. In the NEPA context, another future year, generally 5 to 10 years beyond the project’s first year of operation may also be assessed. In Part 150, the existing condition is generally based on the last 12 consecutive months of data, while the future condition is at least five years from the existing condition year.
impacts, the NEPA document should include commitments to mitigate significant noise impacts. In addition to mitigation to reduce noise impacts the NEPA document can commit to examining noise mitigation options beyond those included in the NEPA document and FONSI/ROD or EIS/ROD. If a NEPA document for an airport development project identifies specific noise mitigation measures to address impacts of the airport development project, implementation of those specific noise mitigation measures can be included as a condition of approval in the EIS/ROD or FONSI/ROD for the airport development project. If the airport development NEPA document identifies a commitment to examining additional noise mitigation through a Part 150 study or study update, the ROD or FONSI/ROD for the airport development project can commit to such a study, but cannot commit to specific Part 150-related noise control measures that have not yet been identified or evaluated in a Part 150 study. Without this evaluation, it is not known whether the measures are feasible or would meet Part 150 program approval criteria. See Section 3.2 for information on preparing concurrent Part 150 and master planning studies.

- After a Part 150 study is completed, NEPA and special purpose laws such as the National Historic Preservation Act may require the FAA and/or airport sponsor to take additional actions to comply with these statutes prior to implementation of noise mitigation measures approved through the Part 150 process. This may include coordination with other agencies, such as a state historic preservation office, preparation of further studies, additional public outreach, or other statutory compliance requirements.

### 3.6 State Land Use Planning Processes.

#### 3.6.1 Specific State Requirements.

Airport sponsors and their consultants should refer to the land use planning processes that can be obtained from their state’s Department of Transportation websites. These websites often discuss the authorizing legislation and associated regulations and provide guidance on the planning processes. Certain states, such as California, have specific requirements for land use planning around airports. The goal of these planning processes is to improve and maximize the compatibility of surrounding land uses with airport operations. Consult and coordinate data from these state planning processes when undertaking or updating a Part 150 study. Note that a land use measure not approved under Part 150 may be implemented outside the Part 150 requirements.

#### 3.6.2 Local Political Jurisdiction’s Action.

The Part 150 Study process requires sponsors to consult with the jurisdictions and land use authorities within the appropriate NEM contour area. Working with these entities ensures that land use recommendations resulting from a Part 150 study are considered
for incorporation into local land use plans and implemented if possible. The reluctance of local jurisdictions to implement recommended land use measures is a major cause of continuing airport noise compatibility issues. Inadequate state and local measures could allow noncompatible development within the noise contour and render the new development ineligible for federal funding for sound insulation. See Section 7.6 for further discussion.
CHAPTER 4. PUBLIC PARTICIPATION AND CONSULTATION PROGRAM

4.1 Introduction.

4.1.1 An important part of a successful Part 150 study is adequate and meaningful participation by a wide range of potentially affected parties, as required by 14 CFR Part 150 Sections 150.21(b) and 150.23(c)-(d). Public participation helps educate the interested and potentially affected parties about technical and policy issues. These issues may include the FAA’s role in the Part 150 process and approval requirements, national transportation policy, air traffic control, existing and forecast noise, changes in airport operations and aircraft types, local land uses, individual property rights, personal annoyance, and regional economic activity. A successful public participation program will promote sharing information among the airport sponsor, airport users and tenants, local land use jurisdictions, potentially affected property owners, elected and appointed public officials, and the general public. The public participation program should include these elements:

- A clear set of goals and objectives.
- An understanding of the “public” to be reached—its characteristics (culture, language and other demographics) and any information on how airport operations may affect its interests.
- A description of the program’s general strategies and techniques.
- Clear responsibilities that identify the authority of consulted parties during the Part 150 Process.
- Explanations of how the public participation program will aid the decision-making process.
- Mechanisms for review and feedback from the public as the Part 150 Study proceeds (see Figures 2-1 through 2-3).

4.1.2 Section 150.21(b) of Part 150 requires that the airport sponsor afford state and local agencies, aeronautical users, and the public with an opportunity to submit their views, data, and comments about the correctness and adequacy of the draft NEMs, descriptions of forecast aircraft operations, and formulation and adequacy of the NCP. Part 150, Section 150.23(d), specifically requires notice and an opportunity for a public hearing on the NCP.

4.1.3 To demonstrate compliance with the regulatory requirements, participation program must be visible. That is, the focus of public participation would be on exploring options and respectfully responding to public concerns rather than focusing on a particular measure or implying that decisions have already been made about mitigation measures. A successful program is essential to public acceptance of technically correct and generally acceptable solutions to airport-specific noise compatibility issues. This involvement must be documented, and it must start early in the Part 150 process. Advisory Circular 150/5050-4, Community Involvement in Airport Planning, provides
guidance for community involvement during airport planning. The following sections
discuss public participation for standard Part 150 studies. The Community Involvement
AC, however, will likely be the main resource to refer to when planning the process.

4.2 Consultation and Public Participation.

An effective public participation program provides interested parties with an early
opportunity to review draft products and provide comments before major decisions are
made. The Part 150 Study development should identify a comprehensive public
participation program as an early priority, and begin consultation with the required
parties during the development and preparation of the NEMs and NCP.

4.2.1 NEM Consultation.

NEM consultation involves government agencies and airport users, whereas public
participation involves the public. This involvement comprises creating real opportunity
for the public’s timely and meaningful review of, and input on, the correctness and
adequacy of the NEM and descriptions of forecast aircraft operations at the
development stage, as required by Part 150 Section 150.21(b). Documentation of the
public participation efforts is required, as the FAA cannot accept an NEM without this
opportunity for the public to review and comment on it.

4.2.2 NCP Public Involvement.

4.2.2.1 The public also needs the opportunity to review and provide input on the
formulation and adequacy of the NCP. Part 150 Section 150.23(d) requires
providing the public the opportunity to actively and directly share its
views, data, and comments on the formulation and adequacy of the
program, as well as response to comments. Although a public hearing is
not required unless specifically requested after notifying the public of this
opportunity to participate in the process, it often makes sense to conduct a
public hearing before completing and sending an NCP to the FAA.

4.2.2.2 When the potentially affected parties become involved before major
decisions or commitments are made, the study team can better address
issues of community concern. Failure to involve all appropriate interested
parties at an early stage in the study can lead to misunderstanding,
mistrust, and potentially jeopardize FAA’s ability to review and approve
materials.

4.3 Identification of Interested Parties.

Part 150 Sections 150.21(b) and 150.23(c) and (d) require that sponsors to consult with
the following parties during the Part 150 process:

4.3.1 FAA Officials.

Examples of FAA officials to include in the Part 150 process are FAA Regional
Airports Division Offices, FAA Airports District Offices, Airport Traffic Control
Towers, Terminal Radar Approach Control Facilities (TRACONs), FAA Service Centers, and Flight Standards and ATO Flight Procedures Offices. FAA participation from the outset will help ensure proposed operational noise abatement measures are operationally feasible and consistent with current laws, regulations, and policies. FAA tower staff as well as FAA Airports Regional and District Offices should be actively engaged on a regular basis.

4.3.2 State Officials.
Examples of state officials to involve in the Part 150 process include state DOTs or aviation offices.

4.3.3 Public Agencies and Planning Agencies.
This group specifically includes those agencies that have jurisdiction over any area depicted on the NEM that is within the DNL 65 dB and greater contours.17 City Planning Departments, County Planning Departments, and Metropolitan Planning Organizations are typically involved.

4.3.4 Other Federal Officials.
This group includes those officials having local responsibility for land uses depicted on the NEMs. For example, Part 150 studies have involved the National Park Service, Bureau of Land Management, U.S. Forest Service, and branches of the U.S. military.

4.3.5 Regular Aeronautical Users of the Airport.
This group may include fixed base operators (FBOs), airlines, airport businesses, corporate aviation interests, general aviation pilots, cargo operators, and other affected airport tenants. For all airports, to the extent needed, consult with aircraft operators and air carriers at the airport. The most efficient method for contacting air carriers during the study process is to contact the airline’s airport affairs committee at the airport. If one does not exist, contact the airport affairs, properties, or corporate real estate manager for each carrier.

4.3.6 The General Public.

4.3.6.1 This group includes those that have indicated their interest or are located within the NEM contours and may be affected by the outcome of the Part 150 Study.

4.3.6.2 Identifying potentially affected property owners can be accomplished through a review of local tax maps or similar ownership documents. Identifying others interested and potentially affected often requires publishing notices and newspaper advertisements, establishing a study web-page, and conducting an initial orientation meeting to present the purpose and nature of the study as well as the supporting public

17 If the local jurisdiction identifies noncompatible land uses in areas exposed to less than DNL 65 dB, consult with parties within the expanded DNL contour.
participation program. The meeting can explain how members of the interested public can take part in the study.

4.3.6.3 Potential participants can generally be identified through consulting with airport staff, reviewing local, state, and federal agency records to identify the parties with jurisdiction, and reviewing lists of airport tenants and users groups such as FBOs and airlines.

4.3.6.4 The FAA does not consider the Part 150 consultation flawed if parties decline to participate, as long as there is evidence in the NEM and NCP documentation they were extended adequate opportunity to participate. Unanimity of opinion is also not required, as long as there was adequate opportunity for meaningful participation to all interested parties.

4.3.6.5 The airport sponsor is responsible for selecting the final NCP measures submitted to the FAA for consideration and is not required to include measures proposed during the consultation or public participation processes. When measures are not included, however, failing to adequately explain and document to the public why these were not included may cause public dissatisfaction with the process and outcome.

4.4 Types of Public Participation.

Rather than specify any type of public participation programs, Part 150 allows sponsors the flexibility with how to meet general consultation/public participation requirements. Depending on the location and size of the study area and the complexity of the issues involved, a public participation program can feature one or more of the following methods.

4.4.1 Large Group Public Meetings.

Two types of large group meetings are commonly used for public participation.

4.4.1.1 Formal Meetings (Hearings).

Sponsors must hold a formal public hearing before submitting the NCP to the FAA if they received a request for one after publishing the required notice and opportunity for a public hearing (Part 150 Section 150.23(d), as amended September 24, 2004). FAA recommends holding the meeting at least 30 days after the date the notice is advertised. The traditional public hearing setting provides individual speakers an opportunity to present their comments.

This approach is generally not a good forum for a debate or continuing discussion of issues and alternatives due to the somewhat inflexible format. It is best held after informal meetings have taken place and many preliminary issues have already been resolved. One advantage of formal hearings is that they are normally recorded verbatim or transcribed by a
stenographer, and the information presented is documented in the NCP. This allows participants to contribute opinions to the official record of the project, which is considered in the FAA’s review.

4.4.1.3 Regularly scheduled local government meetings that have an agenda item for the Part 150 Study do not meet the requirements for a public hearing. More details on Public Hearings are in Section 4.6.

4.4.2 Informal Meetings.

4.4.2.1 An open house format often works best for a public information meeting. A useful strategy is to offer a combined public meeting and hearing, in which the hearing area is held in a different room from, but in the same location as, the information meeting area, and both run concurrently. Specific room arrangements vary depending on the meeting’s goals, but all must accommodate the needs of persons with disabilities.

4.4.2.2 Figure 4-1 shows a typical layout for an open house meeting. In this format, “information stations” arranged throughout a room or building provide poster boards or handouts with information on specific topics of interest. Part 150 Study team members stationed around the information boards listen to attendees’ concerns and answer questions. This is a very effective method to engage interested parties, provide specific information, solicit public opinions, and identify additional alternatives.

4.4.2.3 A key component of this approach is careful documentation of individual discussions so that their results are not lost as the workshop proceeds. It is usually helpful to use a team of more than one staff person at key information sessions so one person stays engaged with members of the public while the documents key points discussed. Another effective place to collect information is a “sign in” station where people can also leave written comments. Sign-in sheets and comments received are subject to release under the Freedom of Information Act.
Figure 4-1. Example of Public Information Meeting Room Layout

Note: ADA indicates Americans with Disabilities Act.

4.4.1.2.4 The number of public information meetings to hold during the Part 150 process can vary depending on the complexity of the Part 150 study and public interest. Public meetings are typically scheduled in the evening to provide the best opportunity for people to attend and maximize potential attendance. Public meetings should avoid conflicts with events that may engage a large part of the public, such as holidays or other significant local government meetings. In some cases, such as when a significantly large elderly population is involved, it may be necessary to schedule meetings in locations and at times that accommodate special needs. In other cases, minority and/or low income communities in the impact area required special outreach considerations such as translation services (see AC 150 5050-4A, Community Involvement in Airport Planning). Or, it may be necessary to hold meetings in more than one location to provide adequate geographic coverage and easy access.

4.4.1.3 Committees or Task Forces.
Consultation and review by the interested public are often accomplished through Part 150 Study committees or task forces. Examples of committees or task forces that sponsor should consider to facilitate the public participation program include a Technical Committee (TC) and a Citizen’s Committee (CC). These are not necessarily a substitute for the
consultation or public participation requirements, but another way of focusing on key concerns. Often a TC or CC is established before an NEM development starts, such as for a master plan (see AC 150/5070-6B, *Airport Master Plans*). In developing committees sponsors should be aware of potential bias, and consider committee representation that balances interests.

4.4.1.4 **Technical Committee (TC).**

The TC generally provides input and insight on technical issues. TC members typically have a high level of experience with some aspect of aviation or airport operations and are often major stakeholders in the airport’s operation. The TC may include FAA experts from the Airports Program Office, Air Traffic Organization (ATO), airlines chief pilots, and aviation trade groups.

4.4.1.5 **Citizen’s Committee (CC).**

The CC serves as an information exchange forum for a representative portion of the interested and potentially affected public. It acts as a conduit for information between the study team and the public at large. The CC often reviews the Part 150 study team’s plans and proposals, interacts with and makes recommendations to the study team during the review, and provides its recommendations on the finished plan to the airport sponsor. As much as possible, CC membership should reflect all interested and affected parties.

4.4.2 **For Committees or Task Forces.**

4.4.3 When establishing a TC, CC, or other citizen participation committee, adequate representation from community and aviation groups should be afforded to the extent possible. In the interest of group efficiency and progress, however, it is not necessary that every citizen or aviation user that has expressed an interest in the study be a member of the committee(s). The size of both the TC and CC should be kept manageable.

4.4.4 Both the TC and the CC are for informational purposes, they have no decision-making power of their own, and are not substitutes for providing notice/information to the general public. In establishing these committees, an airport sponsor does not delegate its authority and responsibilities to them. The specific roles of such committees should be clearly defined at the outset and carefully explained at the initial meetings to prevent later misunderstandings. For some issues, such as discussions of land use compatibility with respect to local zoning, it may be appropriate to combine the committees into a single group.

4.4.5 **Small Group Meetings or Briefings.**

Throughout the Part 150 study, small group meetings—with community boards, elected officials, civic organizations, and other interested organizations—can supplement large
group public information meetings. These meetings provide opportunities for detailed discussions of both the Part 150 regulation and the specific airport Part 150 Study. They also allow study team members to learn about the range of public concerns.

4.4.6 Public Awareness Information Programs.

Many other communication channels can communicate information with the public about the Part 150 study, depending on the geographic area to be covered, the numbers of parties to be reached, the timeframe of the projected study, and the complexity or sensitivity of the issues involved:

- Study mailing lists
- Press releases
- Fact sheets or flyers
- Newsletters
- Websites
- Surveys
- Telephone hotlines
- Social media

Whatever the communication, these public programs should clearly present information with a minimum use of technical jargon so that the targeted audience, usually the general public, can easily understand the information and the issues involved. A continuing component of the programs should be informing the public how they can become involved in the study.

4.5 Preparation of Public Participation Materials.

Before preparing materials to present to the public, it may be necessary to consider producing them in more than one language, just as an interpreter may be necessary to for public meetings and hearings. Census data for the area should be reviewed to understand the area’s ethnic composition and whether a need exists for bi-lingual or multi-lingual materials. The language of the public participation materials often determines the overall layout and design of the materials. More important, identifying the language requirement of the study area reduces the potential for language problems or barriers and engenders respect and trust for the intended audience.

4.5.1 Mailing Lists.

Many Part 150 study teams develop a comprehensive mailing list and continually update it over the course of the Part 150 Study to ensure that all appropriate parties receive notices and other written materials. It is important to make the purpose and existence of the mailing known at the beginning of the Part 150 Study and throughout the process so that all parties who wish to participate can do so. Simply being on a
mailing list and receiving periodic updates will satisfy many in the community. It is important that mailing lists be kept updated and accurate, and that the public understand the need to contact the study team when their information changes.

4.5.2 Press Releases, Flyers, Fact Sheets, and Newsletters.
Press releases, fact sheets, flyers, or newsletters should be concise and efficiently organized. They should use clear, simple language so as to be understood by a wide, diverse audience. It should provide the reader with a brief background on the Part 150 Study, the process, and how far the study has progressed. Key issues should be clearly identified, using simple graphics to illustrate study areas, flight paths, noise contours, and other central elements. Written materials should consistently provide the reader with information on how to further participate in the Part 150 process. In general, newsletters and flyers should not exceed four pages; the longer it is, the less likely the public will read them.

4.5.3 Poster Boards.
Poster boards for public meetings should focus on individual key issues and clearly identify the topics. Multiple, simple posters are more effective than a single poster crowded with too much information. Titles should be large enough to be read from across the room, and text should be large enough to be read from five feet away. The suite of posters at any meeting should include one that describes the “Role of the FAA” in the Part 150 Study, and another that shows a timeline indicating the current status of the Part 150 Study and its relation to the overall schedule for developing the NEM and NCP documents.

4.5.4 Websites.
Project websites make information about Part 150 studies continuously available to the public. They can also help reduce the number of questions received by email and phone. As with other forms of presentation, websites should be kept simple, with the text focused on key issues, the graphics clear, and the site easy to navigate for finding information. The more detailed information can be provided with linked pages or downloadable documents, so that the basic website does not become overly crowded, which discourages use by the public. If a document will be posted on an FAA website, it must be meet the requirements of Section 508 of the Americans with Disabilities Act. States often have similar requirements.

4.5.5 Surveys.
Airport sponsors can use surveys to identify public attitudes and perceptions about issues associated with the Part 150 Process. They can be conducted by phone or mail, online, or through individual interviews or small group meetings. A well-designed airport survey can capture reliable and meaningful data to indicate the opinions of a broad component of the community. Surveys conducted by federal agencies or

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18 More information is available at: https://www.access-board.gov/ict.
supported with federal funds require the Office of Management and Budget’s approval.
These surveys should be coordinated with the airport’s ARP POC before pursuing it.

4.5.6 Telephone Hotlines.
Some airport sponsors have used telephone hotlines to provide information about Part 150 Study progress, collect comments, and handle noise complaints. Comments received over a hotline can be incorporated into the Part 150’s public participation program as part of the comment documentation. The effectiveness of a hotline highly depends on the communications skills of the staff operating it, and staffing it can require a substantial amount of time. However, hotlines can be a convenient way for citizens to participate in the Part 150 Study and an effective method to provide information about meetings and other public participation activities.

4.6 Public Hearing.
Part 150 Section 150.23(d) requires that NCP documentation include evidence that the airport sponsor provided notice and an opportunity for a public hearing before submitting the NCP to the FAA for approval.

4.6.1 Overview.
The public hearing process helps ensure the active and direct participation of the general public and of the parties identified in Part 150 Sections 150.21(b) (public consultation for NEMs) and 150.23(c) and (d) (public consultation as well as opportunity for public hearing for NCPs). Although Part 150 does not specify the timing of the public hearing, it does require that public consultation take place before submitting an NEM or NCP to the FAA. Some sponsors schedule a public hearing without waiting for someone to request one. It is best to conduct the public hearing when the NCP is in draft form and contains all the recommended measures for noise abatement (relating to aircraft operations), land use, and program management (administrative actions). This enables the public to comment on the plan in its entirety, avoiding potential confusion as to the proposed NCP measures.

4.6.2 Notice of Opportunity for a Public Hearing.

4.6.2.1 In order to demonstrate compliance with the requirement for a Notice of Opportunity for a Public Hearing the notice should appear in an area-wide or local newspaper(s) having general circulation in the communities surrounding the airport. The notice should contain the following information:

- A statement that a Part 150 Airport Noise and Land Use Compatibility Planning Study is being conducted for [name the airport].
- A concise statement that the hearing’s purpose is to accept public comments about the NCP.
- The locations and times where the draft NCP document will be available for public review before the hearing.
4.6.2.2 If no one requests a hearing, the airport sponsor must certify that the Notice of Opportunity for a Public Hearing was published and provide the documentation verifying this in the NCP.

4.6.3 Notice of Public Hearing.

4.6.3.1 If a public hearing is requested, or scheduled without a request, the airport sponsor should publish a “Notice of Public Hearing” containing the information listed in Section 4.6.2. This notice informs the public that a hearing will occur. The public notice should be advertised so it meets the state law or local ordinance for publishing legal notices. An affidavit of publication of the notice should be obtained from the newspaper(s) in which it was published and included in the final NCP.

4.6.3.2 The airport sponsor should place copies of the draft NCP document in local libraries and/or other publicly accessible locations so that the public has a meaningful opportunity to review the document before the public hearing.

4.6.4 Conducting the Public Hearing.

A Presiding or Hearing Officer normally conducts the public hearing. There are no specific requirements for serving in this capacity. The Presiding or Hearing Officer for the hearing is responsible for the orderly conduct of the public hearing. A stenographer normally records or transcribes public hearings so an accurate record exists of all presentations and comments made during the hearing. Any person may submit oral or written statements and data about the Part 150 Study during the public hearing. Reasonable limits may be set on the time allowed for oral statements, and the submission of statements in writing may be required. The public comment period is typically extended after the public hearing (usually two weeks) to allow comments to be submitted to the airport sponsor.

4.7 Public Participation Documentation.

Accurate documentation of the public participation process is essential. Even though it is a required component of the final study, the public is more likely to accept the Part 150 Study results when they see that community input and concerns were considered in the study process. The best practice for this ongoing task is to maintain a good record of public involvement and update the documentation regularly over the course of the Part 150 Study rather than prepare it at the end of the process.
4.7.1 Public Participation Program Report Appendix.

4.7.1.1 Part 150 Section 150.21(b) requires the study’s report to include a narrative description of the public consultation accomplished on the NEM and of the opportunities afforded the public to review and comment during the development of the NEMs. Similarly, Part 150 Section 150.23(e)(4) requires the study’s report to include a narrative description of the key issues, public participation, and the consultation carried out for the NCP.

4.7.1.2 These support items that should be included in the appendix:
- Committee rosters
- Committee meeting sign-in sheets and minutes
- Legal notices and other advertisements
- Newsletters
- Presentations, handouts, and data from poster boards used at public information meetings or committee meetings
- Sign-in sheets from public information meetings
- Sign-in sheets and speaker registration cards from the public hearing
- A transcript of the public hearing

4.7.2 Summary of NEM Comments.

There is no requirement in the Part 150 regulation for the sponsor to prepare responses to comments received from the public during the NEM preparation. FAA reviews the NEM documentation that must include a description of the sponsor’s process to gather public input. The regulation requires that the written comments must be filed with the “Regional Airports Division Manager,” since the ADO office has the responsibility for acceptance of the NEMs. The Federal Register Notice announcing FAA acceptance of the NEMs does not include a public comment period. In some cases, however, the FAA or the sponsor may receive comments. The sponsor should forward comments to the FAA, and the FAA will advise the sponsor to consider these comments in preparing the NCP (if an NCP is being prepared).

4.7.3 Summary of NCP Comments.

4.7.3.1 The sponsor is required to afford adequate opportunity for the active and direct participation of the public prior to, and during the development of the NCP. Part 150 Section 150.23(e)(7) requires that the documentation of the Part 150 Study include a summary of the comments received at its public hearing. A transcript, if prepared, should be included in the document. If verbal comments are transcribed at informal meetings, these should also be included along with all comments submitted to the airport sponsor and the airport sponsor’s responses to and treatment of those comments, demonstrating the program is feasible, reasonable, and
consistent with achieving the objectives of airport noise compatibility.

There is, however, no requirement to respond directly to the commenter(s). This information must be filed with the FAA Regional or Airports District Office, usually as an appendix to the study. This requirement ensures that all parties are made aware of the information.

The FAA publishes a federal register notice after it determines the NEM and NCP (if submitted together) conform to Part 150 requirements. The notice specifies a 180-day FAA review period for the NCP, which includes a 60-day public comment period within this review period. Under 150.23(e)(7)), the airport sponsor is required to respond to all comments submitted by the public during this period and to provide all comments and the draft responses to the FAA. The FAA will review all comments and draft responses.

Based on this review, the sponsor, in coordination with FAA, will determine if a revision to the NCP is required. If it does, the comments and associated responses should be included as an appendix in the final NCP. If the NCP does not require revisions, the sponsor shall respond to each comment and make the comments and responses available to the public on its website. A summary of the public input and a response can also be included in the FAA’s ROA.

The FAA publishes a federal register notice that announces the availability of the ROA. If public comments were received during the 60-day comment period and a revised NCP with the comments enclosed was not prepared, the ROA should briefly summarize the public comments received and appropriate responses to those comments. It is not recommended to include an attachment to the ROA with the comments and responses without first consulting with the airport sponsor.

The notice of availability of the ROA does not include a public comment period for its review. However, in rare instances, the sponsor or the FAA may receive comments on the ROA. If this occurs, the FAA, or sponsor should respond to the commenter to discuss their comments and consider this input during implementation.
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CHAPTER 5. PREPARING NOISE EXPOSURE MAPS

5.1 Introduction.

5.1.1 Noise exposure maps (NEMs) are a primary component of the Part 150 Study. Title 14 Part 150 Section 150.21 and Appendix A describe the requirements for NEMs.

5.1.2 The Noise Exposure Map comprises a set of scaled maps that show the airport, its noise contours (existing and forecast), and the surrounding area. The following supporting documentation must be included:

- Existing condition aircraft operations as of the date of submission, based on the preceding 12-month period or preceding full calendar year.
- Forecast aircraft operations at the airport, based on reasonable assumptions. The forecast year must be at least 5 years after the date the current conditions map is submitted.
- Descriptions of each noncompatible land use as of the date the map submitted to the FAA.
- An analysis of how forecast operations will affect compatibility and land uses depicted.

5.1.3 Part 150 (Section 150.1) prescribes the procedures, standards, and methodology governing the development, submission, and review of NEMs. It prescribes single systems for completing the three central tasks required to develop NEMs:

- Measuring noise at airports and surrounding areas. This measurement generally provides a highly reliable relationship between projected noise exposure and surveyed reactions of people to noise.
- Determining exposure of individuals to noise resulting from operations at an airport.
- Identifying the land uses that are normally compatible with various levels of exposure to noise.

5.1.4 Appendix A of this AC provides information on the physics of sound, the effects of noise on people, and noise metrics.

5.2 Creating Base Maps and Databases.

5.2.1 Requirements.

5.2.1.1 Part 150 Section A150.103(b)(1) requires NEMs to graphically depict the airport and its environs. The graphics must be of sufficient quality to display the information required on the NEMs so it is clear and easy to read. The maps must have an arrow indicating north, and they should be
scaled no smaller than 1 inch to 2,000 feet (see Section 5.6.5), with the scale used indicated on the face of the maps.

5.2.1.2 The following data and features must be graphically depicted to scale on the NEMs:
- Airport boundaries.
- Runway configurations and runway end numbers.
- Off-airport streets and other identifiable features.
- Land uses within DNL 65 dB and higher contours (it may be valuable to show surrounding areas outside the noise contours as well).
- Geographic boundaries and names of the surrounding cities, counties, and other jurisdictions that have the authority to plan and control land uses within the depicted noise contours (see Part 150 Section A150.105).

5.2.1.3 Section A150.101 of Part 150 provides full descriptions of the information required to be on the NEM graphics.

5.2.2 Geographic Information Systems (GIS).

5.2.2.1 GIS mapping technology has greatly facilitated NEM development, making it easy to display data and geographic features. GIS technology is a useful tool for developing base mapping and delineating current land use, future land use, jurisdictions, zoning, population, housing, noise sensitive sites, historic buildings/sites, airport-related easements, and airport facilities/property.

5.2.2.2 With a properly configured GIS database, the results of the analysis will be consistent and repeatable. Many sources of for GIS data are readily available online; for example, some counties may provide property zoning records as a public service. There are also many commercial GIS software packages of various levels of complexity that could be used for the Part 150 Study.

5.2.2.2.1 Estimating Population.

The Aviation Environmental Design Tool (AEDT), the software system used for modeling aircraft noise, can import geographic data directly from the U.S. Census Bureau’s TIGER/Line® Shapefiles along with population data, and then export the results for GIS.¹⁹ The Census Bureau organizes its data into geographic units called census blocks. The census block maps

¹⁹ After each census, the U.S. Census Bureau releases public “redistricting” data, referred to as Public Law 94-171 data, which is displayed in maps. Based on census data contributed by each state, these thematic maps show population changes, and may show voting districts, counties, cities, census tracts, and blocks. Participation varies by state.
have the highest spatial resolution with which the Census Bureau
summarizes information. Often, several different land uses are contained
within the area that makes up a census block. However, even though the
population and household numbers are also summarized for each census
block, the maps do not show how the population is distributed across the
land uses. Caution is needed, therefore, when allocating the population to
different land uses within the census block.

5.2.2.2 Identifying Jurisdictions.

The NEMs must clearly identify the jurisdictions within the noise
contours. If there are multiple jurisdictions or complex jurisdictional
boundaries, it may be beneficial to provide a supplemental graphic
illustrating the geographic boundaries and names of the jurisdictions
within the DNL 65 dB and higher contours that the airport sponsor must
consult.

5.2.2.3 Presenting Results.

It is likely that analyses will be presented in both spatial (map) format, as
well as in tables. The NEM is a set of maps that visualize base map
geographic features (such as roads, runways, and rivers) and the census
data in question (such as population, land uses, and number of houses).
The mapped data are usually accompanied by tables that provide key
results in a readable format.

5.3 Identifying and Classifying Existing Land Uses.

Part 150 Section 150.11 requires that determination of land use must be based on
professional planning criteria and procedures utilizing the best practices in
comprehensive planning, master land use planning, zoning, and building and site
designing. Many systems are used in classifying land use. Part 150 does not require a
particular system; however, using the classifications in Table 1 of the Part 150
regulations will help align the final document with requirements needed for approval.
The FAA’s land use compatibility guidelines contained in Part 150 Table 1 are based on
Standard Land Use Coding Manual standards. Part 150 points out, however, that land
use designations by local authorities take precedence over federal determinations:

[D]esignations contained in the table do not constitute a Federal
determination that any use of land covered by the program is acceptable or
unacceptable under Federal, State, or local law. The responsibility for
determining the acceptable and permissible land uses and the relationship
between specific properties and specific noise contours rests with the local
authorities. FAA determinations under Part 150 are not intended to
substitute federally determined land uses for those determined to be
appropriate by local authorities in response to locally determined needs
and values in achieving noise compatible land uses.
5.3.2 The documents should identify noise-sensitive land uses in greater detail than non-noise-sensitive land uses. The NEM should distinguish noise-sensitive locations outside the 65 DNL noise contour from those that are within the contour and subject to noise exposure greater than 65 DNL.

5.4 **Identifying Anticipated Changes to Existing Land Uses.**

Many sources should be reviewed to determine potential future changes in land use that could cause conflicts between the airport and the surrounding communities—comprehensive plans, existing and future land use plans and maps, zoning maps and regulations, land development regulations, transportation plans, and development plans from jurisdictions near the airport. Information gained from this review will be used to develop the land use base map for the Future Condition NEM.

5.5 **Collecting Historical Aviation Activity Data.**

A minimum of 12 consecutive months of historical air traffic activity records is needed to accurately model existing noise exposure. This should be the most recent 12-month period before the study started. If there are exceptional circumstances, such as runway closure during this time, supplemental data can be used to create a representation of normal aircraft operations at the airport. See 5.5.3 Data Sources for examples of these alternate sources. If all the necessary data are not from the same source, it is important to ensure the data are consistent and presents an accurate picture of the aircraft operations at the airport over the 12-month period.

5.5.1 **Aviation Activity to Consider.**

The following types of aviation activity, for both fixed-wing and rotary-wing aircraft, should be included:

- Passenger air carriers
- Cargo air carriers
- Air taxi
- Charters
- Helicopters
- General aviation
- Military aircraft.

5.5.2 **Data to Collect.**

Data to collect and analyze for the NEM:

- Fleet mix (aircraft airframe and engine type).
- Number and type of operations (e.g., departure, arrival, touch-and-go, and run-up).
- Day/night runway utilization.
1433 • Origin/destination information to determine trip/stage lengths and estimated aircraft takeoff weights to determine profile stages.

1435 • Flight tracks and usage relevant to VFR and IFR usage, including approach and departure IFPs or CVFPs in the Terminal Procedures Publication. Also, identify any IFPs or CVFPs expected to be published or amended within the study interval.

1438 • Existing aircraft flight noise abatement operational measures.

1439 • Ground run-up and maintenance activities.

1440 • Relevant weather metrics.

1441 5.5.3 Data Sources.

1442 These sources can be consulted to obtain historical aviation operations data:

1443 • FAA Operations Network (OPSNET) is the official source of FAA air traffic operations counts at towered airports. Where the tower operates less than 24 hours daily, other sources are needed to supplement the tower counts.

1446 • Data from an airport or commercially operated flight tracking system, such as an Airport Noise and Flight Track Monitoring System or credible web-based services.

1448 • Reliable aircraft logs (such as landing fee reports or fuel sales records) kept by the airport sponsor, aircraft operators, or FBOs. To be useful, these logs need to record the aircraft make and model. Alternatively, the logs could record the aircraft registration number, which can be cross-referenced with the FAA aircraft registry database to determine aircraft make and model. 20

1453 • Completed IFR flight plan data, as made available through the FAA Traffic Flow Management System Counts (TFMSC) database on the FAA’s Aviation System Performance Metrics web site. IFR flight count, aircraft type data, time of day, and stage length (city pair) data are available for most airports, even if there is no air traffic control tower. 21 IFR counts of jet and turboprop operations, once normalized, can represent the total operations of these aircraft types which normally operate on IFR flight plans. 22 However, the IFR data will need to have estimates of VFR activity added to more accurately represent the full count of operations. For example, the IFR counts of piston aircraft will often be missing substantial operations, since these aircraft types often operate under VFR rules and so are not counted by the Traffic Flow Management System.

1464 • Observed activity (either in person or via recorded media) that logs aircraft make and model. Observed short-term activity can be converted into an annual count using a statistical sampling method (e.g., two weeks of observations in each of the

20 Airline flight schedules are not normally an acceptable record of actual activity, since operations can vary substantially from the planned flight schedule due to airline network decisions.

21 Airport or consultant may request City Pair data from the ADO, or seek the requisite permissions on ASPM.

22 To normalize the jet and turboprop IFR count data, use the higher of the arrival or departure count by aircraft type and multiply by two. This accounts for IFR flights that are not included in the count, due to IFR flight plan cancellation to fly a VFR approach, or for aircraft that depart VFR and file a flight plan once airborne.

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four seasons). This method is outlined in FAA Report FAA-APO-85-7, Statistical Sampling of Aircraft Operations at Non-Towered Airports. Automated activity counters can be used if attached to visual systems that also capture aircraft registration numbers to provide sufficient information on aircraft make and model.

- Bureau of Transportation Statistics, Form 41, Schedules T-100 and T-100(f) databases are reliable indicators of airline activity. Alternatively, aircraft operator letters (e.g., passenger or cargo airline or charter operator) or written survey results that document existing levels of use by aircraft type can be used.
- Other recent studies accomplished specifically for, or relevant to, the airport with credible data sources.
- See Section 5.6.4 regarding release of flight track data, from which runway use is calculated.

