



DEPARTMENT OF THE ARMY  
US ARMY PUBLIC HEALTH COMMAND (PROVISIONAL)  
5158 BLACKHAWK ROAD  
ABERDEEN PROVING GROUND, MD 21010-5403

MCHB-TS-EON

MEMORANDUM FOR Savannah River Site, Savannah River Nuclear Solutions  
(Mr. C. Barry Shedrow), Building 705-3C, Aiken, SC 29808

SUBJECT: Operational Noise Consultation, 52-EN-0D55-10, Operational Noise  
Contours for Proposed Aviation Activity, Savannah River Site, Aiken, South Carolina,  
12 April 2010.

1. We are enclosing 2 copies of the consultation.
2. Please contact us if this consultation or any of our services did not meet your needs or expectations.
3. The point of contact is Ms. Kristy Broska, Environmental Protection Specialist or Ms. Catherine Stewart, Program Manager, Operational Noise, US Army Public Health Command (Provisional) [USAPHC (Prov)] [formerly US Army Center for Health Promotion and Preventive Medicine (USACHPPM)], at DSN 584-3829, Commercial (410) 436-3829, or email: [kristy.broska@us.army.mil](mailto:kristy.broska@us.army.mil) or [catherine.stewart@us.army.mil](mailto:catherine.stewart@us.army.mil).

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# U.S. Army Public Health Command (Provisional)

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OPERATIONAL NOISE CONSULTATION  
NO. 52-EN-0D55-10  
OPERATIONAL NOISE CONTOURS  
PROPOSED AVIATION ACTIVITY  
SAVANNAH RIVER SITE  
AIKEN, SOUTH CAROLINA  
12 APRIL 2010

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Apr 10. Other requests for this document shall be referred to  
Savannah River Site, Savannah River Nuclear Solutions  
(Mr. C. Barry Shedrow), Building 705-3C, Aiken, SC 29808

Preventive Medicine Survey: 40-5f1

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EXECUTIVE SUMMARY  
OPERATIONAL NOISE CONSULTATION  
NO. 52-EN-0D55-10  
OPERATIONAL NOISE CONTOURS  
PROPOSED AVIATION ACTIVITY  
SAVANNAH RIVER SITE  
AIKEN, SOUTH CAROLINA  
12 APRIL 2010

1. PURPOSE. To address the noise impacts of the proposed Army aviation activity at Barnwell Regional Airport (BRA) and the Department of Energy's Savannah River Site (SRS).

2. CONCLUSIONS.

a. The projected operating environments at BRA and SRS would not generate A-weighted Day Night average Noise Level (ADNL) noise contours. The lack of ADNL contours indicates that annual average noise levels from the aviation activity are compatible with the surrounding environment. Yet, there is potential for individual events to cause annoyance and possibly generate noise complaints.

b. There is a potential that aircraft utilizing the BRA and the SRS airspace may cause annoyance to those living near the flight tracks. However, the majority of the land near the flight tracks is undeveloped.

3. RECOMMENDATIONS.

a. Include the information from this consultation in the appropriate National Environmental Policy Act documentation.

b. To reduce the annoyance potential from the proposed aviation activity:

- Establish a noise complaint management program.
- Develop a public notification system via the Public Affairs Office regarding the potential for noise when the aviation training occurs.
- Monitor both the noise environment and any proposed land use changes surrounding the facility.

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1. REFERENCES. A list of the references used in this consultation is in Appendix A. A glossary of terms and abbreviations used are in Appendix B. A vicinity map is in Appendix C.
2. AUTHORITY. The Army Environmental Command, Aberdeen Proving Ground, MD requested and funded this study.
3. PURPOSE. To address the noise impacts of the proposed Army aviation activity at Barnwell Regional Airport and the Department of Energy's Savannah River Site.
4. GENERAL.
  - a. The Department of Energy has agreed in principle to allow Army aviation activity at their Savannah River Site (SRS) in Aiken, South Carolina.
  - b. Barnwell Regional Airport (BRA), located 6 miles west of the SRS, has agreed in principle to allow the Army to use its airport for fixed/rotary wing operations. The BRA is an interim Drop Zone/Landing Zone (DZ/LZ) location, which will be made available for aviation units, until a usable DZ/LZ(s) is constructed on the SRS.
5. PROJECTED AVIATION ACTIVITY.
  - a. The projected aviation activity will be the same at the BRA and the SRS. The primary fixed wing aircraft would be the C-130 Hercules. Smaller fixed wing aircraft such as the C-235 Casa, C-23 Sherpa, and V-22 Osprey may occasionally be used. The projected rotary wing aircraft includes the CH-47 Chinook and the UH-60 Blackhawk.
  - b. Currently, the average size of an Airborne Infantry Battalion is 550 soldiers. This number was used to calculate the total number of passes required for an Airborne Infantry Battalion to deploy soldiers onto BRA and the SRS.

c. Tables 1 - 4 list the projected aviation activity. By averaging the number of aircraft, days and hours utilized, the total number of sorties in one day would not be expected to exceed more than 1 hour. Due to the low number of aircraft flying, the activity will not generate a Zone II (65 A-weighted Day Night average Level (ADNL)) noise contour or greater.

TABLE 1. PROJECTED ANNUAL AVIATION ACTIVITY.

<b>ANNUAL OPERATIONS</b>	<b>C-130</b>	<b>CH-47</b>	<b>UH-60</b>
Number of days utilized	4	4	4
Number of hours utilized	< 1	< 1	< 1
Number of minutes utilized	19	39	32
Total number of aircraft	32	64	72
Number of passes	64	128	72

TABLE 2. PROJECTED C-130 ACTIVITY OCCURRING IN A 24-HOUR PERIOD.

<b>24-HOUR PERIOD</b>	<b>C-130</b>
Number of hours utilized	< 1
Approximate number of minutes utilized	5 minutes
Total number of aircraft	8
Number of passes	2

TABLE 3. PROJECTED CH-47 ACTIVITY OCCURRING IN A 24-HOUR PERIOD.

<b>24-HOUR PERIOD</b>	<b>CH-47</b>
Number of hours utilized	< 1
Approximate number of minutes utilized	9 minutes
Total number of aircraft	16
Number of passes	32

TABLE 4. PROJECTED UH-60 ACTIVITY OCCURRING IN A 24 HOUR PERIOD.

