APPENDIX A.
INTERAGENCY AND INTERGOVERNMENTAL AGENCY COORDINATION AND CONSULTATION

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Appendix A-1
Interagency and Intergovernmental Coordination for Environmental Planning – Description of Proposed Action and Alternatives

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Sample Coordination Letters

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DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Rebecca Palmer
State Historic Preservation Officer
Nevada State Historic Preservation Office
901 S. Stewart St., Suite 5004
Carson City, NV 89701

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR) at Nellis Air Force Base (AFB)

Dear Ms. Palmer,

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the State Historic Preservation Office (SHPO) may have an interest, and to initiate consultation pursuant to Section 106 of the National Historic Preservation Act (NHPA) and 36 Code of Federal Regulations (CFR) Section 800.3.

The United States Air Force (USAF) is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary Air (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions. Pursuant to 36 CFR Sections 800.4(a) and (b), we request your assistance defining the Area of Potential Effects (APE) and information on any historic properties located therein that may be affected by our undertaking. Location maps are attached for your review.

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. Preliminary investigation indicates that none of the structures planned for demolition, renovation, or addition are eligible for or listed on the National Register of Historic Places (NRHP). No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your agency with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your agency other than you should receive the Draft EA. We will also provide you with a 36 CFR 800.4 effects determination after we have completed the historic property identification process.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact for Environmental Planning is Mr. Tod Oppenborn. Please send him your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at tod.oppenborn@us.af.mil or (702) 652-9366. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:46:00 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
Summary of the Description of the Proposed Action and Alternatives

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

August 24, 2020

99 CES/CENP
6020 Beale Avenue
Nellis AFB, NV 89191-6520

U.S. Department of the Interior Fish and Wildlife Service - Ventura Field Office
2493 Portola Road, Suite B
Ventura,CA 93003-7726

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR) at Nellis Air Force Base (AFB)

Dear Sir/Madam,

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the United States Fish and Wildlife Services (USFWS) may have an interest, and, pursuant to 50 Code of Federal Regulations (CFR) § 402.12(c), request a list of Federally-listed species that may be present in the action area.

The United States Air Force (USAF) is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary Air (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions. Taking into account various environmental concerns, the USAF is engaging early with the appropriate resource and regulatory agencies as it formulates the undertaking. Therefore, we request additional information on what listed, proposed, and candidate species or designated or proposed critical habitats may be in the proposed action area. Location maps are attached for your review. This information and your comments on the proposed action will help us develop the scope of our environmental review.

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your agency with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your agency other than you should receive the Draft EA.

Please provide the species list to my point of contact identified below and advise him of any issues or concerns that you believe we should address in the development of this EA.

The USAF Point of Contact for Environmental Planning is Mr. Tod Oppenborn. Please send him your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at tod.oppenborn@us.af.mil or (702) 652-9366. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely,

CHARLES W. ROWLAND JR.
Chief, Portfolio Optimization

Attachment:
Summary of the Description of the Proposed Action and Alternatives

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

99 CES/CENP
6020 Beale Avenue
Nellis AFB, NV 89191-6520

August 24, 2020

Field Station Manager
US Geological Survey - Las Vegas Field Station
160 N. Stephanie Street
Henderson, NV 89074

Dear Sir/Madam,

The United States Air Force (USAF) is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and operation of contractor-owned contractor-operated Adversary Air (COCO ADAIR) at Nellis Air Force Base (AFB). Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the actions. Taking into account various environmental concerns, the USAF is engaging early with the appropriate resource and regulatory agencies as it formulates the undertaking. Accordingly, the USAF seeks consultation with your office.

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availably of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your agency with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your agency other than you should receive the Draft EA.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact for Environmental Planning is Mr. Tod Oppenborn. Please send him your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at tod.oppenborn@us.af.mil or (702) 652-9366. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely,

CHARLES W. ROWLAND JR.
Chief, Portfolio Optimization

Attachment:
Summary of the Description of the Proposed Action and Alternatives

Government to Government Coordination Letters

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DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Allen Summers
Chairperson
Bishop Paiute Tribe
50 Tusu Lane
Bishop, CA 93514

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Summers

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Bishop Paiute Tribe may have an interest, and to invite the Bishop Paiute Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense (DoD) Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request government-to-government consultation on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether the Bishop Paiute Tribe chooses to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the Nevada State Historic Preservation Office (SHPO).

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your government with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your government other than you should receive the Draft EA.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:47:32 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
Summary of the Description of the Proposed Action and Alternatives

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Charles Wood
Chairperson
Chemehuevi Indian Tribe
P.O. Box 1976
Havasu Lake, CA 92363

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Wood

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Chemehuevi Indian Tribe may have an interest, and to invite the Chemehuevi Indian Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense (DoD) Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request government-to-government consultation on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether the Chemehuevi Indian Tribe chooses to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the Nevada State Historic Preservation Office (SHPO).

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your government with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your government other than you should receive the Draft EA.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:47:32 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
Summary of the Description of the Proposed Action and Alternatives

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Dennis Patch
Chairperson
Colorado River Indian Tribes
26600 Mohave Road
Parker, AZ 85344

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Patch

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Colorado River Indian Tribes may have an interest, and to invite the Colorado River Indian Tribes to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense (DoD) Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request government-to-government consultation on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether the Colorado River Indian Tribes chooses to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the Nevada State Historic Preservation Office (SHPO).

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your government with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your government other than you should receive the Draft EA.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:47:32 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
Summary of the Description of the Proposed Action and Alternatives

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Rodney Mike
Chairperson
Duckwater Shoshone Tribe
P.O. Box 140068
Duckwater, NV 89314

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Mike

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Duckwater Shoshone Tribe may have an interest, and to invite the Duckwater Shoshone Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense (DoD) Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request government-to-government consultation on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether the Duckwater Shoshone Tribe chooses to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the Nevada State Historic Preservation Office (SHPO).

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your government with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your government other than you should receive the Draft EA.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:47:32 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
Summary of the Description of the Proposed Action and Alternatives

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Diana Buckner
Chairwoman
Ely Shoshone Tribe
250 Heritage Drive #B
Ely, NV 89301

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairwoman Buckner

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Ely Shoshone Tribe may have an interest, and to invite the Ely Shoshone Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense (DoD) Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request government-to-government consultation on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether the Ely Shoshone Tribe chooses to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the Nevada State Historic Preservation Office (SHPO).

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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We intend to provide your government with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your government other than you should receive the Draft EA.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:47:32 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
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DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Carl Dahlberg
Chairperson
Fort Independence Indian Tribe
P.O. Box 67
Independence, CA 93526

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Dahlberg

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Fort Independence Indian Tribe may have an interest, and to invite the Fort Independence Indian Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Ona Segundo
Chairwoman
Kaibab Band of Southern Paiutes
HC 65 Box 2
Fredonia, AZ 86022

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairwoman Segundo

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Kaibab Band of Southern Paiutes may have an interest, and to invite the Kaibab Band of Southern Paiutes to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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Deputy Base Civil Engineer

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Curtis Anderson
Chairperson
Las Vegas Paiute Tribe
#1 Paiute Drive
Las Vegas, NV 89106

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Anderson

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Las Vegas Paiute Tribe may have an interest, and to invite the Las Vegas Paiute Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

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DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Richard Button
Chairperson
Lone Pine Paiute-Shoshone Tribe
P.O. Box 747
Lone Pine, CA 93545

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Button

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Lone Pine Paiute-Shoshone Tribe may have an interest, and to invite the Lone Pine Paiute-Shoshone Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

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DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Laura Watters
Chairperson
Moapa Band of Paiutes
P.O. Box 340
Moapa, NV 89025

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Watters

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Moapa Band of Paiutes may have an interest, and to invite the Moapa Band of Paiutes to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Richard Arnold
Native American Coordinator
Pahrump Paiute Tribe
P.O. Box 3411
Pahrump, NV 89041

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Arnold

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Pahrump Paiute Tribe may have an interest, and to invite the Pahrump Paiute Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:47:32 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
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DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Tamra Borchardt-Slayton
Chairperson
Paiute Indian Tribe of Utah
440 North Paiute Drive
Cedar City, UT 84721

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Borchardt-Slayton

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Paiute Indian Tribe of Utah may have an interest, and to invite the Paiute Indian Tribe of Utah to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense (DoD) Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request government-to-government consultation on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether the Paiute Indian Tribe of Utah chooses to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the Nevada State Historic Preservation Office (SHPO).

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

White Dove Kennedy
Chairperson
Timbisha Shoshone Tribe
621 West Line St. Suite 109
Bishop, CA 93514

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Kennedy

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Timbisha Shoshone Tribe may have an interest, and to invite the Timbisha Shoshone Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Daryl Brady
Vice-Chairperson
Yomba Shoshone Tribe
HC 61, Box 6275
Austin, NV 89310

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Vice-Chairperson Brady

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Yomba Shoshone Tribe may have an interest, and to invite the Yomba Shoshone Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Ronnie Snooks
Chairperson
Yomba Shoshone Tribe
HC 61, Box 6275
Austin, NV 89310

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Snooks

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Shane Saulque
Chairperson
Benton Paiute Indian Tribe
25669 Highway 6, PMB I
Benton, CA 93512

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Saulque

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Benton Paiute Indian Tribe may have an interest, and to invite the Benton Paiute Indian Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

James Rambeau, Sr.
Chairperson
Big Pine Paiute Tribe
P.O. Box 700
Big Pine, CA 93513

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Rambeau, Sr.

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Big Pine Paiute Tribe may have an interest, and to invite the Big Pine Paiute Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

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99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Ross Stone
Elder
Big Pine Paiute Tribe
P.O. Box 700
Big Pine, CA 93513

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Elder Stone

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Big Pine Paiute Tribe may have an interest, and to invite the Big Pine Paiute Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense (DoD) Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request government-to-government consultation on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether the Big Pine Paiute Tribe chooses to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the Nevada State Historic Preservation Office (SHPO).

The overall purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

Construction, demolition, renovation, and addition would be necessary to support the additional F-35A aircraft. There would be two facility options for the additional F-35A aircraft depending upon the availability of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. Together, the components of the action would add 751 personnel at Nellis AFB (479 personnel for the addition of 17 F-35As, 32 personnel for the reassignment of three F-22As and 240 personnel to support COCO ADAIR). Details of the preliminary proposed and alternative action are included in the attached Summary of the Description of the Proposed Action and Alternatives.

The EA will assess the potential environmental consequences associated with the proposed action and no action alternative. Potential impacts identified during the initial planning stages include effects on noise, air quality, infrastructure/utilities, biological and cultural resources, and socioeconomic resources. The EA will also examine the cumulative effects when combined with past, present, and any reasonably foreseeable future actions. In support of this process, we request your input in identifying general or specific issues or areas of concern you believe should be addressed in the EA.

We intend to provide your government with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your government other than you should receive the Draft EA.

Please reach out to my point of contact, provided below on any issues or concerns you have in the development of this EA. We ask your assistance in identifying any issues or concerns of which we may be unaware, particularly those that may be affected by this proposal.

The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

Sincerely

FITZPATRICK.DOUGLAS.C.1159071177 Digitally signed by FITZPATRICK.DOUGLAS.C.1159071177 Date: 2020.07.20 08:47:32 -07'00'

DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
Summary of the Description of the Proposed Action and Alternatives

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Douglas C. Fitzpatrick
Deputy Base Civil Engineer, 99 CES
6020 Beale Ave.
Nellis AFB, NV 89191

Timothy Williams
Chairperson
Ft. Mojave Tribe
500 Merriman Avenue
Needles, CA 92363

Subject: Introduction of the Proposed Addition of Seventeen (17) F-35A Joint Strike Fighters, Three (3) F-22As, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR); and Section 106 Consultation Invitation for Nellis Air Force Base (AFB)

Dear Chairperson Williams

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Ft. Mojave Tribe may have an interest, and to invite the Ft. Mojave Tribe to participate in government-to-government consultation with the United States Air Force (USAF) pursuant to Section 106 of the National Historic Preservation Act (NHPA).

The USAF is preparing an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) to evaluate the potential impacts associated with the addition of seventeen (17) F-35A Joint Strike Fighters, three (3) F-22As, and contractor-owned contractor-operated Adversary AIR (COCO ADAIR) at Nellis AFB. Facility construction, demolition, renovation, addition, as well as an increase in personnel would be necessary to support the proposed actions.

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The USAF Point of Contact is Ms. Kish LaPierre. Please send her your comments and concerns to 6020 Beale Ave., Nellis AFB, NV, 89191, or by email or phone at kish.lapierre@us.af.mil or (702) 652-5813. I look forward to receiving any input you may have regarding this endeavor. Thank you in advance for your assistance in this effort.

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DOUGLAS C. FITZPATRICK, Architect, DAF
Deputy Base Civil Engineer

Attachment:
Summary of the Description of the Proposed Action and Alternatives

Attachment to Letters

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Attachment
Summary of the Description of the Proposed Action and Alternatives

1.0 PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

The Air Force is tasked with the defense of the United States (US) and fulfillment of the directives of the President and the Secretary of Defense. The Air Force's mission is to fly, fight, and win. In order to accomplish this mission, it is critical that combat pilots, and the Airmen supporting them, adequately train to attain proficiency on tasks they must execute during times of war and further to sustain this proficiency as they serve in the Air Force.

In support of Combat Air Force (CAF) fighter pilots, the Air Force proposes the following at Nellis Air Force Base (AFB), Nevada:

- add seventeen (17) F-35 Joint Strike Fighter aircraft to support the 65th Aggressor Squadron (AGRS) and the 422nd Test and Evaluation Squadron (TES),
- reassign three F-22A aircraft into the 422nd TES,
- and operate contractor-owned contractor-operated Adversary Air (COCO ADAIR).

1.2 PURPOSE OF THE ACTION

The overall purpose of the Proposed Action is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with Air Force mission requirements, evolving technology and enemy capabilities. This purpose would be achieved through implementation of several supporting actions. These supporting actions include the addition of F-35A Joint Strike Fighter aircraft, the addition of F-22A aircraft, and operation of COCO ADAIR.

1.2.1 Addition of F-35A Joint Strike Fighter Aircraft

The Air Force is moving seventeen (17) F-35As to Nellis AFB as part of a larger initiative to improve test and training for 5th Generation fighter aircraft. The purpose of adding 17 F-35As to Nellis AFB is twofold: (1) establish a realistic 4th and 5th Generation adversary threat to support Tactics, Techniques and Procedures (TTP) for Air Force fighter aircraft, the Air Force Weapons School Weapons Instructor Courses (WIC), tests and exercises; and (2) integrate F-35A flight operations for military operational testing and evaluation. Though there is no universal definition of 5th Generation aircraft, they typically have the characteristics of all-aspect stealth, low probability of intercept radar, high-performance airframes, advanced avionics features, and highly integrated computer systems capable of networking with other elements within the battlespace for situational awareness.

The first purpose would be achieved by transferring nine F-35A aircraft from Eglin AFB, Florida and two F-35A aircraft from Edwards AFB, California to the 65th AGRS at Nellis AFB. The mission of the 65th AGRS is to prepare the CAF, joint and allied aircrews with realistic threat replication, training, academics and feedback with the understanding that several potential adversaries are fielding 5th Generation fighters.

The second purpose would be achieved by assigning six new F-35A aircraft from the F-35A production facility to Nellis AFB to join the 422nd TES. The 422nd TES performs operational testing of all fighter aircraft and munitions entering and in operational use by ACC. The 422nd TES is a geographically separated unit of the 53rd Test and Evaluation Group stationed at Eglin AFB, FL. After a new fighter weapons system completes developmental testing, the mission of the 422nd TES is to thoroughly vet the new equipment in a combat representative environment.

1.2.2 Addition of F-22A Aircraft

The purpose of this action is to reassign three F-22A aircraft from the 95th Fighter Squadron (FS) at Tyndall AFB, Florida into the 422nd TES at Nellis AFB.

1.2.3 Contract Adversary Air

ADAIR services provide tactical fighter jet aircraft flight operations flown by COCO aircraft supporting advanced testing, training, and tactics development. ADAIR is training that simulates real-world threat scenarios. The purpose of this action is to provide a five (5) year Indefinite Quantity Indefinite Delivery (IDIQ) type contract that will provide the 57th Operations Group (OG) Nellis AFB with ADAIR services. Up to thirty aircraft would be added to Nellis AFB.

1.3 NEED FOR THE ACTION

1.3.1 Addition of F-35A Joint Strike Fighter Aircraft

The mission of the 65th AGRS is to prepare the CAF, joint and allied aircrews with realistic threat replication, training, academics and feedback with the understanding that several potential adversaries are fielding 5th Generation fighters. The need for the Proposed Action is to increase operational readiness rates, improve WIC and operational test and evaluation, provide realistic adversary training for current and future threats, and to develop 5th Generation close air support tactics, techniques and procedures. The Commander of Air Combat Command (COMACC) identified a requirement to provide realistic 5th Generation adversary training for current and future threats and directed the movement of nine F-35A from Eglin AFB, Florida to establish this capability at Nellis AFB. Today's aggressor force consists of legacy fighter aircraft and does not have the capability to replicate adversary 5th Generation fighter capability.

1.3.2 Addition of F-22A Aircraft

On October 10, 2018, Hurricane Michael tore through the gulf coast, causing catastrophic damage to the region and damaging 95 percent of the buildings at Tyndall AFB, Florida. The base's hangars and flight operations buildings suffered extensive damage from the storm.

Before the storm, Tyndall AFB was home to the 325th Fighter Wing (FW), comprised of two F-22A squadrons. One squadron, the 95th FS, was operational and the other, the 43rd FS, was a training squadron. Neither squadron will be able to operate from Tyndall AFB for the foreseeable future due to the amount of damage done by Hurricane Michael. The F-22 Formal Training Unit (FTU) is currently operating at Eglin AFB, Florida on a temporary basis. The Air Force has begun its EIAP to analyze the permanent basing location for the F-22 FTU.

Rather than relocating the 95th FS, the Air Force decided to distribute the aircraft assigned to the 95th FS to other F-22A operational squadrons. The Air Force expects this distribution to increase the F-22A's readiness rate and address key recommendations from a recent Government Accountability Office (GAO) report that identified small unit size as one of the challenges with F-22A readiness. GAO-18-190, *F-22 Organization and Utilization Changes Could Improve Aircraft Availability and Pilot Training*, recommended:

> "The Secretary of the Air Force should conduct a comprehensive assessment of the F-22 organizational structure that identifies and assesses alternative approaches to organizing F-22 squadrons. The assessment could at a minimum assess the following two alternatives: consolidating the fleet into larger squadrons and/or wings to improve aircraft availability and revising the design of the deployable units in squadrons to better support current deployment practices and future operational concepts."

The Air Force concurred with this recommendation and as a result will be using the F-22As assigned to the 95th FS to increase the primary aircraft assigned to the remaining operational squadrons to 24 Primary

Aerospace Vehicles Authorized (PAA) each. This would leave three PAA aircraft from the 95th FS, which would be used to improve operational test and evaluation and WIC training, and are included as part of this Proposed Action.

1.3.3 Contract Adversary Air

Air Force readiness is currently affected by several issues including training, weapon system sustainment, and facilities. While all are critical, training in particular has become an increasing concern as worldwide commitments, high operations tempo, and fiscal and manpower limitations detract from available training resources. As an example, the Budget Control Act of 2011, as implemented in 2013, reduced flying hours by 18 percent and temporarily stood down 17 of 40 combat-coded squadrons (The Heritage Foundation, 2015). The Air Force prioritized readiness in 2014, but shortfalls in readiness were not eliminated and have persisted through the present day as indicated by the Chief of Staff of the Air Force's acknowledgement of the lack of readiness in more than half of the service's combat units. In the training arena, readiness issues are manifested by multiple issues such as 1) an inability to internally support ADAIR without a corresponding sacrifice in scarce flying hours and normal training objectives; 2) a lack of advanced threat aircraft to provide representative ADAIR for realistic training; 3) a fighter pilot manning crisis, necessitating increased pilot production beyond sustainable levels; and 4) granting excessive syllabus waivers to graduates of the Air Force Weapons School due to inadequate ADAIR support during final training phases.

Lack of available ADAIR is degrading levels of pilot readiness and contributing to the overall decline in availability of proficient CAF pilots. Current Air Force ADAIR capacity provides less than 50 percent of the total ADAIR requirement across the Air Force.

Self-generated ADAIR can either be "in-house" supporting daily flying schedules or via a dedicated tasking to support an external unit, both referred to as "Red Air." In both the "in-house" and "dedicated" options, performing self-generated ADAIR is at the expense of the tasked units' normal Air Force training objectives. These two options still result in an ADAIR capacity of less than 50 percent of the Air Force-wide requirement and reduce the availability and proficiency of combat qualified pilots at a time when the Air Force is experiencing a shortfall of more than 750 CAF pilots (Venable, 2016). The Air Force created dedicated ADAIR units, or Aggressor Squadrons, to provide required training while lessening the impact to operations squadrons.

The 57th OG is currently experiencing an aggressor training deficit of 5,600 flight hours annually. At this time, the military cannot provide enough suitable aircraft for the mission. Contract surrogate aircraft are needed to emulate potential adversaries.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The Air Force is proposing to add 17 F-35A Joint Strike Fighter aircraft at Nellis AFB to support the 65th AGRS and 422nd TES, reassign three F-22A aircraft into the 422nd TES, and operate COCO ADAIR from Nellis AFB. Together, the components of this action would add 751 personnel at Nellis AFB (479 personnel for the addition of the 17 F-35As, 32 personnel for the consolidation of the three F-22As and 240 personnel for contract adversary air). Facility demolition, renovation, construction, or addition would be necessary to support the new aircraft.

2.1.1 Addition of F-35A Joint Strike Fighter Aircraft

The Proposed Action would increase the approved baseline of 36 F-35As at Nellis AFB by 17 to a total of 53 F-35As. The 17 aircraft will be transferred or reassigned from the following:

- Nine F-35A aircraft would be transferred from the 33rd FW, 58th FS, Eglin AFB to the 57th Wing, 65th AGRS, Nellis AFB.
- Two F-35A aircraft would be reassigned from the 53rd Wing, 31st TES, Edwards AFB to the 57th Wing, 65th AGRS, Nellis AFB.
- Six additional F-35A aircraft would be assigned to the 422nd TES to perform operational test and evaluation of the F-35A weapons system.

There would be no reduction of F-35As at Eglin AFB; as each F-35A is reassigned from Eglin AFB to Nellis AFB, it would be replaced at Eglin AFB by a new F-35A aircraft direct from the plant or by an aircraft transfer from another F-35A location. No change in mission is planned for Eglin AFB as part of this action.

Two F-35A aircraft would be reassigned from the 53rd Wing, 31st TES, Edwards AFB to the 57th Wing, 65th AGRS, Nellis AFB. As Initial Operational Test and Evaluation is completed at Edwards AFB, six F-35A aircraft supporting that effort at Edwards will all move to Nellis AFB. Four of those aircraft would be reassigned to the 422nd TES at Nellis AFB (previously evaluated in a separate NEPA action and included in the 36 F-35A baseline number), and the other two would be reassigned to the 65th AGRS as described above.

Six additional F-35A aircraft from the F-35A production facility would be assigned to the 422nd TES to perform operational test and evaluation of the F-35A weapons system in a combat representative environment. The 422nd TES is an existing unit already tasked to perform this mission and has twelve assigned F-35As prior to this action being implemented. The 422nd TES would have a total of 18 F-35As assigned after this action is complete.

2.1.2 Addition of F-22A Aircraft

Three 95th FS F-22A aircraft initially would be on loan to 422nd TES in accordance with the aircraft loan process as outlined in Air Force Instruction 16-402, *Aerospace Vehicle Programming, Assignment, Distribution, Accounting, and Termination.* These loans would be a "possession only" change until permanent assignment changes would be made. The 422nd TES at Nellis AFB would consolidate three 95th FS F-22A PAA into their current PAA of 12 F-22As, resulting in a total of 15 F-22A PAAs.

2.1.3 Contract Adversary Air

The Proposed Action would provide dedicated COCO ADAIR sorties for CAF training at Nellis AFB, to address shortfalls in pilot training and production capability and to provide the necessary capability and capacity to employ adversary tactics across the training spectrum from basic fighter maneuvers to higher-end, advanced training missions. Training scenarios would include the use of combat tactics and procedures that differ from CAF tactics to simulate an opposing force. The Nellis ADAIR program, utilizing contract air services for Red Air training, began as an 800-hour proof-of-concept in the fall of 2015. The follow-on contract would be known as ADAIR II.

COCO ADAIR would have multiple aircraft available with acceptable capabilities to support training requirements. Market research indicates that following types of aircraft would be proposed by multiple vendors under a competitive solicitation for the Nellis ADAIR II program.

1. The Douglas A4 Skyhawk .
2. The Aero Vodochody L-159 Alca
3. The Dassault F1 Mirage
4. The Atlas Cheetah

This action would assign up thirty (30) adversary aircraft flying minimum threshold requirements of up to 5,600 hours a year or 3,500 sorties.

2.1.4 Facilities

2.1.4.1 Addition of F-35A Joint Strike Fighter Aircraft

The 65th AGRS would require operations and maintenance (O&M) and military construction (MILCON) facility projects on Nellis AFB to successfully beddown additional F-35As. **Figure 1** shows the facilities proposed for demolition, renovation and construction under the Proposed Action. Facilities proposed for demolition, renovation, and construction shall comply with all applicable Federal, State, and local regulations to include the most current Nellis and Creech AFB Installation Facilities Standards (IFS).

Building 1770A is currently occupied by the 57th OG, the 57th Adversary Tactics Wing (ATW), and the COCO ADAIR. Expansion of Building 1770A would be necessary to support the 65th AGRS which would require a 4,000 square foot (ft^2) addition over previously disturbed land on the northwest side of the building, extending towards the parking lot. Renovations would also be necessary and would consist of modernization efforts, making the existing vault certified for F-35A flying operations. This includes power and air conditioning adjustments necessary to support Autonomic Logistics Information Systems (ALIS) installation. The parking lot for Building 1770A would be increased by approximately 30,000 ft^2.

Current occupants of Building 1770A would be moved as follows:

- COCO ADAIR staff would move into a new Building 1770B addition that is part of another Proposed Action not covered in this EA.
- 57th ATW would move to Building 451 which would require a renovation and addition. The proposed addition to Building 451, would be 3,000-4,000 ft^2. The parking lot at Building 451 would be increased by 20,000 ft^2.
- The 57th OG would move into the Close Air Support Integration Group (CIG)/TASS trailers near Building 1770A.

The following renovations and expansions are included as part of the Proposed Action:

- Building 423 would have an annex of 4,000 ft^2 to provide space for the 59 TES.
- Building 278 would be repaired and expanded with a 4,000 ft^2 addition to provide space for a Nondestructive Investigation Lab.
- Building 878 would be repaired altered and expanded with a 4,000 ft^2 addition to support the 422 TES.
- Building 10301 would have interior renovations only.

The A-10 mission currently occupying facility space in Building 262 would be relocated to an area adjacent to the Live Ordnance Loading Area (LOLA) on the east side of the runway. A clamshell type hangar would be erected on a new concrete pad.

Approximately 20 to 50 construction personnel would be on-site during the construction period, particularly during the peak construction action when concrete is being delivered. These crews include truck drivers, equipment operators, escort personnel, craftsmen, and supervisor personnel.

There would be two facility options for additional F-35A maintenance hangar facilities: either an O&M renovation of hangar 262 (option 1), or MILCON construction of a new hangar (option 2). Both facility options would meet the needs of the 65th AGRS and 422nd TES missions. Each alternative is presented below.

Option 1

Option 1 assumes there would be no MILCON funding and the increase of additional maintenance hangar facilities would be accomplished using only O&M facility projects. **Figure 1** shows the facilities proposed for renovation. Facilities modification actions associated with Option 1 are described below.

Building 262 would be renovated and expanded with a 4,000 ft^2 addition. Maintenance for the 65th AGRS would occupy this facility. Building 257 would be expanded with a 4,000 ft^2 addition. Maintenance for the F-35A operational test aircraft would occupy this facility.

In addition, aircraft sunshades would be installed over existing pavement. Building 283 also would require interior repairs.

Option 2

Under this option, O&M and MILCON facility projects on Nellis AFB would be accomplished to successfully increase available maintenance hangar facilities.

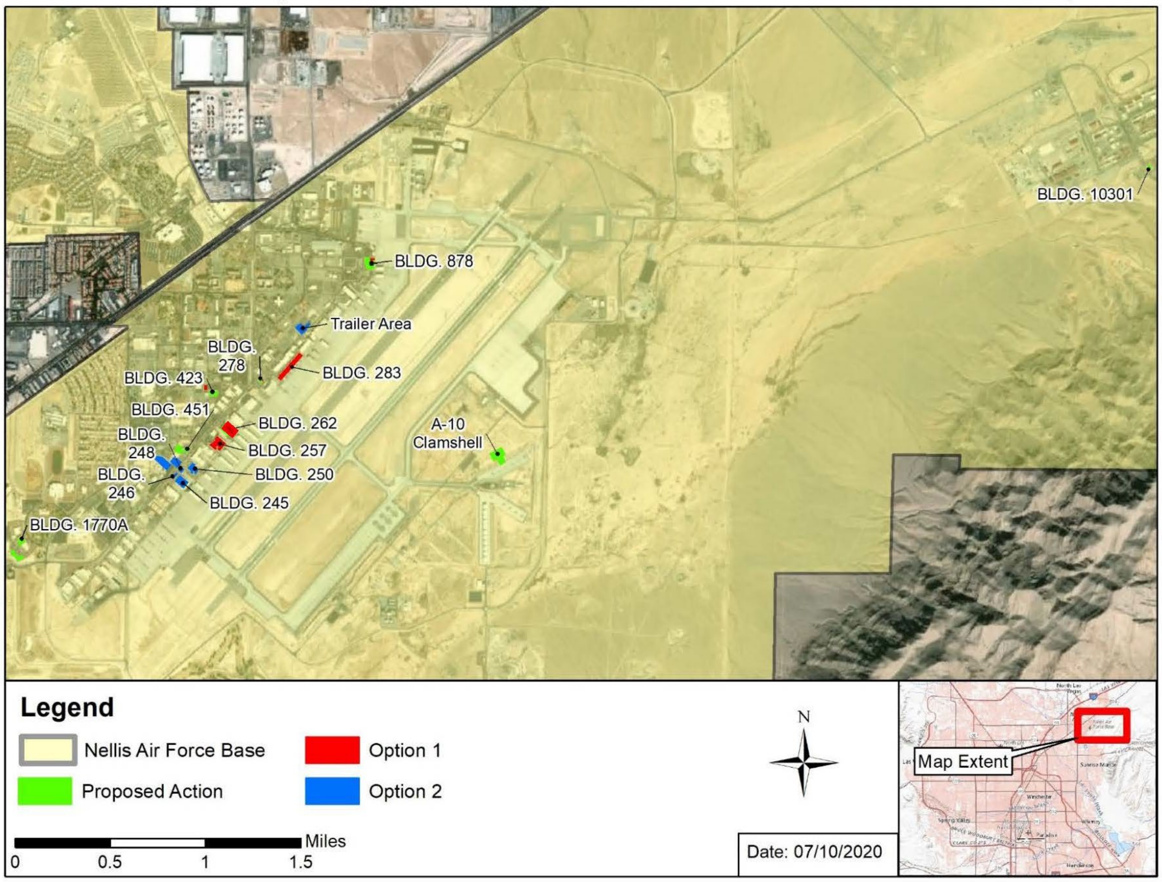
Option 2 would include demolition of Building 250, which is now the Eagle Aircraft Maintenance Unit (AMU) and includes the Weapons School on the western side of the building. Construction of a new 4-bay hangar/AMU for the 65 AGRS F-35As would occur in that location. The total area impacted by demolition for Building 250 would be about 164,000 ft^2 including utility lines, impervious areas, walls, and utility holes. All demolition material would be removed and disposed of according to Federal, State, local, and installation regulations. The size of the 4-bay hangar would be approximately 65,000 ft^2, not including exterior paved areas. The existing parking on the other side of Tyndall Avenue from Building 250 would be expanded by 106 spots, increasing the paved area by approximately 50,000 ft^2.

Eagle AMU personnel would be moved to three existing buildings – Hangar 245, Building 246 and Building 248. Renovations would occur at the three buildings, adding interior walls to Buildings 246 and 248 because they are not currently configured for administrative functions. The proposed addition to Building 246 would be 4,000 ft^2 in size.

Figure 1 shows the facilities proposed for demolition, renovation and construction under this option.

No new building is planned at this time for the Weapons School, which would be moved to temporary trailers. Preliminary siting for these trailers is adjacent to Building 100. New construction for the Weapons School is not part of this action.

Figure 1. Location of Facilities Proposed for Demolition/Renovation/Construction at Nellis Air Force Base under the Options 1 and 2



2.1.4.2 Addition of F-22A Aircraft

Facilities at Nellis AFB are sufficient to accept three additional F-22A aircraft. No MILCON or sustainment, restoration and modernization projects would be required.

2.1.4.3 Contract Adversary Air

COCO ADAIR would utilize the existing Buildings 194 and 199 for hangar maintenance as was done for the COCO ADAIR proof-of-concept. Under the Proposed Action, the pilots would operate out of a portion of Building 1770B, occupying the new addition to that facility when completed. Contract aircraft would not have permanently assigned parking on the ramp, due to the fluid and flexible nature of operations at Nellis AFB. Sufficient aircraft parking is available, but the contract aircraft would be required to move around the ramp as needed.

2.1.5 Personnel

2.1.5.1 Addition of F-35A Joint Strike Fighter Aircraft

Additional military and contractor personnel would be required at Nellis AFB to support the Proposed Action associated with F-35A aircraft. The total increase is approximately 297 military, 143 civilians, and 39 contractor personnel and is depicted in **Table 1**.

Table 1.
Additive Nellis Air Force Base Personnel

Unit/Function	Officer	Enlisted	Civilian	Contractor	Total
65 AGRS	15	8	5		28
Operational Test Mgt/Ops (422 & 59 TES)	28	20	101		149
AGRS Maintenance (Flanker AMU, MUNS, MXG)	2	160	2	2	166
OT Maintenance (Bolt AMU, MUNS, MXG)	1	63	2		66
Lightning AMU			2		2
COR			2		2
BOS			29		29
Backshops				29	29
ALIS				8	8
Total	**46**	**251**	**143**	**39**	**479**

Notes: AFB = Air Force Base; AGRS = Aggressor Squadron; AMU = aircraft maintenance unit; ALIS = Autonomic Logistics Information System; BOS= Base Operation Support; MXG = Maintenance Group; OT = Operational Test

2.1.5.2 Addition of F-22A Aircraft

As shown in **Table 2**, the Proposed Action would add two (2) officers and 30 enlisted personnel for a total of 32 additional personnel authorizations at Nellis AFB associated with F-22A aircraft.

Table 2.
Additive Nellis Air Force Base Personnel

Unit/Function	Officer	Enlisted	Total
422 TES	2	30	32

Notes: TES= Test and Evaluation Squadron

2.1.5.3 Contract Adversary Air

Contract adversary air would add approximately 240 contract personnel, consisting of pilots, operations staff, and maintenance staff.

2.1.6 Sorties

2.1.6.1 Addition of F-35A Joint Strike Fighter Aircraft

The 17 F-35A aircraft would be additive at Nellis AFB with additional programmed flying hours and additional sorties. **Table 3** depicts the changes to sorties flown at each location affected by the F-35A component of the Proposed Action. A sortie is defined as a single military aircraft flight from initial takeoff through final landing.

Table 3
Planned F-35A Annual Sortie Changes

Location	Unit	Δ Day Sorties	Δ Total Sorties	Δ Low Level Sorties	Δ Supersonic Sorties
Nellis AFB	65 AGRS	+1,202	+1,514	+110	+983
Nellis AFB	422 TES	+434	+462	+69	+346

Notes: AFB = Air Force Base; AGRS = Aggressor Squadron; TES = Test & Evaluation Squadron; Δ = change

Night sorties are defined as sorties operating from 2200 to 0700 the next day. For night sorties, the 422 TES would operate at approximately 10% of overall departures and approximately 10% arrivals of overall arrivals. The 65 AGRS would operate at approximately 4% departures and approximately 10% of overall arrivals for night sorties

2.1.6.2 Addition of F-22A Aircraft

The three F-22A aircraft would be additive at Nellis AFB but would support the existing flying program with no planned increases in sorties, airspace use or airfield operations.

2.1.6.3 Contract Adversary Air

Up to 30 contract adversary air aircraft would be based on Nellis AFB. Existing taxiways, runways, and terminal airspace are fully compatible with aircraft requirements. The Nellis COCO ADAIR program would fly no more than 5,600 hours per year or 3,500 sorties (**Table 4**). Operations would be during the day except to support the night "go" for two Red Flags per year. All aircraft under the Proposed Action would follow the published departure and arrival procedures to and from Nellis AFB.

Table 4.
Planned ADAIR II Annual Sortie Changes

Location	Unit	Δ Day Sorties	Δ Total Sorties	Δ Low Level Sorties	Δ Supersonic Sorties
Nellis AFB	ADAIR II	2,975	3,500	525	100

For night sorties, COCO ADAIR operate at approximately 4% departures and approximately 10% of overall arrivals.

2.1.7 Airspace Use

Nellis AFB, along with the NTTR and R-2508 airspace, represents the Air Force's premier location to conduct complex, multi-aircraft CAS combat training exercises in support of ground maneuver units. Nellis AFB airfield airspace environment comprises part of the Class B airspace that the FAA designates around the nation's busiest airports. Designed for air traffic operating under instrument flight rules, Class B airspace for Nellis AFB extends around Nellis AFB and Las Vegas' McCarran International Airport. Class B airspace requires that all aircraft operating within the area be in contact with the controlling air traffic control facility. No changes to operational patterns, altitudes, or routes would be required to accommodate the additional F-35A, F-22A, or COCO ADAIR aircraft.

The primary training airspace that would be used by the additional F-35A, F-22A, or COCO ADAIR aircraft would be the NTTR and R-2508 (**Figure 2**). The NTTR range includes 5,000 square miles of airspace which is restricted from civilian air traffic over-flight and another 7,000 square miles of MOAs which is shared with civilian aircraft. NTTR's restricted areas comprise special-use airspace within which the FAA has determined that potentially hazardous activities occur, including air-to-ground ordnance delivery. Regulations prohibit nonparticipating military and civil/commercial aircraft from flying within this airspace without authorization. Training activities within NTTR predominantly would involve subsonic flight but supersonic flight is authorized in all NTTR airspace units, although at differing altitudes.

R-2508 areas consist of major work areas and includes restricted airspace. The restricted airspaces overlie military lands. The restricted areas are comprised of special-use airspace within which the FAA has determined that potentially hazardous activities occur, including air-to-ground ordnance delivery. Regulations prohibit nonparticipating military and civil/commercial aircraft from flying within the restricted portions of the airspace without authorization. Training activities within R-2508 predominantly involve subsonic flight but supersonic flight is authorized in the High-Altitude and Black Mountain supersonic corridors when properly scheduled, as well as inside the internal restricted areas after receiving specific approval from the appropriate scheduling agency.

Figure 2. Special Use Airspace used by Nellis Air Force Base

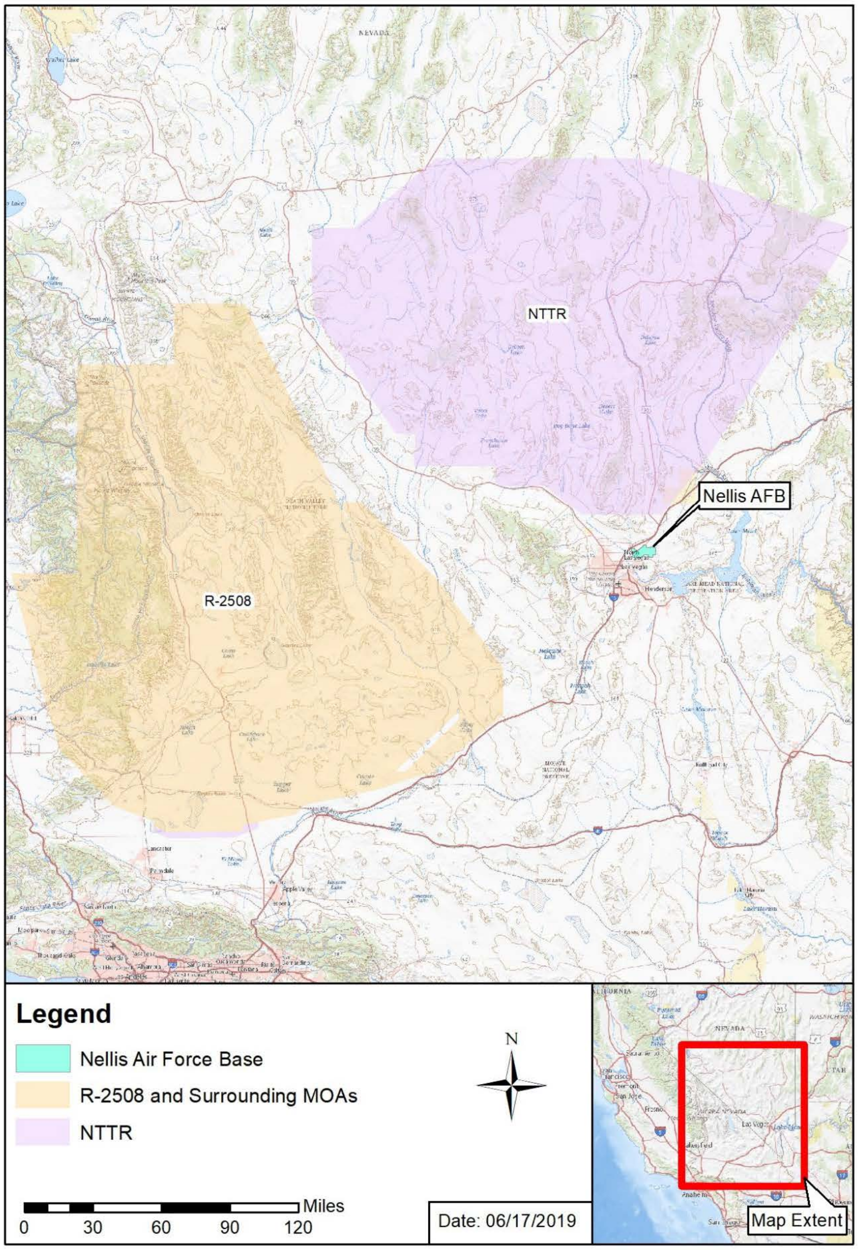


Table 5 provides a breakdown of current and projected training activities for the AGRS, TES, and COCO ADAIR at NTTR and R-2508 for both low and high altitude. The total increase in sorties associated with the Proposed Action would be 5,476 flown in the NTTR and R-2508 annually.

Table 5.
Current and Projected Training Activities for AGRS and TES

Airspace	Current Altitude	Baseline Training Sorties	Projected Addn'l Training Sorties	Projected Total Sorties
NTTR	Low altitude	64 AGRS: 400	65 AGRS: 110	1,209
		422 TES: 143	422 TES: 56	
		ADAIR: 0	ADAIR: 500	
NTTR	High altitude	64 AGRS: 1,925	65 AGRS: 1,264	7,141
		422 TES: 813	422 TES: 314	
		ADAIR: 0	ADAIR: 2,825	
R-2508 Complex	Low altitude	64 AGRS: 66	65 AGRS: 30	171
		422 TES: 36	422 TES: 14	
		ADAIR: 0	ADAIR: 25	
R-2508 Complex	High altitude	64 AGRS: 109	65 AGRS: 110	650
		422 TES: 203	422 TES: 78	
		ADAIR: 0	ADAIR: 150	
Total Proposed Airspace Sorties		3,695	5,476	9,171

Notes: NTTR = Nevada Test and Training Range; AGRS = Aggressor Squadron; TES = Test and Evaluation Squadron

64 AGRS sorties represent those sorties currently flown by F-16 Aggressor aircraft. 65 AGRS additional sorties represent the sorties that would be flown by F-35A aircraft.

2.1.8 Ordnance and Defensive Countermeasures

2.1.8.1 Addition of F-35A Joint Strike Fighter Aircraft

Personnel at Nellis AFB control, maintain, and store all ordnance and munitions required for mission performance on NTTR. This includes training and inert bombs and rockets, live bombs and rockets, chaff, flares, gun ammunition, small arms ammunition, and other explosive and pyrotechnic devices.

Table 6 provides existing and proposed defensive countermeasure use by the 65th AGRS, 422 TES and COCO ADAIR. Flares are a principal defensive countermeasure dispensed by military aircraft to avoid detection or attack by enemy air defense systems. Flares are magnesium pellets ejected from military aircraft and provide high-temperature heat sources that act as decoys for heat-seeking weapons targeting the aircraft. These defensive countermeasures are utilized to keep aircraft from being successfully targeted by or escape from weapons such as surface-to-air missiles, air-to-air missiles, and anti-aircraft artillery

2.1.8.2 Addition of F-22A Aircraft

Under the Proposed Action, the additional three F-22As would not be flying additional sorties and would therefore not increase the expenditure of ordnance in support of their mission requirements.

2.1.8.3 Contract Adversary Air

Under the Proposed Action, COCO ADAIR aircraft would not use chaff and/or flares during training sortie operations.

Table 6.
Existing and Proposed Defensive Countermeasure Use

Special Use Airspace	Unit	Aircraft Type	Countermeasure Type	Current Baseline Use	Proposed Additional Use	Total Estimated Future Use
NTTR	64 AGRS	F-16	[1]Flares	40,000	0	40,000
			Chaff	0	0	0
	65 AGRS	F-35A	[2]Flares	0	22,710	22,710
			[3]Chaff	0	0	0
	422 TES	F-35A	[4]Flares	165	60	225
			Chaff	0	0	0
	ADAIR	A4/TBD	Flares	0	0	0
			Chaff	0	0	0
	Total Flares in NTTR			40,165	22,710	62,935
	Total Chaff in NTTR			0	0	0
R-2508 Complex	64 AGRS	F-16	Flares	0	0	0
			Chaff	0	0	0
	65 AGRS	F-35A	Flares	0	0	0
			Chaff	0	0	0
	422 TES	F-35A	Flares	0	0	0
			Chaff	0	0	0
	ADAIR	A4/TBD	Flares	0	0	0
			Chaff	0	0	0
	Total Flares in R-2508			0	0	0
	Total Chaff in R-2508			0	0	0

Notes:
NTTR = Nevada Test and Training Range; AGRS = Aggressor Squadron; TES = Test & Evaluation Squadron
[1] 64 AGRS baseline flare usage is estimated as one 15x flare pack per sortie (15x 2500 sorties/year = 40,000),
[2] 65 AGRS usage is similarly estimated as 15x 1514 sorties/year = 22,710
[3] F-35A does not currently expend chaff. While it is planned to do so in the future, exact chaff composition and quantities are unknown at this time
[4] The 422 TES uses flares on fewer than 1% of missions (15x 11 sorties/year = 165 current and 15 x 4 sorties/year = 60 for add

2.2 DETAILED DESCRIPTION OF THE SELECTED ALTERNATIVES

NEPA and the CEQ regulations mandate the consideration of reasonable alternatives to the Proposed Action. "Reasonable alternatives" are those that also could be utilized to meet the purpose of and need for the Proposed Action. The NEPA process is intended to support flexible, informed decision-making; the analysis provided by this EA and feedback from the public and other agencies will inform decisions made about whether, when, and how to execute the Proposed Action.

2.2.1 Proposed Action Alternatives

Two Alternatives are carried forward for analysis:

- Nellis Alternative A is the preferred alternative. Details of Alternative A are described in Section 2.1 and include Option 1 for facilities actions.
- Alternative B is also carried forward and is described in Section 2.1, choosing Option 2 for facilities actions. The only difference between Alternative A and B is the selection of Options for facilities actions.

2.2.2 No Action Alternative

Analysis of the No Action Alternative provides a benchmark, enabling decision-makers to compare the magnitude of the potential environmental effects of the Proposed Action. NEPA requires an EA to analyze the No Action Alternative. No action means that an action would not take place at this time, and the resulting environmental effects from taking no action would be compared with the effects of allowing the proposed activity to go forward. No action for this EA reflects the status quo, where no additional aircraft assets would be transferred or reallocated at Nellis AFB.

As the nine F-35As at Eglin are replaced by newer aircraft, those aircraft would either be retired or another use would have to be found for them that does not include the capability to use the internal cannon. Without 5th Generation Aggressors, the Air Force would not have the ability to train and develop tactics against adversary 5th Generation aircraft.

The 422nd TES would not receive the additional three PAA F-22A. Those three aircraft would be distributed to one or more operational squadrons, which would not improve Air Force capability to train weapons instructor pilots or test capability. As a result, one or more operational squadrons would have more than 24 PAA, making force management more difficult as deployable force modules are normally based on a 24 PAA squadron size.

Under the No Action, COCO ADAIR would not operate at Nellis AFB. The 57th OG would continue to experience an aggressor training deficit of 5,600 flight hours annually.

Interagency and Intergovernmental Coordination and Consultations Mailing List

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Appendix A-2
Correspondence Received

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USDA
United States Department of Agriculture

September 15, 2020

Mr. Tod Oppenborn
6020 Beale Ave.
Nellis AFB, NV 89191

Re: Environmental Assessment

Dear Mr. Oppenborn:

Thank you for the opportunity to provide comments regarding the preparation of an Environmental Assessment (EA) for additional fighter planes at Nellis Air Force Base. This project appears within an existing building complex, the USDA Natural Resources Conservation Service – Nevada State Office does not have any comments for the EA.

RAY DOTSON Digitally signed by RAY DOTSON Date: 2020.09.15 17:54:49 -07'00'

Ray Dotson
State Conservationist

Natural Resources Conservation Service
1365 Corporate Blvd., Reno, NV 89502
Phone: (775) 857-8500 Toll Free Fax: (855) 816-0893

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Appendix A-3
Interagency and Intergovernmental Coordination for Environmental Planning –Draft Environmental Assessment

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Sample Coordination Letters

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DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

Mr. Lonny P. Baker
Deputy Commander
99th Civil Engineer Squadron
6020 Beale Ave.
Nellis AFB, NV 89191

Rebecca Palmer
Nevada State Historic Preservation Office
901 S. Stewart St., Suite 5004
Carson City, NV 89701

Dear Ms. Palmer,

The United States Air Force (USAF) is proposing to add 17 F-35 Joint Strike Fighters, 3 F-22 Raptors, and Contractor Owned Contractor Operated Adversary Air (COCO ADAIR) aircraft at Nellis Air Force Base (AFB), Nevada. To take into account various environmental concerns, the AF is engaging early with the appropriate resource and regulatory agencies as it formulates the undertaking. The AF is also preparing an Environmental Assessment (EA) under the National Environmental Policy Act to evaluate potential environmental impacts associated with the addition of 17 F-35 Joint Strike Fighters, 3 F-22 Raptors, and COCO ADAIR.

In accordance with Section 306108 of the National Historic Preservation Act and its implementing regulations at 36 CFR Part 800, the AF, Nellis AFB, is advising you of a proposed undertaking that has the potential to affect historic properties. The undertaking would require infrastructure, facilities, airfield operations, training activities, and personnel to support the Nellis AFB mission.