5.5.4 Data Verification.
Data verification with ATC is recommended throughout the NEM development process to ensure the accuracy of NEM inputs at the time they are submitted to the FAA for a compliance determination.

5.6 Developing and Depicting Existing Modeled Aircraft Flight Tracks.

5.6.1 Flight tracks depict the paths of aircraft as projected on the ground for aircraft arrivals, departures, and touch-and-go operations. Calculating the annual average noise exposure, requires identifying the predominant arrival, departure, and training pattern flight tracks for each runway along with the number of each type of aircraft that used each runway and flight track. The dispersion around the predominant tracks can also be analyzed. These factors help determine the extent and shape of the noise contours and noise levels at noise-sensitive land uses.

5.6.2 How often aircraft use individual flight tracks depends on a variety of factors, including the use of IFPs, ATC instructions, the aircraft’s origin or destination, aircraft performance, wind direction and other weather conditions, and any operational noise abatement measures.

5.6.3 Using Flight Track Data.
The use of flight track data, as collected by radar, multilateration, or ADS-B systems, for developing the modeled flight tracks is recommended as data is commonly available. An airport sponsor may obtain radar data from its own flight tracking system, FAA surveillance sources (see 5.6.2), or commercial sources. The resources needed to obtain flight track data and process it are factored into the study’s schedule/scope.

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5.6.4 Release of FAA Surveillance Data.

The release of FAA radar data, also known as recorded National Airspace System (NAS) Data, is governed by FAA Order 1200.22, External Requests for National Airspace System (NAS) Data, which is outlined in the Office of Airport Planning and Environment (APP-400) memorandum “Requests for Release of FAA Recorded, Historical National Airspace System Data for Airport Planning and Environmental Studies” (January 16, 2015, or any later updates). The memorandum describes the process for airports to use in working with the Office of Airports to obtain recorded NAS data. FAA can only release surveillance data for civil operations, as Department of Defense (DOD) requirements restrict the release of surveillance data for military flights.

5.6.5 Depicting Flight Tracks.

5.6.5.1 Part 150 Section A150.101(e)(2) requires flight tracks for existing conditions be graphically depicted. Separate flight track graphics must be depicted for the forecast timeframe if they are different than the existing conditions. In the interest of NEM legibility, an acceptable option is to depict flight tracks on a separate map instead of on the Existing Condition and Future Condition NEMs. If there are numerous flight tracks, several runways, or both, the depiction of flight tracks may be produced on more than one graphic (for example, one for arrivals and another for departures).

5.6.5.2 The regulation requires the documentation to show flight tracks out to at least 30,000 feet from the end of each runway or otherwise identify them on the maps to correspond to accompanying narrative and/or tabular descriptions. For example, identify flight tracks by arrival or departure, existing or proposed, and indicate any “bundled” tracks that represent a compilation of multiple tracks. Flight track maps must use the same land use base maps used for the Existing Condition and the Future Condition NEMs and must use the same scale. The maps should be scaled no smaller than 1 inch to 2,000 feet. At most airports, this scale will require a paper size that does not easily fit into the published document. This requirement may be met by including the large graphic in a pocket within the published document.24 A smaller-scale version (with the scale shown) that fits on an 11” x 17” or 8.5” x 11” page may be included as a supplemental graphic. Other graphics that are not required by regulation but are used to supplement your NEM documentation may use a smaller scale.

5.6.5.3 Use of non-standard profile, stage lengths, or aircraft not included in the currently approved FAA model must be approved by FAA’s Office of

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24 An electronic copy may be submitted if it meets scale requirements and can be readily reviewed on a personal computer by interested parties; however, a full size hard copy is still required to be in the document.
Environment and Energy and coordinated through the Office of Airport Planning and Programming (APP-420).

5.7 Forecasting Future Aviation Activity.

5.7.1 The forecast of airport and aircraft activity should be for a year that is at least 5 years from the year representing the Existing Condition NEM and be based on reasonable assumptions.

5.7.2 The starting point for all towered airport forecasts is the latest published FAA TAF for the airport and forecasts from the most recent master plan. Regional planning bodies and state aviation agencies may also have conducted airport system planning studies that included forecasts of demand for the airport.

5.7.3 Using FAA’s TAF.

The TAF is a detailed airport forecast that is published annually by the FAA’s Office of Aviation Policy and Plans. The TAF is the official FAA forecast of aviation activity for US airports. It currently covers all FAA and Federal Contract towered airports included in the National Plan of Integrated Airport Systems (NPIAS). Information on the TAF’s methodology, which can vary by airport size, is published on the FAA’s website. The TAF summary report for each airport includes, as appropriate, aircraft operations (total, air carrier, commuter/air taxi, local and itinerant general aviation, and local and itinerant military), enplanements (total, air carrier, and commuter). At most airports, the TAF assumes an unconstrained demand for aviation services. Data in the TAF are presented for a U.S. governmental fiscal year (October through September), and generally cover the past 20 years of historic activity and the next 25 years of predicated activity FAA TAF.

5.7.4 Developing a Local Forecast.

5.7.4.1 If sponsors at towered airports have credible information that supports aircraft operations that differ from the TAF, the ARP POC requires written justification and supporting documentation for its approval before it can be used to develop NEMs. At nontowered airports, development of a local forecast is necessary since the TAF does not actively predict future operations at nontowered facilities. The general requirement for FAA approval of the Part 150 Study’s forecasts is that they are based on reasonable assumptions, supported by an acceptable forecasting analysis, and are consistent with the TAF. Refer to AC 150/5070 Airport Master Plans on forecast evaluations for TAF consistency and the forecast review
process. The forecast should be approved by the ADO planner and this formal approval included in the NEM documentation.

5.7.4.2 Two FAA publications can also help prepare local forecasts for developing the Future Condition NEM:

- AC 150/5070-6, *Airport Master Plans, Chapter 7, Aviation Forecasts*.

5.7.4.3 The ARP POC can provide additional guidance on using forecasting tools, techniques, and methods. Whether the aviation forecasts are being prepared by the airport planning staff or by consultants, early consultation and frequent discussions with FAA staff are encouraged.

5.7.4.4 Written approval to use the local forecast in the Part 150 Study from the FAA ADO or Regional Office is required before developing the future condition contours.

5.7.5 Future Fleet Mix.

Compile and analyze the aircraft and airport operations forecast to determine the operational characteristics for the average annual day of the forecast period. A key variable for future conditions is the fleet mix. Since newer aircraft tend to be quieter than older aircraft, selection of appropriate aircraft types for the future condition is important because and can have a significant effect on the size of the noise contours.

Sources to determine the future fleet mix include new aircraft orders that may replace certain existing aircraft include Securities and Exchange Commission (SEC) filings and annual reports of airlines, and order backlogs of aircraft manufacturers, and third-party vendor data on aircraft fleets and orders.

5.8 Running the Noise Model.

Only a computer-based mathematical model is capable of predicting the noise exposure associated with the complex operation of an airport and projecting that exposure to some future period.

5.8.1 Using the Most Current Noise Model.

5.8.1.1 Part 150 Sections A150.1(b) and A150.103(a) require that noise contours be developed using an FAA-approved methodology or computer program. The following model is approved for use in Part 150 Studies:

- AEDT is the FAA-approved tool for modeling noise. Information on ordering AEDT and guidance on its use are available on the FAA
5.8.1.2 The FAA noise models are maintained to stay current with evolving best practices in acoustic and flight performance modeling. However, the FAA recognizes that some noise analyses may require additional modeling methods to supplement the current FAA modeling capability. Some noise analyses may also require non-standard inputs and methods to properly model the unique circumstances at a given airport. In these cases, the FAA requires modelers to submit requests to use all non-standard modeling inputs and methods, such as aircraft substitutions, to the FAA for approval by AEE before use in any noise analysis. To expedite approval, the requests must first be coordinated with the airport’s FAA Office of Airports (ADO or Region) POC. The ADO or Region will coordinate the request through APP-400. An approval letter must be obtained from AEE before using the inputs in the Part 150 Study. The approval letter must be included in the NEM submission.

5.8.1.3 Requests to use non-standard input/methods should include documentation that demonstrates the reasons and the inputs/methods are more appropriate than the FAA-approved model. Before approving, AEE may request additional information. Previous approvals for similar studies will not

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25 Available at: [https://aedt.faa.gov/2c_information.aspx](https://aedt.faa.gov/2c_information.aspx).

26 Helicopter noise has been fully integrated into AEDT. Therefore, it is no longer necessary to use supplemental models to model rotary wing aircraft operations as well as new heliports.
guarantee approval for the new study since the FAA reviews each new study as a separate case.

For models other than AEDT, data input requirements may differ from those specified in the following subsections.

5.8.2 Using the Required Noise Metric.

For aviation noise analysis, the FAA has determined the yearly DNL, the day-night average sound level, as the primary metric for expressing the cumulative noise level individuals are exposed to resulting from aviation activities. The FAA also recognizes the Community Noise Equivalent Level (CNEL) for analyses at airports in California, the metric this state requires and applies to evening operations between 7:00 p.m. and 9:59 p.m. with a 5dB penalty per operation.

The cumulative metric, whether DNL or CNEL in California, must be used to analyze and characterize multiple aircraft noise events as well as to determine the cumulative noise exposure that individuals experience. Part 150 Section A150.205(c) defines DNL as the 365-day average day-night sound level in decibels. The symbol used to represent the DNL calculation is Ldn. It is computed with following formula:

\[ L_{dn} = 10 \times \log_{10} \left( \frac{1}{365} \sum_{i=1}^{365} 10^{L_{dni}/10} \right) \]

Where \( L_{dni} \) is the day-night average sound level for the \( i^{th} \) day out of one year, and the summation is from \( i=1 \) to 365.

AEDT estimates existing and future year average effects using average annual input conditions. Using this definition to model noise would require running 365 cases of the model and averaging the results. To avoid excessive computation, AEDT uses the concept of an “average annual day.” An average annual day is a reasonable representation of the average daily conditions at the airport in a typical existing and future year. These average conditions include the number and type of operations, routing structure, runway configuration, aircraft weight, temperature, and wind.

Supplemental noise analyses can be used to assist in the public's understanding of noise impact. Supplemental analyses are most often used to describe aircraft noise impacts for specific noise-sensitive locations, and

\[ \text{27 The repetitive cycle of events in most environments leads to the natural choice of a 24-hour day as the base period for evaluation of environmental noise since most airport operations are stable in their day-to-day schedules. However, at many airports, seasonal variations in schedules will change the frequency of aircraft operations during various months. Thus, in assessing the environmental effect of an airport, the daily average noise level, averaged over an annual period, should be considered. This would be expressed as a yearly average of daytime/nighttime average sound level.} \]
should be reported in an appendix. Use of supplemental metrics should fit the circumstances. Appendix A provides more detail about supplemental metrics and Table A-3 describes conditions under which supplemental metrics could be considered. Such supplemental noise analysis is not, by itself, a measure of adverse or significant aircraft noise or impact. AEE approval for supplemental metrics is not required if the metrics to be reported are listed in FAA Order 1050.1 or the Desk Reference for Airport Actions that accompanies FAA Order 5050.4. This so-called blanket approval of the metrics listed in the Desk Reference applies with the following caveat: “Some general discussion of potential secondary effects (e.g., sleep disturbance, disruptions of classroom learning, low-frequency impacts) may be appropriate. However, this discussion must not draw any specific conclusions about impacts or suggest that the findings are significant in any way if there are no approved FAA criteria and standards. Conversely, the discussion must include effective language about existing scientific uncertainties and the lack of FAA assessment methodology, impact criteria, and policy guidance in the area examined by supplemental metrics.”

5.8.3 Required Input Data.

For calculating noise contours, AEDT requires this input:

- Airport parameters, such as latitude, longitude, and average temperatures.
- Runway and helipad identifiers.
- Runway end and/or helipad data such as coordinates, width, and elevation.
- Flight track identifiers and geometry out to at least 30,000 feet laterally from the end of each runway.
- The number and type of aircraft that use each flight track and the local time each operation occurred. For calculating DNL/CNEL, the time of each operation must be sufficient to determine whether it falls during:
  - Daytime hours from 7:00:00 a.m. until 6:59:59 p.m. local time.
  - Evening hours from 7:00:00 p.m. until 9:59:59 p.m. local time (for CNEL only; otherwise counted as daytime hours).
  - Nighttime hours from 10:00:00 p.m. until 6:59:59 a.m. local time.
- Average local weather conditions: The AEDT database contains a 10-year average of weather conditions for each airport. Supplemental sources of average weather data including the National Oceanic and Atmospheric Administration National Climatic Data Center (NCDC) should therefore be used where AEDT requires the definitions for temperature, air pressure, relative humidity and dew point.

5.8.4 Optional Input Data.

Optional input information that may be used in some situations includes the following:
• U.S. Census Bureau TIGER® street files, American Community Survey Data, and/or Public Law 94-171 population data.
• Location of navigational aids (NAVAIDs) and fixes.

5.8.5 Noise-Power-Distance Curves.
Part 150 Section A150.103(b)(6) requires the use of government-furnished data depicting aircraft noise generation and performance characteristics if these data are not already part of the noise model’s database. These basic acoustical data are defined as Noise-Power-Distance (NPD) curves. Airport sponsors and consultants are not allowed to modify the noise model by altering the model’s basic acoustic data (i.e., the NPD curves) or spectral classes. However, users can still create a user-defined aircraft with a user-defined NPD, but this requires AEE review and approval.

5.8.6 Aircraft Substitutions.
The FAA has provided information on its protocol for submitting AEDT non-standard modeling requests on the FAA website. Approval should be coordinated through the ARP POC. One aircraft type may be substituted for another when noise and/or performance data are not readily available. AEDT includes approved aircraft substitutions that do not require AEE approval. Any other aircraft substitution must be coordinated with AEE to determine acceptability for use.

5.8.7 User-Defined Aircraft Types and Profiles.

5.8.7.1 AEDT standard database aircraft and departure and approach profiles should be used to model existing and forecast aircraft operations, unless the need for custom aircraft and/or departure and approach profiles is deemed necessary because these data may not realistically represent the airport’s flight operations. Collection of actual on-site or operator specific profile information is needed only if necessary to adjust for known, unique operating conditions. User-specified modifications to standard AEDT profiles affect both the estimated thrust of the engine, and the distance from source to receiver, as well as critical parameters in the final computation of noise for contours and grid point analysis.

5.8.7.2 If non-standard profiles are necessary for the project, AEE approval is required before using them. The process to follow for gaining this approval are in Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA. The process includes going through the ARP POC, submitting the request for approval to use non-standard aircraft and/or profiles, and obtaining an approval letter from AEE, which must be included in the NEM submission.

5.8.7.3 Noise Abatement Departure Profiles (NADPs).
AEDT contains ICAO-A and ICAO-B profiles, which align with the Close-In and Distant profiles in Advisory Circular 91-53A NADPs.
However, most airline operators will have specific Close-In and Distant profiles specific to aircraft type. The airlines develop standardized profiles that align with AC 91-53A for repeated, safe use by pilots. They are similar to the ICAO-A and –B profiles in AEDT, but can vary. If development of user-defined profiles is necessary to more closely incorporate airline specific profiles into AEDT, airport sponsors or their consultants must submit the profiles to AEE through the ARP POC for review and approval using the format outlined in Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA.

5.8.7.4 Ground Noise.

Although not specifically supported in AEDT, taxi noise can be modeled by creating an overflight track and a fixed-point overflight profile. The AEDT Supplemental User Manual provides instructions for modeling fixed-wing aircraft taxi noise, including an example overflight taxi profile. For modeling long duration, stationary ground noise, the AEDT aircraft run-up function should be used. As these are non-standard profiles, the profiles and their supporting documentation should be submitted to AEE through the ARP POC for approval.

5.8.7.5 Military Aircraft.

The aircraft and noise data in the AEDT database are from the U.S. Air Force NOISEMAP model. For some military aircraft, the AEDT aircraft database does not specify departure and approach profiles. In such cases, fixed-point profiles for these military aircraft need to be created and their justification (with supporting documentation) provided to AEE through the ARP POC. For these newly created profiles, however, AEE does not have a basis for evaluating their correctness given the lack of data. Their role is limited, therefore, to reviewing the supporting data, the methodology for determining the profiles, and the justification.

5.8.7.6 Touch-and-Go (TGO) and Circuit Flight (CIR) Profiles.

The AEDT database contains TGO and CIR profiles for almost all airplanes that have approach and departure performance coefficients. These TGO and CIR database profiles are not considered standard. Instead, they are generic profiles that require modifying to reflect their specific airport operational conditions. The steps for modifying the profiles are outlined in the AEDT User’s Guide.

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28 AEDT is regularly updated. It is recommended that all AEDT users check the FAA’s website (https://aedt.faa.gov/) for updates.
5.8.7.6.2 Adjustments to level segment altitudes do not require AEE approval. Working through the ARP POC, airport sponsors, or through their consultants, must provide AEE with justification and documentation on the adjustments made to the standard TGO and CIR profiles if the steps taken on the profiles are different from those outlined in the AEDT User’s Guide.

5.8.7.7 Helicopter Profiles.
Helicopter profiles are included in the AEDT database for several common helicopter types. These profiles should be reviewed to ensure they are appropriate for the airport’s operational conditions. Working through the ARP POC, sponsors or their consultants must provide AEE with justification and documentation when creating user-defined helicopter profiles or substitutions when no profiles exist in AEDT. For newly created profiles, AEE does not have a basis for evaluating their correctness of user-defined profiles, so their role is limited to reviewing the supporting data, methodology to determine the user-defined profiles, and their justification.

5.8.7.8 Profile Stage or Trip Distance.

5.8.7.8.1 Profile stage identifies the stage lengths for departure profiles. Stage length is a range of trip distances, or the distance between the aircraft departure and arrival points. Stage length is important because the longer the trip, the heavier the average takeoff weight due to increased fuel requirements, and the greater the noise potential. Historically, it has been easier to obtain trip length than average aircraft weight data, so stage length has been used as a surrogate for aircraft takeoff weight. However, given that aircraft weight directly affects the departure profile, it is best to obtain average takeoff weight if feasible from aircraft operators or using BTS T-100 segment data. AEE review and approval is not required if trip length or estimated takeoff weight is used as the basis for determining stage length.

5.8.7.8.2 Other approaches to determine stage length require AEE review and approval, the request routed through the FAA ADO or Region point of contact and supported with justification and documentation.

5.8.8 Noise Model Questions and Documentation.
Questions or uncertainties about the correct use of noise models should be directed to the airport’s ARP POC for resolution or verification. Sponsors and their consultants should be prepared on request to provide AEDT and other noise model files to the FAA electronically.
5.9 Generating Existing Condition Noise Contours.

5.9.1 Determining the operational characteristics for the average annual day requires compiling and analyzing airport and aircraft operations data for the most recent full calendar year or the most recent 12 consecutive months. This information should be formatted for input into the AEDT (or other FAA-approved model). The noise modeling should account for any operational noise abatement measures in use during the selected 12-month period.

5.9.2 Closed, continuous noise contours must be generated for at least DNL 65, 70, and 75 dB. According to Part 150 Section A150.101(a), additional noise contours below DNL 65 dB are optional. If the local jurisdictions have adopted a land use compatibility standard that identifies noncompatible uses in areas exposed to less than DNL 65 dB, the NEM should show contours corresponding to those levels. The NEM documentation should explain all local reasons for establishing noise sensitivity/compatibility below DNL 65 dB and include evidence of the jurisdiction adopting the standard. With a locally adopted standard, the FAA may approve noise abatement or mitigation measures in areas below DNL 65 dB (discussed in Chapter 7 of this AC). These approved noise measures may be eligible for federal funding but are considered a lower priority. If a contour other than 65, 70, or 75 dB is modeled for reasons other than a local standard, the information should go in an appendix.

5.9.3 Noise contours should be digitally superimposed over the land use base map that depicts the required information (described in Section 5.13). Field reviews should be used to verify the locations of noise sensitive areas, specific noise sensitive sites, and current land uses within the noise contours that are DNL 65 dB and above. This is particularly important if there has been an extended period between initial data collection and completion of the NEMs. The DNL 65, 70 and 75 dB noise contours (and locally significant contours, if applicable), then, should be incorporated into the GIS or other mapping program in order to quantify noise exposure in terms of population, households, and land use.

5.9.4 Although not required by Part 150, additional locations for AEDT receptors can be defined in a grid point analysis to calculate DNL values at specific noise-sensitive sites. The airport sponsor may choose to report these results in tables in the document to provide additional information to the public.

5.9.5 Timeframe Considerations and Requirements for Existing Condition NEM Submission. The Existing Condition NEM must identify each noncompatible land use with the year the NEM is submitted to the FAA ADO or Regional Office. Developing the NEMs frequently takes 6 to 12 months. There may be difficulty obtaining all the data necessary for generating noise contours or developing land use base maps. Delays can be encountered in obtaining approvals for user-specified noise model modifications or forecasts, and local controversy can delay the NEM process. By the time the NEMs reach the FAA, the data used to develop the NEMs may not be current and noncompatible land uses may not be accurately identified.
5.9.6 When the Timeframe for the Existing Condition NEM Differs from the Year of Submission.

If the Existing Condition NEM is based on data for a timeframe other than the year of submission, the transmittal letter to the FAA must certify that the data nonetheless represent current conditions. Specifically, the NEM submission must verify that the airport layout, runway use percentages, flight tracks, general aircraft mix, operational data, and noncompatible land uses are equivalent and that changes in total numbers of operations do not alter the accuracy on identified noncompatible land uses (usually indicated by change of DNL 1.5 dB or greater). If there are questions about this, the local FAA ADO or Regional Office is the best point of contact.

5.9.7 When Changes in Operational Data Occur Before Submission.

If changes have occurred that could alter the noise contour over noncompatible land uses, the assessment using an AEDT computer model should nonetheless proceed. The ARP POC should be able to handle questions on this matter.

5.9.8 When the Existing Condition NEM Data Are Not Current.

If the Existing Condition NEM does not represent current noncompatible land use conditions, the airport sponsor cannot certify that the Noise Exposure Map is correct (Part 150 Section 150.21(b)), and the Existing Condition NEM must be updated.

5.10 Noise Monitoring.

5.10.1 Part 150 does not require noise monitoring. Noise monitoring may be used for data acquisition and refinement and to enhance public acceptance, but not to calibrate the noise model or for enforcement purposes.

5.10.2 If noise monitoring is used, it should be accomplished in accordance with Part 150 Section A150.5, measuring and analyzing sound levels using the “A” frequency weighting filter and slow response setting. For computation of the DNL, measurements of individual aircraft events must be reported in sound exposure level (SEL), as defined in Part 150 Section A150.205. Average sound level may be calculated from the SELs of the individual events. The Society of Automotive Engineers Aerospace Recommended Practice ARP4721, Monitoring Aircraft Noise and Operations in the Vicinity of Airports, provides additional guidance. The narrative should indicate that the noise monitoring followed Part 150 guidelines.

5.10.3 The FAA does not endorse the use of noise monitor data to calibrate noise models. Noise monitor installations can vary greatly from airport to airport and data measurement and collection methods are not yet fully standardized. In addition, noise models such as AEDT compute average conditions over the course of a year. Variations
in parameters—such as weather, aircraft payload, tracks, pilot techniques, ambient noise—make it difficult to compare monitor data to model output.

5.10.4 Depicting Aircraft Noise Monitoring Sites on the NEMs.

If noise monitoring is used in the study, the locations of the aircraft noise monitoring sites must be graphically depicted, as required by Part 150 Section A150.101(e)(7). Noise monitoring sites may be depicted on a supplemental land use base map, instead of the NEMs, in the interest of avoiding too much clutter. The same rules apply here as for supplemental graphics depicting flight tracks (see Section 5.6 of this AC).

5.11 Generating Future Condition Noise Contours.

5.11.1 The airport sponsor can only designate one future condition map as the Future Condition NEM for a finding under Part 150. The NEM forecast map must be based on reasonable forecast aircraft operations at the airport and on other reasonable planning assumptions beginning five years after the year the NEMs are submitted to the FAA. The submission can also include additional maps for supporting information, analytical purposes, or longer-range planning.

5.11.2 The forecast aircraft and airport operations should be compiled and analyzed to determine the operational characteristics for the average annual day for the forecast period. As discussed in 5.7.1, a key variable for the forecast is the fleet mix. Newer aircraft tend to be quieter than older aircraft. Part 150 Section 150.21(a)(1) requires that the forecast map be based on reasonable planning assumptions, including any planned airport development. Therefore, the Future Condition NEM may show a different airfield configuration or airport layout than the Existing Condition NEM. The narrative accompanying the NEMs must adequately explain all assumptions.

5.11.3 The Future Condition NEM should be superimposed over a future land use map, if available. The future land use map should depict land use changes anticipated by the year of the Future Condition NEM, and the accompanying text explain the assumptions regarding those future land use changes.

5.11.4 Timeframe Considerations for Future Condition NEM Submission.

5.11.4.1 Developing the NCP frequently takes 12 to 18 months following completion of the NEMs. Consultation requirements, local issues, complex environmental analysis, and local controversy can delay the NCP process. For these reasons, airport sponsors should consider submitting the NEMs and NCP separately. The year selected for the Future Condition NEM should take into consideration the anticipated timeline for completing the NCP, if one is going to be prepared.

5.11.4.2 The FAA encourages airport sponsors to take a long-range look at land use and forecast noise impacts around the airport. The long-range plans can assist the decision making of land use planning agencies. They often do
not provide a solid basis on which to base federal funding decisions for proposed noise measures. Federal participation is determined using an accepted NEM, and the FAA has discretion to use either the Existing or Future NEM depending on which is more appropriate. Questions about the use of either Existing or Future NEMs as the basis of federal funding decisions should be coordinated with the FAA ADO or Regional point of contact, including discussing how selection of either NEM may affect the NCP implementation and timeframe for updating the NEMs and NCP.

5.11.5 The “Future Condition NEM, without NCP Implementation”. This NEM should factor in existing operational noise abatement measures that are expected to still be in effect in the forecast year and include planned changes in airport layout expected to be in place by the forecast year. It would not include new or modified measures recommended for implementation in the NCP.

5.11.6 The “Future Condition NEM, with NCP Implementation”. This NEM should include existing operational noise abatement measures expected to still be in effect in the forecast year as well as planned changes in airport layout expected to be in place by the forecast year. It would also include new or modified measures recommended for implementation in the NCP.29

5.12 Determining Compatible and Noncompatible Land Uses. Different uses of land have different sensitivities to noise. Land use compatibility is primarily determined by whether the level of noise interferes with noise-sensitive human activities. The effects of noise may include sleep disruption; speech interference; inability to concentrate, study, or performing critical tasks; reduced enjoyment of performing arts, religious observances, and outdoor activities; and failure to hear warning sounds. Individuals may have different perceptions of acceptable or unacceptable levels of noise for any given activity. ASNA requires the FAA to identify land uses that are normally compatible with various levels of exposure to noise regardless of the diversity of individual perceptions. See Part 150 Table 1 for land use compatibility guidelines.

5.12.1 General Guidelines for Determining Noise-Sensitive Land Uses.

5.12.1.1 Residential Facilities. Part 150 Table 1 shows structures designed for residential use that are considered noise sensitive. NEM land use classifications should differentiate single-family, multi-family, mobile homes, transient, and institutional residential structures from each other unless local planning and zoning data does not allow this distinction. Residential facilities may include the following:

29 Not all of the NCP procedures may be approved, however.
1977  • Single family homes
1978  • Multi-family residential structures
1979  • Mobile homes, manufactured homes, and trailer houses
1980  • Retirement homes and assisted-living facilities
1981  • Fraternity and sorority houses
1982  • Residence halls and dormitories
1983  • Orphanages
1984  • Convents, monasteries, and rectories
1985  • Hotels, motels, and bed and breakfast inns
1986  • Rooming and boarding houses
1987  • Campgrounds, recreational vehicle parks, and trailer parks

1989  Table 1 of Part 150 does not reference national, state, and local parks, wilderness areas, and wildlife refuges where other noise is very low and a quiet setting is a generally recognized purpose and attribute. Consulting with the ARP POC will help determine if these “quiet setting resources” are located in the noise contour so the FAA can determine what particular land uses are appropriate for certain measured or calculated noise exposure levels.

1995  5.12.3 Compatible versus Noncompatible Land Uses.

1996  5.12.3.1 ASNA required the FAA to identify land uses that are “normally compatible” or “noncompatible” with various aircraft-generated noise levels. Land use guidelines, however, even those adopted by regulation, are planning tools that provide general indications, not absolutes, as to whether particular land uses are appropriate for certain measured or calculated noise exposure levels.

2002  5.12.3.2 According to Part 150 Section A150.101, Table 1, “the responsibility for determining the acceptable and permissible land uses rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.” Locally adopted standards take precedence over federal guidelines. However, these standards must be applied consistently. For example, designations of noncompatible land uses within the locally adopted contours should apply to all noise generating sources, not just airports. In addition, some states
such as California may have factors that render certain land uses compatible.

5.12.3.3 Identifying Compatible versus Noncompatible Land Uses on NEMs.

For NEMs, land uses are identified as either compatible or noncompatible, without footnotes, caveats, qualifications, stipulations, or conditions. Each parcel within the DNL 65 dB and higher contours has a yes/no determination.

There may be situations where land uses that might normally be identified as noncompatible under Part 150 are considered compatible, for example, land uses that have been acoustically treated (sound insulated) or have an avigation easement and so been rendered compatible for purposes of Part 150. Instances such as these should be identified as compatible if the airport sponsor already mitigated the land uses under a previously approved Part 150 Study.

In accordance with Part 150 Section A150.101(e)(5), a land use is not identified as noncompatible if it self-generates noise or the ambient noise from other non-aircraft and non-airport uses (such as highways and railroads) is equal to or greater than the noise from aircraft and airport sources.

5.13 NEM Requirements.

The map portion of the NEM submission package must include at least Existing Condition and Future Condition NEMs with the following information.

Indicate the Year the Map Represents.

The year that the Existing Condition and Future Condition NEMs represent must be indicated on the face of each map. The future condition must be at least 5 years beyond the year shown on the Existing Condition NEM. If the year the map represents is not the year of submittal and at least 5 years in the future, the airport sponsor must certify that the Existing Condition NEM is still valid and the forecast year would nonetheless represent a year at least five years from the Existing Condition NEM (see Section 5.9).

Depict the Airport and Its Environments.

Airport boundaries, runway configurations including runway end numbers, and streets and other identifiable features in the airport environs must be identified.

Depict Noise Contours.

Continuous noise contours of at least DNL 65, 70, and 75 dB must be graphically depicted.

Part 150 Section A150.101 (e) requires that the locations of noise-sensitive public buildings including schools, hospitals, nursing homes and other health care facilities, and properties eligible for listing or listed in the National Register of Historic Places be depicted. These structures and historic properties must be clearly depicted on the map in a manner that allows them to be readily identified, such as by using special symbols. There must be a legend on the face of each map that relates the selected markings to the specific types of structures and historic properties that have been identified. If there are no noise sensitive structures within the contour, the NEM narrative should state this.

5.13.5 Identify Noncompatible Land Uses.

NEMs must identify noncompatible land uses within the noise contours. These noncompatible land uses should be clearly identified on the map in a manner that allows them to be readily identified, such as, by colors, shading, and cross-hatching. There must be a legend on the face of each map that relates the selected markings to the specific noncompatible land uses that have been identified.

5.13.6 Identify Jurisdictions.

Geographic boundaries and names of the jurisdictions with authority to plan and control land uses within the noise contours must be depicted and identified.

5.13.7 Use a Sufficient Scale.

The NEMs must be of sufficient scale to be clear and readable, and the scale should be indicated on the face of the map. Part 150 Section A150.103 (b) (1) requires the scale of a map to be no smaller than 1 inch to 2,000 feet. Depending on the size of the noise contours, this scale may require a paper size that does not easily fit into the published document. Therefore, this requirement may be met by including the large graphic in a pocket within the published document. A smaller-scale version (with the scale shown) that fits on an 11” x 17” or 8.5” x 11” page may be included as a supplemental graphic. See Section 5.6.5 for further details.

5.14 NEM Submittal.

5.14.1 The NEMs are more than just two graphics depicting the existing and forecast year noise contours and noncompatible land uses. The Noise Exposure Maps and supporting documentation (listed below) constitute the NEM submission.

5.14.2 Part 150 submittals can consist of NEMs without an NCP or NEMs and an NCP together. NEMs may be submitted immediately upon completion or at the end of the study process. See Sections 5.9 and 5.13 for a discussion on the need for current information at the time of submittal of NEMs—either separately or in combination with the NCP.

5.14.3 The airport sponsor should retain all study files, including the electronic AEDT input files used to generate the NEMs. The FAA may from time to time request these files for review. Because there is a requirement to update the NEMs if there is a significant
change in the noise environment over noncompatible land uses, having the data files in electronic form makes this task much less costly or tedious.

5.14.4 First-time map submissions do not need to be specifically identified as such, but revisions to NEMs previously in compliance with Part 150 do need this identification and it would help for reader reference to include the date of the previous NEMs.

5.14.5 Including Supporting Documentation.

The NEM submittals should comprise documentation to support the current and forecast years:

- Type and frequency of aircraft operations
- Number and type of aircraft operations during daytime and nighttime periods
- Runway use percentages
- Flight tracks and flight track use percentages
- Operational noise abatement measures that were modeled
- Location of any aircraft noise monitoring sites
- Existing land uses and demographic data
- Planned land use changes
- Anticipated demographic changes in the surrounding areas
- Estimated number of housing units and people residing within each noise contour
- The land use compatibility table used to determine noncompatible land uses
- A description of how forecast operations will affect the compatibility of land uses
- A listing of consulted parties
- A copy of all written comments received during consultation or verification that none were received
- A narrative description supported by documentation of the consultation accomplished on the NEMs and of the opportunities afforded the public to review and comment during the development of the NEM documentation

5.14.6 Including the Airport Name and Airport Sponsor’s Name on the NEM Submission.

The NEM submission will identify the airport name and the airport sponsor. It is desirable to have this information on a cover page of the submission. However, Part 150 does not specify a particular format, as long as this information is included and clearly understandable.

5.14.7 Submitting the NEMs for Preliminary Review.

The FAA encourages airport sponsors to submit the NEMs and supporting documentation for preliminary review before the formal submission so the FAA can determine whether the NEMs comply with Part 150 requirements. The sponsor may
request the FAA’s informal advice, policy review, or technical guidance at any time during the development of the NEMs. Depending on comments from the FAA, revisions to the NEMs and supporting documentation may be needed before formally submitting them to the FAA.

5.14.8 Formally Submitting NEMs.

Formal submission requirements for NEMs and supporting documentation are outlined below and examples of two of them—the cover letter and airport sponsor certifications—are provided in Appendix D. It is recommended, but not required, that the submission include the checklist that is in Appendix B to show up front the requirements of Part 150 for NEMs have been met.

5.14.8.1 Cover Letter.

The formal submission of the NEMs should be accompanied by a signed and dated cover letter from the airport sponsor. The letter should indicate that the sponsor, not its consultant or other party, is submitting the NEMs. The cover letter should state that the NEMs and supporting documentation are being submitted under the provisions of Title 1 of the ASNA (recodified at 49 U.S.C. Section 47503) and Part 150, for appropriate FAA determination.

5.14.8.2 Sponsor’s Certification.

The NEMs and supporting documentation must include the “sponsor’s certification,” preferably on a page at the beginning of the document. However, the regulation requires no specific format. The following considerations apply to the certification.

- The Airport Sponsor is required to certify that it has afforded interested persons adequate opportunity to submit their views, data, and comments about the correctness and adequacy of the draft NEMs and descriptions of forecast aircraft operations (Part 150 Section 150.21(b)).

- Part 150 Section 150.21(e) requires the airport sponsor to certify that each map (or revised map) and description of consultation and opportunity for public comment are true and complete under penalty of 18 U.S.C. Section 1001.