<b>24-HOUR PERIOD</b>	<b>UH-60</b>
Number of hours utilized	< 1
Approximate number of minutes utilized	8 minutes
Total number of aircraft	18
Number of passes	18

d. To demonstrate that the proposed aviation activity would not reach Noise Zone II levels, one can look at the method of calculating Day Night average (DNL).

(1) The most common aircraft utilizing the BRA as a DZ will be the CH-47. The A-weighted Sound Exposure Level (ASEL) of a CH-47 at 1,000 feet Above Ground Level (AGL) is 87.8 decibels (dBA). This information can be used to determine the ADNL. The SEL is sound normalized to one second. If there is only one flight per day, the ADNL can be calculated by subtracting a constant representing 10 times the logarithm of the 86,400 seconds in a 24 hour day, which is 49.4 dB. So, for one CH-47 flyover at 1,000 feet (87.8 dB ASEL), the ADNL would be 38.4 dB ADNL. The ADNL increases 3 dB for every doubling of operations, so the ADNL for 2 flights would be 41.4 dB ADNL, 4 flights per day would equal 44.4 dB ADNL, and 8 flights per day would equal 47.4 dB ADNL. By continuing these calculations, it would take 512 CH-47 flights occurring over one location within a 24-hour period to achieve a 65.4 dB ADNL. Based upon the projected operational parameters and the limited number of aircraft utilizing the airspace, it is unlikely that an incompatible noise zone would ever be generated for the SRS or the BRA.

(2) If the BRA is utilized by either of the helicopters as a LZ, the projected number of sorties (CH-47 32 sorties or UH-60 18 sorties) in 24-hour period would not generate a Zone II (65 dB ADNL) noise contour (Table 5). As the CH-47 approaches the runway at 500 feet AGL, the ASEL is 92.4 dBA and at 250 feet the ASEL is 96.8 dBA. As the UH-60 approaches the runway at 500 feet AGL, the ASEL is 87.8 dBA and at 250 feet AGL the ASEL is 92.4 dBA.

TABLE 5. PROJECTED HELICOPTER ADNL NOISE LEVELS.

NUMBER OF SORTIES	CH-47 ADNL 250' AGL	CH-47 ADNL 500' AGL	UH-60 ADNL 250' AGL	UH-60 ADNL 500' AGL
1	47.4	43	43	38.4
2	50.4	46	46	41.4
4	53.4	49	49	44.4
8	56.4	52	52	47.4
16	59.4	55	55	50.4
32	62.4	58	---	---

e. Although the proposed aviation activity will not generate a Zone II (65 dB ADNL) noise contour, there is still the potential that individual aircraft overflights could annoy people and possibly generate complaints.



6. AVIATION ANNOYANCE POTENTIAL.

a. Scandinavian Studies (Rylander 1974 and Rylander 1988) have found that a good predictor of annoyance at airfields with 50 to 200 operations per day is the maximum level of the 3 loudest events. The SELCalc2 Program (U.S. Air Force 2005) was used to calculate the maximum A-weighted (dBA) noise levels for the projected aircraft at the BRA and the SRS. The levels are listed in Table 6. These maximum levels are compared with the levels listed in Table 7 to determine the percent of the population that would consider itself highly annoyed. While annoyance levels may be lower at flight corridors with fewer than 50 operations per day, it is a tool in providing some indication of the percent of people who might be annoyed.

TABLE 6. AIRCRAFT MAXIMUM NOISE LEVELS.

Slant Distance (feet)	Maximum Level, dBA		
	C-130	CH-47	UH-60
500	98	84	80
1,000	85	78	73
1,500	80	74	69
2,000	77	71	66
2,500	75	68	--
3,000	73	66	--
4,000	69	--	--
5,000	66	--	--

TABLE 7. PERCENTAGE OF POPULATION HIGHLY ANNOYED FROM AIRCRAFT NOISE. (Rylander 1974)

Maximum, dBA	Highly Annoyed
90	35%
85	28%
80	20%
75	13%
70	5%

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b. Table 8 indicates the percent of population that would consider itself highly annoyed correlated with maximum noise levels for specific aircraft overflights. The correlation is based on the Rylander studies which investigated airfields with 50 to 200 operations per day.

TABLE 8. OVERFLIGHT ANNOYANCE POTENTIAL<sup>1</sup>.

Source	Ground Track Distance <sup>2</sup>	dBA Maximum <sup>3</sup>	Population Highly Annoyed <sup>4</sup>
CH-47 – 500' AGL	0'	84	26%
	1320' (1/4 mile)	73	10%
	1760' (1/3 mile)	71	7%
	2640' (1/2 mile)	66	<1%
CH-47 – 1000' AGL	0'	77	16%
	1320' (1/4 mile)	72	8%
	1760' (1/3 mile)	70	5%
	2640' (1/2 mile)	66	<1%
CH-47 – 2000' AGL	0'	70	5%
	1320' (1/4 mile)	68	2%
	1760' (1/3 mile)	67	1%
	2640' (1/2 mile)	65	<1%
CH-47 – 3000' AGL	0'	66	<1%
	1320' (1/4 mile)	65	<1%
UH-60 – 500' AGL	0'	80	20%
	1320' (1/4 mile)	69	4%
	1760' (1/3 mile)	66	<1%

<sup>1</sup> Percent annoyance shown is based upon 50 to 200 overflights per day. (Rylander 1974)

<sup>2</sup> Distance between receiver and the point on Earth at which the aircraft is directly overhead.

<sup>3</sup> Obtained via SelCalc Program (U.S. Air Force 2005)

<sup>4</sup> Calculated percentage based upon regression using the known values in Table 7.

TABLE 8. OVERFLIGHT ANNOYANCE POTENTIAL<sup>1</sup>, Cont'd.

