4

AIRCRAFT NOISE

How an installation manages the aircraft noise it generates can play a key role in shaping an installation's relationship with an adjacent community. It is also a key factor in local land use planning. Since noise from aircraft operations has the potential to significantly impact areas surrounding NAS Meridian and NOLF Joe Williams, the Navy has established certain areas around the installations as noise zones, using the guidance provided in the AICUZ instruction. Noise Zones provide the community and planning organizations the tools needed to safely plan for development in the areas surrounding the airfields. The contours developed as part of this AICUZ Study are based on aircraft type, aircraft operations, and when the aircraft are flown.

This chapter discusses noise associated with aircraft operations, including average noise levels, noise abatement/flight procedures, noise complaints, sources of noise, and airfield-specific noise contours.

4.1 WHAT IS SOUND/NOISE?

Sound is vibrations in the air which can be generated by a multitude of sources. Some sources of noise include roadway traffic, recreational activities, railway activities, and aircraft operations. When the sound becomes invasive or unwanted, it becomes noise. Generally, sound becomes noise to a listener when it interferes with normal activities. For further discussion of noise and its effect on people and the environment, see Appendix A.

Typical A-Weighted Sound Levels and Common Sounds

0 db – Threshold of Hearing
20 dB – Ticking Watch
45 dB – Bird Calls (distant)
60 dB – Normal Conversation
70 dB – Vacuum Cleaner (3 ft)
80 dB – Alarm Clock (2 ft)
90 dB – Motorcycle (25 ft)
100 dB – Ambulance Siren (100 ft)
110 dB – Chain Saw
120 dB – Rock Concert
130 dB – Jackhammer
140 dB – Threshold of Pain

** Refer to Appendix A for additional examples and details on sound levels.*

Common Measurements of Noise/Sound

A-Weighted Decibels, dBA: An expression of the relative loudness of sounds in air as perceived by the human ear where the decibel values of sounds at low frequencies are reduced. By contrast, unweighted decibels make no correction for audio frequency.

Decibels, dB: This unit of measurement is used to represent the intensity of a sound, also called a sound level.

Day-Night Average Sound Level, DNL: A composite metric that incorporates both the intensity of a sound and its duration within a 24-hour period.

** Refer to Appendix A for additional information and details on sound.*

On an A-weighted scale, barely audible sound is set at 0 decibels (dB), and normal speech has a sound level of approximately 60 to 65 dB. Generally, a sound level above 120 dB will begin to provide discomfort to a listener (Berglund and Lindvall 1995), and the threshold of pain is 140 dB.

In this AICUZ Study, all sound or noise levels are measured in A-weighted decibels (dBA), which represent sound pressure adjusted to the range of human hearing with intensity greater than barely audible sound, which is set at 0 dB. When the use of A-weighting is understood, the adjective "A-weighted" is often omitted and the measurements are expressed as dB. In this AICUZ Study, dB units refer to A-weighted sound levels.

The noise exposure from aircraft at NAS Meridian, as with other installations, is measured using the day-night average sound level (DNL) noise metric. The DNL noise metric, established in 1980 by the Federal Interagency Committee on Urban Noise (FICUN), presents a reliable measure of community sensitivity to aircraft noise and has become the standard metric used in the United States (except California, which uses a similar metric, Community Noise Exposure Level [CNEL]).

DNL averages the sound energy from aircraft operations at a location over a 24-hour period. DNL also adds an additional 10 dB to events occurring between 10:00 p.m. and 7:00 a.m. This 10-dB "night-time penalty" represents the added intrusiveness of sounds due to the increased sensitivity to noise when ambient noise levels are low.

By combining factors most noticeable about noise annoyance—maximum noise levels, duration, the number of events over a 24-hour period, and nighttime events—DNL provides a single measure of overall noise impact. Scientific studies and social surveys have found DNL correlates with community annoyance (FICUN 1980, U.S. Environmental Protection Agency [EPA] 1982, American National Standards Institute [ANSI] 1990, Federal Interagency Committee on Noise [FICON] 1992). Although DNL provides a single measure of overall noise impact, it does not provide specific information on the number of noise events or the individual sound levels that occur during the day. For

example, a DNL of 65 dBA could result from a few noisy events or a large number of quieter events.

The DNL is depicted on a map as a noise contour that connects points of equal noise value in 5-dBA increments (60, 65, 70, 75, 80, and 85 DNL). The AICUZ Program generally divides noise exposure into three categories, known as "noise zones," for land use planning purposes:

- **Noise Zone 1:** Less than 65 DNL; low or no noise impact.
- **Noise Zone 2:** 65 to 75 DNL; moderate impact, where some land use controls are required.
- **Noise Zone 3:** Greater than 75 DNL; most severely impacted area and requires the greatest degree of land use control.

Land use recommendations within these noise zones are discussed and provided in Chapter 6. Calculated noise contours do not represent exact measurements and are discussed further in Section 4.3. Noise levels inside a contour may be similar to those outside a contour line. Where the contour lines are close together, the change in noise level is greater. Where the lines are far apart, the change in noise level is gradual.

4.2 NOISE ABATEMENT AND COMPLAINTS

Impacts from noise associated with NAS Meridian and NOLF Joe Williams occur in areas off station, with areas in closer proximity to aircraft operations experiencing greater impacts. NAS Meridian is aware of land uses surrounding its airfields, and the installation takes precautions to reduce noise impacts to sensitive areas. However, given the training requirements and high level of activity on the installation, noise complaints are occasionally filed with the station. Noise abatement procedures instituted by NAS Meridian and noise complaints are discussed below.