The Proposed Action is to add 17 F-35s, 3 F-22s, and COCO ADAIR along with necessary construction, demolition, and renovation to support the additional aircraft. There would be 2 facility options for the additional F-35 aircraft depending upon the availability of military construction funding. No construction or renovation is needed to support the F-22 aircraft or COCO ADAIR. The combined components of the action are expected to add more than 750 personnel at Nellis AFB.

The Area of Potential Effect (APE) for this undertaking is defined in the following manner:

- On Nellis AFB, the direct APE which is defined as the area within 50 meters of the proposed projects. The indirect APE on Nellis AFB is defined a range of approximately 800 meters around the direct APE. Please refer to Figure 3-10 in the enclosed Draft EA.
- Outside Nellis AFB, the APE is defined as the special use airspace that would be used for aircraft training activities. Please refer to Figure 2-2 and 2-3 in the enclosed Draft EA.

There are 10 archaeological sites within the direct APE and 6 National Register of Historic Places (NRHP)-eligible buildings within the indirect APE on Nellis AFB (Figure 3-10 of the EA). There are 30 NRHP-listed resources under the airspace APE. A full description of the cultural resources within the APEs can be found in Section 3.11 of the EA. Nellis AFB has reviewed the Criteria of Adverse Effect and have determined that none apply to the activities that would be carried out in this undertaking.

Pursuant to 36 Code of Federal Regulation §800.5(b), the AF has determined that there would be no adverse effect to historic properties by the addition of 17 F-35 Joint Strike Fighters, 3 F-22 Raptors, and COCO ADAIR. Attached for your review are copies of relevant supporting information supporting the AF's findings and determinations.

We request your comment and/or concurrence on the finding of *No Adverse Effect*. If we do not receive your comments and/or concurrence within the required 30 days, we will assume concurrence and proceed with the undertaking as described.

Please contact Mr. Tod Oppenborn, NEPA Program Manager, at 6020 Beale Ave., Nellis AFB, NV, 89191; or by email at tod.oppenborn@us.af.mil or phone (702) 652-9366 if you have any questions.

Sincerely,

Lonny P. Baker
LONNY P. BAKER, GS-14, DAF
Deputy Commander

Attachment:
Draft EA and Proposed Finding of no Significant Impact
At Web Address: https://www.nellis.af.mil/About/
Partnerships/Environment/

DEPARTMENT OF THE AIR FORCE
99TH CIVIL ENGINEER SQUADRON (ACC)
NELLIS AIR FORCE BASE, NEVADA

99 CES/CENP
6020 Beale Avenue
Nellis AFB, NV 89191-6520

Glen Knowles
US Fish and Wildlife Service - Southern Nevada Fish and Wildlife Office
Field Supervisor
4701 North Torrey Pines Drive
Las Vegas, NV 89130

Dear Mr. Knowles,

Please find the enclosed copy of the Draft Environmental Assessment (EA) and Proposed Finding of No Significant Impact (FONSI) to evaluate the potential environmental impacts, beneficial and adverse, resulting from the proposed addition of 17 F-35 Joint Strike Fighters, three F-22As, and operation of contractor-owned contractor-operated Adversary Air (COCO ADAIR) at Nellis Air Force Base (AFB), Nevada. The action would improve test, training and tactics development capabilities at Nellis AFB to keep pace with United States Air Force (USAF) and United Kingdon Royal Air Force (RAF) mission requirements, evolving technology and enemy capabilities.

The Proposed Action is to add 17 F-35s, three F-22As, and COCO ADAIR along with necessary construction, demolition, renovation, to support the additional F-35 aircraft. There would be two facility options for the additional F-35 aircraft depending upon the availably of military construction (MILCON) funding. No construction or renovation is needed to support the F-22A aircraft or COCO ADAIR. The combined components of the action are expected to add more than 750 personnel at Nellis AFB.

In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations, and the USAF NEPA regulations, Nellis AFB is providing an electronic copy of the Draft Environmental Assessment and Proposed FONSI for review and comment. The document can also be found at http://www.nellis.af.mil/About/Environment.aspx. Please provide comments on the Draft EA and Proposed FONSI within 30 days of receipt of this letter to Tod Oppenborn, NEPA Program Manager, at 6020 Beale Ave., Nellis AFB, NV, 89191; or by email or phone at tod.oppenborn@us.af.mil or (702) 652-9366.

Sincerely,

CHARLES W. ROWLAND JR.
Chief, Portfolio Optimization

Attachment: Draft EA and Proposed FONSI

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 319TH CIVIL ENGINEER SQUADRON (ACC)
GRAND FORKS AIR FORCE BASE, NORTH DAKOTA

FROM: 319 CES/CD
525 Tuskegee Airmen Blvd.
Grand Forks AFB, ND 58205-6434

North Dakota Game and Fish Department
Mr. Terry Steinwand
100 North Bismarck Expressway
Bismarck, ND 58501

SUBJECT: Availability of Draft Environmental Assessment for Proposed Installation Development Base Planning, Grand Forks Air Force Base (AFB), North Dakota

Dear Mr. Steinwand,

The United States Air Force (Air Force) has prepared a Draft Environmental Assessment (EA)/Finding of No Significant Impact (FONSI) for proposed installation development actions at Grand Forks Air Force Base (AFB) in Grand Forks County, North Dakota. The proposed projects are needed to modernize the facilities and infrastructure of the base in support of the military mission. As described further in the Draft EA, these projects include demolition, construction, and renovation activities, as well as other routine improvements to the built environment of Grand Forks AFB.

Pursuant to the National Environmental Policy Act (NEPA; 42 US Code §4321 et seq.) and the Council on Environmental Quality NEPA implementing regulations (40 Code of Federal Regulations [CFR] §§1500-1508), the Air Force invites review and comment on the findings of the Draft EA/FONSI. Electronic copies of the documents can also be found on the Grand Forks AFB website at http://www.grandforks.af.mil/. Hard copies of the Draft EA/FONSI are available for review at the following local libraries: Grand Forks Public Library, Grand Forks, ND; University of North Dakota Legal Library (Thormodsgard Law Library), Grand Forks, ND; and North Dakota State University Library, Fargo, ND. A limited number of hard copies are available upon request.

The Air Force requests your input on the Draft EA/FONSI within 30 days of receipt of this letter. Substantive comments received during the review period will be addressed in the Final EA/FONSI or, if necessary, the Air Force will announce its intent to prepare an Environmental Impact Statement (EIS).

Please direct any further questions or requests for additional information to Mr. Robert Greene at 525 Tuskegee Airmen Blvd, Grand Forks AFB, North Dakota, 58205, or by email or phone at robert.greene.13@us.af.mil or (701) 747-4664.

We look forward to receiving your input on the Draft EA/FONSI and thank you for participating in the Air Force's environmental impact analysis process.

Sincerely,

LANDON.LANCE.ERIC.1458635028 Digitally signed by LANDON.LANCE.ERIC.1458635028 Date: 2021.04.06 08:13:38 -05'00'

Lance E. Landon, GS-13, DAF
Deputy Base Civil Engineer

Attachment: Draft EA and Proposed FONSI

Sample Government to Government Coordination Letter

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50 Tusu Lane
Bishop, CA 93514

Subject: Environmental Assessment and Section 106 Consultation Under the National Historic Preservation Act for the Prposed Addition of 17 F-35 Joint Strike Fighters, 3 F-22s, and Contractor-Owned Contractor-Operated Adversary Air (COCO ADAIR) at Nellis Air Force Base (AFB)

Dear Chairperson Summers,

A couple of months ago, I sent you a letter briefly describing the Air Force's proposal to add 17 F-35 Joint Strike Fighters, 3 F-22s, and COCO ADAIR aircraft at Nellis AFB, Nevada. I would like to follow up by inviting the Bishop Paiute Tribe to engage in government-to-government consultation with Nellis AFB on the proposal per the National Historic Preservation Act and regulations at 36 Code of Federal Regulations Part 800.

The Proposed Action is to add 17 F-35s, 3 F-22s, and COCO ADAIR along with necessary construction, demolition, renovation, to support the additional F-35 aircraft. There would be 2 facility options for the additional F-35 aircraft depending upon the availability of military construction funding. No construction or renovation is needed to support the F-22 aircraft or COCO ADAIR. The combined components of the action are expected to add more than 750 personnel at Nellis AFB.

The United States Air Force (USAF) has prepared a Draft Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality regulations, and USAF NEPA regulations to evaluate the potential environmental impacts, beneficial and adverse, resulting from the Proposed Action. The action would improve test, training and tactics development capabilities at Nellis AFB to keep pace with USAF and United Kingdon Royal Air Force mission requirements, evolving technology, and enemy capabilities.

There are 10 archaeological sites within the direct Area of Potential Effect (APE) and 6 National Register of Historic Places (NRHP) eligible buildings within the indirect APE on Nellis AFB (Figure 3-10 of the EA). There are 30 NRHP-listed resources under the airspace APE. A full description of the cultural resources within the APEs can be found in Section 3.11 of the EA. None of the proposed activities are expected to affect architectural properties and archaeological resources.

I understand that, to date, the Bishop Paiute Tribe has not identified any properties of religious and cultural significance in the area of the proposed actions. We now invite you to identify any such properties that might be affected by our proposed action. Please let us know if any of these properties are present, along with any supporting information on their eligibility for the NRHP.

To ensure that we can make full use of any information you provide, it would be helpful to hear back from you 30 days from receipt of this letter. Please provide comments or requests for additional information within 30 days of receipt of this letter to Mr. Tod Oppenborn, NEPA Program Manager, at 6020 Beale Ave., Nellis AFB, NV, 89191, or by email at tod.oppenborn@us.af.mil or phone (702) 652-9366. Thank you in advance for your consideration.

Sincerely,

Lonny P. Baker

LONNY P. BAKER, GS-14, DAF
Deputy Commander

Attachment:
Draft EA and Proposed Finding of no Significant Impact
At Web Address: https://www.nellis.af.mil/About/Partnerships/Environment/

APPENDIX B.
NOTICES OF AVAILABILITY AND PUBLIC COMMENTS ON THE DRAFT EA

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Table of Content

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Appendix B-1
Notice of Availability Newspaper Posting – Draft Environmental Assessment

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AFFIDAVIT OF PUBLICATION

STATE OF NEVADA)
COUNTY OF CLARK) SS:

ENVIRONMENTAL ASSESSMENT SERVICES LLC
#112
350 HILLS ST
RICHLAND WA 99354

Account # **188532**
Ad Number **0001147410**

Eileen Gallagher, being 1st duly sworn, deposes and says: That she is the Legal Clerk for the Las Vegas Review-Journal and the Las Vegas Sun, daily newspapers regularly issued, published and circulated in the City of Las Vegas, County of Clark, State of Nevada, and that the advertisement, a true copy attached for, was continuously published in said Las Vegas Review-Journal and / or Las Vegas Sun in 2 edition(s) of said newspaper issued from 06/25/2021 to 06/26/2021, on the following days:

06 / 25 / 21
06 / 26 / 21

/S/ Eileen Gallagher
LEGAL ADVERTISEMENT REPRESENTATIVE

Subscribed and sworn to before me on this 28th day of June, 2021

Notary Mary Lee

MARY A. LEE
Notary Public, State of Nevada
Appointment No. 21-7634-01
My Appt. Expires Dec 15, 2024

PUBLIC NOTICE

NOTICE OF AVAILABILITY
DRAFT ENVIRONMENTAL ASSESSMENT AND
PROPOSED FINDING OF NO SIGNIFICANT IMPACT
FOR THE ADDITION OF F-35 JOINT STRIKE FIGHTERS, F-22As AND
CONTRACT ADVERSARY AIR AT NELLIS AFB, NEVADA

A Draft Environmental Assessment (EA) and proposed Finding of No Significant Impact (FONSI) have been prepared to analyze the potential impacts associated with the addition of 17 F-35 Joint Strike Fighters, three F-22As, and operation of contractor-owned contractor-operated Adversary Air (COCO ADAIR) at Nellis Air Force Base (AFB). Facility construction, demolition, renovation, and addition, as well as an increase in personnel, would be necessary to support the actions. The purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with U.S. Air Force and United Kingdom Royal Air Force mission requirements, evolving technology and enemy capabilities.

The EA, prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations, and Air Force instructions implementing NEPA, evaluates potential impacts of the alternative actions on the environment including the No-Action Alternative. Based on this analysis, the Air Force has prepared a proposed FONSI.

The Draft EA and proposed FONSI, dated May 2021, are available for review at the following locations: Las Vegas Library, Nevada State Clearinghouse, Air Force Flight Test Center (AFFTC) Technical Library at Edwards AFB, CA; Inyo County Free Library, Kern County Library Branches at Boron, California City, Mojave, Ridgecrest, Wands Kirk, and River Valley; Los Angeles County Library, and Kern River Valley Library.

Electronic copies of the documents can also be found on the Nellis AFB website at http://www.nellis.af.mil/About/Environment.aspx. You are encouraged to submit comments through 26 July 2021. Please provide any comments within 30 days of the date of this Notice of Availability. Comments should be provided to Tod Oppenborn, NEPA Program Manager, at 6020 Beale Ave., Nellis AFB, NV, 89191; by phone (702) 652-9366; or email tod.oppenborn@us.af.mil

The Air Force is aware of the potential impact of the ongoing coronavirus (COVID-19) pandemic on the usual methods of access to information and ability to communicate, such as the mass closure of local public libraries and challenges with the sufficiency of an increasingly-overburdened internet. The Air Force seeks to implement appropriate additional measures to ensure that the public and all interested stakeholders have the opportunity to participate fully in this Environmental Assessment process. Accordingly, please do not hesitate to contact us directly at the email address or telephone number provided above; we are available to discuss and help resolve issues involving access to the Draft EA and Proposed FONSI, or the ability to comment.

PRIVACY ADVISORY NOTICE

This Draft Environmental Assessment and proposed FONSI are provided for public comment in accordance with the National Environmental Policy Act (NEPA), the President's Council on Environmental Quality NEPA Regulations (40 CFR §1500-1508), and 32 CFR §989, the Environmental Impact Analysis Process (EIAP). The EIAP provides an opportunity for public input on Air Force decision-making, allows the public to offer inputs on alternative ways for the Air Force to accomplish what it is proposing, and solicits comments on the Air Force's analysis of environmental effects.

Public comment allows the Air Force to make better, informed decisions. Letters or other written or oral comments provided may be published in the EA. As required by law, comments provided will be addressed in the EA and made available to the public. Providing personal information is voluntary. Any personal information provided will be used only to identify your desire to make a statement during the public comment portion of any public meetings or hearings or to fulfill requests for copies of the EA and associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of the EA; however only the names of the individuals making comments and specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the EA.

PUB: June 25, 26, 2021 LV Review-Journal

Desert Lightning News

Vol. 5, No. 13 — Serving Southern Nevada's military community, including Nellis, Creech and NTTR — June 25, 2021

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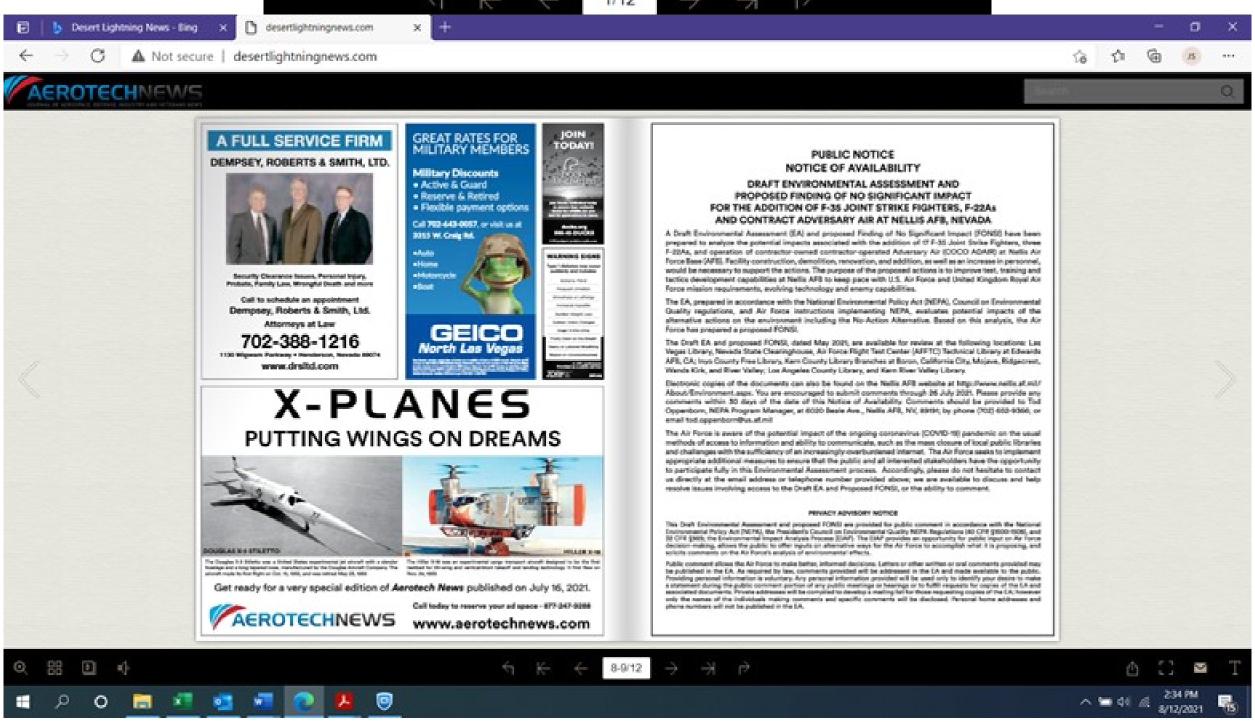
Cunningham returns to Nellis
to take command of U.S. Air Force Warfare Center

See COMMAND, on Page 3

1/12



PUBLIC NOTICE
NOTICE OF AVAILABILITY

DRAFT ENVIRONMENTAL ASSESSMENT AND
PROPOSED FINDING OF NO SIGNIFICANT IMPACT
FOR THE ADDITION OF F-35 JOINT STRIKE FIGHTERS, F-22As
AND CONTRACT ADVERSARY AIR AT NELLIS AFB, NEVADA

A Draft Environmental Assessment (EA) and proposed Finding of No Significant Impact (FONSI) have been prepared to analyze the potential impacts associated with the addition of 17 F-35 Joint Strike Fighters, three F-22As, and operation of contractor-owned contractor-operated Adversary Air (COCO ADAIR) at Nellis Air Force Base (AFB). Facility construction, demolition, renovation, and addition, as well as an increase in personnel, would be necessary to support the actions. The purpose of the proposed actions is to improve test, training and tactics development capabilities at Nellis AFB to keep pace with U.S. Air Force and United Kingdom Royal Air Force mission requirements, evolving technology and enemy capabilities.

The EA, prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations, and Air Force instructions implementing NEPA, evaluates potential impacts of the alternative actions on the environment including the No-Action Alternative. Based on this analysis, the Air Force has prepared a proposed FONSI.

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Public comment allows the Air Force to make better, informed decisions. Letters or other written or oral comments provided may be published in the EA. As required by law, comments provided will be addressed in the EA and made available to the public. Providing personal information is voluntary. Any personal information provided will be used only to identify your desire to make a statement during the public comment portion of any public meetings or hearings or to fulfill requests for copies of the EA and associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of the EA; however only the names of the individuals making comments and specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the EA.

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Appendix B-2
Public Comment on the Draft Environmental Assessment

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Nevada State Clearinghouse Comments Received for E2021-318 E2021-318 EA and FONSI USAF Nellis AFB Addition of F-35 Joint Strike Fighters, Addition of F-22A Raptors and Contract Adversary Air - Clark County - Clark

Comment # 1

From: Brendon Grant
Agency: Nevada Division of Environmental Protection NDEP
Title:
Phone: 775-687-9524
Email: bgrant@ndep.nv.gov
Date Received: 06/30/2021

If the potable water line will be extended to serve a new facility, a formal submittal to the Bureau of Safe Drinking Water will be required for review and approval.

Nevada State Clearinghouse Comments Received for E2021-318 E2021-318 EA and FONSI USAF Nellis AFB Addition of F-35 Joint Strike Fighters, Addition of F-22A Raptors and Contract Adversary Air - Clark County - Clark

Comment # 2

From: Thomas C. Pyeatte Jr.
Agency: Nevada Division of Water Resources
Title: Professional Engineer
Phone: 775-684-2862
Email: tpyeatte@water.nv.gov
Date Received: 07/01/2021

NRS – Nevada Revised Statutes
NAC – Nevada Administrative Code

General:

Compliance with Nevada water law is required.
All waters of the State belong to the public and may be appropriated for beneficial use pursuant to the provisions of NRS Chapters 533 and 534 and not otherwise.
Water shall not be used from any source unless the use of that water is authorized through a permit issued by the State Engineer. For underground sources, certain uses of water may be authorized through the issuance of a waiver pursuant to NRS Chapter 534 and NAC Chapter 534.
Water for Construction Projects
Ensure that any water used on a project for any manner of use shall be provided by an established utility or under permit or temporary change application or waiver issued by the State Engineer's Office with a manner of use acceptable for suggested project's water needs.

Nevada State Clearinghouse
Department of Conservation and Natural Resources
901 South Stewart Street, Suite 5003
Carson City, NV 89701
775-684-2723
http://clearinghouse.nv.gov
www.lands.nv.gov

DATE: July 1, 2021
Division of Water Resources
Nevada SAI # E2021-318

Project: EA and FONSI USAF Nellis AFB Addition of F-35 Joint Strike Fighters, Addition of F-22A Raptors and Contract Adversary Air - Clark County

____________No comment on this project ______X_____Proposal supported as written

AGENCY COMMENTS:

NRS – Nevada Revised Statutes
NAC – Nevada Administrative Code

General:

Compliance with Nevada water law is required.

All waters of the State belong to the public and may be appropriated for beneficial use pursuant to the provisions of NRS Chapters 533 and 534 and not otherwise.

Water shall not be used from any source unless the use of that water is authorized through a permit issued by the State Engineer. For underground sources, certain uses of water may be authorized through the issuance of a waiver pursuant to NRS Chapter 534 and NAC Chapter 534.

Water for Construction Projects

Ensure that any water used on a project for any manner of use shall be provided by an established utility or under permit or temporary change application or waiver issued by the State Engineer's Office with a manner of use acceptable for suggested project's water needs.

From: Shanan Anderson <moapacultural@moapabandofpaiutes.org>
Sent: Friday, August 6, 2021 3:29 PM
To: OPPENBORN, TOD GS-12 USAF ACC 99 CES/CENPP <tod.oppenborn@us.af.mil>
Subject: [Non-DoD Source] Moapa Band of Paiutes Tribal Consultation

Mr. Tod Oppenborn

Thank you for contacting the Moapa Band of Paiutes. Our office received your letter dated, July 23, 2021, concerning: **Additions of F-35 Joint Strike Fighters, Addition of F-22A Raptors and Contract Adversary Air**. At this time the Moapa Band of Paiutes do not have any questions concerning this proposed project.

As for properties of cultural significance in the areas of proposed action: We believe the FULL area where the Nellis Air Force base is located, falls under our properties of religious and cultural significance for our **Landscape, Soundscape, Airflows and Waterflows**.
You are at the foothills of our sacred mountains *Tasiakaiv*, on the foothills where the APE is, we call *Tianitiwipi*, a place we gathered to socialize, sing songs, feast and come together as *Nuwu* (The People). Our sacred song cave in near you, we call *Puahring'Kaiv*.

The aircrafts that you have flying in and out of the base, fly within our songscape and *puah*, that come from these mountains and landscape where your proposed project is located.

Let it be known that this project and any in the future on NAFB that deal with the air, water, land and sound, will in some way effect a part of who we are as *Nuwu* and our *puah* source within all the elements mentioned.

As always, please keep us informed if there are any adverse effects or finding of cultural significance if you plan for any necessary construction, demolition, renovation, to support any aircrafts, in the projected APE.

Thank you for contacting the Moapa Band of Paiutes.

Shanandoah Anderson
Cultural mananger

THE GREAT SEAL OF THE MOAPA BAND OF PAIUTES 1875

Moapa Band of Paiutes
Po Box 340 Moapa, NV 89025
Office: 702-865-2787 Ext. 91
Cell: 702-371-7802

1

NEVADA
STATE HISTORIC
PRESERVATION OFFICE

STATE OF NEVADA
Department of Conservation and Natural Resources

Steve Sisolak, *Governor*
Bradley Crowell, *Director*
Rebecca L. Palmer, *Administrator, SHPO*

July 26, 2021

Lonny P. Baker, GS-14, DAF
Deputy Commander
99th Civil Engineer Squadron
Nellis Airforce Base
6020 Beale Ave.
Nellis AFB, NV 89191

RE: Proposal to Add Seventeen F-35 Joint Striker Fighters, Three F-22 Raptors, and Contractor Owned Contractor Operated Adversary Air (COCO ADAIR) Aircraft at Nellis Airforce Base, Clark County, Nevada (SHPO UT 2021-6793; 28329)

Dear Deputy Commander Baker:

The Nevada State Historic Preservation Office (SHPO) has reviewed the subject documents received June 28, 2021 in accordance with Section 106 of the National Historic Preservation Act (NRHA) of 1966, as amended.

The submitted documents include a digital draft Environmental Assessment (EA) compiled under the National Environmental Policy Act (NEPA). Is the United States Airforce – Nellis Airforce Base (USAF-NAFB) conducting its responsibilities under NEPA and the NHPA concurrently? Please notify the SHPO if Section 106 compliance will occur concurrently with NEPA and inform our office if the EA is determined the appropriate level of NEPA review for this project.

Please note that as of June 1, 2021 the SHPO office is fully open to the public and no longer accepts electronic submissions. As this submission only includes a digital CD and cover letter, please provide our office with the following hard copy materials (which can be taken from the NEPA EA document) as it is the responsibility of the federal agency to provide these hard copy materials to the SHPO for Section 106 review:

- maps of the project area
- Area of Potential Effect map(s)
- maps of the identified historic properties within the project
- project description(s)
- description of cultural resources within the project area
- summary and justification for all potential effects the proposed project may introduce to historic properties

For all future submission to this office please review the SHPO Coversheet instructions and complete the SHPO Coversheet Checklist found at our website (https://shpo.nv.gov/welcome-to-review-and-compliance/compliance-forms).

901 S. Stewart Street, Suite 5004 ✦ Carson City, Nevada 89701 ✦ Phone: 775.684.3448 Fax: 775.684.3442
www.shpo.nv.gov

Comment on the Draft EA from NV SHPO - page 1

Project Description
Based on the draft EA, the USAF-NAFB proposes to add seventeen F-35 Joint Striker Fighters, three F-22 Raptors, and Contractor Owned Contractor Operated Adversary Air (COCO ADAIR) aircraft. The proposed action requires infrastructure, facilities, airfield operations, training activities, and an additional 750 personnel. The project would require construction, demolition, and renovation of buildings to support additional aircraft and personnel. USAF-NAFB states that two facility options for the additional F-35 aircraft are dependent upon funding and no construction or renovation is needed to support the F-22 or COCO ADAIR components of the project.

Proposed demolition and/or renovation of buildings are listed below:

Building No.	Proposed Action
Building 245	Renovations
Building 246	Renovations – interior walls and 4,000 sq. ft. addition
Building 248	Renovations – interior walls
Building 250	Demolition and construction of new 164,000 sq. ft. 6-bay hanger at location
Building 257	Renovation – 4,000 sq. ft. addition
Building 262	Renovation – 4,000 sq. ft. addition
Building 278	Renovation – 4,000 sq. ft. addition and repairs
Building 283	Renovation – interior repairs
Building 423	Renovation – 4,000 sq. ft. annex addition
Building 451	Draft EA does not include description of this building – see below
Building 878	Renovation – 4,000 sq. ft. addition with repairs and alterations
Building 1770	Draft EA does not include description of this building – see below
Building 10301	Renovations – interior only

Area of Potential Effect (APE)
USAF-NAFB has determined the physical APE includes the area where construction will occur and a 50-meter buffer surrounding the construction areas. USAF-NAFB has determined the visual, auditory, atmospheric, and cumulative APE includes 800 meters surrounding the physical APE. USAF-NAFB also states that the special use airspace is included, but this is outside of NAFB. The SHPO **agrees** with the APE as defined.

Identification and Evaluation of Historic Properties
USAF-NAFB has identified ten architectural resources within the physical APE, six National Register of Historic Places (NRHP) eligible buildings within the visual, auditory, atmospheric, and cumulative APE, and ten NRHP listed properties within the special use airspace outside of NAFB. The table on the following page details the properties within the physical, visual, auditory, atmospheric, and cumulative APE.

28329

Lonny P. Baker
July 26, 2021
Page 3 of 4

SHPO Resource No.	Building No.	Status
B13553	Building 245	Not Eligible – SHPO concurred January 5, 2015
B15946	Building 246	Not Eligible – SHPO concurred June 2, 2020
B15947	Building 248*	Not Eligible – SHPO concurred June 19, 2020
B8624	Building 250	Not Eligible – SHPO concurred December 1, 2006
	Building 257	Constructed in 2018 and not considered a historic resource
B15949	Building 262*	Not Eligible – SHPO concurred June 19, 2020
B15953	Building 278*	Not Eligible – SHPO concurred June 19, 2020
B13559	Building 283	Not Eligible – SHPO concurred January 5, 2015
B15967	Building 423*	Not Eligible – SHPO concurred June 19, 2020
B15974	Building 451*	Not Eligible – SHPO concurred June 19, 2020
B16050	Building 878	Not Eligible – SHPO concurred June 19, 2020
	Building 1770	Constructed in 2009 and not considered a historic resource
B16124	Building 10301	Not Eligible – SHPO concurred June 19, 2020

The cover letter states SHPO consultation is ongoing for the buildings noted in the table above marked with an asterisk. Please note those resources above have received SHPO NRHP eligibility concurrence in correspondence dated June 19, 2020 (SHPO UT 2018-5168; 24132).

For all future submissions to this office, please ensure that the SHPO resource number (structure/S#, building/B#, or Trinomial) is included in the cover letter and any additional materials.

The table below lists the properties that are listed on the NRHP under the special use airspace outside of NAFB.

NRHP No.	Property Name
02000820	1938 Lincoln County Courthouse
78001727	Lincoln County Courthouse
84002074	Brown's Hall – Thompson's Opera House
0800510	Smith Hotel – Cornelius Hotel
74001146	Caliente Railroad Depot
75001106	Hidden Forest Cabin
74001143	Mormon Well Spring
72000765	Bristol Wells Townsite
94000183	Sedan Crater
01000863	Old Spanish Trail – Mormon Road

No archaeological resources were identified within the APE and the SHPO recognizes that the potential to recover intact buried archaeological materials is minimal.

28329

Lonny P. Baker
July 26, 2021
Page **4** of **4**

Native American Consultation
The SHPO notes that consultation with the affected Native American tribes has been initiated per 36 CFR § 800.3(f)(2). If this consultation results in the identification of properties of religious and/or cultural significance that could be affected by the undertaking, USAF-NAFB must consult with this office concerning the NRHP eligibility of historic properties and possible effects of the undertaking per 36 CFR § 800.4(c) and 36 CFR § 800.4(d). In order to maintain a complete and accurate record of consultation, please forward a summary of the results of this consultation for the SHPO administrative record.

Consultation with Interested Parties
As the USAF-NAFB submitted the draft EA, the SHPO infers that public consultation will be completed under NEPA. Please provide our office with a summary of public consultation for the SHPO administrative record.

Finding of Effect
The SHPO **concurs** with USAF-NAFB's finding of **No Adverse Effect** to historic properties for the purposes of this undertaking.

Unanticipated Discovery
If any buried and/or previously unidentified resources are located during the project activities, the SHPO recommends that all work in the vicinity of the find cease and this office be contacted for additional consultation per 36 CFR § 800.13(b)(3).

Should you have questions concerning this correspondence, please contact SHPO staff archaeologist Ashley Wiley at (775) 684-3450 or email awiley@shpo.nv.gov.

Sincerely,

Rebecca L. Palmer
State Historic Preservation Officer

28329

APPENDIX C.
DETAILED FACILITY FIGURES

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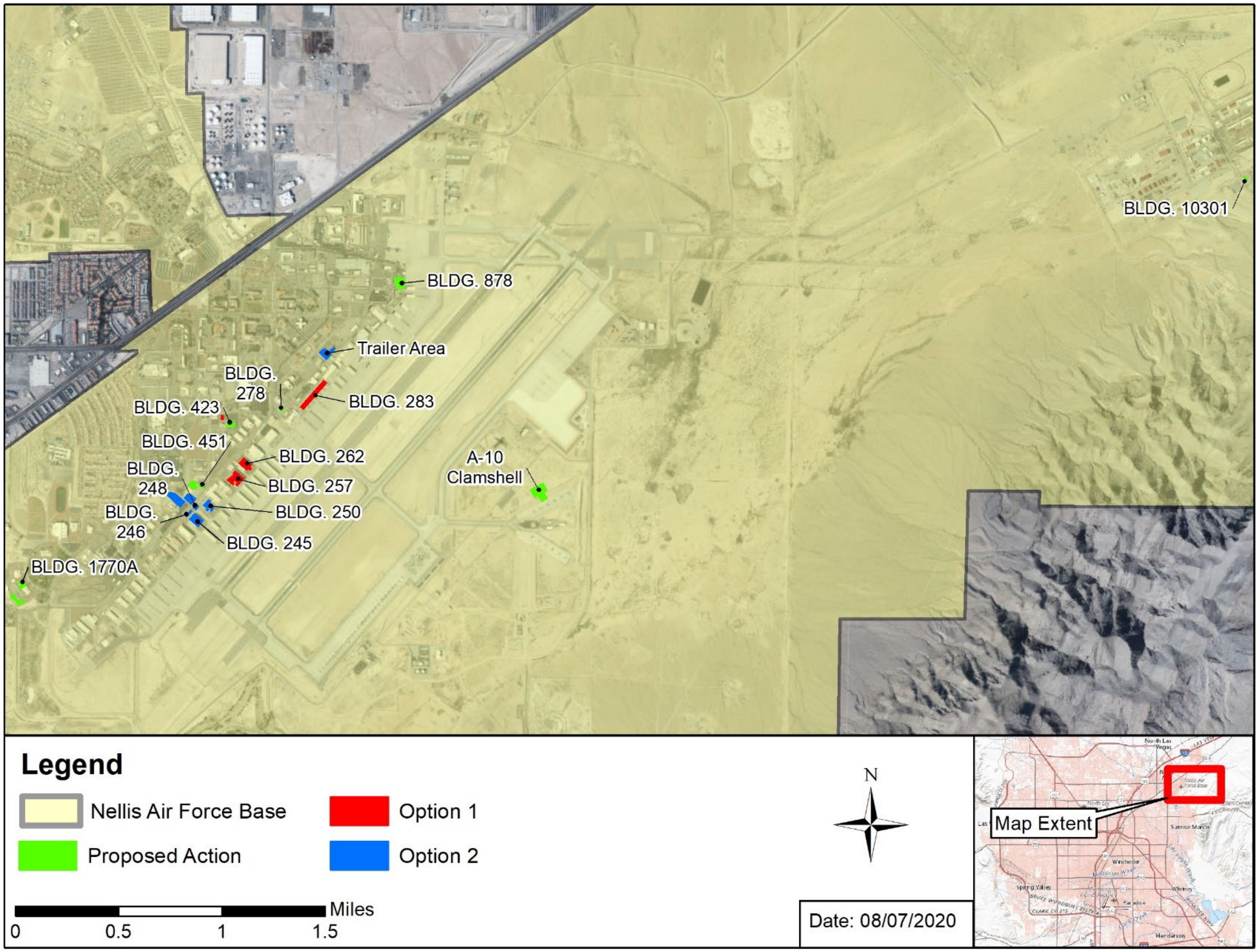

Figure C-1. Location of Facilities Proposed for Demolition/Renovation/Construction at Nellis Air Force Base under Options 1 and 2

