

FINAL

**ENVIRONMENTAL ASSESSMENT
FOR BASE REALIGNMENT AND CLOSURE, INSTALLATION SUPPORT, AND
ASSOCIATED FUTURE MASTER PLANNING ACTIONS AT
REDSTONE ARSENAL, ALABAMA**

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EXECUTIVE SUMMARY

ES.1 Introduction

This environmental assessment (EA) analyzes and documents environmental effects associated with the Army's Proposed Action at Redstone Arsenal. To enable implementation of Base Realignment and Closure (BRAC) recommendations, the Army proposes to provide necessary facilities to support the changes in force structure.

This EA was developed in accordance with the National Environmental Policy Act of 1969 (NEPA), Environmental Effects of Army Actions at 32 CFR Part 651 (Army Regulation 200-2), and implementing regulations issued by the President's Council on Environmental Quality (CEQ) as well as guidance provided by the 2005 Army BRAC NEPA Manual.

ES.2 Background/Setting

Redstone Arsenal is located in Madison County, Alabama, nearly surrounded by the City of Huntsville, and southwest of downtown Huntsville. Redstone Arsenal currently comprises 37,910 acres (including special-use permit land) and is approximately 6 miles wide and 10 miles long. There is no unrestricted public access to Redstone Arsenal. The Tennessee River forms the southern boundary of the arsenal.

ES.3 Proposed Action

The Proposed Action involves BRAC-directed actions, BRAC-discretionary actions, and non-BRAC installation support and associated future master planning actions.

BRAC-Directed Actions – includes the construction and/or renovation of the following nine facilities:

- Army Materiel Command (AMC) and U.S. Army Security Assistance Command (USASAC) Headquarters Complex – Phase I
- AMC Band Facility
- AMC Mail Facility
- Von Braun Complex – Phase III
- Rotary Wing Center (Test and Evaluation Facility and Secure Storage Facility)
- Redstone Arsenal Airfield Fire Station
- Redstone Arsenal Airfield Fuel Tanks
- Rotary Wing Center of Excellence
- 2nd Recruiting Brigade Headquarters

BRAC-Discretionary Actions – includes the following actions that are consistent with or supplement the proposed BRAC-directed actions but which were not specifically included in the BRAC 2005 recommendations:

- Relocation of three personnel with the AMC Logistics Civil Augmentation Program (LOG CAP) from Fort Belvoir, VA to Redstone Arsenal
- Relocation of 27 personnel with the USASAC Field Office from St. Louis, MO to Redstone Arsenal

Non-BRAC Installation Support and Associated Future Master Planning Actions – includes construction and/or renovation of the following eight facilities to provide services and facilities for the population growth on the installation, of which BRAC is a component or to address installation-specific relocation or operational needs:

- AMC and USASAC Headquarters Complex – Phase II
- Von Braun Complex – Phase IV
- Rotary Wing Simulation Center
- Child Development Center
- Gate 1 Replacement and Visitor Center
- Gate 3 Replacement and Truck Inspection Center
- Gate 3 Shipping and Receiving Warehouse
- Fire and Emergency Services Facility

Redstone Arsenal would undergo a net increase of approximately 4,050 personnel as a result of implementing the BRAC Commission's realignment recommendations and the approved BRAC-discretionary actions and an additional 2,800 personnel for non-BRAC installation support and associated future master planning actions.

ES.4 Alternatives

Three categories of alternatives were considered in this EA that represent 1) new facility construction and existing facility renovation, 2) use of existing facilities, and 3) no action. The alternatives were screened for inclusion in this EA using the following criteria: operational constraints, safety constraints, geographic/environmental constraints, and existing facility and mission constraints.

The Preferred Alternative and the No Action Alternative are carried forward and evaluated in this EA. The Preferred Alternative is comprised of BRAC-directed actions, BRAC-discretionary actions, and a number of non-BRAC installation support and associated future master planning actions. Although not integral to implementation of the BRAC-directed actions, the non-BRAC installation support and associated future master planning actions have been included in this document since they will facilitate installation missions and were deemed sufficiently developed to merit NEPA analysis at this time. If these non-BRAC projects are not funded in the future, this would not affect construction of the BRAC projects. A BRAC-directed-actions only alternative was considered, but was not carried forward in this EA because related projects would facilitate implementation of BRAC on Redstone or would become an integral part of administrative complexes which are BRAC funded.

Although implementation of the BRAC-directed actions is mandated by law, an environmental analysis of a No Action Alternative is required by CEQ Regulations to serve as a baseline against which the environmental impacts of the Proposed Action can be evaluated. Under the No Action Alternative, the Proposed Action would not be implemented.

ES.5 Environmental Consequences

Thirteen environmental and human resource areas were characterized and evaluated for potential impacts from the Preferred Alternative and the No Action Alternative. Significance criteria were developed for the affected resource categories, and for many resource categories, are necessarily

qualitative in nature. No potential impacts were classified as significant based on the significance criteria. Potential impacts identified for each resource area from the Preferred Alternative are provided below and summarized in Table ES-1. Requirements are in place to ensure that activities are consistent with installation permits and management plans. These requirements are components of the projects rather than mitigation and are also listed in Table ES-1.

Table ES-1. Summary of Findings for Each Resource Area.

Resource Area	Impact Significance	Associated Requirements
Land Use	Not Significant	None
Aesthetics and Visual Resources	Beneficial Impacts; No Significant Adverse Impacts	None
Air Quality	Not Significant	Emissions regulated under current Title V Permit
Noise	Not Significant	None
Geology and Soils	Not Significant	Site-specific geotechnical surveys required before construction to locate karst geology and sinkholes. BMPs required to minimize soil erosion.
Water Resources	Not Significant	BMPs to reduce erosion and soil migration to water sources. National Pollutant Discharge Elimination System storm water permits would regulate discharges from the construction sites.
Biological Resources	Not Significant	The Rotary Wing Center and Redstone Arsenal Airfield Facilities upgrades are located within the habitat buffer area for the federally endangered Alabama cave shrimp. Redstone Arsenal's requirements for activities occurring in this habitat buffer area would be implemented. Such requirements would necessitate an oil-water separator upstream from a bioremediation pond or other bioretention area to treat storm water runoff from parking areas at these facilities. Jurisdictional wetlands comprising approximately 0.5 acre occur in the south-central portion of the Von Braun Complex site. If the final construction footprint cannot be changed to avoid jurisdictional wetlands, appropriate mitigation would be coordinated and developed through the U.S. Army Corps of Engineers.
Cultural Resources	Not Significant	Consistent with the SHPO recommendation and with the directives of the ICRMP, if any potential cultural or archaeological resource is uncovered during construction, Redstone Arsenal would implement their standard operating procedures to minimize impacts.
Socioeconomics	Beneficial Impacts; No Significant Adverse Impacts	None
Transportation	Not Significant	Redstone Arsenal's continued use of administrative mechanisms, primarily the use of flex-time in personnel schedules, for distributing peak traffic over three-hour periods in the morning and afternoon, would be important. Implementation of a mass-transit or carpool strategy could also help to alleviate the impact of the additional vehicles at Redstone Arsenal.
Utilities	Not Significant	BMPs outlined in the construction permits would be followed to protect the storm water system.