4.2.1 Noise Abatement

NAS Meridian minimizes aircraft noise in the community, also called noise abatement or avoidance, and all naval aviators and students are required to comply with noise abatement procedures. Noise abatement procedures also apply to engine run-up and maintenance operations conducted on station which are written into the Air Operations Manual.

Training on Aircraft Carriers

The Navy cannot alter critical portions of flight patterns to accommodate noise complaints without increasing the risk to student pilots training to land on carriers. For example, the pattern altitude for flight crews performing FCLPs is 600 feet AGL at NAS Meridian and NOLF Joe Williams because that is the standard altitude for the pattern at the carrier. Students need to practice landing with the same carrier pattern they will have to fly at sea. However, there are other measures currently being implemented to reduce off-station noise impacts. Noise abatement procedures at NAS Meridian and NOLF Joe Williams are briefly discussed below:

- Flight crews (pilots and ground maintenance) are briefed on noise abatement procedures and noise sensitive areas detailed in Inflight Guides;
- Flight crews are briefed on the existing patterns and the need to maintain the patterns;
- Transient aircraft are required to secure afterburners no later than the airfield boundary and climb rapidly upon departure, thereby taking the noise away from the community;
- Limits on nighttime flying are established, typically with no aircraft flights after 11:00 p.m., except during certain periods of daylight savings when hours are extended until 12:00 a.m.;

- In addition to the ATC tower and radar, McCain Field is also equipped with Tactical Air Navigation (TACAN) devices to assist with pattern control and an Instrument Landing System (ILS);
- Prolonged periods of high-power run-ups are avoided;
- Hush houses will be used, wherever possible, for maintenance activities; and
- Limited operations are performed on Sunday to avoid church services, except on surge days.

NAS Meridian personnel are active members in the communities surrounding the airfields and are continuously reaching out to stakeholders to establish open communication and resolution of noise issues.

4.2.2 Noise Complaints

The origin and nature of noise complaints within the geographic region is often a tangible barometer of the success or failure of noise abatement procedures. Noise complaints are related to the intensity and frequency of the events as well as the individual sensitivity of the person impacted. Complaints can arise outside the areas depicted by noise contours. This is frequently due to a single event that is unusual, such as when an aircraft flies over an area not commonly overflown or new aircraft operating in the region. In general, individual response to noise levels varies and is influenced by factors including:

- The activity an individual was engaged in at the time of the noise event;
- The individual's general sensitivity to noise;
- The time of day or night;
- The length of time an individual is exposed to a noise;
- The predictability of noise; and
- Weather conditions.

Noise contours and land use recommendations are based on average annoyance responses of a population, but some people have greater noise sensitivity than others. Generally, a small increase in noise level will not be noticeable but, as the change in noise level increases, individual perception is greater, as shown in Table 4-1.

If a noise complaint is received, the Operations Duty Officer records the specifics of the caller's concern in a noise complaint form (i.e., date, time, location).

The noise complaint form is then passed to the ATC Officer who conducts an investigation and may place a follow-up call to the complainant, if warranted.

The ATC Officer then notifies the Air Operations Officer who informs the Community Planning and Liaison Officer (CPLO) for follow-up and the CO/Executive Officer (XO), if needed.

The Air Operations Officer forwards the issue to TRAWING ONE, if warranted. If forwarded, the noise complaint is then discussed and commented on at the squadron level and they provide an explanation to the Air Operations Officer. TRAWING ONE and the Air Operations Officer discuss and implement any changes to operational procedures that may be needed.

Table 4-1. Subjective Responses to Noise

Change	Change in Perceived Loudness
1 decibel	Requires close attention to notice
3 decibels	Barely noticeable
5 decibels	Quite noticeable
10 decibels	Dramatic – twice or half as loud
20 decibels	Striking – fourfold change

As with most airfields, a majority of NAS Meridian noise complaints result from nighttime operations. The number of noise complaints has varied year to year, and peaked in 1999 with the transition from the T-2 and A-4 to the louder T-45C. In recent years, the number of noise complaints has been minimal at both NAS Meridian and NOLF Joe Williams.

If there are concerns or complaints about aircraft noise in the area, citizens are encouraged to contact representatives at the Operations Duty Desk (telephone number listed below) to log their complaints.

Noise Complaints

NAS Meridian
(601) 679-2505

4.3 AIRFIELD NOISE SOURCES AND NOISE MODELING

The Navy conducts noise studies, as needed, to assess the noise impacts of aircraft operations. This 2012 AICUZ Study presents the projected (CY 2020) noise contours at NAS Meridian and NOLF Joe Williams. The Navy utilized NOISEMAP, a widely accepted computer model that projects noise impacts around military airfields. NOISEMAP calculates DNL contours resulting from aircraft operations using such variables as power settings, aircraft model and type, maximum sound levels, and duration and flight profiles. The contours generally follow the flight paths of aircraft.

The main sources of noise at an airfield are maintenance run-ups and flight operations. As part of this AICUZ Study, data from NAS Meridian was compiled and incorporated into the model to generate noise contours. The inputs and data collected include:

- Type of operation (arrival, departure, and pattern);
- Number of operations per day;
- Time of day;
- Flight track;
- Aircraft power settings, speeds, and altitudes;
- Number and duration of pre-flight and maintenance run-ups;
- Terrain (surface type); and
- Environmental data (temperature and humidity).

The 2012 AICUZ Noise contours are provided in Section 4.4.

4.4 2012 AICUZ NOISE CONTOURS

Noise contours provide a military installation, local planning organizations, and the public with a graphical representation of potential noise related impacts associated with aircraft operations.

These contours can assist in locating, identifying, and addressing any incompatible land uses and assist in plans for future development.