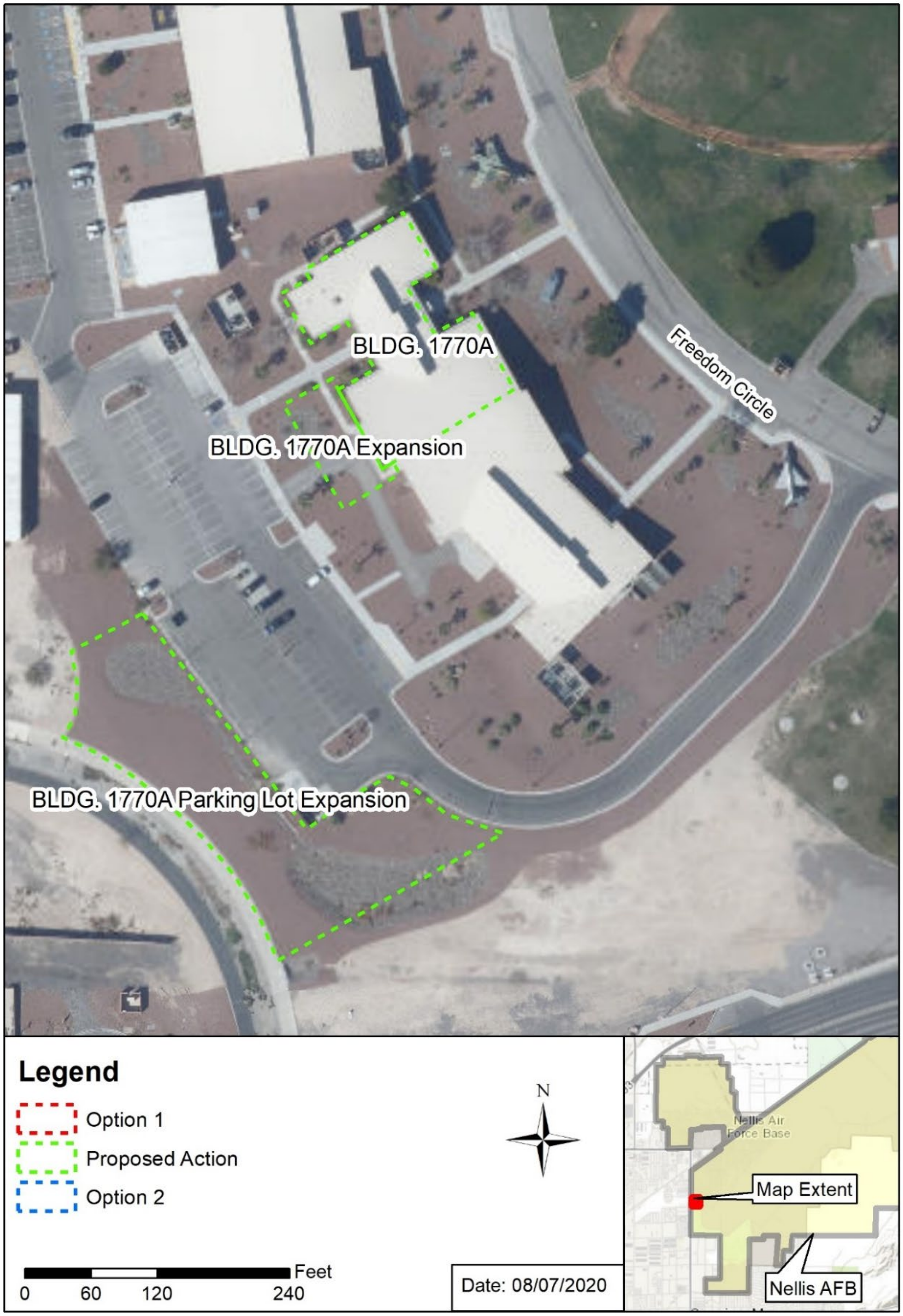

Figure C-2. Building 1770A Addition and Parking Lot

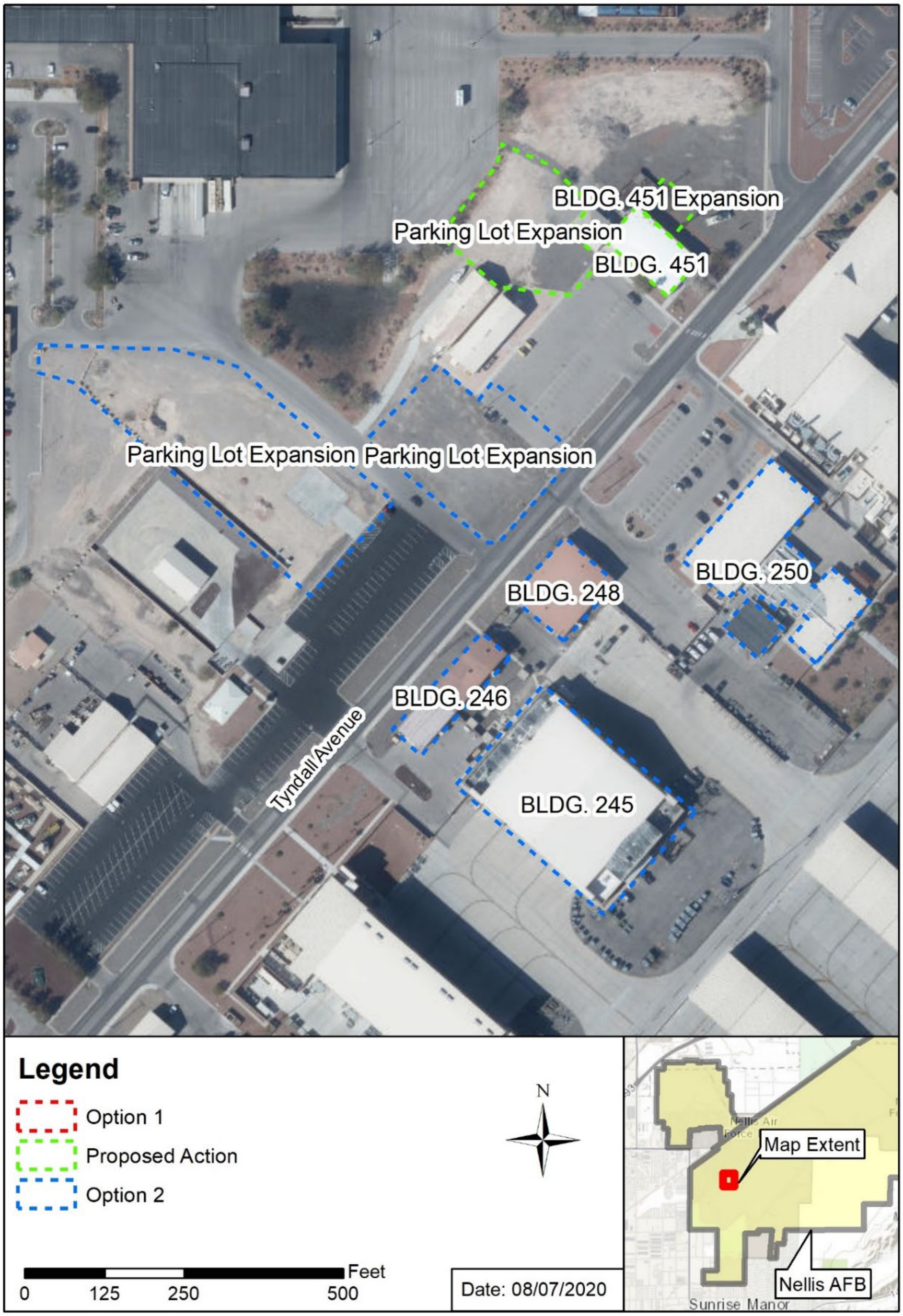

Figure C-3. Buildings 451, 250, 245, 246, 248

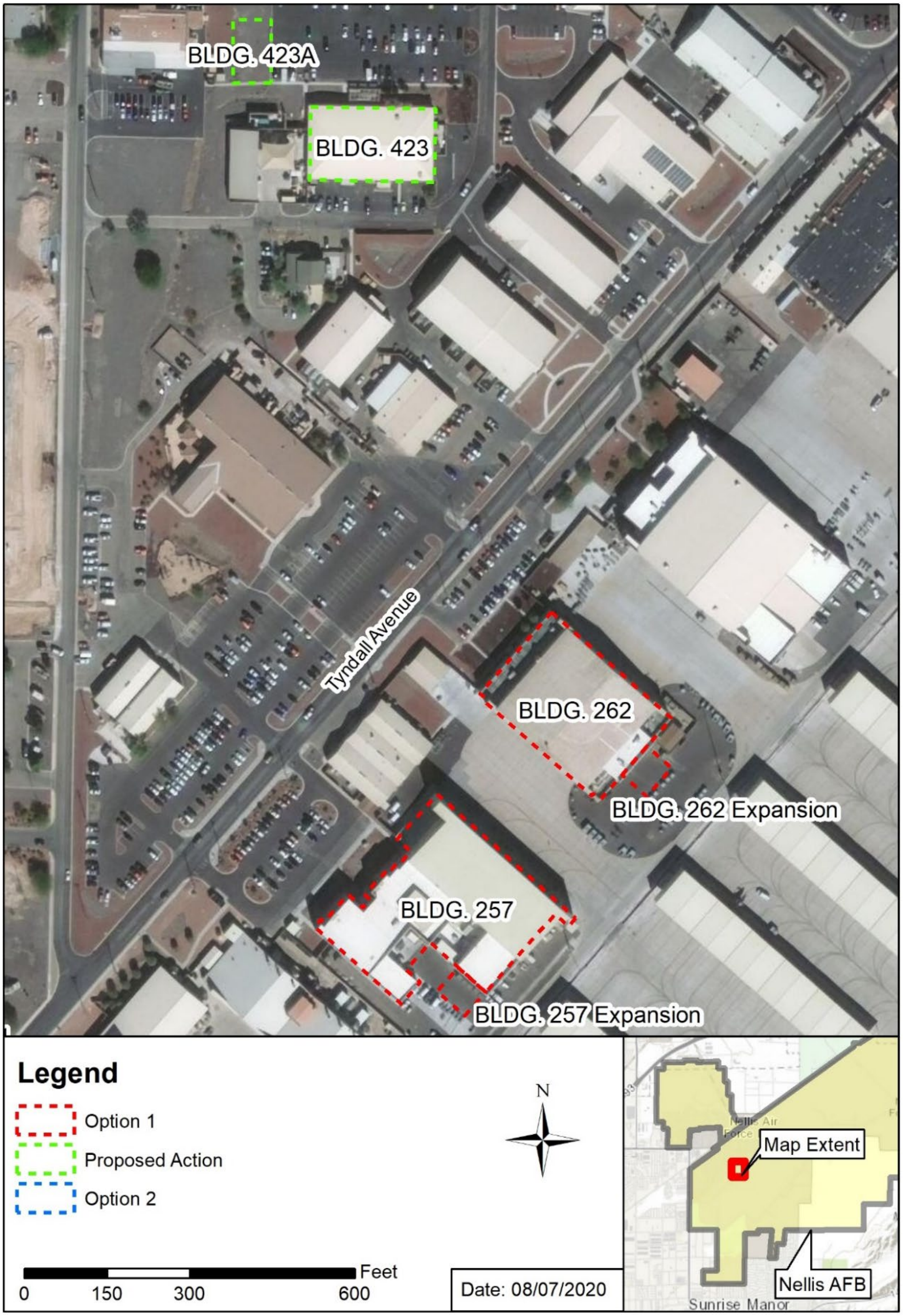

Figure C-4. Buildings 423, 262, and 257

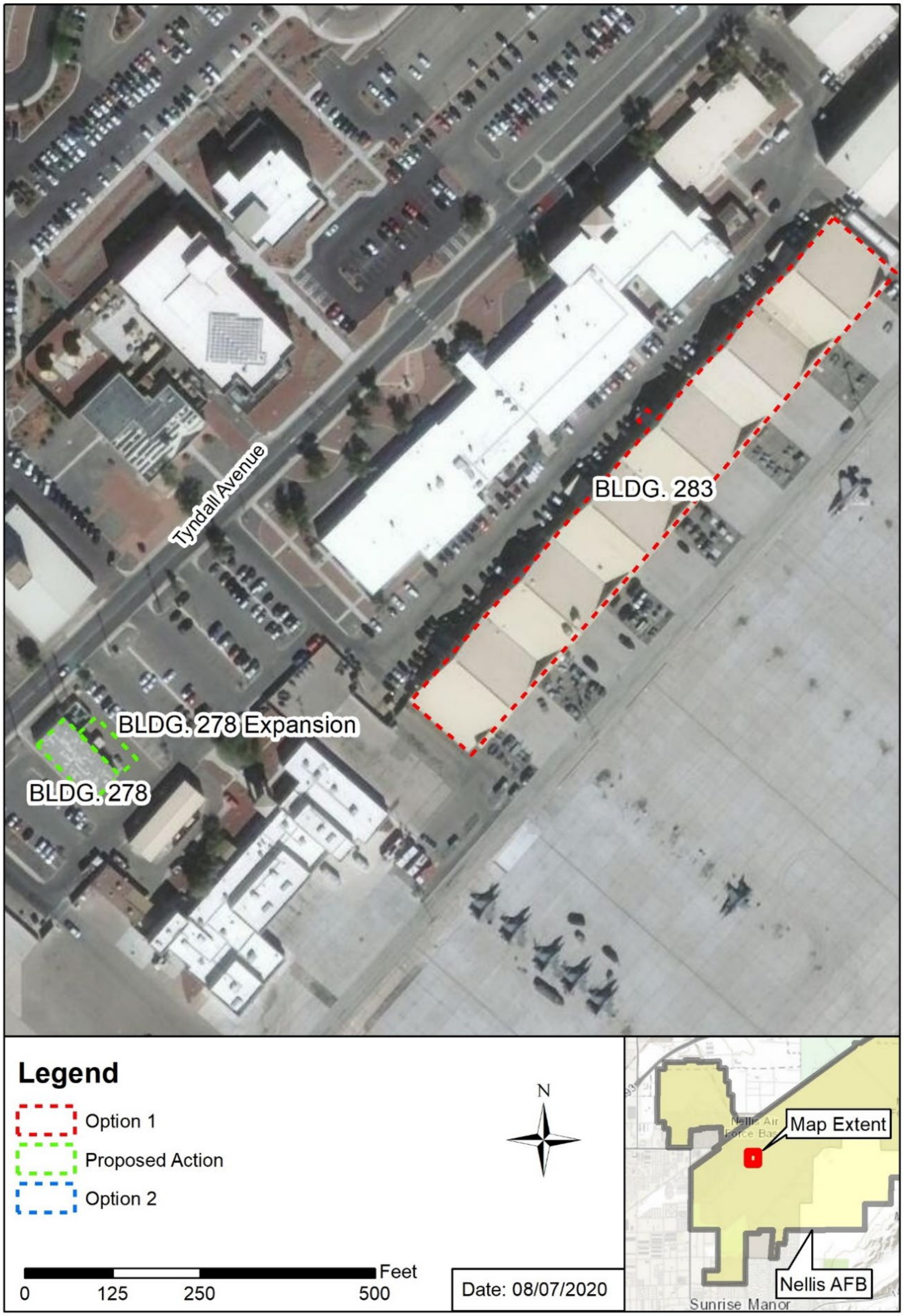

Figure C-5. Buildings 283 and 278

Figure C-6. Building 878

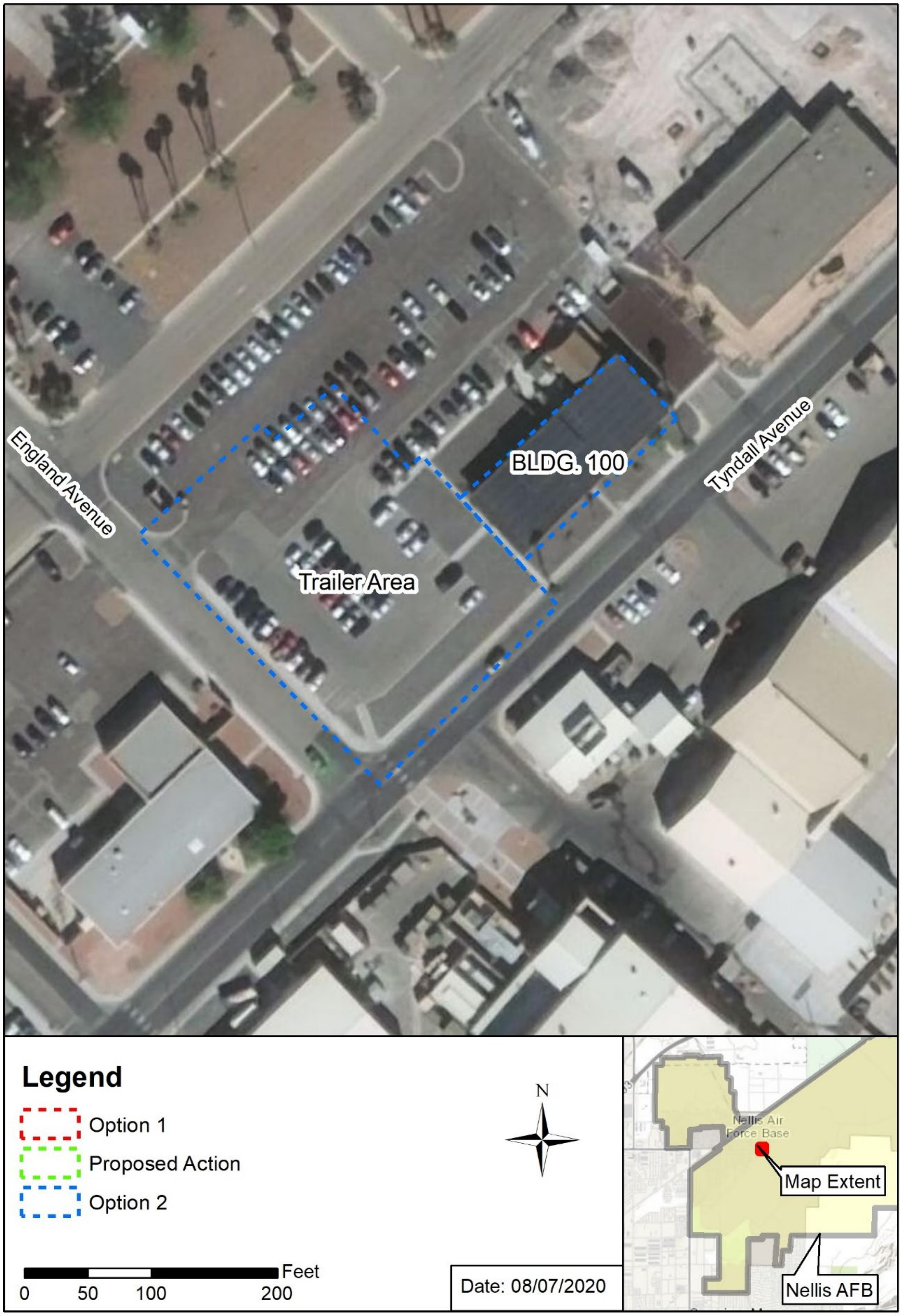

Figure C-7. Trailers Near Building 100

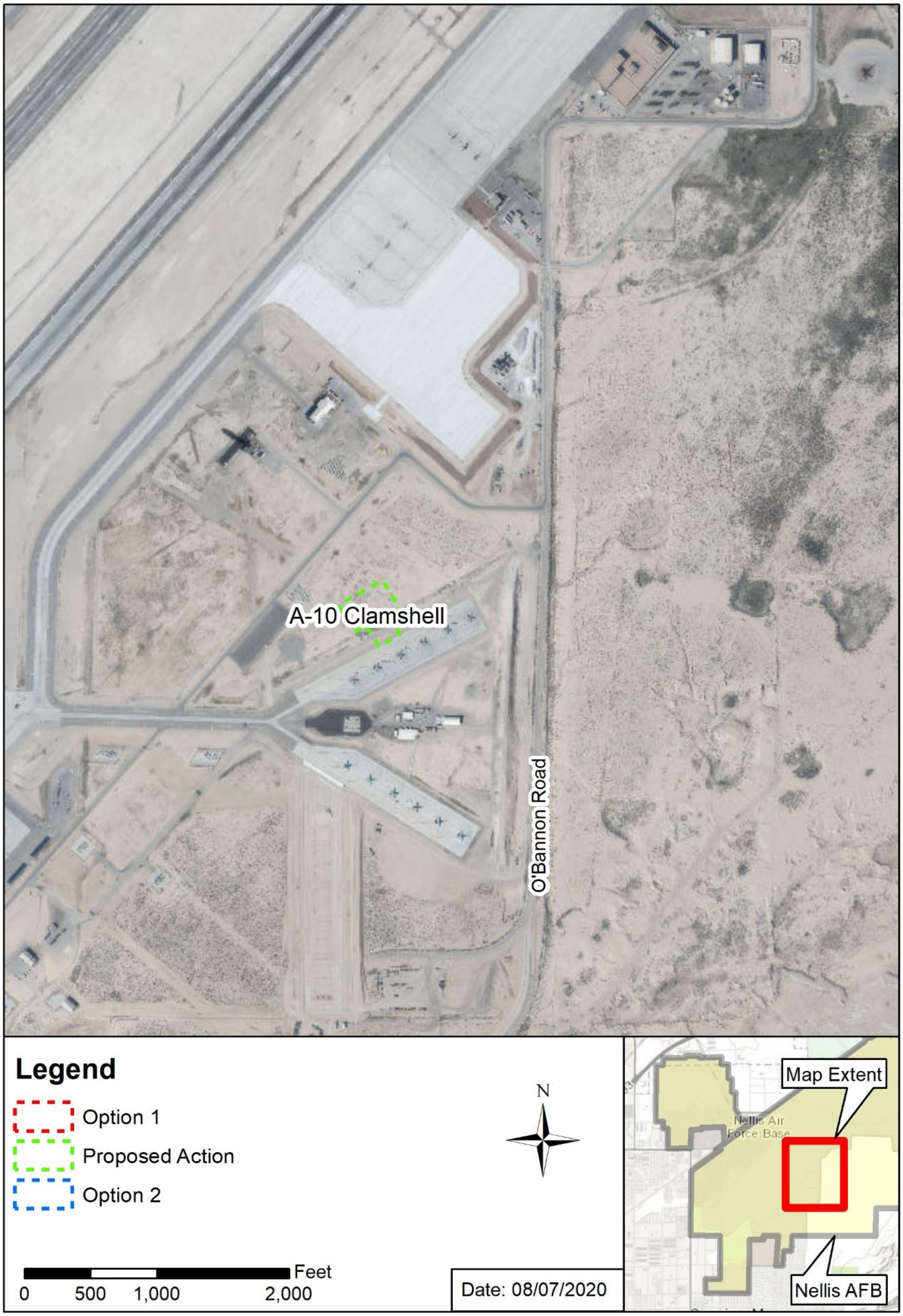

Figure C-8. A-10 Clamshell

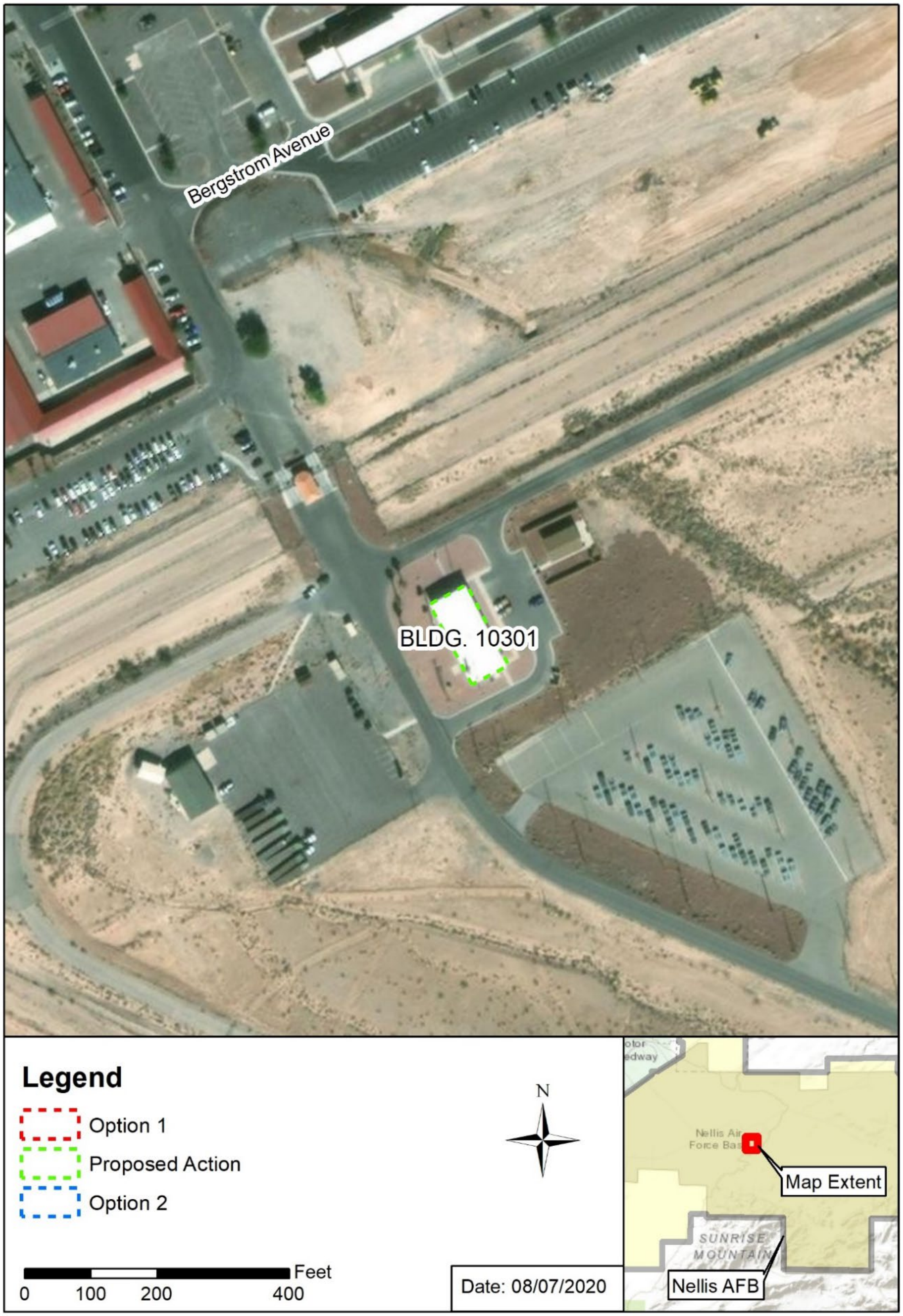

Figure C-9. Building 10301

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APPENDIX D.
SOUND, NOISE, AND POTENTIAL EFFECTS

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Table of Contents

List of Figures

List of Tables

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Appendix D-1
Sound, Noise, and Potential Effects

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D.1.1 Introduction

This appendix discusses sound and noise and their potential effects on the human and natural environment. Section C.1.2 provides an overview of the basics of sound and noise. Section C.1.3 defines and describes the different metrics used to describe noise. The largest section, Section C.1.4, reviews the potential effects of noise, focusing on effects on humans but also addressing effects on property values, structures, and animals. Section C.1.5 contains the list of references cited. Appendix D-2 contains data used in the noise modeling process. A number of noise metrics are defined and described in this appendix. Some metrics are included for the sake of completeness when discussing each metric and to provide a comparison of cumulative noise metrics.

D.1.2 Basics of Sound

D.1.2.1 Sound Waves and Decibels

Sound consists of minute vibrations in the air that travel through the air and are sensed by the human ear. **Figure D-1** is a sketch of sound waves from a tuning fork. The waves move outward as a series of crests where the air is compressed and troughs where the air is expanded. The height of the crests and the depth of the troughs are the amplitude or sound pressure of the wave. The pressure determines its energy or intensity. The number of crests or troughs that pass a given point each second is called the frequency of the sound wave.

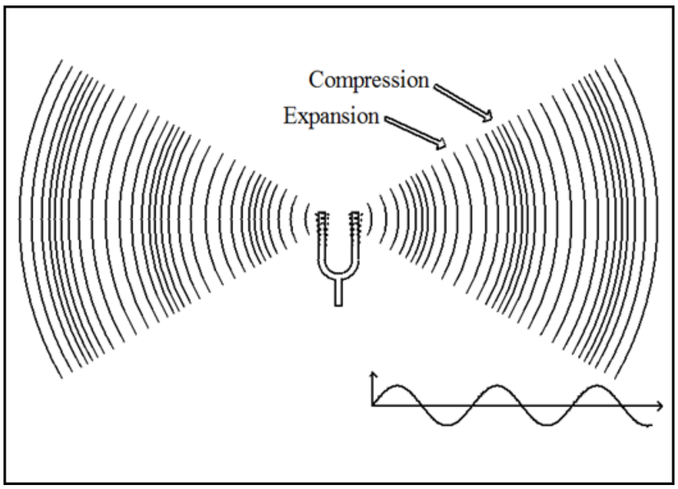


Figure D-1. Sound Waves from a Vibrating Tuning Fork.

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration.

- Intensity is a measure of the acoustic energy of the sound and is related to sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound.

- Frequency determines how the pitch of the sound is perceived. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.

- Duration or the length of time the sound can be detected.

The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because of this vast range, it is unwieldy to use a linear scale to represent the intensity of sound. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 and 140 dB are felt as pain (Berglund and Lindvall, 1995).

As shown on **Figure D-1**, the sound from a tuning fork spreads out uniformly as it travels from the source. The spreading causes the sound's intensity to decrease with increasing distance from the source. For a source such as an aircraft in flight, the sound level will decrease by about 6 dB for every doubling of the distance. For a busy highway, the sound level will decrease by 3 to 4.5 dB for every doubling of distance.

As sound travels from the source, it also is absorbed by the air. The amount of absorption depends on the frequency composition of the sound, the temperature, and the humidity conditions. Sound with high frequency content gets absorbed by the air more than sound with low frequency content. More sound is absorbed in colder and drier conditions than in hot and wet conditions. Sound is also affected by wind and temperature gradients, terrain (elevation and ground cover) and structures.

Because of the logarithmic nature of the decibel unit, sound levels cannot simply be added or subtracted and are somewhat cumbersome to handle mathematically; however, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

60 dB + 60 dB = 63 dB, and
80 dB + 80 dB = 83 dB.

Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

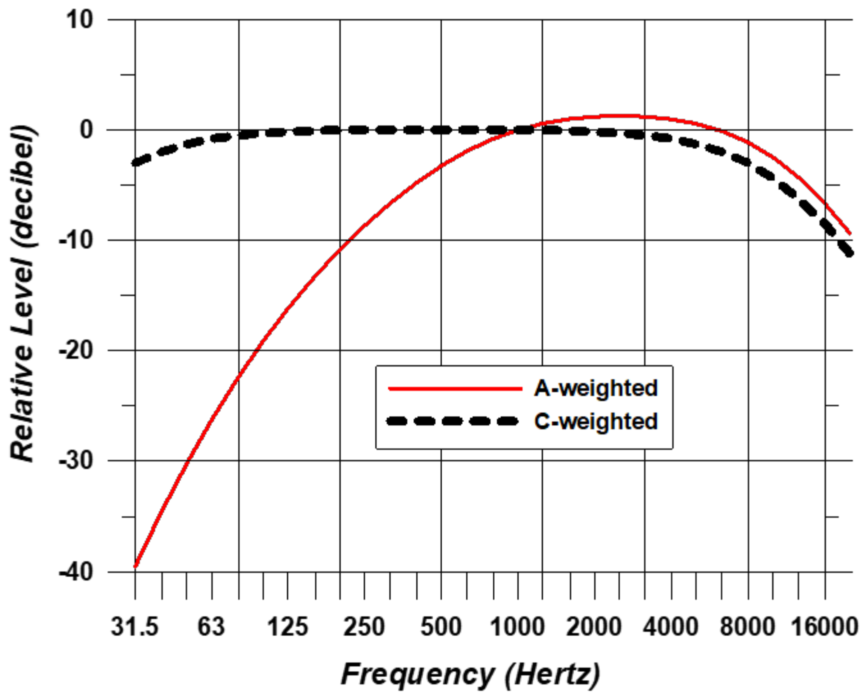
Because the addition of sound levels is different than that of ordinary numbers, this process is often referred to as "decibel addition."

The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness (Berglaund and Lindvall, 1995). This relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness because the human ear does not respond linearly.

Sound frequency is measured in terms of cycles per second or hertz (Hz). The normal ear of a young person can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. As we get older, we lose the ability to hear high frequency sounds. Not all sounds in this wide range of frequencies are heard equally. Human hearing is most sensitive to frequencies in the 1,000 to 4,000 Hz range. The notes on a piano range from just over 27 Hz to 4,186 Hz, with middle C equal to 261.6 Hz. Most sounds (including a single note on a piano) are not simple pure tones like the tuning fork on **Figure D-1**, but contain a mix, or spectrum, of many frequencies.

Sounds with different spectra are perceived differently even if the sound levels are the same. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. These two curves, shown on **Figure D-2**, are adequate to quantify most environmental noises. A-weighting puts emphasis on the 1,000 to 4,000 Hz range where human hearing is most sensitive.

Very loud or impulsive sounds, such as explosions or sonic booms, can sometimes be felt, and can cause secondary effects, such as shaking of a structure or rattling of windows. These types of sounds can add to annoyance and are best measured by C-weighted sound levels, denoted dBC. C-weighting is nearly flat throughout the audible frequency range and includes low frequencies that may not be heard but cause shaking or rattling. C-weighting approximates the human ear's sensitivity to higher intensity sounds.



Source: ANSI S1.4A -1985 "Specification of Sound Level Meters"

Figure D-2. Frequency Characteristics of A- and C-Weighting.

D.1.2.2 Sound Levels and Types of Sounds

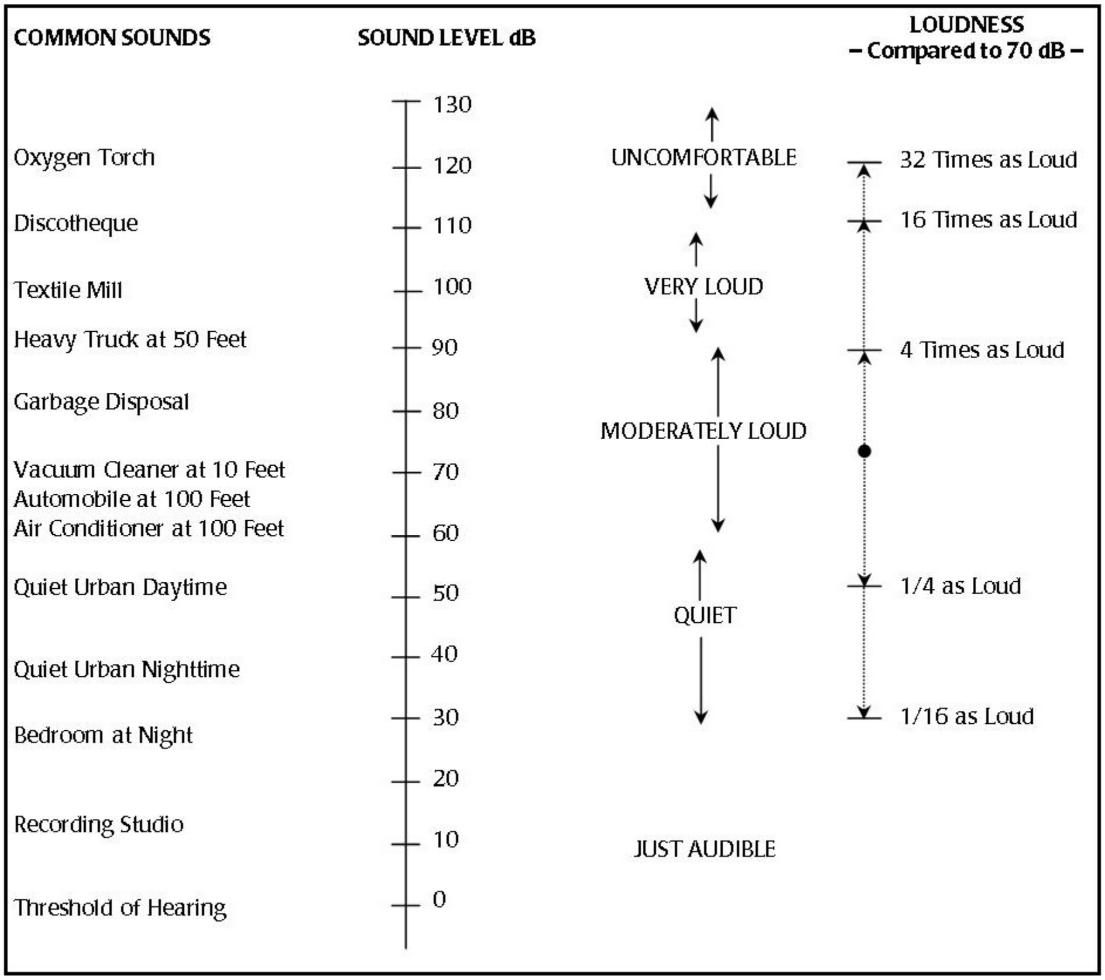
Most environmental sounds are measured using A-weighting. They're called A-weighted sound levels, and sometimes use the unit dBA or dB(A) rather than dB. When the use of A-weighting is understood, the term "A-weighted" is often omitted and the unit dB is used. Unless otherwise stated, dB units refer to A weighted sound levels.

Sound becomes noise when it is unwelcome and interferes with normal activities, such as sleep or conversation. Noise is unwanted sound. Noise can become an issue when its level exceeds the ambient or background sound level. Ambient noise in urban areas typically varies from 60 to 70 dB but can be as high as 80 dB in the center of a large city. Quiet suburban neighborhoods experience ambient noise levels around 45 to 50 dB (USEPA, 1978).

Figure D-3 shows A-weighted sound levels from common sources. Some sources, like the air conditioner and vacuum cleaner, are continuous sounds whose levels are constant for some time. Some sources, like the automobile and heavy truck, are the maximum sound during an intermittent event like a vehicle pass-by. Some sources like "urban daytime" and "urban nighttime" are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods. These are discussed in detail in **Section D.1.3**.

Aircraft noise consists of two major types of sound events: flight (including takeoffs, landings and flyovers), and stationary, such as engine maintenance run-ups. The former is intermittent and the latter primarily continuous. Noise from aircraft overflights typically occurs beneath main approach and departure paths, in local air traffic patterns around the airfield, and in areas near aircraft parking ramps and staging areas. As aircraft climb, the noise received on the ground drops to lower levels, eventually fading into the background or ambient levels.

Impulsive noises are generally short, loud events. Their single-event duration is usually less than 1 second. Examples of impulsive noises are small-arms gunfire, hammering, pile driving, metal impacts during rail-yard shunting operations, and riveting. Examples of high-energy impulsive sounds are quarry/mining explosions, sonic booms, demolition, and industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams (American National Standards Institute [ANSI], 1996).



Source: FICON, 1992

Figure D-3. Typical A-weighted Sound Levels of Common Sounds.

D.1.3 Noise Metrics

Noise metrics quantify sounds so they can be compared with each other, and with their effects, in a standard way. There are a number of metrics that can be used to describe a range of situations, from a particular individual event to the cumulative effect of all noise events over a long time. This section describes the metrics relevant to environmental noise analysis.

D.1.3.1 Single Events

<u>Maximum Sound Level (Lmax)</u>

The highest A-weighted sound level measured during a single event in which the sound changes with time is called the maximum A-weighted sound level or Maximum Sound Level and is abbreviated L_{max}. The L_{max} is depicted for a sample event in **Figure D-4**.

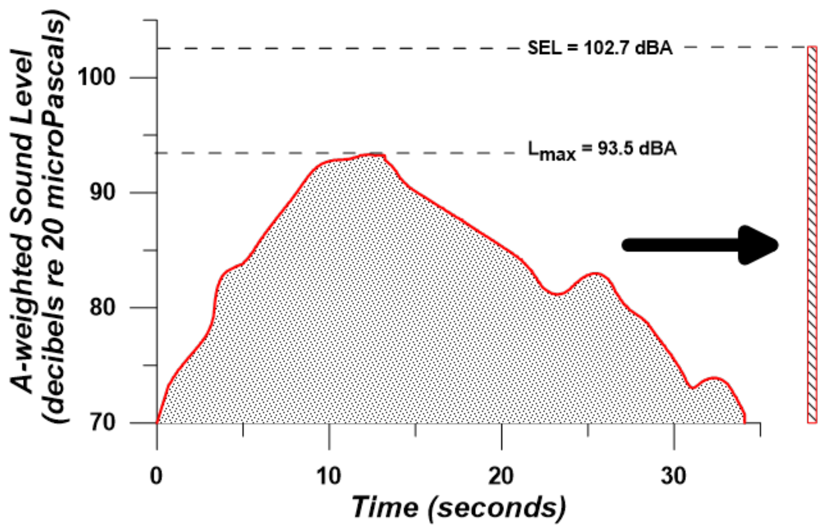
L_{max} is the maximum level that occurs over a fraction of a second. For aircraft noise, the "fraction of a second" is one-eighth of a second, denoted as "fast" response on a sound level measuring meter (ANSI, 1988). Slowly varying or steady sounds are generally measured over 1 second, denoted as "slow" response. L_{max} is important in judging if a noise event will interfere with conversation, television or radio listening, or other common activities. Although it provides some measure of the event, it does not fully describe the noise because it does not account for how long the sound is heard.

Peak Sound Pressure Level (L_{pk})

The Peak Sound Pressure Level is the highest instantaneous level measured by a sound level measurement meter. L_{pk} is typically measured every 20 microseconds, and usually based on unweighted or linear response of the meter. It is used to describe individual impulsive events such as blast noise. Because blast noise varies from shot to shot and varies with meteorological (weather) conditions, the US Department of Defense (DOD) usually characterizes L_{pk} by the metric PK 15(met), which is the L_{pk} exceeded 15 percent of the time. The "met" notation refers to the metric accounting for varied meteorological or weather conditions.

Sound Exposure Level (SEL)

Sound Exposure Level combines both the intensity of a sound and its duration. For an aircraft flyover, SEL includes the maximum and all lower noise levels produced as part of the overflight, together with how long each part lasts. It represents the total sound energy in the event. **Figure C-4** indicates the SEL for an example event, representing it as if all the sound energy were contained within 1 second.



Source: Wyle Laboratories

Figure D-4. Example Time History of Aircraft Noise Flyover.

Aircraft noise varies with time. During an aircraft overflight, noise starts at the background level, rises to a maximum level as the aircraft flies close to the observer, then returns to the background as the aircraft recedes into the distance. This is sketched on **Figure D-4**, which also indicates two metrics (L_{max} and SEL) that are described above. Over time there can be a number of events, not all the same. Because aircraft noise events last more than a few seconds, the SEL value is larger than L_{max}. It does not directly represent the sound level heard at any given time, but rather the entire event. SEL provides a much better measure of aircraft flyover noise exposure than L_{max} alone.

Overpressure

The single event metrics commonly used to assess supersonic noise are overpressure in psf and C-Weighted Sound Exposure Level (CSEL). Overpressure is the peak pressure at any location within the sonic boom footprint.

C-Weighted Sound Exposure Level

CSEL is SEL computed with C frequency weighting, which is similar to A-Weighting (discussed in **Section D.1.2.2**) except that C-weighting places more emphasis on low frequencies below 1,000 hertz.

D.1.3.2 Cumulative Events

Equivalent Sound Level (Leq)

Equivalent Sound Level is a “cumulative” metric that combines a series of noise events over a period of time. L_{eq} is the sound level that represents the decibel average SEL of all sounds in the time period. Just as SEL has proven to be a good measure of a single event, L_{eq} has proven to be a good measure of series of events during a given time period.

The time period of an L_{eq} measurement is usually related to some activity, and is given along with the value. The time period is often shown in parenthesis (e.g., L_{eq}[24] for 24 hours). The L_{eq} from 7:00 a.m. to 3:00 p.m. may give exposure of noise for a school day.

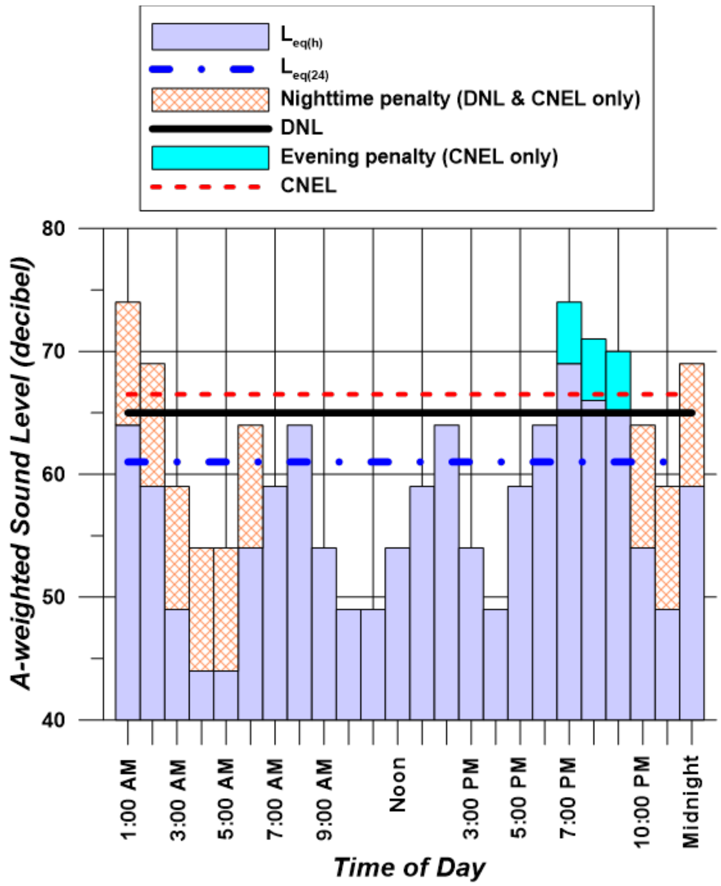
Figure D-5 gives an example of L_{eq}(24) using notional hourly average noise levels (L_{eq}(h)) for each hour of the day as an example. The L_{eq}(24) for this example is 61 dB.

Day-Night Average Sound Level (DNL or Ldn) and Community Noise Equivalent Level (CNEL)

Day-Night Average Sound Level is a cumulative metric that accounts for all noise events in a 24-hour period. However, unlike L_{eq}(24), DNL contains a nighttime noise penalty. To account for our increased sensitivity to noise at night, DNL applies a 10-dB penalty to events during the nighttime period, defined as 10:00 p.m. to 7:00 a.m. The notations DNL and L_{dn} are both used for Day-Night Average Sound Level and are equivalent.

CNEL is a variation of DNL specified by law in California (California Code of Regulations Title 21, Public Works) (Wyle Laboratories, 1970). CNEL has the 10-dB nighttime penalty for events between 10:00 p.m. and 7:00 a.m. but also includes a 4.8-dB penalty for events during the evening period of 7:00 p.m. to 10:00 p.m. The evening penalty in CNEL accounts for the added intrusiveness of sounds during that period. For airports and military airfields, DNL and CNEL represent the average sound level for annual average daily aircraft events.

Figure D-5 gives an example of DNL and CNEL using notional hourly average noise levels (L_{eq}[h]) for each hour of the day as an example. Note the L_{eq}(h) for the hours between 10:00 p.m. and 7:00 a.m. have a 10-dB penalty assigned. For CNEL the hours between 7p.m. and 10 p.m. have a 4.8-dB penalty assigned. The DNL for this example is 65 dB. The CNEL for this example is 66 dB.



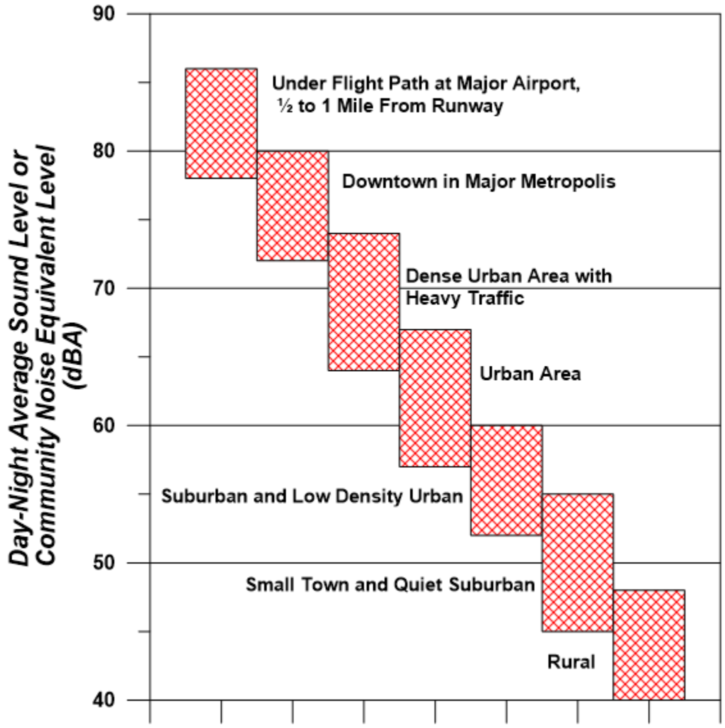
Source: Wyle Laboratories

Figure D-5. Example of L_{eq}(24), DNL and CNEL Computed from Hourly Equivalent Sound Levels.

Figure D-6 shows the ranges of DNL or CNEL that occur in various types of communities. Under a flight path at a major airport the DNL may exceed 80 dB, while rural areas may experience DNL less than 45 dB. The decibel summation nature of these metrics causes the noise levels of the loudest events to control the 24-hour average. As a simple example, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

A feature of the DNL metric is that a given DNL value could result from a very few noisy events or a large number of quieter events. For example, one overflight at 90 dB creates the same DNL as 10 overflights at 80 dB.

DNL or CNEL does not represent a level heard at any given time but represent long-term exposure. Scientific studies have found good correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (Schultz, 1978; USEPA, 1978).



Source: DOD 1978.

Figure D-6. Typical DNL or CNEL Ranges in Various Types of Communities.

Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) and Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$)

Military aircraft utilizing Special Use Airspace (SUA) such as Military Training Routes (MTRs), Military Operations Areas (MOAs), and Restricted Areas/Ranges generate a noise environment that is somewhat different from that around airfields. Rather than regularly occurring operations like at airfields, activity in SUAs is highly sporadic. It is often seasonal, ranging from 10 per hour to less than 1 per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset, with rates of up to 150 dB per second.

The cumulative daily noise metric devised to account for the “surprise” effect of the sudden onset of aircraft noise events on humans and the sporadic nature of SUA activity is the Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}). Onset rates between 15 and 150 dB per second require an adjustment of 0 to 11 dB to the event’s SEL, while onset rates below 15 dB per second require no adjustment to the event’s SEL (Stusnick et al., 1992). The term ‘monthly’ in L_{dnmr} refers to the noise assessment being conducted for the month with the most operations or sorties -- the so-called busiest month.

In California, a variant of the L_{dnmr} includes a penalty for evening operations (7:00 p.m. to 10:00 p.m.) and is denoted $CNEL_{mr}$.

D.1.3.3 Supplemental Metrics

Number-of-Events Above (NA) a Threshold Level (L)

The Number-of-Events Above (NA) metric gives the total number of events that exceed a noise level threshold (L) during a specified period of time. Combined with the selected threshold, the metric is denoted NAL. The threshold can be either SEL or L_{max}, and it is important that this selection is shown in the nomenclature. When labeling a contour line or point of interest (POI), NAL is followed by the number of events in parentheses. For example, where 10 events exceed an SEL of 90 dB over a given period of time, the nomenclature would be NA90SEL(10). Similarly, for L_{max} it would be NA90L_{max}(10). The period of time can be an average 24-hour day, daytime, nighttime, school day, or any other time period appropriate to the nature and application of the analysis.

NA is a supplemental metric. It is not supported by the amount of science behind DNL/CNEL, but it is valuable in helping to describe noise to the community. A threshold level and metric are selected that best meet the need for each situation. An L_{max} threshold is normally selected to analyze speech interference, while an SEL threshold is normally selected for analysis of sleep disturbance.

The NA metric is the only supplemental metric that combines single-event noise levels with the number of aircraft operations. In essence, it answers the question of how many aircraft (or range of aircraft) fly over a given location or area at or above a selected threshold noise level.

Time Above (TA) a Specified Level (L)

The Time Above (TA) metric is the total time, in minutes, that the A-weighted noise level is at or above a threshold. Combined with the threshold level (L), it is denoted TAL. TA can be calculated over a full 24-hour annual average day, the 15-hour daytime and 9-hour nighttime periods, a school day, or any other time period of interest, provided there is operational data for that time.

TA is a supplemental metric, used to help understand noise exposure. It is useful for describing the noise environment in schools, particularly when assessing classroom or other noise sensitive areas for various scenarios. TA can be shown as contours on a map similar to the way DNL contours are drawn.

TA helps describe the noise exposure of an individual event or many events occurring over a given time period. When computed for a full day, the TA can be compared alongside the DNL in order to determine the sound levels and total duration of events that contribute to the DNL. TA analysis is usually conducted along with NA analysis, so the results show not only how many events occur, but also the total duration of those events above the threshold.

D.1.4 Noise Effects

Noise is of concern because of potential adverse effects. The following subsections describe how noise can affect communities and the environment, and how those effects are quantified. The specific topics discussed are

annoyance;
speech interference;
sleep disturbance;
noise effects on children; and
noise effects on domestic animals and wildlife.

D.1.4.1 Annoyance

With the introduction of jet aircraft in the 1950s, it became clear that aircraft noise annoyed people and was a significant problem around airports. Early studies, such as those of Rosenblith et al. (1953) and Stevens et al. (1953) showed that effects depended on the quality of the sound, its level, and the number of flights. Over the next 20 years considerable research was performed refining this understanding and setting guidelines for noise exposure. In the early 1970s, the USEPA published its “Levels Document” (USEPA, 1974) that reviewed the factors that affected communities. DNL (still known as Ldn at the time) was identified as an appropriate noise metric, and threshold criteria were recommended.

Threshold criteria for annoyance were identified from social surveys, where people exposed to noise were asked how noise affects them. Surveys provide direct real-world data on how noise affects actual residents.

Surveys in the early years had a range of designs and formats and needed some interpretation to find common ground. In 1978, Schultz showed that the common ground was the number of people “highly annoyed,” defined as the upper 28 percent range of whatever response scale a survey used (Schultz, 1978). With that definition, he was able to show a remarkable consistency among the majority of the surveys for which data were available. **Figure D-7** shows the result of his study relating DNL to individual annoyance measured by percent highly annoyed (%HA).

Schultz's original synthesis included 161 data points. **Figure D-8** shows a comparison of the predicted response of the Schultz data set with an expanded set of 400 data points collected through 1989 (Finegold et al., 1994). The new form is the preferred form in the United States, endorsed by the Federal Interagency Committee on Aviation Noise (FICAN, 1997). Other forms have been proposed, such as that of Fidell and Silvati (2004) but have not gained widespread acceptance.

When the goodness of fit of the Schultz curve is examined, the correlation between groups of people is high, in the range of 85 to 90 percent; however, the correlation between individuals is much lower, at 50 percent or less. This is not surprising, given the personal differences between individuals. The surveys underlying the Schultz curve include results that show that annoyance to noise is also affected by nonacoustic factors. Newman and Beattie (1985) divided the nonacoustic factors into the emotional and physical variables shown in **Table D-1**.

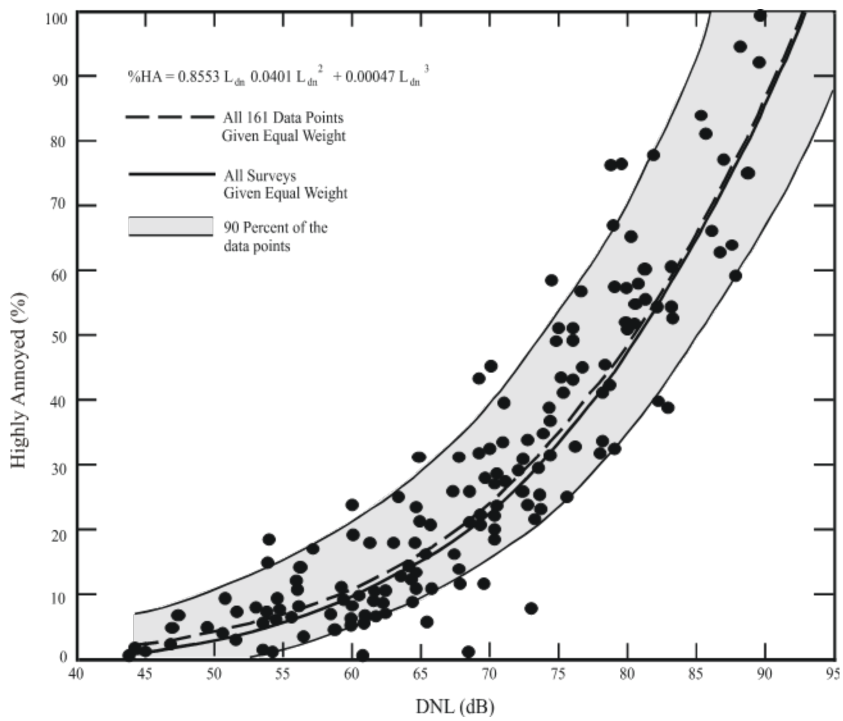


Figure D-7. Schultz Curve Relating Noise Annoyance to DNL (Schultz, 1978).

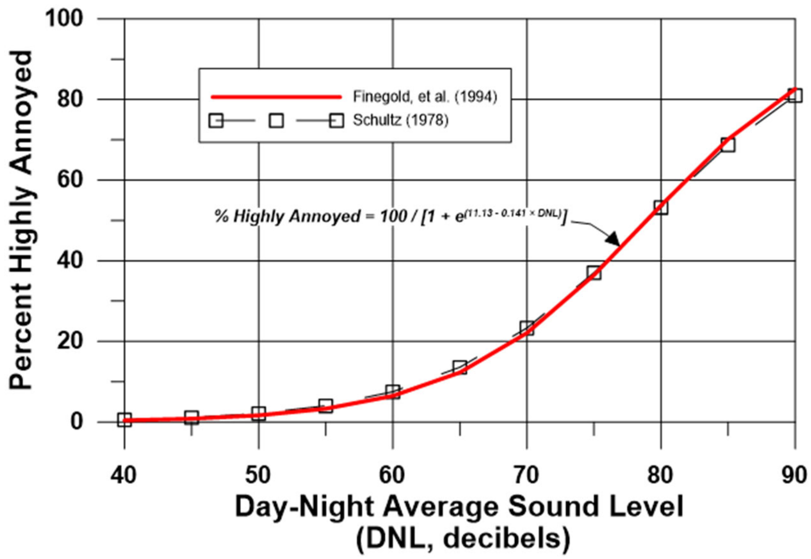


Figure D-8. Response of Communities to Noise; Comparison of Original Schultz (1978) with Finegold et al (1994).

Table D-1
Nonacoustic Variables Influencing Aircraft Noise Annoyance

Emotional Variables
Feeling about the necessity or preventability of the noise
Judgement of the importance and value of the activity that is producing the noise
Activity at the time an individual hears the noise
Attitude about the environment
General sensitivity to noise
Belief about the effect of noise on health
Feeling of fear associated with the noise

Physical Variables
Type of neighborhood
Time of day
Season
Predictability of the noise
Control over the noise source
Length of time individual is exposed to a noise

Schreckenberg and Schuemer (2010) recently examined the importance of some of these factors on short term annoyance. Attitudinal factors were identified as having an effect on annoyance. In formal regression analysis, however, sound level (L_{eq}) was found to be more important than attitude. A series of studies at three European airports showed that less than 20 percent of the variance in annoyance can be explained by noise alone (Márki, 2013).

A recent study by Plotkin et al. (2011) examined updating DNL to account for these factors. It was concluded that the data requirements for a general analysis were much greater than are available from most existing studies. It was noted that the most significant issue with DNL is that it is not readily understood by the public, and that supplemental metrics such as TA and NA were valuable in addressing attitude when communicating noise analysis to communities (DOD, 2009a).

A factor that is partially nonacoustic is the source of the noise. Miedema and Vos (1998) presented synthesis curves for the relationship between DNL and percentage “Annoyed” and percentage “Highly Annoyed” for three transportation noise sources. Different curves were found for aircraft, road traffic, and railway noise. **Table D-2** summarizes their results. Comparing the updated Schultz curve suggests that the percentage of people highly annoyed by aircraft noise may be higher than previously thought. Miedema and Oudshoorn (2001) authors supplemented that investigation with further derivation of percent of population highly annoyed as a function of DNL along with the corresponding 95 percent confidence intervals with similar results.

Table D-2
Percent Highly Annoyed for Different Transportation Noise Sources

DNL (dB)	Percent Highly Annoyed (%HA)			
	Miedema and Vos			Schultz Combined
	Air	Road	Rail	
55	12	7	4	3
60	19	12	7	6
65	28	18	11	12
70	37	29	16	22
75	48	40	22	36

Source: Miedema and Vos, 1998

As noted by the World Health Organization (WHO), however, even though aircraft noise seems to produce a stronger annoyance response than road traffic, caution should be exercised when interpreting synthesized data from different studies (WHO, 1999).

Consistent with WHO's recommendations, the Federal Interagency Committee on Noise (FICON, 1992) considered the Schultz curve to be the best source of dose information to predict community response to noise but recommended further research to investigate the differences in perception of noise from different sources.

The International Standard (ISO, 2016) contains the concept of Community Tolerance Level (L_{ct}) as the day-night sound level at which 50 percent of the people in a particular community are predicted to be highly annoyed by noise exposure. L_{ct} accounts for differences between sources and/or communities when predicting the percentage highly annoyed by noise exposure. ISO also recommended a change to the adjustment range used when comparing aircraft noise to road noise. The previous edition suggested a +3 dB to +6 dB for aircraft noise relative to road noise while the latest editions recommends an adjustment range of +5 dB to +8 dB. This adjustment range allows DNL to be correlated to consistent annoyance rates when originating from different noise sources (i.e., road traffic, aircraft, or railroad). This change to the adjustment range would increase the calculated percent highly annoyed at 65 dB DNL by approximately 2 to 5 percent greater than the previous ISO definition. **Figure D-9** depicts the estimated percentage of people highly annoyed for a given DNL using both the ISO 1996-1 estimation and the older FICON 1992 method. The results suggest that the percentage of people highly annoyed may be greater than previous thought and reliance solely on DNL for impact analysis may be insufficient if utilizing the FICON 1992 method.

The US Federal Aviation Administration (FAA) is currently conducting a major airport community noise survey at approximately 20 US airports in order to update the relationship between aircraft noise and annoyance. Results from this study are expected to be released in 2019.

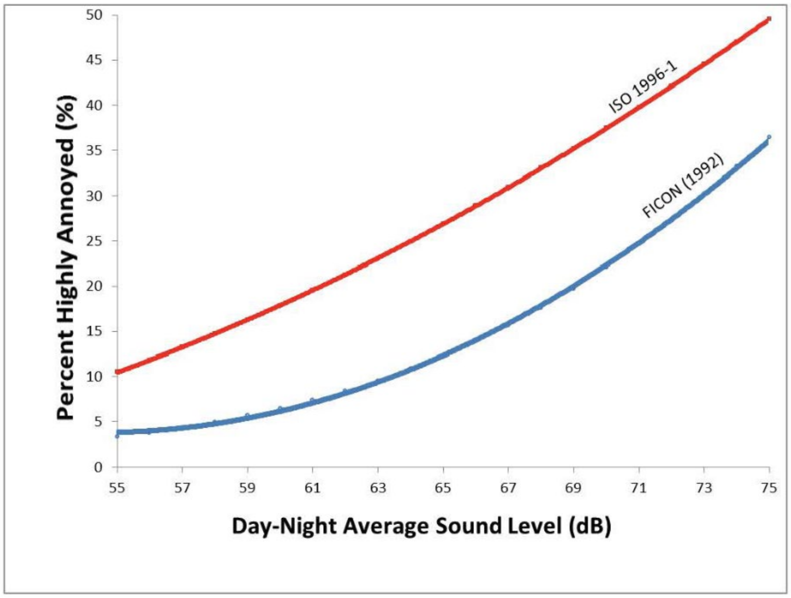


Figure D-9. Percent Highly Annoyed Comparison of ISO 1996-1 to FICON (1992).

D.1.4.2 Speech Interference

Speech interference from noise is a primary cause of annoyance for communities. Disruption of routine activities such as radio or television listening, telephone use, or conversation leads to frustration and annoyance. The quality of speech communication is important in classrooms and offices. In the workplace, speech interference from noise can cause fatigue and vocal strain in those who attempt to talk over the noise. In schools it can impair learning.

There are two measures of speech comprehension:

- Word Intelligibility - the percent of words spoken and understood. This might be important for students in the lower grades who are learning the English language, and particularly for students who have English as a Second Language.

- Sentence Intelligibility – the percent of sentences spoken and understood. This might be important for high-school students and adults who are familiar with the language, and who do not necessarily have to understand each word in order to understand sentences.

US Federal Criteria for Interior Noise

In 1974, the USEPA identified a goal of an indoor $L_{eq}(24)$ of 45 dB to minimize speech interference based on sentence intelligibility and the presence of steady noise (USEPA, 1974). **Figure D-10** shows the effect of steady indoor background sound levels on sentence intelligibility. For an average adult with normal hearing and fluency in the language, steady background indoor sound levels of less than 45 dB L_{eq} are expected to allow 100 percent sentence intelligibility.

The curve on **Figure D-10** shows 99 percent intelligibility at L_{eq} below 54 dB, and less than 10 percent above 73 dB. Recalling that L_{eq} is dominated by louder noise events, the USEPA $L_{eq}(24)$ goal of 45 dB generally ensures that sentence intelligibility will be high most of the time.

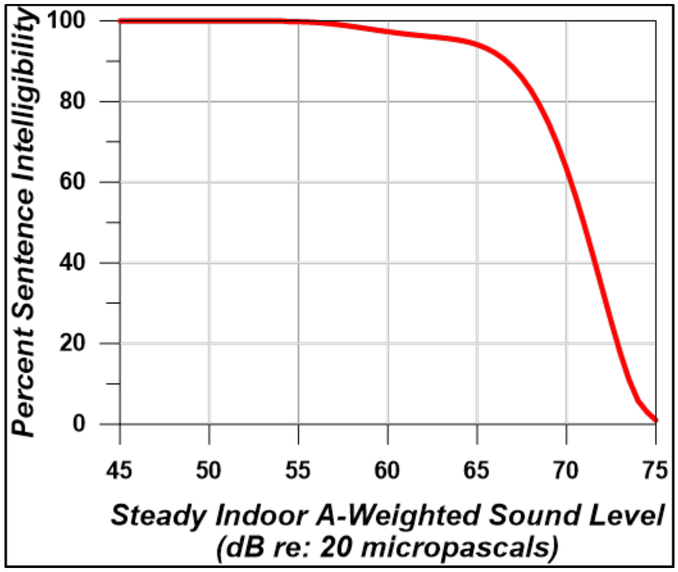


Figure D-10. Speech Intelligibility Curve (digitized from USEPA, 1974).