Resource Area	Impact Significance	Associated Requirements
Hazardous Materials, Hazardous Waste, and Environmental Restoration Sites	Not Significant	<p>Additional hazardous materials and hazardous waste would be tracked by Redstone’s Hazardous Material and Waste Management System.</p> <p>The small increase in hazardous waste volume resulting from the Preferred Alternative could easily be managed under Redstone’s current permit.</p> <p>Disposal of relatively small amounts of ACM and LBP from demolition activities would be in accordance with Redstone’s current procedures.</p> <p>The use of appropriate safety monitoring and implementation of UXO awareness training during construction of the 2nd Recruiting Brigade Headquarters, Von Braun Complex Phases III-IV, and Rotary Wing Center would reduce the likelihood of safety incidents related to IRP and ORAP sites.</p>
Safety and Occupational Health	Not Significant	Notification of construction of the proposed potable water line and water tower associated with the Rotary Wing Center to the Federal Aviation Administration is required.

- | | | | |
|-------|-----------------------------------------------|------|--------------------------------------|
| ACM | Asbestos Containing Material | LBP | lead-based paint |
| AST | aboveground storage tank | ORAP | Operational Range Assessment Program |
| BMP | best management practice | SHPO | State Historic Preservation Officer |
| ICRMP | Integrated Cultural Resources Management Plan | UXO | unexploded ordnance |
| IRP | Installation Restoration Program | | |

Land Use. The Preferred Alternative would be contained within Redstone Arsenal, which sets its own land use and zoning designations, and would not present conflicts or nonconformance with current local or state land use or zoning designations. Overall, potential impacts to land use from the Preferred Alternative are not considered significant.

Aesthetics and Visual Resources. The Preferred Alternative would cause short-term visual impacts resulting from ground disturbance associated with construction of the facilities and utility corridors and the widening of Martin and Burose Roads. However, the reclamation of disturbed areas would remove these visual impacts.

Long-term visual impacts include the addition of facilities to previously undeveloped land, elimination of approximately 58 acres of pine plantations, including a centrally-located 45-acre stand of planted pines, and increased vehicle traffic resulting from additional personnel. Where existing buildings would be demolished and where additions would be built to existing buildings, visual impacts would be beneficial, as older, utilitarian buildings would be replaced by well-landscaped, contemporary structures or upgraded. Replacement of two entrance gates may have especially beneficial impacts to aesthetics, because gates provide the first and last impression of the arsenal. Overall, potential impacts to aesthetics and visual resources from the Preferred Alternative are not considered significant.

Air Quality. Short-term air quality impacts from the Preferred Alternative would occur from temporary and localized construction activities associated with the movement of heavy equipment. Contaminants generated from construction, including particulate matter, vehicle emissions, and increased fugitive dust, would not be substantial compared to the total existing vehicular emissions in the area.

Long-term impacts would include external combustion emissions, fuel storage tank emissions, and other emissions. All anticipated air emissions, except for mobile sources, would be regulated under Redstone Arsenal's Title V permit. Overall, potential impacts to air quality from the Preferred Alternative are not considered significant.

Noise. Short-term noise impacts would be generated by standard construction equipment and by increased construction traffic on area roadways.

Long-term noise impacts would include a certain amount of noise from routine training and testing operations of the approximately 24 additional aircraft that would be housed at the new Rotary Wing Center. Routine training operations would include takeoffs, landings, hover patterns, and closed patterns (which could include activities such as touch-and-go's or low approaches). Based on the limited number of planned daily aircraft operations that would utilize the Redstone Army Airfield, flight corridors, flight tracks, and/or training areas, there would be no substantial increase in noise. Overall, potential noise impacts from the Preferred Alternative are not considered significant.

Geology and Soils. The presence of karst geology, including numerous sinkholes throughout the arsenal, necessitates that site-specific geotechnical surveys be completed by the selected contractor prior to construction; however, no adverse environmental impacts are expected. Construction sites may require some slight grading, but would not require or generate any cut or fill since the areas are relatively flat. Overall, potential impacts to geology and soils from the Preferred Alternative are not considered significant.

Water Resources. Erosion control during construction activities would reduce the movement of soils via surface waters and mitigate potential damage. National Pollutant Discharge Elimination System storm water permits would regulate discharges from the construction sites. The Preferred Alternative facilities are unlikely to have any impact upon existing groundwater contamination areas, because these facilities would not interfere with groundwater flow, nor would they be expected to contribute additional pollutants to groundwater. Overall, potential impacts to water resources from the Preferred Alternative are not considered significant.

Biological Resources. Construction/renovation would cause short-term impacts on vegetation surrounding construction sites, but over the long term, existing vegetation around the sites would be expected to remain the same. The Preferred Alternative would result in the removal of approximately 1 percent of the installation's pine forest type from the installation's commercial forestry program and approximately 35 acres of pasture from the Agricultural Leasing and Grazing Program. Fifty-one acres of pasture on the site of the proposed Von Braun Complex expansion have already been removed from the lease program. The losses to commercial forestland and pasture would not substantially diminish any regionally or locally important plant species or plant habitat.

Construction may affect on-site wildlife through the long-term direct loss of a relatively small amount of habitat and direct mortality of individuals occurring in construction zones. Facilities built on currently undeveloped land would result in the direct long-term loss of approximately 143 acres of habitat for ground-dwelling or nesting species (58 acres of pine plantation and 85 acres of pasture, or approximately 0.5 percent of existing undeveloped, unpaved land on the

arsenal). However, impacts to overall habitat diversity, genetic diversity, and species diversity would not be significant.