Source	Ground Track Distance <sup>2</sup>	dBA Maximum <sup>3</sup>	Population Highly Annoyed <sup>4</sup>
UH-60 – 1000' AGL	0'	73	10%
	1320' (1/4 mile)	68	2%
	1760' (1/3 mile)	65	<1%
UH-60 – 2000' AGL	0'	66	<1%
	1320' (1/4 mile)	64	<1%
	1760' (1/3 mile)	62	<1%
C-130 – 1000' AGL	0'	85	28%
	1320' (1/4 mile)	79	19%
	1760' (1/3 mile)	77	16%
	2640' (1/2 mile)	72	8%
	5280' (1 mile)	64	<1%
C-130 – 2000' AGL	0'	77	16%
	1320' (1/4 mile)	75	13%
	1760' (1/3 mile)	74	11%
	2640' (1/2 mile)	71	7%
	5280' (1 mile)	64	<1%
C-130 – 3000' AGL	0'	73	10%
	1320' (1/4 mile)	72	8%
	1760' (1/3 mile)	71	7%
	2640' (1/2 mile)	69	4%
	5280' (1 mile)	63	<1%
C-130 – 4000' AGL	0'	69	4%
	1320' (1/4 mile)	69	4%
	1760' (1/3 mile)	68	2%
	2640' (1/2 mile)	67	1%
	5280' (1 mile)	62	<1%

<sup>1</sup> Percent annoyance shown is based upon 50 to 200 overflights per day. (Rylander 1974)

<sup>2</sup> Distance between receiver and the point on Earth at which the aircraft is directly overhead.

<sup>3</sup> Obtained via SelCalc Program (U.S. Air Force 2005)

<sup>4</sup> Calculated percentage based upon regression using the known values in Table 7.

c. Also based on Rylander’s results, Figure 1 provides a graphical depiction of the data presented in Table 8 for the percent of population annoyed by a C-130. The figure shows that the levels are based on the receivers being located directly under the C-130 at 1,000 feet AGL.

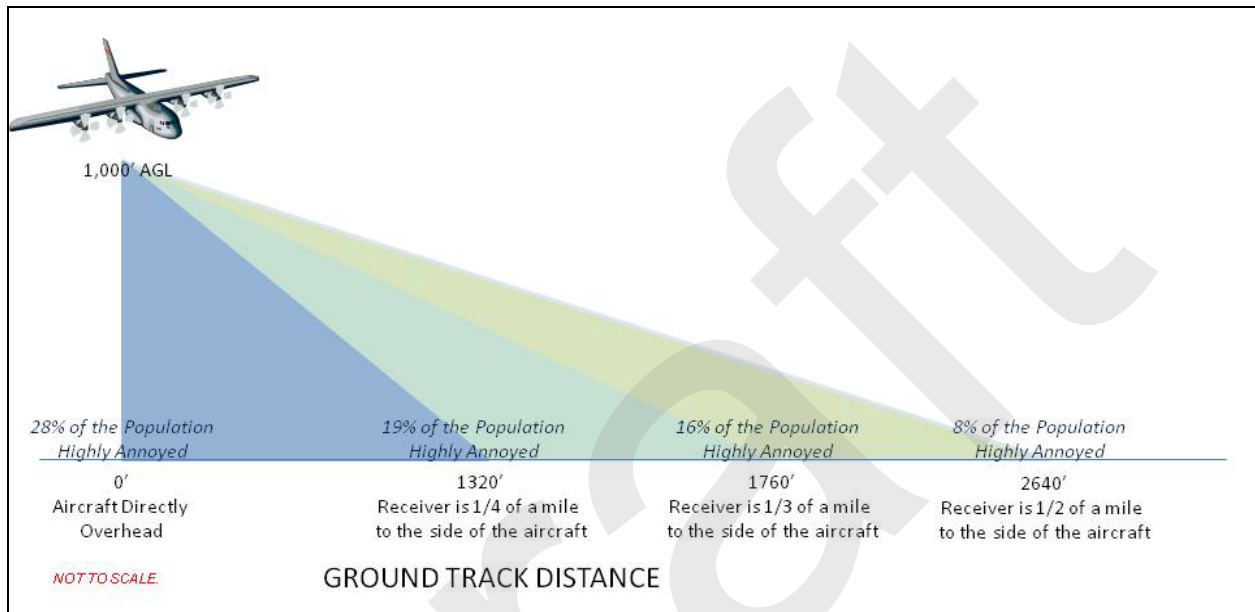


FIGURE 1. C-130 OVERFLIGHT ANNOYANCE POTENTIAL (More than 50 Daily Overflights).

## 7. BARNWELL REGIONAL AIRPORT ACTIVITY.

a. Existing Operations. The BRA is a small general aviation airfield that has approximately 65 flights per day (23,750 per year).

b. Projected Army Operational Parameters. The projected operational parameters for the BRA were provided by Fort Gordon and are as follows:

- **Approach:** The recommended, primary approach would be from the southwest to the northeast using runway 5/23 for parachute operations (Figure 2). This route crosses over the city of Barnwell's most sparsely populated area. The minimum jump altitude is 1,000 feet AGL over Runway 5/23.
- **Fixed Wing Aircraft:**
  - Fixed wing aircraft maintain a minimum altitude of 3,000 feet AGL, until approximately 6 miles from BRA. At that point, aircraft may descend to jump altitude in vicinity of runway 5/23. One C-130 Aircraft would be allowed to land on BRA per month due to aircraft weight on the runway. Smaller aircraft such as a C-235 Casa, C-23 Sherpa, and V-22 Osprey may be allowed more frequent use of the airport for landing.
  - The total estimated number of soldiers deploying to SRS using BRA for Airborne Operations would be 2,350.
  - No airborne elements larger than battalion size are anticipated to be inserted into BRA at any one time. Currently, the average size of an Airborne Infantry Battalion is 550 soldiers.
- **Rotary Wing Aircraft:**
  - Rotary wing aircraft would maintain a minimum altitude of 3,000 feet AGL, until approximately 6 miles from BRA. At that point, aircraft may descend to jump altitude in vicinity of runway 5/23.
  - The estimated number of soldiers deploying to SRS using BRA by rotary wing aircraft may be as low as 24 soldiers, up to a company size elements of 150 soldiers on runway 5/23 at any one time.
  - Conducting airborne training from rotary wing aircraft may require repeated passes and loitering of rotary wing aircraft to allow for loading of troops, gain proper jump altitude, verify winds, and then deploy troops.
- **Departure:** The aircraft would exit the airfield to the northeast crossing over sparsely populated areas. The aircraft would either exit the airspace or approach the runway for another drop.