Classroom Criteria

For teachers to be understood, their regular voice must be clear and uninterrupted. Background noise has to be below the teacher's voice level. Intermittent noise events that momentarily drown out the teacher's voice need to be kept to a minimum. It is therefore important to evaluate the steady background level, the level of voice communication, and the single-event level due to aircraft overflights that might interfere with speech.

Lazarus (1990) found that for listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., a comparison of the level of the sound to the level of background noise) is in the range of 15 to 18 dB. The initial ANSI classroom noise standard (ANSI, 2002) and American Speech-Language-Hearing Association (ASLHA, 2005) guidelines concur, recommending at least a 15-dB signal-to-noise ratio in classrooms. If the teacher's voice level is at least 50 dB, the background noise level must not exceed an average of 35 dB. The National Research Council of Canada (Bradley, 1993) and WHO (1999) agree with this criterion for background noise.

For eligibility for noise insulation funding, the FAA guidelines state that the design objective for a classroom environment is 45 dB L_{eq} during normal school hours (FAA, 1985).

Most aircraft noise is not continuous. It consists of individual events like the one sketched on **Figure D-4**. Since speech interference in the presence of aircraft noise is caused by individual aircraft flyover events, a time-averaged metric alone, such as L_{eq}, is not necessarily appropriate. In addition to the background level criteria described above, single-event criteria that account for those noisy events are also needed.

A 1984 study by Wyle for the Port Authority of New York and New Jersey recommended using Speech Interference Level (SIL) for classroom noise criteria (Sharp and Plotkin, 1984). SIL is based on the maximum sound levels in the frequency range that most affects speech communication (500-2,000 Hz). The study identified an SIL of 45 dB as the goal. This would provide 90 percent word intelligibility for the short time periods during aircraft overflights. While SIL is technically the best metric for speech interference, it can be approximated by an L_{max} value. An SIL of 45 dB is equivalent to an A weighted L_{max} of 50 dB for aircraft noise (Wesler, 1986).

Lind et al. (1998) also concluded that an L_{max} criterion of 50 dB would result in 90 percent word intelligibility. Bradley (1985) recommends SEL as a better indicator. His work indicates that 95 percent word intelligibility would be achieved when indoor SEL did not exceed 60 dB. For typical flyover noise, this corresponds to an L_{max} of 50 dB. While WHO (1999) only specifies a background L_{max} criterion, they also note the SIL frequencies and that interference can begin at around 50 dB.

The United Kingdom Department for Education and Skills (UKDfES) established in its classroom acoustics guide a 30-minute time-averaged metric of L_{eq}(30min) for background levels and the metric of LA1,30min for intermittent noises, at thresholds of 30 to 35 dB and 55 dB, respectively. LA1,30min represents the A-weighted sound level that is exceeded 1 percent of the time (in this case, during a 30-minute teaching session) and is generally equivalent to the L_{max} metric (UKDfES, 2003).

Table D-3 summarizes the criteria discussed. Other than the FAA (1985) 45 dB L_{max} criterion, they are consistent with a limit on indoor background noise of 35 to 40 dB L_{eq} and a single event limit of 50 dB L_{max}. It should be noted that these limits were set based on students with normal hearing and no special needs. At-risk students may be adversely affected at lower sound levels.

Table D-3
Indoor Noise Level Criteria Based on Speech Intelligibility

Source	Metric/Level (dB)	Effects and Notes
US FAA (1985)	$L_{eq(during\ school\ hours)}$ = 45 dB	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used.
Lind et al. (1998), Sharp and Plotkin (1984), Wesler (1986)	L_{max} = 50 dB / SIL 45	Single event level permissible in the classroom.
WHO (1999)	L_{eq} = 35 dB L_{max} = 50 dB	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB.
US ANSI (2010)	L_{eq} = 35 dB, based on Room Volume (e.g., cubic feet)	Acceptable background level for continuous and intermittent noise.
UK DFES (2003)	$L_{eq(30min)}$ = 30-35 dB L_{max} = 55 dB	Minimum acceptable in classroom and most other learning environs.

D.1.4.3 Sleep Disturbance

Sleep disturbance is a major concern for communities exposed to aircraft noise at night. A number of studies have attempted to quantify the effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies. Emphasis is on studies that have influenced US federal noise policy. The studies have been separated into two groups:

1) Initial studies performed in the 1960s and 1970s, where the research was focused on sleep observations performed under laboratory conditions.
2) Later studies performed in the 1990s up to the present, where the research was focused on field observations.

Initial Studies

The relation between noise and sleep disturbance is complex and not fully understood. The disturbance depends not only on the depth of sleep and the noise level, but also on the nonacoustic factors cited for annoyance. The easiest effect to measure is the number of arousals or awakenings from noise events. Much of the literature has therefore focused on predicting the percentage of the population that will be awakened at various noise levels.

FICON's 1992 review of airport noise issues (FICON, 1992) included an overview of relevant research conducted through the 1970s. Literature reviews and analyses were conducted from 1978 through 1989 using existing data (Griefahn, 1978; Lukas, 1978; Pearsons et. al., 1989). Because of large variability in the data, FICON did not endorse the reliability of those results.

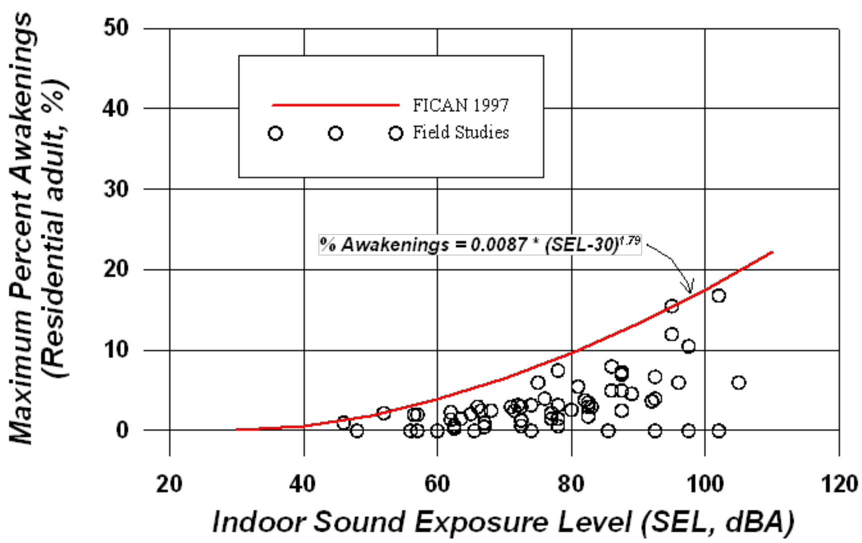
FICON did, however, recommend an interim dose-response curve, awaiting future research. That curve predicted the percent of the population expected to be awakened as a function of the exposure to SEL. This curve was based on research conducted for the US Air Force (Finegold et al., 1994). The data included most of the research performed up to that point and predicted a 10 percent probability of awakening when exposed to an interior SEL of 58 dB. The data used to derive this curve were primarily from controlled laboratory studies.

Recent Sleep Disturbance Research – Field and Laboratory Studies

It was noted that early sleep laboratory studies did not account for some important factors. These included habituation to the laboratory, previous exposure to noise, and awakenings from noise other than aircraft. In the early 1990s, field studies in people's homes were conducted to validate the earlier laboratory work conducted in the 1960s and 1970s. The field studies of the 1990s (e.g., Horne et al., 1994) found that 80-90 percent of sleep disturbances were not related to outdoor noise events, but rather to indoor noises and nonnoise factors. The results showed that, in real life conditions, there was less of an effect of noise on sleep than had been previously reported from laboratory studies. Laboratory sleep studies tend to show more sleep disturbance than field studies because people who sleep in their own homes are used to their environment and, therefore, do not wake up as easily (FICAN, 1997).

FICAN

Based on this new information, in 1997 FICAN recommended a dose-response curve to use instead of the earlier 1992 FICON curve (FICAN, 1997). **Figure D-11** shows FICAN's curve, the red line, which is based on the results of three field studies shown in the figure (Ollerhead et al., 1992; Fidell et al., 1994; Fidell et al., 1995a, 1995b), along with the data from six previous field studies.



Source: FICAN 1997

Figure D-11. FICAN 1997 Recommended Sleep Disturbance Dose-Response Relationship.

The 1997 FICAN curve represents the upper envelope of the latest field data. It predicts the maximum percent awakened for a given residential population. According to this curve, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB. An indoor SEL of 58 dB is equivalent to an outdoor SEL of about 83 dB, with the windows closed (73 dB with windows open).

Number of Events and Awakenings

It is reasonable to expect that sleep disturbance is affected by the number of events. The German Aerospace Center (DLR Laboratory) conducted an extensive study focused on the effects of nighttime aircraft noise on sleep and related factors (Basner et al., 2004). The DLR Laboratory study was one of the largest studies to examine the link between aircraft noise and sleep disturbance. It involved both laboratory and in-home field research phases. The DLR Laboratory investigators developed a dose-response curve that predicts the number of aircraft events at various values of L_{max} expected to produce one additional awakening over the course of a night. The dose-effect curve was based on the relationships found in the field studies.

Later studies by DLR Laboratory conducted in the laboratory comparing the probability of awakenings from different modes of transportation showed that aircraft noise lead to significantly lower awakening probabilities than either road or rail noise (Basner et al., 2011). Furthermore, it was noted that the probability of awakening, per noise event, decreased as the number of noise events increased. The authors concluded that by far the majority of awakenings from noise events merely replaced awakenings that would have occurred spontaneously anyway.

A different approach was taken by an ANSI standards committee (ANSI, 2008). The committee used the average of the data shown on **Figure D-11** rather than the upper envelope, to predict average awakening from one event. Probability theory is then used to project the awakening from multiple noise events.

Currently, there are no established criteria for evaluating sleep disturbance from aircraft noise, although recent studies have suggested a benchmark of an outdoor SEL of 90 dB as an appropriate tentative criterion when comparing the effects of different operational alternatives. The corresponding indoor SEL would be approximately 25 dB lower (at 65 dB) with doors and windows closed, and approximately 15 dB lower (at 75 dB) with doors or windows open. According to the ANSI (2008) standard, the probability of awakening from a single aircraft event at this level is between 1 and 2 percent for people habituated to the noise sleeping in bedrooms with windows closed, and 2 to 3 percent with windows open. The probability of the exposed population awakening at least once from multiple aircraft events at noise levels of 90 dB SEL is **shown in Table D-4.**

Table D-4
Probability of Awakening from NA90SEL

Number of Aircraft Events at 90 dB SEL for Average 9-Hour Night	Minimum Probability of Awakening at Least Once	
	Windows Closed	Windows Open
1	1%	2%
3	4%	6%
5	7%	10%
9 (1 per hour)	12%	18%
18 (2 per hour)	22%	33%
27 (3 per hour)	32%	45%

Source: DOD, 2009b

In December 2008, FICAN recommended the use of this new standard. FICAN also recognized that more research is underway by various organizations, and that work may result in changes to FICAN's position. Until that time, FICAN recommends the use of the ANSI (2008) standard (FICAN 2008).

Summary

Sleep disturbance research still lacks the details to accurately estimate the population awakened for a given noise exposure. The procedure described in the ANSI (2008) Standard and endorsed by FICAN is based on probability calculations that have not yet been scientifically validated. While this procedure certainly provides a much better method for evaluating sleep awakenings from multiple aircraft noise events, the estimated probability of awakenings can only be considered approximate.

D.1.4.4 Noise Effects on Children

Recent studies on school children indicate a potential link between aircraft noise and both reading comprehension and learning motivation. The effects may be small but may be of particular concern for children who are already scholastically challenged.

Effects on Learning and Cognitive Abilities

Early studies in several countries (Cohen et al., 1973, 1980, 1981; Bronzaft and McCarthy, 1975; Green et al., 1982; Evans et al., 1998; Haines et al., 2002; Lercher et al., 2003) showed lower reading scores for children living or attending school in noisy areas than for children away from those areas. In some studies noise exposed children were less likely to solve difficult puzzles or more likely to give up.

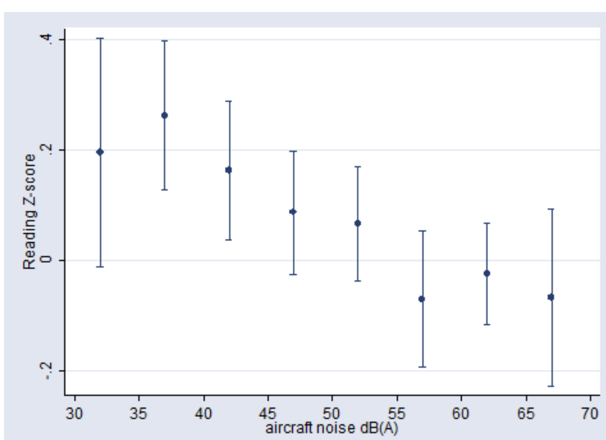
A longitudinal study reported by Evans et al. (1998), conducted prior to relocation of the old Munich airport in 1992, reported that high noise exposure was associated with deficits in long-term memory and reading comprehension in children with a mean age of 10.8 years. Two years after the closure of the airport, these deficits disappeared, indicating that noise effects on cognition may be reversible if exposure to the noise ceases. Most convincing was the finding that deficits in memory and reading comprehension developed over the 2-year follow-up for children who became newly noise exposed near the new airport; deficits were also observed in speech perception for the newly noise-exposed children.

More recently, the Road Traffic and Aircraft Noise Exposure and Children's Cognition and Health (RANCH) study (Stansfeld et al., 2005; Clark et al., 2005) compared the effect of aircraft and road traffic noise on over 2,000 children in three countries. This was the first study to derive exposure-effect associations for a range of cognitive and health effects and was the first to compare effects across countries.

The study found a linear relation between chronic aircraft noise exposure and impaired reading comprehension and recognition memory. No associations were found between chronic road traffic noise exposure and cognition. Conceptual recall and information recall surprisingly showed better performance in high road traffic noise areas. Neither aircraft noise nor road traffic noise affected attention or working memory.

Figure D-12 shows RANCH's result relating noise to reading comprehension. It shows that reading falls below average (a z-score of 0) at Leq greater than 55 dB. Because the relationship is linear, reducing exposure at any level should lead to improvements in reading comprehension.

An observation of the RANCH study was that children may be exposed to aircraft noise for many of their childhood years and the consequences of long-term noise exposure were unknown. A follow-up study of the children in the RANCH project is being analyzed to examine the long-term effects on children's reading comprehension (Clark et al., 2009). Preliminary analysis indicated a trend for reading comprehension to be poorer at 15 to 16 years of age for children who attended noise-exposed primary schools.



Sources: Stansfeld et al. 2005; Clark et al. 2005

Figure D-12. RANCH Study Reading Scores Varying with L_{eq}.

There was also a trend for reading comprehension to be poorer in aircraft noise exposed secondary schools. Significant differences in reading scores were found between primary school children in the two different classrooms at the same school (Bronzaft and McCarthy, 1975). One classroom was exposed to high levels of railway noise while the other classroom was quiet. The mean reading age of the noise-exposed children was 3 to 4 months behind that of the control children. Studies suggest that the evidence of the effects of noise on children's cognition has grown stronger over recent years, (Stansfeld and Clark, 2015), but further analysis adjusting for confounding factors is ongoing, and is needed to confirm these initial conclusions.

Studies identified a range of linguistic and cognitive factors to be responsible for children´s unique difficulties with speech perception in noise. Children have lower stored phonological knowledge to reconstruct degraded speech reducing the probability of successfully matching incomplete speech input when compared with adults. Additionally, young children are less able than older children and adults to make use of contextual cues to reconstruct noise-masked words presented in sentential context (Klatte et al., 2013).

FICAN funded a pilot study to assess the relationship between aircraft noise reduction and standardized test scores (Eagan et al., 2004; FICAN, 2007). The study evaluated whether abrupt aircraft noise reduction within classrooms, from either airport closure or sound insulation, was associated with improvements in test scores. Data were collected in 35 public schools near three airports in Illinois and Texas. The study used several noise metrics. These were, however, all computed indoor levels, which makes it hard to compare with the outdoor levels used in most other studies.

The FICAN study found a significant association between noise reduction and a decrease in failure rates for high school students, but not middle or elementary school students. There were some weaker associations between noise reduction and an increase in failure rates for middle and elementary schools. Overall the study found that the associations observed were similar for children with or without learning difficulties, and between verbal and math/science tests. As a pilot study, it was not expected to obtain final answers but provided useful indications (FICAN, 2007).

A recent study of the effect of aircraft noise on student learning (Sharp et al., 2013) examined student test scores at a total of 6,198 US elementary schools, 917 of which were exposed to aircraft noise at 46 airports with noise exposures exceeding 55 dB DNL. The study found small but statistically significant associations between airport noise and student mathematics and reading test scores, after taking demographic and school factors into account. Associations were also observed for ambient noise and total noise on student mathematics and reading test scores, suggesting that noise levels per se, as well as from aircraft, might play a role in student achievement.

As part of the Noise-Related Annoyance, Cognition and Health (NORAH) study conducted at Frankfurt airport (Shreckenberg and Guski, 2015), reading tests were conducted on 1,209 school children at 29 primary schools. It was found that there was a small decrease in reading performance that corresponded to a one-month reading delay; however, a recent study observing children at 11 schools surrounding Los Angeles International Airport (LAX) found that the majority of distractions to elementary age students were other students followed by themselves, which includes playing with various items and daydreaming. Less than 1 percent of distractions were caused by traffic noise.

While there are many factors that can contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led WHO and a North Atlantic Treaty Organization (NATO) working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (NATO, 2000; WHO, 1999). The awareness has also led to the classroom noise standard discussed earlier (ANSI, 2002).

D.1.4.5 Noise Effects on Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci et al. (1988), assert that the consequences that physiological effects may have on behavioral patterns are vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intraspecific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960s and 1970s on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Manci et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci et al., 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights.

Secondary effects may include nonauditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles, 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith et al., 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci et al., 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith et al., 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the Manci et al. (1988) literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci et al. (1988) reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci et al., 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottereau, 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service, 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock. This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci et al., 1988).

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied; therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the “startle” or “fright” response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

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Appendix D-2
Noise Modeling

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The following sections describe input data used in the noise modeling process. This data was developed in coordination with the Air Force Air Combat Command (ACC), Air Force Civil Engineer Center (AFCEC), and Nellis Air Force Base (Nellis) personnel.

D.2.1 Airfield Operations

The first step in estimating the effects of the addition of F-35s, the addition of F-22s, and the COCO ADAIR was to determine the baseline operations at Nellis AFB and associated airspace. Baseline conditions are taken from the 2017 Nellis AFB Air Installation Compatible Use Zone report. 24 TASS F-16C operational conditions from the 2017 TASS Beddown EA were validated and updated from interviews with a 24 TASS pilot and added to the baseline model. **Table D-5** contains the break out of baseline operations by aircraft type and organization. **Table D-6** contains the operations modeled for the baseline as well as proposed aircraft operations.

A SORTIE IS A SINGLE FLIGHT, BY ONE AIRCRAFT, FROM TAKEOFF TO LANDING, WHILE A SORTIE-OPERATION IS THE USE OF ONE AIRSPACE UNIT (E.G., MOA) BY ONE AIRCRAFT. THE NUMBER OF SORTIE-OPERATIONS IS USED TO QUANTIFY THE NUMBER OF USES BY AIRCRAFT AND TO ACCURATELY MEASURE POTENTIAL IMPACTS; E.G. NOISE, AIR QUALITY, AND SAFETY IMPACTS. A SORTIE-OPERATION IS NOT A MEASURE OF HOW LONG AN AIRCRAFT USES AN AIRSPACE UNIT, NOR DOES IT INDICATE THE NUMBER OF AIRCRAFT IN AN AIRSPACE UNIT DURING A GIVEN PERIOD; IT IS A MEASUREMENT FOR THE NUMBER OF TIMES A SINGLE AIRCRAFT USES A PARTICULAR AIRSPACE UNIT.

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Table D-5
Baseline Operations at Nellis

Category	Sub-cat	Squadron / Unit	Aircraft Type	Departure				Instrument Arrival			Break Arrival			Non-Break Arrival			SFO Arrival			SFO Pattern			Visual Pattern			Visual ReEntry Pattern			TOTAL		
				Day (0700-2200)	Night (2200-0700)	Total	% of deps in AB takeoff roll	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Based	53 TEG	422 TES	A-10C	884	27	911	n/a	-	-	-	707	-	707	177	27	204	-	-	-	-	-	-	-	-	-	-	-	-	1,768	54	1,822
			F-15C	547	-	547	50%	-	-	-	493	-	493	54	-	54	-	-	-	-	-	-	54	-	54	-	-	-	1,148	-	1,148
			F-15E	590	11	601	100%	-	11	11	530	-	530	60	-	60	-	-	-	-	-	-	62	-	62	-	-	-	1,242	22	1,264
			F-16C	504	59	563	80%	-	28	28	454	-	454	25	2	27	54	-	54	-	-	-	112	-	112	-	-	-	1,149	89	1,238
			F-22	592	-	592	0%	53	-	53	533	-	533	6	-	6	-	-	-	-	-	-	59	-	59	-	-	-	1,243	-	1,243
			F-35A	1,075	120	1,195	68% day; 15% night	75	120	195	914	-	914	11	-	11	75	-	75	4	-	4	8	-	8	8	-	8	2,170	240	2,410
	57 WING	16 WPS	F-16C	1,140	126	1,266	75%	57	81	138	1,006	-	1,006	54	46	100	22	-	22	24	-	24	120	-	120	6	-	6	2,429	253	2,682
		17 WPS	F-15E	902	9	911	100%	-	9	9	857	-	857	45	-	45	-	-	-	-	-	-	272	-	272	-	-	-	2,076	18	2,094
		34 WPS	HH-60G	324	-	324	n/a	-	-	-	-	-	-	203	121	324	-	-	-	-	-	-	174	-	174	-	-	-	701	121	822
		433 WPS	F-15C	767	88	855	40%	-	44	44	723	44	767	44	-	44	-	-	-	-	-	-	88	-	88	44	-	44	1,666	176	1,842
			F-22	504	88	592	0%	9	44	53	533	-	533	6	-	6	-	-	-	-	-	-	59	-	59	-	-	-	1,111	132	1,243
		64 AGRS	F-16C	2,478	103	2,581	74%	116	258	374	2,097	-	2,097	110	-	110	-	-	-	-	-	-	234	-	234	24	-	24	5,059	361	5,420
		65 AGRS	F-15C	-	-	-	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		66 WPS	A-10C	1,138	47	1,185	n/a	-	-	-	703	-	703	422	60	482	-	-	-	-	-	-	70	-	70	-	-	-	2,333	107	2,440
	24 TASS		F-16C	1,159	128	1,287	90%	58	82	140	1,024	-	1,024	55	46	101	22	-	22	26	-	26	122	-	122	6	-	6	2,472	256	2,728
	66 RQS		HH-60G	876	35	911	n/a	-	-	-	-	-	-	876	35	911	-	-	-	-	-	-	3,646	-	3,646	-	-	-	5,398	70	5,468
	88 TES		HH-60G	137	-	137	n/a	-	-	-	-	-	-	123	14	137	-	-	-	-	-	-	174	-	174	-	-	-	434	14	448
	DOE REMOTE SENSING LAB		C-12	88	4	92	n/a	-	-	-	-	-	-	88	4	92	-	-	-	-	-	-	62	-	62	-	-	-	238	8	246
			Bell 412	100	4	104	n/a	-	-	-	-	-	-	100	4	104	-	-	-	-	-	-	-	-	-	-	-	-	200	8	208
	Thunderbirds		F-16C	1,415	-	1,415	40%	22	-	22	1,214	-	1,214	175	-	175	4	-	4	10	-	10	12	-	12	-	-	-	2,852	-	2,852
BASED TOTAL				**15,220**	**849**	**16,069**	**-**	**390**	**677**	**1,067**	**11,788**	**44**	**11,832**	**2,634**	**359**	**2,993**	**177**	**-**	**177**	**64**	**-**	**64**	**5,328**	**-**	**5,328**	**88**	**-**	**88**	**35,689**	**1,929**	**37,618**

Table D-5 (cont'd)
Transient Baseline Operations at Nellis

Category	Sub-cat	Squadron / Unit	Aircraft Type	Departure				Instrument Arrival			Break Arrival			Non-Break Arrival			SFO Arrival			SFO Pattern			Visual Pattern			Visual ReEntry Pattern			TOTAL		
				Day (0700-2200)	Night (2200-0700)	Total	% of deps in AB takeoff roll	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Transient	Military - no MFE	attack jet	A-10	32	-	32	n/a	-	-	-	-	-	-	32	-	32	-	-	-	-	-	-	-	-	-	-	-	-	64	-	64
		fighter	F-15	26	-	26	-	-	-	-	-	-	-	26	-	26	-	-	-	-	-	-	-	-	-	-	-	-	52	-	52
			F-16	12	-	12	-	-	-	-	-	-	-	12	-	12	-	-	-	-	-	-	-	-	-	-	-	-	24	-	24
			F-18	93	-	93	-	-	-	-	-	-	-	93	-	93	-	-	-	-	-	-	-	-	-	-	-	-	186	-	186
			F-22	21	-	21	-	-	-	-	-	-	-	21	-	21	-	-	-	-	-	-	-	-	-	-	-	-	42	-	42
		jet trainer (T-38, F-5)	T-38	63	-	63	100%	-	-	-	-	-	-	63	-	63	-	-	-	-	-	-	-	-	-	-	-	-	126	-	126
		tanker	KC-10	99	3	102	n/a	-	-	-	-	-	-	99	3	102	-	-	-	-	-	-	-	-	-	-	-	-	198	6	204
		tanker (A330/KC-30*)	C-17	4	-	4	n/a	-	-	-	-	-	-	4	-	4	-	-	-	-	-	-	-	-	-	-	-	-	8	-	8
		tanker/other (E-3, E-6, KC-135)	KC-135	103	2	105	n/a	-	-	-	-	-	-	103	2	105	-	-	-	-	-	-	-	-	-	-	-	-	206	4	210
		large 4-eng jet (An-124, C-17, C-5)	C-17	268	4	272	n/a	-	-	-	-	-	-	268	4	272	-	-	-	-	-	-	-	-	-	-	-	-	536	8	544
		2-eng jet Narrow-body (C-32, C-40, C-9, P-8)	B-737	38	1	39	n/a	-	-	-	-	-	-	38	1	39	-	-	-	-	-	-	-	-	-	-	-	-	76	2	78
		large 4-eng prop (C-160**, C-130, P-3) and Tiltrotor**	C-130	278	1	279	n/a	-	-	-	-	-	-	278	1	279	-	-	-	-	-	-	-	-	-	-	-	-	556	2	558
		large 2-eng prop (C-160, C-146, E/C-2)	C-130 / 2	22	-	22	n/a	-	-	-	-	-	-	22	-	22	-	-	-	-	-	-	-	-	-	-	-	-	44	-	44
		small jet (C-20, C-21, C-35, C-37, C-38, Falcon 900, T-1, T-39)	C-21	76	1	77	n/a	-	-	-	-	-	-	76	1	77	-	-	-	-	-	-	-	-	-	-	-	-	152	2	154
		2-eng turboprop	C-12	102	-	102	n/a	-	-	-	-	-	-	102	-	102	-	-	-	-	-	-	-	-	-	-	-	-	204	-	204
		1-eng turboprop (T-6, P-51)	T-6	16	-	16	n/a	-	-	-	-	-	-	16	-	16	-	-	-	-	-	-	-	-	-	-	-	-	32	-	32
		small prop (C-182)	GASEPF	-	-	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		helo (H-1, H-3, H-64, H-46, H-47, H-60, H-65)	HH-60	63	-	63	n/a	-	-	-	-	-	-	63	-	63	-	-	-	-	-	-	-	-	-	-	-	-	126	-	126
Tr	non-MFE			1,316	12	1,328		-	-	-	-	-	-	1,316	12	1,328	-	-	-	-	-	-	-	-	-	-	-	-	2,632	24	2,656

Table D-5 (cont'd)
Transient Baseline Operations at Nellis

Category	Sub-cat	Squadron / Unit	Aircraft Type	Departure				Instrument Arrival			Break Arrival			Non-Break Arrival			SFO Arrival			SFO Pattern			Visual Pattern			Visual ReEntry Pattern			TOTAL		
				Day (0700-2200)	Night (2200-0700)	Total	% of deps in AB takeoff roll	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Transient	Military - Red Flag 3 per year	fighter	F-15	947	-	947	-	-	-	-	-	-	-	947	-	947	-	-	-	-	-	-	-	-	-	-	-	-	1,894	-	1,894
			F-16	132	-	132	-	-	-	-	-	-	-	132	-	132	-	-	-	-	-	-	-	-	-	-	-	-	264	-	264
			F-18	2,630	-	2,630	-	-	-	-	-	-	-	2,630	-	2,630	-	-	-	-	-	-	-	-	-	-	-	-	5,260	-	5,260
			F-22	237	-	237	-	-	-	-	-	-	-	237	-	237	-	-	-	-	-	-	-	-	-	-	-	-	474	-	474
		fighter (foreign; UK-10 (Typhoon))	F-18A/C	815	-	815	-	-	-	-	-	-	-	815	-	815	-	-	-	-	-	-	-	-	-	-	-	-	1,630	-	1,630
		bomber (B-2)	B-1	815	-	815	100%	-	-	-	-	-	-	815	-	815	-	-	-	-	-	-	-	-	-	-	-	-	1,630	-	1,630
		tanker	KC-135	342	-	342	n/a	-	-	-	-	-	-	342	-	342	-	-	-	-	-	-	-	-	-	-	-	-	684	-	684
		large 4-eng jet (E-3A/D, E-8 JSTARS)	KC-135	315	-	315	n/a	-	-	-	-	-	-	315	-	315	-	-	-	-	-	-	-	-	-	-	-	-	630	-	630
		2-eng jet Narrow-body (E-7)	B-737-300 B1	105	-	105	n/a	-	-	-	-	-	-	105	-	105	-	-	-	-	-	-	-	-	-	-	-	-	210	-	210
		large 4 eng prop (P-3, C-130)	C-130	342	-	342	n/a	-	-	-	-	-	-	342	-	342	-	-	-	-	-	-	-	-	-	-	-	-	684	-	684
		small jet (R-1, RC-35)	C-21	210	-	210	n/a	-	-	-	-	-	-	210	-	210	-	-	-	-	-	-	-	-	-	-	-	-	420	-	420
		MQ-1 and MQ-9	MQ-x	210	-	210	n/a	-	-	-	-	-	-	210	-	210	-	-	-	-	-	-	-	-	-	-	-	-	420	-	420
		helo (H-60)	HH-60	132	-	132	n/a	-	-	-	-	-	-	132	-	132	-	-	-	-	-	-	-	-	-	-	-	-	264	-	264
	Military - Green Flag; CY14x1	attack jet (AV-8)	F-18	103	-	103	-	-	-	-	-	-	-	103	-	103	-	-	-	-	-	-	-	-	-	-	-	-	206	-	206
		fighter (F-15E/S)	F-15	343	-	343	-	-	-	-	-	-	-	343	-	343	-	-	-	-	-	-	-	-	-	-	-	-	686	-	686
		fighter (F-16)	F-16	1,075	-	1,075	-	-	-	-	-	-	-	1,075	-	1,075	-	-	-	-	-	-	-	-	-	-	-	-	2,150	-	2,150
		fighter (legacy F-18)	F-18	84	-	84	-	-	-	-	-	-	-	84	-	84	-	-	-	-	-	-	-	-	-	-	-	-	168	-	168
		fighter (Super Hornet, Growler)	F-18E/F	180	-	180	-	-	-	-	-	-	-	180	-	180	-	-	-	-	-	-	-	-	-	-	-	-	360	-	360
		bomber	B-1	168	-	168	100%	-	-	-	-	-	-	168	-	168	-	-	-	-	-	-	-	-	-	-	-	-	336	-	336
			B-52	26	-	26	n/a	-	-	-	-	-	-	26	-	26	-	-	-	-	-	-	-	-	-	-	-	-	52	-	52
		tanker (KC-135)	KC-135	106	-	106	n/a	-	-	-	-	-	-	106	-	106	-	-	-	-	-	-	-	-	-	-	-	-	212	-	212
		large 4-eng jet (E-3, E-8 JSTARS)	KC-135	105	-	105	n/a	-	-	-	-	-	-	105	-	105	-	-	-	-	-	-	-	-	-	-	-	-	210	-	210
		2-eng turboprop	C-12	18	-	18	n/a	-	-	-	-	-	-	18	-	18	-	-	-	-	-	-	-	-	-	-	-	-	36	-	36
Transien	Red Flag (3 per year)			7,232	-	7,232		-	-	-	-	-	-	7,232	-	7,232	-	-	-	-	-	-	-	-	-	-	-	-	14,464	-	14,464
	Green Flag (total)			2,208	-	2,208		-	-	-	-	-	-	2,208	-	2,208	-	-	-	-	-	-	-	-	-	-	-	-	4,416	-	4,416
	TRANSIENT TOTAL			**10,756**	**12**	**10,768**		**-**	**-**	**-**	**-**	**-**	**-**	**10,756**	**12**	**10,768**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**21,512**	**24**	**21,536**
GRAND TOTAL				**25,976**	**861**	**26,837**		**390**	**677**	**1,067**	**11,788**	**44**	**11,832**	**13,390**	**371**	**13,761**	**177**	**-**	**177**	**64**	**-**	**64**	**5,328**	**-**	**5,328**	**88**	**-**	**88**	**57,201**	**1,953**	**59,154**

Notes:
1) Each pattern is a closed-circuit flight track that represents 2 two operations -- one arrival plus one departure

Table D-6
Based Baseline Operations at Nellis Plus Proposed Action Operations (Transient Operations Do Not Change)

Category	Sub-cat	Squadron / Unit	Aircraft Type	Departure				Instrument Arrival			Break Arrival			Non-Break Arrival			SFO Arrival			SFO Pattern			Visual Pattern[1]			Visual ReEntry Pattern			TOTAL		
				Day (0700-2200)	Night (2200-0700)	Total	% of deps in AB takeoff roll	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Based	53 TEG	422 TES	A-10C	884	27	911	n/a	-	-	-	707	-	707	177	27	204	-	-	-	-	-	-	-	-	-	-	-	-	1,768	54	1,822
			F-15C	547	-	547	50%	-	-	-	493	-	493	54	-	54	-	-	-	-	-	-	54	-	54	-	-	-	1,148	-	1,148
			F-15E	590	11	601	100%	-	11	11	530	-	530	60	-	60	-	-	-	-	-	-	62	-	62	-	-	-	1,242	22	1,264
			F-16C	504	59	563	80%	-	28	28	454	-	454	25	2	27	54	-	54	-	-	-	112	-	112	-	-	-	1,149	89	1,238
			F-22	592	-	592	0%	53	-	53	533	-	533	6	-	6	-	-	-	-	-	-	59	-	59	-	-	-	1,243	-	1,243
			F-35A (proposed)	416	46	462	68% day; 15% night	29	46	75	354	-	354	4	-	4	29	-	29	2	-	2	4	-	4	4	-	4	842	92	934
			F-35A	1,075	120	1,195	68% day; 15% night	75	120	195	914	-	914	11	-	11	75	-	75	4	-	4	8	-	8	8	-	8	2,170	240	2,410
	57 WING	16 WPS	F-16C	1,140	126	1,266	75%	57	81	138	1,006	-	1,006	54	46	100	22	-	22	24	-	24	120	-	120	6	-	6	2,429	253	2,682
		17 WPS	F-15E	902	9	911	100%	-	9	9	857	-	857	45	-	45	-	-	-	-	-	-	272	-	272	-	-	-	2,076	18	2,094
		34 WPS	HH-60G	324	-	324	n/a	-	-	-	-	-	-	203	121	324	-	-	-	-	-	-	174	-	174	-	-	-	701	121	822
		433 WPS	F-15C	767	88	855	40%	-	44	44	723	44	767	44	-	44	-	-	-	-	-	-	88	-	88	44	-	44	1,666	176	1,842
			F-22	504	88	592	0%	9	44	53	533	-	533	6	-	6	-	-	-	-	-	-	59	-	59	-	-	-	1,111	132	1,243
		64 AGRS	F-16C	2,478	103	2,581	74%	116	258	374	2,097	-	2,097	110	-	110	-	-	-	-	-	-	234	-	234	24	-	24	5,059	361	5,420
		65 AGRS	F-35A (proposed)	1,454	60	1,514	68% day; 15% night	68	151	219	1,230	-	1,230	65	-	65	-	-	-	-	-	-	136	-	136	14	-	14	2,967	211	3,178
		66 WPS	A-10C	1,138	47	1,185	n/a	-	-	-	703	-	703	422	60	482	-	-	-	-	-	-	70	-	70	-	-	-	2,333	107	2,440
	24 TASS		F-16C	1,159	128	1,287	90%	58	82	140	1,024	-	1,024	55	46	101	22	-	22	26	-	26	122	-	122	6	-	6	2,472	256	2,728
	COCO ADAIR (proposed)[2]		F1 Mirage	1,680	70	1,750	100%	78	175	253	1,422	-	1,422	75	-	75	-	-	-	-	-	-	314	-	314	157	-	157	3,726	245	3,971
			A-4N	840	35	875	n/a	39	88	127	711	-	711	37	-	37	-	-	-	-	-	-	158	-	158	79	-	79	1,864	123	1,987
			L-159	840	35	875	n/a	39	88	127	711	-	711	37	-	37	-	-	-	-	-	-	158	-	158	79	-	79	1,864	123	1,987
	66 RQS		HH-60G	876	35	911	n/a	-	-	-	-	-	-	876	35	911	-	-	-	-	-	-	3,646	-	3,646	-	-	-	5,398	70	5,468
	88 TES		HH-60G	137	-	137	n/a	-	-	-	-	-	-	123	14	137	-	-	-	-	-	-	174	-	174	-	-	-	434	14	448
	DOE REMOTE SENSING LAB		C-12	88	4	92	n/a	-	-	-	-	-	-	88	4	92	-	-	-	-	-	-	62	-	62	-	-	-	238	8	246
			Bell 412	100	4	104	n/a							100	4	104													200	8	208
	Thunderbirds		F-16C	1,415	-	1,415	40%	22	-	22	1,214	-	1,214	175	-	175	4	-	4	10	-	10	12	-	12	-	-	-	2,852	-	2,852
BASED TOTAL				**20,450**	**1,095**	**21,545**	-	**643**	**1,225**	**1,868**	**16,216**	**44**	**16,260**	**2,852**	**359**	**3,211**	**206**	-	**206**	**66**	-	**66**	**6,098**	-	**6,098**	**421**	-	**421**	**46,952**	**2,723**	**49,675**
Tr	**TRANSIENT TOTAL**			**10,756**	**12**	**10,768**		-	-	-	-	-	-	**10,756**	**12**	**10,768**	-	-	-	-	-	-	-	-	-	-	-	-	**21,512**	**24**	**21,536**
GRAND TOTAL				**31,206**	**1,107**	**32,313**		**643**	**1,225**	**1,868**	**16,216**	**44**	**16,260**	**13,608**	**371**	**13,979**	**206**	-	**206**	**66**	-	**66**	**6,098**	-	**6,098**	**421**	-	**421**	**68,464**	**2,747**	**71,211**

Notes:
1) Each pattern is a closed-circuit flight track that represents 2 two operations -- one arrival plus one departure
2) Contractor Owned Contractor Operated Adversary Aircraft will be modeled with surrogates: F1 Mirage represented with an F-16C, A-4N with an A-4C, and L-159 with a T-45.

D.2.2 Runway and Flight Track Use

This section describes the flight tracks used by the aircraft operating out of Nellis as well as the runway utilization. Utilization percentages are provided for each runway as well as the split usages in **Table D-7**. Flight track maps for all aircraft are presented on **Figure D-13** (departures), **Figure D-14** (arrivals), and **Figure D-15** (closed patterns). Closed pattern flight tracks represent aircraft patterns that depart and arrive on the same runway. Example flight profiles that use closed pattern flight tracks are simulated flame out and visual flight rules pattern profiles.

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Table D-7
Runway Usage for Based Aircraft at Nellis

Operation Type	Direction / Pad	53 TEG--422 TES										422 TES & 16 WPS		57 WING 16 WPS		57 WING 17 WPS		57 WING 34 WPS	
		A-10C (fut F-16)		F-15C		F-15E		F-16C (baseline only)		F-22		F-35A		F-16C (baseline only)		F-15E		HH-60G	
		Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)
Departure	03	75%	75%	70%	0%	40%	40%	40%	40%	60%	0%	58%	100%	60%	60%	50%	50%	0%	0%
	21	25%	25%	30%	0%	60%	60%	60%	60%	40%	0%	42%	0%	40%	40%	50%	50%	0%	0%
	JOLLY	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
Instrument Arrival	21	0%	0%	0%	0%	0%	100%	0%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	0%
Break Arrival	03	35%	0%	25%	0%	25%	25%	44%	0%	40%	0%	58%	0%	20%	0%	50%	0%	0%	0%
	21	65%	0%	75%	0%	75%	75%	56%	0%	60%	0%	42%	0%	80%	0%	50%	0%	0%	0%
Non-Break Arrival	03	35%	0%	25%	0%	25%	25%	40%		40%	0%	59%	0%	20%	41%	50%	0%	0%	0%
	21	65%	100%	75%	0%	75%	75%	60%	100%	60%	0%	41%	100%	80%	59%	50%	0%	0%	0%
	JOLLY	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%
SFO Arrivals	03	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	21	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%
SFO Pattern	03	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	0%	0%	0%	0%	0%	0%	0%
	21	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	87%	0%	100%	0%	0%	0%	0%	0%
Visual Pattern	03	25%	0%	25%	0%	25%	25%	20%	0%	25%	25%	26%	0%	16%	0%	50%	0%	0%	0%
	21	75%	0%	75%	0%	75%	75%	80%	0%	75%	75%	74%	0%	84%	0%	50%	0%	0%	0%
	GOLF	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%
Visual ReEntry Pattern	03	0%	0%	0%	0%	0%	0%	0%	0%		0%	20%	0%	8%	0%	0%	0%	0%	0%
	21	0%	0%	0%	0%	0%	0%	0%	0%		0%	80%	0%	92%	0%	0%	0%	0%	0%

Operation Type	Direction / Pad	57 WING--433 WPS				57 WING 64 AGRS		57 WING 65 AGRS		57 WING 66 WPS		CIG		66 RQS		88 TES		DOE REMOTE SENSING LAB		Thunderbirds	
		F-15C		F-22		F-16C		F-35A (fut)		A-10C (fut F-16C)		F-16C (fut only)		HH-60G		HH-60G		C-12		F-16C (fut F-35A)	
		Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)
Departure	03	50%	50%	50%	50%	45%	45%	45%	45%	66%	66%	60%	60%	0%	0%	0%	0%	25%	25%	41%	0%
	21	50%	50%	50%	50%	55%	55%	55%	55%	34%	34%	40%	40%	0%	0%	0%	0%	75%	75%	59%	0%
	JOLLY	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	100%	100%	0%	0%	0%	0%
Instrument Arrival	21	0%	100%	100%	100%	100%	100%	100%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	100%	0%
Break Arrival	03	25%	25%	25%	0%	30%	0%	30%	0%	37%	0%	20%	0%	0%	0%	0%	0%	0%	0%	18%	0%
	21	75%	75%	75%	0%	70%	0%	70%	0%	63%	0%	80%	0%	0%	0%	0%	0%	0%	0%	82%	0%
Non-Break Arrival	03	25%	0%		0%	30%	0%	30%	0%	27%	0%	20%	41%	0%	0%	0%	0%	14%	3%	0%	0%
	21	75%	0%	100%	0%	70%	0%	70%	0%	73%	100%	80%	59%	0%	0%	0%	0%	86%	97%	100%	0%
	JOLLY	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	100%	100%	0%	0%	0%	0%
SFO Arrivals	03	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	21	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%	0%
SFO Pattern	03	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	21	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	100%	0%
Visual Pattern	03	25%	0%	25%	25%	25%	0%	25%	0%	35%	0%	16%	0%	0%	0%	0%	0%	14%	14%	16%	0%
	21	75%	0%	75%	75%	75%	0%	75%	0%	65%	0%	84%	0%	0%	0%	0%	0%	86%	86%	84%	0%
	GOLF	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%
Visual ReEntry Pattern	03	8%	0%	0%	0%	8%	0%	8%	0%	0%	0%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	21	92%	0%	0%	0%	92%	0%	92%	0%	0%	0%	92%	0%	0%	0%	0%	0%	0%	0%	0%	0%

1)

Table D-7 (cont'd)
Runway Usage for Transient Aircraft at Nellis

Operation Type	Runway / PadHead	53 TEG--422 TES										422 TES & 16 WPS		57 WING 16 WPS		57 WING 17 WPS		57 WING 34 WPS		57 WING--433 WPS				57 WING 64 AGRS		57 WING 65 AGRS		57 WING 66 WPS		24 TASS		66 RQS		88 TES		DOE REMOTE SENSING LAB		Thunderbirds		COCO ADAIR	
		A-10C		F-15C		F-15E		F-16C		F-22		F-35A		F-16C		F-15E		HH-60G		F-15C		F-22		F-16C		F-35A		A-10C		F-16C		HH-60G		HH-60G		C-12		F-16C		Mirage F1, A-4N, L-159	
		Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)
Departure	03L	15%	15%	80%	0%	80%	80%	80%	80%	80%	0%	80%	80%	50%	50%	90%	95%	0%	0%	90%	90%	90%	90%	90%	90%	90%	90%	34%	34%	50%	50%	0%	0%	0%	0%	0%	0%	90%	0%	90%	90%
	03R	85%	85%	20%	0%	20%	20%	20%	20%	20%	0%	20%	20%	50%	50%	10%	5%	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%	66%	66%	50%	50%	0%	0%	0%	0%	0%	0%	10%	0%	10%	10%
	03R-Bravo	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%
	21L	85%	85%	20%	0%	20%	20%	20%	20%	20%	0%	20%	0%	50%	50%	10%	5%	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%	65%	65%	50%	50%	0%	0%	0%	0%	100%	100%	10%	0%	10%	10%
	21R	15%	15%	80%	0%	80%	80%	80%	80%	80%	0%	80%	0%	50%	50%	90%	95%	0%	0%	90%	90%	90%	90%	90%	90%	90%	90%	35%	35%	50%	50%	0%	0%	0%	0%	0%	0%	90%	0%	90%	90%
	JOLLYN	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	90%	90%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	90%	90%	90%	90%	0%	0%	0%	0%	0%	0%
	JOLLYS	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	10%	10%	0%	0%	0%	0%	0%	0%
Instrument Arrivals	21L	0%	0%	0%	0%	0%	100%	0%	100%	100%	0%	100%	100%	100%	100%	0%	100%	0%	0%	0%	100%	100%	100%	100%	100%	100%	100%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	100%		100%	100%
	21R	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Break Arrival	03L	15%	0%	95%	0%	90%	90%	85%	0%	90%	0%	56%	0%	40%	0%	90%	0%	0%	0%	90%	90%	90%	0%	90%	0%	90%	0%	25%	0%	40%	0%	0%	0%	0%	0%	0%	0%	90%	0%	90%	0%
	03R	85%	0%	5%	0%	10%	10%	15%	0%	10%	0%	44%	0%	60%	0%	10%	0%	0%	0%	10%	10%	10%	0%	10%	0%	10%	0%	75%	0%	60%	0%	0%	0%	0%	0%	0%	0%	10%	0%	10%	0%
	21L	85%	0%	5%	0%	10%	10%	18%	0%	10%	0%	42%	0%	60%	0%	10%	0%	0%	0%	10%	10%	10%	0%	10%	0%	10%	0%	83%	0%	60%	0%	0%	0%	0%	0%	0%	0%	10%	0%	10%	0%
	21R	15%	0%	95%	0%	90%	90%	82%	0%	90%	0%	58%	0%	40%	0%	90%	0%	0%	0%	90%	90%	90%	0%	90%	0%	90%	0%	17%	0%	40%	0%	0%	0%	0%	0%	0%	0%	90%	0%	90%	0%
Non-Break Arrival	03L	15%	0%	95%	0%	90%	90%	85%		90%	0%	41%	0%	40%	40%	90%	0%	0%	0%	90%	0%	0%	0%	100%	0%	100%	0%	25%	0%	40%	40%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%
	03R	85%	0%	5%	0%	10%	10%	15%	0%	10%	0%	59%	0%	60%	60%	10%	0%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%	75%	0%	60%	60%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%
	21L	85%	100%	5%	0%	10%	10%	15%	15%	10%	0%	51%	51%	60%	60%	10%	0%	0%	0%	10%	0%	10%	0%	0%	0%	0%	0%	69%	69%	60%	60%	0%	0%	0%	0%	100%	100%	10%	0%	0%	0%
	21R	15%	0%	95%	0%	90%	90%	85%	85%	90%	0%	49%	49%	40%	40%	90%	0%	0%	0%	90%	0%	90%	0%	100%	0%	100%	0%	31%	31%	40%	40%	0%	0%	0%	0%	0%	0%	90%	0%	100%	0%
	JOLLYN	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	90%	90%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	90%	90%	90%	90%	0%	0%	0%	0%	0%	0%
	JOLLYS	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	10%	10%	0%	0%	0%	0%	0%	0%
SFO Arrival	21L	0%	0%	0%	0%	0%	0%	85%	0%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%	0%	60%	0%	0%	0%
	21R	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%	100%	0%	40%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0%	40%	0%	0%	0%
SFO Pattern	03L	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	03R	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	21L	0%	0%	0%	0%	0%	0%	85%	0%	0%	0%	100%	0%	60%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	60%	0%	0%	0%	0%	0%	0%	0%	60%	0%	0%	0%
	21R	0%	0%	0%	0%	0%	0%	15%	0%	0%	0%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0%	40%	0%	0%	0%
Visual Pattern	03L	0%	0%	95%	0%	90%	90%	40%	0%	90%	90%	72%	0%	40%	0%	90%	0%	0%	0%	90%	0%	90%	90%	90%	0%	95%	0%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0%	90%	0%	90%	0%
	03R	100%	0%	5%	0%	10%	10%	60%	0%	10%	10%	28%	0%	60%	0%	10%	0%	0%	0%	10%	0%	10%	10%	10%	0%	5%	0%	100%	0%	60%	0%	0%	0%	0%	0%	100%	100%	10%	0%	10%	0%
	21L	100%	0%	5%	0%	10%	10%	60%	0%	10%	10%	25%	0%	60%	0%	10%	0%	0%	0%	10%	0%	10%	10%	10%	0%	5%	0%	100%	0%	60%	0%	0%	0%	0%	0%	100%	100%	10%	0%	10%	0%
	21R	0%	0%	95%	0%	90%	90%	40%	0%	90%	90%	75%	0%	40%	0%	90%	0%	0%	0%	90%	0%	90%	90%	90%	0%	95%	0%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0%	90%	0%	90%	0%
	GOLF03	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	50%	0%	0%	0%	0%	0%	0%	0%
	GOLF21	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	50%	0%	0%	0%	0%	0%	0%	0%
Visual ReEntry Pattern	03L	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	100%	0%	100%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%
	03R	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	21L	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	65%	0%	0%	0%	0%	0%	65%	0%	0%	0%	65%	0%	65%	0%	0%	0%	65%	0%	0%	0%	0%	0%	0%	0%	0%	0%	65%	0%
	21R	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	0%	35%	0%	0%	0%	0%	0%	35%	0%	0%	0%	35%	0%	35%	0%	0%	0%	35%	0%	0%	0%	0%	0%	0%	0%	0%	0%	35%	0%

Table D-7 (cont'd)
Runway Usage for Transient Aircraft at Nellis

		A-10C		F-15C		F-16C		F-18A/C		F-22		T-38C		B-52H		B-1		KC-10A		KC-135R		C-17		B-737-300		C-130H&N&P		C-21A		MQ-x (CITATIONX)		C-12		T-6		GASEPF		HH-60G	
		Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)	Day (0700-2200)	Night (2200-0700)
Departure	03L	10%	0%	90%	0%	90%	0%	90%	0%	90%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	03R	90%	0%	10%	0%	10%	0%	10%	0%	10%	0%	100%	0%	0%	0%	100%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%
	21L	90%	0%	10%	0%	10%	0%	10%	0%	10%	0%	100%	0%	0%	0%	100%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%
	21R	10%	0%	90%	0%	90%	0%	90%	0%	90%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Non-Break Arrival	03L	10%	0%	90%	0%	90%	0%	90%	0%	90%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	03R	90%	0%	10%	0%	10%	0%	10%	0%	10%	0%	100%	0%	0%	0%	100%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%
	21L	90%	0%	10%	0%	10%	0%	10%	0%	10%	0%	100%	0%	0%	0%	100%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%
	21R	10%	0%	90%	0%	90%	0%	90%	0%	90%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

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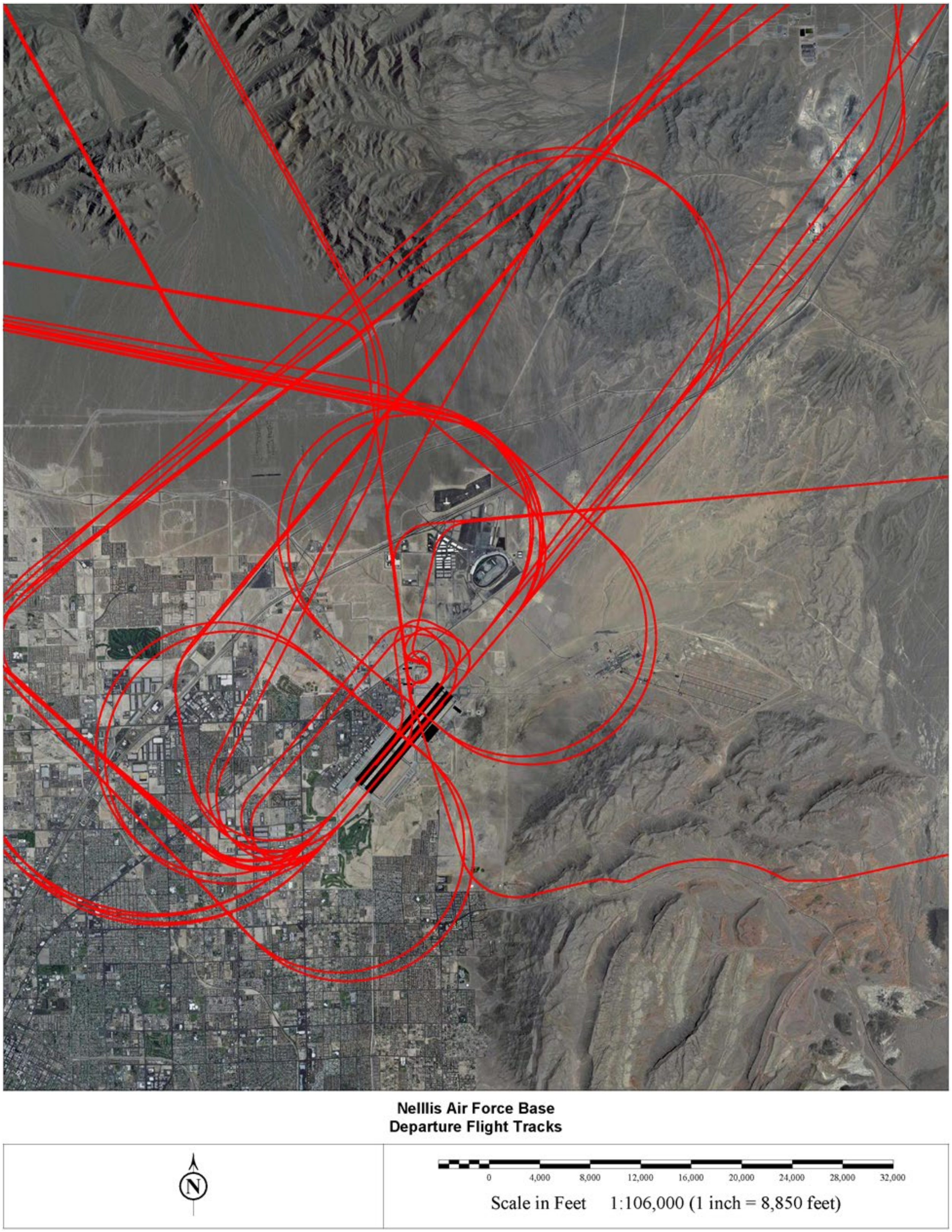


Figure D-13. Departure Flight Tracks at Nellis.