A moderate increase from current operations is projected for NAS Meridian and NOLF Joe Williams through CY 2020.

Noise contours provide NAS Meridian, local community planning organizations, and the general public with maps of the modeled noise related impacts of aircraft operations. Noise contours, when overlaid with local land uses, create a useful tool to help locate and address any incompatible land uses and can assist in planning for future development.

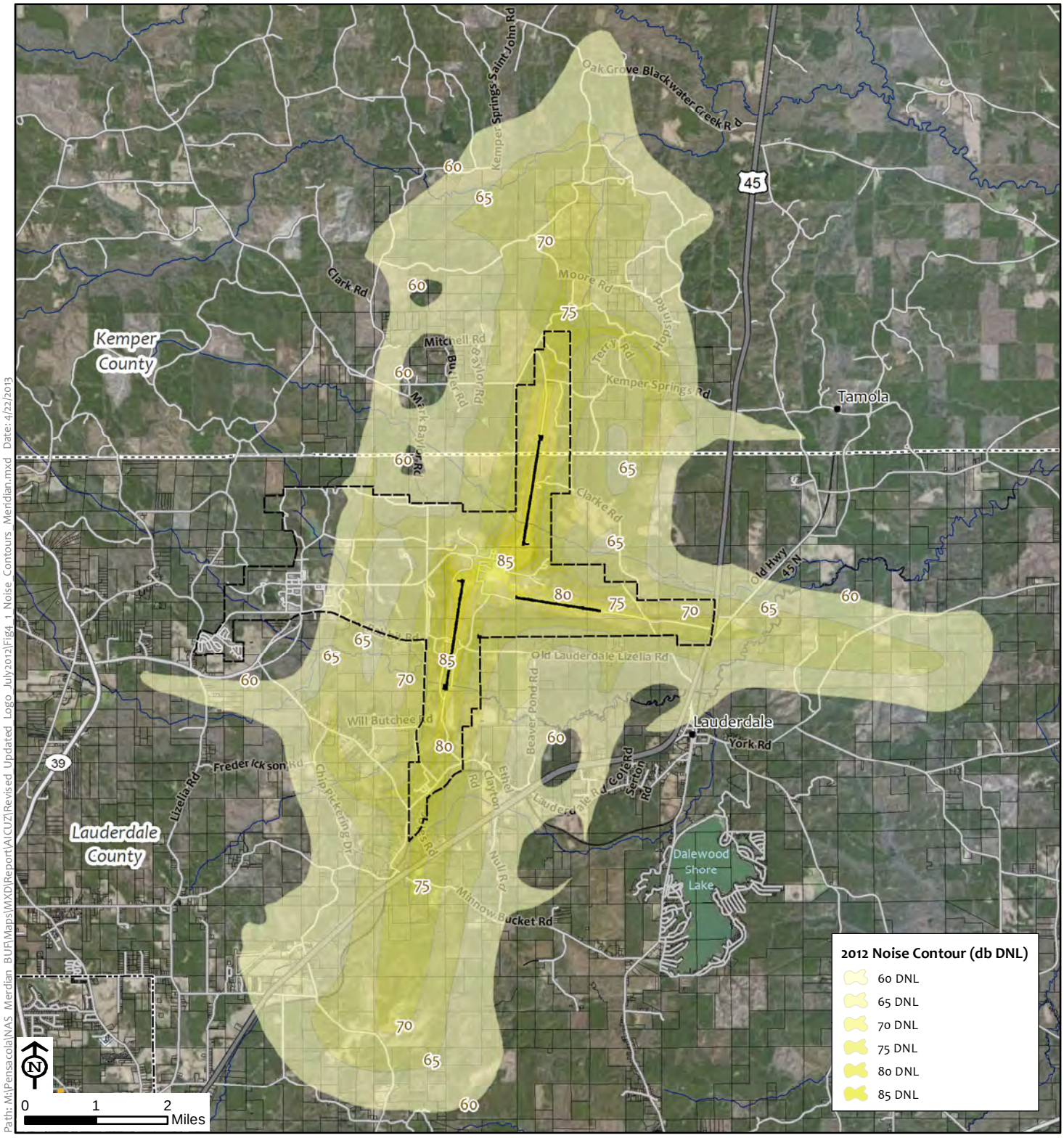
Noise contours provided in this AICUZ Study are identified as the 2012 AICUZ noise contours, based on the year of the Study release, but represent projected operations out to CY 2020. Aircraft operations are projected into the future to help ensure that the future operational capability of the air installation is accounted for. This AICUZ Study forecasts aircraft operations as far into the future as possible to assess an air station's impact on the local community. Therefore, projected operations are incorporated into this 2012 AICUZ Study. Projected operations for NAS Meridian and NOLF Joe Williams vary from current operations—there is an increase in flight operations at both installations through CY 2020 (see Chapter 1, Tables 1-3 and 1-4).

The 2012 AICUZ noise contours for NAS Meridian are presented in the following sections along with detailed descriptions of the noise environments for each airfield. Also provided are comparisons and figure overlays of the 2004 AICUZ Study and the 2012 AICUZ noise contours. The comparison helps to identify changes to noise exposure based on projected changes in aircraft operations and allows the targeting of land use incompatibility and follow-on potential recommendations to mitigate noise impacts. Land use and recommendations for addressing incompatibility issues within noise zones for each airfield are provided and discussed in Chapter 6.

4.4.1 2012 AICUZ Noise Contours for NAS Meridian

As shown on Figure 4-1, the 2012 AICUZ noise contours align with all three runways and extend outward from the installation along the typical flight tracks. The contours follow the dominant flight tracks, and noise propagates outward from those paths. The 60 DNL contour extends approximately 4 miles in all directions around the airfield.