- The Airport Sponsor must attest to the accuracy of map data by stating that the Existing Condition NEM accurately identifies noncompatible land uses as of the date of submittal. See Section 5.9 of this AC for a discussion on the timeframe considerations for Existing Condition NEM submissions.

The same verification and certification must be provided for the map developed for the existing and forecast years. For delayed

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30 See Part 150 Section 150.21(e)
submissions, the verification should explain why the underlying assumptions are still reasonable and the forecast NEM continues to represent conditions at least 5 years from the year of submission.

5.14.8.3 Supporting Documentation.

5.14.8.3.1 Accompanying information needs to document the reasonable assumptions about future type and frequency of aircraft operations, number of nighttime operations, flight patterns, airport layout and planned airport development, planned land use changes, and demographic changes in the surrounding areas. This information also needs to explain how the forecast operations will affect the compatibility and land uses depicted on the map.

5.14.8.3.2 In addition, the airport is requested to include the geospatial map file of the existing and future contours in the final submission.

5.14.8.4 Required Number of Copies Submitted.

Five hardcopies and one electronic file (including geospatial file of existing and future contours) of the NEMs and supporting documentation should be submitted to the FAA ADO or Region point of contact unless informed otherwise. The local FAA office may request fewer, or additional, copies to expedite their review and response time.
CHAPTER 6. REVIEW AND UPDATING EXisting PART 150 STUDIES

6.1 Overview.

6.1.1 Airport sponsors should periodically review the airport’s existing Part 150 Study to determine whether the NEMs still accurately reflect current operational conditions and land use patterns and that the NCP measures are being implemented according to their schedule. The review should examine the NCP and decide if it is time to reevaluate approved noise abatement and mitigation measures or to add new ones. For example, the review could raise these questions:

- Are changes to previously approved measures warranted? Or could new measures be proposed to reduce impacts further?
- Have all the land use measures been completed? For example, are previously approved measures still appropriate, especially operational noise abatement measures?
- Should the noise measures portion of the NCP be expanded?
- Has there been a change in fleet mix, number of operations, runway usage, IFPs, or nighttime operations that would change the noise contour to the degree that NEMs must be revised according to the statute and thereby change the existing NCP (see Section 6.2.3).
- Quantifying changes and their effect on noise contours becomes very important when sponsors are seeking funding for sound insulation programs.
- How successfully are the local land use jurisdictions carrying out measures within their authority?

6.1.2 Part 150.23(e)(8) requires airport sponsors to identify the period covered by the NCP program and schedule for implementation. At the end of this period is an opportune time to review the Part 150 Study to assess the NCP’s progress, seeking assistance on updating the NEM or NCP from the ARP POC.

6.2 Updating NEMs.

ASNA and Part 150.21(d)(1) require, in general, that airport sponsors update their NEMs when the DNL\(^{31}\) increases or decreases at least 1.5 dB over noise-sensitive land uses. Such a revision is required only if the relevant change in the operation of the airport occurs during the forecast period of the applicable noise exposure map submitted by an airport operator; or the implementation period of the airport operator’s noise compatibility program.\(^{32}\) The definition of “substantial new noncompatible use” in Part 150 Section 21(d)(1) should not be interpreted to apply only to areas that experience a 1.5 dB increase or newly noncompatible land uses experiencing less than 1.5 dB

\(^{31}\) FAA recognizes CNEL for California projects.
\(^{32}\) See Section 174 of FAA Reauthorization Act 2018.
increase. Also of concern are land uses becoming noncompatible because the noise level increases from 64 dB to 65 dB. If numbers of aircraft operations significantly increase or decline or the fleet mix changes to substantially louder or quieter aircraft, NEM updates might be needed if these changes alter the airport’s noise contours.\(^{33}\) This, in turn, can have ramifications for the NCP and the funding considerations of previously approved NCP measures. FAA noise-related funding decisions are based on accurate NEMs. Some techniques for determining whether NEMs need to be updated are described in the next subsections.

### 6.2.1 Timing of Updates

Some airports may prefer to update their NEMs on a regular basis. The schedule could match forecast conditions or be on a specific schedule, such as 5 years. An update is particularly important if the airport receives or intends to request federal funds to carry out noise measures. If an NEM update is included as an FAA-approved NCP measure, it is potentially eligible for federal funding provided it also meets the AIP justification requirements.\(^{34}\) Periodic updates might be necessary because of local commitments to report this information, or state requirements. ASNA and Part 150 require that, if the NEM is updated and shows a change in compatible land use, the airport sponsor update the NCP. This should be listed as an Administrative Measure within the NCP.\(^{35}\)

### 6.2.2 State Requirements

Some states require airports to develop NEMs similar to the Part 150 Study, so sponsors should check whether their states have such regulations. Although these state requirements do not supersede the Part 150 regulations, the results of those other studies can be used as a gauge to determine whether NEMs must be updated under 14 CFR Part 150 Section 21(d).

### 6.2.3 Assessing Changes to Noise Contours

Although changes to land use within an airport’s NEM are relatively easy to determine through a windshield survey, such as by driving through the communities or by reviewing recent aerial photography, it is often difficult to know whether an increase or decrease of DNL 1.5 dB has occurred over noncompatible land use without running the AEDT. Unforeseeable impacts associated with IFPs, air traffic management, or air commerce may have occurred since the time the NCP was approved. Therefore, a variety of factors need to be considered and professional judgment applied when assessing potential changes to noise contours resulting from changes to aircraft operations.

#### 6.2.3.1 Assessing the Nature of Operational Changes

Airport sponsors should have an electronic set of the study files, including all those used to develop the NEMs, so adjustments to determine whether

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\(^{33}\) For example, day night split change, significant change in fleet mix, quieter aircraft, nighttime cargo operations, and changes in operational procedures.

\(^{34}\) See AIP Handbook at: [https://www.faa.gov/airports/aip/aip_handbook/](https://www.faa.gov/airports/aip/aip_handbook/).

\(^{35}\) See Part 150 Section 23(e)(9).
there is a DNL 1.5 dB increase or decrease over noncompatible land uses will not be too burdensome. When operational noise abatement measures can no longer be uses in accordance with the approved measure or when there are other changes to air traffic management, the new traffic flows need to be evaluated. If the operational changes include changes to runway utilization, flight tracks, or flight track utilization, then AEDT should be used to assess these changes.

6.2.3.2 Using the FAA Approved Computer Program.
Since AEDT is the current FAA-approved computer model for assessing operational changes, updating AEDT files to assess operational changes should not involve extensive resources. AEDT accepts older Integrated Noise Model (INM) input files. Questions about modeling should be directed to the FAA along with documentation of the types of changes that have occurred at the airport. This documentation could briefly describe the change(s) and include supporting statistical data or graphical depictions of operational changes.

6.2.3.3 Screening.
6.2.3.3.1 In very limited circumstances, using the Area Equivalent Method (AEM) may help determine whether the overall area within the noise contour has increased by 17 percent or more (this would indicate a potential 1.5 dB increase requiring an NEM update). The AEM provides an indication of the overall percent of change to the noise contour area in tabular form. Assessments using the FAA’s AEM computer model are appropriate under the following types of changes to airport operations:

- Non-locational in nature (involving changes in flight tracks) and only affect the number of aircraft operations
- Aircraft fleet mix adds noisier aircraft
- Day/night split of aircraft operations adding more nighttime, operations or changes runway use percentages

6.2.3.3.2 If operational changes include helicopter operations, AEM cannot be used. The AEM algorithms that relate aircraft Landing-Takeoff cycles to contour area were not designed to include helicopter operations. Consequently, given degree of uncertainty when trying to model helicopter operations in AEM, AEDT is the most appropriate.

6.2.3.3.3 The AEM provides extremely limited information as a Part 150 screening tool because of the specificity required for all Part 150 assessments. As a

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36 The AEM can only be used to evaluate changes to fleet mix or numbers of operations because the model assumes a single runway and single direction operations. It cannot determine if the shape of the noise contour has changed.
result, the FAA must approve use of AEM for Part 150 Studies ahead of time. AEM cannot be used to certify that an outdated NEM is valid.

6.3 Revising NCPs.
Revising an NCP is not always required when NEMs are updated. Part 150 states that NCPs should include a provision for revising the program if made necessary by revision of the NEMs. If the NEMs are revised and the new maps reveal that land uses previously designated noncompatible are now compatible or vice versa, then NCP elements based on the previous NEMs may no longer be applicable or new elements may be needed. In this case, NCP measures affected by changes in the noise contour need to be updated, especially to remain eligible for AIP funding. The FAA will consider whether ongoing noise measures that are near completion will remain eligible and justified.

6.3.1 Determining When an NCP Update is Necessary.
Although Part 150 Section 23(e)(8) requires identifying the period covered by NCPs, Part 150 does not specifically state when an NCP update is or is not required. FAA policy on funding noise projects has practical implications to seriously consider when deciding whether to update an NCP. For example, if revised NEMs reveal a significant increase or decrease in the size of the noise contours over noncompatible land uses, the relationship needs to be examined between the updated NEMs and the geographical extent of previous FAA-approved NCP noise abatement measures such as property acquisition/or sound insulation. Operational noise abatement measures may no longer be effective due to land use encroachment or changes in air traffic flow patterns and the airport and other airports in the vicinity. Sometimes the NCP may need to be updated after an airport infrastructure development project.

6.3.1.1 Cases Where NEMs Reveal Additional Noncompatible Land Uses.
When revised NEMs reveal additional noncompatible land uses within the DNL 65 dB contour, the number of additional properties that would be potentially eligible for mitigation according to approved measures in the NCP need to be determined and included in an NCP revision.

6.3.1.2 Cases Where the NEMs Reveal a Reduction in Noncompatible Land Uses.
If revised NEMs reveal a reduction in the number of noncompatible land uses inside the DNL 65 dB or greater noise contours, then properties previously considered to be eligible for mitigation using FAA funding may lose their eligibility. Noncompatible land uses that shift from being inside a higher noise contour to a contour of lesser noise would also not be eligible for previously approved mitigation (such as acquisition) unless that same type of mitigation was included in the previously approved NCP for the lower noise contour area. Reduction in noncompatible land uses need to be included in a revised NCP.
6.3.2 AIP Priority Rating.

FAA program guidance provides that noise mitigation projects will receive an AIP priority rating based upon the noise contour in which they are located. Projects inside higher-level noise contours receive a higher priority rating than projects inside lower-level noise contours. Because of the competition for AIP funding with other airports’ noise mitigation projects, the goal of the priority rating system is to ensure that federal funding of noise mitigation projects is directed first to the more highly noise-impacted projects. See FAA Order 5100.38.
CHAPTER 7. PREPARING NOISE COMPATIBILITY PROGRAMS

7.1 Introduction.
An NCP contains the measures airport sponsors propose to implement for reducing existing noncompatible land uses and preventing the introduction of new noncompatible land uses within the area covered by the sponsor’s NEMs. The NCP may also consider actions proposed by other responsible agencies.

7.1.1 Purposes of the NCP.
The purposes of the NCP are fourfold:
- Promote a planning process in which airport sponsors can study airport noise impacts as well as the costs and benefits of alternative noise reduction techniques.
- Encourage land use jurisdictions through the planning process to examine existing and forecast noncompatible land uses and consider actions to reduce them.
- Use public participation and agency coordination to facilitate creating a noise abatement plan that all interested parties (to the best of their ability) can agree on, that is suited to a particular airport, and will not unduly affect the national air transportation system.
- Develop noise reduction techniques and land use control that, to the extent they can:
  - Confine aircraft DNL values of 75 dB or greater to areas within the airport boundary.\textsuperscript{37}
  - Establish and maintain compatible land uses in the areas between the DNL 65 and 75 dB contours.

7.2 NCP Standards for Analysis and Approval.
Based on the airport noise exposure and the noncompatible land use identified in the NEM documentation, the NCP’s final measures\textsuperscript{38} must meet these requirements:
- Reduce existing noncompatible uses.
- Prevent or reduce the probability of additional noncompatible uses being established.
- Does not impose an undue burden on interstate or foreign commerce.
- Can be revised if changes in the NEM show NCP revision is necessary.
- Is not unjustly discriminatory.
- Does not reduce safety or adversely affect the safe and efficient use of airspace.

\textsuperscript{37} For California, the FAA accepts the CNEL, which is similar to the DNL metric, but adds an evening weighting.
\textsuperscript{38} Title 14 CFR Part 150 Appendix B150.5.
7.3 Consideration of Program Alternatives.

The FAA examines NCP recommendations using all of the 14 CFR Part 150 approval criteria. Under Part 150 Section B150.7(b), each NCP must at a minimum consider whether the following noise compatibility program alternatives apply at the airport. The consideration of additional measures is optional, and can be recommended during the consultation process by any consulting party. Table 7-1 lists possible actions that could be considered for airport-specific noise problems. These measures come directly from ASNA (recodified at 49 U.S.C. Section 47504) and are also found in Part 150 Section B150.7(b).

7.3.1 Program Alternatives That Must Be Considered.

These minimum measures must be considered for applicability and feasibility at airports developing an NCP.

7.3.1.1 Acquisition.

Acquisition of land and interests therein, including but not limited to air rights (e.g., over flight rights), easements, and development rights to ensure property use is for purposes which are compatible with airport operations.

7.3.1.2 Construction and Shielding.

Construction of noise barriers and acoustical shielding including the sound insulation of public buildings.

7.3.1.3 Runway Use.

Implementation of a preferential runway use plan.

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39 The term “sound insulation” is also called “sound attenuation,” “noise insulation,” or “sound proofing.”
Table 7-1. Matrix of Possible Noise Control Alternatives

<table>
<thead>
<tr>
<th>IF YOU HAVE NOISE FROM:</th>
<th>CONSIDER THESE ACTIONS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRPORT LAYOUT CHANGES</td>
<td>Changes in Runway Location or Length</td>
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<tr>
<td></td>
<td>Isolating Maintenance Run-ups or Use of Noise Barriers and Acoustical Shielding</td>
</tr>
<tr>
<td>AIRPORT &amp; AIRSPACE USE AND AIRCRAFT OPERATION</td>
<td>Preferential or Rotational Runway Use</td>
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<tr>
<td></td>
<td>Preferential Flight Track Use</td>
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<tr>
<td></td>
<td>Modification to Approach and Departure Procedures</td>
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<tr>
<td></td>
<td>Restrictions on Ground Movement of Aircraft</td>
</tr>
<tr>
<td></td>
<td>Restrictions on Engine Run-ups or Use of Ground Equipment</td>
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<tr>
<td></td>
<td>Use Restrictions</td>
</tr>
<tr>
<td>LAND USE</td>
<td>Comprehensive Planning</td>
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<tr>
<td></td>
<td>Compatible Use Zoning/Zoning Regulations</td>
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<td></td>
<td>Subdivision Regulations</td>
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<tr>
<td></td>
<td>Real Estate Disclosure</td>
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<tr>
<td></td>
<td>Land Acquisition and Relocation</td>
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<td>Acquisition of Vacant Land</td>
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<td></td>
<td>Noise Insulation</td>
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<tr>
<td></td>
<td>Acquisition of Easements or Development Rights</td>
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<tr>
<td></td>
<td>Purchase Assurance/Sales Assurance/Transaction Assistance</td>
</tr>
<tr>
<td>NOISE PROGRAM MANAGEMENT</td>
<td>Pilot Awareness Program</td>
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<td></td>
<td>Periodic Program Monitoring</td>
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<td></td>
<td>Establish a Noise Abatement Contact/Noise Complaint Hotline</td>
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<tr>
<td></td>
<td>Noise Monitoring</td>
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<tr>
<td></td>
<td>Establish Community Participation Program</td>
</tr>
</tbody>
</table>

These measures come directly from the ASNA (recodified at 49 United States Code (U.S.C.) 47504) and are also found in Part 150 Section B150.7(b).
7.3.1.4 Flight Tracks and Procedures.
Use of flight visual and instrument flight tracks, including the modification of charted IFPs and CVFPs, to control the operation of aircraft to reduce noise exposure to individuals or specific noise-sensitive areas around the airport.

7.3.1.5 Restrictions.
Restrictions that affect Stage 2 and Stage 3 aircraft must comply with 14 CFR Part 161 requirements. Title 14 CFR Part 161 implements relevant portions of ANCA that relate to restrictions on flight operations. Many of the restrictions specified in ASNA may be superseded by technological advances or procedures and are no longer appropriate. Part 161 restrictions on the use of the airport by any type or class of aircraft based on their noise characteristics can include any of the following:

- Denial of use of the airport to aircraft types or classes that do not meet federal noise standards.
- Capacity limitation based on the relative noisiness of different types of aircraft.
- Mandatory requirements for aircraft using the airport to use noise abatement takeoff or approach procedures previously approved as safe by the FAA.\(^{41}\)
- Landing fees based on FAA certificated or estimated noise emission levels, or on time of arrival.
- Partial or complete curfews.

7.3.1.6 Other Alternatives or Combinations of Measures.
Other actions or combinations of actions which would realize noise control or abatement benefits for the public within the noise-impacted area, such as refined aircraft departure profiles.

7.3.1.7 FAA-Recommended Alternatives.
Under Part 150 Section B150.7(b)(7), airport sponsors must consider “other actions recommended for analysis by the FAA for the specific airport.” Although it is expected that FAA recommendations would usually be offered during the consultation process, the FAA may also provide them after the NCP has been submitted. The FAA may recommend a new alternative not previously considered or a variation of an alternative that was considered and rejected.
7.3.2 Implementation Authority.

7.3.2.1 In accordance with Part 150 Section B150.7(c), the NCP must indicate for each considered measure the category of the entity or combination of entities that has authority to implement the measures. Entities with this authority might include:

- Airport operators or sponsors
- State agencies or political subdivisions of a governing body
- The FAA
- Other federal agencies

7.3.2.2 The NCP should also indicate the willingness of the entity or entities to implement the alternatives.

7.3.3 Alternatives Description and Analysis.

7.3.3.1 Part 150 Section 150.23(e)(2) requires a description and analysis of the considered noise abatement alternatives and a discussion of why specific measures were rejected for inclusion in an airport sponsor’s final NCP. The description should be sufficiently detailed to be clearly understood. The amount of analysis will vary with each alternative and with the amount of interest in pursuing particular requirements.

7.3.3.2 Generally, Part 150 does not specify the analytical detail required to justify rejected alternatives. The rationale presented in the documentation for rejecting alternatives should be reasonable and not arbitrary or capricious. The analysis should ensure measures are not rejected because of faulty technical analysis or flawed conclusions (for example, by claiming a particular measure is illegal when it is not).

7.3.3.3 Requirements for analyzing alternatives that are recommended for the NCP are detailed in the next section.

7.4 Alternatives Recommended for Implementation.

7.4.1 The NCP documentation must clearly indicate which noise abatement alternatives are recommended for FAA approval/implementation. These must be recommended by airport sponsors, not their consultants or other parties; however, sponsors may recommend measures proposed by other parties. NCP alternatives are premised on existing and projected noise levels. They should be reexamined when there are changes in operations or layout at the airport that would result in an increase or decrease of
1.5 dB in noise exposure over noncompatible land uses, or changes in land uses around
the airport.

7.4.2 Even though the Part 150 regulation, FAA staff, the public, and other consulted parties
may recommend the consideration of specific alternatives, airport sponsors have the
final decision on which alternatives to reject and which to recommend in the NCP.

Analytical Requirements and Program Standards.
There are no exceptions to the analytical requirements and the program standards
imposed by Part 150 Section B150.5. Insufficient analysis in NCP documents could
lead to disapproval of an otherwise perfectly reasonable recommendation.

7.4.3.1 Requirements for Continuation of Past Practices.
Recommendations of measures that are continuations of past practices but
not previously approved in an NCP (for example, noise practices that were
put in place locally outside of the formal Part 150 Process), must meet the
same analytical requirements and program standards as new measures if
they are submitted for FAA approval. If sponsors do not desire formal
FAA approval for noise abatement and mitigation practices already in
place at the airport, the NCP document must describe them in its
introduction existing conditions section as part of baseline conditions.
These practices also must be described in the narrative as practices that
were modeled for developing the Existing Condition NEM. These
modeled and described practices must accurately reflect what is occurring
at the airport. For instance, if an FAA-approved IFP in a previously
approved NCP is no longer used, actual flight tracks must be modeled as
the NEM baseline and described in the narrative.

7.4.3.2 Re-Approval of Previously Approved Alternatives.
7.4.3.2.1 No FAA action is required to implement measures that have been
approved in a previous NCP. However, if an approved alternative is not
implemented within five years of the date of approval, it is considered
expired and not part of the baseline conditions, and needs to be
re-analyzed in an NCP update. Modified measures the FAA approved in
an earlier NCP which are submitted for reapproval must meet the
analytical requirements and program standards as if they were a first-time
request for approval. Updated NCPs replace the most recent, previously
approved NCP.

7.4.3.2.2 Upon re-evaluation, a previously approved alternative may need to be
modified to improve noise-reduction benefits or removed because it is no
longer applicable due to changes in land uses. A measure may no longer
be feasible or effective due to safety, efficiency, air traffic management, or
other airspace constraints in the vicinity. Only the re-evaluated alternatives
that are shown to be feasible and noise beneficial for FAA re-approval
should be submitted in the NCP update.
7.4.3.3 Previously Approved but Unchanged Operational Measures.

Previously approved operational measures successfully in place at the airport and depicted on the NEMs do not normally have to be reevaluated when updating an NCP—as long as no changes have been made to the measures. These measures are reported as part of the baseline conditions at the airport, with no request for an FAA re-approval. A sponsor needs to produce a table summarizing all previously proposed measures (from previous NCPs), FAA approval status, implementation status, and action required/requested by FAA. Questions that arise concerning these measures should be discussed with the ARP POC.

7.4.4 Implementation Responsibilities.

Part 150 Sections 150.23(e)(8) and B150.7(c) require the study to identify the agency or agencies responsible for implementing each recommended alternative. Part 150 Section B150.7(c) further requires an indication of whether those agencies have agreed to implement measures within their authority. Do not include measures as recommendations in NCPs if there is no indication the responsible authority plans to take action toward carrying it out. Part 150 Section 150.23(e)(8) requires the NCP documentation to include any essential government actions that will be necessary to implement specific alternatives such as zoning changes or amending comprehensive plans.

7.4.5 Implementation Schedule.

Part 150 Sections 150.23(e)(8) and B150.7(c) require NCPs to include an estimated schedule for implementing its alternatives. This information should be written to sufficiently address the requirement in Part 150 Section 150.23(e)(8) for indicating the period the NCP covers. If an approved alternative is not implemented within five years of the date of approval, it will need to be reevaluated with respect to any updated NEM. This is particularly true for an ongoing sound insulation or land acquisition program carried out under Part 150. Schedules should be updated as necessary.

7.4.6 Implementation Costs.

Part 150 Section 150.23(e)(8) requires the NCP documentation to include an indication of the anticipated costs of the recommended measures and the anticipated funding sources.

7.4.7 Changes to Previous Plans.

Under Part 150 Section 150.23(e)(6), the NCP documentation must indicate how, if at all, the recommended measures may change any independently undertaken noise control plan or actions or an approved and implemented Part 150 land use compatibility program.
Categories of Program Alternatives.

Given the program alternatives that must be evaluated in an NCP, most airport sponsors typically propose program alternatives in three general categories: noise abatement (aircraft operations/airport layout), land use, and program management (administrative actions). Individual recipients (such as a homeowner or school) of noise compatibility projects may be entitled to more than one program alternative if the measures are approved in the sponsor’s NCP, enhance land use compatibility, provide additional protection for the airport, and the total cost of the measures is reasonable in relation to the property value. For example, sound insulation may be combined with acquisition of an easement, or a sponsor may acquire residential property and install sound insulation with an easement, before offering it for resale.

The three general categories of noise measures are explained below.

Noise Abatement Measures.

Noise abatement measures may include either operational or infrastructure components:

- Operational, such as implementing a preferential runway system or using charted instrument flight procedures to direct aircraft to fly specified tracks.

- Airport infrastructure development such as noise barriers or engine run up enclosures.

Airport sponsors must comply with title 14 CFR Part 161 (see Sections 1.2.1, 3.4, and 7.3.1.5 of this AC) before implementing any mandatory airport noise or access restriction affecting Stage 2 or Stage 3 aircraft, regardless of aircraft weight. A mandatory airport noise or access restriction that affects any aircraft type (any stage or non-staged aircraft) must comply with the grant assurances.

In addition to showing that the operational measures would reduce existing noncompatible land uses (provide a net reduction) or prevent future noncompatible land uses, Part 150 Section 150.33 requires the FAA to conduct a separate evaluation of the operation to determine their potential impacts on aviation safety and efficiency. Before operational noise abatement measures that may affect aviation safety are implemented, they must have a favorable SRM finding per FAA Order 5200.11.

The objective in choosing specific aircraft operational measures is to achieve the best combination of noise abatement strategies and compatible land use measures that work best for the airport and the surrounding
environment, consistent with the FAA Administrator’s other obligations such as safety and efficiency.

7.5.4  **Land Use Measures.**
Land use noise measures comprise two types:

7.5.4.1  **Remedial Measures.**
These measures are intended to reduce existing noncompatible land uses. The four most commonly used remedial noise mitigation measures:

- Land acquisition (Section 7.13)
- Sound insulation (Section 7.14)
- Easement acquisition (Section 7.15)
- Purchase assurance / sales assurance / transaction assistance (Section 7.16)

7.5.4.2  **Preventive Measures.**

7.5.4.2.1  Preventative measures are normally within the sole authority of the local land use jurisdictions and are intended to prevent the introduction of additional noncompatible land uses. These are the most commonly used preventive land use noise measures:

- Comprehensive planning
- Zoning regulations
- Subdivision regulations
- Acquisition of easements or development rights
- Revised building codes for sound insulation
- Real estate disclosure
- Acquisition of vacant land

7.5.4.2.2  The FAA believes that preventing additional residential land uses within the DNL 65 dB noise contour and creating non-noise sensitive land uses (such as industrial) is highly preferred over allowing residential uses, even with sound attenuation or avigation easements.

7.5.4.2.3  **Table 1 of Part 150** notes that the FAA does not substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses. Airport sponsors and local land use jurisdictions are urged to pursue all possible avenues to discourage new residential development within the levels of noise exposure designated as “significant” in Part 150. If local needs dictate permitting noncompatible
developments inconsistent with Table 1 of Part 150, any noncompatible land use structures (such as residences) constructed after October 1, 1998, are not eligible for remedial mitigation using federal financial assistance (see Section 7.6 of this AC for more information).

7.5.5 Program Management Measures.

7.5.5.1 Part 150 does not require sponsors to quantify benefits for program management measures in an NCP if they do not lend themselves to quantification. For example, it may be difficult to quantify the effectiveness and benefits of an awareness program for pilots. The NCP description of program management measures, however, should include evidence they are related to successful implementation of your NCP. As an example of a program management measure, Part 150 Section 150.35 requires revising the NCP if the NEMs are significantly revised. Many airport sponsors schedule automatic revisions or reviews of the NCP and NEMs within a specified timeframe, which encourages long-term successful implementation.

7.5.5.2 Other program management measures:

- Periodic program monitoring
- Establishing committees to keep the public informed of NCP progress
- Establishing a noise abatement contact at the airport
- Establishing a noise complaint hotline

7.5.6 Approval of Land Use Mitigation Measures after October 1, 1998.

7.5.6.1 The FAA published a policy in April of 1998 advising land use jurisdictions across the country that it will no longer approve remedial (after-the-fact) noise mitigation measures for new noncompatible development that occurs in the vicinity of airports that had a noise contour map distributed to the public after October 1, 1998. Noncompatible land uses must be in existence on that date.

7.5.6.2 The FAA recognizes that there will be gray areas which will have to be addressed on a case-by-case basis within these policy guidelines. For example, minor development on vacant lots within an existing residential neighborhood that is clearly not extensive would not be considered new noncompatible development. It may, for practical purposes, need to be

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42 FAA’s policy was published in the Federal Register on April 3, 1998 (63 FR 16409-16414).
treated with the same remedial measures applied to the rest of the neighborhood.

Airport sponsors must provide adequate justification in the NCP documentation for such exceptions to the policy guidelines.

7.6 Approval of Land Use Mitigation Measures in Areas Less Than DNL 65 dB.

7.6.1 Land use mitigation measures are usually recommended in areas where aircraft noise exposure exceeds DNL 65 dB. For determining funding, the FAA gives priority to the areas with the highest noise levels.\(^43\) However, land use mitigation measures may be approved and potentially eligible for federal financial assistance for areas exposed to noise levels less than DNL 65 dB. Mitigation for areas below the federal noncompatibility criteria in Part 150, Table 1, may be approved if three criteria are met:

- The local land use authority and the airport sponsor have adopted a designation of noncompatibility different from Table 1 in its NCP.\(^44\)
- NEM contours and the NEM and NCP narrative identify the areas as noncompatible and propose to mitigate in that area.
- The airport sponsor’s proposal to mitigate otherwise meets the Part 150 approval standards, including the requirement to reduce or prevent noncompatible land uses.

7.6.2 For remedial land use mitigation measures (such as residential sound insulation) in areas below DNL 65 dB that are proposed in the NCP, airports sponsors must support their grant applications with appropriate documentation so the FAA can determine whether they are justified for federal financial assistance for the year of the grant application. For example, projects within DNL 65 dB contour may be expanded beyond the DNL 65 dB contour to include a reasonable additional number of otherwise ineligible parcels contiguous to a sound insulation project area. This is called “Block Rounding.”\(^45\) Where a high percentage of a neighborhood is within the noise contour, neighborhood or street boundary lines rather than the actual noise contour may be used.

\(^{43}\) The competition for federal dollars is high, and areas with higher noise impacts receive higher priority.

\(^{44}\) The Airport Sponsor may not unilaterally include a local standard in the Part 150 Study if it is not acting as the land use control authority or acting in cooperation with the land use control authority. Jurisdictions with land use control authority must have formalized “locally determined needs and values” \(\text{(Table 1 of Part 150)}\) by adopting local standards before they can be included in the Part 150 Study document. Those local standards must not be limited to aviation-related noise, but applicable to all noise sources.

\(^{45}\) See the complete discussion of eligibility of Block Rounding in the most current edition of FAA Order 5100.38, Airport Improvement Program Handbook.
to determine the boundaries to establish a “contiguous block rounding” area if one or two homes are impacted.  

7.6.3 For questions about establishing a “block rounding” boundary, the sponsor must consult with their ARP POC.

7.7 Use of Supplemental Noise Analyses.

In some instances, such as when responding to input from the public, special land use agreements (leases, for example), or other specific reasons, supplemental metrics may be used in a Part 150 study. Appendix A of this AC provides more detail on supplemental noise metrics and analyses. Noise mitigation benefits have to be demonstrated within the NEM contours DNL 65 or higher dB. Supplemental noise metrics may not be used as a measure of significant aircraft noise impacts under NEPA, noncompatible land use under Part 150, or to demonstrate a noise benefit.

7.7.1 Supplementing DNL Analysis on a Case-by-Case Basis.

DNL analysis may be supplemented on a case-by-case basis. Because of the diversity of situations, the variety of supplemental metrics, and limitations, airport sponsors should coordinate their use with their FAA ADO or regional point of contact. Since a Part 150 planning grant cannot be amended once it has been executed, it is best to determine whether and why to use supplemental metrics when the scope of work is drafted. Refer to Appendix A and Table A-1 in this AC to determine the likelihood the study would require a supplemental metric analysis.

7.7.2 Basis for Supplemental Noise Analysis.

7.7.2.1 Supplemental noise analyses are most often used to describe aircraft noise impacts for specific noise-sensitive locations or situations and to assist in the public’s understanding of the noise impact. Accordingly, the analyses should clearly describe the impacts and the pertinent facts supporting use of the supplemental analyses proposed in the study document. The selection of supplemental analyses, methodologies, and metrics will depend upon the circumstances of each particular case. In some cases, a more complete narrative description of the noise events contributing to the DNL contours with additional tables, charts, maps, or metrics may be appropriate. In other cases, supplemental analyses may include metrics other than DNL.

7.7.2.2 Supplemental metrics selected should fit the circumstances. Some metrics are better suited for describing human responses than others (see Table A-1 of this AC for the metric and associated noise issue). Unlike DNL,
which reflects the magnitude, duration, and frequency of the noise events, supplemental metrics often do not cover all three.

### 7.8 Preferential Runway Use

#### 7.8.1 Preferential runway use means voluntarily using certain runways rather than others to reduce noise impacts. The concept may apply to certain operations at particular times, such as directing evening or nighttime cargo flights away from residential areas.

Another common concept is to designate a preferred calm wind runway, for use to direct traffic in a preferred direction when wind speeds are sufficiently low that there is general flexibility in runway choice. More complex runway use measures may seek to “share” or “equalize” noise by rotating through runway configurations.

#### 7.8.2 Runway selection is based principally on aircraft safety and efficiency, as well as aircraft performance capabilities, which is influenced by several factors:

- Wind direction and speed
- Aircraft performance, including tolerance for crosswinds
- Runway slope, length, and pavement strength
- Terrain and obstacles
- Airspace traffic flow management in relation to ratio of operational demand to runway capacity

#### 7.8.3 Within these parameters, there may be informal runway-use options that can help to mitigate an airport’s noise during operative conditions. Preferential runway use for noise abatement entails using a preferred runway or runway direction for takeoff or landing which enable aircraft to avoid noise-sensitive land uses during the initial departure and final approach phases of flight. A preferential runway use program transfers the traffic from one direction or runway to another. If operationally feasible, preferential use runway reshapes the noise contour, potentially reducing the number of people exposed to high noise levels. In particular, preferential runway use can be advantageous for nighttime operations when calmer winds and/or reduced traffic demand allows for more flexibility in runway choice.

#### 7.8.4 Data Requirements.

A significant amount of data is required in the NCP to support a proposed preferential runway use alternative:

- An indication of the noise-reduction benefits to noncompatible land uses:
- Noise contour comparisons superimposed over land use maps
- Comparisons of numbers of people and residences impacted with and without the adjusted runway use system
- Noise reduction in dB DNL provided to noise-sensitive sites on the ground.
Other narrative explanation related to geographic and demographic conditions around the airport that qualitatively describe benefits, such as flight patterns over vacant or compatible corridors and away from noncompatible land uses.

- Describe the characteristics of the preferred runway length and strength to confirm that the preferred runway is designed for the aircraft that will use it, given the performance capabilities of the aircraft type(s).
- An indication that approach and departure horizontal and vertical clearance planes are adequate and that required NAVAIDS and IFPs are available.
- Indicate that the preferential runway use is in accordance with FAA Order 8400.9, National Safety and Operational Criteria for Runway Use Programs and 14 CFR Part 91.129(h):
  - describe how consideration was given to effects on controller workload and airspace flow management relevant to the times and traffic volumes when the proposed preferential runway use program would be in effect, including:
    - the effects on terminal airspace efficiency such as aircraft routing and sequencing;
    - the potential encroachment into adjacent terminal airspace serving other airports; and.
  - any adverse impacts to flight safety.
- Information on which aircraft or if all aircraft using the airport are subject to the preferential runway use, including whether aircraft are requested to use preferred runway(s) based on their noise characteristics, operational performance, or reasons relating to traffic separation for efficiency.
- If significant inefficiencies such as reportable delays (per FAA Order 7210.55) result from the preferential runway use, information to support:
  - The noise-reduction benefit is sufficient to demonstrate a cost-beneficial tradeoff.
  - The necessity of preferential runway use compared to other noise reduction alternatives.
  - Costs of preferential runway use due to capacity reduction, additional aircraft operating time, aircraft fuel and emissions, and/or airport and airspace delay.
  - The potential for undue burden on commerce (including any unjust discrimination).