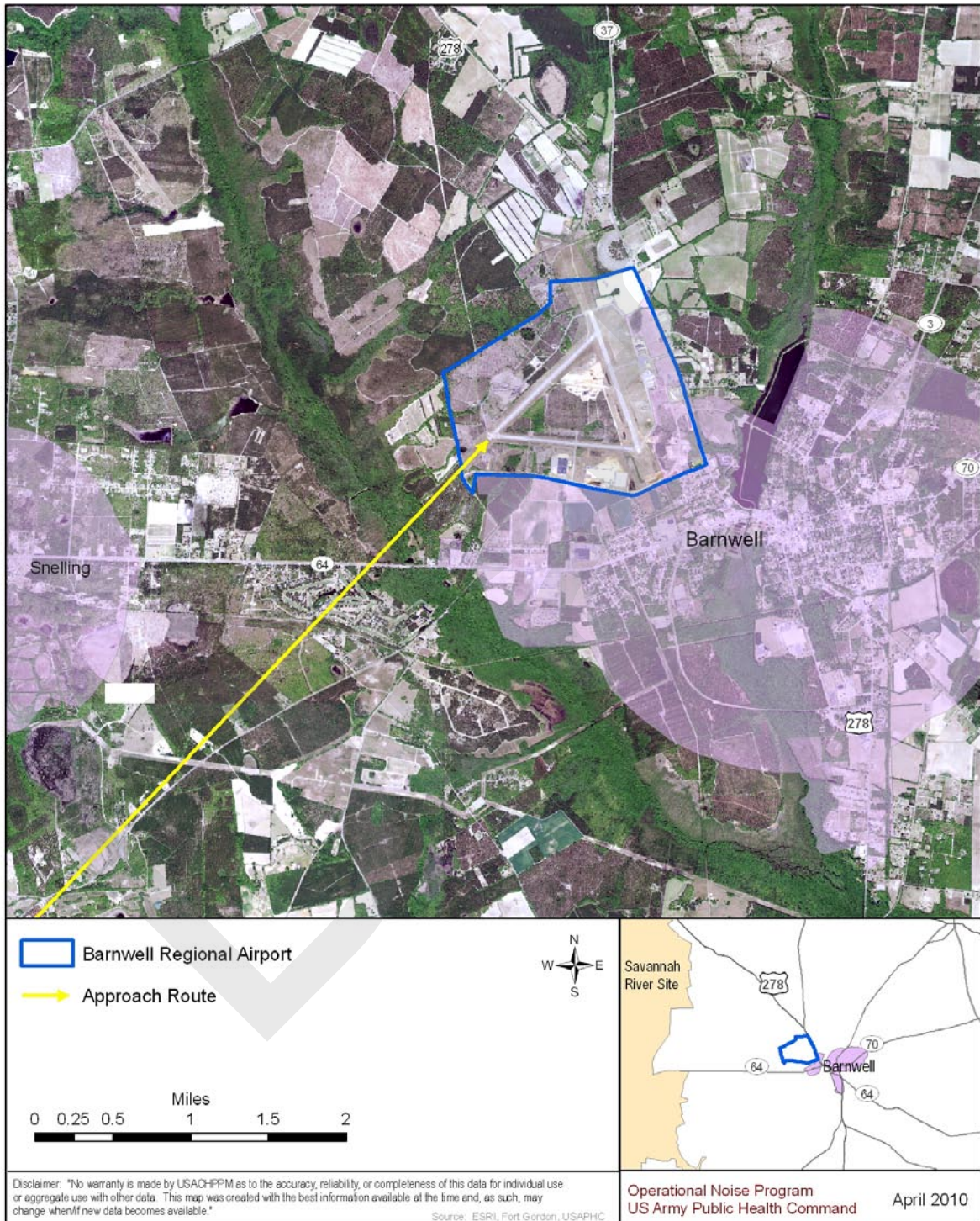


FIGURE 2. APPROACH ROUTE BARNWELL REGIONAL AIRPORT

c. Fixed Wing. Based on the annoyance tables in section 6, up to 28 percent of the population may consider itself highly annoyed from a C-130 overflight. The majority of the land under the flight route to BRA is undeveloped. The percent of population annoyed varies based on the altitude of the aircraft.

(1) At the minimum jump altitude of 1,000 feet AGL directly under the flight path, up to 28 percent of the population may consider itself highly annoyed from a C-130 overflight. There is a small residential area directly under the flight path approximately 1.25 mile from the end of the runway.

(2) Approaching BRA with an altitude of 2,000 feet AGL directly under the flight path, up to 16 percent of the population may consider itself highly annoyed from a C-130 overflight.

(3) Approaching BRA with an altitude of 3,000 feet AGL directly under the flight path, up to 10 percent of the population may consider itself highly annoyed from a C-130 overflight.

(4) A higher jump altitude for the C-130 of 1,500 feet AGL could reduce the annoyance potential directly under the flight route to 20 percent. Based on community reaction to the C-130 overflights, if needed, the Army could increase the minimum jump altitude to 1,500 feet AGL.

d. Rotary Wing. Based on the annoyance tables in section 6, up to 16 percent of the population may consider itself highly annoyed from a CH-47 overflight and up to 10 percent of the population may consider itself highly annoyed from a UH-60 overflight. The majority of the land under the flight route to BRA is undeveloped. The percent of population annoyed varies based on the altitude of the aircraft.

(1) CH-47 Activity.

(a) At the minimum jump altitude of 1,000 feet AGL directly under the flight path, up to 16 percent of the population may consider itself highly annoyed from a CH-47 overflight. There is a small residential area directly under the flight plan approximately 1.25 mile from the end of the runway.

(b) Approaching BRA with an altitude of 2,000 feet AGL directly under the flight path, up to 5 percent of the population may consider itself highly annoyed from a CH-47 overflight.

(c) Approaching BRA with an altitude of 3,000 feet AGL directly under the flight path, less than 1 percent of the population may consider itself highly annoyed from a CH-47 overflight.

(2) UH-60 Activity.

(a) At the minimum jump altitude of 1,000 feet AGL directly under the flight path, up to 10 percent of the population may consider itself highly annoyed from a UH-60 overflight. There is a small residential area directly under the flight plan approximately 1.25 mile from the end of the runway.