NAS Meridian



Path: M:\Pensacola\NAS_Meridian_BUF\Maps\MXD\Report\AICUZ\Revised_Updated_Logo_July2012\Fig4_1_Noise_Contours_Meridian.mxd Date: 4/22/2013

NAS Runways

19L 01R 19R 10 28 01L

US Highway
State Highway
Secondary/Local Road
Parcel Boundary

Installation Boundary
Runway
Meridian Corporate Boundary
County Boundary

Figure 4-1
2012 AICUZ Noise Contours
NAS Meridian
Lauderdale County, Mississippi

Source: U.S. Navy 2011; Microsoft Virtual Earth 2011; Wyle 2011

The 65 DNL contour extends north into Kemper County, approximately 3.25 miles from the northern air station boundary, and is driven mainly by departures on runway 01R. Likewise, the 65 DNL contour extends east, approximately 3.25 miles from US-45 or the eastern edge of the station boundary, mainly due to departures on runway 10. The contour also extends approximately 3.25 miles from the southern edge of the air station boundary into Lauderdale County, mainly due to departures on runway 19R. Finally, the 65 DNL contour extends approximately 1.6 miles west of the southwestern boundary of the air station as a result of GCA operations on flight and, to a lower extent, closed pattern operations (touch-and-go and FCLPs).

The 70 DNL contour also extends approximately 2 miles off station in the same general shape as the 65 DNL contour, and the 75 DNL extends slightly off station off the runway ends. Contours greater than 80 DNL do not extend off station and are concentrated around the runways.

Figure 4-2, provides a DNL color gradient of the noise propagating from NAS Meridian into Lauderdale County. The highest noise levels are concentrated within the installation and decrease to much lower levels in Lauderdale County. The figure also depicts the noise outside the 65 DNL noise contour, which is deemed minimal by the AICUZ Program.

Comparison of 2004 and 2012 AICUZ Noise Contours for NAS Meridian

The 2012 AICUZ noise contours have increased in overall size from the 2004 AICUZ noise contours (see Figure 4-3). The general shape of the contours has remained the same, with a slight increase in the degree the contours extend off station. The increase in size is concentrated around the runway ends. The 2012 AICUZ noise contours extend further off station at the runway ends as compared to the 2004 AICUZ Study.