7.8.5 FAA Informal Agreement.

Part 150 states that “Consultation with FAA regional official shall include, to the extent practicable, informal agreement from FAA on proposed new or modified flight procedures.” Airport sponsors should consult with the FAA ATO staff, including personnel in the ATCT and TRACON, as well the Operations Support Group at the Service Center (through the ARP POC), early enough in the Part 150 process to determine whether ATO can safely and efficiently conduct the proposed preferential
runway use plan. In particular, the TRACON serving the airport is the key resource for collaboration on airspace flow management. ATO may conduct SMS before implementation of any air traffic operational measure at a towered airport. See Section 9.3.2.

Approval Authority.

Approval of preferential runway use for noise abatement at both towered and nontowered airports is within the authority of the FAA. Implementation depends on airspace safety and efficiency, traffic, wind, and weather. FAA may approve preferential runway use as an informal program under 14 CFR Part 91.129(h). The final decision on which runway to use rests with the pilot in command of the aircraft, who is ultimately responsible for decisions regarding the safety of the aircraft. For these reasons, operational measures are only approved as “voluntary” in a Part 150 program.

Ensure the operative runway use parameters (e.g., runways, times, winds, traffic volume, aircraft types) are clearly described and indicated as voluntary before including them in the NCP for FAA approval.

National Environmental Policy Act Considerations.

The Part 150 study process does not take the place of compliance with NEPA. Before the FAA can implement approved preferential runway use programs prepared under a Part 150 study, the proposed runway use programs must be examined under NEPA and the FAA must issue a decision approving the changes. The airport sponsor plays a critical role in providing information necessary to complete an environmental review. See FAA Order 5050.4 for more information on the environmental review process.

Aircraft Flight Operational Noise Abatement Measures.

Operational flight tracks, profiles, and similar measures for abating noise may be part of a proposed NCP. They include adjusting takeoff and landing profiles, aircraft thrust settings, and approach and departure tracks for VFR or IFR traffic use.

Aircraft flight operational noise abatement measures may be effective in reducing area exposed to the DNL 65 dB level, thereby changing the size or changing the shape of the noise contours around an airport and the number of people affected. Noise-reduction within the DNL 65 dB contour must be analyzed and show a benefit before a proposed measure can be considered further.

Where flight measures are recommended, their benefits should be preserved by ensuring the underlying land uses also are compatible, either through land use planning.

In cases where there is a more stringent local standard, benefits must be quantified to that standard.
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commitments by the jurisdiction with authority or through an airport sponsor’s remedial mitigation (such as acquisition).

7.9.4 Noise Abatement Departure Profiles.

7.9.4.1 Takeoff profiles and their power and flap settings can be adjusted to reduce noise to either close-in or more-distant noise-sensitive areas. Noise abatement departure profiles are aircraft type- and operator-specific, and are typically implemented by runway end (i.e., departures from a specific runway or parallel runways will use a similar NADP).

7.9.4.2 A noise abatement departure profiles should optimize noise reduction either close in or distant from the takeoff runway while maintaining flight safety. FAA AC 91-53A, Noise Abatement Departure Profile, describes acceptable criteria for safe noise abatement departure profiles (NADP) for subsonic turbojet-powered airplanes with a maximum certificated gross takeoff weight of more than 75,000 pounds. Guidance for general aviation is available from the National Business Aircraft Association (NBAA). Aircraft operators have preset techniques to fly NADPs based on airline or NBAA operating guidance. During NCP development, the airport can evaluate whether the close-in or distance NADP is best for any noise sensitive areas proximate to a given runway end. However, the airport cannot propose unique NADPs that vary from the standard NADPs that align with AC 91-53A. Absent instructions otherwise, most aircraft operators with fly a takeoff profile that is similar to the Distant NADP.

7.9.4.3 For approval of the NADPs, the noise-reducing benefits within the DNL 65 dB contour must be quantified in the NCP.

7.9.5 Noise Abatement Approach Measures.

7.9.5.1 Reduced Drag Techniques.

The principle of reduced drag techniques consists of delaying as much as possible wing flap extension and landing gear use, consistent with speed management, height clearance, and safe operation. Noise-reduction benefits within the DNL 65 dB contour must be quantified in the NCP.

7.9.5.2 Optimum Profile Descent (OPD).

7.9.5.2.1 The OPD flight technique is an initial approach procedure between en route and interception of the final approach. OPD reduces the noise experienced on the ground by reducing the overall thrust required during initial descent and keeping the aircraft higher for a longer time. Once at the interception of the final approach, a standard profile descent to the runway is flown. Formerly, OPDs were referred to as Continuous Descent
Arrival / Approach (CDA). OPDs are normally implemented with an RNAV Standard Terminal Arrival (STAR) procedure.

While FAA modeling for OPD generally shows that the noise contour remains the same for the DNL 65 dB noise contour, OPD may show benefits, especially where a lower DNL significance threshold has been adopted. In addition to noise reduction, OPD can provide emission benefits. To date, the primary rational for the OPDs implemented in the NAS is for aircraft fuel and emissions savings.

If the OPD is proposed under a locally adopted noise threshold, the NCP should describe the DNL benefit and any impact on air traffic safety, management, or efficiency. Noise-reduction benefits within the DNL 65 dB contour must be quantified in the NCP.

The implementation of descent and approach procedures, OPD in particular, requires the NCP to describe how the procedures would relate to these factors:

- Safety requirements
- Airspace efficiency, including operational and ATC constraints
- Weather conditions
- Pilot workload, awareness, training, and experience
- Aircraft and engine characteristics
- Aircraft fleet mix
- Operating rules.

Successful implementation will depend on close collaboration between all parties—aircraft operators and pilots, air traffic control, airframe and engine manufacturers, airport sponsors. Enabling OPD use is often dependent on large-scale terminal airspace redesign efforts.

Reverse Thrust.
Reverse thrust is an effective, complementary way of braking an aircraft, especially on contaminated runways (for example those coated with rain or snow), and serves to significantly reduce the required runway length on landing or to abort a takeoff. In some cases, in order to minimize ground noise, the use of reverse thrust for jet or propeller engines can be limited to reverse idle. Limiting the use of reverse thrust above reverse idle might be considered during a specified period, especially during nighttime hours. Such a limitation could only be used when safety allows it. Associated noise-reduction benefits within the DNL 65 dB contour must be quantified in the NCP.
7.9.6 Approach and Departure Routes using Visual and Instrument Methods.

7.9.6.1 Designated approach and departure flight tracks may be used to mitigate noise by routing aircraft away from noncompatible land uses and instead over compatible land uses, when possible.

7.9.6.2 The use of flight tracks by aircraft flying under either VFR or IFR should be considered depending on the mix of users at the airport. Often, an airport sponsor needs to consider developing noise abatement flight tracks for both visual and instrument operations. Even if the preferred ground track is similar, the method by which the preferred flight track is accomplished varies between an aircraft flying VFR versus the same aircraft flying IFR.

7.9.6.3 Noise abatement flight tracks can risk increasing noise exposure in other areas when noise is shifted or focused. The tradeoff of specific procedures should demonstrate overall improvements to the noise environment. Noise-reduction benefits within the DNL 65 dB contour must be quantified, and airspace efficiency and safety must be evaluated in the NCP in collaboration with ATO and aircraft operators.

7.9.6.4 Preferential Visual Tracks.

Preferential visual tracks can route aircraft over compatible corridors, avoiding noise-sensitive areas on departure and arrival. Approach and departure tracks may include designated headings to turn aircraft away from noise-sensitive areas under or next to the usual takeoff and approach paths. Visual tracks can combine a recommended heading with a minimum altitude for before turning over a neighborhood. Proposed approach and departure visual tracks must take into account specific constraints such as terrain and airspace flow corridors at other nearby airports. Preferential visual tracks are not charted in the TPP and are best used for aircraft operations being conducted under VFR. Aircraft that routinely under IFR, such as business jets and large turboprops, will not routinely use visual tracks to connect to IFR airways and flows.

7.9.6.5 Preferential Instrument Procedures.

7.9.6.5.1 Preferential instrument tracks have a similar purpose to visual tracks, but are charted as Instrument Flight Procedures (IFPs) in the FAA Terminal Procedures Publication (TPP). Charted Visual Flight Procedures (CVFP) that are assigned to aircraft in their IFR clearance are also published in the TPP. In the interest of clarity, the use of the term “procedures” with operational noise abatement measures should refer specifically to charted instrument and visual procedures published in the TPP.

7.9.6.5.2 Today, nearly all new requests for IFPs are accomplished with Performance Based Navigation (PBN), including area navigation using...
GPS (RNAV (GPS)) and Required Navigation Performance (RNP). See FAA’s 2016 PBN NAS Navigation Strategy for further information on RNAV and RNP capabilities and strategies for use in the NAS. PBN, when coupled with Flight Management System (FMS) automation in aircraft, enables the precise, repeatable routing of aircraft on an IFP. Depending on geography and the location of noise sensitive areas, as well as the standards governing IFP design, PBN capabilities can effectively route aircraft away from noise sensitive areas or cause adverse impacts by focusing aircraft tracks over noise sensitive areas. As further PBN concepts are matured, new advanced procedures could bring further options to design improved noise abatement IFPs.

7.9.6.5.3 Developing IFPs for noise abatement is more complex than visual tracks and necessitates detailed collaboration with FAA ATC and ATO Flight Procedures. However, developing IFPs can also result in a more useable and repeatable flight track as it enables aircraft that routinely fly under IFR, such as airline and business jets and large turboprops, to incorporate the IFPs in their flight plans and IFR clearances.

7.9.6.6 Dispersed Departure Flight Tracks.

Successive departing aircraft may be dispersed, or fanned, on different flight tracks over wide-ranging areas. Fanning can be accomplished with either a range of visual headings or divergent IFR tracks (i.e., ATC vectors or Standard Instrument Departures (SIDs)). Dispersing flight tracks in this way tends to decrease the length of the noise contours and to increase the width. If this measure is proposed as a noise abatement alternative, it should not disperse noise over a wider range of people (sharing the noise) unless it can be demonstrated there is an overall net benefit (reduction in numbers of people impacted without causing disproportionate impacts such as to minority or low income populations or adding people to the DNL 70 dB contour).

7.9.7 Data Requirements.

A significant amount of data is required in the NCP to support proposed aircraft flight operational noise abatement measures.

- An indication of the noise-reduction benefits to noncompatible land uses:
- Noise contour comparisons superimposed over land use maps
- Comparisons of numbers of people and residences impacted with and without the noise abatement measures.
- Noise reduction in dB DNL provided to noise-sensitive sites on the ground.
Other narrative explanation related to geographic and demographic conditions around the airport that qualitatively describe benefits, such as flight patterns over vacant or compatible corridors and away from noncompatible land uses.

- An indication that approach and departure horizontal and vertical clearance planes are adequate and that required NAVAIDS and IFPs are available.
- An indication that consideration was given to effects on controller workload and airspace flow management relevant to the times and traffic volumes when the operational noise abatement measures would be in effect, including:
  - the effects on terminal airspace efficiency such as aircraft routing and sequencing;
  - the potential encroachment into adjacent terminal airspace serving other airports; and
  - any adverse impacts to flight safety.
- Information on which aircraft or if all aircraft using the airport are subject to the operational noise abatement measures, including whether aircraft are requested to use the measures based on their noise characteristics, operational performance, or reasons relating to traffic separation for efficiency.
- If significant inefficiencies such as reportable delays (per FAA Order 7210.55) result from the operational noise abatement measures, information to support:
  - The noise-reduction benefit is sufficient to demonstrate a cost-beneficial tradeoff.
  - The necessity of operational noise abatement measures compared to other noise reduction alternatives.
- Costs of operational noise abatement measures use due to capacity reduction, additional aircraft operating time or flight distance, aircraft fuel and emissions, and/or airport and airspace delay.
- The potential for undue burden on commerce (including any unjust discrimination).

**7.9.8 FAA Informal Agreement.**

Part 150 states that “Consultation with FAA regional official shall include, to the extent practicable, informal agreement from FAA on proposed new or modified flight procedures.” Airport sponsors should consult with the FAA ATO staff, including personnel in the ATCT and TRACON, as well the Operations Support Group at the Service Center (through the ARP POC), early enough in the Part 150 process to determine whether ATO can safely and efficiently use proposed new or modified flight procedures. FAA recommends that any deliberations on new or amended charted flight procedures use FAA’s TARGETS software to facilitate the development of flyable procedures. ATO may conduct SMS before implementation of any air traffic operational measure at a towered airport. See Section 9.3.2.
Approval Authority.

Approval of airspace and aircraft operational control measures for noise abatement is within the FAA’s authority. Implementation depends on airspace safety and efficiency, traffic, wind, and weather. The final decision on pilot use of operational noise abatement measures, including those assigned in IFR clearances, is with the pilot in command of the aircraft who is ultimately responsible for decisions regarding the safety of the aircraft. For these reasons, aircraft flight operational noise abatement measures are approved as “voluntary” in a Part 150 program. Voluntary use extends to noise abatement IFPs, as the pilot has the option to refuse an IFR clearance that includes an IFP that the aircraft cannot safety fly, and instead coordinate with ATC for a different IFP that is flyable under the existing conditions.

National Environmental Policy Act Considerations.

The Part 150 study process does not take the place of compliance with NEPA. Before operational noise abatement measures approved under a Part 150 study can be implemented, the proposed measures must be examined under NEPA and the FAA must issue a decision approving the changes. See FAA Orders 5050.4 and 7400.2 for more specific information on the environmental review processes for airports and airspace.

Surface Operations.

Two operational measures used on the ground at airports can reduce aircraft noise:

- Limiting the timing and location of aircraft engine ground run-ups.
- Surface management routings to reduce taxiing time or distance.

If these measures are proposed, the NCP must quantify the benefits within the DNL 65 dB contour.

Engine run-up operations, in which the engines are inspected on the ground by running at a high or full power, must occur on an airport in order to complete required maintenance actions and carry out checks critical to flight safety. Operational measures might be recommended that would move high-power engine run-ups to designated areas central to the airport, and away from nearby residences. Full-power run-ups might be proposed for only specified times during the day, and/or in specially-constructed testing pens that are located away from noise-sensitive areas. (See Section 7.11 of this AC.)

Auxiliary power units provide aircraft system power and air conditioning for aircraft maintenance, pre-flight preparation, and engine start at departure. Measures might be recommended to reduce noise in the vicinity of parked aircraft by minimizing the use of this auxiliary power, provided alternative sources of power are available, such as from other ground service equipment, terminal bridge services, or gate electrification.

Data Requirements.

Instructions for noise-modeling of surface operations are included in the AEDT manual.

Additional information might be needed if the modeling results for these modified
surface operations do not fully reflect the noise-reducing benefits. If this is the case, contact your ARP POC for assistance. NCPs should indicate the benefits of proposed noise abatement surface operations to noncompatible land uses, such as:

- Quantified cumulative noise reduction to noncompatible areas
- Numbers of people for whom noise is reduced
- Effects on the noise contours
- Other narrative that describes quantified benefits

The Part 150 study process does not take the place of compliance with NEPA. Before airport sponsors can implement surface operations identified under a Part 150 study, the proposed changes must be examined under NEPA and the FAA must issue a decision approving the changes. The airport sponsor plays a critical role in providing information necessary to complete an environmental review. See FAA Order 5050.4 for more information on the environmental review process.

Applicability of Part 161.
Proposed ground-based measures should demonstrate that they do not reduce the total number or hours of aircraft operations, or affect aircraft safety. To do so, would require analysis under 14 CFR Part 161.

**Noise Barriers and Ground Run-up Enclosures.**

Properly planned and constructed noise barriers may be proposed to shield noise. Noise barriers can be earthen berms, vegetation, or manufactured barriers located between sources of ground-level noise on the airport and close-in, noise-sensitive receptors. Noise barriers reduce ground-based noise from aircraft operations (such as engine run-ups or taxiway queuing), but they do not mitigate noise once aircraft are in flight. Noise barriers must be built to the correct height, depth, and placement to provide meaningful relief without interfering with safe and efficient movement of aircraft on the ground, including line of sight. Proper positioning of newly constructed airport buildings can also function as a ground-based noise screen to adjacent communities.

Noise barriers should be constructed in areas that would provide a minimum noise reduction of 5 dB at the nearest noncompatible land use within the noise contour. A minimum change of 5 dB has been scientifically shown to be perceptible to most people. Depending on their location at the airport, noise barriers may not have an impact on the size of the noise contour.

Some airports have proposed or constructed GREs, or ground run-up enclosures. These are three-sided structures, similar to an open garage with no roof, in which engine run-up operations are conducted and the walls lined with acoustic panels dampen the
noise. FAA Order 5100.38 provides guidance on grant eligibility requirements for noise barriers and ground run-up enclosures.

### 7.11.4 Data Requirements

**7.11.4.1** The data required in the NCP to support airport development measures proposed for noise abatement are similar to what is required for preferential runway use and for flight tracks.

**7.11.4.2** Depending on the type of measure, the NCP could present the benefits to noncompatible land uses in several forms:

- Quantified cumulative noise reduction for noncompatible areas.
- Pre- and post- decibel levels for typical aircraft using a run-up enclosure at noise sensitive receptors. Use a technically acceptable methodology to equate these levels to speech and/or sleep disturbance.
- Numbers of people for whom noise is reduced.
- For layout changes, data on measurable change in existing and/or future noise contours over noncompatible land uses that demonstrate the benefits equal or exceed the cost for new pavement.
- For noise barriers, the analysis should show airport line-of-sight and Part 77 surfaces (obstructions) have been evaluated as part of deciding where to place the barriers.

### 7.11.5 Environmental Considerations

Airport operators often seek federal financial assistance to plan and construct airport development measures such as noise barriers or GREs. Additionally, many airport development measures require a change to the ALP, and the provision of federal financial assistance as well as approval of an ALP by the FAA where required by statute, is a federal action requiring environmental review. The Part 150 study process does not take the place of compliance with NEPA, so before airport sponsors can implement development measures from the Part 150 Study, the FAA may need to comply with NEPA (see Section 150.5(c)). The ROA should indicate the measures that can be implemented immediately by the sponsor and those that require environmental analysis. If required, sponsors must submit information to the FAA sufficient for compliance with NEPA. See FAA Order 5050.4 for more information on the environmental review process.
7.12 Access Restrictions.

7.12.1 Part 150 Section B150.7 requires airport sponsors to analyze restrictions on airport use by certain aircraft based on their noise characteristics. If the NCP is not proposing airport access restriction, the discussion of this alternative may be brief.

7.12.2 Before a Stage 2 or Stage 3 access restriction may be implemented, sponsors must satisfy the requirements of Title 14 CFR Part 161. ANCA directed in part the FAA to establish a regulation governing airport noise and access restrictions affecting Stage 2 and Stage 3 aircraft operations. Part 161 is that regulation. Part 161 allows airports to utilize the Part 150 process to apply for a restriction, although the standards of Part 161 are used for FAA’s determination on the proposed restriction.

7.12.3 Part 161 defines noise or access restrictions as:

- “Restrictions (including but not limited to provisions in ordinances and leases) affecting access or noise that affect the operations of Stage 2 or Stage 3 aircraft, such as:
- Limits on the noise generated on either a single-event or cumulative basis;
- A limit, direct or indirect, on the total number of Stage 2 or Stage 3 aircraft operations;
- A noise budget or noise allocation program that includes Stage 2 or Stage 3 aircraft;
- A restriction imposing limits on hours of operation;
- A program of airport use charges that has the direct or indirect effect of controlling airport noise; and
- Any other limit on Stage 2 or Stage 3 aircraft that has the effect of controlling airport noise.”

7.12.4 The Part 161 definition of noise or access restrictions does not include peak-period pricing programs with the objective of aligning the number of aircraft operations with airport capacity.

7.12.5 Data and Approval Requirements.

Aircraft use restrictions proposed by airport sponsors for Stage 3 aircraft must undergo a rigorous analysis and comply with the requirements of Part 161.

- Restrictions affecting Stage 3 aircraft must be approved by the FAA under 14 CFR Part 161.

- Restrictions affecting other aircraft types must be able to demonstrate they will not violate federal law, including grant assurances.

7.12.6 Part 161 Standards for Approval.

For restrictions affecting Stage 3 aircraft, Part 161 details six conditions that must be satisfied in order for the FAA to approve the restriction:
The proposed restriction is reasonable, non-arbitrary, and non-discriminatory.

The proposed restriction does not create an undue burden on interstate or foreign commerce.

The proposed restriction maintains safe and efficient use of the navigable airspace.

The proposed restriction does not conflict with any existing federal statute or regulation.

The applicant has provided adequate opportunity for public comment on the proposed restriction.

The proposed restriction does not create an undue burden on the national aviation system.

7.12.7 Part 150 Standards for Approval

The Part 150 Standards for Approval are in 14 CFR Part 150 Section 150.35. These criteria are described in Section 7.2 of this AC.

7.13 Land Acquisition and Relocation

Land acquisition and relocation of occupants is a remedial (corrective) land use mitigation measure. Land acquisition and relocation assure airport sponsor of long-term land use compatibility. Acquired land can be cleared and retained as a noise buffer to prevent noise-sensitive land uses near the airport if it is in a very high noise zone. It can be sold with deed restrictions to control the types of future development permitted near the airport, or it can be redeveloped for compatible land uses. Airport sponsors should work closely with the ARP POC to develop a long-term plan for land reuse. The FAA requires sponsors to release the land once it is no longer needed for noise compatibility.

7.13.1 Data Requirements

For proposed remedial land acquisition, airport sponsors must document this information in the NCP:

- The mitigation area shown on the NEM is within the existing or future DNL 65 dB noise contour (or within a lower noise level contour that is considered noncompatible under locally adopted land use guidelines). It may then be included in the NEM and NCP by the sponsor; however, sponsors are not required to include mitigation requirements down to the lower adopted standard.

- Evidence the property’s land use is noncompatible within the NEM noise contour.

- The acquisition meets Part 150 approval criteria.

7.13.2 Other Requirements

1. If vacant land is highly likely to be developed as a noncompatible use, local controls are inadequate to prevent that development, and if the FAA has approved the sponsor’s recommendation in an approved NCP, the acquisition is eligible.
2. Whenever federal funding is involved in the development of a Part 150 study or in mitigation under approved NCP measures, airport sponsors must satisfy the
Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act). Title 49 CFR Part 24, Uniform Relocation Assistance and Real Property Acquisition, is the regulation that implements the Uniform Act. Land acquired with AIP funding must comply with AC 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Project, FAA Order 5100.37, Land Acquisition and Relocation Assistance for Airport Projects, and FAA Order 5100.38.

3. Properties developed after October 1, 1998, are not eligible for remedial noise abatement measures unless they had a noise contour map published before that date that was distributed to the public. This policy should be disclosed during the study process so the public is aware of possible limitations on implementing this measure.

4. Land within the DNL 75 dB noise contour may be retained in airport ownership. Land at less than DNL 75 dB should be disposed of per Grant Assurance 31 Disposal of Land and associated FAA guidance. Land reuse must be consistent with FAA’s policy on disposal of noise land when it is no longer needed for noise compatibility purposes. See FAA Order 5100.38.

7.14 Sound Insulation.

7.14.1 Data Requirements.

These data must be provided in the NCP for proposed sound insulation:

- Location of the sound insulation area shown on the NEM within the existing or future DNL 65 dB noise contour or within a lower level contour that is considered noncompatible under adopted local land use guidelines.

- Documentation that the structures are noncompatible under Part 150 guidelines or under local guidelines.

- Numbers and types of structures proposed for mitigation (dwellings, schools, churches, hospitals). Evidence that people residing inside the DNL 65 dB and above noise contours have been made aware of the requirement that they must also experience interior noise levels 45 dB or greater as an average in habitable rooms.49

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49 Habitable areas of residences are living, sleeping, eating, or cooking areas (single family and multifamily) per the current version of Advisory Circular 150/5000-9, Announcement of Availability Report No. DOT/FAA/PP/92-5, Guidelines for the Sound Insulation of Residences Exposed to Aircraft Operations. Bathrooms, closets, halls, vestibules, foyers, stairways, unfinished basements storage or utility spaces are not considered to be habitable.
To be eligible for federal aid, AIP eligibility requirements must be met (see the chapter on noise compatibility projects, FAA Order 5100.38).

### Insulation Criteria

#### 7.14.2.1

The purpose of sound insulation is to reduce airport noise impacts on occupants inside a building. Only a noise-impacted noncompatible structure that is in the DNL 65 dB contour and the existing interior noise levels are 45 dB or greater with the windows closed can be considered for insulation with federal aid.\(^{50}\)

#### 7.14.2.2

A noise-impacted noncompatible structure - typically a residence, place of worship, school, or hospital – must be both in the DNL 65 dB contour and be experiencing existing interior noise levels that are greater than 45 dB in habitable rooms with the windows closed to be considered eligible for federal aid.

#### 7.14.2.3

There are three ways that a structure can be considered for noise insulation in three sets of conditions.

1. The structure is located within a valid existing or forecast DNL\(^{51}\) 65 dB or higher noise contour associated with operations at an airport on the FAA-accepted NEM\(^{52}\) and is in an approved program measure.\(^{53}\)
   
   The NEM is normally developed by an airport sponsor as part of a Part 150 study or by a state or local jurisdiction noise program under 49 U.S.C. Section 47141.\(^{54}\)

2. The structure is included in a noise mitigation program prepared by a local jurisdiction surrounding a medium or large hub airport that either has not prepared a 14 CFR Part 150 program or does not have an updated 14 CFR Part 150 program.\(^{55}\)

3. The structure is an adversely affected school or hospital. Under 49 U.S.C. Section 47504, an adversely affected school or a hospital may also be eligible whether or not it is part of an airport sponsor’s NCP.

#### 7.14.2.4

Under 14 CFR Part 150, the FAA adopted the standard of DNL 65 dB, established by the Federal Interagency Committee on Noise\(^{56}\) (FICON) as

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\(^{50}\) See The AIP Handbook, FAA Order 5100.38.  
\(^{51}\) The FAA recognizes CNEL as an alternative noise metric for California. For this guidance, the metric DNL and CNEL can be used interchangeably.  
\(^{52}\) 14 CFR Part 150 Section 150.21.  
\(^{53}\) Per 49 U.S.C. Section 47504(c).  
\(^{54}\) Compatible land use planning and projects by state and local governments.  
\(^{55}\) Codified in 49 U.S.C. Section 47141.  
the federal land use compatibility guideline at which residential land uses are considered noncompatible with airport noise.

7.14.2.5 A lower local standard (such as DNL 60 dB) may be used for Part 150 purposes if the standard is formally adopted by the local jurisdiction for land-use compatibility and the airport sponsor has incorporated it. When a lower local noise standard is adopted outside of the Part 150 process, 49 U.S.C. Section 47141 requires that the land use compatibility plan be developed cooperatively by the airport sponsor and local jurisdiction.

7.14.3 NEMs used for Sound Insulation Programs Must Be Current.

7.14.3.1 Noise contours change for many reasons, for instance in response to changes in aviation activity and changes to air traffic management or IFPs. By law, the FAA must rely on only those noise exposure maps that reflect current or reasonably projected conditions. In general, NEM’s that are less than 5 years old are considered current, unless conditions such as fleet mix or the day/night operations have changed.

7.14.3.2 NEM’s that are older than 5 years must be verified and updated. The FAA must verify that the NEM showing the DNL 65 dB contour reflects the current or projected operational conditions at the airport and associated noncompatible land uses. The FAA must place a copy of the verification in the project files.

7.15 Easement Acquisition.

Sponsors are encouraged to obtain an avigation easement from owners of noise-impacted properties in return for the sound insulation of their structures, but it is not a mandatory Part 150 requirement. An avigation easement conveys a defined property interest for a specified area. It limits the owner’s use of the easement-encumbered property (height restrictions, lighting, etc.), and permits right of overflight over the encumbered property. An avigation easement acquisition that conveys to the airport the right of overflight and associated noise makes the encumbered property compatible with airport operations. Despite significant technological advances in aircraft design and navigation aids, and successful NCPs, problems continue to arise due to noncompatible land uses being built near airports. Obtaining avigation easements has been one way to deal with these circumstances.

57 Per 49 U.S.C. Section 47504(c)(2)(B).
58 49 U.S.C. 47503.
59 49 U.S.C. Section 47503(b) requires submission of revised noise maps if a change in the operation of the airport would establish a substantial new noncompatible use or would significantly reduce noise over existing noncompatible uses that is not reflected in the existing conditions map or forecast map on file with the FAA. The requirement for determining currency of an NEM is in 14 CFR Part 150.
60 An avigation easement is a “nonpossessory” interest in an owner’s property that clearly describes the airport use of airspace for overflight (versus specific ownership or possession of the land) and also restricts the property owner’s use of or intrusion into the area transferred.
7.15.1 Data Requirements.
The NCP must include these requirements for proposed easement acquisitions:

- The location of the easement acquisition area shown on the NEM within the existing or future DNL 65 dB noise contour or within a lower level contour that is considered noncompatible under locally adopted land use guidelines.

- The number and location of noncompatible structures that are proposed to be mitigated under the measure.

- Documentation that the property’s land use is noncompatible under Part 150 guidelines or under local guidelines.

- Indication that the avigation easement will establish the property as compatible.

7.15.2 How Noise Easements Work in the Part 150 Program.

7.15.2.1 Conveyed easement rights “run with the land,” which means the easement is tied to the property and moves from deed to deed regardless of subsequent owners of the encumbered property. An easement conveyance does not prevent subsequent reasonable mitigation that may be offered by the airport under Noise Compatibility Program updates or for other project purposes.

7.15.2.2 Under an approved NCP, a property owner who conveys an easement is compensated for the encumbrance placed on the property. Compensation is properly appraised based on the loss in value to the noise-impacted property due to the additional encumbrance.

7.15.2.3 Although easement compensation is difficult to appraise because of limited market information, the value is minimal. Acceptable appraisal procedures are described in the most recent version of FAA Order 5100.37. Specific considerations and methods to appraise easements acquired for noise compatibility are provided in AC 150/5100-17.

7.15.2.4 Subsequent owners of property with a noise easement should be provided actual or physical notice of the noise impact resulting from airport and aircraft operations when the property transfers ownership (see Section 7.23 of this AC for further information).

7.15.2.5 Airport sponsors may seek an easement conveyance in exchange for providing sound insulation assistance. An easement not only addresses existing noncompatible land use concerns, it helps establish the property’s future compatibility should it be sold. The FAA encourages, but does not require, a noise easement accompany sound insulation. The easement
provides notice with the property that the airport has provided sound insulation improvements.

7.15.2.6 An easement acquisition may be proposed where sound insulation is not feasible for the particular structure. For example, the structure may need significant code upgrades to qualify for federally funded sound insulation, and the homeowner may not be able to bring the structure up to code.

7.15.2.7 Easement acquisition may be an effective remedial measure when offered as a separate Part 150 measure to property owners who do not wish to move from a project area where voluntary acquisition is being proposed or when the easement is conveyed as part of a purchase assurance, sales assurance, or transaction assistance program.

7.16 **Purchase Assurance / Sales Assurance / Transaction Assistance.**

7.16.1 Purchase assurance, sales assurance, and transaction assistance programs are other means to achieve compatible land use along with easement acquisition. Airport sponsors either acquire a residence for resale or help a homeowner with a home market sale without changing the existing land use. These measures help homeowners who want to move from the noise-impacted area. Each of these types of measures facilitates a timely market sale of noise-impacted property.

7.16.2 The residences are eligible for sound insulation prior to sale or resale. Also, pre-existing sound insulation offered under an earlier noise mitigation program will not disqualify a property from purchase/sales assurance/transaction assistance programs.

7.16.3 As part of the transaction process, airport sponsors must ensure that potential buyers have an appropriate disclosure. The disclosure will describe the airport’s noise exposure on the property and the sponsor’s intention to retain an easement or similar interest.

7.16.4 **Data Requirements.**

The NCP must include this information to support the proposed purchase assurance/sales assistance/transaction assistance measures:

- **Location of the purchase assurance/sales assistance/transaction assistance area** (identified on the NEMs and described in the NCP narrative). The property should be within the existing or future official NEM DNL 65 dB noise contour or a lesser noise contour level that is considered noncompatible under locally adopted land use guidelines.

- **Number of structures within the area proposed for this mitigation measure.**

- **Discussion of how the measure will render the property compatible.**
7.16.5 How the Options Work in the Part 150 Program.

7.16.5.1 Under purchase assurance, a property that fails to sell within a specified time is purchased by the airport sponsor and then resold for continued residential use. The airport sponsor purchases the property at the appraised market value “as is” subject to airport noise. Typically, sound insulation is provided, and the property is then listed and sold subject to the airport’s avigation easement. If the airport sponsor purchases the property, the sponsor must retain an easement. A purchase assurance program requires an extensive property management and sales effort, so sponsors may contract with consultants or realtors. Some list price premium may be desirable to secure the market price on the airport’s sale of the property.

7.16.5.2 Under sales assurance, the appraised market value of the residence is guaranteed on a timely market sale; however, the airport does not acquire the property. Should the property sell for less than the appraised value, the selling owner is compensated for the shortfall by the airport sponsor. Property is appraised at its current market value “as is” subject to airport noise. The property is listed and sold subject to the airport’s avigation easement that is conveyed to the sponsor at the sale of the property.

7.16.5.3 Transaction assistance generally involves an agreement by the airport sponsor to pay certain costs associated with the sale of residential property. Allowable costs are generally limited to the real estate sales commission. The property is listed and sold subject to the airport’s avigation easement that is conveyed to the airport sponsor at the property’s sale.

7.16.5.4 The purchase assurance, sales assurance, and transaction assistance programs offer several benefits:

- The existing occupant is able to sell the property and move away from a noise-impacted area.
- The new occupant acquires the property with full disclosure of the noise environment.
- Airport sponsors retain an avigation easement over the property to permit continued overflights and their attendant noise.

7.16.5.5 The property sale listing and purchase contract should explicitly disclose and acknowledge that the property is within the airport’s noise impact area and that the property is encumbered with the avigation easement and conveyed before sale of the property (see Section 7.22 of this AC for further information).

7.16.5.6 Purchase assurance, sales assurance, and transaction assistance maintains a viable residential neighborhood (as opposed to acquisition of residential properties for demolition and redevelopment) and are less costly measures.
than a buy-out and redevelopment to secure compatible land use. The selling owner in each measure is not considered a “displaced person” and is not eligible for relocation assistance under the Uniform Act.

7.16.5.7 Purchase assurance, sales assurance, and transaction assistance measures may be offered independently or combined with either a sound insulation program, an easement acquisition program, or both. When these options are offered together, the variety of options may appeal to homeowners that want to move out of the neighborhood as well as those who prefer to remain.

7.17 Comprehensive Planning.

7.17.1 A comprehensive plan is a local jurisdiction’s guide for the development of a community. It is a critical and, when properly managed, effective way to ensure land use compatibility around airports. Since aviation is an element of a region’s transportation system, the goals of airport development should be established in the framework of the comprehensive plan. In some instances, more than one jurisdiction will be affected by the airport’s noise contours and flight paths. This should be considered in each respective comprehensive plan. The comprehensive plan can provide short-range and long-range policy recommendations regarding how the land areas around an airport should be developed, redeveloped, or maintained.

7.17.2 Some states mandate that comprehensive plans be prepared by all local governments. Others require that comprehensive plans be prepared only if the local government wants to adopt and enforce land regulatory tools. Other state laws contain no specific planning-related requirements and each individual local government applies home-rule policies. Comprehensive plans normally have a 20-year horizon. ASNA permits forecast NEMs to extend beyond five years, so comprehensive plans can be developed based on an airport’s longer range of forecasts.

7.17.3 Data Requirements.

7.17.3.1 The NCP needs to include all the data that will support the elements that can be anticipated for the comprehensive plan. For example, it might include the existing or forecast NEM from the Part 150 Study, land use standards within each NEM contour zone, and relevant NCP recommendations, such as adopting construction standards where new noise-sensitive construction is permitted in certain noise contour zones. These recommended policies for local comprehensive planning will guide compatible development in the vicinity of the airport.