(b) Approaching BRA with an altitude of 2,000 feet AGL directly under the flight path less than 1 percent of the population may consider itself highly annoyed from a UH-60 overflight.

e. ANNOYANCE POTENTIAL. There is a potential that proposed Army aircraft utilizing the BRA airspace and airfield may cause annoyance to those living near the flight tracks.



## 8. SAVANNAH RIVER SITE ACTIVITY.

a. Fixed Wing and Rotary Wing Air Corridors. The Department of Energy – Savannah River (DOE-SR) requested measures be provided to control access of Army aircraft in SRS airspace. The military aircraft will have specific flight corridors into the SRS airspace (Figure 3).

b. Projected DZ Operational Parameters. The projected operational parameters for the fixed wing DZ at SRS were provided by Fort Gordon and are as follows:

- **Approach:** The primary approach would be from the southwest to the northeast (Figure 4). Aircraft may approach from the northwest to southeast if conditions warrant. The minimum jump altitude is 1,000 feet AGL. Exiting the DZ the aircraft would turn to avoid overflight of Plant Vogtle Electric Power Generating Plant.
- **Fixed Wing Aircraft:** Fixed wing aircraft maintain a minimum altitude of 4,000 feet AGL, until approximately 6 miles from the DZ. At that point aircraft may descend to jump altitude.

c. C-130 Annoyance Potential. There is a potential that proposed C-130 aircraft utilizing the DZ may cause annoyance to those living near the flight tracks. Based on the potential annoyance tables in section 6, up to 28 percent of the population may consider itself highly annoyed from a C-130 overflight. However, the majority of the land under the flight route to the SRS is undeveloped and the fixed wing DZ is situated well away from residential areas.

(1) At the minimum jump altitude of 1,000 feet AGL directly under the flight path, up to 28 percent of the population may consider itself highly annoyed from a C-130 overflight. There are no residential areas directly under the flight path.

(2) Approaching the DZ with an altitude of 2,000 feet AGL directly under the flight path, up to 16 percent of the population may consider itself highly annoyed from a C-130 overflight. There may be scattered residences near the flight path.

(3) Approaching the DZ with an altitude of 3,000 feet AGL directly under the flight path, up to 10 percent of the population may consider itself highly annoyed from a C-130 overflight. There may be scattered residences near the flight path.