NAS Meridian

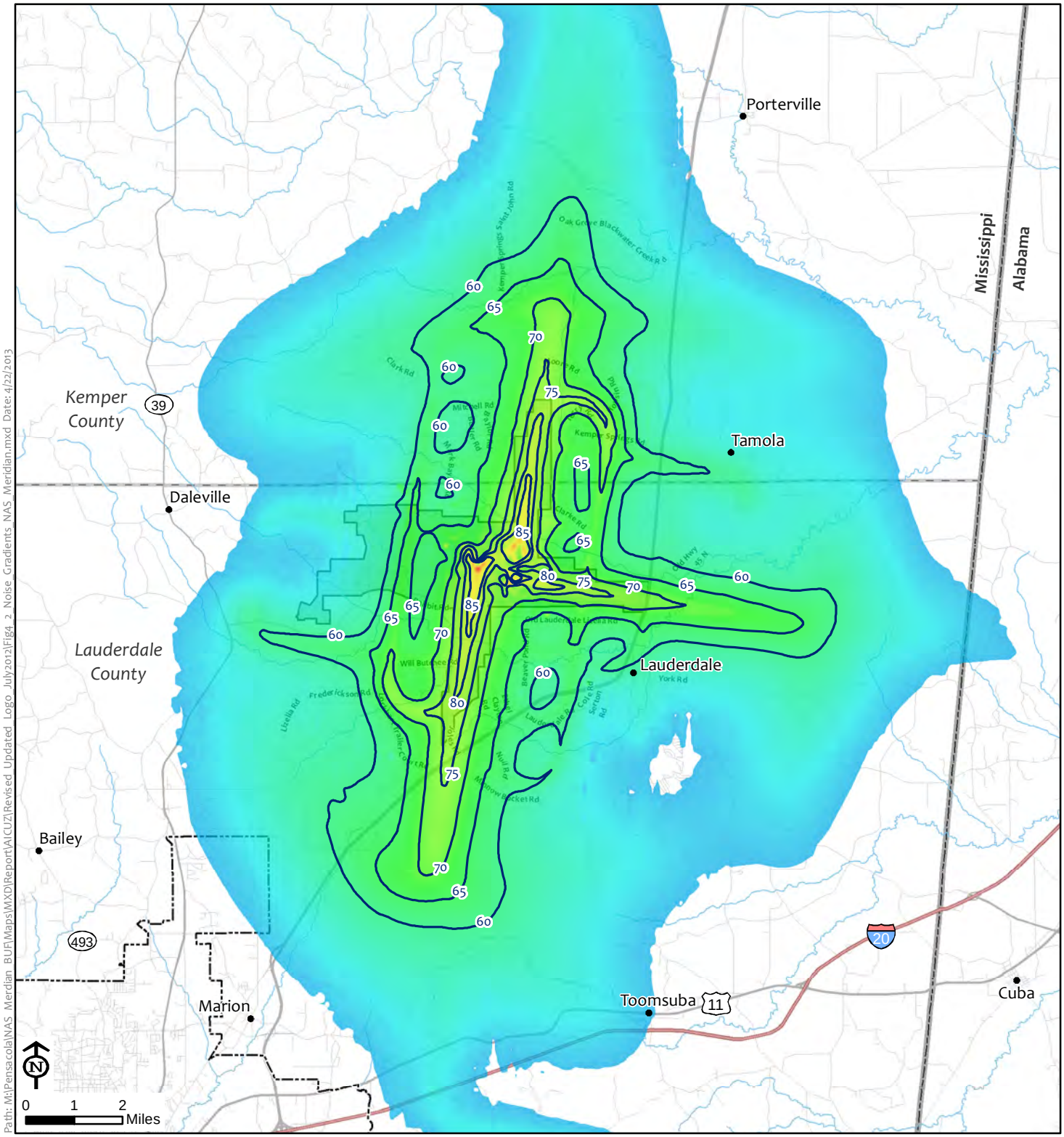
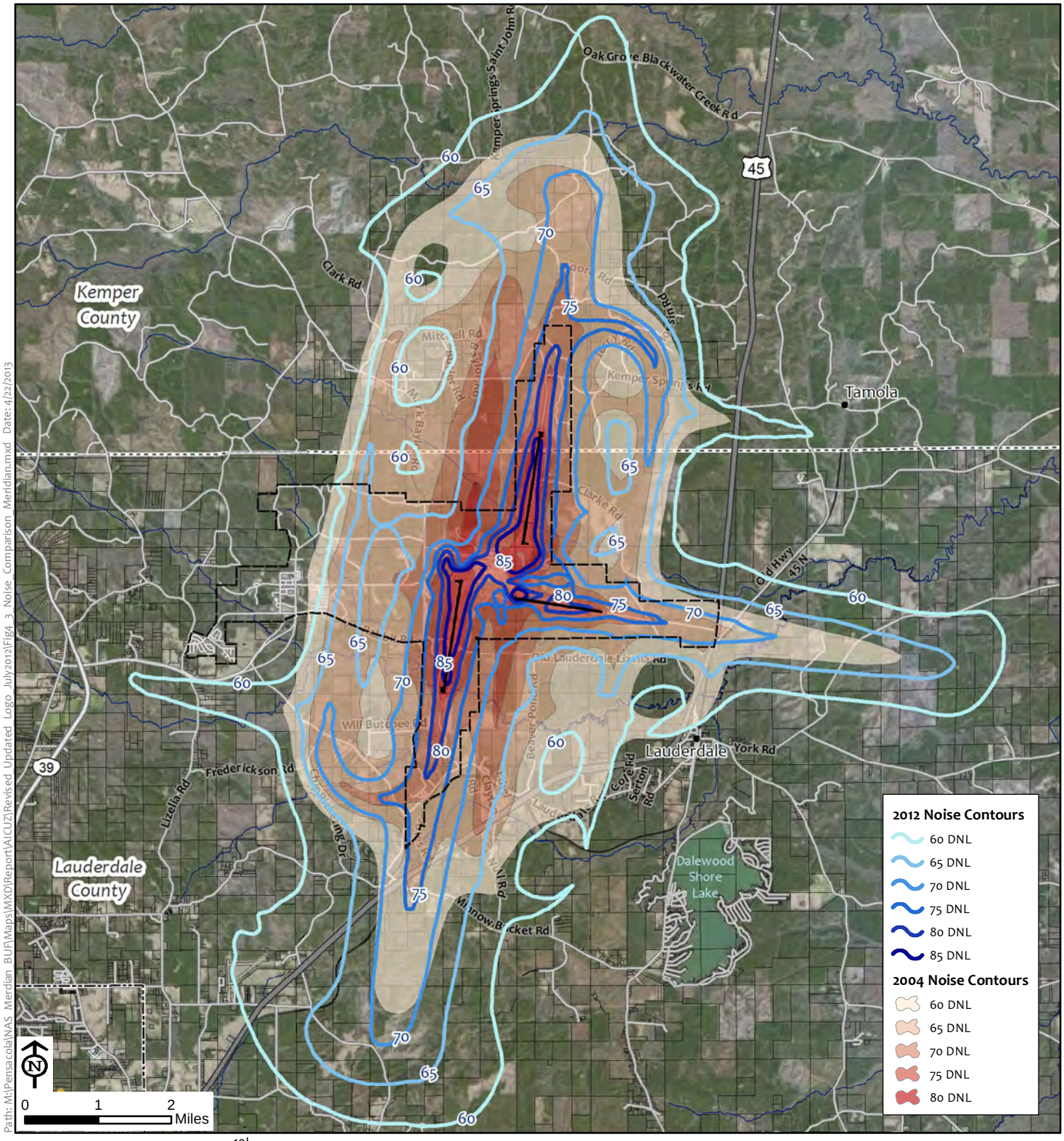


Figure 4-2
2012 AICUZ Noise Gradients
NAS Meridian
Lauderdale County, Mississippi

Source: U.S. Navy 2011; ESRI 2010; Wyle 2012

Path: M:\Pensacola\NAS_Meridian_BUF\Maps\MXD\Report\AICUZ\Revised_Updated_Logo_July2012\Fig4_2_Noise_Gradients_NAS_Meridian.mxd Date: 4/22/2013

NAS Meridian



NAS Runways

19L
01R
19R
10
28
01L

US Highway
State Highway
Secondary/ Local Road
Parcel Boundary

Installation Boundary
Runway
Meridian Corporate Boundary
County Boundary

Figure 4-3
Comparison of 2004 and 2012 AICUZ Noise Contours
NAS Meridian
Lauderdale County, Mississippi

Source: U.S. Navy 2011; Microsoft Virtual Earth 2011; Wyle 2011

The off station area impacted by the noise contours has increased by approximately 13,000 acres as indicated in Table 4-2. Off station areas impacted by the greater than 65 DNL in this study total 16,326 acres compared to 10,652 acres in the 2004 AICUZ Study, for an increase of 5,671 acres. However, the majority of the increased acreage (7,711 acres) is within in the 60-65 DNL zone. This contour range falls within Noise Zone 1 (Section 4.1), which is categorized as having low or no noise impact.