7.17.3.2 While the FAA will render an approval or disapproval of this type of preventive land use measure, the federal government has no authority to control land use. Successful implementation of comprehensive planning measures is purely within the authority of the governing land use
jurisdictions. A land use measure disapproved under Part 150 may be implemented outside the Part 150 requirements.

7.17.4 Including Comprehensive Planning in a Part 150 Study.

Development of the land use elements of a local jurisdiction’s comprehensive plan is a very important step in recognizing and analyzing some of the issues of concern in and around airports. An existing land use map should be created to depict how on-site and off-site properties are currently being used. Properties can be inventoried, analyzed, and classified on the existing land use map. Existing noise exposure contours and other related informational mapping can be superimposed to discern the degree of noise exposure to properties within and around an airport. GIS can extract base map data and topographic information, property information, vegetation cover, noise contours, and other information that will be useful as land use compatibility alternatives are studied.

Comprehensive planning usually includes a future land use plan map representing the recommendations of the plan’s land use. Using current and projected noise exposure mapping assists in decisions about what types of land use should be considered in the various areas. In cases where development has not yet substantially occurred around an airport, a comprehensive land use plan can provide direction to compatible new development. In areas already developed close to airport property or where airport expansion conflicts with adjacent and surrounding properties, the plan can recommend how to mitigate such conflicts.

Benefits of Comprehensive Planning.

Airport sponsors often include measures in their NCP to prevent the development of new noncompatible land uses as well as recommendations for preventive land use controls by local jurisdictions. Part 150 requires the NCP to describe “the agency or agencies responsible for such implementation, whether those agencies have agreed to the implementation, and the approximate schedule agreed upon.”

Success in implementing these measures has been mixed, however. A major factor is the multiplicity of jurisdictions with land use control authority within airport noise impact areas. The greater the number of different jurisdictions, the greater the probability that at least some of them will not implement controls. The absence of a cooperative relationship between an airport sponsor and local jurisdictions impedes appropriate land use compatibility planning. The NCP, therefore, should not recommend measures not likely to be implemented by the respective authorities. When there is some positive response to comprehensive planning and other preventive land use measures, however, the airport
sponsor should continue efforts to obtain compatible comprehensive land
use planning by all parties.

7.18 Zoning.

7.18.1 The most common preventive land use control is zoning. Zoning enables state and local
governments to designate uses that are permitted for each parcel of land. It normally
consists of a zoning ordinance that specifies land development and use constraints.

7.18.2 The use of zoning to control development in and around airport facilities has realized
varied degrees of success. If put in place early enough – before development patterns
are set before properties are substantially subdivided – zoning can be an effective tool to
help eliminate or reduce noncompatible development and land uses around airports.

7.18.3 Data Requirements.

7.18.3.1 NCPs that propose zoning regulations should include these elements:

- A description or map of the area covered by the proposed regulation.61
- A description of the recommended re-zoning criteria and the area they
  apply to within the noise contour.
- Explanation (or documentation) indicating how the recommendation
  meets Part 150 approval criteria; specifically, that future development
  will be compatible with the noise level if zoning regulations are
  implemented or specific parcels re-zoned.
- Feasibility of the recommendation being implemented by the
  respective zoning authorities.

7.18.3.2 The FAA will render an approval or disapproval of this type of preventive
land use measure; however, the federal government has no authority to
control land use. Its successful implementation is within the control of the
governing land use jurisdictions.

7.18.4 Factors to Consider for Zoning Recommendations in a Part 150 Study.

7.18.4.1 Zoning is a preferred method of preventing noncompatible land use in
noise-impacted areas. For zoning to work effectively, it should be based
on a comprehensive plan that considers the total needs of the community
and the specific needs of the airport, recognizing its value to the local
economy. For zoning to be viable, there should be a reasonable present or

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61 Although jurisdictions are encouraged to establish “buffer” areas beyond the significant noise contour (DNL 65
dB), ASNA only permits FAA approval of mitigation measures proposed within the officially adopted
noncompatibility standard. The FAA will approve that portion of an NCP’s recommendation that meets ASNA
criteria, and will encourage the jurisdiction with authority to prevent further noise sensitive encroachment.
future need for each designated use. Zoning can be used constructively to increase the value and productivity of the affected land. One of the primary advantages of zoning is that it may be used to promote land use compatibility while leaving the land in private ownership, on the tax rolls, and economically productive.

7.18.4.2 Zoning has several limitations:

- Zoning controls are normally applicable only to those areas within the boundaries of the zoning jurisdiction. However, airport noise often impacts more than one jurisdiction. Effective zoning requires coordination among all the impacted jurisdictions.

- Some communities may have cumulative type zoning districts which allow uses permitted in a higher use, less intensive zone to be permissible in a lower use, more intensive zone. For example, residential uses could be permitted in districts zoned for lower uses such as agricultural. Cumulative zoning could also permit noncompatible development in an area not zoned for it; so it would be necessary to revise the existing cumulative-type code or adopt additional overlay zoning use districts which create specific permitted uses and exclude all others.

- Zoning in areas already developed incompatibly is normally not possible. In some jurisdictions, rezoning that affects current land uses may not pass state constitutional tests. Discussion with state representatives during Part 150 Study consultation will provide the opportunity to decide whether rezoning should be considered. If such zoning is allowed and is accomplished, the current use will likely be allowed to remain as a nonconforming use until it is changed voluntarily by the property owner to a conforming use, until the property owner has had time to recoup an investment in the property, or until the property is sold.

- Zoning is often not permanent. In most jurisdictions, the current legislative body is not bound by prior zoning actions. Zoning which achieves noise compatibility is subject to continual pressure for change from urban expansion and from those who might profit from zoning changes. Periodically, the entire zoning ordinance for a jurisdiction may be updated to accommodate increased growth or new land use concepts.

7.18.4.3 These steps should be taken when considering development of zoning ordinances:

1. Review all existing regulations (particularly land use and zoning) in the jurisdictions involved. Construct an existing zoning map if one is not available. Determine whether the existing zoning ordinance has
been properly adopted and recorded. Where possible, have the consulted jurisdictions provide this information for the Part 150 Study.

2. Review existing state legislation and case law affecting planning review and approval actions necessary. Consultation with the state during the Part 150 Study should expedite this process.

3. For additional ideas, research contemporary approaches to land use and zoning control being employed in similar jurisdictions around the country.

4. With the knowledge of what is and is not feasible in the jurisdictions around the airport, consider a variety of applicable land use controls, such as airport noise overlay zones, variance procedures, special exceptions, and performance standards.

   a. Ensure that airport-related zoning recommendations and the regulations that would enforce them (for example, subdivision regulations) are consistent with the adopted comprehensive plan or that there is a measure for the recommendations to be considered in any proposed amendments to comprehensive plans.

   b. Develop an estimated implementation timeframe for the recommendations in the NCP. Allow for adequate review of all airport zoning and development ordinances by legal counsel, appropriate internal agencies and authorities, affected special districts, and all affected local government entities.

   c. Monitor the implementation process of land use zoning recommendations and include a measure that provides for continued public involvement. For example, recommend developing and implementing a public participation program designed to elicit meaningful responses from the general public as part of ongoing land use planning. Provide for airport participation whenever the jurisdiction considers land use zoning changes.

An airport noise overlay zone (ANOZ) and airport noise overlay district (ANOD) are sometimes used to regulate land use around U.S. airports. The ANOZ is an overlay district that becomes part of the local zoning ordinance. Overlay zones normally use the airport’s NEM noise contours within which there are restrictions on permitted land uses. These limits vary with distance from the airport, noise level impacts, and an area’s location or orientation with respect to the airport. The ANOZ acknowledges the unique land use impacts of airports, regulates the siting of noise sensitive uses or establishes construction requirements, and complies with FAA regulations regarding noise.

Overlay zoning creates special zoning to meet specific needs not generally covered under the zoning ordinance. For example, airport noise overlay zones can prohibit noise-sensitive land uses near the airport or require
dedication of avigation easements and/or non-suit covenants (in this case, restrictions on future claims for noise-related damages as a result of granting the easement). Such regulations are supplemental to the requirements of the general zoning district. All development and building permits for properties within an overlay district would have to meet all of the requirements of the specific zoning district in which they are located.

7.18.4.6 An Airport Noise Overlay Zone, or ANOZ is an effective way to promote land use compatibility. The boundaries of an ANOZ are generally based on noise exposure contours. It is advisable to use future NEMs that are periodically updated.

7.18.4.7 Title 14 CFR Part 77 addressed notification and review processes for structure and building heights. Responsible airport planning dictates addressing these structure heights proximate to airports, which will need to be included in an overlay ordinance. Requests for FAA approval of height and hazard zoning do not belong in an NCP because it is not a noise abatement measure. Height provisions need to be addressed through the Title 14 CFR Part 77 process. Jurisdictions that adopt zoning ordinances will usually also adopt subdivision regulations (discussed in the next section). It is important to ensure that ordinances include cross references to related regulations of the zoning ordinance so all requirements of the subdivision regulations are simultaneously considered.

7.19 Subdivision Regulations.

7.19.1 Subdivision consists of dividing a lot, tract, or parcel of land into two or more lots, tracts, parcels, or other divisions of land for sale or development. A subdivision plat is a plan for subdividing and developing the land.

7.19.2 Since urban and rural areas grow primarily through the development of new subdivisions, the subdividing of vacant land or the re-subdividing of existing tracts has a major influence on the future composition of the area. It establishes street patterns and influences the type and character of development that will occupy the land.

7.19.3 Regulations controlling new subdivisions are an integral part of comprehensive planning. Depending on differing state legislations, subdivision regulations may be prepared, adopted, and enforced through actions of the local legislative body or the local planning commission.

7.19.4 When applied around airports, subdivision regulation works in a similar regulatory environment as that of a zoning ordinance. Plat review procedures provide an opportunity for jurisdictions and airport sponsors to determine how a proposed
subdivision design could contribute to the incompatibility of noise exposure to residential areas around airports.

7.19.5 By making certain to provide and record on the subdivision plat or deed the appropriate performance standards (such as controlling the siting of homes relative to noise contour overlays or by including compatible land use buffer zones and open spaces), proper distances from higher decibel noise exposure levels can be achieved and maintained. This is especially important when these performance standards are also made conditions of zoning.

7.19.6 Data Requirements.

7.19.6.1 An NCP for proposed subdivision regulations should include this information:

- A description or map of the area covered by the proposed regulation, consistent with Part 150 and ASNA requirements.
- A description of how future development of the property will be compatible with the noise level if subdivision regulations are implemented.
- An account of whether responsible jurisdictions have agreed to implement regulations within their authority.

7.19.6.2 The FAA will render an approval or disapproval of this type of preventive land use measure; however, the federal government has no authority to control land use. Regulations for subdivisions are within the authority of the governing land use jurisdictions.

7.19.7 Considering Subdivision Regulations in a Part 150 Study.

For developing subdivision regulations, these steps should be considered in consultation with the responsible governing bodies:

1. Review all adopted subdivision regulations already in place in all affected communities and identify major variations in requirements, particularly as they apply to residential development.
2. Review state legislation and case law affecting subdivision regulations with emphasis on application to all affected communities and any review / approval actions necessary by state agencies such as water supply and wastewater disposal.
3. Research the contemporary approaches to subdivision regulation used in similar jurisdictions around the country to determine whether they are appropriate and can be applied at the airport.

7.20 Acquisition of Easements or Development Rights.

Acquisition of easements as a remedial measure for achieving compatible land use was discussed in Section 7.15 of this AC. Easements can also serve as a preventive measure.
if they are acquired before noncompatible uses are developed. Refer to Section 7.15 of this AC for information on how to implement this type of measure.

7.20.1 Data Requirements.
An NCP the proposed changes in development rights should include this information:

- Location of the development rights or easement acquisition area within the NEM existing or future DNL 65 dB noise contour or within a lower level contour that is considered noncompatible under locally adopted land use guidelines.
- Location of the area to which any development rights are to be transferred.
- Description of how future development of the property will be compatible and the area to which rights are transferred will also be compatible with the noise level if easements or development rights are acquired.

7.20.2 Development Rights Purchase Options.

7.20.2.1 Purchase of Development Rights (PDR) is another way to prevent noncompatible land uses around the airport. In this option, airport sponsors purchase the property owner’s right to noise-sensitive land development, leaving the owner all other rights of ownership, yet preventing any noncompatible development. The price of the development rights is generally equal to the reduction in the market value of the land, that is, the difference between the value of the land limited to development for compatible uses and its current market value.

7.20.2.2 PDR, or variations of it, could also be used by local governments and airport sponsors (depending on ownership) to allow compatible uses to continue, eliminating noncompatible uses on specific properties for which their development rights have been purchased.

7.20.2.3 Transfer of Development Rights (TDR) is another land use and development control technique. The basic concept of TDR is to preserve or retain land in its existing or rural setting in one location. Under a TDR, landowners sell (transfer) development rights on their land to another interested party who can use the rights to increase density of development at another location. In this case, development rights from an area within a 65 DNL or higher contour could be transferred for development in an area not exposed to aircraft noise. Legally, state statutes would have to contain provisions to use TDR. A development rights transfer system would have to be adopted by the local government, and the comprehensive plan would need to recognize this means of development rights land designation. If TDR is considered, getting it enacted would be recommended in the NCP. If adopted by law, it would be included in an NCP update.

7.20.2.4 TDR could allow airport-area jurisdictions to avoid unwanted development in high noise exposure areas or redevelop these areas to less
intense use, allowing such limitations to be maintained in perpetuity. The
sending property would ideally be rezoned to whatever rights remained on
the property. The receiving property might also have to be rezoned to
allow the type and intensity of use anticipated.

Whatever changes in zoning might be necessary, the changes should
conform to the adopted comprehensive plan. When comprehensive
planning is evaluated along with specific zoning and preventive planning
measures, individual changes can be implemented over the period of the
plan. If the proposed changes had not been anticipated in the plan and
therefore were not in conformance, amendments can be proposed to any
comprehensive plan in the NCP so other preventive planning measures can
be included. When included in a comprehensive plan, losses and gains of
development rights would adequately reflect the long-term policy
implications (such as land use changes) of the plan.

A very high degree of coordination and cooperation between airport
sponsors and state and local governments is required for these techniques
to be useful.

Building codes are primarily concerned with the functional and structural aspects of
buildings and structures, and usually require adequate sound insulation in new
construction or major renovations. Some states have adopted a statewide uniform
building code; others permit each local governing body to adopt its own building code.

An NCP that proposes building code regulations should include this
information:

- A description or map of the area covered by the proposed regulation
  and where the properties lie within the official NEMs.
- A description of how the measure will promote future compatible
development of the property.

The FAA will render an approval or disapproval of this type of preventive
land use measure; however, the federal government has no authority to
control land use. Successful implementation of building codes is within
the authority of the governing land use jurisdictions.

Minimum structural construction techniques and material standards often
determine whether changes in current standards or adopting new ones can
increase the interior noise reduction levels of typical residential or other
noise-sensitive structures in noise-impacted areas. Building codes are essentially a legal means of requiring adequate sound insulation in new construction.

Some building codes have special requirements for properties located in high noise exposure areas. Property owners are made aware of these requirements through occasional notifications and when they apply for building permits. During application for a permit, the authorizing jurisdiction requires an action ranging from securing an avigation easement to installing sound insulation, or prohibits construction based on the location of the property to the applicable building code.

Measures to achieve appropriate outdoor-to-indoor NLR is a primary goal of any sound attenuation program. Appropriate NLR measures should be required in proposed building code regulations. They can be required in the design and construction of certain types of buildings, such as homes, schools, hospitals, and churches.

Real Estate Disclosure.

The basic disclosure of airport noise situations is handled in some jurisdictions through ordinances that require sellers of parcels of land to reveal to purchasers that they are in a “noise impact zone.” Real estate agents are also instructed about these zones and the ordinance requirements.

Residents who move into an area may not be aware of an airport’s presence or the implications of airport noise. Besides publishing NEMs on airport websites, another method of informing the public is to record an “airport disclosure agreement” or other applicable covenant on subdivision plats and site development plans.

These preventive measures could be included in comprehensive planning, making the airport disclosure agreement and covenants part of a property’s deed record. A disclosure agreement could require that the property owner or selling agent inform the prospective buyer of the airport’s location and noise potential, including any remedial measures that have improved the property, such as sound attenuation. When disclosure is enacted as a deed covenant on a subdivision plat, the covenant provisions would be enforced by private parties just as a contract would be enforced.

The location of the airport and whether there are other similar land use covenants in the vicinity would be described in the real estate disclosure agreement and covenants. The covenant also should describe the airport sponsor’s responsibilities that are part of the covenant agreement. The airport disclosure agreement would also identify Title 14 CFR Part 77, Objects Affecting Navigable Airspace, the imaginary surfaces used to avoid
obstructions to flight paths and assess the need for noise controls such as avigation
 easements or noise overlay zones.

7.22.5 Property owners and realtors often oppose real estate disclosures because they may
 make it more difficult to sell noise-impacted property. Disclosures may deter buyers
 sensitive to noise. Those not deterred from purchasing a noise-impacted property may
 also be less likely to become noise complainants or noise litigants.

7.22.6 An NCP that proposes real estate disclosures should include a description or map of the
 proposed disclosure area and describe the type of disclosure proposed. The FAA will
 render an approval or disapproval of this type of preventive land use measure; however,
 the federal government has no authority to control land use. This authority is with the
 governing land use jurisdictions.

7.23 Acquisition of Vacant Land.

As with acquisition of developed land as a remedial measure for obtaining compatible
 land use (discussed in Section 7.13 of this AC), so too can acquiring land that does not
 presently have noncompatible uses, but such uses are unlikely to occur.

7.23.1 Data Requirements.

For NCPs that propose preventive land acquisition, this information should be included:

- Location of the acquisition area shown on the NEM within the existing or future
  DNL 65 dB noise contour or within a lower level contour that is considered
  noncompatible under locally adopted land use guidelines.

- A discussion of how the property’s current zoning would permit the now
  compatible vacant land to become noncompatible.\(^\text{62}\)

- An account of how the property would remain compatible after acquisition through
  adequate land use controls.

7.23.2 Considering Vacant Land Acquisition in a Part 150 Study.

7.23.2.1 If vacant land is highly likely to be developed incompatibly, local controls
 are inadequate to prevent that development, and if the FAA has approved
 the sponsor’s recommendation in an approved NCP, the acquisition is
 eligible. If however, airport sponsors already have land use control
 jurisdiction over the vacant land, then they should prevent noncompatible
 development by a means other than acquisition of the land.\(^\text{63}\)

7.23.2.2 To be eligible for federal financial assistance, acquisition of vacant land
 must comply with the Uniform Act. Land acquired with AIP funding must

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\(^{62}\) For example, the airport sponsor has no authority to make the land use compatible except through purchase; there
is no prior compatible land use agreement with the jurisdiction(s).

\(^{63}\) Grant Assurance 21.
comply with AC 150/5100-17 and the FAA Order 5100.38 chapter on land acquisition projects (see Section 7.13 of this AC for further information).

7.24 Program Management.

7.24.1 Monitoring Program Effectiveness.

After an NCP has been approved, sponsors should continually evaluate its effectiveness and consider improvements and determine whether proposed measures are being implemented on schedule. For example:

- Land acquisition and sound insulation projects should be reviewed to determine whether modifications are needed due to changes in the noise environment.

- Operational measures for noise abatement should be monitored for adherence and to determine whether the anticipated noise benefits are being realized. Also, if land uses are changing, operational measures may need to be reexamined for continued effectiveness.

- Use Program Management measures to continue working with the state and local governing bodies to implement preventive land use planning measures such as comprehensive plans and changes in zoning laws.

- Use Program Management as a tool to monitor jurisdictions’ actions regarding requests for changes in zoning, variances, or subdivision actions within the study area.

Examples and discussions of how to carry out these Program Management measures for monitoring and evaluating the NCP follow. Program Management measures are also discussed in Sections 7.5.5 and 9.4 of this AC.

NCP Periodic Review.

Periodic reviews of approved measures should be scheduled and budgeted by airport sponsors as an integral part of the NCP. Each review should include how to address problems or deficiencies identified, especially those pertaining to the NCP’s performance. The review should establish whether the NCP remains viable. New or corrective measures can be examined in an NCP update.

These activities should be accomplished during the NCP implementation review:

- Compare the then-current overall noise compatibility to that projected in the NCP’s goals and objectives for the forecast timeframe.
- Appraise the rate of growth of the community and of the airport’s operations to determine if the approved NCP measures are still adequate.

- Review the airport NEM to determine whether a change in the fleet mix or airport operations has caused, or is projected to cause, an increase or decrease to the noise exposure of DNL 1.5 dB or greater over noncompatible land uses (See Section 6.2 of this AC). A change of this magnitude will require an update to the NEMs.

- Review the current operational measures to determine if they maintain aircraft noise within the designated noise impact areas. For example, has there been an unexpected significant increase in operations at the airport? Have there been changes in the use of local airspace such as increased air traffic or changes in flight patterns from other nearby airports that affect how often these measures can be implemented?

- Review the land use base map to determine if there are changes in land uses that render approved operational noise abatement measures no longer beneficial.

- Review the recommended land use preventive measures to determine if they have been implemented.

- Review the implemented land use preventive measures to determine if they are adequate to protect the designated noise impact areas from encroachment by noise sensitive uses. Review the effectiveness of remedial measures in resolving existing noncompatible uses within the noise impact areas, and document progress and any problems encountered in their implementation.

Sponsors may want to continue an advisory committee. The committee formed during the NCP process is already familiar with the contents of the NCP. Advisory Committee or Community Roundtable Committee members can maintain community participation while the NCP is implemented, monitor the NCP during its progress to determine if its measures are working, and recommend changes to the NCP as needed.

Addressing Noise Complaints.
A noise abatement contact or noise abatement hotline can be established to respond to noise complaints in a number of ways:

- Establishing and maintaining a noise complaint file.
- Providing an initial response to noise complaints.
- Investigating complaints and providing appropriate follow-up actions.
- Preparing publicly available noise complaint reports.
Need for Regular Updates.

The NCP must provide for revision if made necessary by a significant revision of the NEMs. This commitment can be described in the implementation section of the NCP, or the NCP may include a separate measure for FAA approval.

Portable and Permanent Fixed Noise Monitoring.

The NCP might include an ongoing requirement to monitor actual noise conditions. Monitoring aircraft noise around airports may be as modest as a few portable noise monitors (to respond to individual noise complaints, for example), or an extensive system of fixed monitors linked to a central processing unit to monitor overall NEM conditions at the airport and determine when an NEM and NCP update are required. Eligibility for a permanent monitoring system will be limited to circumstances where it is clear that portable monitors would be inadequate. The greater the operations and larger the noise contour, the more likely a permanent system is justified.

For reasons of aviation safety, FAA approval does not extend to the use of monitoring equipment for enforcement of a noise rule or preferred flight track. A primary justification for monitoring equipment, therefore, should be to provide information necessary to carry out other noise compatibility projects in the approved NCP and to monitor progress in achieving noise compatibility objectives. Here are some sample uses of noise monitoring:

- Selection of dwelling units or other structures for sound insulation.
- Pre- and post-insulation interior/exterior noise measurement.
- Compliance with a monitoring requirement of state noise law.
- Aiding implementation of other noise compatibility projects.
- Providing noise data for future revision of the NCP; however, monitoring data should never be used as the basis for a future contour.

FAA Order 5100.38 provides guidance on allowable costs for monitoring equipment.

Data Requirements.

For proposed program management measures, the NCP should explain how program management measures would fit into overall NCP success.

Program Management Measures in a Part 150 Study.

Program management measures normally do not reduce or prevent noncompatible land uses. They may be approved, however, as contributing to the overall successful implementation of the NCP and preventing the introduction of additional noncompatible land uses.
7.25 NEM with Program Implementation.

7.25.1 If NEMs and the NCP are submitted to the FAA separately, and the forecast NEM was not based on NCP implementation, airport sponsors should submit a revised forecast NEM with the NCP in accordance with Part 150 Section B150.3(b), unless there are no aircraft operational recommendations that would change the NEM contours. NEMs may need to be updated after the FAA takes action on the NCP if the NEMs included program measures that would alter the NEM contours, but were disapproved. This requirement is described in Part 150 Section 150.21(d).

7.25.2 Revisions to NEMs and new NEMs must meet the same Part 150 requirements as initial submissions.

7.25.3 The program documentation must indicate which measures are recommended for implementation, and which measures are depicted in the NEMs.

7.25.4 If overall numbers of people exposed to significant noise levels will be reduced through implementation of the NCP, the NCP is determined to meet ASNA and Part 150 standards, even though it is possible that some noise-sensitive land uses around an airport may experience an increase in noise. The determination is based on a “net reduction” in overall noise impacts. When there is an increase in noise over noncompatible land uses of DNL 1.5 dB or greater, an EA will be required before implementing the measure (Part 150 Section 150.5).

7.26 NCP Submittal.

Sponsors should identify their Part 150 program submission as either an NCP submittal that follows an NEM submittal or as NEMs and NCP submitted together.

7.26.1 Revision to a Previous NCP.

If the NCP is a revision to a previously approved NCP, sponsors should identify this in their submittal.

7.26.2 Separate NEM and NCP Submissions.

If the NEMs and the NCP are submitted to the FAA separately, airport sponsors should include the NEMs with the later submittal of the NCP, assuming the NEMs are still valid and do not require revision under Part 150 Section 150.21(d). The NCP documentation should indicate the FAA has previously found the NEMs in compliance with Part 150. Sponsors must certify that the NEMs as well as the description of consultation and opportunity for public comment are true and complete (Part 150 Section 150.21(e)) and that the NEMs still representing the current and forecast conditions at the airport as of the date the NCP is submitted. If one or both of the NEMs are no longer “true and complete,” sponsors must submit appropriately revised NEMs with the NCP.
7.26.3 Identify the Submitting Party.
Clearly identify the airport name and the airport sponsor’s name on the NCP submission. It is desirable to have this information on a cover page of the submission. However, there is no format specified in Part 150, so it is acceptable to otherwise present this information as long as it is included and is clearly understandable.

7.26.4 Submitting the NCP for Preliminary Review.
The NCP may be submitted to the FAA for preliminary review, prior to the submission for formal review and approval.

7.26.4.1 Informal Submittals.
Sponsors may request from the FAA informal advice, a policy review, or technical guidance. The FAA also will provide technical advice during the Part 150 study process including whether recommendations are technically acceptable, feasible to implement, or approvable under federal criteria. Depending on the FAA’s feedback, sponsors may need to revise the NCP before submitting it for formal approval.

7.26.5 Formal Submission Requirements.
Formal submission requirements are outlined below. An example cover letter and airport sponsor certifications are provided in Appendix C of this AC. It is helpful to ensure the checklist is included to show the requirements of Part 150 for NCPs have been met. See Appendix B for a copy of the checklist.

7.26.5.1 Cover Letter.
The formal submission of the NCP should be accompanied by a signed and dated cover letter from the airport sponsor. The letter should indicate that the NCP is being submitted by the sponsor and not by its consultant or any other party. The cover letter should state that the NCP is being submitted under the provisions of Title I of ASNA and Part 150 for appropriate FAA determinations. Certifications required by Part 150 Section 150.21 should be included with the cover letter when the NEMs and NCP are submitted together. See Appendix C for examples of cover letters and certifications.

7.26.5.2 Required Number of Copies to Submit.
The Part 150 regulation states that sponsors must submit five hard copies of the NCP to the FAA through their ARP POC. Local FAA offices may request additional copies to expedite their review and response. Also, electronic submittals may be an option, so the ARP POC should be contacted for guidance.
CHAPTER 8. FAA REVIEW PROCESS

8.1 Introduction.
This chapter describes the review process the FAA follows when it receives an NEM, NCP, or combined NEM/NCP submittal from an airport sponsor. As noted in previous chapters, timelines and procedures associated with the FAA review process should be considered for preparing NEMs and NCPs. In general, the expectation is that the NEM and NCP will be submitted together to FAA. The only circumstances in which the FAA would expect to receive just an NEM are when noise contours have shrunk and there are no plans to revise the NCP.

8.2 Preliminary NEM Submittals.
As a best practice, airport sponsors should submit preliminary NEMs and accompanying information to the FAA for informal review and advice before sharing the NEMs with the public. Part 150 does not specify a timeline for informal reviews. For changes to AEDT modeling input (see Section 5.8) formal requests may be needed before submitting the NEMs for review. The ARP POC will coordinate requests with the AEE through the headquarters APP-400. An informal NEM review may require coordination across several FAA offices; for example, FAA ARP personnel may need to verify operational assumptions with local ATO facilities to ensure they reflect accurate operation.

Sponsors should carefully consider comments received from the FAA following an informal review and incorporate them into the final submittal to the greatest extent possible. This will greatly increase the likelihood that the final NEM submittal complies with the requirements of Part 150.

8.3 Official NEM Submittals.
When airport sponsors submit an official NEM document package (see paragraph 5.14.8) for official FAA acceptance, the Regional FAA Airports Division or ADO takes these steps:

1. Review the NEMs and accompanying information to determine whether the documentation demonstrates compliance with Part 150.

2. Send a letter to the airport sponsor acknowledging receipt of the NEMs and stating whether the NEMs comply with Part 150.

3. If the NEMs comply with Part 150, prepare a notice of compliance for the NEMs that the FAA will publish in the Federal Register. The Federal Register notice advises the public of where they can review the accepted airport sponsor NEMs.
8.3.2 If the NEMs do not comply with the requirements of Part 150, the letter to the airport sponsor will indicate the elements of the submittal not in compliance. The sponsor will therefore need to revise and resubmit the NEMs.

For NEMs that comply, once the Federal Register notice is published the airport sponsor may publish the NEMs, which can include posting on the airport’s website.

8.4 **Preliminary NCP Submittals.**

The process for an FAA review of preliminary NCP submittals is more extensive than preliminary NEM reviews. The FAA’s Regional Airports Division or ADO will coordinate the NCP documentation with other FAA lines of business with the responsibility for and expertise in measures proposed in the NCP. For example, as with the NEMs, FAA Airports personnel will need to verify operational assumptions with local ATO facilities to ensure they reflect accurate operation. Preliminary reviews are valuable when an NCP contains operational noise abatement measures, including IFPs, or proposed restrictions. Informal reviews provide airport sponsors with feedback from the FAA and an opportunity to make necessary revisions before beginning an official FAA review.

8.5 **Official NCP Submittals.**

When airport sponsors submit their official NCP (see Section 7.26), the FAA Regional Airports Division or ADO will take these steps:

- Conduct an independent review of the NCP using the NCP checklist in Appendix B to assess whether the program conforms to the requirements of Part 150. Evidence of consultation, certifications, and correct NEM years are important components.

- FAA will send a letter to the airport sponsor that acknowledges receipt of the NCP and provides comments on the NCP’s conformance with Part 150 requirements.

- If the NCP does not meet Part 150 procedural requirements, the FAA will provide comments on the deficiencies that should be addressed to receive FAA approval of the NCP measure.

- Once the NCP meets Part 150 requirements, the FAA will prepare a Federal Register notice. The notice announces the airport covered by the NCP, the date the FAA received the final NCP, and where the public can review it. Typically, a copy of the final NCP will be available at the airport sponsor’s offices and at the FAA’s Regional Airports Division and ADO. The notice announces the start of a 60-day public comment period in which the public may send comments to the FAA. This announcement also begins the FAA’s formal, final 180-day review period for the NCP.

- When the FAA begins the 180-day review, it conducts an evaluation of each NCP measure to determine whether each one meets FAA approval criteria. In some instances, measures may be interrelated (such as a preferred runway use in combination with a charted IFP), so these will be evaluated together.
FAA approval criteria include whether a recommendation may create an undue burden on interstate or foreign commerce (including unjust discrimination), is reasonably consistent with the goal of reducing existing noncompatible land use or preventing additional noncompatible land use, and includes new or modified aircraft flight operational noise abatement measures. FAA also reviews measures to determine whether they may interfere with the authority and responsibility of the FAA Administrator and whether IFPs can be implemented within the period covered by the program without reducing safety or the efficient use of the navigable airspace. FAA review and approval criteria is in Part 150 Sections 150.33 and 150.35.

As part of the FAA review, the agency will prepare a formal ROA that approves or disapproves each measure of the NCP, prepare a Federal Register notice announcing the decision(s), notify the airport sponsor of the final NCP determination, and provide the ROA to the airport sponsor.

Airport sponsors need to consider numerous factors relating to the FAA’s NCP review process. First, the FAA will approve or disapprove each proposed measure contained in the NCP. The law states that any measure not acted on by the FAA within the 180-day review period is considered approved, except for measures relating to flight procedures (i.e., IFPs and CVFPs charted in the FAA’s TPP, or included in the ATCT SOP).64 If the agency defers a decision on flight procedures, it will issue its determination on these measures within a reasonable period (typically, after completing related analyses of the measure’s feasibility or after reviewing additional information submitted to assist in a final decision on the measure).

Conditional approvals are not issued, but some measures may not be able to be carried out until after completing pre-requisite actions (e.g., environmental analyses and safety management reviews before implementing IFPs that affect airport or aircraft operations). These actions will be contained within the language granting approval to these measures.

During the 180-day review period, the FAA may reach out in other ways to help in the evaluation:

- Consult with the airport sponsor and its consultant.
- Explore the objectives of the program and propose alternatives for achieving them.
- Convene meetings as necessary for gathering facts needed to make a determination.

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64 See Part 150 Section 150.35(a).
8.5.5 Airport sponsors must provide all the information needed for the FAA to complete its review. Refer to Part 150 Section 150.33 for a complete list of these requirements.

8.6 **NCP Determination / Record of Approval.**

8.6.1 When the FAA determines that an NCP from an airport sponsor is complete, and after the FAA public comment period has closed, the agency will issue a ROA. The ROA will contain introductory background on why the airport conducted the Part 150 Study, a brief summary of each program measure evaluated in the NCP, and the FAA’s determination regarding the measure. The ROA will make these points clear:

- FAA approvals are approvals of actions that the airport recommends be taken.
- Approvals indicate only that the actions would, if implemented, be consistent with the purposes of Part 150.
- Approvals do not constitute decisions to implement the actions.\(^{65}\)
- Later decisions concerning possible implementation of the actions may be subject to environmental or other procedures or requirements.

For each program measure described in an NCP, the FAA will make a determination:

- Approved
- Disapproved
- Approved or disapproved in part
- No action.

8.6.2 An FAA determination of disapproval will provide the reason for the decision. The determination of no action may only be applied to measures related to flight procedures (i.e., IFPs and CVFPs charted in the FAA’s TPP, or included in the ATCT SOP). These measures are not subject to the 180-day deadline and may be acted on after that date. The ROA should describe the unresolved action and commit to a decision within a specified time.

8.6.3 NCP determinations are effective as of the date of approval subject to any additional requirements as noted above.

8.7 **NCP Withdrawal.**

8.7.1 If an airport sponsor withdraws the NCP during the 180-day review period, the FAA will halt the formal review. Resubmittals that meet Part 150 NCP requirements require a restart of the 180-day review period unless the Regional Airports Division Manager determines that the modification of the program can be integrated into the rest of the

\(^{65}\) Some measures require additional analysis before implementing.
program without exceeding the original 180-day review period (Part 150 Section 150.33(e)).

8.7.2 The FAA may withdraw approvals under these conditions:

- The FAA requires the airport sponsor to revise the program or a portion of the program, and it is not revised.
- A revision is submitted for approval and the determination on the revised NCP is inconsistent with the earlier approval.
- A term or condition of the program, or portion thereof, is violated by the responsible government body.
- A flight procedure or other FAA action upon which the approved program or portion of it is dependent on is later disapproved, significantly altered, or rescinded by the FAA.
- The airport sponsor asks the FAA to withdraw approval.
- Impacts on flight procedures, air traffic management, or air commerce occur that could not be foreseen at the time of approval.
- For cause—provided that the FAA sends a 30-day written notice to the airport sponsor of the FAA’s intention to withdraw or modify the determination and the reasons for the action.