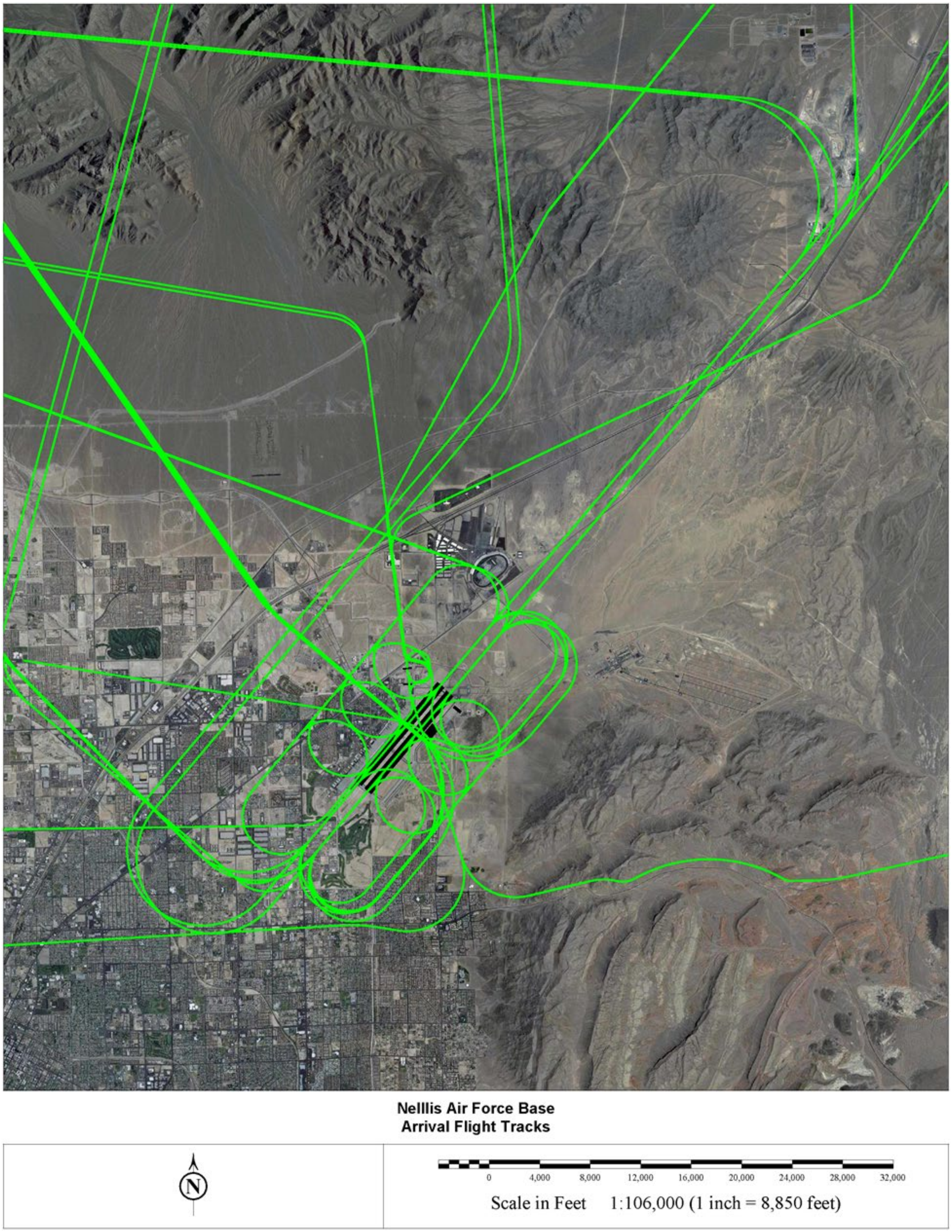
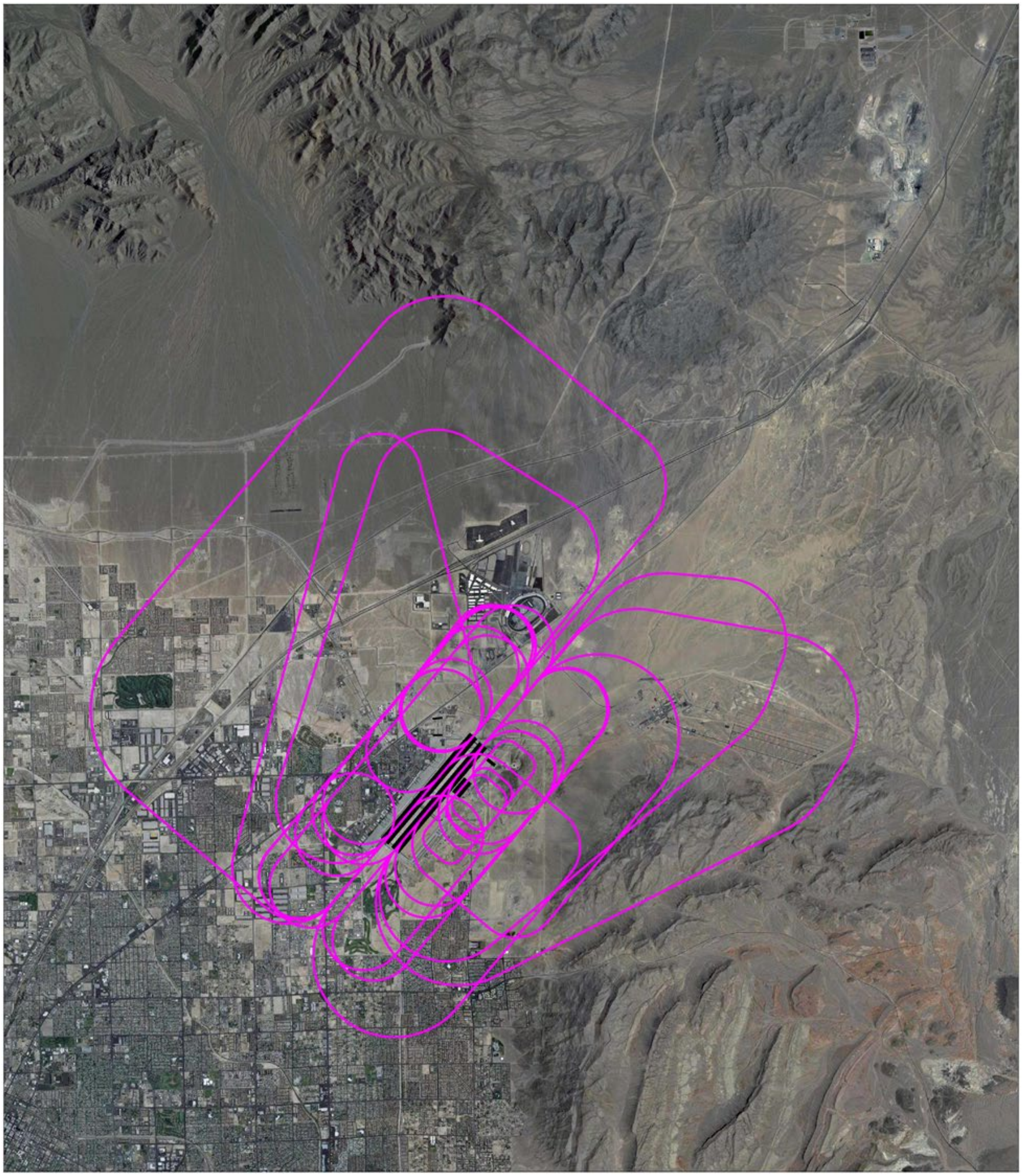


Figure D-14. Arrival Flight Tracks at Nellis.



Nelllis Air Force Base
Closed Pattern Flight Tracks

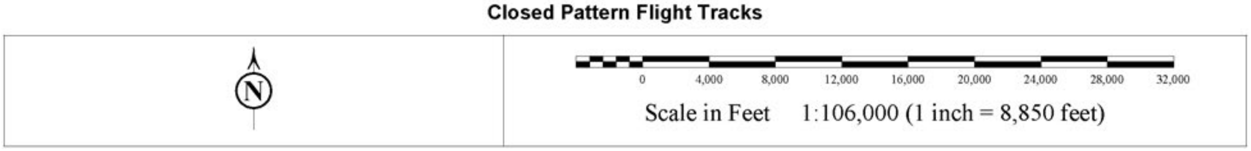


Figure D-15. Closed Pattern Flight Tracks at Nellis.

D.2.3 Flight Profiles and Aircraft

The Proposed Action would locate contractor aircraft at Nellis with the appropriate capabilities to respond to the needs of the fighters at the base. In addition to the contractor aircraft, 17 F-35 aircraft will be moved to Nellis. The F-35 aircraft will be split into how they are used: 11 will be used to form the 65 AGRS and 6 will be added to the 422 TES. The Flight track and runway utilization of the F-35s added to the 422 TES will follow the usage of the existing F-35s in that squadron. The 65 AGRS and contractor aircraft will follow the track and runway utilization of the 64 AGRS.

The contractor will be providing aircraft with differing capabilities to fulfill the mission. Three aircraft that will be used by the contractor are the F1 Mirage, the A-4N, and the L-159. Because the noise model does not have those specific aircraft in its database, surrogates have been chosen to represent their noise emissions. The F1 Mirage will be represented by the F-16C, the A-4N by the A-4C, and the L-159 by the T-45. The surrogates for the contractor aircraft are presented in **Table D-8.**

Table D-8
Contractor Aircraft Noise Surrogates

Contractor Aircraft	F1 Mirage	A-4N	L-159
Noise Surrogate	F-16C	A-4C	T-45

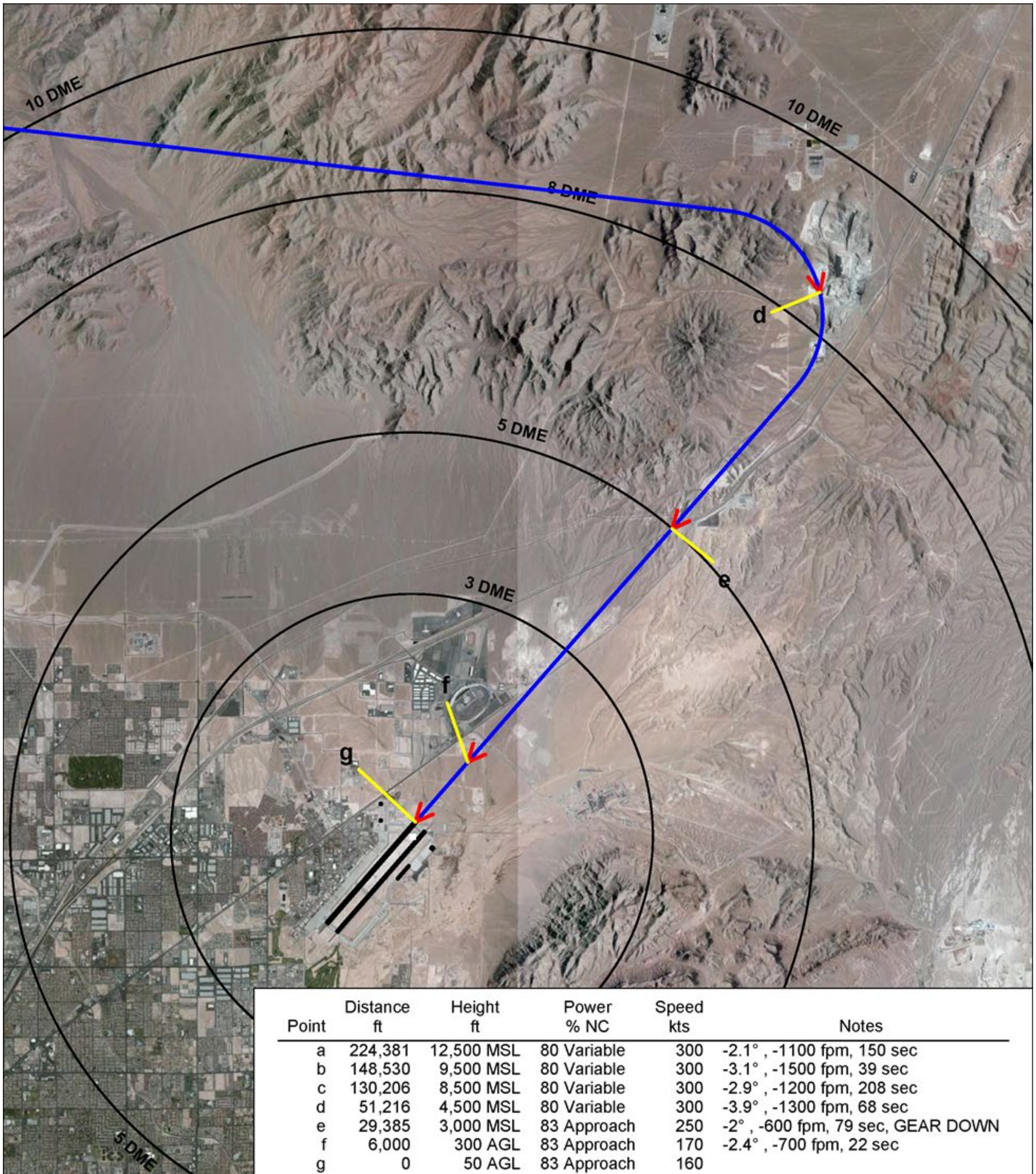
This section details the representative profiles for aircraft involved with the Proposed Action at Nellis. This includes the F-16C aircraft of the 64 AGRS, which will be used as a surrogate for the F1 Mirage, the F-35s of the 422 TES, whose operations will be increased by the addition of 7 additional aircraft, and the additional contractor aircraft, the A-4N and the L-159. The F-35s used to form the 65 AGRS will have the same profiles of the F-35s of the 422 TES. The other aircraft at Nellis have profiles that were detailed in the recent AICUZ and are not presented here for brevity.

Representative profiles provide the speed and power setting of each type of aircraft as a function of distance along the flight track for the representative maneuvers. For modeling purposes, the appropriate profile is used for all flight tracks that conform to that maneuver type. For example, all overhead break arrival tracks utilize the representative profile for modeling that maneuver.

The operations tables (**Tables D-5 and D-6**) can be used with the runway usage table (**Table D-7**) to understand the distribution of the following representative profiles that will be modeled on tracks associated with each runway. One important point to note in looking at flight profiles: the description of the power setting indicates the aircraft's configuration. For modeling noise emissions, there are two different configurations. Any description with the words Approach or Parallel indicate that the aircraft is fully configured for arrival (landing gear down, flaps set, etc.). All other descriptions in the profile indicate the aircraft is not fully configured for arrival.

D.2.3.1 Based Aircraft Representative Flight Profiles

Flight Profiles for 64 AGRS F-16Cs

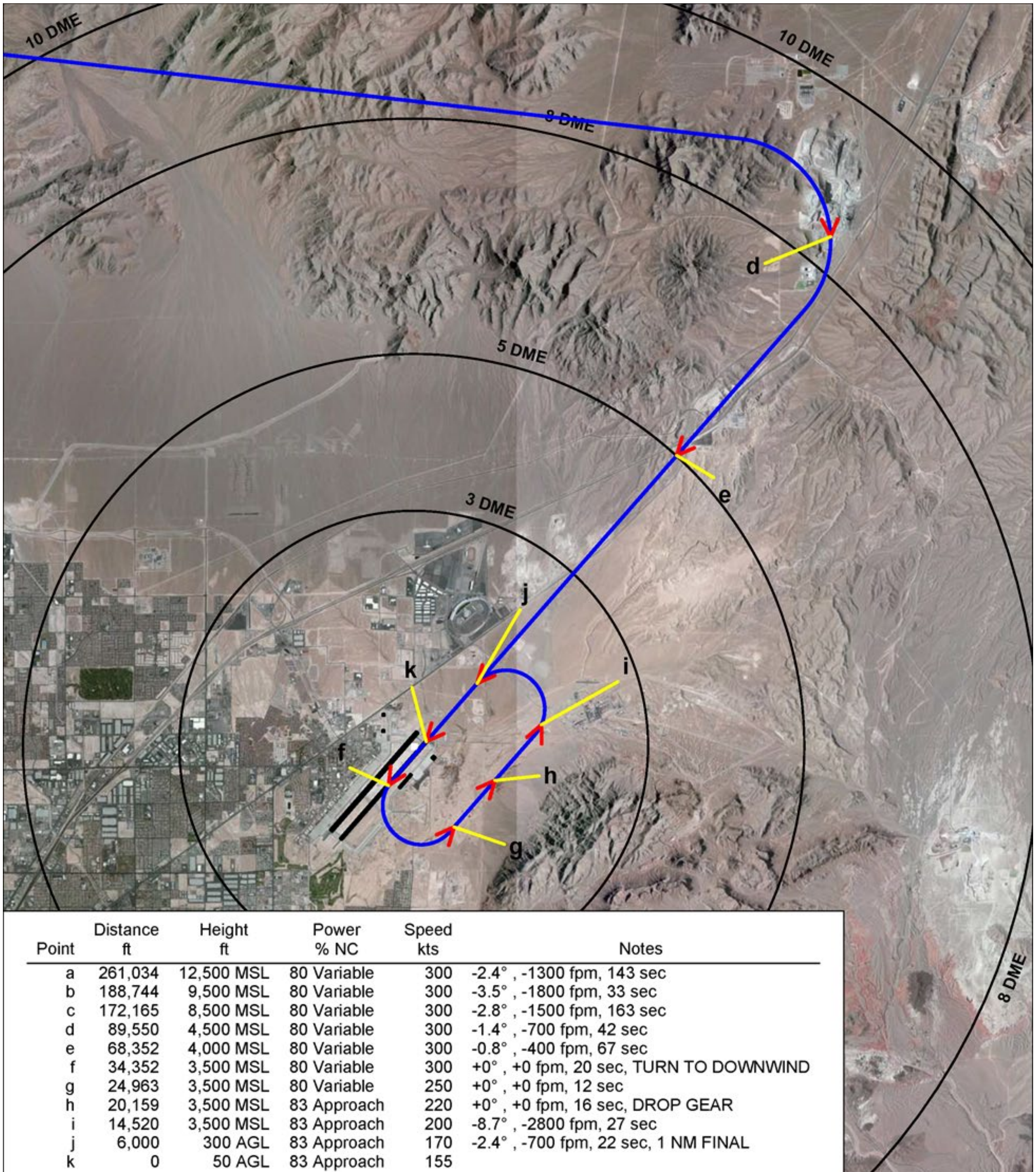


Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	224,381	12,500 MSL	80 Variable	300	-2.1° , -1100 fpm, 150 sec
b	148,530	9,500 MSL	80 Variable	300	-3.1° , -1500 fpm, 39 sec
c	130,206	8,500 MSL	80 Variable	300	-2.9° , -1200 fpm, 208 sec
d	51,216	4,500 MSL	80 Variable	300	-3.9° , -1300 fpm, 68 sec
e	29,385	3,000 MSL	83 Approach	250	-2° , -600 fpm, 79 sec, GEAR DOWN
f	6,000	300 AGL	83 Approach	170	-2.4° , -700 fpm, 22 sec
g	0	50 AGL	83 Approach	160	

Nellis AFB (1,868 ft MSL), Non-Break Arrivals Flight Profile 21A21
PW220 RECOVERY STRYK/GASS/APEX TO VFR ST-IN
Based F-16C (F100-PW-220)
Runway 21R, Flight Track 21RA05 - STRYK RECOVERY TO VFR ST-IN

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000
Scale in Feet 1:110,000 (1 inch = 9,160 feet)

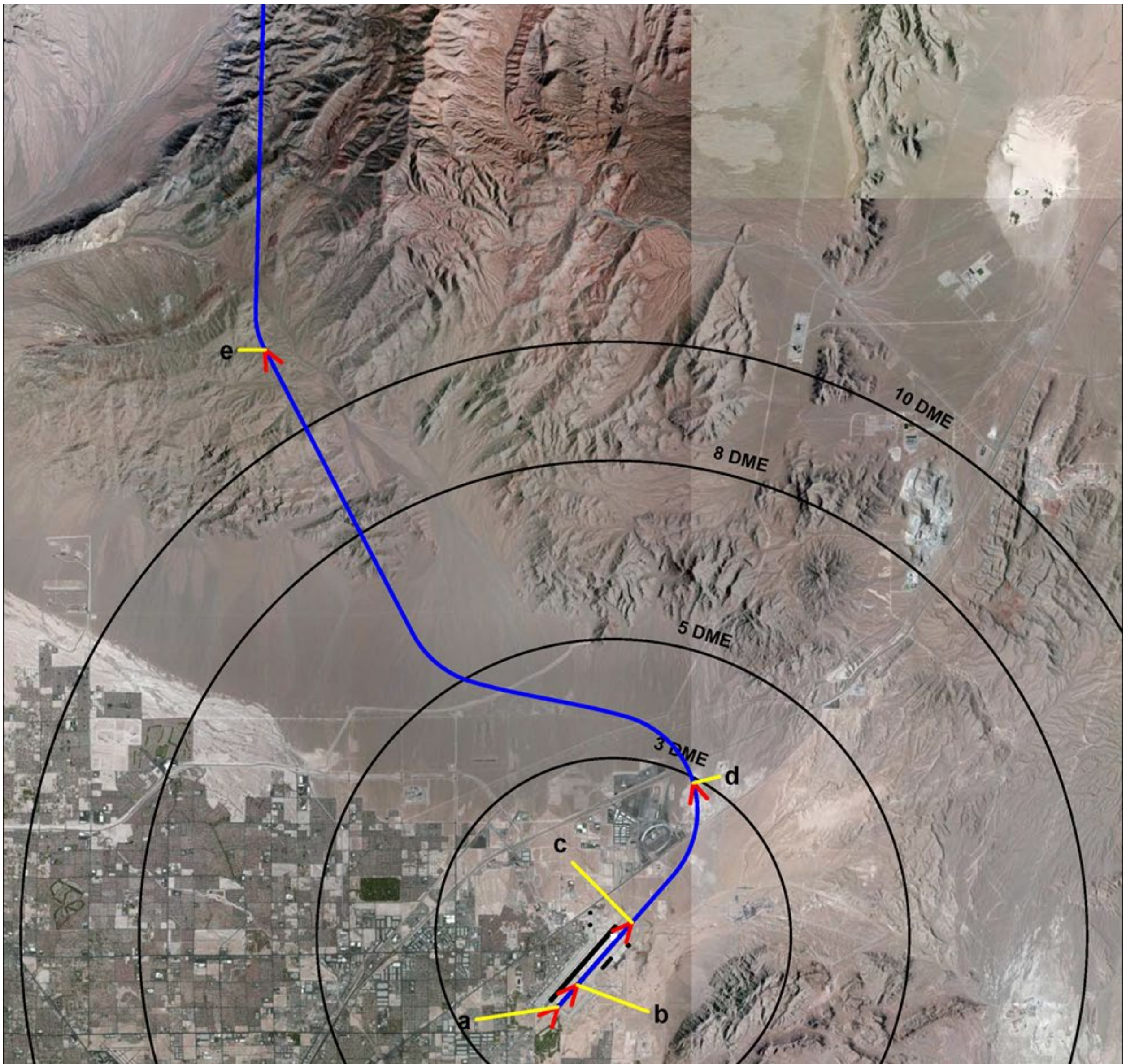
N



Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	261,034	12,500 MSL	80 Variable	300	-2.4° , -1300 fpm, 143 sec
b	188,744	9,500 MSL	80 Variable	300	-3.5° , -1800 fpm, 33 sec
c	172,165	8,500 MSL	80 Variable	300	-2.8° , -1500 fpm, 163 sec
d	89,550	4,500 MSL	80 Variable	300	-1.4° , -700 fpm, 42 sec
e	68,352	4,000 MSL	80 Variable	300	-0.8° , -400 fpm, 67 sec
f	34,352	3,500 MSL	80 Variable	300	+0° , +0 fpm, 20 sec, TURN TO DOWNWIND
g	24,963	3,500 MSL	80 Variable	250	+0° , +0 fpm, 12 sec
h	20,159	3,500 MSL	83 Approach	220	+0° , +0 fpm, 16 sec, DROP GEAR
i	14,520	3,500 MSL	83 Approach	200	-8.7° , -2800 fpm, 27 sec
j	6,000	300 AGL	83 Approach	170	-2.4° , -700 fpm, 22 sec, 1 NM FINAL
k	0	50 AGL	83 Approach	155	

Nellis AFB (1,868 ft MSL), Break Arrivals Flight Profile 21B40
PW220 RECOVERY FROM STRYK/GASS/APEX BREAK 4000' DOWN RWY
Based F-16C (F100-PW-220)
Runway 21L, Flight Track 21LB07 - STRYK RECOVERY TO INITIAL BREAK 4000' DOWN RWY

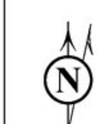
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000
Scale in Feet 1:113,000 (1 inch = 9,420 feet)



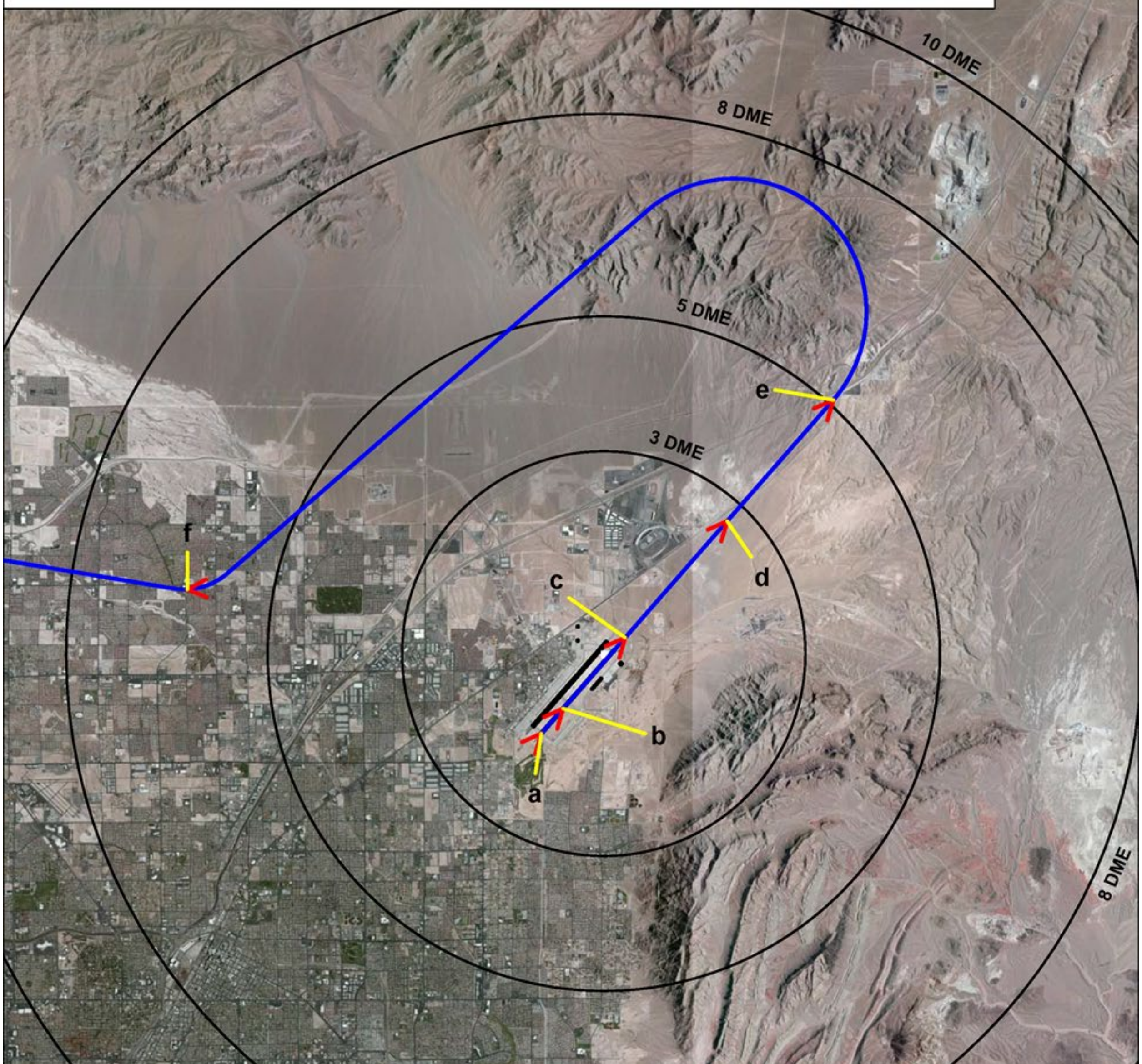
Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	90 Mil	0	+0° , +0 fpm, 22 sec
b	3,000	0 AGL	91 Takeoff	160	+6.7° , +2700 fpm, 22 sec, Mil - 3000FT ROTATE
c	11,500	500 AGL	90 Takeoff	320	+0.3° , +200 fpm, 30 sec
d	28,000	3,000 MSL	90 Takeoff	350	+6.8° , +4200 fpm, 113 sec
e	95,000	7,000 MSL	90 Takeoff	350	+6.2° , +3800 fpm, 171 sec
f	195,833	20,000 MSL	90 Takeoff	350	

Nellis AFB (1,868 ft MSL), Departure Flight Profile 21D12M
PW220 DREAM DEPARTURE FLEX TURNOUT MIL PROFILE
Based F-16C (F100-PW-220)
Runway 03R, Flight Track 03RD02 - DREAM 4 FLEX TURNOUT ONLY USED WHEN 21 IS ACTIVE
Prior to brake release, aircraft sits at 90 % NC Mil for 1 sec

Scale in Feet 1:162,000 (1 inch = 13,500 feet)



Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	92 Max A/B	0	+0° , +0 fpm, 22 sec, A/B POWER
b	3,000	0 AGL	92 Afterburner	160	+6.7° , +2700 fpm, 22 sec, A/B - ROTATE 3000 FT
c	11,500	1,000 AGL	90 Takeoff	300	+0.4° , +200 fpm, 25 sec, CUT A/B
d	25,472	3,000 MSL	90 Takeoff	350	+10.9° , +6700 fpm, 25 sec
e	39,992	5,800 MSL	90 Takeoff	350	+5° , +3100 fpm, 102 sec
f	130,000	11,000 MSL	90 Takeoff	350	+3.5° , +2200 fpm, 303 sec
g	279,247	20,000 MSL	90 Takeoff	350	

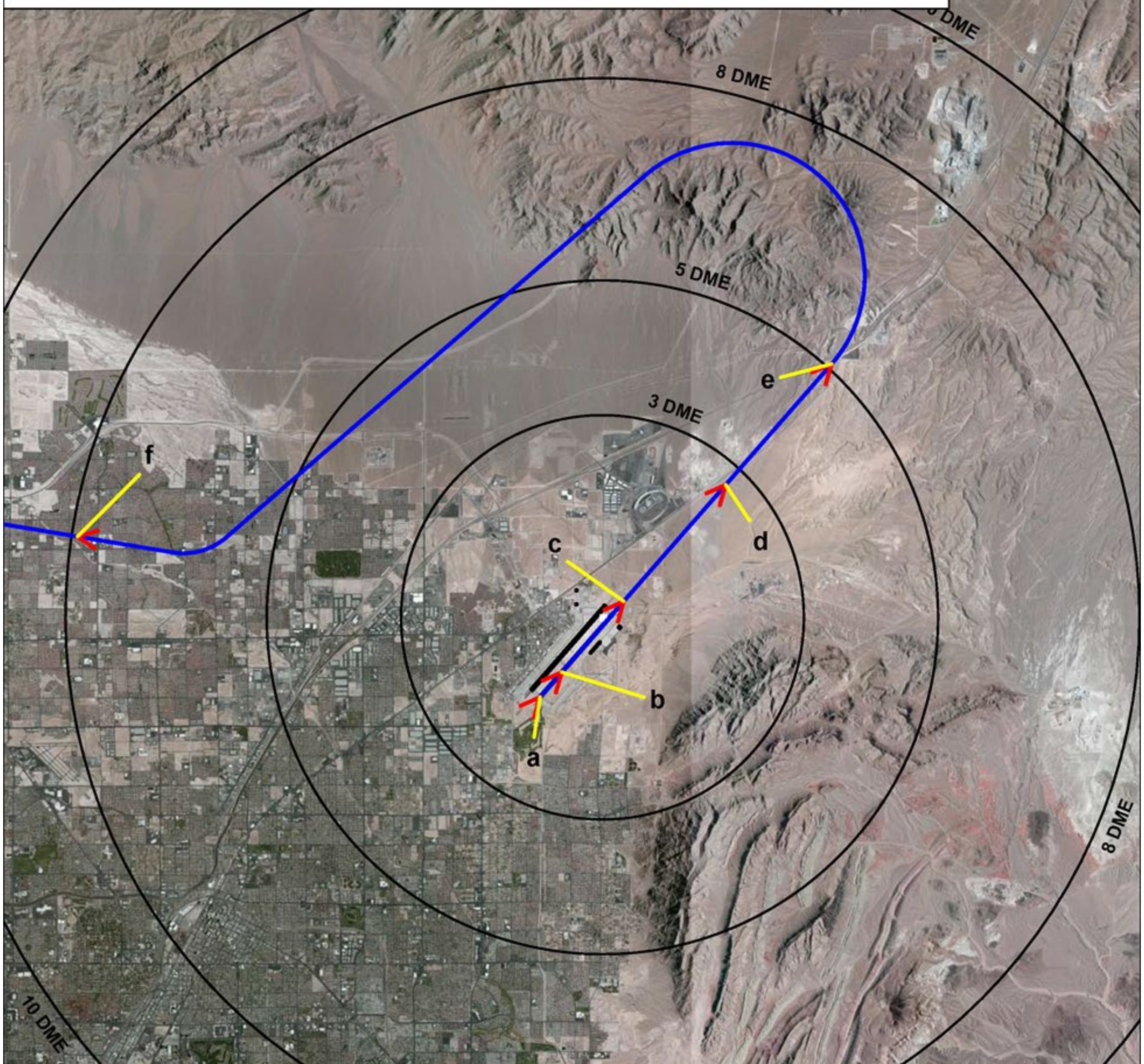


Nellis AFB (1,868 ft MSL), Departure Flight Profile 21D15AB
PW220 FYTTR ONE A/B PROFILE
Based F-16C (F100-PW-220)
Runway 03R, Flight Track 03RD05 - FYTTR THREE (CLIMB TO 5800 MLS BEFORE TURN TO WEST)
Prior to brake release, aircraft sits at 92 % NC Max A/B for 1 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000
Scale in Feet 1:145,000 (1 inch = 12,100 feet)

N

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	92 Mil	0	+0° , +0 fpm, 22 sec
b	3,000	0 AGL	92 Takeoff	160	+6.7° , +2700 fpm, 22 sec, Mil - 3000FT ROTATE
c	11,500	500 AGL	90 Takeoff	320	+0.4° , +200 fpm, 25 sec
d	25,472	3,000 MSL	90 Takeoff	350	+10.9° , +6700 fpm, 25 sec
e	39,992	5,800 MSL	90 Takeoff	350	+5° , +3100 fpm, 102 sec
f	140,000	11,000 MSL	90 Takeoff	350	+3.5° , +2200 fpm, 303 sec
g	279,247	20,000 MSL	90 Takeoff	350	

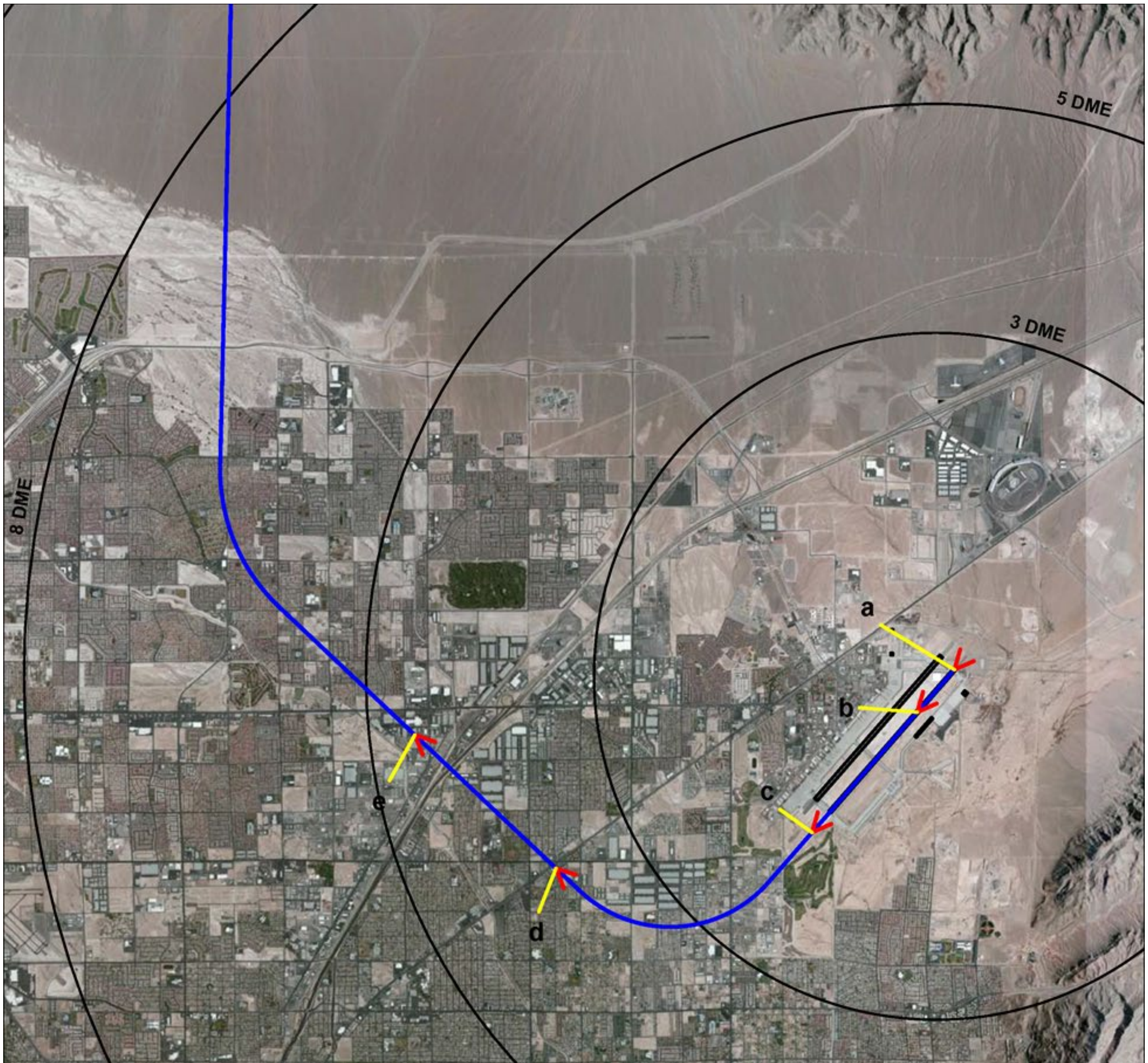


Nellis AFB (1,868 ft MSL), Departure Flight Profile 21D15M
PW220 FYTTR ONE MIL PROFILE
Based F-16C (F100-PW-220)
Runway 03R, Flight Track 03RD05 - FYTTR THREE (CLIMB TO 5800 MLS BEFORE TURN TO WEST)
Prior to brake release, aircraft sits at 92 % NC Mil for 1 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000

Scale in Feet 1:145,000 (1 inch = 12,100 feet)

N



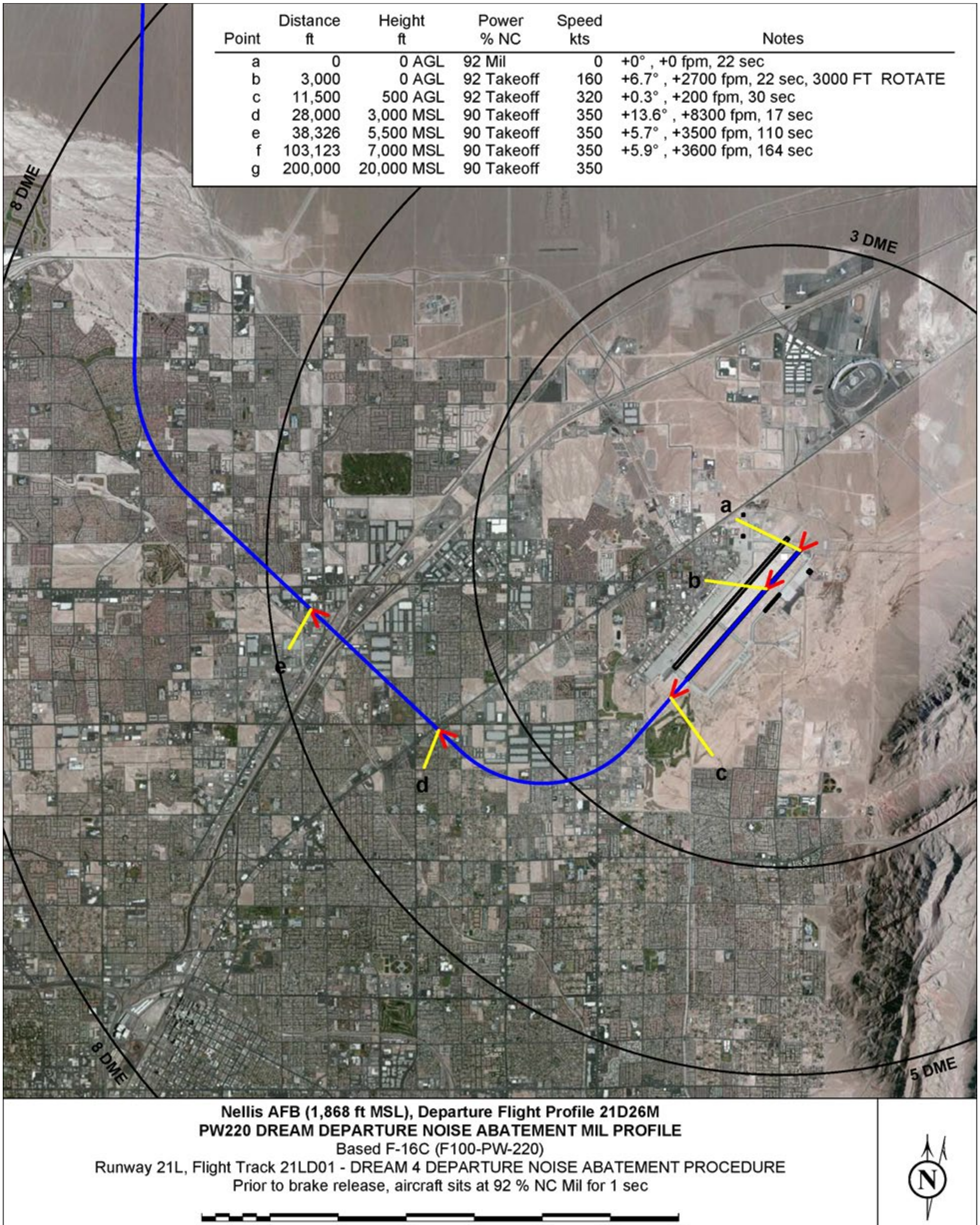
Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	92 Max A/B	0	+0° , +0 fpm, 22 sec, A/B POWER
b	3,000	0 AGL	92 Afterburner	160	+6.7° , +2700 fpm, 22 sec, 3000 FT A/B ROTATE
c	11,500	1,000 AGL	90 Takeoff	320	+0.3° , +200 fpm, 30 sec, CUT A/B
d	28,000	3,000 MSL	90 Takeoff	350	+13.6° , +8300 fpm, 17 sec
e	38,326	5,500 MSL	90 Takeoff	350	+5.7° , +3500 fpm, 110 sec
f	103,123	12,000 MSL	90 Takeoff	350	+5.9° , +3600 fpm, 164 sec
g	200,000	20,000 MSL	90 Takeoff	350	

Nellis AFB (1,868 ft MSL), Departure Flight Profile 21D26AB
PW220 DREAM DEPARTURE NOISE ABATEMENT A/B PROFILE
Based F-16C (F100-PW-220)
Runway 21L, Flight Track 21LD01 - DREAM 4 DEPARTURE NOISE ABATEMENT PROCEDURE
Prior to brake release, aircraft sits at 92 % NC Max A/B for 1 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000
Scale in Feet 1:85,800 (1 inch = 7,150 feet)