Table 4-2. Areas within Noise Zones (DNL), NAS Meridian

Noise Zone	Total Off Station Land Area	
	2004 AICUZ Noise Zones (acres)	2012 AICUZ Noise Zones (acres)
60-65 DNL	10,249	17,960
65-70 DNL	7,662	11,343
70-75 DNL	2,219	4,393
75+ DNL	771	587
TOTAL AREA	**20,901**	**34,283**

As described above and depicted on Figure 4-3, the 2012 AICUZ noise contours have changed in overall size from the 2004 AICUZ Study. The differences between the 2004 and 2012 AICUZ noise contours are the result of various updates to the modeled data reflecting projected operations at NAS Meridian. The updates resulting in changes include integration of new flight tracks and modifications to existing flight tracks, updates to flight track utilization, adjustments to numbers of operations conducted during day and acoustical night periods, runway utilization percentages for all operations types, updates to the composition of airfield operations, primarily projected number of pattern operations relative to arrival and departure operations, improved mapping techniques, and a revision to the modeled T-45 departure altitude profile resulting in a reduced rate of climb.

4.4.2 2012 AICUZ Noise Contours for NOLF Joe Williams

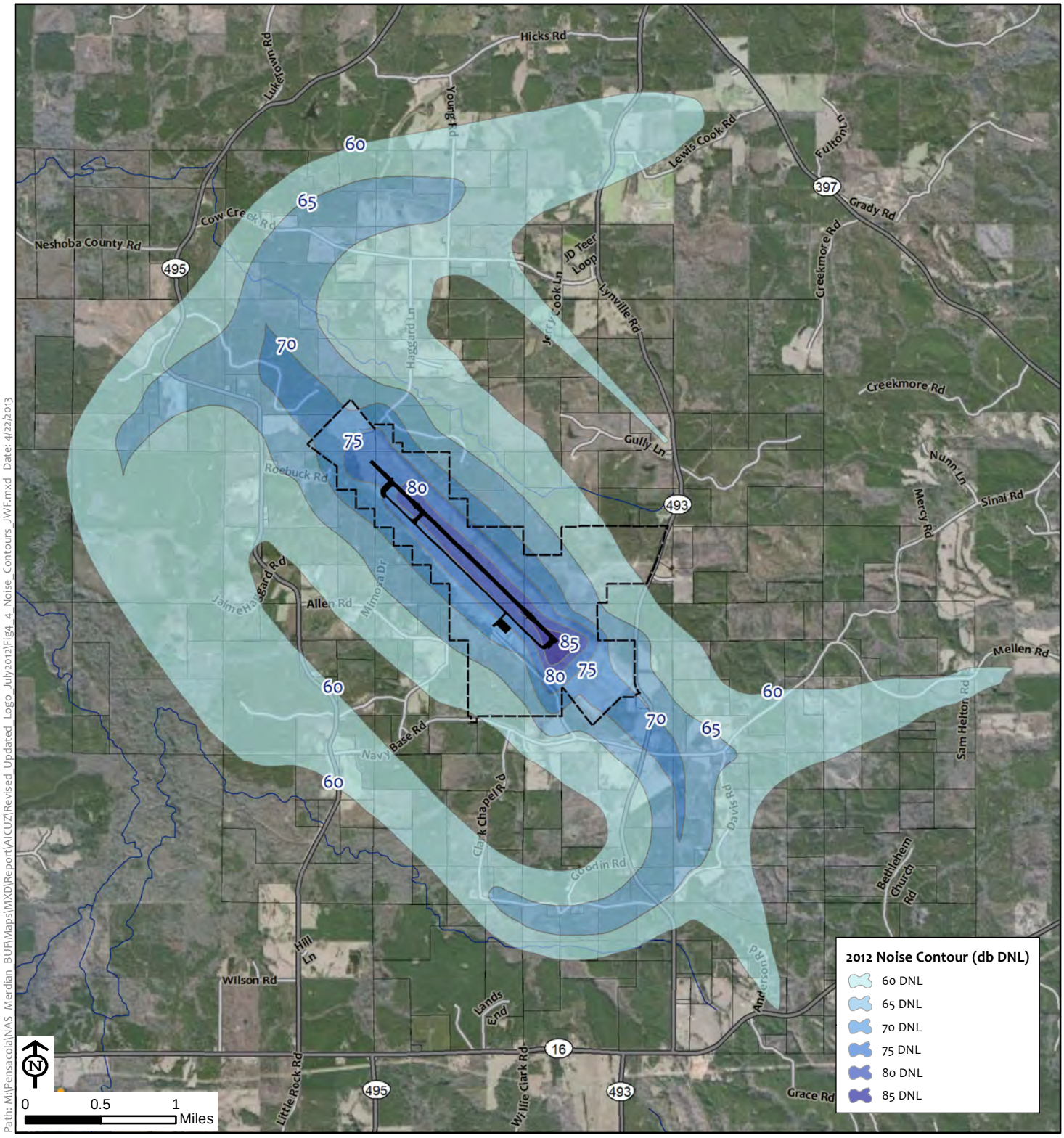
As shown on Figure 4-4, the 2012 AICUZ noise contours for NOLF Joe Williams align with the single runway and extend outward from the installation along the typical flight tracks. The contours follow the dominant flight tracks and propagate outward from those paths. The 60 DNL contour extends approximately 1.25 miles off the runway ends to the northwest and southeast and approximately 0.5 mile to the northeast and southwest.