8.8 Local Notice about Limitations on Recovering Damages for Noise.

8.8.1 Following official FAA acceptance of an airport’s NEMs, airport sponsor should publish a legal notice pursuant to 49 U.S.C. Section 47506 (see Part 150 Section 150.21(f)). Sponsors should check with their legal staff or local jurisdiction to see if there is special language or publication requirements to follow when publishing this notice.

8.8.2 An example of what the legal notice could state:

This serves to provide public notice that, on [insert date], the Federal Aviation Administration (FAA) announced its determination that the “XXXX Existing Condition Noise Exposure Map” and “YYYY Future Condition Noise Exposure Map” submitted by the [insert airport sponsor’s name] for [insert airport name] under the provisions of 49 U.S.C. Section 47503 and 14 CFR Part 150 were found to be in compliance with applicable requirements. The Noise Exposure Maps and supporting documentation are available for public inspection during normal business hours ([insert times and days of the week]) at [insert airport sponsor’s office location].

8.8.3 The notice must be published at least three times in newspapers of general circulation in the counties (or parishes) where the airport and surrounding properties are located. The
notices serve two purposes, which Part 150 statutes refer to as “constructive” and
“actual” knowledge of the NEMs by local property owners. Publication of the legal
notice serves as “constructive knowledge” of the existence of the new or updated NEMs
for property owners or potential buyers. Actual knowledge of the NEM is achieved if a
person is given a copy of the map when acquiring a property interest.

8.8.4 As indicated in 49 U.S.C. Section 47506, as of the date of the notice, no person who
acquires property or an interest in property in an area surrounding the airport, having
actual or constructive knowledge of the existence of the Noise Exposure Maps, will be
entitled to recover damages with respect to the noise attributable to the airport unless
such person can show that (1) after acquiring the interest in such property, there was a
significant (a) change in the type or frequency of aircraft operations at the airport, (b)
change in the airport layout, (c) change in flight patterns, or (d) increase in nighttime
operations; and (2) that damages have resulted from any such change or increase.

8.8.5 Airport sponsors should keep on hand indefinitely proof of the notice’s publication from
the newspapers in which the notice is published along with the NEMs most recently
determined in compliance with Part 150 and proof of all other publication of program-
related notices.

8.8.6 Similarly, if airport sponsors publish a complete version of their Part 150 study
following FAA acceptance of NEMs and approval of the NCP, copies of the FAA
acceptance/approval correspondence, the ROA, Federal Register notices, the initial
legal notice, and proof of publication should be included in the final Part 150 study
documents that are retained in the airport’s publicly available files.
CHAPTER 9. IMPLEMENTATION

9.1 Introduction.

9.1.1 This chapter describes the process for implementing FAA-approved NCP measures. Part 150 Section 150.23(e)(8) requires the NCP to include a schedule for how the implementation should proceed.

9.1.2 Airport sponsors should consider whether they need to enlist the assistance of one or more experts when deciding on the best strategy for implementing the approved program. While measures may be implemented by the responsible governing body without consultant assistance, specialized consultants may be needed to provide staff and technical resources for implementing various aspects of an airport’s NCP.

9.1.3 After Part 150 measures have been approved, additional review may still be required for implementation, similar to the environmental review discussed in Chapter 3. For example, if the environmental review did not include a formal Section 106 review of historic resources, and it is found that approved measures could impact historic homes, then completion of a Section 106 review would be required to comply with the National Historic Preservation Act.

9.2 Funding Implementation of Approved Noise Compatibility Program Measures.

9.2.1 Airport Capital Improvement Plan (ACIP) and Airport Improvement Program.

9.2.1.1 The ACIP is the primary planning tool for systematically identifying, prioritizing, and assigning funds to critical airport projects. The ACIP is also the basis for distributing AIP grant funds.

9.2.1.2 The ACIP identifies the airport improvement projects and their associated costs that will be needed over the next five years, including noise compatibility projects. In awarding AIP funds to sponsors of airports, the FAA emphasizes funding the highest priority projects first. One of the FAA’s primary goals for projects in the ACIP is to improve the compatibility of airports with the surrounding communities. In funding noise abatement measures, the FAA gives priority to higher noise-
impacted areas. Eligible noise compatibility projects generally fall into the following categories:

- Land acquisition (including relocation assistance).
- Acquisition of avigation easements.
- Purchase assurance / sales assurance / transaction Assistance.
- Sound insulation (see Paragraph. 7.14 for detailed requirements).
- Runway and taxiway construction that the FAA has approved for noise abatement in an NCP (including associated land acquisition, lighting, and navigational aids).
- Noise monitoring equipment.
- Noise barriers.

9.2.1.3 For noise compatibility projects in an NCP to be considered for AIP funding, the FAA must determine eligibility. If airport sponsors do not conduct a Part 150 study, PFCs may still be used for noise measures; however, PFC-funded measures must be approvable under Part 150.

9.2.1.4 The FAA normally disapproves remedial noise mitigation measures\(^{66}\) for noncompatible development constructed after October 1, 1998, under Part 150 (see Federal Register, April 3, 1998 (Volume 63, Number 64)) unless the airport sponsor did not have a noise contour map distributed to the public before that date or the property was not within the DNL 65dB contour. Other noise compatibility proposals may be approved in the NCP, but may not be eligible for consideration of federal funding. Examples of these instances are development of new or modified IFPs or CVFPs, operation or administrative costs of an airport sponsor’s ongoing noise program, or demonstration programs to test the effectiveness of new noise abatement and mitigation technology.

9.2.1.5 For FAA-approved NCP measures, airport sponsors should coordinate with their FAA points of contact to help determine the scope of AIP and PFC funding to implement those measures.

9.2.1.6 The AIP’s grants management system generates virtually all forms and reports necessary to apply for AIP funding. Most are available in digital format and can be completed in a word processing program.

9.2.1.7 The FAA website has the current versions of FAA Order 5100.38, the AIP Handbook, which provides a description of the process for including and

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\(^{66}\) The most commonly used remedial noise mitigation measures are land acquisition and relocation, sound insulation, easement acquisition, purchase assurance, and transaction assistance.
prioritizing projects, and which provides a complete discussion of project eligibility and funding application requirements.

9.2.2 Passenger Facility Charge Program.

9.2.2.1 The PFC program provides airport-generated funds by imposing a charge per enplaned (boarding) passenger. It provides airport sponsors a local source of funding for airport projects. PFC funds can be used to fund approved NCP measures and the airport sponsor’s local share of implementation costs for AIP-funded projects.

9.2.2.2 PFC eligibility differs from AIP eligibility. To be eligible for PFC funding, a noise abatement project must be located in an area adversely impacted by noise and eligible for approval as a noise compatibility measure were it submitted for approval under Part 150. However, PFC-funded projects do not have to be submitted to the FAA in an NCP and do not have to receive Part 150 approval. For projects not part of an approved NCP, the FAA requires sponsors to provide documentation that the project would nonetheless have accomplished a noise mitigation purpose that would be eligible for approval under Part 150. The eligibility of the proposed noise project must be supported by current noise information such as DNL grid points or current noise contours prepared for a Part 150 Study, environmental (NEPA) document, or other suitable planning document.

9.2.2.3 Airport sponsors interested in funding implementation of NCP measures through PFCs should refer to the FAA website for the current version of FAA Order 5500.1, for specific instructions (http://www.faa.gov/airports/pfc/).

9.2.3 Disposal of Airport Noise Land.

The disposal of noise land does not require an FAA release of obligations. Noise land is not acquired for airport development or aeronautical use. The sponsor must inventory acquired noise land and submit a re-use plan for FAA acceptance detailing land to be sold for compatible redevelopment and land that will be retained for airport use or noise buffer. Acquired noise land that may be sold is unneeded for public airport use and upon FAA acceptance of the reuse plan there is no need for an FAA release of obligations on the unneeded land. The sponsor must ensure fair market value proceeds on sale or long term lease and retain adequate property rights such as easement and lease restrictions that prevent any noncompatible land use or development of any land parcel disposed. The FAA guidance document entitled Noise Land Management and Requirements for Disposal of Noise Land or Development Land Funded with AIP describes the sponsor requirements to manage acquired noise land and the FAA review procedures for acceptance of the sponsor’s noise reuse plan.
9.3 Implementing Aircraft Flight Operational Noise Abatement Measures.

As described in Sections 7.8 and 7.9, operational noise abatement measures seek to use preferred runway use, profiles, or tracks to reduce noise over a community. Different implementation steps exist depending on the type of operational noise abatement measure that is approved in the NCP, as outlined in this section.

9.3.1 Use Methods.

9.3.1.1 Aircraft flight operational noise abatement measures are voluntary for the pilot and ATC depending on safety, wind, weather, and traffic flow management. Conditions may dictate that the pilot deviate from voluntary compliance from the intended flight measure. The final decision acceptance and use of operational noise abatement measures, including those assigned in IFR clearances, is with the pilot in command of the aircraft who is ultimately responsible for decisions regarding the safety of the aircraft. For these reasons, aircraft flight operational noise abatement measures are approved as “voluntary” in a Part 150 program.

9.3.1.2 Within the voluntary construct, it is essential for the airport to consider the operational method for how noise abatement measures are utilized by pilots, such as VFR or IFR methods. The operational method is a key consideration to develop measures that are flyable with recurring, repeatable use by pilots. Otherwise, the measures may not attain the noise benefits sought by the airport and nearby communities. Voluntary use extends to noise abatement measures assigned in ATC clearances, as the pilot has the option to refuse an ATC clearance that includes a runway or IFP that the aircraft cannot safely use. Instead, the pilot will coordinate with ATC for a different clearance that is flyable under the operative conditions.

9.3.1.3 Relevant operational measures with different implementation and use mechanisms are shown in Table 9-1:

Table 9-1. Matrix of Implementation and Use Mechanisms by Operational Noise Abatement Measures.

<table>
<thead>
<tr>
<th>Operational Noise Abatement Measure</th>
<th>Towered Airport</th>
<th>Non-Towered Airport (or when Tower closed)</th>
<th>Publish in Chart Supplement</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFR IFPs on departure or arrival (including CVFPs)</td>
<td>Request published IFP; assigned to pilots by ATC on an IFR clearance.</td>
<td>Request published IFP; assigned to pilots by ATC on an IFR clearance.</td>
<td>Yes</td>
</tr>
<tr>
<td>Operational Noise Abatement Measure</td>
<td>Towered Airport</td>
<td>Non-Towered Airport (or when Tower closed)</td>
<td>Publish in Chart Supplement</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>VFR Flight Tracks on departure or arrival</td>
<td>Detail VFR flight track and use in LOA with ATCT. ATCT assigns use when directing visual traffic.</td>
<td>Pilot notification via Chart Supplement</td>
<td>Yes</td>
</tr>
<tr>
<td>Preferential Runway Use</td>
<td>Detail preferred runway use in LOA with ATCT. ATCT assigns use when directing traffic and operative conditions allow.</td>
<td>Identify the preferred noise abatement runway and operative conditions (e.g., nighttime, calm winds) in the Chart Supplement.</td>
<td>Yes</td>
</tr>
<tr>
<td>NADPs</td>
<td>Seek ATC input; implementation is via Chart Supplement</td>
<td>Pilot notification via Chart Supplement</td>
<td>Yes</td>
</tr>
</tbody>
</table>

9.3.2 Collaboration with ATC and Aircraft Operators.

9.3.3 The airport is advised to include the ADO in all coordination with the ATO and aircraft operators during NCP development and later implementation steps.

9.3.4 Towered Airport.

9.3.4.1 If new or amended visual flight tracks or IFPs are being evaluated in an NCP, the airport should begin consultation early in the NCP process with the Air Traffic Manager in the ATCT and TRACON, as applicable. The Air Traffic Manager may identify that further collaboration is needed with the Operations Support Group, ATO Flight Procedures, or other units within the ATO Service Center. The use of TARGETS software to facilitate the development of flyable IFPs can also be a point of collaboration between the airport and ATO. Consultation with ATO can determine whether special analyses, simulator evaluation with support from airlines, or even preliminary flight testing is practical to help demonstrate a proposed operational measure’s feasibility. The Air Traffic Manager can indicate whether a measure is feasible, while units in the ATO Service Center can review it for consistency with national policy.

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67 This can help expedite national level review when a feasible measure is submitted later for implementation.
FAA requires a SRM analysis for aircraft flight operational noise abatement measures that may affect aviation safety per Order 5200.11, FAA Airports (ARP) Safety Management System (SMS).

In addition to ATC, airline and aircraft operator technical pilots can provide specific expertise on flyability, operational use in consideration of airline rules, aircraft performance, safety, and related operational factors that are essential to developing operational noise abatement measures. Active engagement and collaboration with aircraft operators can go a long way towards implementing successful operational noise abatement measures.

Consult with the servicing ATC facility (e.g., TRACON or ARTCC) if noise abatement IFPs are being evaluated in the NCP. The IFP will need to integrate with the IFR route structure serving the airport. In addition, collaboration with aircraft operators, using both VFR and IFR methods, are essential to developing and implementing viable operational noise abatement measures. Aircraft operators can provide specific expertise on flyability, operational use, and safety.

A specific implementation path exists for NADPs. NADPs are not charted IFPs and so are not included in the TPP. NADPs are operating techniques used by the pilot for thrust, flap, and rate of climb management during takeoff. Use of NADPs is published in the FAA’s Chart Supplement in the noise abatement information section for each airport (when applicable). NADP use is also included in airport specific reference sheets used by airlines. Aircraft operators will select the preset operating steps for the two available NADPs per standard airline or NBAA operating techniques. Although not a published IFP, ATC input into NADP use is still essential since the two NADPs can result in variable airspeeds that need to be considered with airspace flow and separation management.

Before FAA-approved NCP operational noise abatement measures can be implemented, even if they have been deemed operationally feasible and would realize noise-reduction benefits, airport sponsors must submit data sufficient for the FAA to environmentally evaluate the proposed measures under NEPA.

FAA Order 1050.1, states that new instrument approach procedures, departure procedures, en route procedures, modifications to currently approved instrument procedures, or new or revised air traffic management (ATC) practices, which routinely route air traffic over noise-sensitive areas at less than 3,000 feet above ground level, normally require an EA.
This includes procedures that alter flight tracks or specific altitudes. Accordingly, Preferential Runway Use and Aircraft Flight Operational Noise Abatement Measures, as described in Sections 7.8 and 7.9, normally require an environmental analysis before they can take effect when proposed at a towered airport or when using a charted IFP.

Order 1050.1 also states that new procedures that route aircraft over non-noise sensitive areas can be categorically excluded from environmental assessment. Also excluded are procedural actions users request on a test basis for less than six months to determine effectiveness of new technology and measure possible impacts on the environment. Visual flight tracks at non-towered airports do not normally require NEPA review.

An operational noise abatement measure may reduce noise in one noise-sensitive area around the airport but increase noise (possibly to a lesser degree) to another. When an EA is required, the FAA reviews the airport sponsor-prepared EA. During the EA process, the airport sponsor conducts an initial noise analysis, typically using the data from the NCP. The EA determines the changes in noise around the airport due to the sponsor’s proposed aircraft flight operational noise abatement measure. Based on the EA’s results, the sponsor may need to add noise mitigation to areas that are newly impacted if the NCP does not already address this. Examples of new noise impacts are creating a significant increase in noise over environmental justice populations (low-income or minority populations) or adding people to the DNL 70 dB contour.

The FAA’s noise threshold above which impacts are considered significant is a DNL 1.5 dB increase in noise over any noise-sensitive area within the DNL 65 dB contour. If the significance threshold is not exceeded, and no extraordinary circumstances exist (as defined by Order 1050.1, Paragraph 5-2), the FAA may conclude that the proposed operational noise abatement measure will not significantly affect the human environment and issue a FONSI. Implementation of the proposed operational flight measure may be implemented following the FONSI.

If the significance threshold is exceeded, FAA is required to report in their NEPA review of the airport EA the noise increases from the operational measure, which would include a DNL 1.5 dB increase in noise over any noise-sensitive area within the DNL 65 dB contour as well as any increase of 3 dB between DNL 60 and 65 dB contour, and any increase of 5 dB between DNL 45 and 60 dB contour. When the impact is considered

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68 See FAA Order 7400.2, Procedures for Handling Airspace Matters, Chapter 32.
significant, the FAA may issue a mitigated FONSI or require an EIS for
the proposed operational noise abatement measure.

9.3.7 Publication in FAA’s Chart Supplement and Terminal Procedures Publication.

9.3.7.1 The primary reference for pilots use of airport noise abatement
information is the FAA’s Chart Supplement. All airports with noise
abatement programs use the noise section in the airport’s individual listing
to convey relevant operational noise abatement instructions for pilot use.
When there are complex noise abatement instructions, the “front matter”
can be supplemented with a graphic in the Special Notices section of the
Chart Supplement. Consultant available APP-400 documentation on best
practices for describing noise abatement information in the Chart
Supplement. If Charted IFPs are used for noise abatement purposes, the
specific IFPs are referenced in the Chart Supplement, instead of describing
specific steps about how the procedure is flown.

9.3.7.2 If the NCP measure is approved, the language for the Chart Supplement is
submitted to the ADO to ensure it meet FAA requirements, in
collaboration with ATO.

9.3.7.3 When charted Instrument Flight Procedures (IFPs) are proposed for use by
aircraft on IFR clearances, whether a CVFP or an instrument arrival or
departure procedures, the airport will need to submit the requested
procedure into the FAA’s IFP Gateway. This initiates the FAA Order
8260.43, Flight Procedures Management Program, process for publishing
new procedures in the Terminal Procedures Publication (TPP). IFPs
authorized by an approved NCP are assigned a specific priority for
publication. The typical timeframe for development of a new or amended
IFP can be up to 3 years. IFPs will be developed using standard RNAV
(GPS) or RNAV (RNP) criteria as described in FAA Order 8260.3,
TERPS. Charted Visual Flight Procedures are developed using the criteria
and guidance in FAA Order 8260.61, Charted Visual Flight Procedures.
Noise abatement IFPs that seek development of SIDs, STARs, or RNP
(AR) procedures use the process identified and FAA Order 7100.41, PBN
Implementation Process.

9.3.8 Airport Agreements with Aircraft Operators and ATC.

9.3.8.1 At both towered and nontowered airports, an airport sponsor may need to
include new or changed noise abatement information in the airport’s rules
and regulations or minimum standards documents. The rules and
regulations and minimum standards are often referenced in lease
agreements, which notify and obligate airport tenants to comply. Sponsors
should also notify local pilots of new or changed noise abatement
information that may be relevant to them. Notification options include
handouts, bulletins, newsletters, signs in the FBO, etc. FAA will not
support/approve permanent Notices to Airmen about noise abatement, as
the Chart Supplement is the primary source for pilots to obtain such
information.

9.3.8.2 At airports with an FAA ATCT, the airport should coordinate a detailed
Letter of Agreement (LOA) that identifies and describes the relevant
parameters for use of approved aircraft flight operational noise abatement
measures. This preferential runway use measures, NADPs, and visual
flight tracks, and IFPs. The LOA process services to facilitate adoption of
aircraft flight operational noise abatement measures into the ATCT and
TRACONs Standard Operating Procedures (SOP). This is a key step to
enabling regular and safe use of the intended noise abatement measures.
At nontowered airports, the airport should consider an LOA with the
servicing ATC facility (e.g., TRACON or ARTCC) if there are IFPs with
noise abatement purposes that are to be used by IFR aircraft.

9.4 Implementing Preventive Land Use Measures.

9.4.1 Preventive land use management measures seek to reduce the possibility of adding new
noise-sensitive land uses within existing and future airport noise contours. These
measures must be implemented by the entities that have jurisdiction with land use
control authority. Airport sponsors may not have legal authority to implement land use
controls. When there is such legal authority, the grant assurances require airport
sponsors to manage land within its jurisdiction consistent with Grant Assurance 21,
Compatible Land Use for noise projects.

9.4.2 Airports are frequently surrounded by multiple local government entities, each with the
authority to adopt and enforce its own local land regulatory measures. Identifying all
impacted jurisdictions and diligently working toward their full participation and buy-in
during the study process is critical to successfully implementing land use compatibility
measures.

9.5 Implementing Remedial Land Use Measures.

When implementing remedial land use measures such as land acquisition or sound
insulation, airport sponsors should anticipate potential environmental impacts. For
example, a structure proposed for sound insulation may be a historic structure needing
special treatment. Airport layout changes or installation of navigational aids that are
approved for noise abatement may disturb areas with archeological significance. Refer
to FAA Orders 1050.1 and 5050.4 for additional guidance on complying with NEPA
and special purpose laws when implementing remedial land use measures.


9.5.1.1 Airport sponsors should consider developing step-by-step procedures for
implementing the approved remedial land use mitigation measures. A
9.5.1.2 The manual should include the following items:

- A policy statement for prioritizing program participation and for addressing hardship cases.
- Parcels identified for purchase, sound insulation, or easement.

9.5.1.3 FAA Order 5100.38 allows an airport to ensure equity among homes in the neighborhood affected by the acquisition program. To this end, the property acquisition limits may be expanded beyond the DNL 65 dB contour line to a logical neighborhood boundary such as the end of a block of homes that may be divided by the contour line, a highway fronting the neighborhood, or other natural feature defining the immediate pre-project neighborhood limits. Where necessary and feasible, therefore, the acquisition program may include a reasonable number of such homes located outside the eligible contour line, but identified as part of the neighborhood being acquired. The FAA Airports Regional Division or ADO (through the airport’s ARP POC) must agree with the proposed boundaries.

9.5.1.4 Each alternative mitigation measure should be described so it is easy to follow and provides a path for timely implementation. Property owners may be offered a single program option, such as land acquisition and relocation assistance where land use is being changed to compatible use. Property owners may be offered their choice of several program options that do not change land use—purchase assurance, avigation easement, sound insulation, or a combination of options.

9.5.1.5 Land acquisition to change land use (such as from residential to compatible commercial/industrial) may not be combined with options that would not bring about the desired land use change. For example, sound insulation would not be offered with land acquisition and relocation assistance. The success changing the land use as part of an acquisition depends on owners being willing to sell their property and the airport sponsor’s ability to assemble the acquired land for compatible redevelopment or compatible reuse.

9.5.1.6 The Policies and Procedures Manual for program implementation should identify the options that are available for each alternative. For example, can displaced persons remain in the dwelling rent free for a short time after the airport takes title of the property but before relocation to a comparable replacement dwelling? Will smaller bid packages within the
sound insulation program allow local construction companies a chance to work as general contractors instead of sub-contractors?

The manual could also include forms and documents that will be needed in the actual implementation phase of the program, such as purchase agreements and avigation easements.

FAA approval of the manual is not required, but it is recommended to have the ARP POC review it before it is finalized.

Acquiring Avigation Easements.

If the NCP includes an FAA-approved measure for acquiring avigation easements, the proposed easement acquisition procedures must conform to 49 CFR Part 24. To help in this, FAA AC 150/5100-17 provides specific guidance on appraising, negotiating, and purchasing easements for NCPs. Where allowable and cost effective, the FAA AC describes a minimum offer and valuation study method to apply upon showing that the fair market value of easements to be acquired is a nominal amount.

The easement valuation must comply with all FAA guidelines as described in AC 150/5100-17. It must estimate fair market value compensation for buying permanent avigation easements for the airport NCP. The valuation will appraise the effect of the easement on the market value of the participating properties. The appraisal also considers existing and proposed overlay zoning and subdivision or building code restrictions on the property.

AC 150/5100-17 provides specific guidance for appraising and negotiating the purchase of avigation easements in conformance to FAA requirements. (See paragraph 2-17, Appraisal of Avigation Easements Acquired for Noise Compatibility, and paragraph 3-9, Minimum Payment Negotiations.) Airport sponsors may submit the easement appraisal reports and proposed negotiation procedure to the ARP POC for review and acceptance. Upon FAA acceptance, sponsors can include these documents in the program implementation manual.

Preparing a Sound Insulation Program Agreement.

If the NCP includes an FAA-approved measure for sound insulation of privately owned property, Grant Assurance 5, Preserving Rights and Powers, requires the airport sponsor to enter into an agreement with private property owners. The grant agreement contains provisions that protect the federal investment and the interests of the FAA and airport sponsors and so must be included in the agreement with the private property owner. FAA Order 5100.38 includes wording for this agreement. These grant conditions are on the FAA website on the grant assurances page.
9.5.4 Preparing a Relocation Plan.

If the NCP includes an FAA-approved measure for providing relocation assistance, sponsors must prepare a Relocation Plan. AC 150/5100-17, Chapter 4, describes the requirements for relocation planning. Relocation planning must address issues associated with displacing individuals, families, businesses, farms, and nonprofit organizations.

9.5.5 Airport Sponsor Compliance Review and Quality Control.

9.5.5.1 To help assure maximum federal reimbursement of eligible costs, airport sponsors are encouraged to put in place a compliance review and quality control function. Guidance for this is in AC 150/5100-17 and the forms in Appendix 3 of that AC.

9.5.5.2 The Airport Sponsor must also maintain adequate records, including those pertaining to real estate, appraisals, acquisition, relocation, and property management, and other documentation necessary to show compliance with 49 CFR Part 24. This documentation needs to be readily available during regular business hours for inspection by representatives of the FAA, Office of the Secretary of Transportation, and Government Accountability Office. Airport sponsors must keep records for at least three years after FAA grant closeout.

9.5.5.3 Chapter 9 of AC 150/5100-17 provides guidance to airport sponsors on required documentation to support grant assurances and certifications to the FAA. Appendix 1 of FAA Order 5100.37, Land Acquisition and Relocation Assistance for Airport Projects, provides a documentation checklist for sponsors’ parcel or project files. For larger and more complex land projects, cost-effective computer or web-based document management and quality control systems are recommended.

9.5.6 Maintaining a Noise Land Inventory.

9.5.6.1 Land acquired under airport NCPs is often referred to as “noise land.” Noise land acquired with AIP grant funds is subject to Grant Assurance 31, Written Assurances on Acquiring Land, which is based on the statute found at 49 U.S.C. Section 47107 (c)(2)(A).

9.5.6.2 Airport sponsors must keep an up-to-date Noise Land Inventory that records all of the noise land parcels that were acquired with AIP grant funds. The inventory must fully account for all grant-acquired noise land. The inventory can also help the airport sponsor dispose of land when it is
no longer needed for noise compatibility (unneeded noise land). This AIP
guidance is on the Airport Improvement Program page.

9.5.7 Disposal of Unneeded Land.
When noise land is no longer needed for noise compatibility, the airport sponsor may
“dispose of” the land. “Disposal” of noise land does not mean that airport sponsors must
sell the property to another party. The airport can decide whether to sell unneeded noise
land at fair market value, keep and lease it, or exchange it. Whatever the decision,
sponsors must return the federal share of the disposal proceeds to the Airport and
Airway Trust Fund or use it for another approved noise compatibility project or eligible
AIP project at the airport.

9.6 Implementing Program Management Measures.
Program management measures may include keeping active your public involvement
programs that were established during the Part 150 Study, such as meeting with
advisory committees, publishing newsletters, or updating websites. Program
management measures might include tracking the NCP’s overall progress and changes
in aircraft operations to determine when a Part 150 map or program update might be
needed.

9.6.1 Maintaining Public Involvement Programs.
Many airport sponsors keep public involvement programs active after submitting the
NCP to the FAA. Keeping communication active between the airport and concerned
citizens’ groups is a means to provide the status and progress of the approved NCP.
These programs may distribute monthly or quarterly status reports or newsletters and
maintain a website for the public to access noise contour information and status and
progress reports. Public information programs can be a conduit for meaningful
communication with the public and a forum for discussing complaints. While most of
these programs are not eligible for federal funding, first-time development of a website
for this purpose may be eligible. The ARP POC can provide guidance on the program
management measures eligible for federal funding.

9.6.2 Acquisition of Noise and Operations Monitoring and Flight Tracking Systems.
For sponsors that decide to purchase a noise and operations monitoring or a flight
tracking system, the federal procurement regulations for this purchase are described in
49 CFR Part 18.36. Airport sponsors should develop a bid specification that describes in
detail the required system capabilities, equipment, and installation and maintenance
requirements.

9.7 Implementing Other Noise Abatement/Mitigation Measures Approved in an NCP.
9.7.1 Lights or other visual devices to help pilots fly specific noise abatement visual flight
rules (VFR) flight tracks or traffic patterns are eligible for consideration of federal
funding when they are an approved measure in an NCP. Construction of runways and
taxiways, including land acquisition, lighting, and marking, is eligible for funding as a
9.7.2 When implementing these types of noise abatement measures, airport sponsors should anticipate potential impacts on environmental resources. Refer to FAA Orders 1050.1 and 5050.4 for additional guidance on complying with NEPA when implementing NCP measures.

9.7.3 Sponsors can consider undertaking follow-on studies for determining other noise abatement measures which might be approved in an NCP:

- Analysis to determine the most effective design for a ground run-up enclosure or noise barrier.
- Study to evaluate airport noise and access restrictions, as long as the study is included in a Part 150 Study update with accompanying recommendations.
- Analysis of the feasibility and eligibility of providing acoustical treatment to a particular facility or type of structure.

9.7.4 The costs of a follow-on study approved in the NCP normally could be eligible for federal funding. Airport sponsors should select a vendor (whether a consultant, contractor, or equipment manufacturer) through a competitive sealed bid process. Allowable costs for follow-on studies include system design, noise monitoring equipment, dedicated data processing equipment and software, equipment installation, site preparation, and one-time costs for installation of electrical power and data transmission lines. If the installation involves ground disturbance, the study needs to determine if NEPA applies.
APPENDIX A. AIRCRAFT NOISE

A.1 Aircraft Noise Background.

A.1.1 Noise is unwanted sound. Sound becomes noise when it interferes with normal activities. Sound is a physical phenomenon consisting of tiny pressure oscillations forming waves traveling through a medium, such as air, and is sensed by the human ear. Aircraft noise results from the operation of aircraft, such as engine run-ups, taxiing, departures, arrivals, and aircraft overflights.

A.1.2 Aircraft noise originates from the engines as well as the airframe or structure of aircraft. The engines are generally the most significant source of noise. Although noise generated by propeller-driven aircraft can be annoying, jet aircraft are commonly the source of disturbing noise at airports.

A.1.3 The two basic types of jet aircraft (operating as of the publication date of this AC) are equipped with turbofan or turbojet engines. Aircraft flying faster than the speed of sound generate an intense pressure wave called a sonic boom, in addition to the propulsion and airframe noise. Currently, non-military aircraft are prohibited from producing sonic booms over land in the United States.

A.1.4 Today’s commercial airplanes powered by high bypass jet engines have noise sources located inside the engine and external to the airplane:

- The jet exhaust mixing with the atmosphere produces noise behind the engine exhaust.
- The fan and forward stages of the low-pressure compressor generate noise which radiates forward through the engine air intake.
- Fan noise also radiates downstream through the bypass duct.
- Turbine and combustor noise radiate from the engine’s core nozzle.
- As air passes over the fuselage, wings, control surfaces, and landing gear, it creates turbulence which in turn generates what is called airframe noise.

A.1.5 During flyover, this highly directional noise produced by jet airplanes is characterized by an increase in sound energy as the airplane approaches up to a maximum level. This sound level begins to decrease as the airplane passes overhead, decreasing further in a series of lesser peaks as the airplane departs the area.

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69 FAA regulation has required engine retrofit to meet Stage 3 airplane engine standards since September 1991. All airplanes weighing greater than 75,000 pounds were required to be retrofitted or phased out by January 1, 2000 (Federal Register 56, September 25, 1991). The FAA Modernization and Reform Act of 2012 extended this requirement to require all jet aircraft above and below 75,000 pounds to meet Stage 3 or Stage 4 noise levels, effective December 31, 2015.
A.1.6 Noise made by a helicopter is very complex and consists of multiple forms of noise associated with the main and tail rotors. The repetitive rotary motion of the air displaced by the blade surfaces (thickness noise) and the variation in loading on the blade surfaces (loading noise) generate what’s called periodic tonal noise. Noise also results from the interactions of rotor blades with the forces generated by the tips of the rotor blades. This noise generates very directional noise pulses below the rotor plane.

A.1.7 The main noise source in a propeller-driven airplane is the propeller with possible contribution from the engine exhaust. Propeller blades generate thickness and loading noise as the previous paragraph described.

A.2 Noise Metrics.

Multiple noise metrics are used to assess potential airport noise impacts. Different noise metrics can be used to describe individual noise events, such as a single operation of an aircraft taking off, or groups of events, such as the cumulative effect of numerous aircraft operations, which creates a general noise environment or overall exposure level. Both types of descriptors are helpful in explaining how people tend to respond to a given noise condition. Descriptions of these metrics follow.

A.2.1 Decibel, dB.

A.2.1.1 Because of the vast range of sound pressure or intensity detectable by the human ear, sound pressure level (SPL) is represented by the metric known as a decibel (dB). A dB is a ratio of one sound value to another on a logarithmic scale. It is ten times the logarithm of the ratio of the sound pressure from a source relative to a reference pressure that equal to the threshold of human hearing. Therefore, a SPL of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet (laboratory-type) listening conditions. At 120 dB, the ear begins to feel a discomfort, and pain begins at approximately 140 dB. Most environmental sounds have SPLs ranging from 30 to 100 dB.

A.2.1.2 Because decibels are logarithmic (non-linear), they cannot be added or subtracted directly like other (linear) numbers. For example, if two sound sources each produce 100 dB, when they are operated together they will produce 103 dB, not 200 dB. Four 100 dB sources operating together again double the sound energy, resulting in a total SPL of 106 dB, and so on. In addition, if one source is much louder than another, the two sources operating together will produce practically the same SPL as if the louder source were operating alone. For example, a 100 dB source plus an 80 dB source produce 100 dB when operating together. The louder source masks the quieter one.

A.2.1.3 Two useful rules to remember when comparing SPLs are: (1) most people perceive a 10 dB increase in SPL between two noise events to be a
doubling of loudness, and (2) changes in SPL of less than 3 dB between
two events are not easily detected in everyday environments.

A.2.2 A-Weighted Decibel, dBA.

A.2.2.1 A-weighting is a “filtering” of sound that approximates the auditory
sensitivity of the human ear. Frequency, or pitch, is a basic physical
characteristic of sound and is expressed in units of cycles per second, or
hertz (Hz). The normal frequency range of hearing for most people is from
about 20 to 15,000 Hz. Because the human ear is more sensitive to middle
and high frequencies (1000 to 4000 Hz), a frequency weighting called “A”
weighting is applied to the measurement of sound. Frequencies below and
above the range of frequencies to which the human ear is most sensitive
contribute less to the overall perception of sound, which is reflected in the
sound pressure range quantified in an A-weighted decibel. The
international “A” standard approximates the sensitivity of the human ear
and helps in assessing the perceived loudness of various sounds.

A.2.2.2 Figure A-1 charts common indoor and outdoor sound levels. A quiet rural
area at night may be 30 dBA or lower, a quiet urban area at night may be
40 dBA, whereas the operator of a typical gas lawn mower may
experience a level of 90 dBA or higher. Similarly, the level in a library
may be 30 dBA or lower; rock concerts may reach levels near 110 dBA.

A.2.3 Maximum A-Weighted Noise Level, Lmax.