N

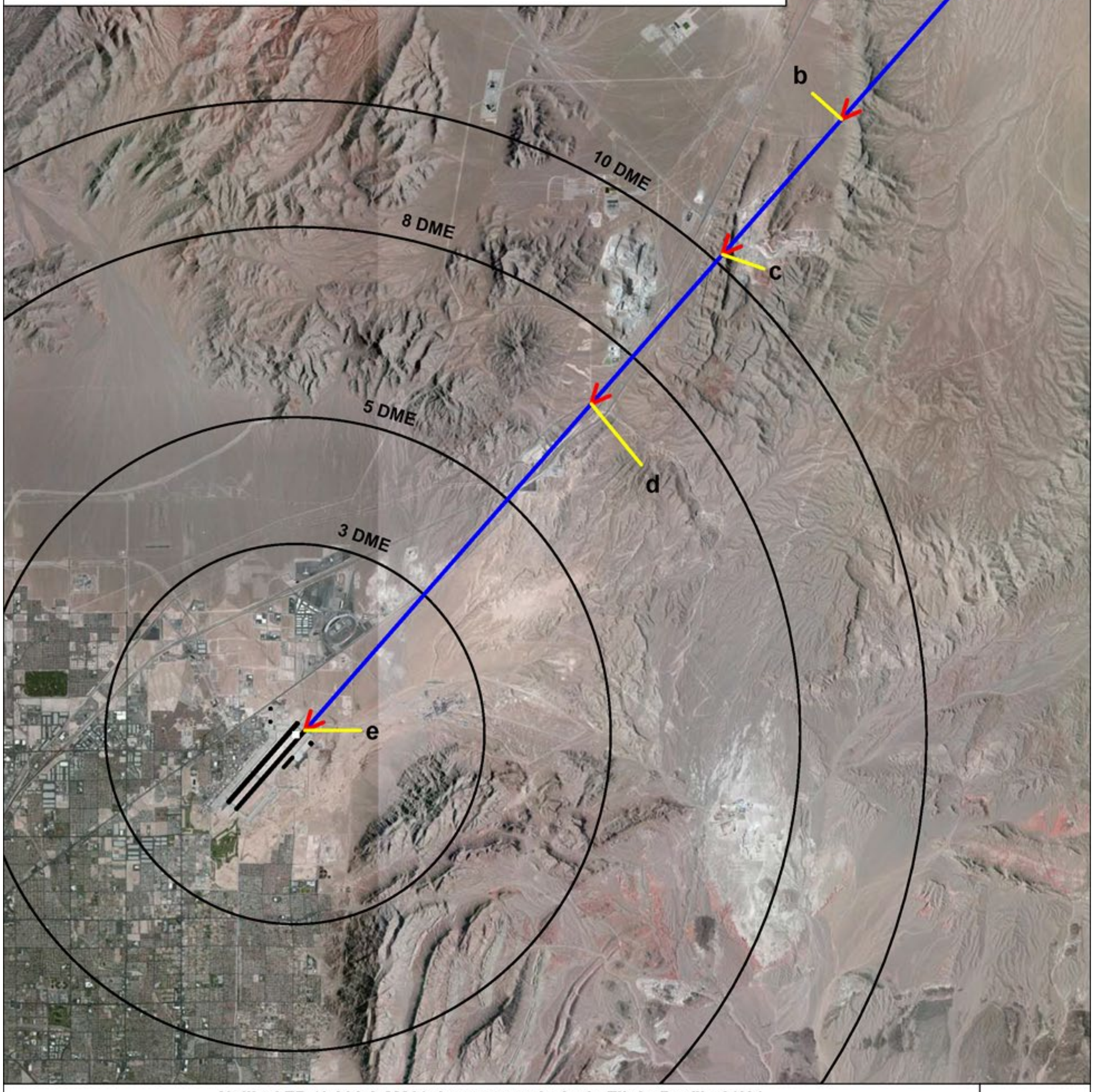
Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	92 Mil	0	+0° , +0 fpm, 22 sec
b	3,000	0 AGL	92 Takeoff	160	+6.7° , +2700 fpm, 22 sec, 3000 FT ROTATE
c	11,500	500 AGL	92 Takeoff	320	+0.3° , +200 fpm, 30 sec
d	28,000	3,000 MSL	90 Takeoff	350	+13.6° , +8300 fpm, 17 sec
e	38,326	5,500 MSL	90 Takeoff	350	+5.7° , +3500 fpm, 110 sec
f	103,123	7,000 MSL	90 Takeoff	350	+5.9° , +3600 fpm, 164 sec
g	200,000	20,000 MSL	90 Takeoff	350	



Nellis AFB (1,868 ft MSL), Departure Flight Profile 21D26M
PW220 DREAM DEPARTURE NOISE ABATEMENT MIL PROFILE
Based F-16C (F100-PW-220)
Runway 21L, Flight Track 21LD01 - DREAM 4 DEPARTURE NOISE ABATEMENT PROCEDURE
Prior to brake release, aircraft sits at 92 % NC Mil for 1 sec

Scale in Feet 1:80,800 (1 inch = 6,730 feet)

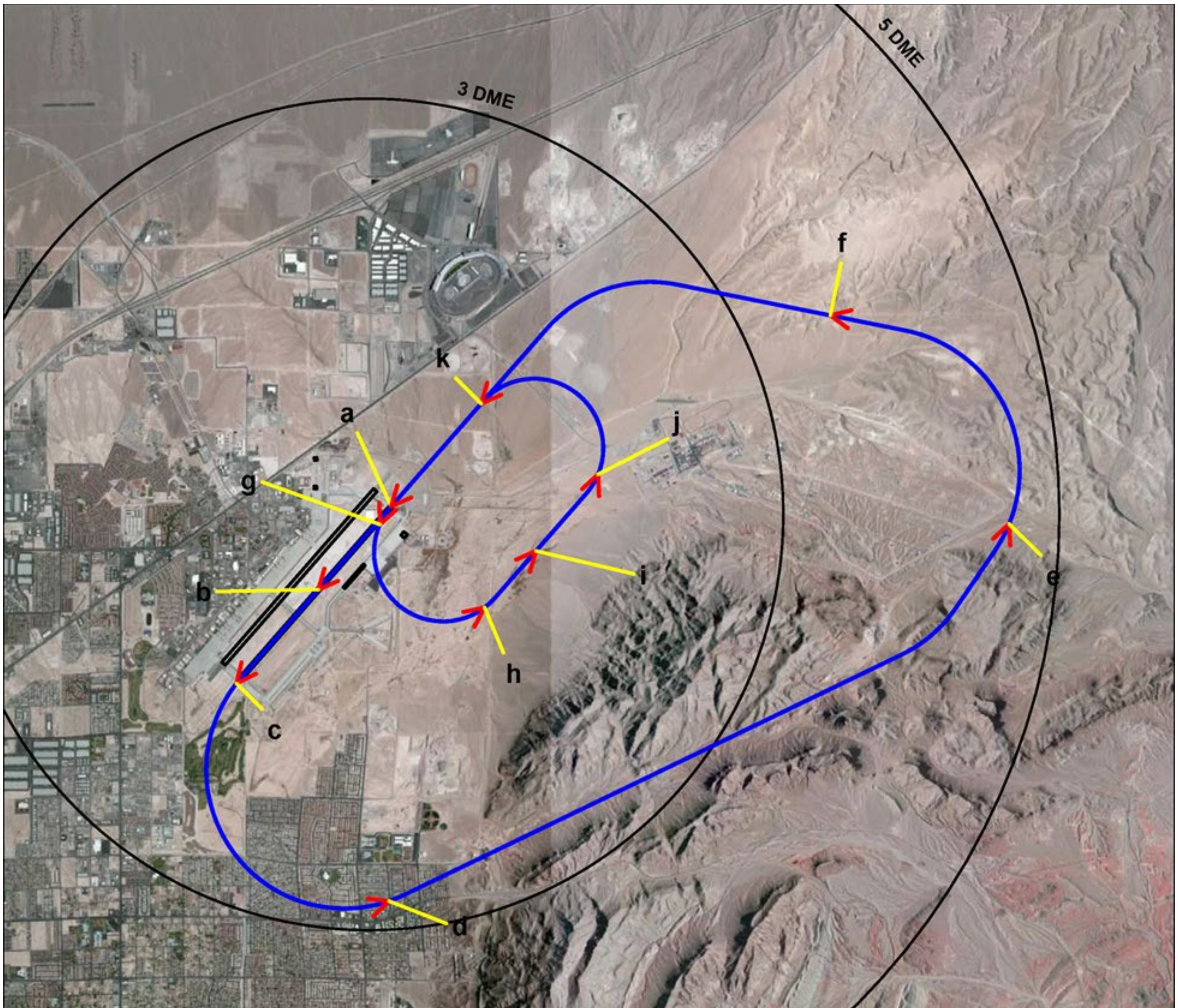
Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	150,000	10,000 MSL	80 Variable	250	-4° , -1800 fpm, 171 sec
b	78,041	5,000 MSL	80 Variable	250	-2.7° , -1000 fpm, 48 sec
c	60,761	4,200 MSL	83 Approach	180	+0° , +0 fpm, 63 sec, Drop Gear
d	41,679	4,200 MSL	83 Approach	180	-3.1° , -1000 fpm, 141 sec, FAF
e	0	50 AGL	83 Approach	155	



Nellis AFB (1,868 ft MSL), Instrument Arrivals Flight Profile 21I01
PW220 ILS PROCEDURE
Based F-16C (F100-PW-220)
Runway 21L, Flight Track 21LI01 - USED FOR IFR ARRIVALS

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:148,000 (1 inch = 12,300 feet)

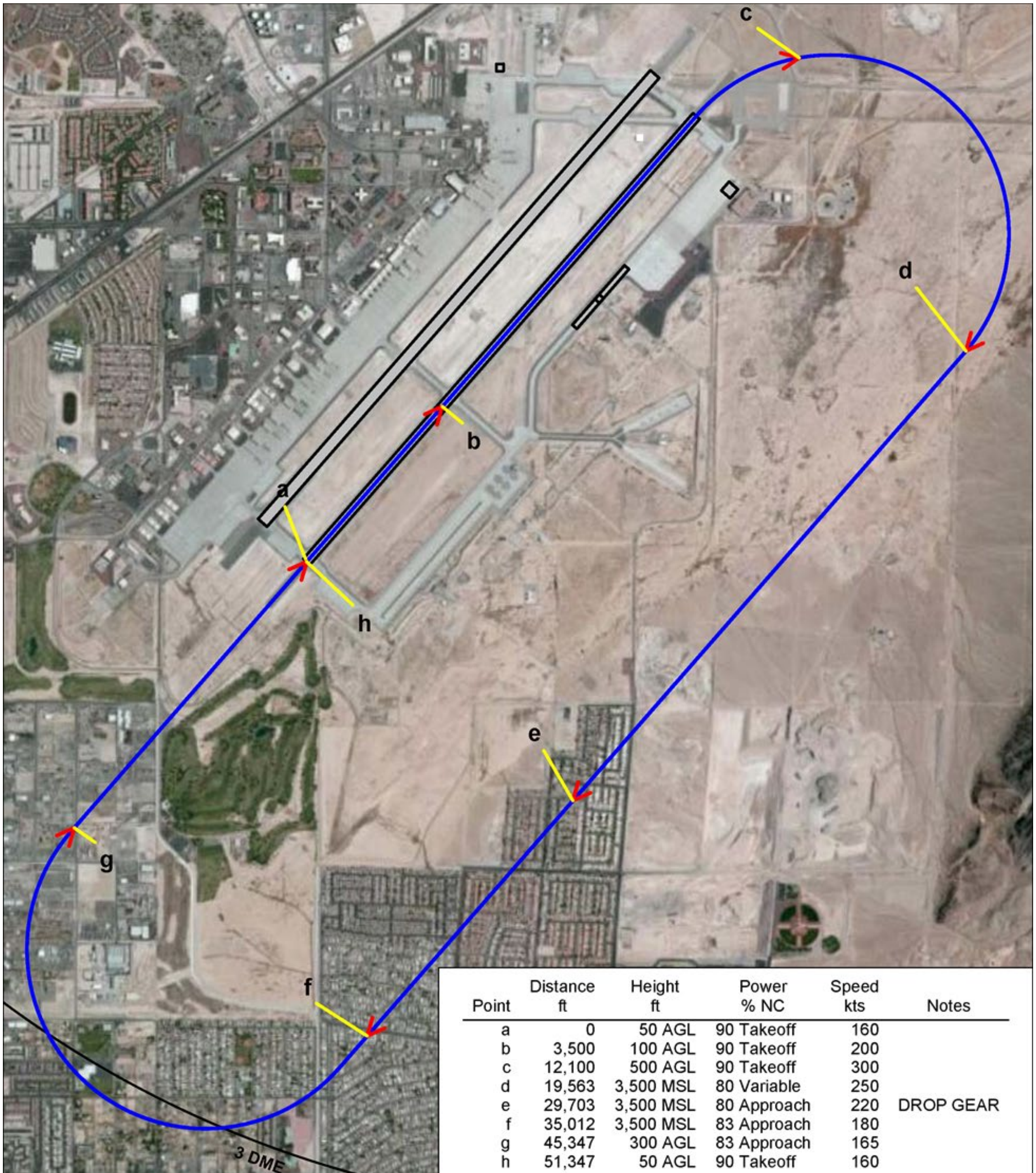


Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	50 AGL	90 Takeoff	160	+0.6° , +200 fpm, 16 sec
b	4,861	100 AGL	90 Takeoff	200	+0° , +0 fpm, 13 sec
c	10,329	1,000 AGL	90 Takeoff	300	+15.4° , +8100 fpm, 31 sec
d	25,973	4,400 MSL	80 Variable	300	+0° , +0 fpm, 64 sec
e	58,550	4,400 MSL	80 Variable	300	-3.6° , -1900 fpm, 28 sec
f	72,913	3,500 MSL	80 Variable	300	+0° , +0 fpm, 48 sec
g	97,436	3,500 MSL	80 Variable	300	+0° , +0 fpm, 17 sec, TURN TO DOWNWIND
h	105,417	3,500 MSL	80 Variable	250	+0° , +0 fpm, 8 sec
i	108,782	3,500 MSL	80 Approach	220	+0° , +0 fpm, 12 sec, DROP GEAR
j	113,123	3,500 MSL	83 Approach	200	-20.4° , -6500 fpm, 28 sec
k	121,738	300 AGL	83 Approach	170	-2.4° , -700 fpm, 22 sec
l	127,738	50 AGL	90 Takeoff	160	

Nellis AFB (1,868 ft MSL), Visual ReEntry Pattern Flight Profile 21RE02
PW220 DUCK REENTRY
Based F-16C (F100-PW-229)
Runway 21L, Flight Track 21LR01 - VFR (DUCK) Re-entry

0 4,000 8,000 12,000 16,000 20,000
Scale in Feet 1:72,700 (1 inch = 6,060 feet)

N



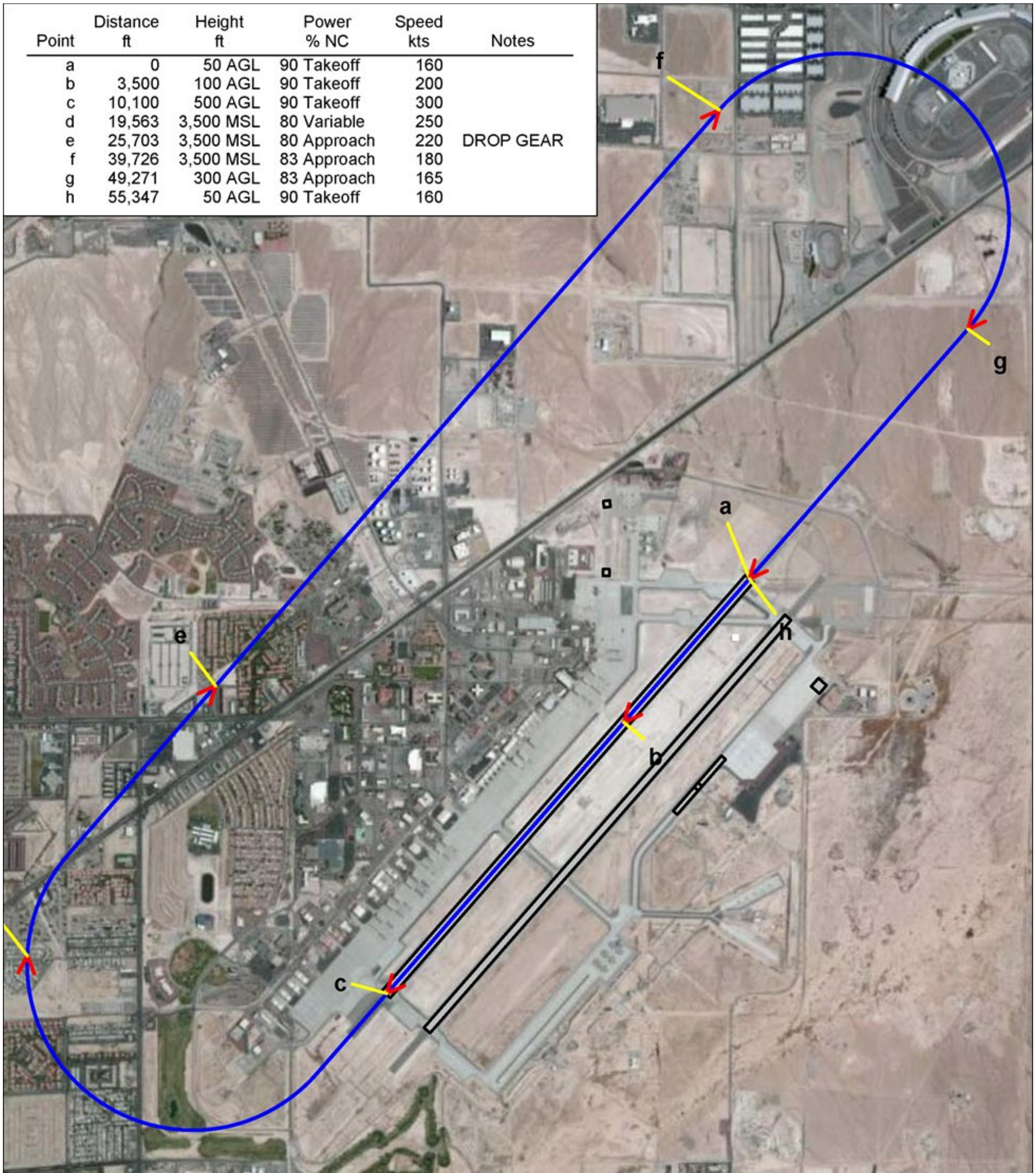
Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	50 AGL	90 Takeoff	160	
b	3,500	100 AGL	90 Takeoff	200	
c	12,100	500 AGL	90 Takeoff	300	
d	19,563	3,500 MSL	80 Variable	250	
e	29,703	3,500 MSL	80 Approach	220	DROP GEAR
f	35,012	3,500 MSL	83 Approach	180	
g	45,347	300 AGL	83 Approach	165	
h	51,347	50 AGL	90 Takeoff	160	

Nellis AFB (1,868 ft MSL), Visual Pattern Flight Profile 21V02
PW220 VFR INSIDE DOWNWIND
Based F-16C (F100-PW-220)
Runway 03R, Flight Track 03RV01 - Sunrise closed

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000
Scale in Feet 1:24,700 (1 inch = 2,060 feet)

N

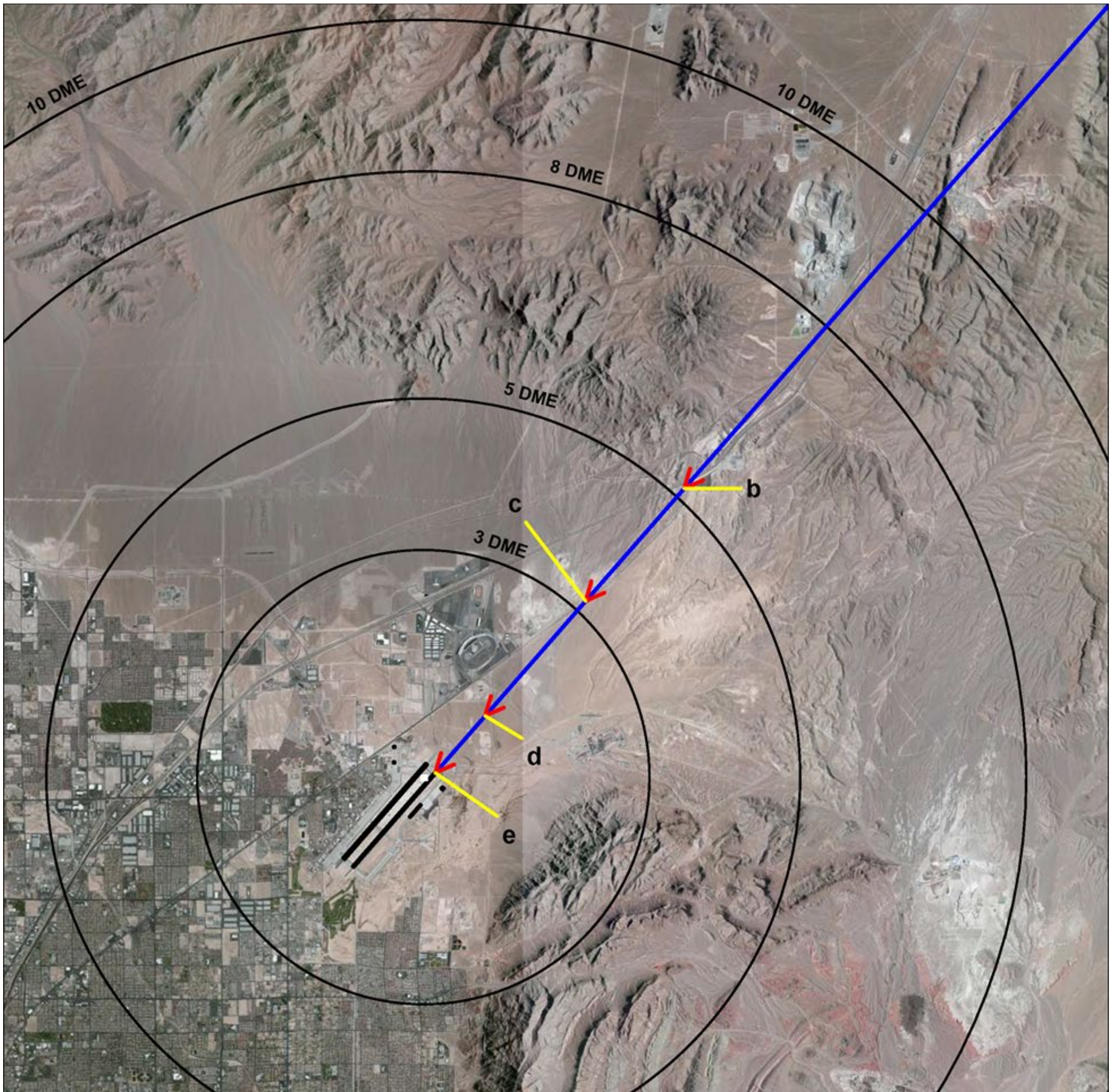
Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	50 AGL	90 Takeoff	160	
b	3,500	100 AGL	90 Takeoff	200	
c	10,100	500 AGL	90 Takeoff	300	
d	19,563	3,500 MSL	80 Variable	250	
e	25,703	3,500 MSL	80 Approach	220	DROP GEAR
f	39,726	3,500 MSL	83 Approach	180	
g	49,271	300 AGL	83 Approach	165	
h	55,347	50 AGL	90 Takeoff	160	



Nellis AFB (1,868 ft MSL), Visual Pattern Flight Profile 21V06
PW220 VFR INSIDE DOWNWIND
Based F-16C (F100-PW-220)
Runway 21R, Flight Track 21RV01_2 - Standard closed

Scale in Feet 1:26,700 (1 inch = 2,220 feet)

Flight Profiles for 65th Aggressor Squadron and 422nd TES F-35s



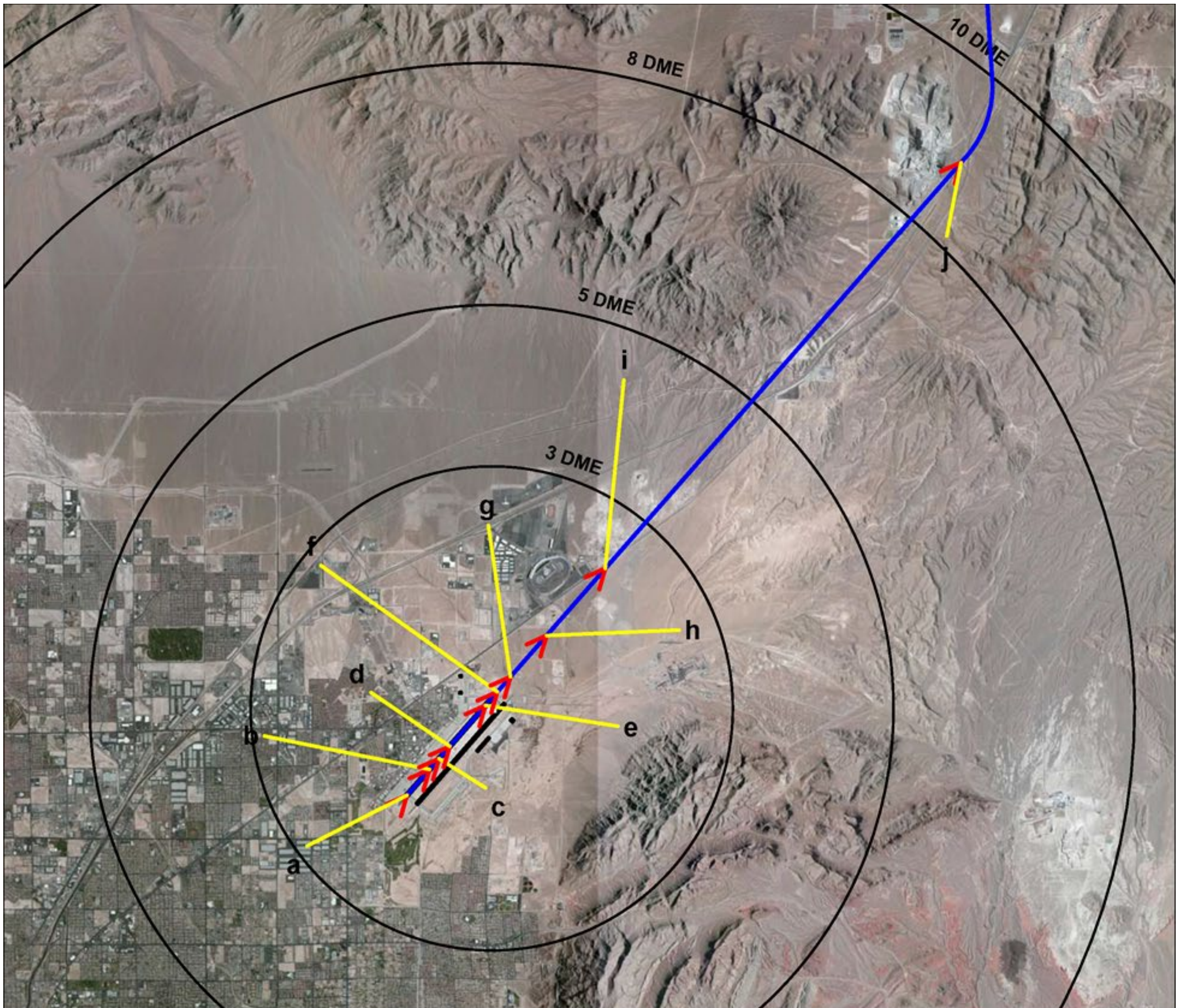
Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	200,000	15,000 MSL	15 Variable	350	-3.7° , -1900 fpm, 370 sec, Change to legacy elevation
b	30,380	3,400 MSL	45 Parallel	225	-2.4° , -800 fpm, 36 sec, Initial 5nm, 3400 feet Gear down
c	18,350	2,889 MSL	45 Parallel	170	-3.2° , -900 fpm, 43 sec, 3 degree glide slope
d	6,080	2,168 MSL	45 Parallel	170	-2.6° , -700 fpm, 23 sec, Converted to MSL from here on per course rules
e	0	50 AGL	45 Parallel	150	Threshold crossing, approx. 1200 feet from touchdown point

Nellis AFB (1,868 ft MSL), Instrument Arrivals Flight Profile 22I01
ILS APPROACH P14
Based F-35A (F-135-PW-100)
Runway 21L, Flight Track 21LI01 - USED FOR IFR ARRIVALS

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000

Scale in Feet 1:126,000 (1 inch = 10,500 feet)

N



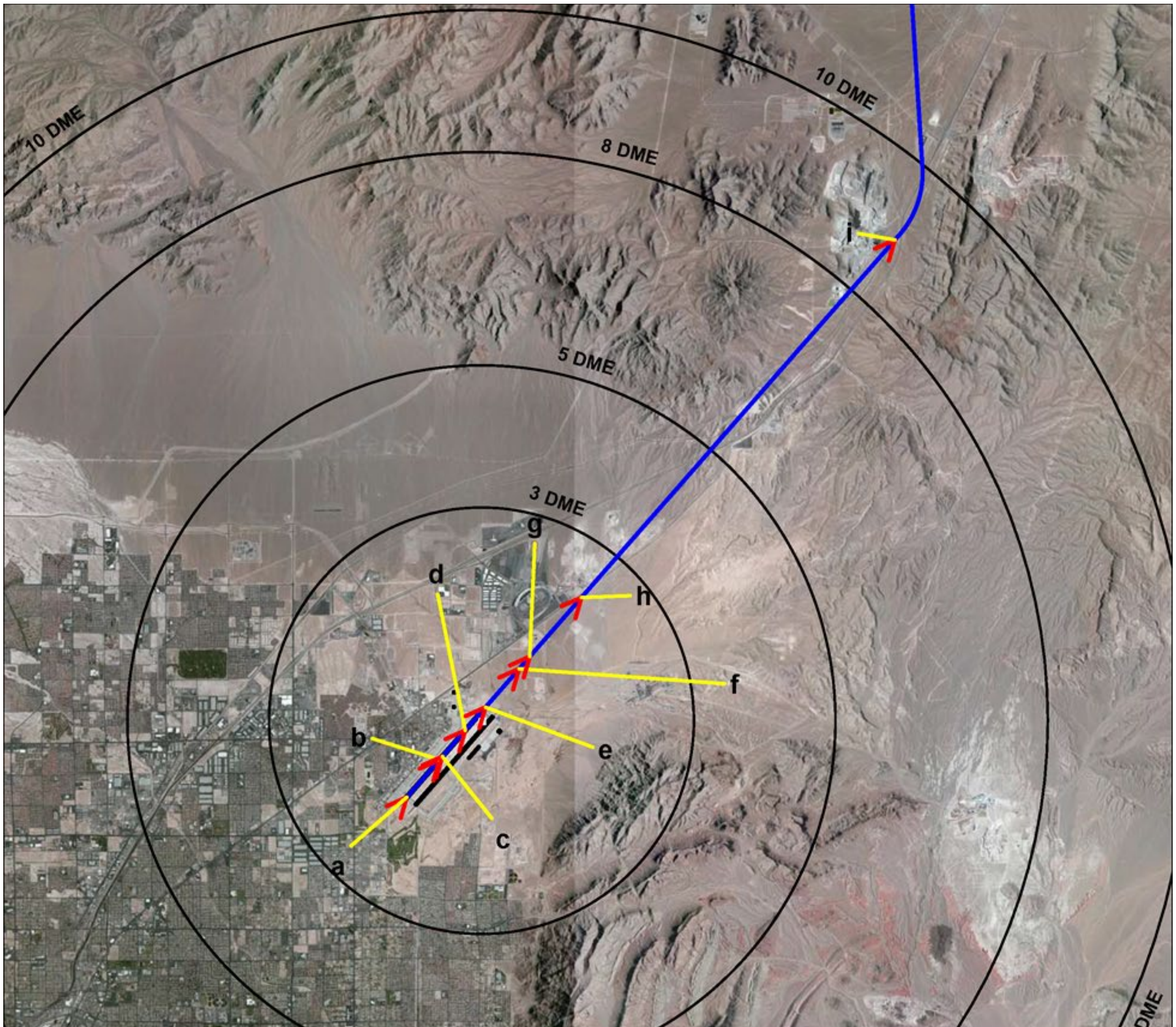
Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	0 AGL	12 50% ETR	0	+0° , +0 fpm, 16 sec, 1 second @ 50%ETR before brake release
b	2,585	0 AGL	150 Afterburner	190	+0.9° , +300 fpm, 3 sec, lift-off; initiate gear up
c	3,676	18 AGL	150 Afterburner	200	+3.5° , +1400 fpm, 3 sec
d	4,908	93 AGL	150 Afterburner	251	+3.8° , +1800 fpm, 9 sec
e	9,000	362 AGL	150 Afterburner	287	+3.8° , +2000 fpm, 3 sec
f	10,364	452 AGL	100 Variable	300	+10.6° , +5600 fpm, 3 sec
g	11,871	2,622 MSL	100 Variable	300	+38.4° , +20400 fpm, 8 sec, Converted to MSL from hereon per course r
h	16,000	3,900 MSL	100 Variable	350	-4.3° , -2600 fpm, 11 sec, resume Nellis profile except 100% ETR vice 9
i	22,725	5,400 MSL	80 Variable	350	+2.3° , +1400 fpm, 69 sec
j	63,422	7,000 MSL	80 Variable	350	+4.4° , +2700 fpm, 400 sec
k	196,000	25,000 MSL	55 Variable	350	

Nellis AFB (1,868 ft MSL), Departure Flight Profile 22D01AB
dream a/b P1
Based F-35A (F-135-PW-100)
Runway 03L, Flight Track 03LD01 - DREAM 4
Prior to brake release, aircraft sits at 12 % ETR 50% ETR for 1 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:125,000 (1 inch = 10,400 feet)

N



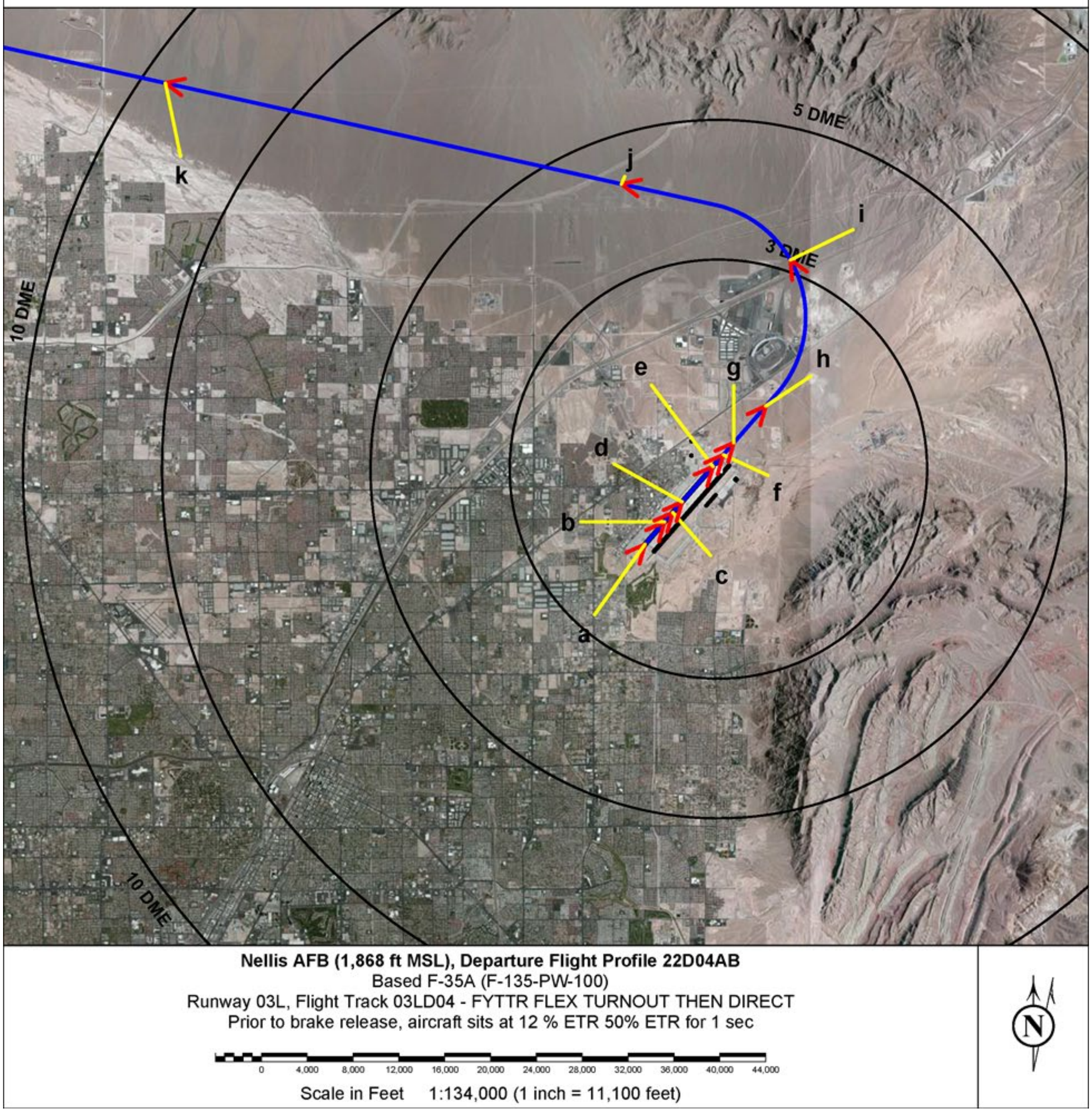
Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	0 AGL	12 50% ETR	0	+0° , +0 fpm, 27 sec, 1 seconds @ 50%ETR before brake release
b	4,258	0 AGL	100 Variable	190	+2.7° , +1000 fpm, 1 sec, Lift-off, initiate gear up
c	4,634	18 AGL	100 Variable	203	+2.6° , +1000 fpm, 8 sec
d	7,616	153 AGL	100 Variable	244	+6° , +2700 fpm, 6 sec
e	10,242	430 AGL	100 Variable	273	+10.1° , +5100 fpm, 9 sec
f	14,613	3,112 MSL	100 Variable	300	+29.6° , +16300 fpm, 3 sec, Converted to MSL from here on per course ru
g	16,000	3,900 MSL	80 Variable	350	+12.6° , +7700 fpm, 11 sec, Resume previous modeling
h	22,725	5,400 MSL	80 Variable	350	+2.3° , +1400 fpm, 69 sec
i	63,422	7,000 MSL	80 Variable	350	+4.4° , +2700 fpm, 400 sec
j	196,000	25,000 MSL	55 Variable	350	

Nellis AFB (1,868 ft MSL), Departure Flight Profile 22D01M
dream1 MIL P2
Based F-35A (F-135-PW-100)
Runway 03L, Flight Track 03LD01 - DREAM 4
Prior to brake release, aircraft sits at 12 % ETR 50% ETR for 1 sec

Scale in Feet 1:142,000 (1 inch = 11,800 feet)

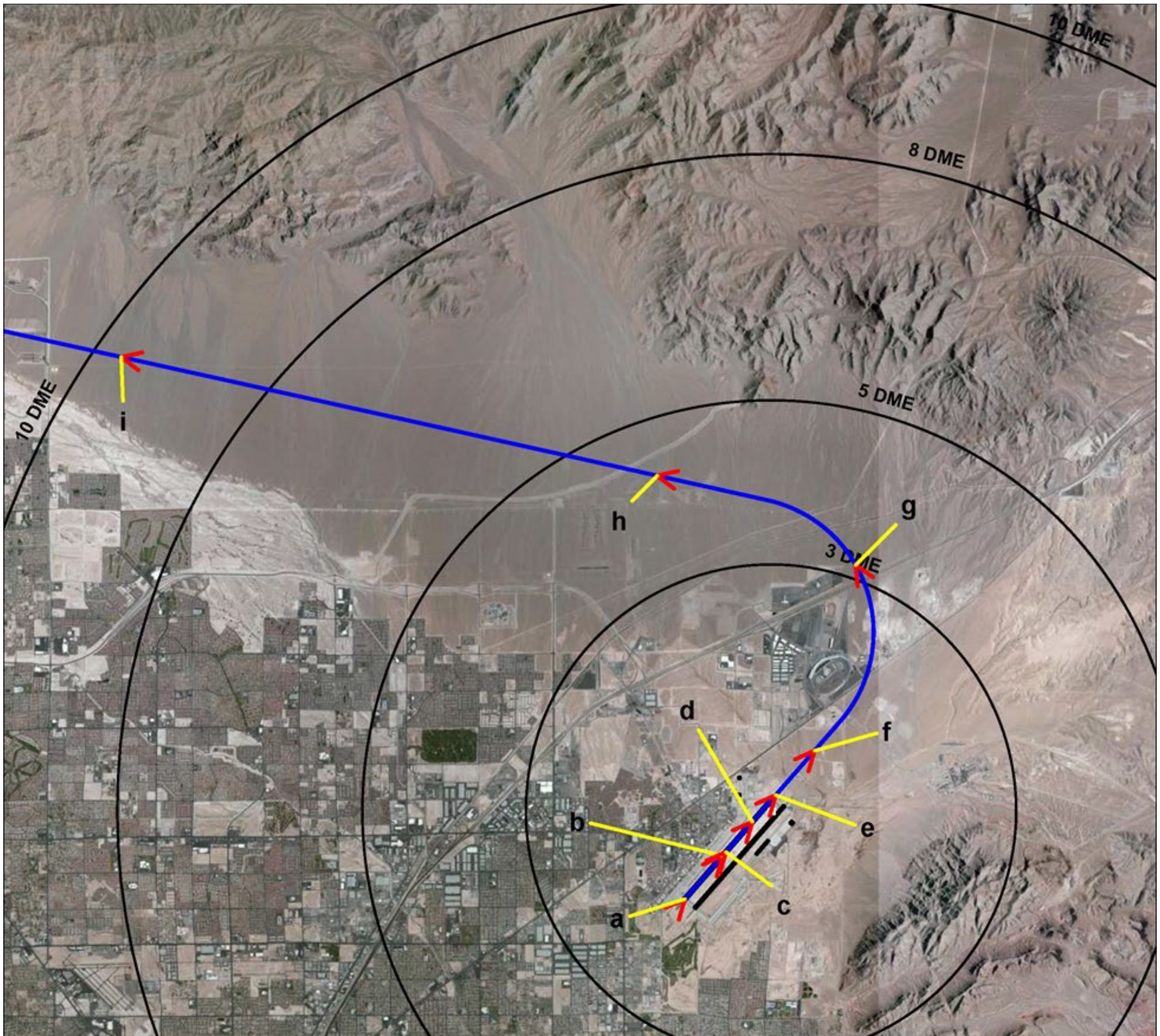
COC

Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	0 AGL	12 50% ETR	0	+0° , +0 fpm, 16 sec, 1 second @ 50%ETR before brake release
b	2,585	0 AGL	150 Afterburner	190	+0.9° , +300 fpm, 3 sec, lift-off; initiate gear up
c	3,676	18 AGL	150 Afterburner	200	+3.5° , +1400 fpm, 3 sec
d	4,908	93 AGL	150 Afterburner	251	+3.8° , +1800 fpm, 9 sec
e	9,000	362 AGL	150 Afterburner	287	+3.8° , +2000 fpm, 3 sec
f	10,364	452 AGL	100 Variable	300	+11° , +5800 fpm, 3 sec
g	11,754	2,622 MSL	100 Variable	300	+5.1° , +2900 fpm, 8 sec, Converted to MSL from here on per course rule
h	16,000	3,000 MSL	100 Variable	350	+2.1° , +1300 fpm, 24 sec, resume Nellis profile except 100% ETR vice 9
i	29,924	3,500 MSL	45 Variable	350	+8.5° , +5200 fpm, 28 sec
j	46,672	6,000 MSL	80 Variable	350	+1.4° , +900 fpm, 69 sec
k	87,428	7,000 MSL	80 Variable	350	+0.7° , +400 fpm, 360 sec
l	236,000	2,500 MSL	55 Variable	350	



Nellis AFB (1,868 ft MSL), Departure Flight Profile 22D04AB
Based F-35A (F-135-PW-100)
Runway 03L, Flight Track 03LD04 - FYTTR FLEX TURNOUT THEN DIRECT
Prior to brake release, aircraft sits at 12 % ETR 50% ETR for 1 sec

Scale in Feet 1:134,000 (1 inch = 11,100 feet)

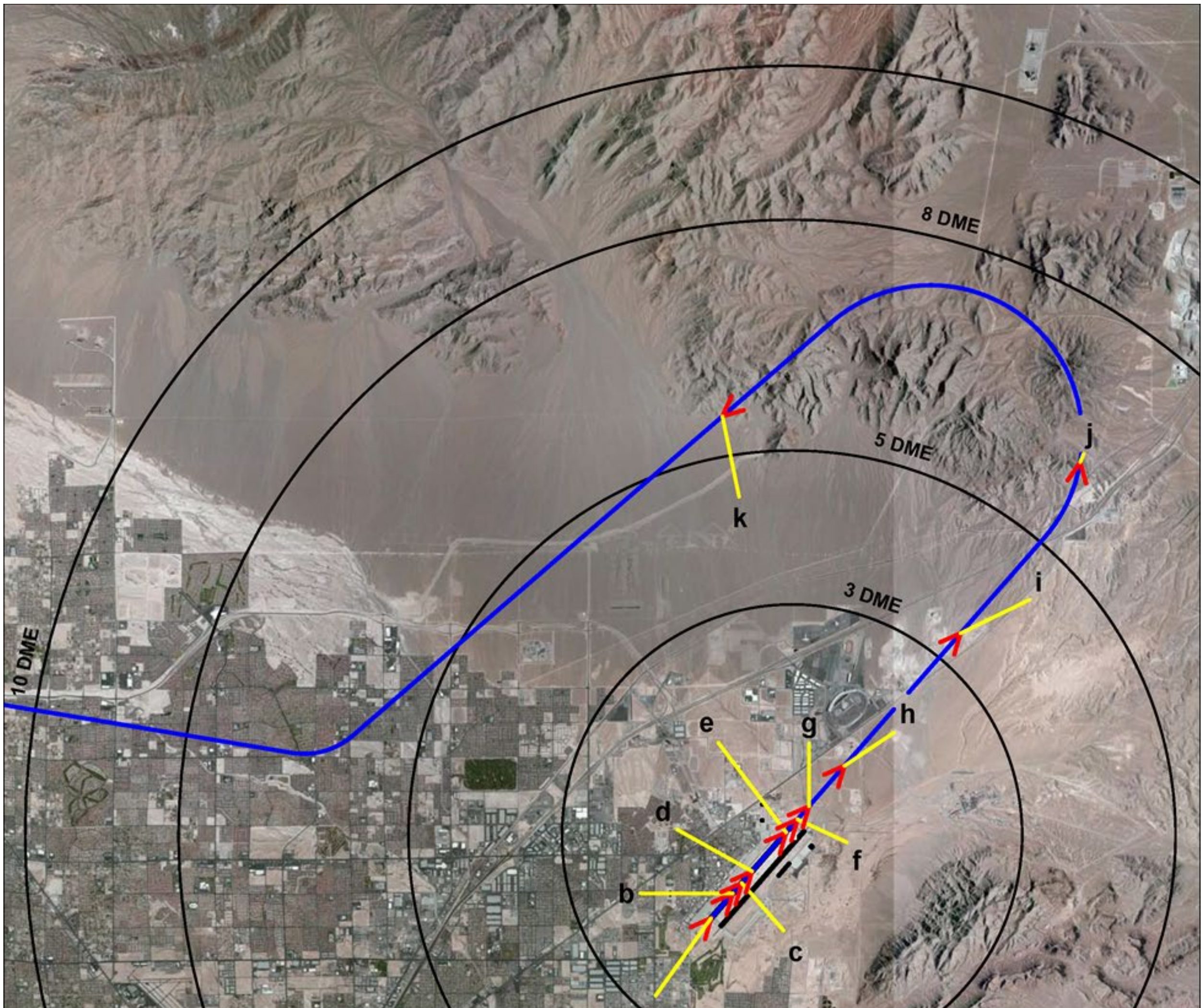


Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	0 AGL	12 50% ETR	0	+0° , +0 fpm, 27 sec, 1 seconds @ 50%ETR before brake release
b	4,258	0 AGL	100 Variable	190	+2.7° , +1000 fpm, 1 sec, Lift-off, initiate gear up
c	4,634	18 AGL	100 Variable	203	+2.6° , +1000 fpm, 8 sec
d	7,616	153 AGL	100 Variable	244	+6° , +2700 fpm, 6 sec
e	10,242	430 AGL	100 Variable	273	+10° , +5000 fpm, 9 sec
f	14,613	3,102 MSL	100 Variable	300	+1.5° , +900 fpm, 28 sec, Converted to MSL from here on per course rules
g	29,924	3,500 MSL	45 Variable	350	+8.5° , +5200 fpm, 28 sec, Ressume previous modeling
h	46,672	6,000 MSL	80 Variable	350	+1.4° , +900 fpm, 69 sec
i	87,428	7,000 MSL	80 Variable	350	+0.7° , +400 fpm, 360 sec
j	236,000	25,000 MSL	55 Variable	350	

Nellis AFB (1,868 ft MSL), Departure Flight Profile 22D04M
Based F-35A (F-135-PW-100)
Runway 03L, Flight Track 03LD04 - FYTTR FLEX TURNOUT THEN DIRECT
Prior to brake release, aircraft sits at 12 % ETR 50% ETR for 1 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000
Scale in Feet 1:121,000 (1 inch = 10,100 feet)

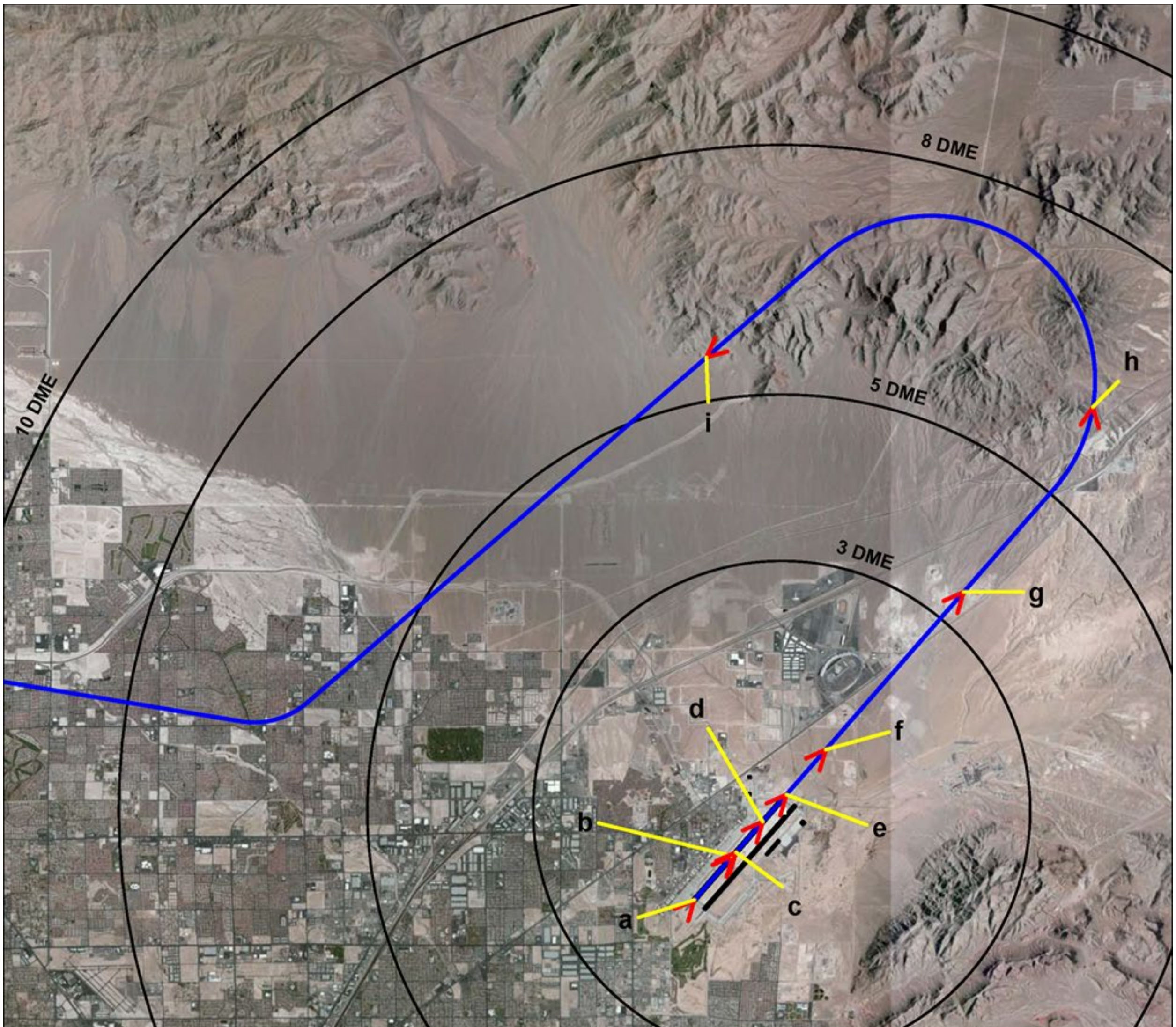
N



Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	0 AGL	12 50% ETR	0	+0° , +0 fpm, 16 sec, 1 second @ 50%ETR before brake release
b	2,585	0 AGL	150 Afterburner	190	+0.9° , +300 fpm, 3 sec, lift-off; initiate gear up
c	3,676	18 AGL	150 Afterburner	200	+3.5° , +1400 fpm, 3 sec
d	4,908	93 AGL	150 Afterburner	251	+3.8° , +1800 fpm, 9 sec
e	9,000	362 AGL	150 Afterburner	287	+3.8° , +2000 fpm, 3 sec
f	10,364	452 AGL	100 Variable	300	+11° , +5800 fpm, 3 sec
g	11,754	2,622 MSL	100 Variable	300	+5.1° , +2900 fpm, 8 sec, Converted to MSL from here on per course rule
h	16,000	3,000 MSL	100 Variable	350	+2.1° , +1300 fpm, 24 sec, resume Nellis profile except 100% ETR vice 9
i	29,924	3,500 MSL	45 Variable	350	+8.5° , +5200 fpm, 28 sec
j	46,672	6,000 MSL	80 Variable	350	+1.4° , +900 fpm, 69 sec
k	87,428	7,000 MSL	80 Variable	350	+0.7° , +400 fpm, 360 sec
l	236,000	2,500 MSL	55 Variable	350	