Although there is no habitat for protected species located in the vicinity of the Preferred Alternative facilities, the Rotary Wing Center and Redstone Arsenal Airfield Facilities upgrades are located within the habitat buffer area for the federally endangered Alabama cave shrimp. Redstone Arsenal has requirements for activities occurring in this habitat buffer area that go beyond standard best management practices; these requirements provide an extra level of protection to the Alabama cave shrimp by reducing the likelihood of any discharges of pollutants into groundwater or surface water. As these requirements are in place to ensure that activities are consistent with the installation's Endangered Species Management Plan, they are components of the projects rather than mitigation. Redstone Arsenal's requirements would necessitate an oil-water separator upstream from a bioremediation pond or other bioretention area to treat storm water runoff from parking areas at these facilities. Runoff from maintenance areas and other hardstand would also have to be routed through an oil-water separator prior to treatment in the arsenal's wastewater system or through bioremediation. There may also be other requirements under the Endangered Species Management Plan. The design and operation of the two proposed above ground storage tanks and the airfield fire station upgrade would also be required to comply with the installation's cave shrimp protection plan.

The U.S. Fish and Wildlife Service and the Alabama Department of Conservation and Natural Resources have reviewed the proposed project and the U.S. Fish and Wildlife Service concurred that the Preferred Alternative is not likely to adversely affect the Alabama cave shrimp or any other listed or candidate species.

With two exceptions, the Preferred Alternative would not affect wetlands. Jurisdictional wetlands comprising approximately 0.5 acre occur in the south-central portion of the Von Braun Complex site. Additionally, the new or upgraded sewer force main from the proposed AMC HQ/USASAC HQ complex would cross the ephemeral stream (which flows from the wetland on the site of the Von Braun Complex expansion). If the final construction footprint cannot be changed to avoid jurisdictional wetlands and if the stream that flows from the wetland would be impacted by utility upgrades, the Army will obtain the necessary Clean Water Act Section 404 permit and appropriate mitigation will be coordinated and developed through the U.S. Army Corps of Engineers. The permit and any mitigation required by the permit would become part of the construction project.

Overall, potential impacts to biological resources from the Preferred Alternative are not considered significant.

Cultural Resources. The Preferred Alternative would not affect any National Register of Historic Places-eligible archeological sites. The proposed facilities have been sited to avoid effects on historic structures and the portion of the installation within the boundaries of the proposed Historic Districts. The finding of no effect by the Redstone Arsenal has been concurred in by the Alabama State Historic Preservation Officer (SHPO). Consistent with the SHPO recommendation and with the directives of the Integrated Cultural Resources Management Plan, if any potential cultural or archaeological resource is uncovered during construction, Redstone Arsenal would implement their standard operating procedures to

minimize impacts. Overall, potential impacts to cultural resources from the Preferred Alternative are not considered significant.

Socioeconomics. Redstone Arsenal would undergo a net increase of 6,800 personnel by implementing the BRAC Commission's realignment recommendations, the approved BRAC-discretionary actions, and non-BRAC installation support and associated future master planning actions. The largest increase in population in the region of influence would be for Limestone County followed by Marshall County. The total percent change in the region of influence would be an increase of 26 percent. The Economic Impact Forecast System analysis generally indicates beneficial impacts, with an increase of about 13,600 jobs, increased income by more than \$620 million, and increased business sales by about \$1.7 billion.

The Preferred Alternative would result in significant beneficial impacts to fire protection on-post through the demolition of the outdated Rideout Fire Station, addition of a more modern, efficient, and centrally located facility, and renovation and update of the airfield fire station.

The Preferred Alternative would result in an increase in long-term employment and income, resulting in both high-tech and service-related positions. No adverse disproportionate effects on minority or low-income populations would occur. Overall, potential socioeconomic impacts from the Preferred Alternative are considered long-term beneficial with no significant adverse impacts.

Transportation. Potential short-term impacts include an increase in vehicular traffic as a result of construction projects. Construction traffic would be in intervals as a result of the construction schedule so it is unlikely that large increases in construction traffic and traffic from new personnel would occur at the same time. Impacts as a result of construction activities would not be significant.

Potential long-term impacts include an increase in traffic on and surrounding Redstone Arsenal. Gates that would be subjected to increased use for access to the installation, based on the proposed facility locations, include Gates 1, 3, 7, 8, 9, and 10. Based on the projections in this EA, the most widely used gates would be Gates 1, 7, and 9. These gates may experience increased congestion that would be alleviated by Redstone Arsenal's continued use of administrative mechanisms, primarily the use of flex-time in personnel schedules, for distributing peak traffic over three-hour periods in the morning and afternoon. Implementation of a mass-transit or carpool strategy could also help to alleviate the impact of the additional vehicles at Redstone Arsenal.

Increased roadway congestion may also occur. As part of the BRAC-directed actions, the Preferred Alternative includes the widening of Burose Road and portions of Mills Road. This would make both roads four lanes from Neal Road to Martin Road. Traffic signals would be installed at the main entrance into the Von Braun Complex from Burose Road. This road widening would alleviate some roadway congestion. Additionally, Redstone Arsenal would continue to rely on administrative measures to help control roadway congestion.

Planned future road improvement projects include the widening of Martin Road to four lanes from Rideout to Zierdt Road, and the widening of Mills Road from Toftoy Thruway to Fowler

Road. These projects would eventually help congestion but would not be available during implementation of BRAC-directed actions. Overall, potential impacts to transportation from the Preferred Alternative are not considered significant.

Utilities. For the majority of the sites, the proposed utilities would be located within the identified construction/renovation footprints. Since implementation of the Preferred Alternative would require construction disturbances greater than 1 acre, construction storm water permits would be required. In order to minimize short-term construction impacts to the storm water system, best management practices outlined in the construction permits would be followed. The utility requirements to implement the Preferred Alternative are well within the systems' capacity. Overall, potential impacts to utilities from implementation of the Preferred Alternative are not significant.

Hazardous Materials, Hazardous Wastes, and Environmental Restoration Sites. No substantial increases in quantities or types of hazardous materials on-post would occur. During the construction process, hazardous wastes that are regulated by the U.S. Environmental Protection Agency, Department of Transportation, and the state would be generated and would require transport. New facilities would generate hazardous wastes that may include adhesives, paints, thinners, byproducts used in painting, solvents, and oil and lubricants. However, the expected increase of hazardous waste would be approximately 4 percent.

Of the 12 facility groups within the Preferred Alternative, there are three that are in close proximity to five identified Installation Restoration Program (IRP) or Operational Range Assessment Program (ORAP) sites. Immediately prior to construction, the most recent data regarding the nature and extent of soil and groundwater contamination would be reviewed to determine if safety monitoring during construction (especially intrusive activities adjacent to these sites) is necessary. Construction workers should receive unexploded ordnance awareness training for construction activities occurring near ORAP site RSA-072. Following these safety precautions would reduce the likelihood of safety incidents related to IRP and ORAP sites, and thus impacts from working in the vicinity of these sites are not considered significant.