Sound levels vary with time. For example, sound increases as an aircraft approaches,
then decreases and blends into the ambient, or background, as the aircraft recedes into
the distance. Because of this variation, it is often convenient to describe a particular
noise event (e.g., a single aircraft flyover) by its highest or maximum sound level
(Lmax). Figure A-1 shows common sound levels for comparison. The Lmax metric
describes only one dimension of an event; it provides no information on the cumulative
noise exposure generated by a sound source. In fact, two events with identical Lmax
levels may produce very different total noise exposures. One may be of very short
duration, while the other may last much longer. Lmax is useful for identifying detectable
noise changes. A 3 dB increase in Lmax is “barely perceptible,” while a 5 dB increase in
Lmax is “clearly perceptible.”

A.2.4 Sound Exposure Level, SEL.

A.2.4.1 The most common measure of noise exposure for a single aircraft flyover
event is the sound exposure level (SEL). SEL is a summation of the A-
weighted sound energy at a particular location over the true duration of a
noise event, normalized (or compressed) to a fictional duration of one
second. The true noise event duration is defined as the amount of time the
noise event exceeds a specified level (that is at least 10 dBA below the
maximum value measured during the noise event). For noise events lasting
more than one second, SEL does not directly represent the sound level
heard at any given time, but rather provides a measure of the gross impact of the entire acoustic event.

Using the one-second measure enables the comparison of noise events of different duration and maximum levels. Because the SEL is normalized to one second, it will almost always be larger in magnitude than the $L_{\text{max}}$ for the same event. For most aircraft events, the SEL is about 7 to 12 dBA higher than the $L_{\text{max}}$. Additionally, since it is a cumulative measure, a higher SEL can result from louder or longer events.

SEL is used for comparing the noise energy emitted by different sources. In noise analysis documentation, SEL can be used to compare the noise energy emitted by different aircraft types. Figure A-2 is a graphic comparison of the SEL 80, 85, and 90 dBA noise contour areas for one takeoff and landing for a few select airplane types.
Figure A-1. Common Outdoor and Indoor Sound Levels

**Outdoor Sound Levels**
- Threshold of Pain
- Military Jet Takeoff with Afterburner at 50 feet
- Ambulance Siren at 10 feet
- Pile Driver at 50 feet
- Gas Lawnmower at 3 feet
- Sports Boat at 100 feet
- Diesel Truck at 50 feet
- Concrete Mixer at 50 feet
- Leaf Blower at 50 feet
- Commercial / Urban Area, Daytime
- Urban Expressway at 300 feet
- Suburban Area, Daytime
- Quiet Urban Area, Nighttime
- Quiet Suburban Area, Nighttime
- Quiet Rural Area, Nighttime
- Quiet Wilderness Area, No Wind
- Threshold of Human Hearing

**Indoor Sound Levels**
- Threshold of Pain
- Rock Band Concert
- Night Club with Live Music
- Food Blender at 3 feet
- Noisy Restaurant
- Garbage Disposal at 3 feet
- Vacuum Cleaner at 10 feet
- Normal Conversation at 3 feet
- Active Office Environment
- Quiet Office Environment
- Dishwasher, Next Room
- Library
- Quiet Bedroom, Nighttime
- Concert Hall, Background
- Recording Studio
- Threshold of Human Hearing

Source: URS Corporation, 2008
Computer noise models, such as the AEDT, base their computations on SEL.

Figure A-3 shows an event’s “time history,” or the variation of sound level with time. For typical sound events experienced by a stationary listener, such as an aircraft flyover, the sound level increases as the source (or aircraft) approaches the listener, peaks, and then diminishes as the aircraft flies away from the listener. In Figure A-3, the area under the time history curve represents the overall sound energy of the noise event. The $L_{\text{max}}$ for the event shown in Figure A-3 was 93.5 dBA. Compressing the event’s total sound energy into one second computes its SEL which is 102.7 dBA.

Equivalent Sound Level, $L_{eq}$

Equivalent sound level (abbreviated $L_{eq}$) is a measure of the noise exposure resulting from the accumulation of A-weighted sound levels over a specified period (an hour, an 8-hour school day, nighttime, or a full 24-hour day).

Because the length of the $L_{eq}$ period can differ depending on the time frame measured, the applicable period should always be identified or clearly understood when discussing this metric. Such durations are often identified through a subscript. For example, for an 8-hour day $L_{eq}(8)$ is used; for 24-hours, $L_{eq}(24)$.

According to the equal energy principle, the effect of a combination of noise events is related to their combined sound energy. Thus, $L_{eq}$ sums up the total energy over the time period of interest and gives a level equivalent to the average sound energy over that period. Such average levels are usually based on integrating A-weighted levels. Thus $L_{eq}$ is the average energy equivalent level of the A-weighted sound over a specified time period.

For typical aircraft flight events, and as noted earlier for SEL, $L_{eq}$ does not represent the sound level heard by the listener when the event occurs, but rather represents the total sound exposure for the $L_{eq}$ timeframe of interest. Also, the “average” sound level suggested by $L_{eq}$ is not an arithmetic or linear value, but a logarithmic, or “energy-averaged,” sound level. Loud events that tend to dominate the noise environment, therefore, are best described by the $L_{eq}$ metric.
A.2.6 Day-Night Average Sound Level, DNL70 and Community Noise Equivalent Level, CNEL.

A.2.6.1 The FAA has adopted, in title 14 CFR Part 150, a single system for measuring noise at airports and surrounding areas that generally provides a highly reliable relationship between projected noise exposure and surveyed reaction of people to noise. It also covers determining exposure of individuals to noise resulting from the operations of an airport at night.

\[ L_{dn} \] is the mathematical symbol for DNL as noted in Section A150.203 of the Part 150 regulation.
Figure A-2. SEL Noise Footprints
Figure A-3. Comparison of Maximum Sound Level (Lmax) and Sound Exposure Level (SEL)

![Diagram showing comparison of Lmax and SEL]

A.2.6.2 This metric is the DNL or the CNEL for California airports. Both noise metrics logarithmically average aircraft sound levels generated at the airport over an annualized average 24-hour period. Each aircraft operation between 10:00 p.m. and 6:59 a.m. is treated as if it were ten operations. Similarly, CNEL (but not DNL) includes an additional penalty weighting for operations taking place between 7:00 p.m. and 9:59 p.m. in the evening. Each aircraft operation during these hours is counted as if it were three operations. Logarithmically, these multipliers are the equivalent of adding 10 dB to the noise level of each nighttime operation and 4.77 dB to the noise level of each evening operation.

A.2.6.3 These weightings are added to account for the increased sensitivity to noise during evening and night time hours. Ambient (without aircraft) sound levels during evening and nighttime are typically lower than during the day. The decibel "penalty" represents the added intrusiveness of sounds occurring during the evening and at night.

A.2.6.4 Like $L_{eq}$, DNL and CNEL are time-averaged sound levels, and therefore are measurements of sound averaged over a specified length of time. DNL and CNEL quantify the average sound energy during a 24-hour period. The DNL and CNEL metrics account for the noise levels of all individual aircraft events, the number of times they occur, and when they occur (day/evening/night). Values of DNL and CNEL can be measured with standard monitoring equipment, but for developing Part 150 Noise Exposure Maps (NEMs), they are predicted with an FAA-approved method.
computer model. The current FAA-approved model is the AEDT. The AEDT model, as well as guidance and other information, is available for a nominal fee at: https://aedt.faa.gov/2c_information.aspx.

A.2.6.5 Due to the DNL descriptor’s close correlation with the degree of community annoyance from aircraft noise, DNL has been formally adopted by most federal agencies for measuring and evaluating transportation noise for land use planning and noise impact assessment. CNEL has been adopted by the State of California.

A.2.6.6 In 1979, the Federal Interagency Committee on Urban Noise (FICUN) was formed to develop federal policy and guidance on noise. The committee’s membership included the Environmental Protection Agency (EPA), FAA, the Federal Highway Administration, and the Departments of Defense (DOD), Housing and Urban Development (HUD), and Veterans Affairs (VA). It also developed consolidated federal land use compatibility guidelines using DNL as the common descriptor of noise levels.

A.2.6.7 To develop the guidelines, it was also necessary to establish a correlation between land use and noise exposure classifications. The FICUN issued its report entitled Guidelines for Considering Noise in Land Use Planning and Control in June 1980. This report established the Federal government’s DNL 65 dB standard and related guidelines. The FICUN generally agreed that standard residential construction was compatible for noise exposure from all sources up to DNL 65 dB.

A.2.6.8 In 1991, the FAA and EPA initiated the Federal Interagency Committee on Noise (FICON) to review technical and policy issues related to assessment of noise impacts around airports. Membership included representatives from DOD, DOT, HUD, the Department of Justice, VA, and the Council on Environmental Quality. The FICON review focused, among other things, on how noise impacts are determined and described, and to what extent impacts outside of DNL 65 dB should be reviewed in NEPA documents. The FICON’s findings and recommendations were published in the August 1992 Federal Agency Review of Selected Airport Noise Analysis Issues. With respect to DNL, the FICON found that there were no new descriptors or metrics of sufficient scientific standing to substitute for the DNL metric. It recommended continuing using the DNL metric as the principal means for describing long-term noise exposure from civil and military aircraft operations. The FICON reaffirmed the methodology for using DNL as the noise exposure metric to determine community noise impacts.

A.2.6.9 DNL provides a simple method to compare the effectiveness of alternative airport scenarios. Land use planners have acquired over 20 years of working experience applying this metric to make zoning and planning
decisions. DNL is a sound and workable tool for land use planning and in relating aircraft noise to community reaction. Experience indicates that DNL provides a very good measure of impacts on the quality of the human environment, forming an adequate basis for decisions that influence major transportation infrastructure projects.

A.2.6.10 As of the publication date of this AC, FAA believes DNL continues to be the best metric available in the scientific community for measuring aircraft noise and land use compatibility. Scientific studies on this subject, however, are ongoing.

A.2.6.11 FAA Order 1050.1 requires DNL be used to describe cumulative noise exposure and to identify aircraft noise and land use compatibility. Already mentioned is the FAA's acceptance of CNEL as an alternative metric for California. Besides DNL and CNEL, other cumulative and single event metrics can be used to supplement noise compatibility studies.

A.2.6.12 Some airport sponsors may wish to examine seasonal impacts of aircraft operations using a DNL analysis, for example, to provide additional information on the short-term (usually summer/winter tourism or vacationing season) peak activity at an airport. In locations experiencing these fluctuations, there can be an immense difference in noise contours based on aircraft operations averaged over 365 days versus contours based on the shorter timeframes of peak seasons. Seasonal DNL may also be applied to runway use. One season may be a predominantly northern flow and another predominantly southern. In either case, modeling results of DNL (or CNEL for California) for a shorter timeframe than annual averages may not be substituted for the official NEMs submitted in Part 150 studies.

A.2.7 Time Above (TA).

Time Above (TA) is the amount of time (usually expressed in minutes) for which aircraft-related noise exceeds a specified A-weighted sound level, expressed in decibels, during a given period. In other words, it provides the number of minutes an aircraft's noise level is louder than another noise level during the given period. Examples include the duration an aircraft is louder than the ambient noise level or louder than the level that interferes with speech.

A.2.8 Number of Events Above (NA).

Number of Events Above (NA) is the count of the number of aircraft noise events above a specified sound level, expressed in decibels. The threshold is usually expressed as either an SEL or $L_{\text{max}}$. The NA at a given location are counted and summed over a specified period. Examples include the number of aircraft events louder than the ambient noise level or louder than the level that interferes with speech. The NA is sometimes included as a supplement to DNL to provide more detail on the frequency of events in the vicinity of an airport.
A.3 Supplemental Noise Analysis.

279  A.3.1 Part 150 Section 150.9(b) requires that exposure of individuals to noise resulting from the operation of an airport be established in terms of DNL as the FAA’s primary noise metric. The FAA also recognizes CNEL for use as the cumulative metric for California. In Part 150 studies, supplemental noise metrics may be used to describe the aircraft noise exposure for specific noise-sensitive locations or situations and to assist in the public’s understanding of the noise exposure.

286  A.3.2 Supplemental analyses use other noise metrics to describe annoyance and other noise effects such as speech interference, sleep disturbance, and effects on children’s learning. Examples of these supplemental metrics include $L_{eq}$, $L_{\text{max}}$, SEL, TA, and NA. Table A-1 provides suggested supplemental metrics to describe particular noise effects. Supplemental metrics may be used to help create dose responses (changes resulting from exposure to a stressor) for evaluating noise’s effect on sleep disturbance, speech interference, and children’s learning. These areas of study are still in the research stage; so there is no scientific consensus on a methodology for these studies. Table A-1 presents a list of possible effects of noise and supplemental metrics that may be useful on a case-by-case basis in describing them.

Table A-1. Sample Supplemental Descriptors\(^7\)

<table>
<thead>
<tr>
<th>Possible effects</th>
<th>Cumulative energy average</th>
<th>Loudness of single events</th>
<th>Time aircraft are heard</th>
<th>Numbers of events</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community annoyance</strong></td>
<td>DNL – Average Day Night sound level</td>
<td>$L_{\text{max}}$ – Maximum Sound Level</td>
<td>Time Above – Typically 60 or 65 dB, the speech interference level.</td>
<td>$N_{70}$ – Number of events above 70 dBA / Australian metric cited in '02 FICAN report.</td>
</tr>
<tr>
<td>Psychological response to a given noise exposure</td>
<td>$L_{eq}$ – Equivalent Sound Level</td>
<td>SEL – Sound Exposure Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sleep disturbance</strong></td>
<td>$L_{eq}$ (night)</td>
<td>SEL (Used in 1997 FICAN sleep disturbance curve)</td>
<td></td>
<td>$L_{\text{max}}$</td>
</tr>
<tr>
<td>Threshold noise level causing sleep arousal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Speech interference</strong></td>
<td>$L_{eq}$ (daytime)</td>
<td>SEL</td>
<td>$L_{\text{max}}$</td>
<td>Number of events above 60/65 dB</td>
</tr>
<tr>
<td>Intruding noise that masks speech and reduces intelligibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^7\) No required supplemental metrics. A-Weighted except for $N_{70}$ and PSIL (the arithmetic average of sound pressure levels for 500, 1000 and 2000 Hz octave bands).
### Possible effects

<table>
<thead>
<tr>
<th><strong>School learning</strong></th>
<th><strong>Cumulative energy average</strong></th>
<th><strong>Loudness of single events</strong></th>
<th><strong>Time aircraft are heard</strong></th>
<th><strong>Numbers of events</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>As related to school sound insulation programs</td>
<td>Leq (school hours) 45 dB interior goal</td>
<td>SEL – for interior noise reduction (NLR) minimum 5 dB</td>
<td>Number of events above 45 dB (interior)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Park visitor annoyance</strong></th>
<th><strong>Cumulative energy average</strong></th>
<th><strong>Loudness of single events</strong></th>
<th><strong>Time aircraft are heard</strong></th>
<th><strong>Numbers of events</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Covers “interference with visitor enjoyment” &amp; “appreciation of natural quiet” (daytime and seasonal variations)</td>
<td>Leq (park hours)</td>
<td>Lmax</td>
<td>TAA – Time above Ambient (Existing or Natural)</td>
<td>Number of events above ambient and 10 dB increments</td>
</tr>
</tbody>
</table>

---

A.3.3 Publications that synthesize the research of these select areas of interest (sleep disturbance, children’s learning, and speech interference) are nonetheless available to help determine how to complete these analyses. Using these sources should be coordinated with the FAA point when these supplemental analyses are discussed in the NCP.

A.3.4 **Sleep Disturbance.**

A.3.4.1 To study sleep disturbance, FICON developed several dose-response relationships in 1992, as did the Federal Interagency Committee on Aircraft Noise (FICAN) in 1997 and others (see the annotated bibliography in Appendix E). These relationships link SEL to a percent-awakened number (percent of a population likely to be awakened as a result of single event noise levels). No provision was made in the FICAN study for combining the effects of multiple events, although more recent work has begun to address this area. In July 2008, the American National Standards Institute (ANSI) published a standard for estimating the

---

72 PSIL is arithmetic avg of sound pressure levels for 500, 1000 and 2000 Hz octave bands.
73 Background (ambient) measurements often desirable.
A.3.4.2 Rather than calculate the number of awakenings, ANSI S12.9-2008 provides a method to estimate the probability of being awakened at least once during a full night of aircraft operations. In 2009, the FICAN recommended this new estimation procedure for analyzing behavioral awakenings from aircraft noise. However, FICAN recognizes that additional sleep disturbance research is underway by various organizations and that work may result in additional changes to FICAN’s position. Until then, FICAN recommends the use of ANSI S12.9-2008. Based on the FICAN recommendation, the FAA endorses the use of ANSI S12.8-2008 for developing supplemental analyses for sleep disturbance. However, FAA cautions that a supplemental analysis must not attach undue significance of supplemental metric levels to specific noise impacts, and must include effective language about existing scientific uncertainties and the lack of FAA assessment methodology, impact criteria, and policy guidance.

A.3.5 Speech Interference.

To examine speech interference, FICON recommends using a cumulative A-weighted metric that is limited to the affected time period hours ($L_{eq}(x)$, where $x$ equals the hours evaluated) or a TA analysis (outdoor educational exhibits, for example). The EPA established a relationship between percent sentence intelligibility and steady indoor A-weighted sound level in the EPA “Levels Document.”

A.3.6 Effects on Children’s Learning.

To assess the effects on children’s learning, it is important to evaluate three variables: the steady ambient level, the level of voice communication, and the single event level that might interfere with speech. FAA Order 5100.38 indicates that schools should have an A-weighted $L_{eq}$ of less than 45 dBA, during school hours and in the classroom environment. For determining eligibility for consideration for federal funding, the school must be located within the significant noise contour of the FAA-accepted NEM. If the school is located within the contour, supplemental $L_{eq}(x)$ measurements should be taken during the school day (where $x$ equals school day hours). Several days of measurements should be taken to establish the average school day $L_{eq}$ interior noise level. Sound insulation would be eligible for federal funding if the noise level exceeds $L_{eq}(x)$ 45 dBA.

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76 Using either the federal tables or local standards of significance adopted by the Land Use Jurisdiction and Airport Sponsor.
APPENDIX B. NEM AND NCP CHECKLISTS

Use the checklists as a guide in reviewing your NEM or NCP package for completeness and compliance with FAA guidance before submitting them to your FAA Airports Regional Office or ADO point of contact. Including the NEM and NCP checklists completed in detail for NEM and NCP submission (as appropriate) packages facilitate FAA’s review.

The first table in the Appendix is an NEM checklist and the second is an NCP checklist.

Table B-1. NEM Checklist

<table>
<thead>
<tr>
<th>14 CFR PART 150</th>
<th>NOISE EXPOSURE MAP CHECKLIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRPORT NAME: ____________________</td>
<td>REVIEWER: __________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes/No/NA</th>
<th>Page Number/Other Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>Is this submittal appropriately identified as one of the following, submitted under 14 C.F.R. Part 150:</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>An NEM only?</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>An NEM and NCP?</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>A revision to NEMs which have previously been determined by FAA to be in compliance with Part 150?</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Is the airport name and the qualified airport sponsor identified?</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Is there a dated cover letter from the airport operator which indicates the documents and geospatial map data are submitted under Part 150 for appropriate FAA determinations?</td>
<td></td>
</tr>
</tbody>
</table>
# 14 CFR PART 150
## NOISE EXPOSURE MAP CHECKLIST

<table>
<thead>
<tr>
<th>AIRPORT NAME: ____________________</th>
<th>REVIEWER: ____________________</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes/No/NA</th>
<th>Page Number/Other Reference</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>II. Consultation: [150.21(b), A150.105(a)]:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Identification:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are the consulted parties identified?</td>
<td></td>
</tr>
</tbody>
</table>

| 2. Do they include all those required by 150.21(b) and A150.105(a)? | |

| C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b), and certification as true and complete under 150.21(e)? Note: Certifications are covered under VI so recommend deleting reference here. | |

| D. Does the document indicate whether written comments were received during consultation and, if there were comments, they are on file with the FAA region, or were all comments included in the documentation? | |

| III. General Requirements: [150.21] | |

| | | | |
# 14 CFR PART 150

## NOISE EXPOSURE MAP CHECKLIST

**AIRPORT NAME:** ___________________  
**REVIEWER:** ___________________

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes/No/NA</th>
<th>Page Number/Other Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Are there two maps, each clearly labeled on the face with year (existing condition year and future forecast)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Map currency:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Does the existing condition map year match the year on the airport operator's NEM submittal?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Is the future map based on reasonable forecasts and other planning assumptions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Forecast aircraft operations?</td>
<td></td>
<td></td>
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<tr>
<td>4. Forecast fleet mix?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Forecast number of night operations?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Forecast flight tracks or any planned IFPs under development?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. If the answer to 1 and 2 above is no, has the airport operator verified in writing that data in the documentation are representative of existing condition and future forecast conditions as of the date of submission?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. If the NEM and NCP are submitted together:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**14 CFR PART 150**

**NOISE EXPOSURE MAP CHECKLIST**

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes/No/NA</th>
<th>Page Number/Other Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has the airport operator indicated whether the future map is based on future contours without the program vs. contours if the program is implemented?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. If the future map is based on program implementation:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Are the specific program measures which are reflected on the map identified?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Only one future condition NEM can be designated for a finding under Part 150 Section 21(a)(1). The NEM forecast map must be based on reasonable forecast aircraft operations and other reasonable planning assumptions for the fifth calendar year or later beginning after the year the NEM’s are submitted to the FAA. This does not preclude the inclusion of additional maps for supporting information, analytical purposes, or longer range planning.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IV. Map Scale Graphics, and Data Requirements: [A150.101, A150.103, A150.105, 150.21(a)]**

A. Are the maps of sufficient scale to be clear and readable (they must not be less than 1" to 2,000’), and is the scale indicated on the maps? |           |                            |
## 14 CFR PART 150
### NOISE EXPOSURE MAP CHECKLIST

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<thead>
<tr>
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<tr>
<th>Item</th>
<th>Yes/No/NA</th>
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<tbody>
<tr>
<td>B. Is the quality of the graphics such that required information is clear and readable?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Depiction of the airport and its environs:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Is the following graphically depicted to scale on both the existing conditions and future maps?: [A150.101e2,4]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Airport boundaries?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Runway configurations with runway end numbers?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Does the depiction of the off-airport data include:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. A land use base map depicting streets and other identifiable geographic features?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. The area within the DNL 65 dB contour (or beyond, at local discretion)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65 dB contour (or beyond, at local discretion)? [A150.105(a),(b)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Noise Contours</td>
<td></td>
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</table>
## 14 CFR PART 150
### NOISE EXPOSURE MAP CHECKLIST

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<tr>
<th>Item</th>
<th>Yes/No/NA</th>
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</thead>
<tbody>
<tr>
<td>1. Continuous contours for at least the DNL 65, 70, 75 dB?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Based on current airport and operational data for the existing condition year NEM, and forecast data for the future NEM? [A150.101(a),(e) (3)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Flight tracks for the existing condition and future forecast timeframes (which must use the same scale as the NEM, and the same land use base map as the existing condition and future NEM), which are numbered to correspond to accompanying narrative? [A150.101(e) (2)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Locations of any noise monitoring sites (these may be on supplemental graphics that must use the same land use base map as the official NEMs). [A150.101(e) (7)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Noncompatible land use identification:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Are noncompatible land uses within at least the 65 Ldn depicted on the maps? [150.21(a), A150.101 (a),(b),(c),(d),(e) (5)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Are noise sensitive public buildings identified? [150.21 (a)] National Register Properties? [150.101(e) (6), (9)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Yes/No/NA</td>
<td>Page Number/Other Reference</td>
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</tr>
<tr>
<td>3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. Narrative Support of Map Data: [(50.21(a), A150.1, A150.101, A150.103]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Technical Data:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Are the technical data, including data sources, on which the NEMs are based adequately described in the narrative?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Are the underlying technical data and planning assumptions reasonable? [150.21(a) (1), A150.103(b)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Calculation of noise contours:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Is the methodology indicated?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Is it FAA approved? [A150.103(a)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Was the same model used for both maps? (If this is unclear, the sponsor needs to verify.)</td>
<td></td>
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# 14 CFR PART 150
## NOISE EXPOSURE MAP CHECKLIST

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<tbody>
<tr>
<td>c.</td>
<td>Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Correct use of noise models:</td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Does the documentation indicate the airport operator has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another?</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>If so, does this have written approval from AEE?</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>For noise contours below DNL 65 dB contour, does the supporting documentation include explanation of local reasons (i.e., local planning purposes? Narrative explanation is highly desirable but not required by the Rule.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Is there evidence that local jurisdiction adopted a lower standard?</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Noncompatible Land Use Information: [150.21(a), A150.101(a),(b),(c),(d),(e) (5)]</td>
<td></td>
</tr>
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</table>
# 14 CFR PART 150

## NOISE EXPOSURE MAP CHECKLIST

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<tbody>
<tr>
<td>1. Does the narrative give estimates of the number of people residing in each of the contours (L\text{DN} 65, 70, and 75, at a minimum) for both the existing condition and future maps?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Does the documentation indicate whether Table 1 of Part 150 was used by the airport operator?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. If a variation to Table 1 was used:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Does the narrative clearly indicate which adjustments were made and the local reasons for doing so?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Does the narrative include the airport operator’s complete substitution for Table 1?</td>
<td></td>
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</tr>
<tr>
<td>3. Does the narrative include information on self-generated or ambient noise where noncompatible land use identifications consider non-airport/aircraft sound sources?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Where normally noncompatible land uses are not depicted as such on the NEMs, does the narrative satisfactorily explain why, with reference to the specific geographic areas?</td>
<td></td>
<td></td>
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<tr>
<td>5. Does the narrative describe how forecasts will affect land use compatibility?</td>
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**VI. Map Certification:** [150.21(b), 150.21.(e)]
## 14 CFR PART 150
### NOISE EXPOSURE MAP CHECKLIST

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<th>Item</th>
<th>Yes/No/NA</th>
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</thead>
<tbody>
<tr>
<td>A. Has the operator certified in writing that interested persons have been afforded adequate opportunity to submit views, data, and comments concerning the correctness and adequacy of the draft maps and forecasts?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Has the operator certified in writing that each map and description of consultation and opportunity for public comment are true and complete?</td>
<td></td>
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<tr>
<td>C. If NEM dates are older than the date of submittal (DOS), has the airport operator certified in writing that aircraft operations, fleet mix, number of operations, and airport operating procedures are representative of existing conditions, and that forecasts for future NEM remain valid as of the DOS? Often a sensitivity analysis is necessary.</td>
<td></td>
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<tr>
<td>Item</td>
<td>Yes/No/NA</td>
<td>Page Number/Other Reference</td>
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<td>----------------------------</td>
</tr>
<tr>
<td>I. Identification and Submission Program:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Submission is properly identified:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. 14 C.F.R. Part 150 NCP?</td>
<td></td>
<td></td>
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<tr>
<td>2. NEM and NCP together?</td>
<td></td>
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<tr>
<td>3. Program revision?</td>
<td></td>
<td></td>
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<tr>
<td>B. Airport and Airport Sponsor's name identified?</td>
<td></td>
<td></td>
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<tr>
<td>C. NCP transmitted by airport operator cover letter?</td>
<td></td>
<td></td>
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<tr>
<td>II. Consultation: [150.23]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Documentation includes narrative of public participation and consultation process?</td>
<td></td>
<td></td>
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<tr>
<td>B. Identification of consulted parties:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Are parties in 150.23(c) consulted?</td>
<td></td>
<td></td>
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<tr>
<td>2. Public and planning agencies identified?</td>
<td></td>
<td></td>
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<tr>
<td>3. Agencies in 2, above, correspond to those indicated on the NEM?</td>
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</table>
### NOISE COMPATIBILITY PROGRAM CHECKLIST

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<tr>
<td><strong>C. Satisfied 150.23(d) requirements:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Documentation shows active and direct participation of parties in B. above?</td>
<td></td>
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<tr>
<td>2. Active and direct participation of general public:</td>
<td></td>
<td></td>
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<tr>
<td>3. Participation was prior to and during development of NCP and prior to submittal to FAA?</td>
<td></td>
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<tr>
<td>4. Indicates adequate opportunity afforded public to submit views, data, etc.?</td>
<td></td>
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<tr>
<td><strong>D. Evidence included of notice and opportunity for public hearing on NCP?</strong></td>
<td></td>
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<tr>
<td><strong>E. Documentation of comments:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Includes summary of public hearing comments if hearing was held?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Includes copy of all written material submitted to operator?</td>
<td></td>
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<tr>
<td>3. Includes operator's responses/disposition of written and verbal comments?</td>
<td></td>
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<tr>
<td><strong>F. Informal agreement received from FAA on flight procedures?</strong></td>
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NOISE COMPATIBILITY PROGRAM CHECKLIST

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<tbody>
<tr>
<td>III. Noise Exposure Maps: [150.23, B150.3, B150.35(0)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This section of the checklist is not a substitute for the Noise Exposure Map checklist.</td>
<td></td>
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</tbody>
</table>

It deals with maps in the context of the Noise Compatibility Program submission.

#### A. Inclusion of NEMs and supporting documentation:

1. Map documentation either included or incorporated by reference?

2. Maps previously found in compliance by FAA?

3. Compliance determination still valid?

4. Does 180-day period have to wait for map compliance finding?

#### B. Revised NEMs submitted with program: (Review using NEM checklist if map revisions included in NCP submittal)

1. Revised NEMs included with program?

2. Has airport operator requested FAA to make a determination on the NEM(s) when NCP approval is made?

#### C. If program analysis uses noise modeling:

1. AEDT, Heliport Noise Model (HNM), or FAA-approved equivalent?

2. Modeling in accordance with A150.5?
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<tr>
<td>D. Existing condition and future maps clearly identified as the official NEMs?</td>
<td></td>
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</tr>
<tr>
<td>IV. Consideration of Alternatives: [B150.7, 150.23(e)]</td>
<td></td>
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<tr>
<td>A. At a minimum, are the alternatives below considered? If not, appropriate rationale provided?</td>
<td></td>
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</tr>
<tr>
<td>1. Land acquisition and interest therein, including air rights, easements, and development rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Barriers, acoustical shielding, public building soundproofing</td>
<td></td>
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<tr>
<td>3. Preferential runway use system</td>
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<tr>
<td>4. Visual Flight Tracks and/or Instrument Flight Procedures</td>
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<tr>
<td>5. Noise Abatement Flight Profiles (e.g., AC 91-53A)</td>
<td></td>
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<tr>
<td>6. Restrictions on type/class of aircraft (as least one restriction below must be checked) Any proposed restriction must be coordinated with APP-400.</td>
<td></td>
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</tr>
<tr>
<td>a. Deny use based on Federal standards</td>
<td></td>
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<tr>
<td>b. Capacity limits based on noisiness</td>
<td></td>
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<tr>
<td>c. Noise abatement takeoff/approach procedures</td>
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<td>Item</td>
<td>Yes/No/NA</td>
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<tr>
<td>d. Landing fees based on noise or time of day</td>
<td></td>
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<tr>
<td>e. Nighttime restrictions</td>
<td></td>
<td></td>
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<tr>
<td>7. Other actions with beneficial impact</td>
<td></td>
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<tr>
<td>8. Other FAA recommendations</td>
<td></td>
<td></td>
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<tr>
<td>B. Responsible implementing authority identified for each considered alternative?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Analysis of alternative measures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Measures clearly described?</td>
<td></td>
<td></td>
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<tr>
<td>2. Measures adequately analyzed?</td>
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<td></td>
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<tr>
<td>3. Adequate reasoning for rejecting alternatives?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Other actions recommended by the FAA:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Should other actions be added? List separately or on back of this form, actions and discussion with airport operator to have them included prior to the start of the 180-day cycle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. Alternatives Recommended for Implementation: [150.23(e), B150.7(c), B150.35(b), B150.5]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Document clearly indicates:</td>
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<tr>
<td>1. Alternatives recommended for implementation?</td>
<td></td>
<td></td>
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<tr>
<td>2. Final recommendations are airport operator's, not those of consultant or third party?</td>
<td></td>
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**B. Do all program recommendations:**

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<tr>
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<th>Yes/No/NA</th>
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<tbody>
<tr>
<td>1. Relate directly or indirectly to reduction of noise and noncompatible land uses?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Contain description of contribution to overall effectiveness of program?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Noise/land use benefits quantified to extent possible?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Include actual/anticipated effect on reducing noise exposure within noncompatible area shown on NEM?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Effects based on relevant and reasonably expressed assumptions?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Have adequate supporting data to support its contribution to noise/land use compatibility?</td>
<td></td>
<td></td>
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<tr>
<td>C. Analysis appears to support standards set forth in 150.35(b) and B150.5?</td>
<td></td>
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<tr>
<td><strong>D. When use restrictions are recommended:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Are alternatives with potentially significant noise/compatible land use benefits thoroughly analyzed so that appropriate comparisons and conclusions can be made?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Use restrictions coordinated with APP-400 prior to making determination on start of 180 days?</td>
<td></td>
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<tr>
<td><strong>E. Do the following also meet Part 150 analytical standards:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Formal recommendations which continue existing practices?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. New recommendations or changes proposed at end of Part 150 process?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>F. Documentation indicates how recommendations may change previously adopted plans?</strong></td>
<td></td>
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<tr>
<td><strong>G. Documentation also:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Identifies agencies which are responsible for implementing each recommendation?</td>
<td></td>
<td></td>
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<tr>
<td>2. Indicates whether those agencies have agreed to implement?</td>
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<tr>
<td>3. Indicates essential government actions necessary to implement recommendations?</td>
<td></td>
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<tr>
<td>H. Timeframe:</td>
<td></td>
<td></td>
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<tr>
<td>1. Includes agreed upon schedule to implement alternatives?</td>
<td></td>
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<tr>
<td>2. Indicates period covered by the program?</td>
<td></td>
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<tr>
<td>I. Funding/Costs:</td>
<td></td>
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</tr>
<tr>
<td>1. Includes costs to implement alternatives?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Includes anticipated funding sources?</td>
<td></td>
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<td>VI. Program Revision: [150.23(e)(9)]</td>
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<td>A. Supporting documentation includes provision for revision?</td>
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APPENDIX C. NEM AND NCP SUBMISSION COVER LETTERS AND CERTIFICATIONS

This Appendix provides cover letters and certifications for your NEM and NCP submissions. You can use these examples as a guide in writing your Airport Sponsor Certification and cover letter to your ARP POC.

Cover letters and certifications are provided for the following submittal situations:
1. NEMs submitted by themselves
2. NCP submitted by itself, following submission of NEMs
3. NEMs and NCP submitted together
RE: TITLE 14 CFR PART 150 NOISE EXPOSURE MAPS SUBMITTAL FOR FEDERAL AVIATION ADMINISTRATION COMPLIANCE DETERMINATION

Dear [FAA Point of Contact]:

Enclosed are ____________ copies of [Airport’s Name] Title 14 CFR Part 150 Noise Exposure Maps (NEMs) and supporting documentation, along with an electronic version. These NEMs and supporting documentation are submitted under the provisions of Title 49 United States Code, chapter 475 and Title 14 CFR Part 150. The [Airport Sponsor], as owner and operator of [Airport], is submitting these NEMs and supporting documentation for appropriate Federal Aviation Administration (FAA) determination.

Should you have any questions regarding the enclosed document, please do not hesitate to contact [Contact Information]. We appreciate your assistance in this matter.

Sincerely,

[Name]
[Title]

Enclosures
SPONSOR’S CERTIFICATION

The Noise Exposure Maps (NEMs) for [Airport Name], hereby submitted in accordance with Title 14 CFR Part 150, were prepared with the best available information and are certified as true and complete to the best of my knowledge and belief.

The Existing Condition NEM is based on data generated for a timeframe representing the year of submission. [or, The Existing Condition NEM is not based on data generated for a timeframe representing the year of submission. However, there has been no change in operation at the airport that would create any substantial new noncompatible uses or significantly reduce noise over noncompatible uses]. The assumptions and activity levels used to develop the Existing Condition NEM are based on data from [Existing Condition Time Period Used for Modeling]. The noise contours representing the existing condition are identified as the [Year] Noise Exposure Map.