Nellis AFB (1,868 ft MSL), Departure Flight Profile 22D05AB
hiway2 flex turnout a/b P1
Based F-35A (F-135-PW-100)
Runway 03L, Flight Track 03LD05 - FYTTR THREE (CLIMB TO 5800 MSL BEFORE TURN TO WEST)
Prior to brake release, aircraft sits at 12 % ETR 50% ETR for 1 sec

Scale in Feet 1:134,000 (1 inch = 11,100 feet)

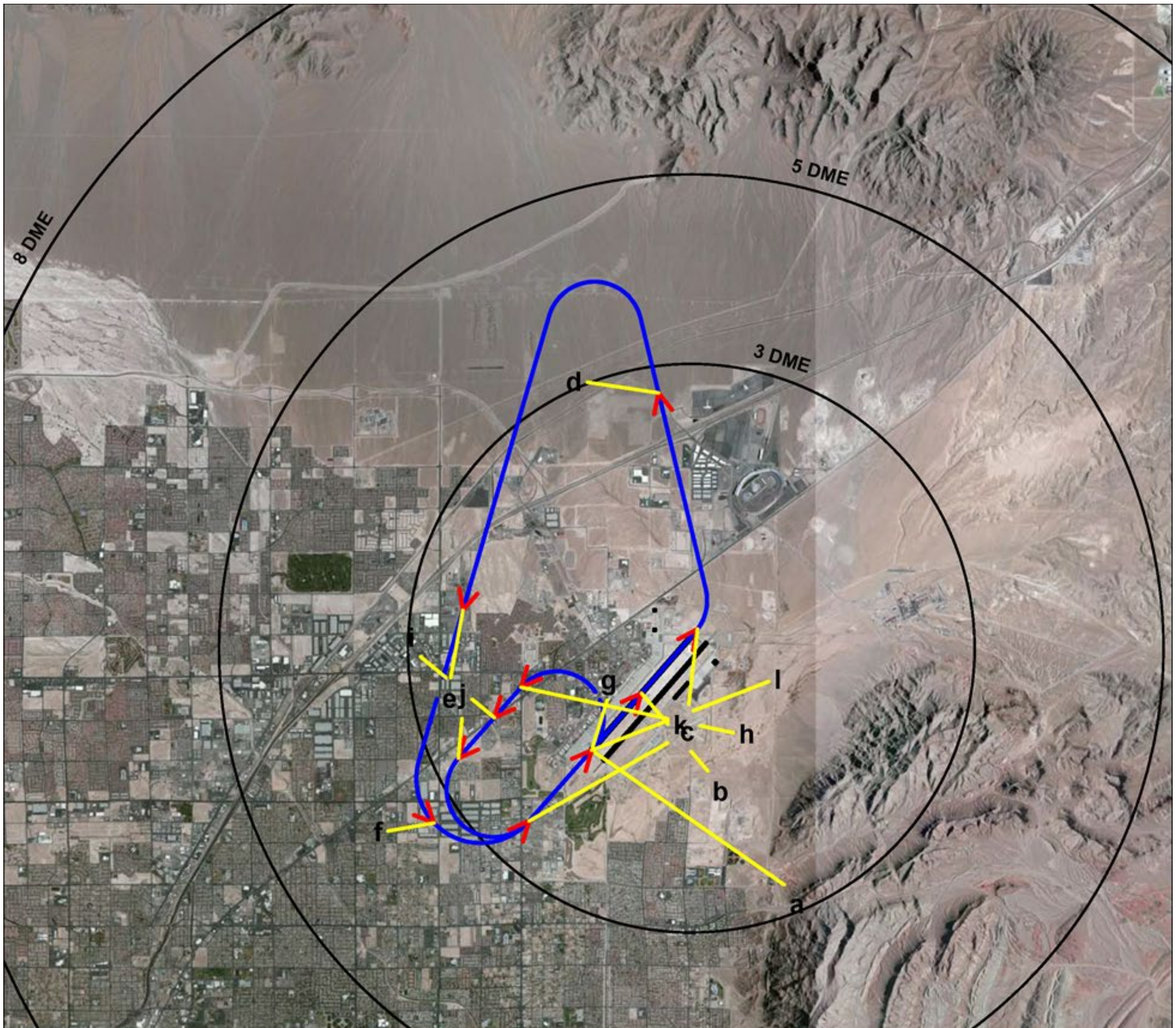


Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	0 AGL	12 50% ETR	0	+0° , +0 fpm, 27 sec, 1 seconds @ 50%ETR before brake release
b	4,258	0 AGL	100 Variable	190	+2.7° , +1000 fpm, 1 sec, Lift-off, initiate gear up
c	4,634	18 AGL	100 Variable	203	+2.6° , +1000 fpm, 8 sec
d	7,616	153 AGL	100 Variable	244	+6° , +2700 fpm, 6 sec
e	10,242	430 AGL	100 Variable	273	+10° , +5000 fpm, 9 sec
f	14,613	3,102 MSL	100 Variable	300	+1.5° , +900 fpm, 28 sec, Converted to MSL from here on per course rules
g	29,924	3,500 MSL	45 Variable	350	+8.5° , +5200 fpm, 28 sec, Ressume previous modeling
h	46,672	6,000 MSL	80 Variable	350	+1.4° , +900 fpm, 69 sec
i	87,428	7,000 MSL	80 Variable	350	+0.7° , +400 fpm, 360 sec
j	236,000	25,000 MSL	55 Variable	350	

Nellis AFB (1,868 ft MSL), Departure Flight Profile 22D05M
hiway2 flex turnout MIL P2
Based F-35A (F-135-PW-100)
Runway 03L, Flight Track 03LD05 - FYTTR THREE (CLIMB TO 5800 MSL BEFORE TURN TO WEST)
Prior to brake release, aircraft sits at 12 % ETR 50% ETR for 1 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000
Scale in Feet 1:121,000 (1 inch = 10,100 feet)

N

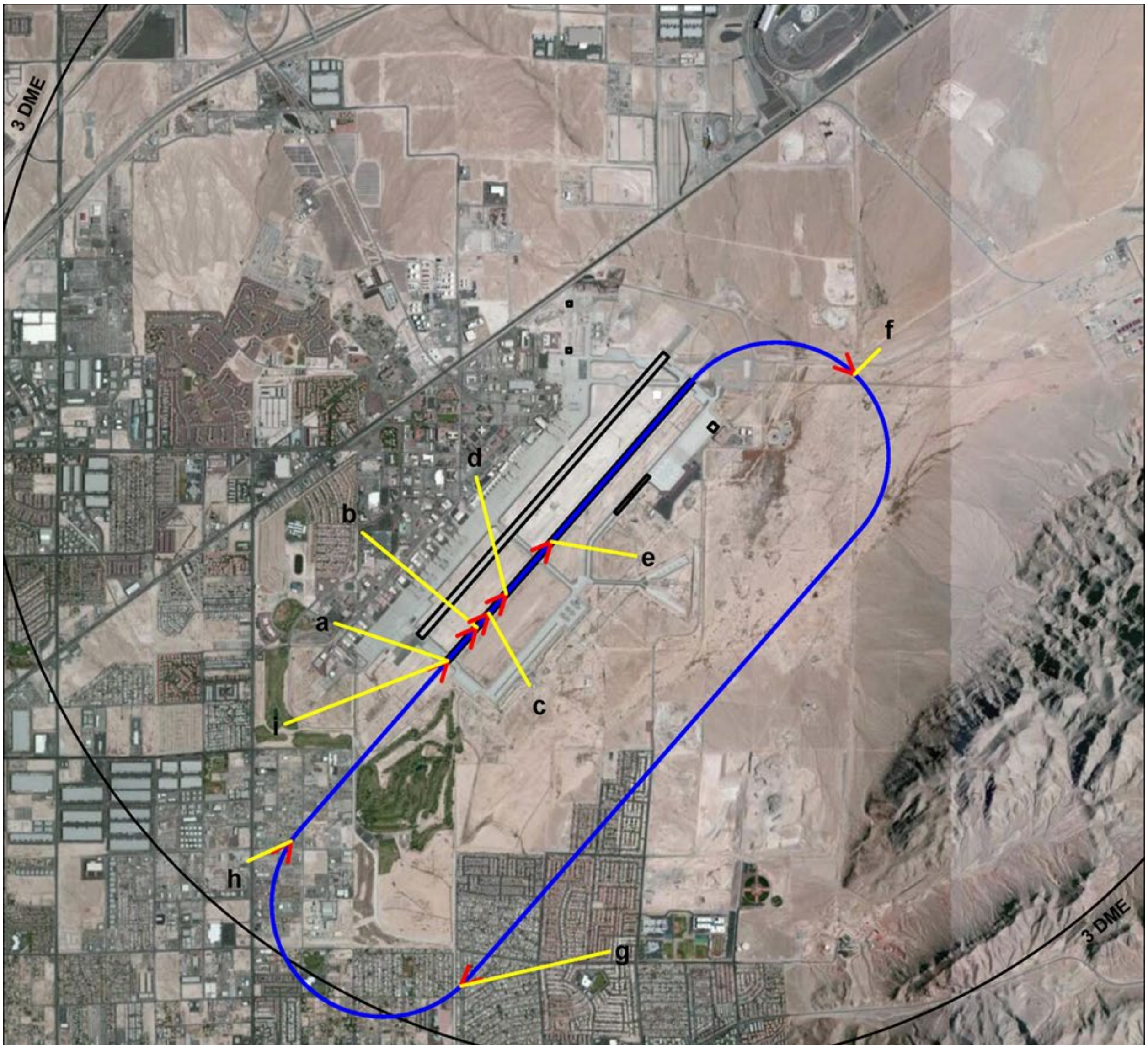


Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	50 AGL	100 Variable	150	Threshold crossing, no touchdown
b	4,860	50 AGL	100 Variable	150	begin to climb
c	10,329	75 AGL	100 Variable	170	
d	25,972	153 AGL	100 Variable	250	
e	58,550	4,900 MSL	80 Variable	300	
f	72,913	4,900 MSL	45 Variable	300	
g	85,859	4,900 MSL	35 Variable	250	Resume Nellis P9 Profile
h	95,404	1,500 AGL	35 Variable	225	Break point approach end of runway, power between idle and 35% in break 3
i	98,000	1,500 AGL	35 Parallel	225	
j	101,480	1,500 AGL	35 Parallel	170	45 degrees off of point of intended landing, start turn final ~ 6080 feet
k	111,024	325 AGL	55 Parallel	170	
l	117,100	50 AGL	100 Variable	150	Threshold crossing, approx. 1200 feet from thouchdown point and approx 15

Nellis AFB (1,868 ft MSL), Visual ReEntry Pattern Flight Profile 22RE01
Based F-35A (F-135-PW-100)
Runway 03L, Flight Track 03LR01 - VFR FLEX Re-entry (Outside Closed)

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000
Scale in Feet 1:106,000 (1 inch = 8,840 feet)

N



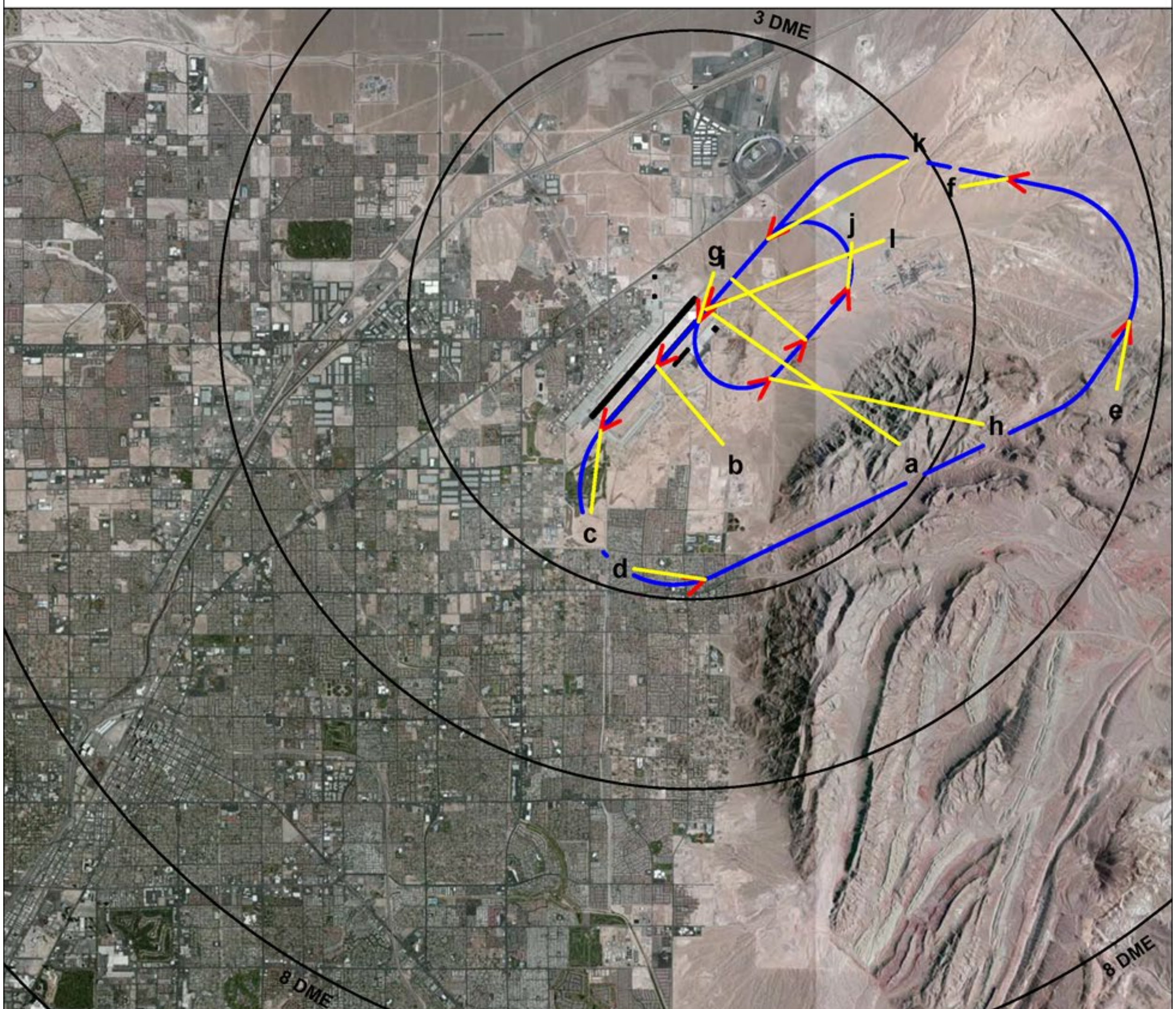
Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	50 AGL	45 Parallel	150	-2.4° , -600 fpm, 5 sec, -Threshold Crossing
b	1,200	0 AGL	100 Variable	150	+0° , +0 fpm, 2 sec, Touchdown speed and Mil Power
c	1,700	0 AGL	100 Variable	150	+2° , +600 fpm, 3 sec
d	2,405	25 AGL	100 Variable	170	+8.4° , +2900 fpm, 6 sec, Gear up
e	4,274	300 AGL	100 Variable	225	+6.4° , +2500 fpm, 28 sec
f	14,979	1,500 AGL	50 Variable	225	+0° , +0 fpm, 63 sec, Change, pattern elv to 1600 per course rules
g	36,004	1,500 AGL	35 Parallel	170	-7.7° , -2300 fpm, 31 sec, 45 degrees off of point of intended landing, start tu
h	44,887	300 AGL	55 Parallel	170	-2.2° , -600 fpm, 24 sec
i	51,347	50 AGL	45 Parallel	150	Threshold crossing, approx, 1200. 1200 feet from touchdown.

Nellis AFB (1,868 ft MSL), Visual Pattern Flight Profile 22V02
VISUAL CLOSED P21
Based F-35A (F-135-PW-100)
Runway 03R, Flight Track 03RV01 - Sunrise closed

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000
Scale in Feet 1:43,600 (1 inch = 3,640 feet)

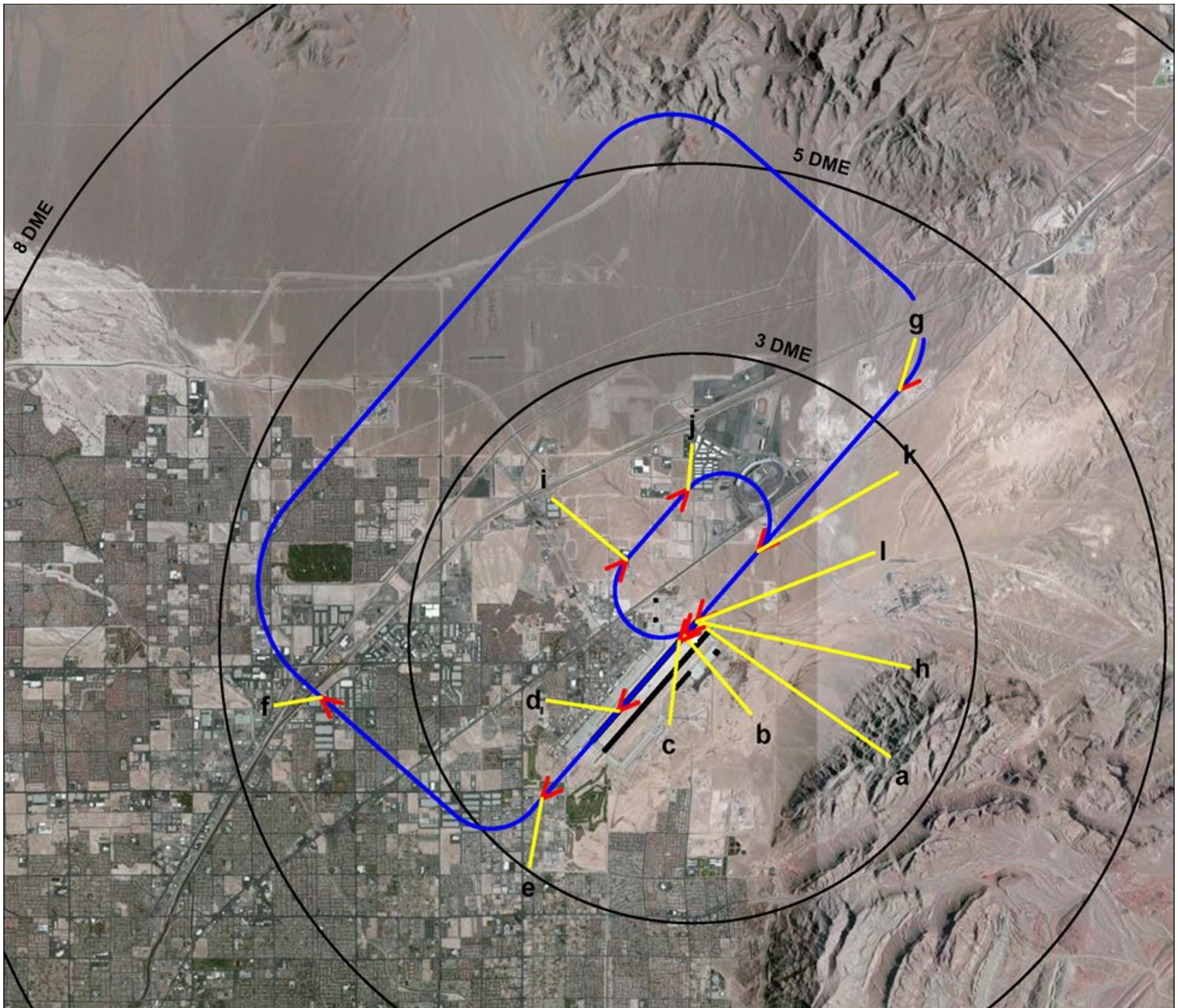
N

Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	50 AGL	100 Variable	150	Threshold crossing, no touchdown
b	4,860	50 AGL	100 Variable	150	begin to climb
c	10,329	75 AGL	100 Variable	170	
d	25,972	153 AGL	100 Variable	250	
e	58,550	4,900 MSL	80 Variable	300	
f	72,913	4,900 MSL	45 Variable	300	
g	97,435	4,900 MSL	35 Variable	250	Resume Nellis P9 Profile
h	105,416	1,500 AGL	35 Variable	225	Break point approach end of runway, power between idle and 35% in break 3
i	108,782	1,500 AGL	35 Parallel	225	
j	113,122	1,500 AGL	35 Parallel	170	45 degrees off of point of intended landing, start turn final ~ 6080 feet
k	121,738	325 AGL	45 Parallel	170	
l	127,738	50 AGL	100 Variable	150	Threshold crossing, approx. 1200 feet from thouchdown point and approx 15



Nellis AFB (1,868 ft MSL), Visual ReEntry Pattern Flight Profile 22RE02
DUCK REENRTY
Based F-35A (F-135-PW-100)
Runway 21L, Flight Track 21LR01 - VFR (DUCK) Re-entry

Scale in Feet 1:106,000 (1 inch = 8,840 feet)



Point	Distance ft	Height ft	Power % ETR	Speed kts	Notes
a	0	50 AGL	100 Variable	150	+0° , +0 fpm, 5 sec, Threshold crossing, no touchdown
b	1,200	50 AGL	100 Variable	150	+2.9° , +800 fpm, 2 sec, begin to climb
c	1,700	75 AGL	100 Variable	170	+0.8° , +300 fpm, 17 sec
d	7,616	153 AGL	100 Variable	250	+20.9° , +9900 fpm, 16 sec
e	15,070	4,900 MSL	80 Variable	300	+0° , +0 fpm, 35 sec
f	32,966	4,900 MSL	45 Variable	300	+0° , +0 fpm, 164 sec
g	109,000	4,900 MSL	35 Variable	250	-4.3° , -1800 fpm, 49 sec, Resume Nellis P9 Profile
h	128,747	1,500 AGL	35 Variable	225	+0° , +0 fpm, 25 sec, Break point approach end of runway, power between id
i	138,172	1,500 AGL	35 Parallel	225	+0° , +0 fpm, 18 sec, gear down
j	144,172	1,500 AGL	35 Parallel	170	-7.1° , -2100 fpm, 33 sec, 45 degrees off of point of intended landing, start tu
k	153,597	325 AGL	45 Parallel	170	-2.6° , -700 fpm, 22 sec
l	159,597	50 AGL	100 Variable	150	Threshold crossing, approx. 1200 feet from thouchdown point and approx 15

Nellis AFB (1,868 ft MSL), Visual ReEntry Pattern Flight Profile 22RE04
FLEX Re-Entry
Based F-35A (F-135-PW-100)
Runway 21R, Flight Track 21RR01 - visual re-entry

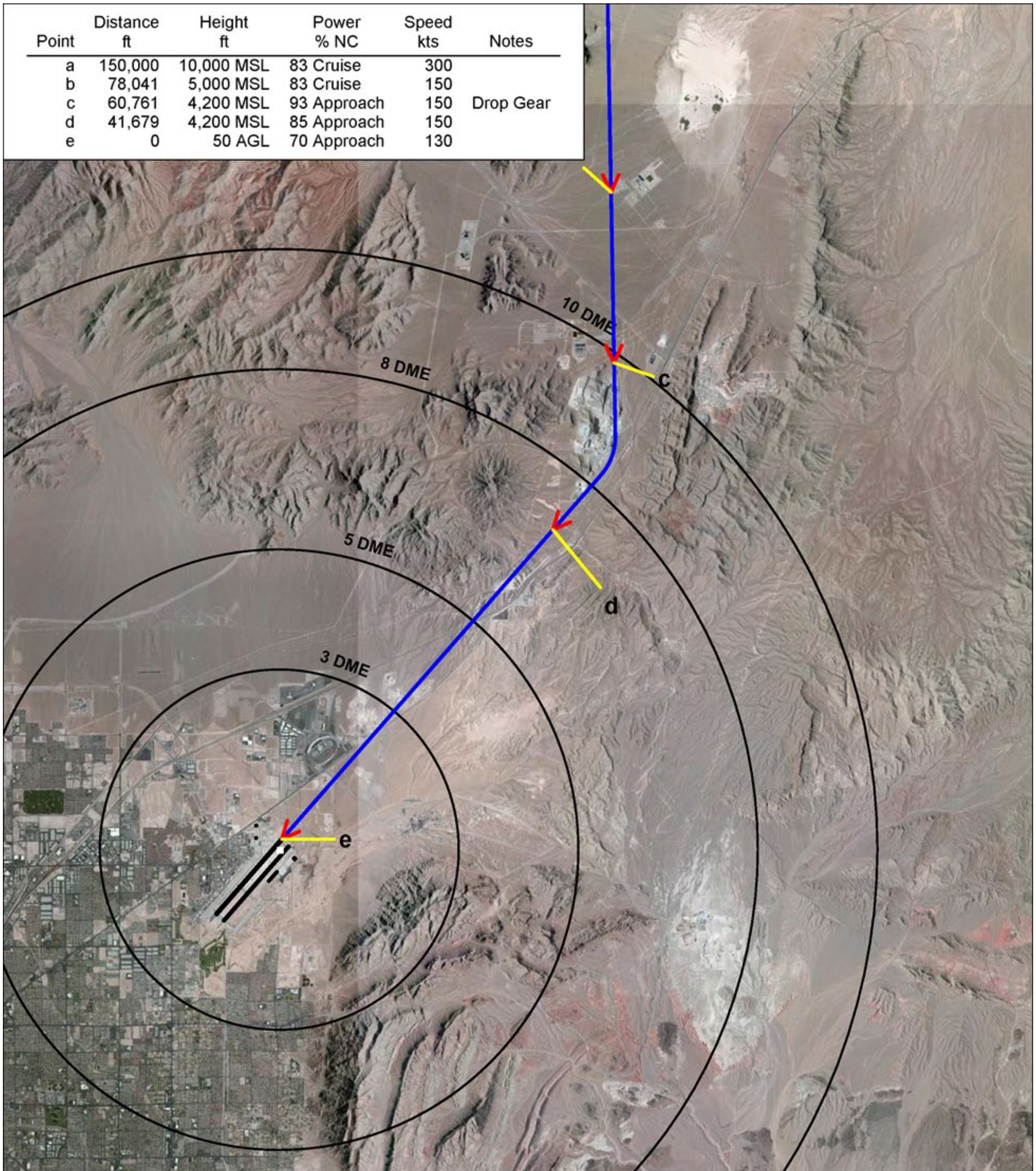
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:106,000 (1 inch = 8,840 feet)

N

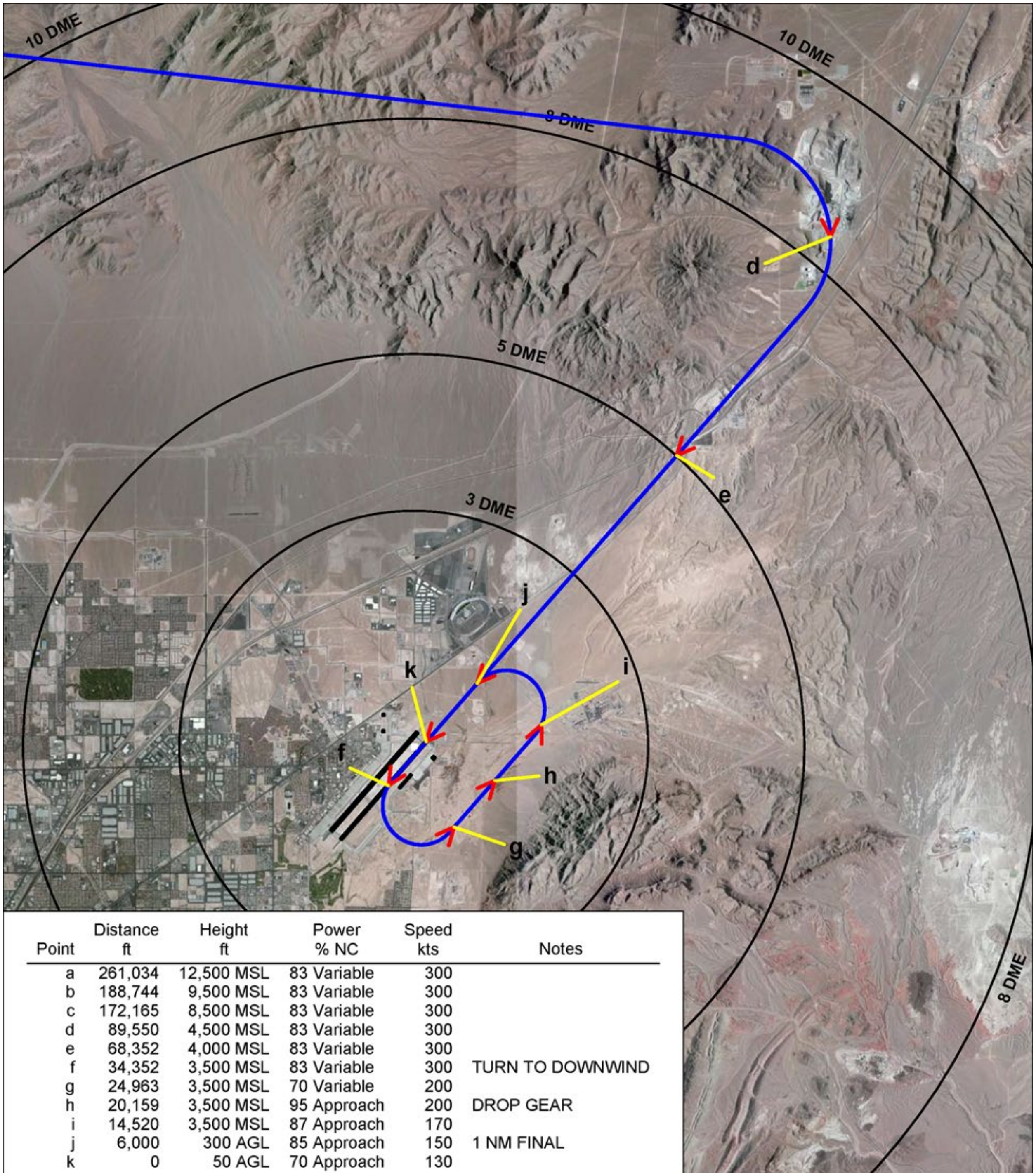
COCO ADAIR A-4N Flight Profiles(A-4C Surrogate)

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	150,000	10,000 MSL	83 Cruise	300	
b	78,041	5,000 MSL	83 Cruise	150	
c	60,761	4,200 MSL	93 Approach	150	Drop Gear
d	41,679	4,200 MSL	85 Approach	150	
e	0	50 AGL	70 Approach	130	



Nellis AFB (1,868 ft MSL), Non-Break Arrivals Flight Profile 26A19
RECOVERY FROM ARCOE TO VFR STRAIGHT
Based A-4N (J52-P-8B)
Runway 21R, Flight Track 21RA03 - ARCOE TO APEX FOR STRAIGHT IN

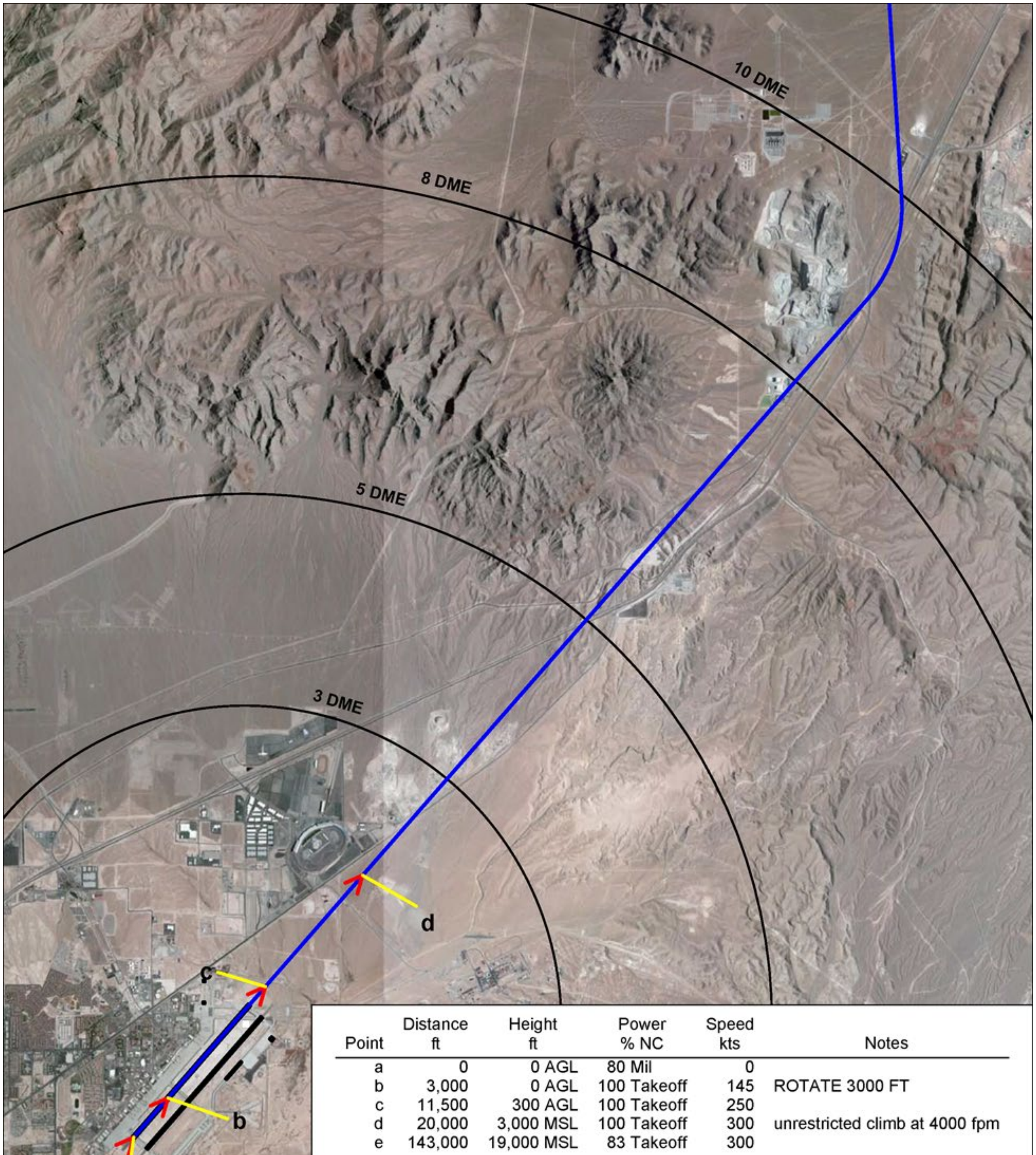
Scale in Feet 1:148,000 (1 inch = 12,300 feet)



Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	261,034	12,500 MSL	83 Variable	300	
b	188,744	9,500 MSL	83 Variable	300	
c	172,165	8,500 MSL	83 Variable	300	
d	89,550	4,500 MSL	83 Variable	300	
e	68,352	4,000 MSL	83 Variable	300	
f	34,352	3,500 MSL	83 Variable	300	TURN TO DOWNWIND
g	24,963	3,500 MSL	70 Variable	200	
h	20,159	3,500 MSL	95 Approach	200	DROP GEAR
i	14,520	3,500 MSL	87 Approach	170	
j	6,000	300 AGL	85 Approach	150	1 NM FINAL
k	0	50 AGL	70 Approach	130	

Nellis AFB (1,868 ft MSL), Break Arrivals Flight Profile 26B40
RECOVERY FROM STRYK/GASS/APEX BREAK 4000' DOWN RWY
Based A-4N (J52-P-8B)
Runway 21L, Flight Track 21LB07 - STRYK RECOVERY TO INITIAL BREAK 4000' DOWN RWY

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000
Scale in Feet 1:113,000 (1 inch = 9,420 feet)



Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	80 Mil	0	
b	3,000	0 AGL	100 Takeoff	145	ROTATE 3000 FT
c	11,500	300 AGL	100 Takeoff	250	
d	20,000	3,000 MSL	100 Takeoff	300	unrestricted climb at 4000 fpm
e	143,000	19,000 MSL	83 Takeoff	300	

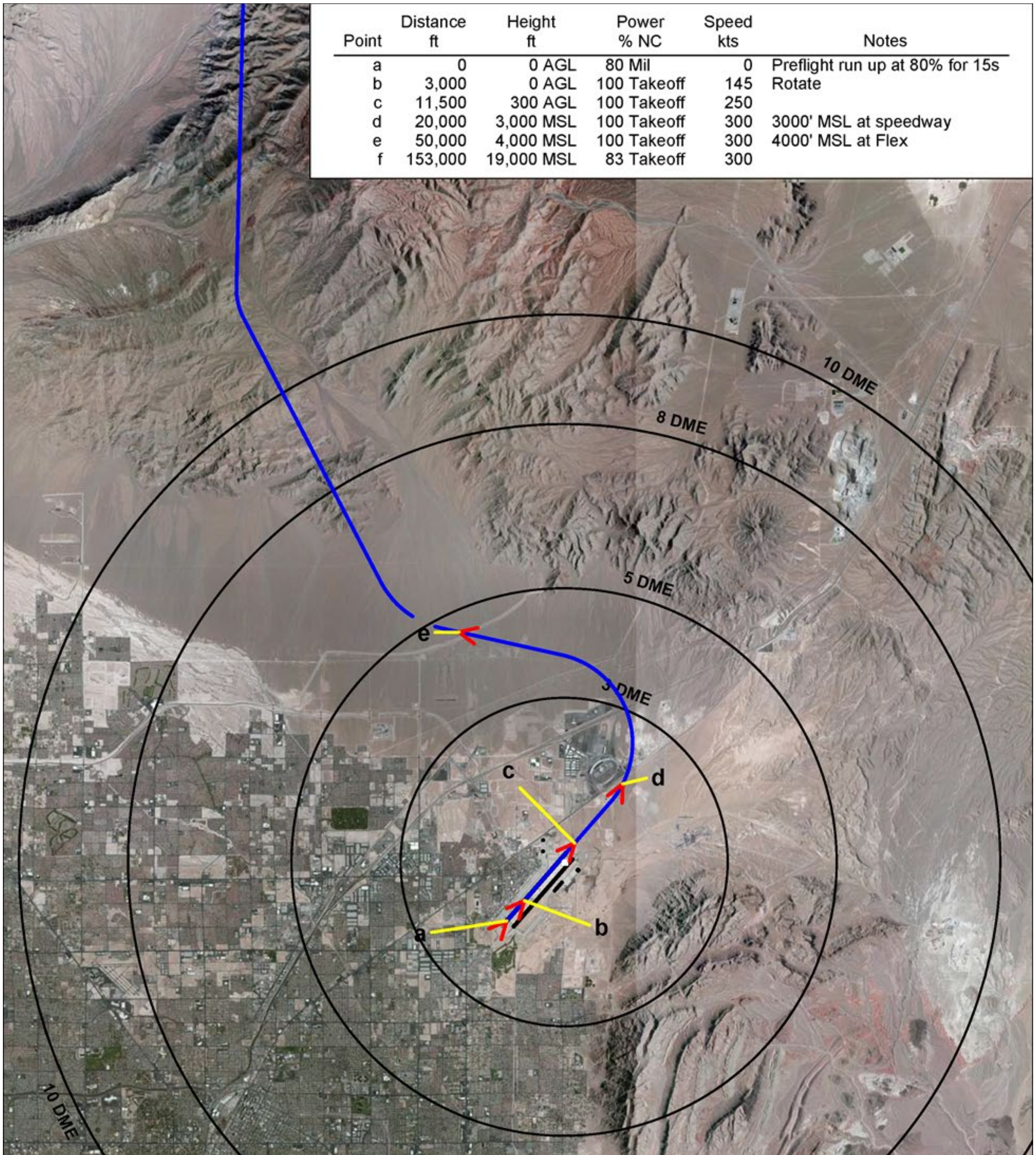
Nellis AFB (1,868 ft MSL), Departure Flight Profile 26D01
DREAM DEPARTURE
Based A-4N (J52-P-8B)
Runway 03L, Flight Track 03LD01 - DREAM 4
Prior to brake release, aircraft sits at 80 % NC Mil for 15 sec

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:83,700 (1 inch = 6,980 feet)

N

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	0 AGL	80 Mil	0	Preflight run up at 80% for 15s
b	3,000	0 AGL	100 Takeoff	145	Rotate
c	11,500	300 AGL	100 Takeoff	250	
d	20,000	3,000 MSL	100 Takeoff	300	3000' MSL at speedway
e	50,000	4,000 MSL	100 Takeoff	300	4000' MSL at Flex
f	153,000	19,000 MSL	83 Takeoff	300	



Nellis AFB (1,868 ft MSL), Departure Flight Profile 26D02
FLEX TURNOUT MIL PROFILE
Based A-4N (J52-P-8B)
Runway 03L, Flight Track 03LD02 - DREAM 4 FLEX TURNOUT ONLY USED WHEN 21 IS ACTIVE
Prior to brake release, aircraft sits at 80 % NC Mil for 15 sec

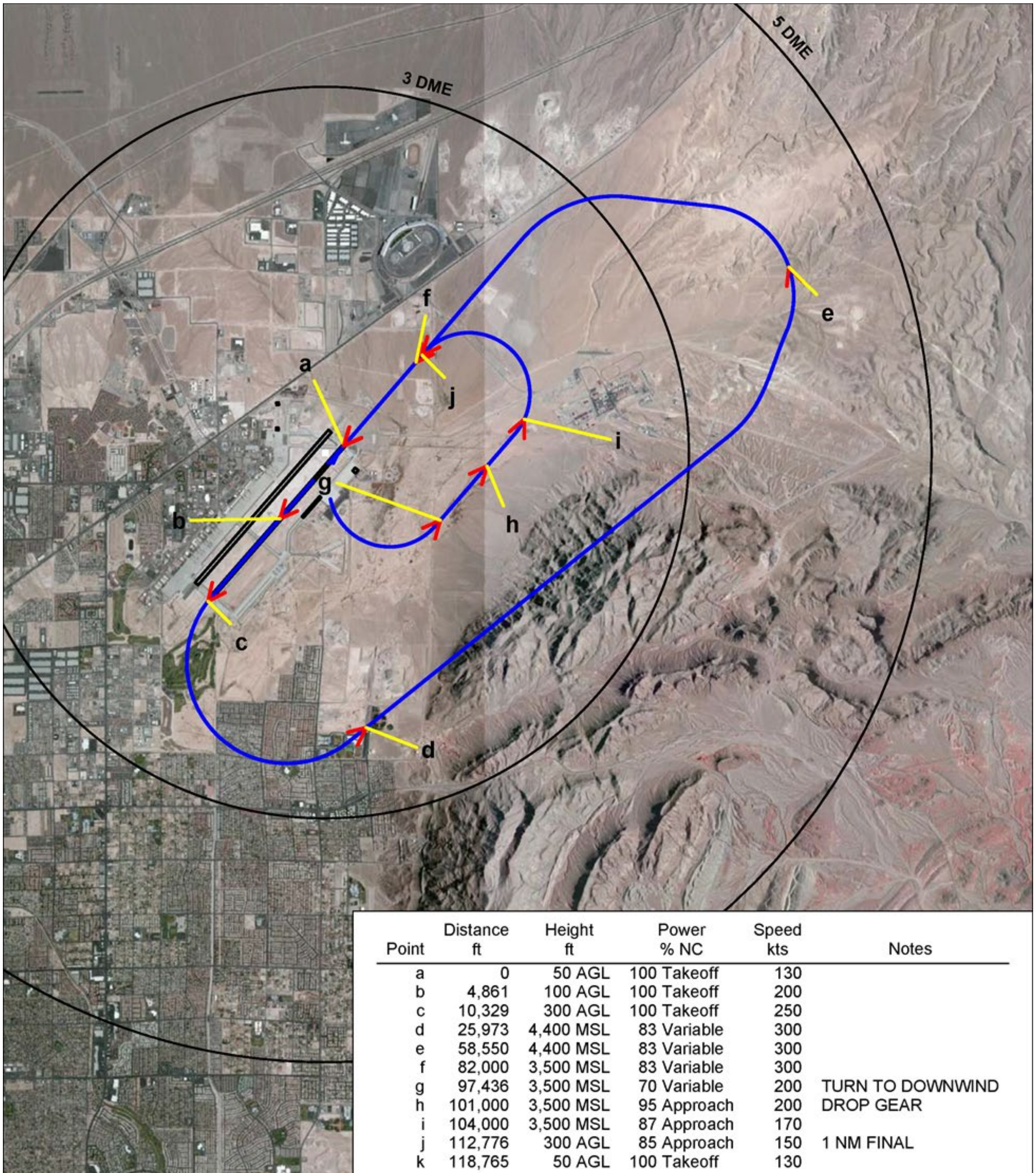
Scale in Feet 1:162,000 (1 inch = 13,500 feet)

Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	150,000	10,000 MSL	83 Cruise	300	
b	78,041	5,000 MSL	83 Cruise	150	
c	60,761	4,200 MSL	93 Approach	150	Drop Gear
d	41,679	4,200 MSL	85 Approach	150	
e	0	50 AGL	70 Approach	130	

Nellis AFB (1,868 ft MSL), Instrument Arrivals Flight Profile 26I01
ILS PROCEDURE
Based A-4N (J52-P-8B)
Runway 21L, Flight Track 21LI01 - USED FOR IFR ARRIVALS

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000
Scale in Feet 1:148,000 (1 inch = 12,300 feet)

N

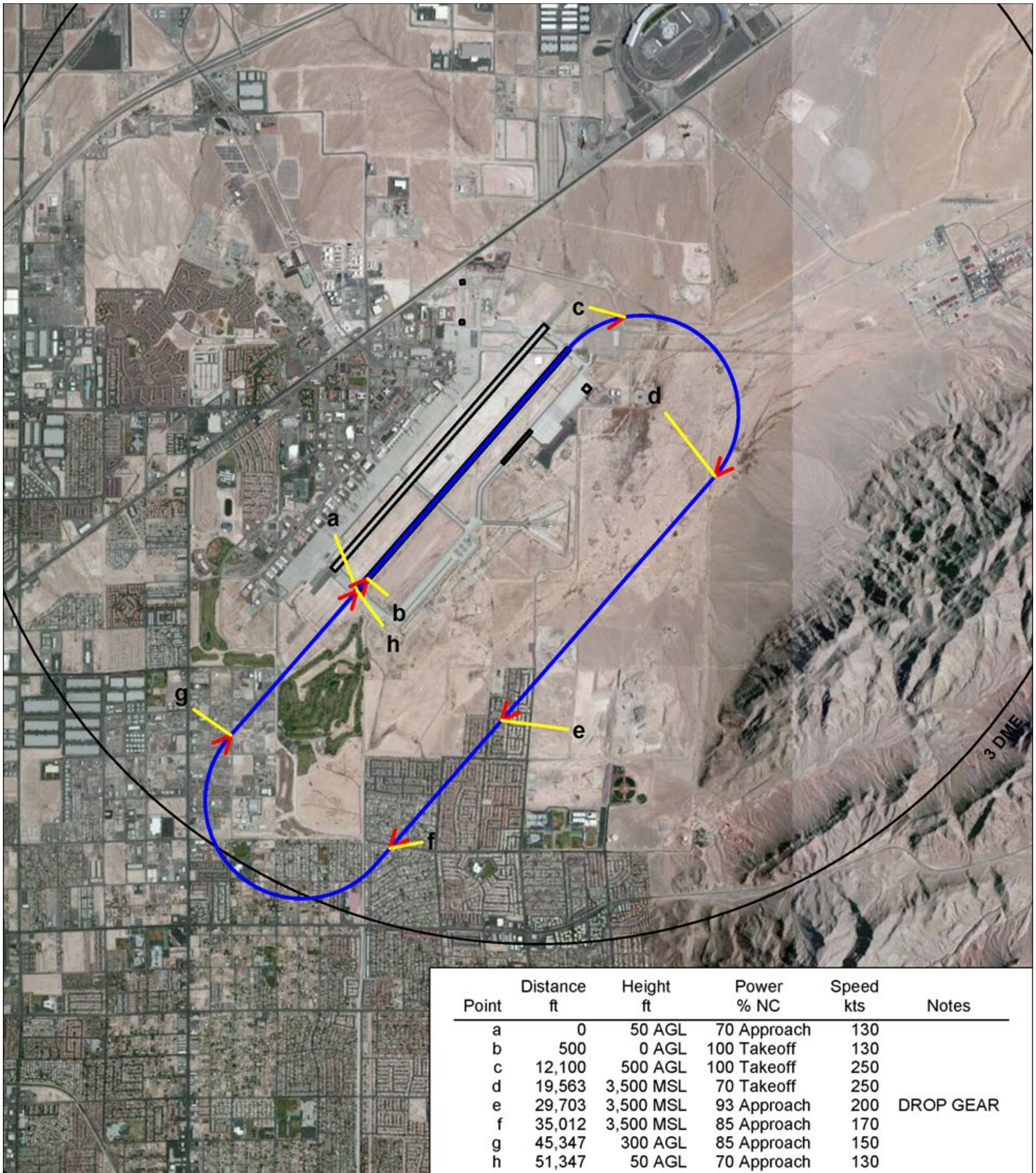


Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	50 AGL	100 Takeoff	130	
b	4,861	100 AGL	100 Takeoff	200	
c	10,329	300 AGL	100 Takeoff	250	
d	25,973	4,400 MSL	83 Variable	300	
e	58,550	4,400 MSL	83 Variable	300	
f	82,000	3,500 MSL	83 Variable	300	
g	97,436	3,500 MSL	70 Variable	200	TURN TO DOWNWIND
h	101,000	3,500 MSL	95 Approach	200	DROP GEAR
i	104,000	3,500 MSL	87 Approach	170	
j	112,776	300 AGL	85 Approach	150	1 NM FINAL
k	118,765	50 AGL	100 Takeoff	130	