Safety and Occupational Health. The Preferred Alternative would create working conditions in and around construction activities that would require proper safety precautions. Other potential worker safety concerns would include possible unexploded ordnance from prior operations and the possibility of encountering soil and/or groundwater contamination from IRP and ORAP sites.

The Preferred Alternative would not be located within any airplane accident potential zones. A proposed potable water line and water tower associated with the Rotary Wing Center would be located near the runway. Notification of construction to the Federal Aviation Administration would be required. The increase in aircraft operations could result in an increase in aircraft mishaps at Redstone Army Airfield. Overall, potential impacts to safety and occupational health are not considered significant.

Cumulative Impacts. Cumulative impacts were addressed by considering the impacts of the Preferred Alternative in combination with impacts from other past, present, and reasonably foreseeable projects. Eleven actions were identified in this EA as present or reasonably

foreseeable. The scope of the cumulative effect analysis involved evaluating impacts to the 13 environmental and human resource areas cumulatively by geographic and temporal extent in which the effects would be expected to occur. Cumulative impacts are not considered significant.

ES.6 Mitigation Responsibility

No mitigation measures are required for the Preferred Alternative, because resulting impacts are not significant. Requirements are in place at Redstone Arsenal to ensure that activities are consistent with installation permits and management plans. Requirements that would be implemented as part of the Proposed Action are summarized in Table ES-1.

ES.7 Conclusions

As analyzed and discussed in this EA, direct, indirect, and cumulative impacts of the Preferred Alternative and the No Action Alternative have been considered, and no significant impacts have been identified. Therefore, issuance of a Finding of No Significant Impact is warranted, and preparation of an environmental impact statement is not required.

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TABLE OF CONTENTS

Section	Page
1.0 Purpose, Need, and Scope.....	1
1.1 Introduction.....	1
1.2 Purpose and Need	3
1.3 Scope.....	3
1.4 Public Involvement.....	4
1.5 Regulatory Framework	5
2.0 Proposed Action.....	6
2.1 Introduction.....	6
2.2 Implementation Requirements Proposed for BRAC-Directed Actions	7
2.2.1 AMC/USASAC Headquarters	7
2.2.2 MDA/SMDC.....	8
2.2.3 ATTC/Rotary Wing Air Platform RDAT&E	9
2.2.4 2 nd Recruiting Brigade	10
2.3 Implementation Proposed for BRAC-Discretionary Actions	11
2.3.1 AMC LOG CAP	11
2.3.2 USASAC Field office	11
2.4 Implementation Requirements Proposed for Non-BRAC Installation Support and Associated Future Master Planning Actions.....	11
2.4.1 AMC HQ/USASAC HQ Complex Future Expansion	12
2.4.2 Von Braun Complex Future Expansion.....	12
2.4.3 Rotary Wing Simulation Center.....	12
2.4.4 Child Development Center	13
2.4.5 Gate 1 and Gate 3 Facilities.....	13
2.4.6 Fire and Emergency Services Facility	15
3.0 Alternatives.....	16
3.1 Introduction.....	16
3.2 Alternatives Considered.....	17
3.3 Alternatives Carried Forward	26
3.3.1 Preferred Alternative.....	26
3.3.2 No Action Alternative.....	33
3.4 Alternatives Considered and Not Carried Forward	34
4.0 Affected Environment and Consequences.....	35
4.1 Introduction.....	35
4.2 Land Use	35
4.2.1 Affected Environment.....	35
4.2.2 Consequences.....	40
4.3 Aesthetics and Visual Resources	40
4.3.1 Affected Environment.....	40
4.3.2 Consequences.....	41
4.4 Air Quality	42
4.4.1 Affected Environment.....	42

TABLE OF CONTENTS (Continued)

Section	Page
4.4.2 Consequences.....	45
4.5 Noise.....	48
4.5.1 Affected Environment.....	48
4.5.2 Consequences.....	49
4.6 Geology and Soils.....	53
4.6.1 Affected Environment.....	53
4.6.2 Consequences.....	54
4.7 Water Resources.....	55
4.7.1 Affected Environment.....	55
4.7.2 Consequences.....	57
4.8 Biological Resources.....	58
4.8.1 Affected Environment.....	58
4.8.2 Consequences.....	62
4.9 Cultural Resources.....	65
4.9.1 Affected Environment.....	65
4.9.2 Consequences.....	68
4.10 Socioeconomics.....	69
4.10.1 Affected Environment.....	69
4.10.2 Consequences.....	74
4.11 Transportation.....	78
4.11.1 Affected Environment.....	78
4.11.2 Consequences.....	82
4.12 Utilities.....	85
4.12.1 Affected Environment.....	85
4.12.2 Consequences.....	88
4.13 Hazardous Materials, Hazardous Waste, and Environmental Restoration Sites.....	94
4.13.1 Affected Environment.....	94
4.13.2 Consequences.....	96
4.14 Safety and Occupational Health.....	100
4.14.1 Affected Environment.....	100
4.14.2 Consequences.....	105
4.15 Cumulative Effects.....	107
4.15.1 Past, Present, and Reasonably Foreseeable Actions.....	107
4.15.2 Cumulative Effects Summary.....	109
4.15.3 Irreversible and Irrecoverable Commitment of Resources.....	113
4.16 Mitigation Summary.....	113
5.0 Findings and Conclusions.....	113
6.0 List of Preparers.....	114
7.0 Distribution List.....	115
8.0 References.....	116

TABLE OF CONTENTS (Continued)

Section	Page
9.0 Persons Consulted.....	122
APPENDIX A AIR EMISSIONS	
APPENDIX B NOISE	
APPENDIX C CONSULTATION AND COORDINATION	
APPENDIX D ECONOMIC IMPACT FORECAST SYSTEM REPORT	
APPENDIX E TRAFFIC	