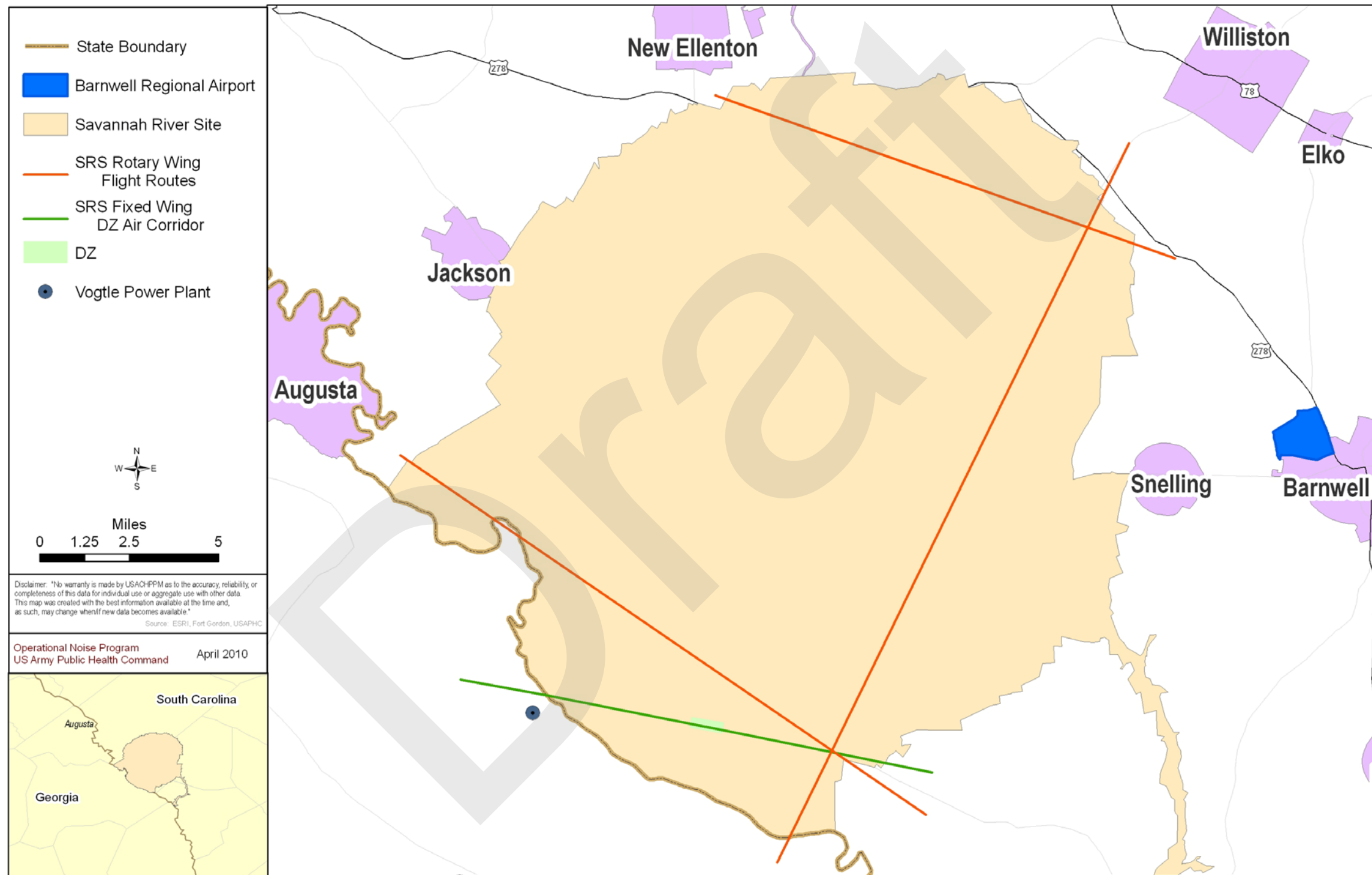


FIGURE 3. SAVANNAH RIVER SITE

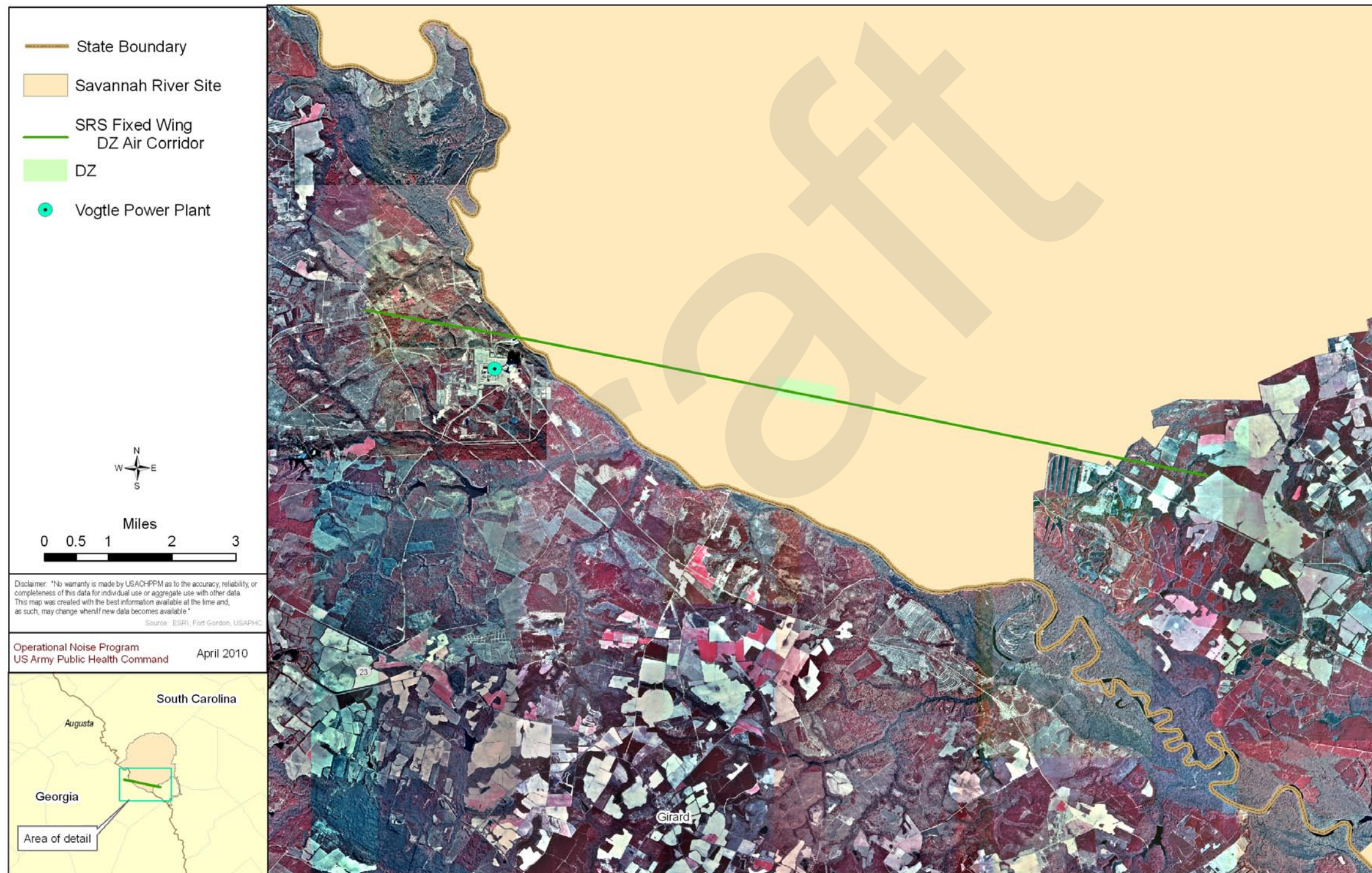


FIGURE 4. FIXED WING DROP ZONE SAVANNAH RIVER SITE

d. Projected LZ Operational Parameters. The projected operational parameters for the rotary wing LZ at SRS were provided by Fort Gordon and are as follows:

- **Approach:** The Army recommends 3 rotary wing air corridors be provided for aircraft to access SRS training lands. These are labeled routes Alpha, Bravo, and Charlie (Figure 5). Once in the SRS airspace, the Army helicopters will follow designated routes provided by the DOE-SR Aviation.
- **Rotary Wing Aircraft:** Aircraft would maintain a minimum altitude of 3,500 feet AGL before crossing over the SRS boundary. Once aircraft cross into SRS, aircraft may assume training altitudes as requested and approved by DOE-SR Aviation. Aircraft must maintain course, following the predetermined route until the aircraft near the training location or LZ. At that time, the aircraft may depart the predetermined route and land on the approved LZ. To depart the LZ, the aircraft would follow the route to the next LZ or depart SRS airspace following the predetermined route off site.
- **LZ Locations:** The helicopter LZs are not predefined. The LZs would likely alternate between clear cuts and give the troops some latitude during training.

e. Rotary Wing Annoyance Potential.

(1) Based on the minimum altitude of 3,500 feet AGL at the SRS boundary, the potential annoyance from the rotary wing aircraft is less than 1 percent.

(2) Within the SRS boundary, the percent of population annoyed would vary based on the altitude of the helicopter; if the helicopter is near the boundary; and there if there are residences nearby. The majority of the land surrounding the SRS is undeveloped.