The 65 DNL contour extends northeast of the NOLF boundary by approximately 1.6 miles. The DNL noise exposure in this area ('horn' shape) of the contour is driven mainly by departures on runway 32. The 65 DNL contour extends southeast ('horn shape') of the NOLF boundary by approximately 0.75 mile, mainly due to departures on runway 14, and approximately 1.4 miles from the southern edge of the NOLF boundary, mainly due to pattern operations and carrier-break arrivals on runway 32. The 65 DNL contour also extends approximately 1.3 miles northwest of the NOLF boundary as a result of departures on runway 32.

The 70 DNL contour extends minimally off station immediately following the runway ends. The 75 and greater DNL contours are contained exclusively on station.

Figure 4-5, provides a DNL color gradient of the noise propagating from NOLF Joe Williams into Kemper County. The highest noise levels are concentrated within the installation and decrease in Kemper County. Figure 4-5 also depicts the noise outside the 65 DNL noise contour, which is deemed minimal by the AICUZ Program.

NOLF Joe Williams



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NAVAL AIR STATION MERIDIAN, MS
"TRAINING TO FIGHT... FROM THE SEA"

NOLF Runways
14
32

State Highway
Secondary/Local Road
Installation Boundary
Runway
Parcel Boundary

Figure 4-4
2012 AICUZ Noise Contours
NOLF Joe Williams
Kemper County, Mississippi

Source: U.S. Navy 2011; Microsoft Virtual Earth 2011; Wyle 2011

NOLF Joe Williams

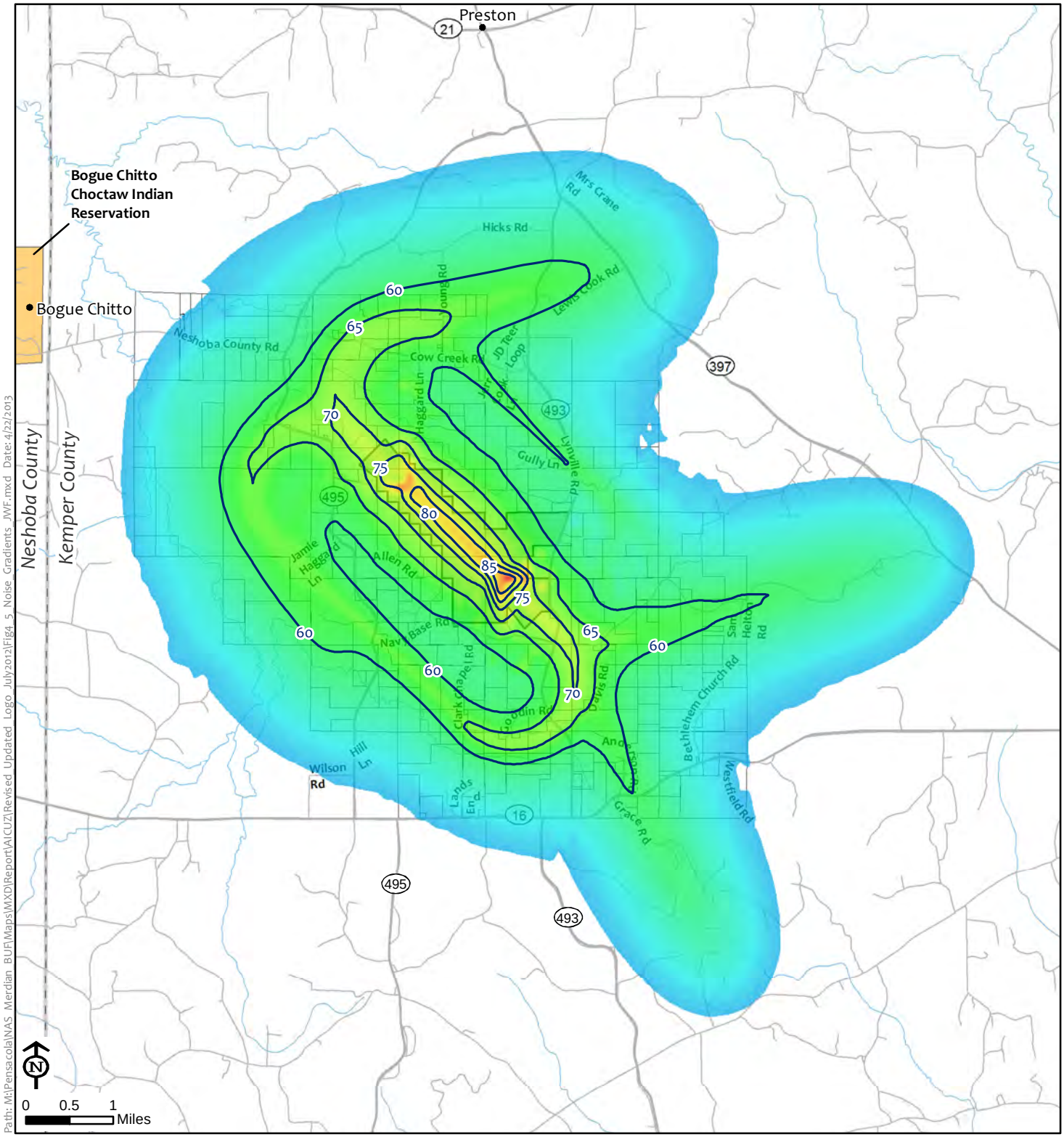

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Figure 4-5
2012 AICUZ Noise Gradients
NOLF Joe Williams
Kemper County, Mississippi

Source: U.S. Navy 2011; ESRI 2010; Wyle 2012

Comparison of 2004 and 2012 AICUZ Noise Contours for NOLF Joe Williams

The 2012 AICUZ noise contours for Joe Williams have remained similar in size when compared to 2004 AICUZ noise contours, as shown on Figure 4-6. The general shape of the contours has remained the same, with a slight increase in the degree the contours extend off station, primarily to the northeast. The 'horns' in the 2012 AICUZ noise contours extend further off station than those in the 2004 AICUZ Study.