LIST OF TABLES

Table	Page
2.1-1. Estimated Timeframes for Proposed Action Construction/Renovation Projects.....	6
3.1-1. Facility Groups.....	16
3.2-1. Alternatives Considered for the BRAC-Directed Actions.....	18
3.2-2. Alternatives Considered for the Non-BRAC Installation Support and Associated Future Master Planning Actions.....	23
3.2-3. Facility Group Alternatives.....	26
3.3-1. Preferred Alternative.....	26
3.4-1. Alternatives Considered and Not Carried Forward.	34
4.2-1. Current and Future Land Use Classifications (On-Post) for Lands Potentially Affected by the Proposed Action.....	37
4.2-2. Existing Facilities Nearest to Preferred Alternative Project Locations.	37
4.3-1. Direct Effects of the Preferred Alternative on Existing Structures.....	42
4.4-1. National Ambient Air Quality Standards.....	43
4.4-2. 2005 Air Emissions Inventory Summary for Redstone Arsenal.....	44
4.4-3. 2001 Reported Air Emissions for Madison County, Alabama.	45
4.4-4. Actual, Expected, and Potential to Emit Air Emissions at Redstone Arsenal.	46
4.5-1. Typical Levels of Noises Encountered in Daily Life and Industry.	48
4.6-1. Estimated Disturbed Area for the Preferred Alternative by Facility Group.	55
4.8-1. Ecological Units and Affected Area in Preferred Alternative Project Areas.....	59
4.8-2. Federally Listed Species and Species of Concern at Redstone Arsenal.	61
4.9-1. Memoranda of Agreement for NRHP-eligible Buildings and Structures.	67
4.10-1. Major Job Sectors in the Region of Influence in 2001.	69
4.10-2. Population of Region of Influence.....	70
4.10-3. Demographics of Huntsville, Alabama (2000).	70
4.10-4. School District Information.	73
4.10-5. Projected Population in the Region of Influence from 2005 to 2030.	75
4.10-6. Economic Impact Forecast System Report Summary for BRAC-Directed Actions.	76
4.11-1. Projected Redstone Gate Use Resulting from the Preferred Alternative.....	83
4.12-1. Preferred Alternative Percent Increases in Potable Water Demand.	90
4.12-2. Preferred Alternative Wastewater Increase to PDR Wastewater Treatment Plant.	90
4.12-3. Preferred Alternative Projects with Substantial Communications Upgrades.	92
4.12-4. Projected Quantities of Demolition Waste Material to Landfill.....	93
4.13-1. Summary of Pertinent IRP and ORAP Sites as related to the Preferred Alternative Location.	97

LIST OF FIGURES

Figure	Page
3.2-1a. Location Map Redstone Arsenal.....	28
3.2-1b. Proposed Facility Group Construction/Renovation Site Locations	29
3.3-1. Preferred Alternative and Proposed Utilities	30
3.3-2. Construction Phases for the AMC/USASAC HQ.....	31
3.3-3. Construction Phases for the Von Braun Complex.	32
4.2-1. Land Use on Redstone Arsenal.....	39
4.8-1. Jurisdictional Wetlands on the Site of the Proposed Von Braun Complex Expansion. .	63
4.11-1. Active Entrance Gates at Redstone Arsenal.	80
4.11-2. Current Congested Roadways in Huntsville, Alabama.....	81
4.13-1. Installation Restoration Program (IRP) Sites in the Vicinity of the Proposed Von Braun Complex Expansion, 2 nd Recruiting Brigade Headquarters, and Rotary Wing Center Complex.	99
4.14-1. Military Ranges.....	101
4.14-2. Explosive Safety Quantity Distance (Q/D) Zones	102
4.14-3. Accident Potential Zones (APZs).	104

LIST OF ABBREVIATIONS/ACRONYMS

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
ACM	Asbestos Containing Material
ADEM	Alabama Department of Environmental Management
ADP	automated data processing
AFB	Air Force Base
AMC	Army Materiel Command
APZ	accident potential zone
AST	aboveground storage tank
AT/FP	Anti-terrorism/Force Protection
ATTC	Aviation Technical Test Center
BRAC	Base Realignment and Closure
CAAA	Clean Air Act Amendments of 1990
CDC	Child Development Center
CDL	construction/demolition landfill
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHPPM	Center for Health Promotion and Preventive Medicine
CO	carbon monoxide
DAT&E	Development & Acquisition, Test & Evaluation
dB	decibel
dBA	A-weighted decibel
DDESB	DoD Explosives Safety Board
DDT	dichlorodiphenyltrichloroethane
DERP	Defense Environmental Restoration Program
DLSME	Defense Land Systems and Miscellaneous Equipment
DMS	Defense Message System
DoD	U.S. Department of Defense
DRMO	Defense Reutilization and Marketing Office
DSN	Defense Switched Network
DTCC	Distributed Test Control Center
EA	environmental assessment
ECM	Erosion Control Measure
EIFS	Economic Impact Forecast System
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESP	Explosives Site Plan
FNSI	Finding of No Significant Impact
ft	feet
FTS	Federal Technology Services
HAP	hazardous air pollutant
HAZMAT	Hazardous Materials
HQ	Headquarters
I3MP	Installation Information Infrastructure Modernization Program

LIST OF ABBREVIATIONS/ACRONYMS (Continued)

ICRMP	Integrated Cultural Resources Management Plan
IRP	Installation Restoration Program
IT	information technology
LAN	local area network
LBP	lead-based paint
Ldn	day-night average sound level
LOG CAP	Logistics Civil Augmentation Program
MDA	Missile Defense Agency
MGD	million gallons per day
mg/m ³	milligrams per cubic meter
MOA	Memorandum of Agreement
MSL	mean sea level
MVA	megavolt amperes
NA	Not Applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act of 1969
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRHP	National Register of Historic Places
O ₃	ozone
OB/OD	open burning and open detonation
ORAP	Operational Range Assessment Program
OSHA	Occupational Safety and Health Administration
Pb	lead
PDR	Proctor, Davis, and Ray
PM	particulate matter
PM ₁₀	particulate matter with an aerodynamic size less than or equal to 10 microns
PM _{2.5}	particulate matter with an aerodynamic size less than or equal to 2.5 microns
ppm	parts per million
PRO	petroleum range organic compounds
PTE	potential to emit
Q/D	quantity-distance
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
RDAT&E	Research, Development & Acquisition, Test & Evaluation
RDTE	Research, Development, Testing, and Engineering

LIST OF ABBREVIATIONS/ACRONYMS (Continued)

ROI	region of influence
RTTC	Redstone Technical Test Center
RTV	Rational Threshold Value
SARA	Superfund Amendments and Reauthorization Act
SCIF	Sensitive Compartmented Information Facility
sf	square feet
SMDC	Space and Missile Defense Command
SO ₂	sulfur dioxide
SO _x	sulfur oxides
STE	Secure Telephone Equipment
SVOC	semi-volatile organic compound
TCE	trichloroethylene
tpy	tons per year
TVA	Tennessee Valley Authority
UAV	unmanned aerial vehicle
USACE	U.S. Army Corps of Engineers
USASAC	U.S. Army Security Assistance Command
USAATTC	U.S. Army Aviation Technical Test Center
UST	underground storage tank
UXO	unexploded ordnance
VOC	volatile organic compound
VPG	Virtual Proving Ground
yd ³	cubic yards

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1.0 PURPOSE, NEED, AND SCOPE

1.1 Introduction

On September 8, 2005, the Defense Base Closure and Realignment Commission (BRAC Commission) recommended certain realignment actions at Redstone Arsenal, AL. These recommendations were approved by the President on September 15, 2005, and forwarded to Congress. The Congress did not alter any of the BRAC Commission's recommendations, and on November 9, 2005, the recommendations became law. The BRAC Commission recommendations must now be implemented as provided for in the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510), as amended.