The assumptions and activity levels used to develop the Future Condition NEM are based on reasonable forecasts and other planning assumptions. The Future Condition NEM is based on data generated for a timeframe [Number of Years (must be at least five years from the date of submission represented by your Existing Condition NEMs)] years in the future from the year of submission. The noise contours representing the future condition are identified as the [Future Year] Noise Exposure Map.

The NEMs were prepared in consultation with officials of the state and public and planning agencies whose area, or any portion of whose area, of jurisdiction is within the DNL contour depicted on the NEMs. The consultation also included Federal officials having local responsibility and regular aeronautical users of the airport. It is further certified that adequate opportunity has been afforded interested persons to submit their views, data, and comments concerning the correctness and adequacy of the NEMs and the supporting documentation and forecasts. As required in 14 CFR Part 150 Section 21(b), a copy of all written comments received during consultation has been filed with the FAA Regional airports division manager.

________________________  ______________________________
Date of Signature          [Name]

[Title]

[Airport Sponsor]
RE:  TITLE 14 CFR PART 150 NOISE COMPATIBILITY PROGRAM

SUBMITTAL FOR FORMAL REVIEW AND APPROVAL

Dear [FAA Point of Contact]:

Enclosed are ___________ copies of the Noise Compatibility Program (NCP) for [Airport], for your formal review and approval. The [Airport Sponsor], as owner and operator of the [Airport], is submitting this NCP under the provisions of Title 49 USC chapter 471 and Title 14 CFR Part 150.

The NCP for [Airport] includes the Future Condition Noise Exposure Map, With Program Implementation. The [Airport Sponsor] is requesting the Federal Aviation Administration (FAA) to make a new map compliance finding upon approval of the NCP as outlined in 150.21.

The NCP for [Airport] was made available for public review prior to the public hearing, which was held on [Date] [if no hearing was held, state that a notice of opportunity for a public hearing was published prior to submittal of this NCP and the Airport Sponsor did not receive any requests for a hearing]. Comments received during the public review period and any public hearing have been included as an appendix to the NCP.

The [Airport Sponsor] formally adopted the recommendations contained in the NCP for [Airport] [describe the forum and provide date].

Should you have any questions regarding the enclosed document, please do not hesitate to contact [Contact Information]. We appreciate your assistance in this matter.

Sincerely,

[Name]
[Title]

Enclosures

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77 Your FAA point of contact may have different requirements for the number and type of submittal.
78 Include this request only if you are submitting a revised future condition NEM that incorporates measures (i.e., with Program Implementation) that were not included in your original NEM submission that would change the NEM.
79 Inclusion of comments is an optional way to meet the Part 150 requirement, which is to summarize the comments received. Disposition of comments applicable to the content and process for preparing the NCP is mandated by Part 150 section 150.23(e)(7). 150.23 only deals with NEM. Part 150 Section 21 only deals with NEM and does not have the same requirement to dispose of comments.
SPONSOR’S CERTIFICATION

The Noise Compatibility Program (NCP) and the Future Condition Noise Exposure Map (NEM), With Program Implementation\textsuperscript{80} for [Airport], hereby submitted in accordance with Title 14 CFR Part 150, were prepared with the best available information and are certified as true and complete to the best of my knowledge and belief.

The NEM and NCP were developed and prepared in consultation with Federal Aviation Administration (FAA) regional officials, the officials of the state, and of any public agencies and planning agencies whose area of jurisdiction, or any portion thereof, is within the DNL contour depicted on the NEM, and other Federal officials having local responsibility for land uses depicted on the map. This consultation included regular aeronautical users of the airport, including air carriers, military and other aircraft operators, as appropriate. The Future Condition NEM, With Program Implementation, is intended to replace the Future Condition NEM, Without Program Implementation, which was found by FAA to be in compliance with applicable requirements effective [Date]. The [Airport Sponsor] is requesting FAA to make a new map compliance finding for the Future Condition NEM, With Program Implementation. The new Future Condition NEM development went through process outlined in 150.21 to ensure updated consultation with regular aeronautical users of the airport.

It is further certified that prior to and during the development of the NCP, and prior to submission of the resulting program to the FAA, the [Airport Sponsor] afforded adequate opportunity for the active and direct participation of the state, public agencies and planning agencies in the areas surrounding the airport, aeronautical users of the airport, and the general public to submit their views, data, and comments on the formulation and adequacy of the NCP. Prior to submitting this NCP to the FAA, the [Airport Sponsor] held a public hearing [or state that an opportunity was provided and no requests were received].

This document constitutes the official NCP for [Airport], as recommended by the [Airport Sponsor]. The recommendations in this NCP are those of the [Airport Sponsor], not the consultant or another party.

\begin{center}
\begin{tabular}{ll}
Date of Signature & \hline
& [Name] \\
& [Title] \\
& [Airport Sponsor] \\
\end{tabular}
\end{center}

\textsuperscript{80} Include only if submitting a revised future condition NEM that incorporates operational measures (i.e., with Program Implementation).
Dear [FAA Point of Contact]:

Enclosed are ___________ copies of the Noise Exposure Maps (NEMs) and Noise Compatibility Program (NCP) for [Airport]. This document is being submitted by the [Airport Sponsor], as owner and operator of the [Airport]. The NEMs and supporting documentation are submitted under the provisions of Title 49 USC, chapter 475 and Title 14 CFR Part 150 for appropriate FAA determination. The NCP is submitted under the provisions of Title 49 USC, chapter 471 and Title 14 CFR Part 150 for your formal review and approval.

The NCP for [Airport] was made available for public review prior to the public hearing, which was held on [Date] [if no hearing was held, state that a notice of opportunity for a public hearing was published prior to submittal of this NCP and the Airport Sponsor did not receive any requests for a hearing]. Comments received during the public review period and any public hearing have been included as an appendix to the NCP.82

The [Airport Sponsor] formally adopted the recommendations contained in the NCP for [Airport] [describe the forum and provide date].

Should you have any questions regarding the enclosed document, please do not hesitate to contact [Contact Information]. We appreciate your assistance in this matter.

Sincerely,

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81 Your FAA point of contact may have different requirements for the number and type of submittal.
82 Inclusion of comments is an optional way to meet the Part 150 requirement which is to summarize the comments received. Disposition of comments applicable to the content and process for preparing the NCP is mandated by Part 150 Section 150.23(e)(7). 150.23 only deals with the NCP and Part 150 Section 21 only deals with the NEM and does not have the same requirement to dispose of comments.
[Name]

[Title]

Enclosures
SPONSOR’S CERTIFICATION

The Noise Exposure Maps (NEMs) and the Noise Compatibility Program (NCP) for [Airport], hereby submitted in accordance with Title 14 CFR Part 150, were prepared with the best available information and are certified as true and complete to the best of my knowledge and belief.

The Existing Condition NEM is based on data generated for a timeframe representing the year of submission. [Or, The Existing Condition NEM is not based on data generated for a timeframe representing the year of submission. However, there has been no change in operation at the airport that would create any substantial new noncompatible uses or significantly reduce noise over noncompatible uses]. The assumptions and activity levels used to develop the Existing Condition NEM are based on data from [Existing Condition Time Period Used for Modeling]. The noise contours representing the existing condition are identified as the [Year] Noise Exposure Map.

The assumptions and activity levels used to develop the Future Condition NEM are based on reasonable forecasts and other planning assumptions. The Future Condition NEM is based on data generated for a timeframe [Number of Years (must be at least five years from the date of submission represented by your Existing Condition NEMs)] years in the future from the year of submission. The noise contours representing the future condition are identified as the [Future Year] Noise Exposure Map.

The NEMs and NCP were developed and prepared in consultation with Federal Aviation Administration (FAA) regional officials, the officials of the state, and of any public and planning agencies whose area of jurisdiction, or any portion thereof, is within the DNL contour depicted on the NEM, and other Federal officials having local responsibility for land uses depicted on the map. This consultation included regular aeronautical users of the airport, including air carriers, military and other aircraft operators, as appropriate.

It is further certified that prior to and during the development of the NCP, and prior to submission of the resulting program to the FAA, the [Airport Sponsor] afforded adequate opportunity for the active and direct participation of the state, public agencies and planning agencies in the areas surrounding the airport, aeronautical users of the airport, and the general public to submit their views, data, and comments on the formulation and adequacy of the NCP. Prior to submitting this NCP to the FAA, the [Airport Sponsor] held a public hearing [or state that an opportunity was provided and no request for a hearing was received].

This document constitutes the official NEMs and NCP for [Airport], as recommended by the [Airport Sponsor]. The recommendations in this NCP are those of the [Airport Sponsor], not the consultant or another party.

________________________
[Name]
[Title]
[Airport Sponsor]
APPENDIX D. REFERENCES


APPENDIX E. ANNOTATED BIBLIOGRAPHY

Note: A large portion of the material in this annotated bibliography is taken from the Airport Cooperative Research Program (ACRP) project 03-03, Enhancing Airport Land Use Compatibility. Much of it has been edited.


This Standard provides acoustical performance criteria, design requirements, and design guidelines for new school classrooms and other learning spaces. The standard may be applied when practicable to the major renovation of existing classrooms. These criteria, requirements, and guidelines are keyed to the acoustical qualities needed to achieve a high degree of speech intelligibility in learning spaces. Test procedures are provided in an annex when conformance to this standard is to be verified.


This study reports the results of laboratory and in-home sleep studies. The in-home study locations were chosen to be sites with high aircraft noise and low levels of other noise. The in-home results differed considerably from the laboratory results, with subjects being much less inclined to awaken from aircraft noise in their homes. Many variables were recorded, such as sleep stage, heart rate, respiratory movements, and general body movements (motility). The aircraft noise was quantified in terms of the maximum A-weighted sound level at the sleeper’s ear. The subject was considered to be awakened if the sleep stage changed from a deeper sleep stage to the lightest sleep stage (called S1) or to awake. The study attempted to determine the percentage of awakenings that are induced by aircraft noise beyond the awakenings that normally (spontaneously) occur. In general, aircraft levels must exceed 35 dBA at the sleeper’s ear before any awakenings more than spontaneous ones, are likely to occur. When accounting for spontaneous awakenings, aircraft maximum levels of up to approximately 75 dBA are likely to produce 10% additional awakenings.


This paper reports a study of what happened when recorded aircraft arrivals and departures were played in sleeper’s bedrooms. The findings were that 1) the subjects were awakened more readily by aircraft noise events in the early morning (closer to rising time) than by the same events in the evening (the time closer to retiring); 2) the first aircraft noise events in the early morning are more disturbing (greater motility) than succeeding events or than events in the evening; 3) the amount of motility is affected by

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83 The ACRP was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. In October 2005, the FAA executed a contract with the National Academies, acting through its Transportation Research Board (TRB), to serve as manager of the ACRP. Additional information on the ACRP and the Land Use Project is available on the TRB website.
the time history of the noise event – events like arrivals that quickly rise and fall, produce
higher levels of motility than do the slower rising and falling levels of departures, despite
having equal maximum levels.

California Department of Transportation, Division of Aeronautics. *Noise Standards*. Title 21,
Subchapter 6.

Article 3, Chapter 4, Part 1, Division 9, Public Utilities Code (Regulation of Airports)
provides the noise standards governing the operations for all California DOT approved
airports. “These standards are based upon two separate legal grounds: (1) the power of
airport proprietors to impose noise ceilings and other limitations on the use of the airport,
and (2) the power of the state to act to an extent not prohibited by federal law.”

If a county, city, or community declares an airport as having a noise problem (i.e.,
noncompatible uses within the Noise Impact Boundary (NIB)) then, the county can
require the airport to monitor the noise and validate the NIB. If the county’s audit of the
airport’s NIB study finds the airport does have a noise problem, then the airport must
submit quarterly reports with a map depicting the NIB, noise measurement levels, and
number of people estimated living within the NIB, as well as aircraft operations and
number of aircraft type having the highest noise levels. The regulation provides
suggestions for controlling and reducing noise issues.

California Department of Transportation, Division of Aeronautics. (2002, January). *California
Airport Land Use Planning Handbook*. Santa Rosa, CA.

The Handbook is divided into two parts. Part I describes Airport Land Use Commission
(ALUC) procedures and plans. These chapters discuss the establishment of ALUCs, the
preparation and adoption of airport land use compatibility plans, formulation of airport
land use compatibility policies, ALUC review of local actions, and responsibilities of
local agencies. Part II discusses in more detail the two principal airport land use
compatibility issues of aircraft noise and safety. These chapters address measurement of
airport noise, establishment of airport noise compatibility policies, aircraft accident
characteristics and data, and the establishment of airport safety compatibility policies.
The handbook also contains a 14 page summary and ten appendices that include a
summary of California laws related to airport land use planning, federal regulation
governing obstructions in the vicinity of airports, sample implementation documents and
guidance on performing supporting analysis, general aviation accident data, and a list of
reference documents.

Limited.

The book provides an overview of airport systems planning from a global perspective and
addresses how the concept of strategic system planning can be applied to planning
airports and airport systems. The authors examine the evolving context of airport
planning, including environmental concerns and economic considerations, as well as
institutional issues. The book describes both the regional and national airport system
planning process, and presents a wide range of case studies from the United States,
Canada, Europe, Brazil, and Japan. There is a chapter on the community response to
aircraft noise which provides a brief review of selected literature on the effect of aircraft
noise on property values and discusses some of the implications for noise mitigation measures, including sound-proofing homes and compensation.


Clark County, NV, uses an Airport Environ (AE) Overlay District to determine the range of compatible land uses to prohibit noncompatible development and prohibit uses that are detrimental to the health, safety, and welfare of its citizens. The AE Overlay District supersedes the nine other types of overlay districts which include a residential neighborhood preservation overlay, a gaming enterprise overlay, and a red rock design overlay. Specifically the AE Overlay District requires all development to follow FAA regulations concerning airspace and safety, and requires noise attenuated construction standards in compliance with Clark County Code, chapter 22.22. The code designates 12 sub-districts or areas with specific land-use requirements that include runway protection zones, accident potential zones, and a variety of noise contour zones. These 12 sub-districts use a table to determine the appropriate type of land-use, permitting standards, and mitigation requirements. Further, the code requires all county airports to submit Airport Airspace Zoning Maps and specifically requires McCarran Airport to provide a Noise Exposure Map to the County every 5 years.


This reference document provides tools for local policymakers, planners, and airport managers to improve compatibility between airports and surrounding communities.


This document defines the DOD policy to achieve compatible land uses of public and private lands near military airfields while maintaining operational effectiveness. Incompatible land is defined as areas that may obstruct the airspace or as areas exposed to health, safety, or welfare hazards of aircraft operations. The DOD’s first priority is to take all “reasonable, economical and practical measures to reduce and/or control the generation of noise from flying and flying related activities.” After all reasonable noise source control measures are taken, the DOD recognizes that significant land areas will remain exposed to noise that is incompatible with certain uses. Therefore the DOD developed guidelines for compatible land uses within three zones: the Clear Zone, the Accident Potential Zone, and the Noise Zone.


The purpose of the JLUS is to encourage cooperative land use planning between military installations and surrounding communities in order to accommodate future compatible growth of both. The DOD will fund a study to develop local jurisdictional development guidelines for accident potential zones and noise exposure zones above DNL 65 dB that will include limits on tall structures, on-base measures to mitigate community impacts, and peripheral land uses that adversely impact installation operations. Communities are asked to put forth a good faith commitment that the study recommendations which may
include comprehensive planning, zoning ordinances, subdivision regulations, and building codes will be accepted and incorporated into local land development planning and decision-making. This study is a partnership between the military and the local community. JLUS recommends implementation through a permanent advisory board comprised of military and community stakeholders in order to uphold the JLUS recommendations and offer peer support for politically sensitive land use controls.


This document was developed for installation planners as a procedural tool designed to aid in the development of acceptable noise environments for facilities on military installations. It presents guidance for selecting sites for new facilities within existing or expected future noise environments and discusses noise reduction techniques which may be applied to render marginally acceptable locations suitable for use. The guidelines presented are consistent with the Air Installation Compatible Use Zone Program and land use recommendations generally accepted by the planning community.


In order to provide adequate guidance to state and local government, the EPA published information as to the levels of noise “requisite to protect the public health and welfare with an adequate margin of safety.” The document identifies levels to protect public health and welfare for a number of situations. These levels are not standards, but it is EPA’s judgment that the maintenance of levels of environmental noise at or below the identified levels is requisite to protect the public from adverse health and welfare effects.


The Airport Noise Compatibility Planning Toolkit implements the FAA Land Use Planning Initiative's short-term recommendations to develop a land use planning information package for FAA regions. This toolkit includes various publications that address airport noise compatibility planning. It can be used by airport sponsors, local planning jurisdictions, and other government entities as a guide to assist in compatible land use planning around the nation's airports. A similar version of the toolkit is being specifically designed for use by state aviation officials.


This is the FAA’s agency-wide environmental protocol for compliance with the National Environmental Policy Act, and implements the CEQ’s regulations. Appendix A, section 14, addresses noise. An initial noise analysis is accomplished during the environmental assessment in order to determine if significant noise impacts are expected for forecasted
conditions. If significant noise impacts are expected, then either noise abatement and
mitigation that reduces noise impact below the significant noise impact threshold levels
or a more detailed analysis as part of an EIS is required. Additional contours and
supplemental noise analyses are optional and determined by the FAA on a case-by-case
basis.

Instructions for Airport Projects.* Washington, D.C.

This supplements FAA Order 1050.1E by providing NEPA instructions for Federal
actions that support airport development projects. Essentially, NEPA and CEQ’s
regulations “provide Federal agencies with instructions on protecting the quality of the
human and natural environments” and requires these agencies to consider the
environmental impacts of actions prior to making a decision. This Order provides
implementation guidance of NEPA, CEQ’s regulations, 40 CFR 1500-1508, and
Department of Transportation’s Order 5610.1C, *Procedures for Considering
Environmental Impacts.* Additionally, Order 5050.4B incorporates the Vision 100
provisions on increasing air capacity and decreasing congestion.

Appendix R is most relevant to the Part 150 program. Washington, D.C.

This Handbook describes the FAA’s funding and project criteria for Airport
Improvement Program grants.

FAA. Title 14 CFR part 91. *General Operating and Flight Rules.*

This federal regulation establishes general rules for the operation of aircraft with regard
to diverse airport types. This includes various flight conditions, such as Instrument Flight
Rules or Visual Flight Rules, maintenance, special flight operations, foreign aircraft
operations, and operating noise limits.

FAA. (2004). Title 14 CFR part 150, and Amendments 150-1 to 150-4. *Airport Noise
Compatibility Planning.*

Part 150, Airport Noise Compatibility Planning, is the primary Federal regulation guiding
and controlling planning for aviation noise compatibility on and around airports. Part 150
established procedures, standards, and methodologies to be used by airport operators for
the preparation of Noise Exposure Maps and Noise Compatibility Programs. The Part
150 process is a balanced approach for mitigating the noise impacts of airports upon their
neighbors, while protecting or increasing both airport access and capacity as well as
maintaining the efficiency of the national aviation system.

The regulations contained in Part 150 are voluntary and airport operators are not required
to participate. However, an approved Part 150 NCP is the primary vehicle for gaining
approval of applications for Federal grants for noise abatement projects, and provides the
analyses of impacts of proposed changes to an airport’s operations. The Part 150 program
responds to the principles set forth in the Aviation Noise Abatement Policy Statement of
FAA. Title 14 CFR part 161. Notice and Approval of Airport Noise and Access Restrictions.

This regulation implemented that portion of the Airport Noise and Capacity Act of 1990 governing notice and approval of airport noise and access restrictions affecting the operation of Stage 2 and Stage 3 aircraft. This regulation defines requirements and procedures for airport operators to follow when proposing new or modified aircraft noise and access restrictions. Under this regulation, airport sponsors must comply with applicable Part 161 requirements before imposing noise or access limitations on any aircraft classified as Stage 2 or Stage 3, regardless of aircraft weight.

Before restrictions on Stage 2 aircraft may be imposed, the airport operator must inform the public of the proposed restriction, its anticipated or actual costs and benefits, any alternative restrictions proposed, and non-restriction alternatives considered. The sponsor must allow several entities to comment on the proposed restriction, including federal, state, and local government agencies, aircraft operators, and the public. Any restriction on the operation of Stage 2 aircraft must also comply with applicable federal law, including grant agreements.

Before restrictions on Stage 3 aircraft may be imposed, the airport operator must inform the public of the proposed restriction, its anticipated or actual costs and benefits, any alternative restrictions proposed, and non-restriction alternatives considered. The sponsor must allow several entities to comment on the proposed restriction, including federal, state, and local government agencies, aircraft operators, and the public. The airport operator must then submit an application to the FAA for approval or disapproval of the proposed noise or access restriction(s). Another means of imposing a restriction on Stage 3 aircraft operations is to reach written agreement between the airport operator and the operators of Stage 3 aircraft affected by the proposed restriction.

Part 161 could provide improved airport land use compatibility should the proposed restriction be shown to be noise beneficial, not unjustly discriminatory and not unduly burdensome on commerce or the national system of airports. See Part 161 for a full description of the statutory conditions for approval of noise and access restrictions. The analysis must demonstrate the proposed restriction provides benefits that non-restriction alternatives do not and cannot provide within the significant (DNL/CNEL 65 dB) noise contour. Successful completion of the Part 161 process would permit the airport operator to implement noise and access restrictions at the airport.


This survey of state agencies and FAA regions primarily focuses on awareness and education programs and activities, including laws and regulations in effect. Responses were received from eight FAA regions and 42 states. Of these, 79 percent reported some type of noise program run by local or state officials, including many regulations and guidelines. Of the reported programs, few were directed at public education and awareness. The document summarizes the best examples of education programs gleaned from the survey.
In 1992, FICON recommended an interim dose-response curve to predict the percent of the exposed population expected to be awakened as a function of the exposure to single event noise levels expressed in terms of sound exposure level (SEL). Since the adoption of FICON’s interim curve in 1992, substantial field research in the area of sleep disturbance has been completed. The data from these studies show a consistent pattern, with considerably less percent of the exposed population expected to be behaviorally awakened.

In light of this new information, FICAN recommends the adoption of a new dose-response curve for predicting awakening, based on the data in this paper and the supporting references. Because the adopted curve represents the upper limit of the data presented, it should be interpreted as predicting the “maximum percent of the exposed population expected to be behaviorally awakened.”

The 1990 Federal Interagency Committee on Noise, FICON, was formed to review Federal policies that govern the assessment of airport noise impacts. It has since been superseded by FICAN. FICON produced this report and made aviation noise policy recommendations. This report explicitly recommends continued use of DNL, but recognizes that this metric and use of only the value of DNL 65 dB may be insufficient to communicate the potential noise effects and the need for noise abatement measures. Policy recommendations included: (1) Continued use of the DNL metric as the principal means for describing long-term noise exposure of aircraft. (2) Continued agency discretion in the use of supplemental noise analyses. (3) Improved public understanding of the DNL metric, supplemental methodologies and aircraft noise impacts. (4) A screening analysis for noise sensitive areas (i.e., additional analysis should be performed in environmental documents where there is an increase in noise of 3 dB or greater at the DNL 60 dB noise level). The full report can be downloaded from the FICAN website.

A number of Federal agencies have published policies and/or guidance on noise and land use. These agencies included the Department of Defense, Department of Transportation, Housing and Urban Development, Environmental Protection Agency, and Veteran’s Administration. The 1980 document provided a consolidation of federal guidance on incorporating noise considerations in local development planning and site review. While this document did not replace individual federal agency material, it has served as a guide for individual agencies in dealing with their respective noise and land use compatibility programs.

More than a decade had passed since a relationship between community noise exposure and the prevalence of annoyance was synthesized by Schultz from the findings of a dozen social surveys. This quantitative dosage-effect relationship (DNL metric) has been adopted as a standard means for predicting noise-induced annoyance in environmental assessment documents. This 1991 document updates the 1978 relationship with findings of social surveys conducted since its publication. Although the number of data points from which a new relationship was inferred more than tripled, the 1978 relationship still provides a consistent fit to the original data.


Field measurements were conducted of potential sleep disturbance associated with changes in nighttime aircraft noise exposure near three airports. One study was conducted near Stapleton International Airport and Denver International Airport in anticipation of the closure of the former and opening of the latter. A second study was conducted in the vicinity of DeKalb-Peachtree Airport, a large general aviation airport. No major differences in noise-induced sleep disturbance were observed as a function of changes in nighttime aircraft noise exposure.


This report presents the methods and results of four in-home sleep studies conducted in the vicinities of Denver Stapleton International Airport (DEN) and Denver International Airport (DIA). The studies were carried out before and after the closing of DEN and before and after the opening of DIA. Sound Exposure Level, SEL, was the metric of the noise event used. The percent of noise events producing either awakenings or increased movement varied widely. Approximately 2% of events at 70 dB SEL resulted in behavioral awakenings, and from 21% to 75% of events at 70 dB SEL resulted in actimetric (movement) responses depending on the criteria used. All measures show an increasing awakening or arousal response with increasing SEL.


This report provides “information on (1) the key concerns and challenges associated with airports’ current operations and future growth—particularly concerns about noise, water pollution, and air pollutant emissions—and the actions being taken by the nation’s busiest airports to balance environmental concerns with such operations and growth and (2) the actions taken by FAA and other federal agencies to address environmental concerns associated with airports’ current operations and future growth.” The study found that noise is the primary environmental concern and challenge for airports. The top concern was older aircraft, followed by incompatible local zoning, pressure for residential development, and increasing population.

The EU Directive (DIRECTIVE 2002/49/EC, relating to the assessment and management of environmental noise) specifies $L_{\text{night}}$ as the indicator for sleep disturbance. This report presents relationships between $L_{\text{night}}$ and sleep disturbance for transportation noise. The effects of sleep that are addressed are: 1) onset of motility, 2) increase in mean motility during sleep and 3) self-reported sleep disturbance.


The guide provides a project management handbook for studying, initiating, and implementing residential sound insulation programs in neighborhoods around civilian and military airports. The guide presents information based on fundamental acoustic principles supported by practical experience gained in numerous residential sound insulation projects across the country. The most successful solutions to problems typically encountered in these projects have been discussed in the guide.


This paper reviews the state-of-the-art in economic valuation of noise to provide advice to the European Commission in determining interim values for noise to be used in Benefit Cost Analysis.


This paper describes a cost-benefit analysis of a number of possible noise abatement measures in the Netherlands. Benefits are calculated according to consumers’ preferences for dwellings, and values applied are derived from two different methodologies (hedonic pricing and contingent valuation). Costs are shown to be surpassed by benefits. The paper identifies weaknesses in valuing noise, particularly where issues of equity, benefit transfer and embedding are concerned.


This is one of the first large scale in-home studies of awakening due to aircraft noise. Subjects were between the ages of 20 and 70 years. Subjects kept sleep diaries and wore actimeters (to measure motility) for 15 nights. The objectives were to determine the relationship between outdoor aircraft sound levels and the probability of sleep disturbance. Overall, aircraft noise events with a Sound Exposure Level less than 90 dB were unlikely to produce any measurable increase in rates of sleep disturbance. The study also found that sensitivity to sleep disturbance varied by more than a factor of two – the most sensitive individuals were more than twice as likely to be disturbed by an event than were the least sensitive. An important conclusion was that all sleep disturbance data collected in laboratory situations significantly over-estimated the probability of awakening in a home situation.

Oregon’s Department of Environmental Quality (DEQ) recognizes airport noise as a threat to the public health and welfare of residents living near an airport. Oregon follows the FAA recommendations for specific noise abatement and mitigation within and above the 65 DNL noise contours.

The guidebook offers overlay zoning ordinances and planning templates for airports in order to identify noncompatible land uses, prevent future noncompatible development and protect the airport as a viable part of the transportation system. Due to complex fleet mixes these templates should not be used at larger commercial airports, such as Portland, Eugene, and Medford.


This report looks at how to use noise overlay districts to encourage land-use compatibility within an airport area. It reviews the federal guidelines for establishing noise overlay zones, defines terms used in discussions of airport-related noise problems, and presents models of a zoning ordinance, a subdivision ordinance, a building code, and an easement contract.


This study was conducted in people’s homes in the vicinity of Schiphol Airport. Both actimeters and button pushes were used to identify motility and behavioral awakenings. Results are reported as probability of motility and probability of increased motility relative to non-noise motility. One result was that the probability of increased motility increases when indoor maximum A-weighted sound levels from aircraft exceed 40 dB (or an SEL of about 50 dB). Indoor sound levels were found to effect subjects’ response, with louder interior levels decreasing the probability of aircraft noise induced motility.


This article is the original published paper relating percent of people reporting being “highly annoyed” to DNL. It provides a curve, now often referred to as “the Schultz Curve,” that graphically presents that “dose-response” relationship. It is often cited as the basis for the use of DNL 65 dB as the threshold of noise impact. It should be noted that the “Schultz Curve” includes annoyance from all transportation sources, see Fidell, S. Mar-Apr 2004, for an interpretation of annoyance produced by aircraft only.


This document strives to advance the way in which aircraft noise exposure information is conveyed to the non-expert as a basis for informed dialogue between airports and surrounding communities. It responds to the difficulties in communicating the sound levels produced or expected to be produced by aircraft operations at an airport. This document presents several tested alternative descriptions for cumulative metrics. The methods presented do not replace, but supplement, the cumulative metrics of noise exposure.

This paper defines the environmental capacity of an airport in terms of “aircraft noise, air quality, third party risk, biodiversity, climate change and community opposition to growth.” The positive effects of quieter aircraft have been offset by growth in air traffic. Impact can be mitigated in the short term through operational noise abatement measures. Effective land use planning is mentioned as a long term measure. The recommendations for maximizing the environmental capacity of an airport do not address land use compatibility. Long term airport planning, including planning for ground transportation infrastructure, is recommended.


This paragraph states “…it is in the public interest to recognize the effects of airport capacity expansion projects on aircraft noise. Efforts to increase capacity through any means can have an impact on surrounding communities. Noncompatible land uses around airports must be reduced and efforts to mitigate noise must be given a high priority.”


This subchapter requires that a single system be developed for measuring noise and determining the level of noise exposure caused by airport operations. It also requires identification of land uses normally compatible with exposure to noise. Section 47505 of the act authorizes the issuance of grants for airport noise compatibility planning to reduce or prevent noncompatible land uses in communities around airports.


As stated in the law, Congress found that community noise concerns led to uncoordinated and inconsistent restrictions on aviation that could impede the national air transportation system and that a noise policy must be carried out on a national level. Congress stated it recognized that community concerns can be alleviated through the use of new technology airplanes and the use of revenues. In this law, Congress established the collection of passenger facility charges, the phase out of Stage 2 airplanes weighing greater than 75,000 pounds from operating in the continental United States, and a requirement for the federal government to establish procedures for reviewing airport noise and access restrictions on the operation of Stage 2 and Stage 3 airplanes. As of January 1, 2000, all turbojet airplanes weighing greater than 75,000 pounds were required to meet Stage 3 noise levels or cease operations in the continental United States.

The FAA adopted a new noise standard for subsonic jet airplanes and subsonic transport category large airplanes. The standard ensures that the latest available noise reduction technology is incorporated into new airplane designs. This Stage 4 airplane design noise standard (published July 5, 2005, in the *Federal Register*) applies to any person submitting an application for a new airplane type design on and after January 1, 2006.
This section, authorized in section 160 of Vision 100 - Century of Aviation Reauthorization Act, Public Law 108-176, H.R.2115 (2003, December), established a pilot program enabling states or local governmental agencies to receive federal funding for land-use compatibility planning and projects. The government entity must have land use jurisdiction and be located around large or medium sized hub airports that had not conducted a Part 150 Study within the past 10 years. The state or local agency must enter into a written cooperative agreement with the airport operator that the agreement will achieve, to the maximum extent possible, compatible land uses consistent with Federal land use compatibility criteria under Section 47502(3) and that those compatible land uses will be maintained in perpetuity. Additionally, it requires jurisdictions that accept federal funding for land-use compatibility plans to comply in perpetuity with all FAA land-use regulations including airspace and height constraints.

The law also provided funding for an FAA study to provide prospective home buyers located within the vicinity of an airport access to the Noise Exposure Maps and other information derived from these maps. The ability to have information about an airport’s noise exposure was seen as an expansion of real estate disclosure and was viewed as an important step in compatible land-use planning around airports.


This is the study required by Vision 100, to seek ways to reduce aircraft noise and emissions and increase aircraft fuel efficiency. Three recommendations were made from this study. First, establish a federal interagency group to coordinate and communicate governmental actions to reduce the negative impacts of aviation on local air quality, noise and climate change. Secondly, develop metrics and tools that communicate best scientific understandings of aviation’s environmental impacts on human health and welfare. The tools should integrate environmental and economic cost/benefit analyses in order to evaluate research benefits of source reduction technologies and operational advancements, assess environmental constraints on airspace expansion, account for airline economics, assess policy and operational decision impacts on communities, and understand aviation’s environmental damage and future mitigation costs. Third, nationally pursue a balanced approach towards development of operational, technological and policy options to reduce the unfavorable aviation environmental impacts.


This volume is an introduction to airport land use compatibility planning as applied in Washington State. Part I covers the State interest in aviation. Part II covers the challenge of encroachment and the Airport Land Use Compatibility Program. The program includes general technical assistance, a best practices handbook, comprehensive plan review, and technical outreach workshops. Part III discusses the impact of the challenge: height hazards, safety, and noise. Part IV discusses the dimensions of the challenge:
understanding risk and liability. Part V concludes that airports and local jurisdictions must be willing to work together on long term solutions.
## APPENDIX F. TERMS AND ACRONYMS

### A

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AC</td>
<td>Advisory Circular</td>
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<tr>
<td>ADO</td>
<td>Airports District Office</td>
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<td>AEDT</td>
<td>Aviation Environmental Design Tool</td>
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<td>AEE</td>
<td>Office of Environment and Energy</td>
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<tr>
<td>AEM</td>
<td>Area Equivalent Method</td>
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<td>AFE</td>
<td>Above Field Elevation</td>
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<td>AIP</td>
<td>Airport Improvement Program</td>
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<td>AIR</td>
<td>Aerospace Information Report</td>
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<tr>
<td>Airport Operator</td>
<td>The public agency or private owner of a public-use airport, typically referred to in this AC as airport sponsor.</td>
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<tr>
<td>ALP</td>
<td>Airport Layout Plan</td>
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<td>ANCA</td>
<td>Airport Noise and Capacity Act</td>
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<td>ANOZ</td>
<td>Airport Noise Overlay Zones</td>
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<td>APA</td>
<td>American Planning Association</td>
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<td>Office of Aviation Policy and Plans</td>
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<td>APU</td>
<td>Auxiliary Power Unit</td>
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<td>ARTCC</td>
<td>Air Route Traffic Control Center</td>
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<td>ASNA</td>
<td>Aviation Safety and Noise Abatement Act of 1979</td>
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<tr>
<td>ATCT</td>
<td>Airport Traffic Control Tower</td>
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<td>ATO</td>
<td>Air Traffic Organization</td>
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<td>Citizen’s Advisory Committee</td>
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<td>Categorical Exclusion</td>
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<td>Code of Federal Regulations</td>
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Subject: AC 150/5020-1A  
Date: ____________________

**Please check all appropriate line items:**

- [ ] An error (procedural or typographical) has been noted in paragraph __________ on page ____.  
- [ ] Recommend paragraph ______________ on page ______________ be changed as follows:
  
  __________________________________________  
  __________________________________________  

- [ ] In a future change to this AC, please cover the following subject:  
  *(Briefly describe what you want added.)*  
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- [ ] I would like to discuss the above. Please contact me at (phone number, email address).
  
  __________________________________________  
  __________________________________________  

Submitted by: ____________________  
Date: ____________________