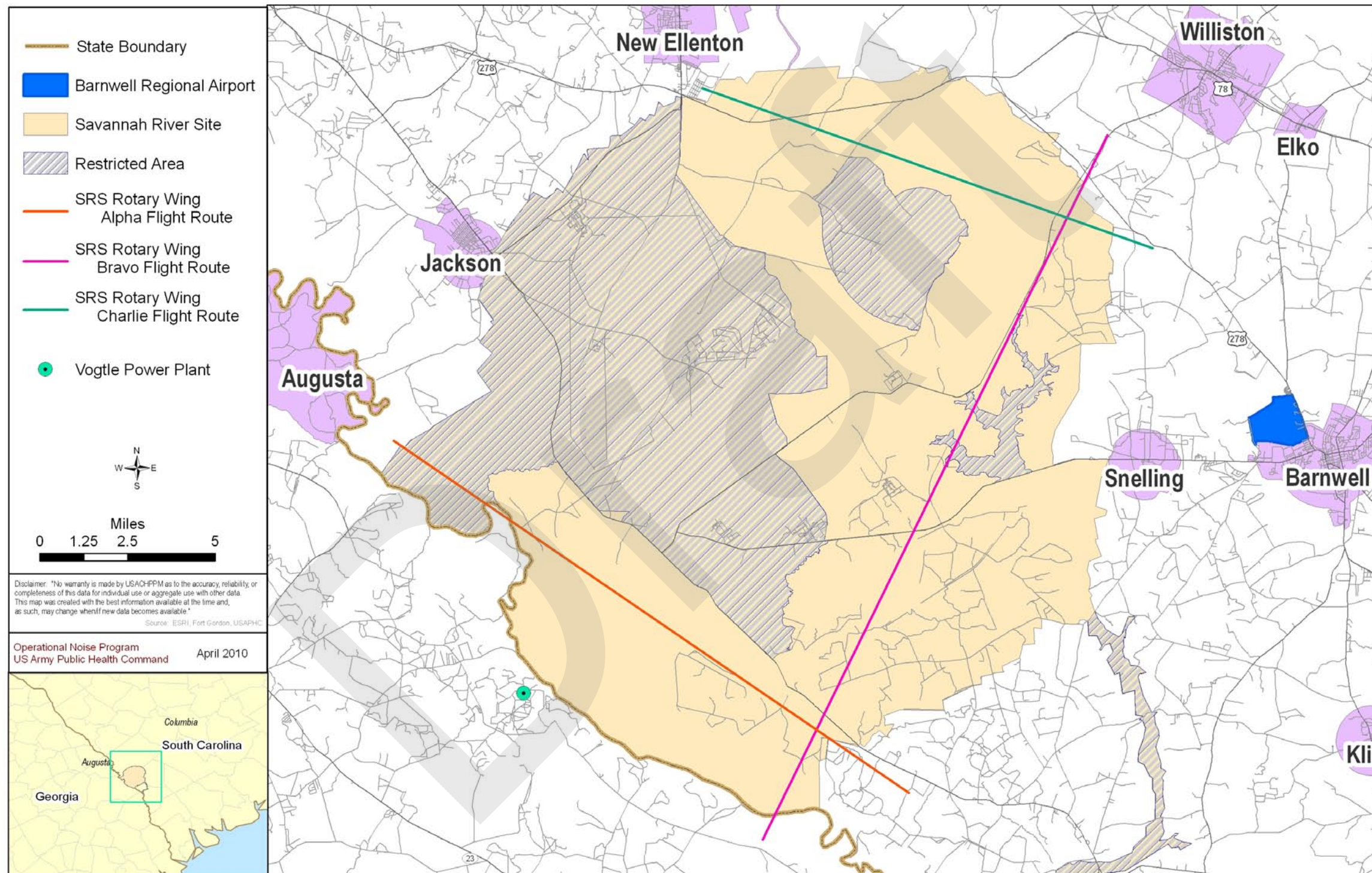


FIGURE 5. ROTARY WING AIRCRAFT ROUTES SAVANNAH RIVER SITE

## 9. MITIGATION TECHNIQUES TO REDUCE NOISE COMPLAINTS.

a. As the aviation activity at BRA and SRS will not be conducted on a routine basis, the best option for reducing the potential of noise complaints is good community relations and public notification. The potential for noise complaints may be reduced by providing the news media with press releases prior to the aviation training.

b. The press release would include a telephone number that the community can use to receive additional information or complain about the noise. The news media would be monitored to make sure the information is being released to the community in a timely manner.

- SAMPLE: "Special Activity Notice – \_\_\_\_\_ plans to conduct several aviation training missions at \_\_\_\_\_. The aviation training mission may include equipment/troop drops utilizing \_\_\_\_\_ and \_\_\_\_\_ wing aircraft. The \_\_\_\_\_ will be conducting this \_\_\_\_\_ exercise during the period of \_\_\_ Nov to \_\_\_ Nov from \_\_\_\_\_ am to \_\_\_\_\_ pm. If the weather conditions are unfavorable, the training may be rescheduled. Questions should be directed to 610-xxx-xxxx or 800-xxx-xxxx."

## 10. CONCLUSIONS.

a. The projected operating environments at BRA and SRS would not generate ADNL noise contours. The lack of ADNL contours indicates that annual average noise levels from the aviation activity are compatible with the surrounding environment. Yet, there is potential for individual events to cause annoyance and possibly generate noise complaints.

b. There is a potential that aircraft utilizing the BRA and the SRS airspace may cause annoyance to those living near the flight tracks. However, the majority of the land under the flight track is undeveloped.

## 11. RECOMMENDATIONS.

- a. Include the information from this consultation in the appropriate National Environmental Policy Act (NEPA) documentation.
- b. To reduce the risk of noise complaints from the proposed aviation activity:
  - Establish a noise complaint management program.
  - Develop a public notification system via the Public Affairs Office regarding the potential for noise when the aviation training occurs.
  - Monitor both the noise environment and any proposed land use changes surrounding the facility.

KRISTY BROSKA  
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APPROVED:

CATHERINE STEWART  
Program Manager  
Operational Noise

## APPENDIX A

### REFERENCES

1. Rylander, et. al., 1974, "Re-Analysis of Aircraft Noise Annoyance Data Against the dBA Peak Concept", Journal of Sound and Vibration, Volume 36, pages 399 - 406.
2. Rylander and Bjorkman, 1988, "Maximum Noise Levels as Indicators of Biological Effects", Journal of Sound and Vibration, Volume 127, pages 555 - 563.
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## APPENDIX B

### GLOSSARY OF TERMS, ACRONYMS & ABBREVIATIONS

#### B-1. GLOSSARY OF TERMS.

**Above Ground Level** – distance of the aircraft above the ground.

**A-weighted Sound Level** - the ear does not respond equally to sounds of all frequencies, but is less efficient at low and high frequencies than it is at medium or speech range frequencies. Thus, to obtain a single number representing the sound pressure level of a noise containing a wide range of frequencies in a manner approximating the response of the ear, it is necessary to reduce, or weight, the effects of the low and high frequencies with respect to the medium frequencies. Thus, the low and high frequencies are de-emphasized with the A-weighting. The A-scale sound level is a quantity, in decibels, read from a standard sound-level meter with A-weighting circuitry. The A-scale weighting discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear. The A-scale sound level measures approximately the relative "noisiness" or "annoyance" of many common sounds.