The BRAC Commission recommended relocation of the following to Redstone Arsenal:

- 2nd Recruiting Brigade from Fort Gillem, GA
- Missile Defense Agency (MDA) functions from:
 - Suffolk Building, Falls Church, VA – All MDA functions except the Ballistic Missile Defense System Sensors Directorate
 - Former Space and Missile Defense Command (SMDC) Building, a leased facility in Huntsville, AL – All MDA functions
 - Federal Office Building 2, Arlington, VA – All MDA functions except the Command and Control Battle Management and Communications Directorate and excluding the Headquarters (HQ) Command Center for the MDA
 - Crystal Square 2, Arlington, VA – All MDA functions
- HQ component of U.S. Army SMDC from Crystal Square 2 and Crystal Mall 4, Arlington, VA
- Army Materiel Command (AMC) and U.S. Army Security Assistance Command (USASAC), an AMC major subordinate command from Fort Belvoir, VA
- Aviation Technical Test Center (ATTC) from Fort Rucker, AL for consolidation with the Redstone Technical Test Center (RTTC)
- Activities in rotary wing air platform development and acquisition from Warner-Robins Air Force Base (AFB), GA

The BRAC Commission recommended relocation, disestablishment, or realignment of the following from Redstone Arsenal:

- Relocate Information Systems Development and Acquisition to Aberdeen Proving Ground, MD
- Relocate Ordnance Munitions and Electronics Maintenance School (referred to by its former name, Missile and Munitions Center, in the BRAC Recommendation) to Fort Lee, VA

- Relocate the following functions to the Defense Supply Center in Richmond, VA:
 - Budget/Funding, Contracting, Cataloging, Requisition Processing, Customer Services, Item Management, Stock Control, Weapon System Secondary Item Support, Requirements Determination, Integrated Materiel Management Technical Support Inventory Control Point functions for Aviation Consumable Items; reestablish them as Defense Logistics Agency Aviation Inventory Control Point functions
 - Disestablish the procurement management and related support functions for Aviation Depot Level Repairables and designate them as Aviation Inventory Control Point functions
- Relocate the following functions to the Defense Supply Center in Columbus, OH:
 - Budget/Funding, Contracting, Cataloging, Requisition Processing, Customer Services, Item Management, Stock Control, Weapon System Secondary Item Support, Requirements Determination, Integrated Materiel Management Technical Support Inventory Control Point functions for Missile Consumable Items; reestablish them as Defense Logistics Agency Missile Inventory Control Point functions
 - Disestablish the procurement management and related support functions for Missile Depot Level Repairables and designate them as Missile Inventory Control Point functions
- Realign the following functions to Headquarters AMC: A portion of the remaining integrated materiel management, user, and related support functions necessary to oversee the Inventory Control Point activities at Aberdeen Proving Ground, MD; Detroit Arsenal, MI; Soldier System Center; Natick, MA; and Redstone Arsenal, AL
- Relocate the joint robotics program development and acquisition activities to Detroit Arsenal, MI, and consolidate them with the Program Executive Office Ground Combat Systems, Program Executive Office Combat Support and Combat Service Support and Tank Automotive Research Development Engineering Center

In addition, the Army proposes to implement the following BRAC-discretionary moves to Redstone Arsenal:

- AMC Logistics Civil Augmentation Program (LOG CAP) from Fort Belvoir, VA
- USASAC Field Office from St. Louis, MO

To enable implementation of these recommendations, the Army proposes to provide necessary facilities to support the changes in force structure. The Army also proposes to provide several non-BRAC installation support facilities to provide services for population growth on the installation, of which BRAC is a component, and the expansion or upgrade of several facilities in the vicinity of the BRAC actions. This environmental assessment (EA) analyzes and documents environmental effects associated with the Army's Proposed Action at Redstone Arsenal. Details of the Proposed Action are described in Section 2.2. Environmental effects associated with recommended relocation, disestablishment, or realignment of personnel/functions from Redstone Arsenal will be assessed in compliance with the National Environmental Policy Act of 1969 (NEPA) by the receiving installations.

1.2 Purpose and Need

The purpose of the Proposed Action is to implement the BRAC Commission's recommendations pertaining to Redstone Arsenal and to implement several non-BRAC installation support and associated future master planning actions.

The primary need for the Proposed Action is to improve the ability of the Nation to respond rapidly to challenges of the 21st century. The Army's mission is to defend the United States and its territories, support national policies and objectives, and defeat nations responsible for aggression that endangers the peace and security of the United States. To carry out these tasks, the Army must adapt to changing world conditions and must improve its capabilities to respond to a variety of circumstances across the full spectrum of military operations.

In previous rounds of BRAC, the explicit goal was to save money and downsize the military in order to reap a "peace dividend." In the 2005 BRAC round, the U.S. Department of Defense (DoD) sought to reorganize its installation infrastructure to most efficiently support its forces, increase operational readiness and facilitate new ways of doing business. Thus, BRAC represents more than cost savings. It supports advancing the goals of transformation, improving military capabilities, and enhancing military value. The Army needs to carry out the BRAC recommendations at Redstone Arsenal in order to achieve the objectives for which Congress established the BRAC process.

A secondary need for the Proposed Action is to provide non-BRAC installation support facilities and to expand or upgrade select facilities located in the vicinity of the BRAC actions. The non-BRAC installation support and associated future master planning actions would provide general installation community support facilities that provide services for population growth on Redstone Arsenal, primarily resulting from the incoming BRAC realignments. These support actions would be implemented in the general timeframe associated with the BRAC actions. The non-BRAC support facilities/upgrade actions have been identified through the Redstone Arsenal Master Planning process as projects needed for implementation in the future and are included due to their close proximity to the BRAC actions.