Nellis AFB (1,868 ft MSL), Visual ReEntry Pattern Flight Profile 26RE02
DUCK REENTRY
Based A-4N (J52-P-8B)
Runway 21L, Flight Track 21LR01_2 - VFR (DUCK) Re-entry

0 4,000 8,000 12,000 16,000 20,000
Scale in Feet 1:72,700 (1 inch = 6,060 feet)

N



Point	Distance ft	Height ft	Power % NC	Speed kts	Notes
a	0	50 AGL	70 Approach	130	
b	500	0 AGL	100 Takeoff	130	
c	12,100	500 AGL	100 Takeoff	250	
d	19,563	3,500 MSL	70 Takeoff	250	
e	29,703	3,500 MSL	93 Approach	200	DROP GEAR
f	35,012	3,500 MSL	85 Approach	170	
g	45,347	300 AGL	85 Approach	150	
h	51,347	50 AGL	70 Approach	130	

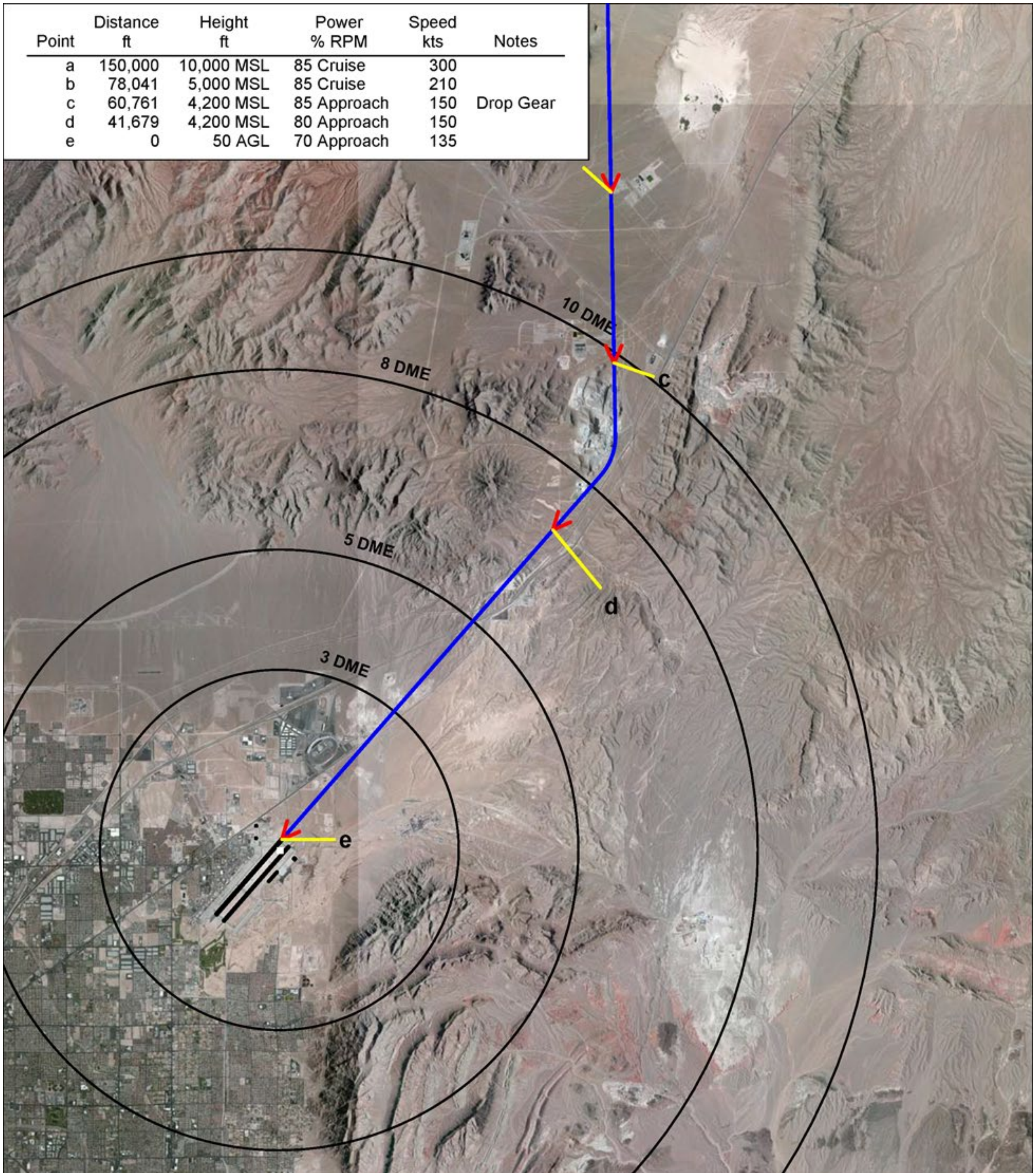
Nellis AFB (1,868 ft MSL), Visual Pattern Flight Profile 26V02
COCO ADAIR A-4N VFR INSIDE DOWNWIND
Based A-4N (J52-P-8B)
Runway 03R, Flight Track 03RV01 - Sunrise closed

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000

Scale in Feet 1:45,500 (1 inch = 3,790 feet)

COCO ADAIR L-159 Flight Profiles(T-45 Surrogate)

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	150,000	10,000 MSL	85 Cruise	300	
b	78,041	5,000 MSL	85 Cruise	210	
c	60,761	4,200 MSL	85 Approach	150	Drop Gear
d	41,679	4,200 MSL	80 Approach	150	
e	0	50 AGL	70 Approach	135	

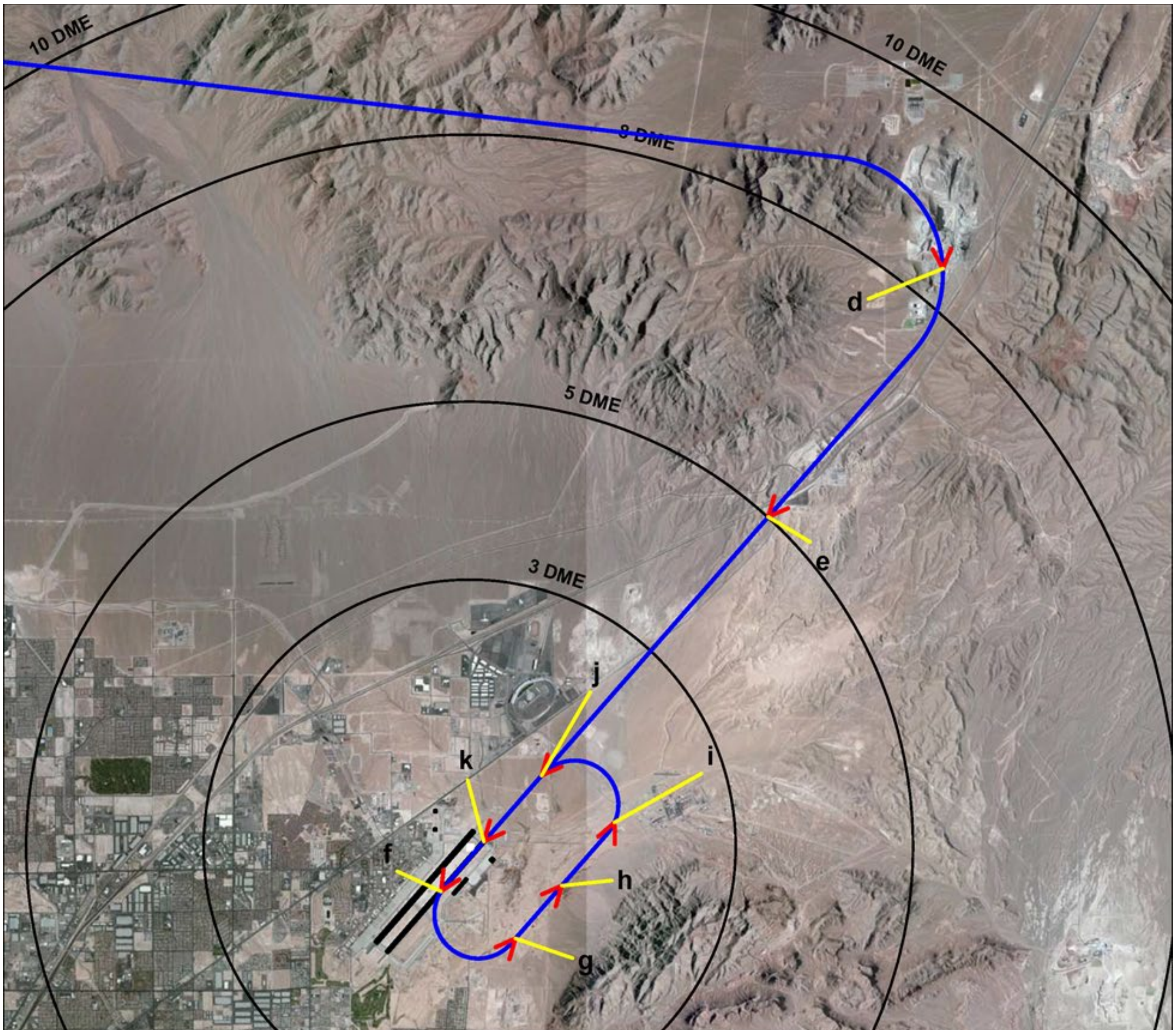


Nellis AFB (1,868 ft MSL), Non-Break Arrivals Flight Profile 27A19
RECOVERY FROM ARCOE TO VFR STRAIGHT
Based L-159 (F405-RR-401)
Runway 21R, Flight Track 21RA03 - ARCOE TO APEX FOR STRAIGHT IN

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:148,000 (1 inch = 12,300 feet)

N



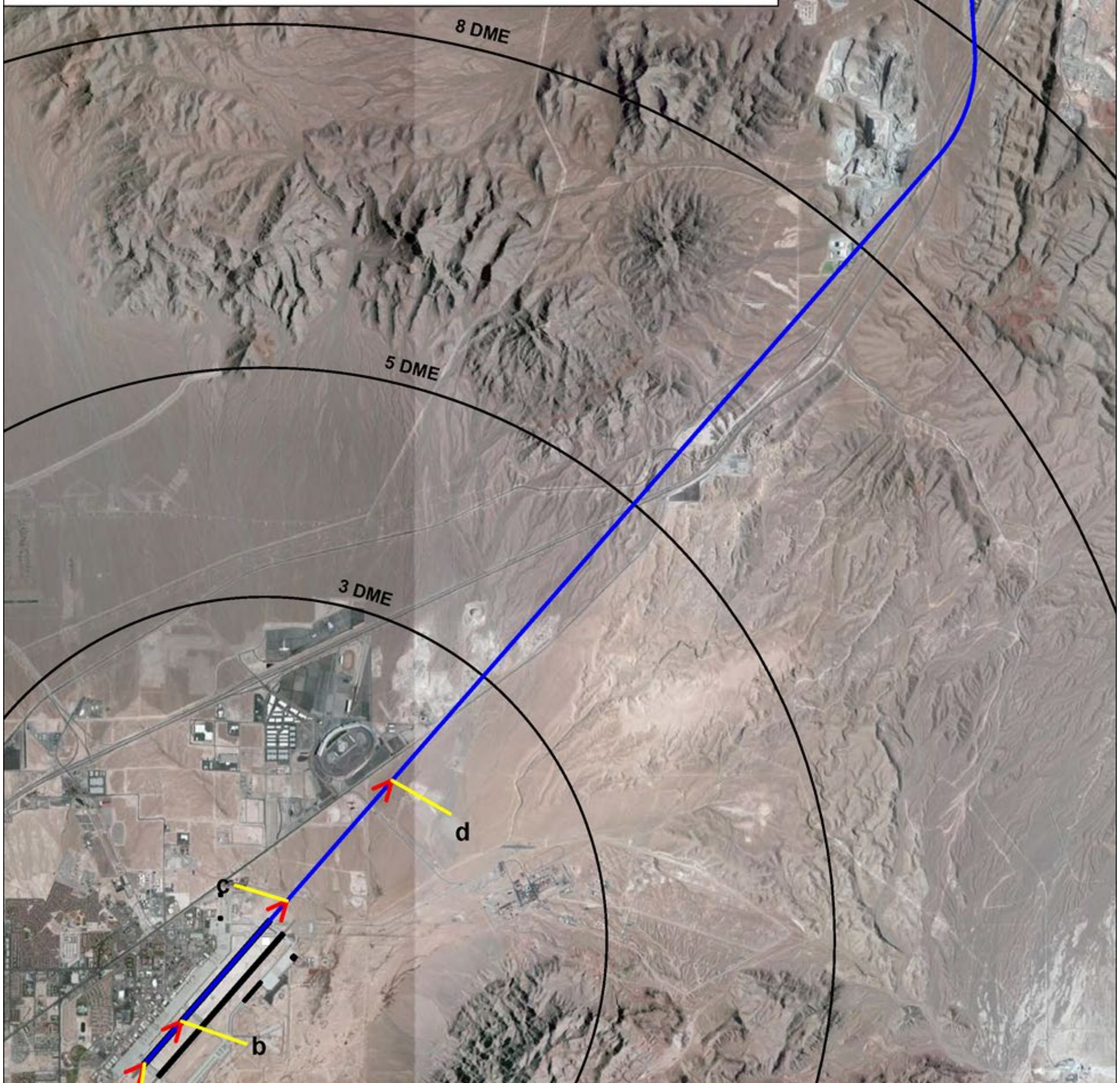
Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	261,034	12,500 MSL	85 Variable	300	
b	188,744	9,500 MSL	85 Variable	300	
c	172,165	8,500 MSL	85 Variable	300	
d	89,550	4,500 MSL	85 Variable	300	
e	68,352	4,000 MSL	85 Variable	300	
f	34,352	3,500 MSL	73.7 Variable	300	TURN TO DOWNWIND
g	24,963	3,500 MSL	73.7 Variable	200	
h	20,159	3,500 MSL	73.7 Approach	200	DROP GEAR
i	14,520	3,500 MSL	80 Approach	150	
j	6,000	300 AGL	80 Approach	135	1 NM FINAL
k	0	50 AGL	73.7 Approach	135	

Nellis AFB (1,868 ft MSL), Break Arrivals Flight Profile 27B40
RECOVERY FROM STRYK/GASS/APEX BREAK 4000' DOWN RWY
Based L-159 (F405-RR-401)
Runway 21L, Flight Track 21LB07 - STRYK RECOVERY TO INITIAL BREAK 4000' DOWN RWY

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000
Scale in Feet 1:113,000 (1 inch = 9,420 feet)

N

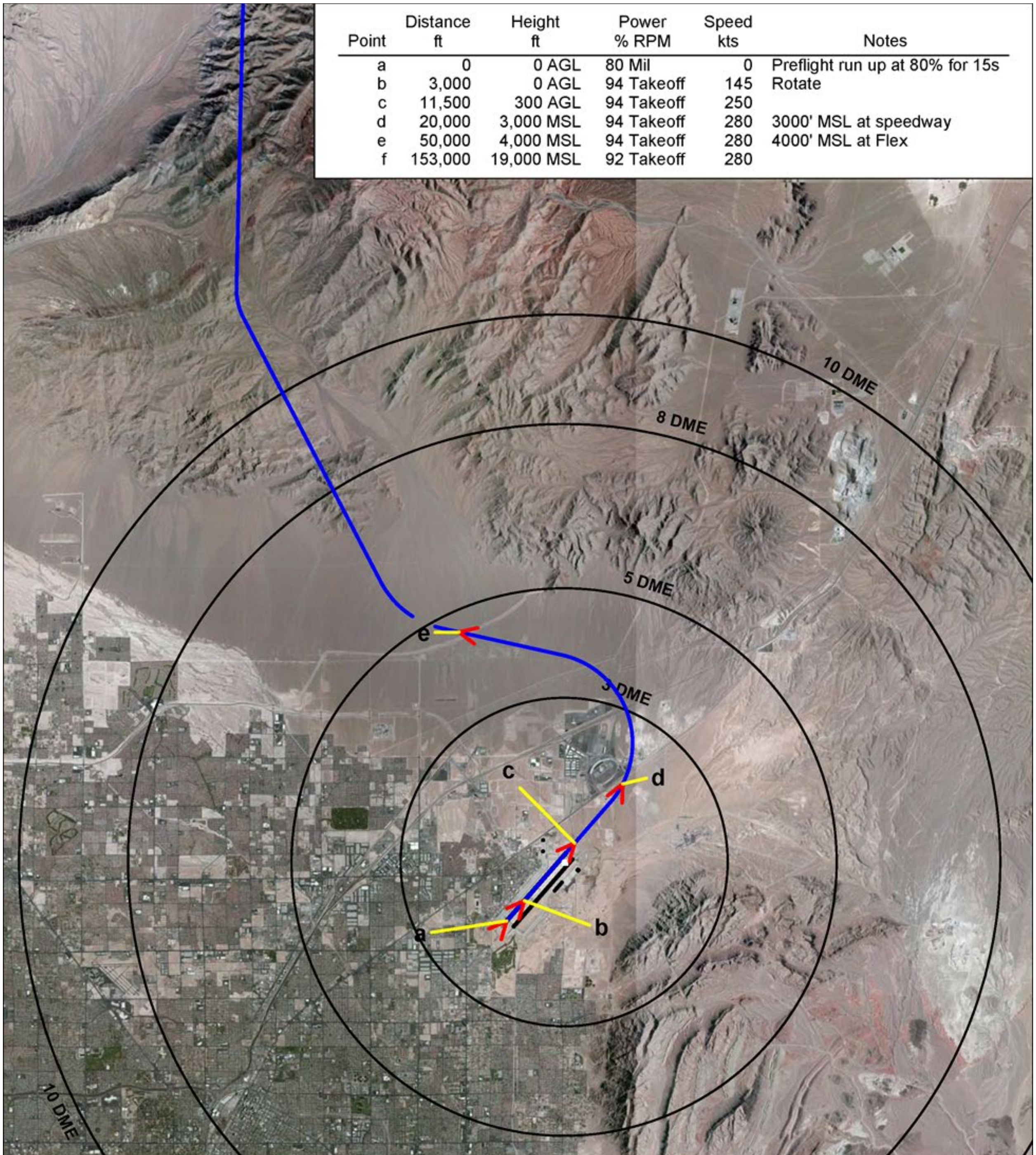
Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	80 Mil	0	
b	3,000	0 AGL	94 Takeoff	145	ROTATE 3000 FT
c	11,500	300 AGL	94 Takeoff	250	
d	20,000	3,000 MSL	94 Takeoff	280	unrestricted climb at 4000 fpm
e	143,000	19,000 MSL	92 Takeoff	280	



Nellis AFB (1,868 ft MSL), Departure Flight Profile 27D01
DREAM DEPARTURE
Based L-159 (F405-RR-401)
Runway 03L, Flight Track 03LD01 - DREAM 4
Prior to brake release, aircraft sits at 80 % RPM Mil for 15 sec

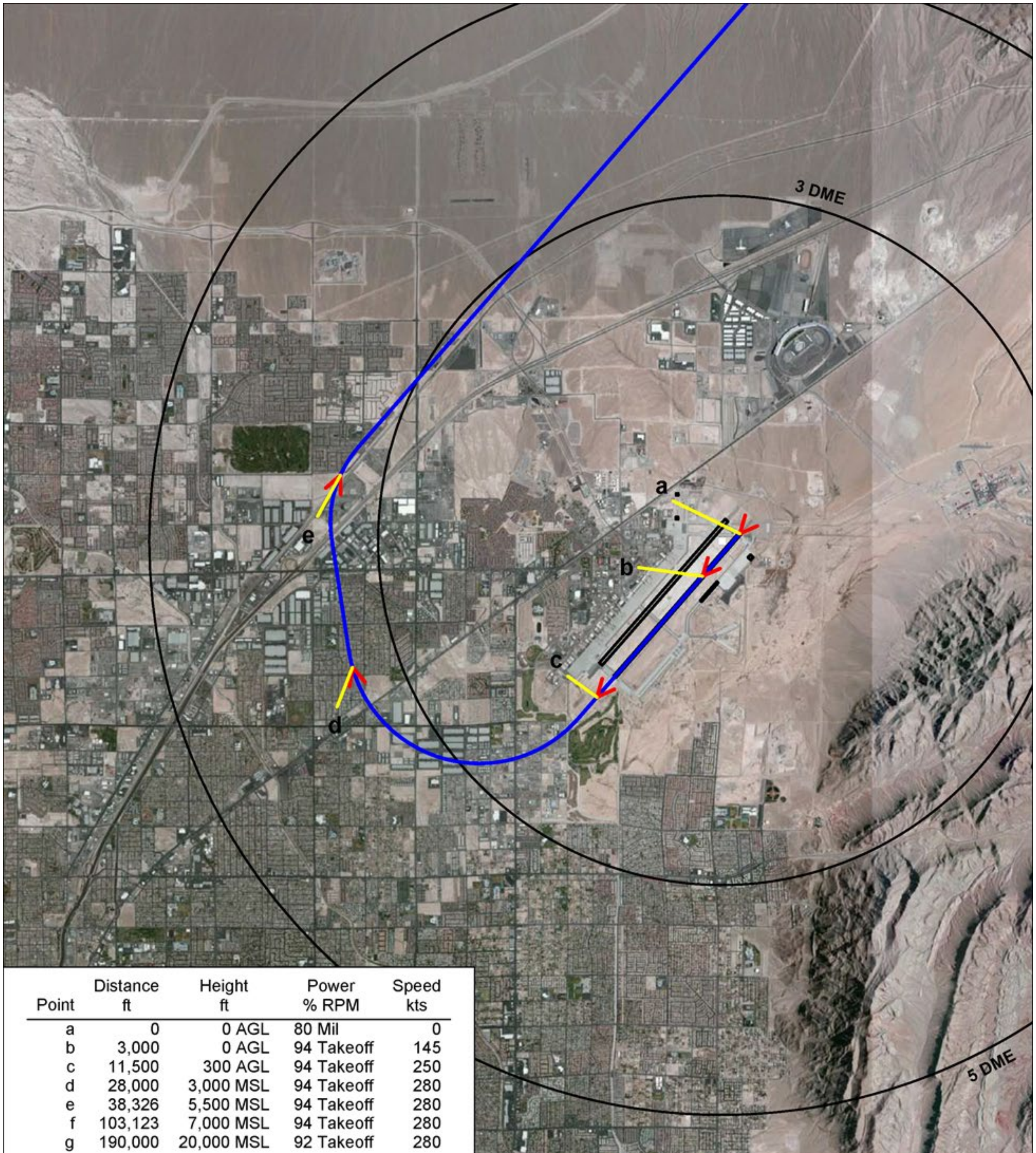
Scale in Feet 1:83,700 (1 inch = 6,980 feet)

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	80 Mil	0	Preflight run up at 80% for 15s
b	3,000	0 AGL	94 Takeoff	145	Rotate
c	11,500	300 AGL	94 Takeoff	250	
d	20,000	3,000 MSL	94 Takeoff	280	3000' MSL at speedway
e	50,000	4,000 MSL	94 Takeoff	280	4000' MSL at Flex
f	153,000	19,000 MSL	92 Takeoff	280	



Nellis AFB (1,868 ft MSL), Departure Flight Profile 27D02
FLEX TURNOUT MIL PROFILE
Based L-159 (F405-RR-401)
Runway 03L, Flight Track 03LD02 - DREAM 4 FLEX TURNOUT ONLY USED WHEN 21 IS ACTIVE
Prior to brake release, aircraft sits at 80 % RPM Mil for 15 sec

0 10,000 20,000 30,000 40,000 50,000
Scale in Feet 1:162,000 (1 inch = 13,500 feet)



Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	80 Mil	0
b	3,000	0 AGL	94 Takeoff	145
c	11,500	300 AGL	94 Takeoff	250
d	28,000	3,000 MSL	94 Takeoff	280
e	38,326	5,500 MSL	94 Takeoff	280
f	103,123	7,000 MSL	94 Takeoff	280
g	190,000	20,000 MSL	92 Takeoff	280

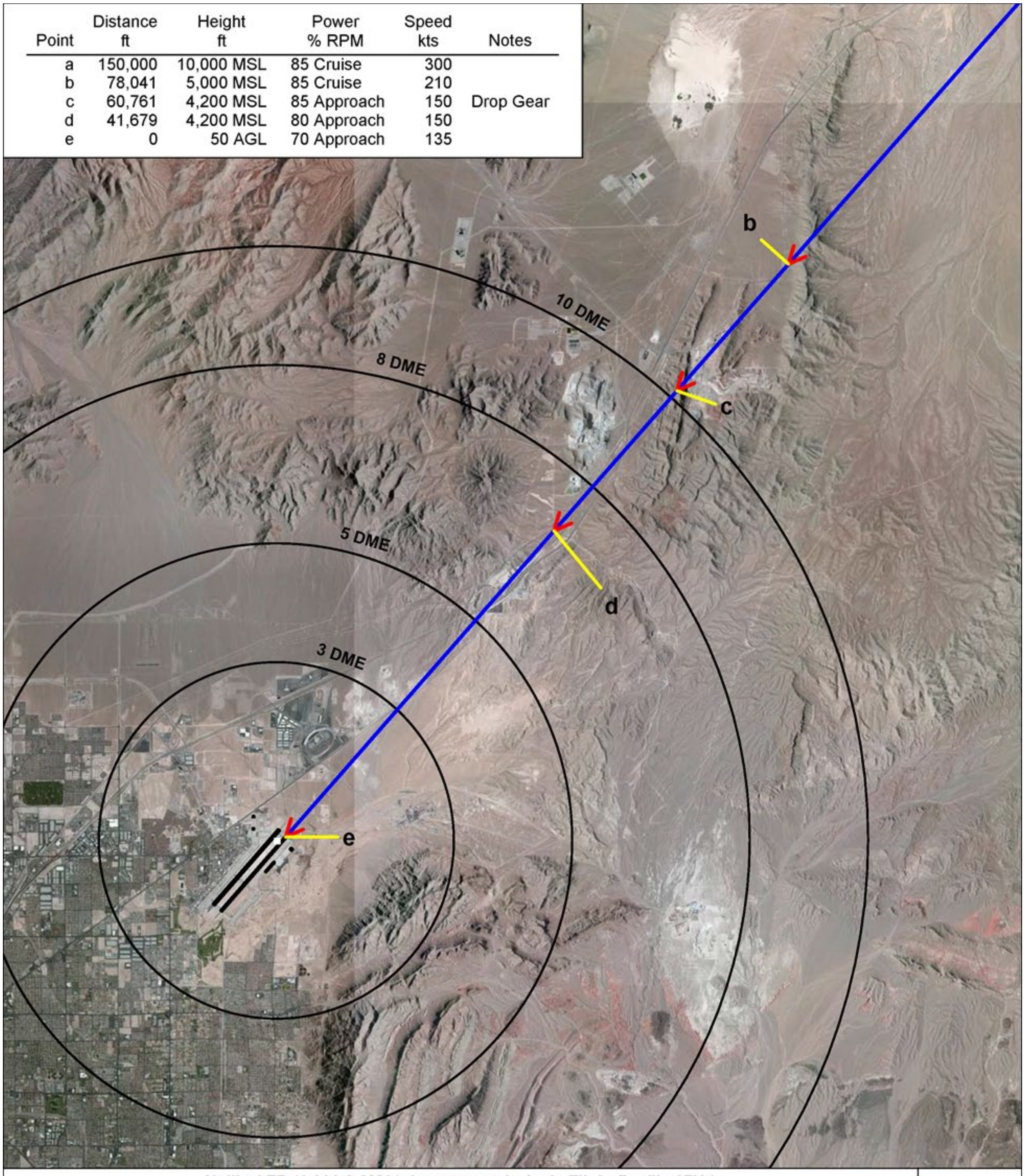
Nellis AFB (1,868 ft MSL), Departure Flight Profile 27D27
DOE CLASS B NORTHEAST DEPARTURE MIL PROFILE
Based L-159 (F405-RR-401)
Runway 21L, Flight Track 21LD02 - DOE CLASS B NORTHEAST DEPARTURE
Prior to brake release, aircraft sits at 80 % RPM Mil for 15 sec

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:77,100 (1 inch = 6,430 feet)

N

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	150,000	10,000 MSL	85 Cruise	300	
b	78,041	5,000 MSL	85 Cruise	210	
c	60,761	4,200 MSL	85 Approach	150	Drop Gear
d	41,679	4,200 MSL	80 Approach	150	
e	0	50 AGL	70 Approach	135	

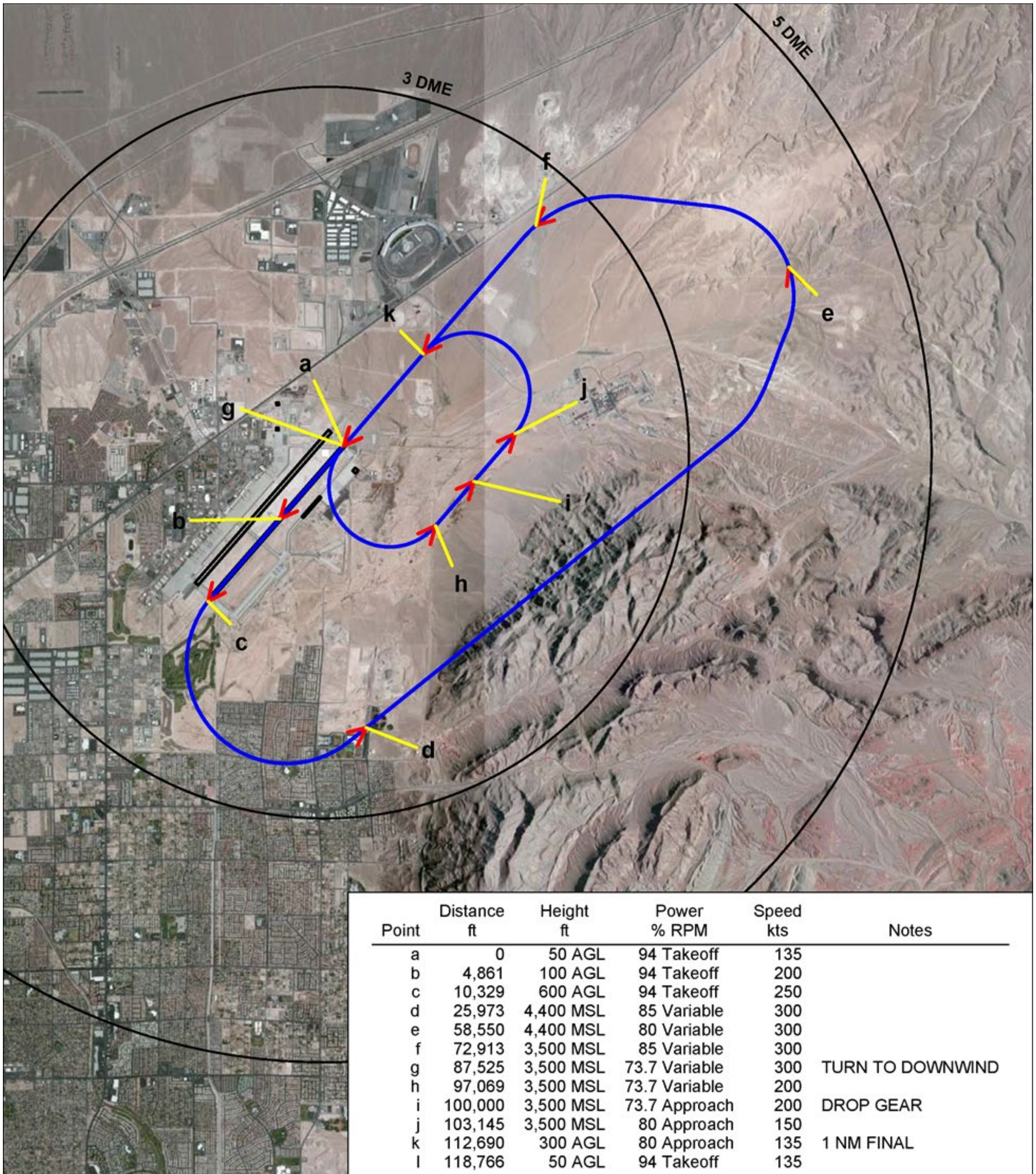


Nellis AFB (1,868 ft MSL), Instrument Arrivals Flight Profile 27I01
ILS PROCEDURE
Based L-159 (F405-RR-401)
Runway 21L, Flight Track 21LI01 - USED FOR IFR ARRIVALS

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:148,000 (1 inch = 12,300 feet)

N



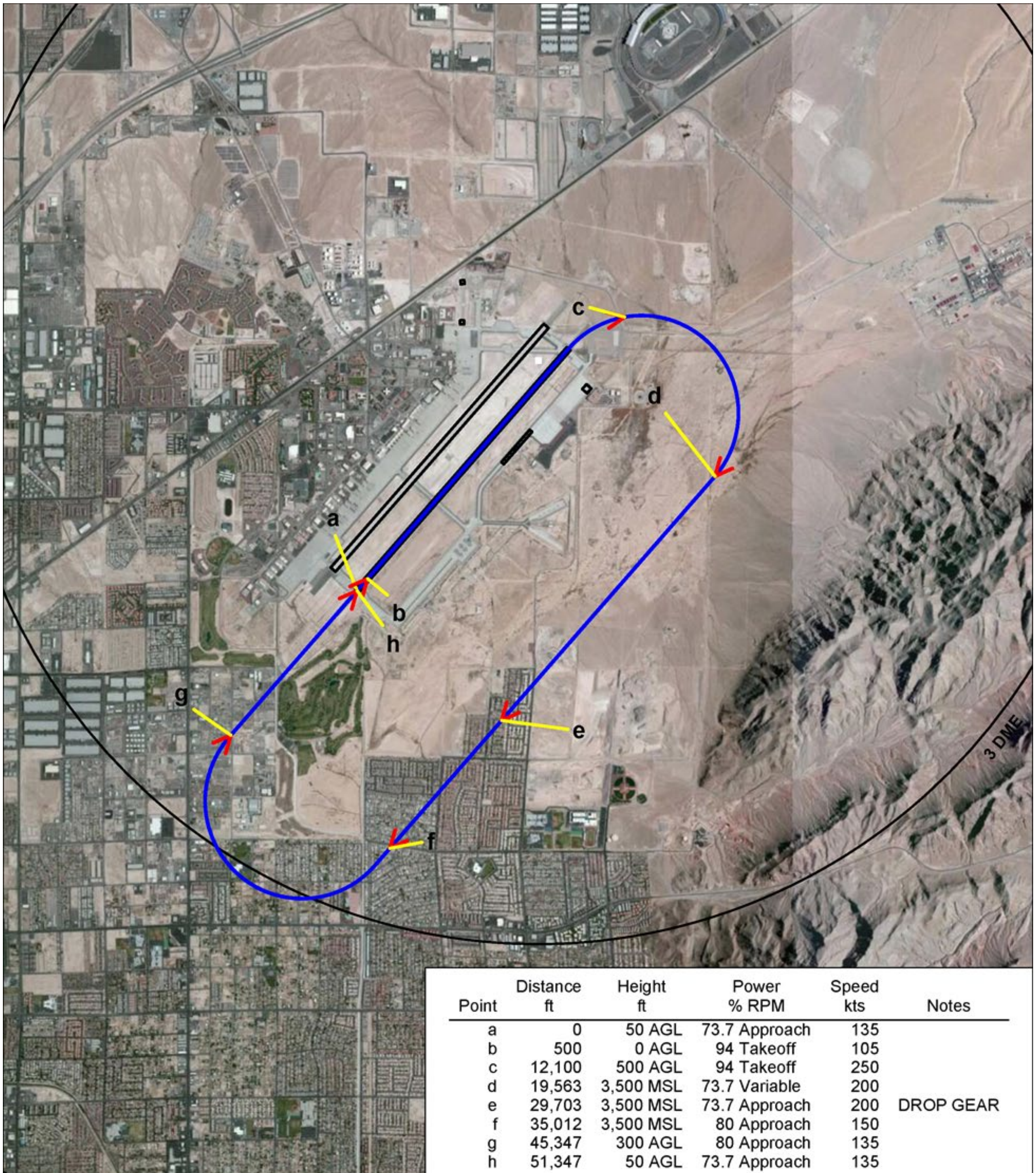
Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	50 AGL	94 Takeoff	135	
b	4,861	100 AGL	94 Takeoff	200	
c	10,329	600 AGL	94 Takeoff	250	
d	25,973	4,400 MSL	85 Variable	300	
e	58,550	4,400 MSL	80 Variable	300	
f	72,913	3,500 MSL	85 Variable	300	
g	87,525	3,500 MSL	73.7 Variable	300	TURN TO DOWNWIND
h	97,069	3,500 MSL	73.7 Variable	200	
i	100,000	3,500 MSL	73.7 Approach	200	DROP GEAR
j	103,145	3,500 MSL	80 Approach	150	
k	112,690	300 AGL	80 Approach	135	1 NM FINAL
l	118,766	50 AGL	94 Takeoff	135	

Nellis AFB (1,868 ft MSL), Visual ReEntry Pattern Flight Profile 27RE02
DUCK REENTRY
Based L-159 (F405-RR-401)
Runway 21L, Flight Track 21LR01_2 - VFR (DUCK) Re-entry

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:72,700 (1 inch = 6,060 feet)

N



Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	50 AGL	73.7 Approach	135	
b	500	0 AGL	94 Takeoff	105	
c	12,100	500 AGL	94 Takeoff	250	
d	19,563	3,500 MSL	73.7 Variable	200	
e	29,703	3,500 MSL	73.7 Approach	200	DROP GEAR
f	35,012	3,500 MSL	80 Approach	150	
g	45,347	300 AGL	80 Approach	135	
h	51,347	50 AGL	73.7 Approach	135	

Nellis AFB (1,868 ft MSL), Visual Pattern Flight Profile 27V02
VFR INSIDE DOWNWIND
Based L-159 (F405-RR-401)
Runway 03R, Flight Track 03RV01 - Sunrise closed

Scale in Feet 1:45,500 (1 inch = 3,790 feet)

D.2.4 Ground/Maintenance Run-ups

This section details the number, type, and duration of the ground and maintenance engine run-up operations at the airfield. Because the COCO ADAIR aircraft would be doing major maintenance off site, the only ground operations expected to increase with the addition of COCO ADAIR aircraft would be the pre-flight run-up checks, post-flight idling, and trim tests. The addition of the F-35s will be expected to increase the maintenance of numbers of the already existing F-35 events. **Figure D-16** shows the location of all the static run-up locations at Nellis. The location for COCO ADAIR aircraft parking is Rows 1 and 2 noted on the figure. The trim pad is where trim test operations for COCO ADAIR aircraft would be performed **Table D-9** details the number, type and duration of the on-field maintenance operations. For brevity, only the changes in maintenance operations are detailed here. The recently completed AICUZ contains the full listing of baseline maintenance operations.

Figure D-16. Static Operations Locations

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Table D-9 Proposed Action Maintenance Operations

Group	Aircraft	Engine Type	profile ID	Test Name	Location ID	Magnetic Heading (deg)	Annual Events: Events	Annual Events: % Day (0700-2200)	Annual Events: % Night (2200-0700)	Reported Power Setting (% RPM Unless Noted Otherwise)	Duration at Power Setting (Minutes) Per Event	Number of Engines Running Simul-taneously	Comments
57 MX GROUP	F-35	F135-PW-100	F35 MBIT	F-35 MAINTENANCE - Usually run Aircraft when necessary for follow-on MX. Those reasons being for Boroscopes, engine removal, IPP fails on engine start. Usual occurs 0700-2200 on rows 17-18. 22 times per aircraft per year.	F35 MBIT	30	260 - baseline +374 - proposed	95%	5%	10%ETR	10.0	1	Proposed Action will increase by 6 aircraft for 422 TES and 11 aircraft for the 65 AGRS. So increase will = 17 aircraft*22 times/aircraft = 374 more events.
COCO ADAIR	F1 Mirage (F-16C Surrogate)		COCOF1MX1	10 Trim Test Annually	Trim Pad 1	260°	10	100%	0	Idle	10	1	
										Military	10		
										Afterburner	5		
			COCOF1MX2	Typically leak and ops checks	Row 1	39	25	100%	0	Idle	10	1	
	A4-N (A-4C Surrogate)		COCOA4MX1	7 Trim Tests Annually	Trim Pad 1	260	7	100%	0	Idle	10	1	
										Military	10		
			COCOA4MX2	Typically leak and ops checks	Row 2	39	30	100%	0	Idle	10	1	
	L-159 (A-4C Surrogate)		COCOL1MX1	15 Trim Tests Annually	Trim Pad 1	260	15	100%	0	Idle	10	1	
										Military	10		
			COCOL1MX2	Typically leak and ops checks	Row 2	39	50	100%	0	Idle	10	1	

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D.2.5 Supersonic Flight Operations

Supersonic operations are allowed in the NTTR component airspaces and are modeled above 15,000 feet MSL. Airspace sorties require aircraft to exceed Mach 1.0 (supersonic) for brief periods of time for approximately 10 percent of total flight time. This is equivalent to less than 5 minutes of supersonic flight activity per sortie.

The BooMap program was used to compute cumulative sonic boom exposure under supersonic air combat training arenas. Under the existing conditions, the cumulative CDNL exposure in the various MOAs and Restricted Airspace used by based Nellis aircraft do not exceed 45 dB CDNL under any primary use airspace.

Single event sonic boom levels estimated for supersonic flights in the NTTR are shown in **Table D-10**. Overpressure (psf) and CSEL (decibels) were estimated directly under the flight path for the supersonic aircraft currently using the NTTR (F-15E, F-16C, F-22, and F-35) at various altitudes and Mach numbers. Overpressure levels estimated for the NTTR airspaces range from 4.8 to 0.9 psf depending on the flight conditions. Overpressure and CSEL values are shown for viable flight conditions for these aircraft.

Likewise, the single event sonic boom levels for supersonic aircraft associated with the Proposed Action (i.e., F-35, F-22, and Mirage F-1 [which was modeled using the F-16C as a surrogate]) would be the same as is reported for these aircraft in **Table D-10**. However, the number of sonic booms experienced is expected to increase with the proposed additional sorties flying in the NTTR.

Table D-10
Nevada Test and Training Range: Sonic Boom Levels Undertrack for Aircraft in Level Flight at Mach 1.2 and 1.5

	Altitude (Feet MSL)			
Aircraft	**15,000**	**25,000**	**35,000**	**50,000**
Mach 1.2				
Overpressure (psf)				
F-15E	4.7	2.5	1.7	1.2
F-16C	3.8	2.0	1.3	1.0
F-22	4.8	2.6	1.7	1.2
F-35	4.8	2.6	1.7	1.2
C-Weighted Sound Exposure Level (dB)[1]				
F-15E	115	110	106	103
F-16C	113	108	104	101
F-22	115	110	106	103
F-35	115	110	106	103
Mach 1.5				
Overpressure (psf)				
F-15E			1.8	1.2
F-16C			1.5	0.9
F-22			1.9	1.2
F-35			1.9	1.2
C-Weighted Sound Exposure Level (dB)[1]				
F-15E			107	103
F-16C			105	101
F-22			107	103
F-35			107	103

Note:
F-16C was a surrogate for the Mirage F-1.
C-weighted Sound Exposure Level (CSEL) – SEL with frequency weighting that places more emphasis on low frequencies below 1,000 hertz

When sonic booms reach the ground, they impact an area that is referred to as a “carpet.” The size of the carpet depends on the supersonic flight path and on atmospheric conditions. The width of the boom carpet beneath the aircraft is about 1 mi for each 1,000 ft of altitude (National Aeronautics and Space Administration [NASA], 2017). Sonic booms are loudest near the center of the carpet, having a sharp “bang-bang” sound. Near the edges, they are weak and have a rumbling sounding like distant thunder. The boom levels shown in **Table D-10** are the loudest levels computed at the center of the carpet, directly under the flight path, for the constant Mach, level flight conditions indicated. The location of these booms will vary with changing flight paths and weather conditions, so it is unlikely that any given location will experience these undertrack levels more than once over multiple events. Public reaction is expected to occur with overpressures above 1 psf, and in rare instances, damage to structures have occurred at overpressures between 2 and 5 psf (NASA, 2017). People located farther away from the supersonic flight paths, who are still within the primary boom carpet, might also be exposed to levels that may be startling or annoying, but the probability of this decreases the farther away they are from the flight path. People located beyond the edge of the boom carpet are not expected to be exposed to sonic boom although post-boom rumbling sounds may be heard.

APPENDIX E.
LISTED SPECIES POTENTIALLY OCCURRING IN THE ACTION AREA

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Table E-1
Federally and State-Listed Species with the Potential to be Affected by Alternative A or Alternative B at Nellis Air Force Base and Special Use Airspace

Species	Federal Status[a]	State Status[b]	Critical Habitat	Nellis AFB	SUA NTTR	SUA R-2508
Birds						
California Condor (*Gymnogyps californianus*)	Endangered	CA: SE UT: SSL	Final		X	X
Greater Sage-grouse (*Centrocercus urophasianus*)		UT: SSL				X
Inyo California Towhee (*Pipilo crissalis eremophilus*)	Threatened	CA: SE	Final			X
Least Bell's Vireo (*Vireo bellii pusillus*)	Endangered	CA: SE				X
Mexican Spotted Owl (*Strix occidentalis lucida*)	Threatened	UT: SSL			X	
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	Endangered	CA: SE NV: S1B UT: SSL		X	X	X
Western Snowy Plover (*Charadrius nivosus nivosus*)	Threatened					X
Yellow-billed Cuckoo (*Coccyzus americanus*)	Threatened	CA: SE NV: S1B UT: SSL	Proposed		X	X
Yuma Clapper Rail (*Rallus logirostris yumanensis*)	Endangered	CA: ST NV: S1B		X	X	
Mammals						
Amargosa Vole (*Microtus californicus scirpensis*)	Endangered	CA: SE	Final			X
Fisher (*Pekania pennant*)	Proposed Threatened	CA: ST				X
North American Wolverine (*Gulo gulo luscus*)	Proposed Threatened	CA: ST				X
San Joaquin Kit Fox (*Vulpes macrotis mutica*)	Endangered	CA: ST				X
Sierra Nevada Bighorn Sheep (*Ovis canadensis sierrae*)	Endangered	CA: SE	Final			X
Tipton Kangaroo Rat (*Dipodomys nitratoides nitratoides*)	Endangered	CA: SE				X
Reptiles						
Blunt-nosed Leopard Lizard (*Gambelia silus*)	Endangered	CA: SE				X
Desert Tortoise (*Gopherus agassizii*)	Threatened	CA: ST	Final	X	X	X
Giant Garter Snake (*Thamnophis gigas*)	Threatened	CA: ST				X
Amphibians						
California Red-legged Frog (*Rana draytonii*)	Threatened					X
Mountain Yellow-legged Frog (*Rana muscosa*)	Endangered	CA: SE	Final			X
Sierra Nevada Yellow-legged Frog (*Rana sierra*)	Endangered	CA: ST	Final			X
Yosemite Toad (*Anaxyrus canorus*)	Threatened					X
Fish						
Big Spring Spinedace (*Lepidomeda mollispinis pratensis*)	Threatened	NV: S1	Final		X	
Delta Smelt (*Hypomesus transpacificus*)	Threatened	CA: SE				X

Species	Federal Status[a]	State Status[b]	Critical Habitat	Nellis AFB	SUA NTTR	SUA R-2508
Hiko White River Springfish (*Crenichthys baileyi*)	Endangered	NV: S1	Final		X	
Lahontan Cutthroat Trout (*Oncorhynchus clarkia henshawi*)	Threatened	UT: SSL				X
Little Kern Golden Trout (*Oncorhynchus aguabonita white*i)	Threatened		Final			X
Moapa Dace (*Moapa coriacea*)	Endangered	NV: S1			X	
Mohave Tui Chub (*Gila bicolor mohavensis*)	Endangered	CA: SE				X
Owens Pupfish (*Cyprinodon radiosus*)	Endangered	CA: SE				X
Owens Tui Chub (*Gila bicolor snyderi*)	Endangered	CA: SE				X
Pahranagat Roundtail Chub (*Gila robusta jordani*)		NV: S1			X	
Pahrump Poolfish (*Empetrichthys latos*)	Endangered	NV: S1		X	X	
Paiute Cutthroat Trout (*Onchorhynchus clarkia seleniris*)	Threatened					X
Railroad Valley Springfish (*Crenichthys nevadae*)	Threatened	NV: S2			X	
Razorback Sucker (*Xyrauchen texanus*)	Endangered	CA: SE NV: S1		X	X	
Virgin River Chub (*Gila seminude*)	Endangered	NV: S1			X	
White River Spinedace (*Lepidomeda albivallis*)	Endangered	NV: S1			X	
White River Springfish (*Crenichthys baileyi baileyi*)	Endangered	NV: S1	Final		X	
Woundfin (*Plagopterus argentissimus*)	Endangered	NV: S1 UT: SSL			X	
Plants						
Amargosa Niterwort (*Nitrophila mohavensis*)	Endangered	CA: SE NV: S1				X
Ash Meadows Blazingstar (*Mentzelia leucophylla*)	Threatened	NV: S1			X	
Ash Meadows Gumplant (*Grindelia fraxinipratensis*)	Threatened	NV: S1			X	
Bakersfield Cactus (Opuntia treleasei)	Endangered	CA: SE				X
California Jewelflower (*Caulanthus californicus*)	Endangered	CA: SE				X
Dwarf Bear-poppy (*Arctomecon humilis*)	Endangered				X	
Holmgren Milk-vetch (*Astragalus holmgreniorum*)	Endangered				X	
Jones Cycladenia (*Cycladenia humilis* var. *jonesii*)	Threatened				X	
Keck's Checker-mallow (*Sidalcea keckii*)	Endangered		Final			X
Lane Mountain Milk-vetch (*Astragalus jaegerianus*)	Endangered		Final			X
San Joaquin Adobe Sunburst (*Pseudobahia peirsonii*)	Threatened	CA: SE				X
San Joaquin Wooly-threads (*Monolopia congdonii*)	Endangered					X
Shivwits Milk-vetch (*Astragalus ampullarioides*)	Endangered	UT: SSL			X	

Species	Federal Status[a]	State Status[b]	Critical Habitat	Nellis AFB	SUA NTTR	SUA R-2508
Springville Clarkia (*Clarkia springvillensis*)	Threatened	CA: SE				X
Ute Ladies'-tresses (*Spiranthes diluvialis*)	Threatened	NV: S1			X	
Whitebark Pine (*Pinus albicaulis*)	Candidate					X
Crustaceans						
Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)	Threatened					X
Insects						
Kern Primrose Sphinx Moth (*Euproserpinus euterpe*)	Threatened					X

Notes:

a. Source: U.S. Fish and Wildlife Service IPaC.

b. Source: California Department of Fish and Game (California Natural Diversity Database), Nevada Natural Heritage Program, State of Utah Department of Natural Resources Division of Wildlife Resources.

CA = California; IPaC = Information for Planning and Consultation; NTTR = Nevada Test and Training Range; NV = Nevada; SE = State Endangered; ST = State Threatened, S1 = Critically Imperiled; S1B = critically imperiled, breeds in the area; S2 = Imperiled; SSL = Sensitive Species List; SUA = Special Use Area; UT = Utah

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