The off station area impacted by the noise contours has decreased by approximately 2,600 acres, as shown in Table 4-3. There is an overall decrease in the acreage impacted for all noise zones.

Table 4-3. Areas within Noise Zones (DNL), NOLF Joe Williams

Noise Zone	Total Off Station Land Area	
	2004 AICUZ Noise Zones (acres)	2012 AICUZ Noise Zones (acres)
60-65 DNL	7,806	6,043
65-70 DNL	2,125	1,825
70-75 DNL	794	327
75 + DNL	82	1
Total Area	**10,807**	**8,196**

As described above and depicted on Figure 4-6, the 2012 AICUZ noise contours have remained similar in size and shape when compared to the 2004 AICUZ Study, with a few minor differences. The differences are the result of various updates to the modeled data reflecting projected operations at NOLF Joe Williams. The updates resulting in changes include modification to flight tracks and integration of new flight tracks, updates to runway utilization, updates in the projected number of closed pattern operations relative to arrival and departure operations (83 percent in baseline to 45 percent in CY 2020), decreased operational level (approximately 50 percent), a revision to the modeled T-45 departure altitude profile resulting in a reduced rate of climb, and improved mapping techniques.

NOLF Joe Williams

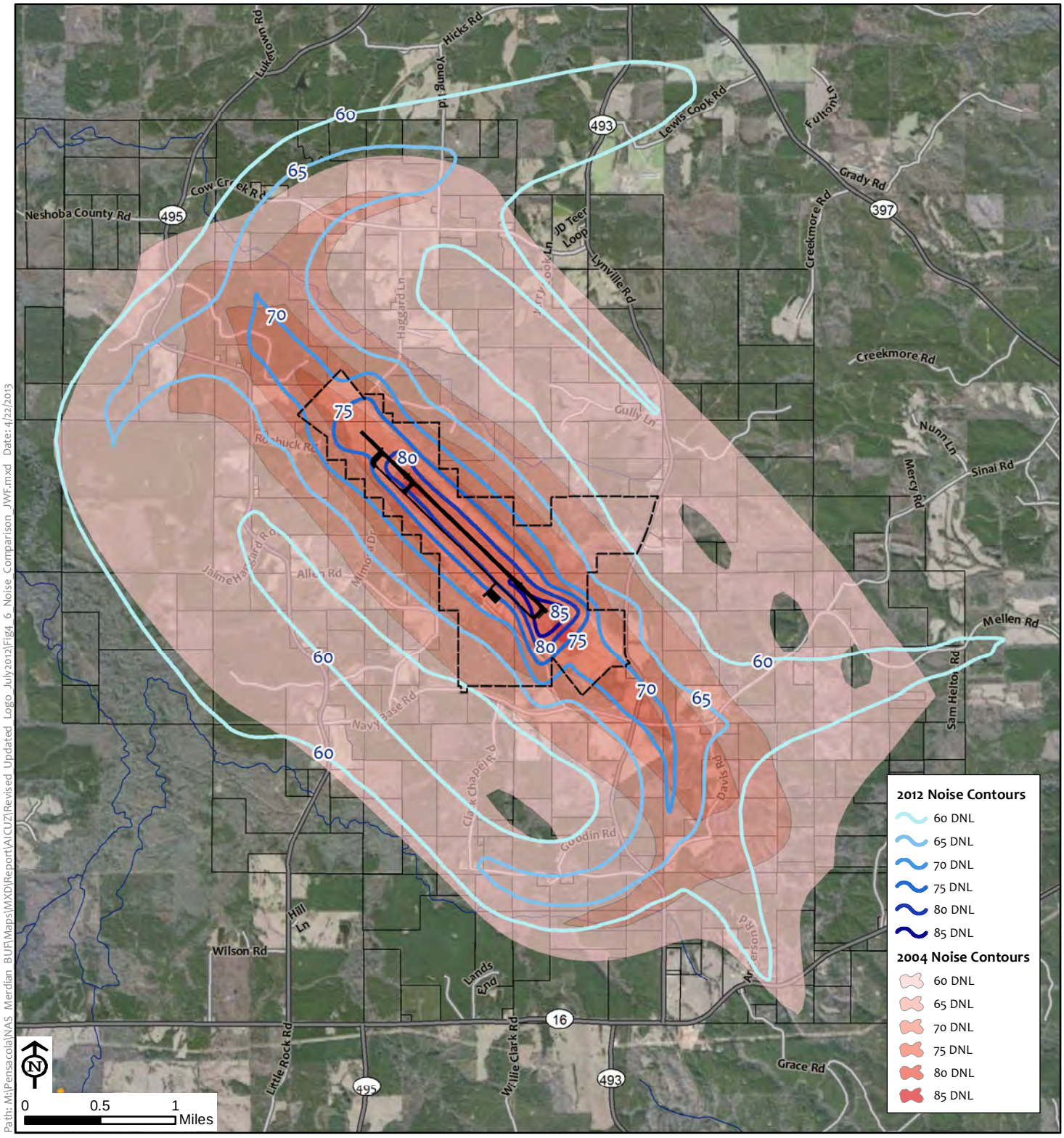

Figure 4-6
Comparison of 2004 and 2012 AICUZ Noise Contours
NOLF Joe Williams
Kemper County, Mississippi

Source: U.S. Navy 2011; Microsoft Virtual Earth 2011; Wyle 2011