**Average Sound Level** - the mean-squared sound exposure level of all events occurring in a stated time interval, plus ten times the common logarithm of the quotient formed by the number of events in the time interval, divided by the duration of the time interval in seconds.

**Day-Night Average Sound Level (DNL)** - the 24-hour average frequency-weighted sound level, in decibels, from midnight to midnight, obtained after addition of 10 decibels to sound levels in the night from midnight up to 7 a.m. and from 10 p.m. to midnight (0000 up to 0700 and 2200 up to 2400 hours).

**Decibels (dB)** – a logarithmic sound pressure unit of measure.

**Ground Track Distance** – the distance between the receiver and the point on the Earth at which the aircraft is directly overhead.

**Noise** – any sound without value.

**Slant Distance** – the line of sight distance between the receiver and the aircraft. The slant distance is the hypotenuse of the triangle represented by the altitude AGL of the aircraft and the distance between the receiver and the aircraft’s ground track distance.

**Sound Exposure Level (SEL)** – a constant sound level which has the same amount of energy in 1 second as the original sound event.

## B-2. GLOSSARY OF ACRONYMS AND ABBREVIATIONS.

ADNL	A-weighted Day Night average Level
AGL	Above Ground Level
ASEL	A-weighted Sound Exposure Level
BRA	Barnwell Regional Airport
dB	Decibels
dBA	Decibels, A-weighted
DNL	Day Night average Level
DOE-SR	Department of Energy Savannah River
DZ	Drop Zone
LZ	Landing Zone
MAX	Maximum sound level
SEL	Sound Exposure Level
SRS	Savannah River Site

APPENDIX C

VICINITY MAP

Draft

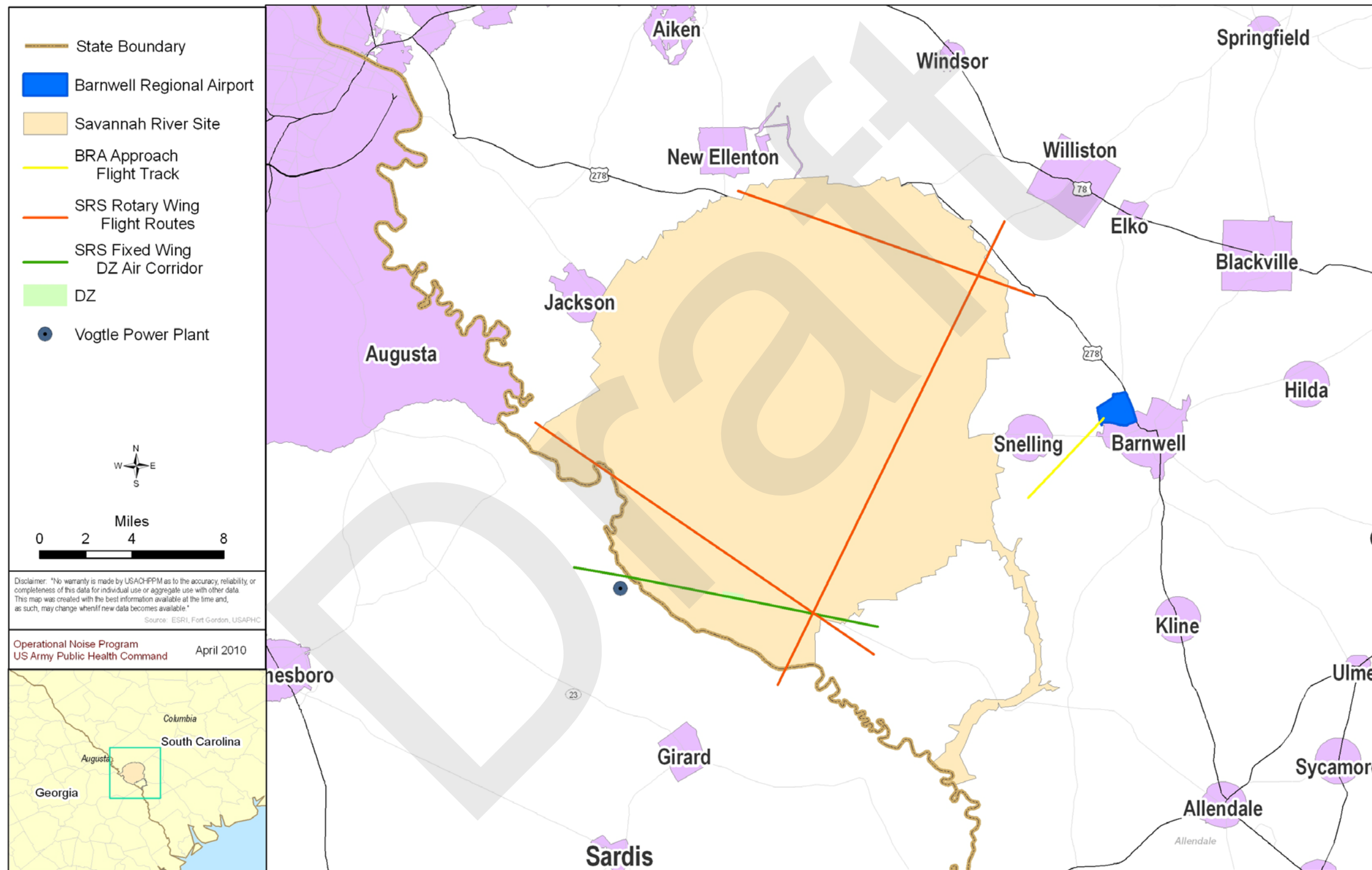


FIGURE C. BARNWELL REGIONAL AIRPORT AND SAVANNAH RIVER SITE VICINITY MAP