1.3 Scope

This EA was developed in accordance with NEPA, 32 CFR Part 651 (Army Regulation 200-2, Environmental Effects of Army Actions), and implementing regulations issued by the President's Council on Environmental Quality (CEQ) as well as guidance provided by the 2005 Army BRAC NEPA Manual. Its purpose is to inform decision makers and the public of the likely environmental consequences of the Proposed Action and alternatives and determine whether the environmental impacts are significant. The EA identifies, documents, and evaluates environmental effects of implementing realignments and other proposed actions at Redstone Arsenal, AL. An interdisciplinary team of environmental scientists, biologists, planners, economists, engineers, archaeologists, historians, and military technicians analyzed the Proposed Action and alternatives in light of existing conditions and identified relevant beneficial and adverse effects associated with the actions.

The Defense Base Closure and Realignment Act of 1990 specifies that NEPA does not apply to actions of the President, the Commission, or the DoD, except "(i) during the process of property

disposal, and (ii) during the process of relocating functions from a military installation being closed or realigned to another military installation after the receiving installation has been selected but before the functions are relocated” (Sec. 2905(c)(2)(A), Public Law 101-510, as amended). The law further specifies that in applying the provisions of NEPA to the process, the Secretary of Defense and the secretaries of the military departments concerned do not have to consider “(i) the need for closing or realigning the military installation which has been recommended for closure or realignment by the Commission, (ii) the need for transferring functions to any military installation which has been selected as the receiving installation, or (iii) military installations alternative to those recommended or selected” (Sec. 2905(c)(2)(B)). The Commission’s actions, as well as the need for closing or realigning a military installation, are exempt from NEPA. Accordingly, this EA does not address the need for realignment. However, unlike BRAC-directed actions, discretionary realignments and future master planning actions are not exempt from the need to consider whether to realign a unit or activity to another installation/location.

The decision to be made is how the Army will implement the BRAC realignment recommendations and the related installation support and future master planning actions at Redstone Arsenal and, as appropriate, carry out mitigation measures that would reduce adverse effects on the environment. The decision to implement realignment and the related actions will be based on strategic, operational, environmental, and other considerations, including the results of this analysis.

1.4 Public Involvement

The Army invites public participation in the NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. All agencies, organizations, and members of the public having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate in the decision-making process.

Public participation opportunities with respect to this EA and decision-making on the Proposed Action are guided by 32 CFR Part 651 (Army Regulation 200-2, Environmental Effects of Army Actions) and the 2005 Army BRAC NEPA Manual, which implement the Army’s policies and responsibilities for the early integration of environmental considerations into BRAC planning and decision-making. Upon completion, the EA will be made available to the public for 30 days, along with a draft Finding of No Significant Impact (FNSI), if supported by the EA. At the end of the 30-day public review period, the Army will consider all comments submitted by individuals, agencies, or organizations on the Proposed Action, the EA, and draft FNSI. As appropriate, the Army may then execute the FNSI, if supported by the EA, and proceed with implementing the Proposed Action.

Throughout this process, the public may provide comments or obtain information regarding the Proposed Action and the status of the EA through the Redstone Arsenal Public Affairs Office by calling Mr. Andy Roake at 256-876-5302.

1.5 Regulatory Framework

Decisions concerning the timing and manner of implementing the Proposed Action rest on numerous factors such as mission requirements, schedule, availability of funding, and environmental considerations. In addressing environmental considerations, Redstone Arsenal is guided by relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resources management and planning. These include the Clean Air Act, Clean Water Act, Noise Control Act, Endangered Species Act, National Historic Preservation Act, Archaeological Resources Protection Act, Resource Conservation and Recovery Act, and Toxic Substances Control Act. EOs bearing on the Proposed Action include EO 11988 (*Floodplain Management*), EO 11990 (*Protection of Wetlands*), EO 12088 (*Federal Compliance with Pollution Control Standards*), EO 12580 (*Superfund Implementation*), EO 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*), EO 13101 (*Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*), EO 13123 (*Greening the Government Through Efficient Energy Management*), EO 13148 (*Greening the Government Through Leadership in Environmental Management*), EO 13175 (*Consultation and Coordination with Indian Tribal Governments*), and EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*). These authorities are addressed in various sections throughout this EA when relevant to particular environmental resources and conditions. The full text of the laws, regulations, and EOs is available on the Defense Environmental Network & Information Exchange Web site at <http://www.denix.osd.mil>. Although not an EO, the Annotated Policy Document of the Department of the Defense American Indian and Alaska Native Policy (27 Oct 99) will be used as guidance in consultation with Native American Tribes.

2.0 PROPOSED ACTION

2.1 Introduction

The Proposed Action involves force structure or population changes on Redstone Arsenal that are a result of the BRAC Commission's recommendations (BRAC-directed actions), BRAC-discretionary actions, and non-BRAC installation support and associated future master planning actions. Implementation of the recommendations generates requirements for construction or renovation of facilities necessary to support them.

For the purposes of this EA, BRAC-directed actions are those actions that implement the BRAC Commission's recommendations and are mandated by BRAC law. BRAC-discretionary actions are those actions that are consistent with or supplement the proposed BRAC-directed actions but which were not specifically included in the BRAC 2005 recommendations. These actions would typically result in substantial cost savings and efficiencies for the associated organizations. Installation support and associated future master planning actions are those actions that support BRAC realignment on Redstone Arsenal or address installation-specific relocation or operational needs but are neither BRAC-directed nor BRAC-funded projects.

Redstone Arsenal would undergo a projected net increase of approximately 4,050 personnel (i.e., approximately 4,770 incoming and 720 outgoing personnel) by implementing the BRAC Commission's realignment recommendations and the approved BRAC-discretionary actions (SERO 2006). These personnel numbers are best estimates and may slightly change in the future as the various organizations interpret and begin to implement the BRAC recommendations. Existing installation facilities do not have the required space and/or capabilities to accommodate all of the incoming BRAC personnel and functions. Therefore, construction of new facilities or renovation of existing facilities would be required. Non-BRAC installation support and associated future master planning actions on Redstone Arsenal would necessitate relocating several existing facilities and constructing a number of new facilities. It is estimated that up to an additional 2,800 personnel would relocate to Redstone Arsenal based on these non-BRAC installation support and associated future master planning actions. Table 2.1-1 lists the estimated timeframes for the proposed construction/renovation projects.

Table 2.1-1. Estimated Timeframes for Proposed Action Construction/Renovation Projects.

Facility Name	Estimated Construction Start	Estimated Construction End
BRAC-Directed Actions		
AMC and USASAC HQs Complex Phase I	3/2007	2/2009
AMC Band Facility	3/2007	2/2009
AMC Mail Facility	3/2007	2/2009
Von Braun Complex Phase III	2/2007	8/2009
Rotary Wing Center (Test and Evaluation Facility and Secure Storage Facility)	3/2009	3/2011
Redstone Arsenal Airfield Fire Station	3/2009	3/2011
Redstone Arsenal Airfield Fuel Tanks	3/2009	3/2011
Rotary Wing Center of Excellence	3/2009	3/2011
2 nd Recruiting Brigade HQ	3/2007	5/2008
Non-BRAC Installation Support and Associated Future Master Planning Actions		
AMC and USASAC HQs Complex Phase II	NA	NA
AMC and USASAC HQs Complex Phase III	NA	NA

Facility Name	Estimated Construction Start	Estimated Construction End
Von Braun Complex Phase IV	3/2008	3/2010
Rotary Wing Simulation Center	NA	NA
Child Development Center	3/2008	3/2009
Gate 1 Replacement and Visitor Center	3/2008	3/2009
Gate 3 Replacement and Truck Inspection Area	3/2008	3/2009
Gate 3 Shipping and Receiving Warehouse	NA	NA
Fire and Emergency Services Facility	3/2008	3/2009

AMC Army Materiel Command

BRAC Base Realignment and Closure

HQ Headquarters

NA Specific dates are not yet available; these projects are expected to occur after 2011.

USASAC U.S. Army Security Assistance Command

All proposed construction projects would include Anti-terrorism/Force Protection (AT/FP) measures and supporting facilities such as supporting utilities, exterior lighting, information systems, walks, curbs, gutters storm drains, and site improvements. AT/FP measures include bollards, water barriers, berms, vehicle crash gates, intrusion detection systems, laminated glazing, and design for progressive collapse.

2.2 Implementation Requirements Proposed for BRAC-Directed Actions

The implementation requirements proposed for accomplishing the BRAC-directed portion of the Proposed Action are described below.

2.2.1 AMC/USASAC HEADQUARTERS

The AMC and USASAC HQs would relocate to Redstone Arsenal from Fort Belvoir. This would include relocating a total of 1,750 personnel (SERO 2006). Redstone Arsenal does not have sufficient administrative space to meet AMC's and USASAC's requirements. Additionally, the installation does not have the capability to scan mail for biological and chemical agents. Under the Proposed Action, four new facilities would be constructed and one existing facility would be renovated, as described below.

Facility	Existing and New Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
AMC HQ	1,370	487,230	0	574,200	153,360	1,214,790
USASAC HQ	367	104,989	0	Included w/AMC HQ	Included w/AMC HQ	104,989
AMC Band	40	10,175	5,907	65,115	0	81,197
AMC Mail	10	3,200	0	10,080	0	13,280

AMC and USASAC HQs Facilities (Phase I) – A new facility would be constructed for the AMC HQ and for the USASAC HQ. The two facilities would be located adjacent to one another. Major features of each facility include administrative space, conference rooms, emergency operation centers, classrooms, computer rooms, and Sensitive Compartmented Information Facility (SCIF) areas. A cafeteria, auditorium, and fitness center would be shared by the facilities.

AMC Band Facility – The existing Post Theater, Building 3712, would be renovated to provide the AMC Band with rehearsal space and an addition to this building would be constructed for a band training facility. The training facility would provide administrative, instrument storage, and additional practice space.

AMC Mail Facility – A mail facility would be constructed to provide the capability to scan AMC's mail for chemical and biological agents. The facility would include administrative space, an x-ray room, and space for sorting, storage, and mail scanning.

2.2.2 MDA/SMDC

MDA functions from leased facilities in Arlington, VA, Falls Church, VA, and Huntsville, AL would relocate to Redstone Arsenal, as would the HQ component of the SMDC from Arlington, VA. This would include a total of 2,248 MDA personnel from the DC area, 240 personnel from Huntsville, and 161 SMDC personnel (SERO 2006). Redstone Arsenal does not have sufficient administrative space to meet MDA's and SMDC's requirements. Under the Proposed Action, the Von Braun Complex would be expanded to provide administrative space and specialized technical laboratories, as described below. This would be the third construction effort at the Von Braun Complex (referred to as the Von Braun Complex, Phase III in this EA).

Facility	Existing and New Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
Von Braun Complex, Phase III	2,649	850,000	0	946,800	139,500	1,936,300

Several multi-story reinforced concrete and structural steel buildings would be constructed on concrete footings, with pre-casted wall panels and build-up roofs. Required functional areas include administrative space, access control center, SCIFs, special access areas, test data storage and analysis area, technical library, computer operations, meeting rooms, training area, graphics, break rooms, and storage areas. A cafeteria, auditorium, physical fitness center, and covered walkways between facilities would be constructed. A central utility plant would also be constructed that contains gas-fired boilers, electrical-driven chillers, fire pumps, primary and electrical supply and distribution, and standby generators for mission critical loads. A new substation will be constructed to replace substation #8. The construction project would include widening of Burose Road and portions of Mills Road. This would make both roads four lanes from Neal Road to Martin Road. Traffic signals would be installed at the main entrance into the complex from Burose Road.

NEPA documentation was completed in January 2001 for the initial construction efforts at the Von Braun Complex, entitled *Final Environmental Assessment for the Consolidation and Movement of Off-Site Military Organizations to Redstone Arsenal, Alabama* (U.S. Army Aviation and Missile Command 2001). The 2001 EA analyzed the area to be included in the proposed Phase I, II, and III construction efforts at the Von Braun Complex. Phase I, the SMDC Center, was completed in 2003. Phase II is under construction with an estimated completion of Spring 2007 at which time MDA personnel located in Huntsville, AL will relocate to this portion of the complex. The Phase III expansion would allow the collocating of MDA and SMDC personnel on Redstone Arsenal.

2.2.3 ATTC/ROTARY WING AIR PLATFORM RDAT&E

The ATTC would relocate to Redstone Arsenal from Fort Rucker, AL. This would include relocating 323 personnel (SERO 2006). The Rotary Wing Air Platform Research, Development & Acquisition, Test & Evaluation (RDAT&E) would also relocate to Redstone Arsenal from Warner Robbins AFB, GA. This would include relocating 50 personnel (SERO 2006).

The ATTC would be consolidated with the RTTC to form a single organization and to establish a Center for Rotary Wing Air Platform Development & Acquisition, Test & Evaluation (DAT&E) at Redstone Arsenal. The installation does not have sufficient test/evaluation and administrative space to meet the organization's mission requirements. Additionally, the airfield fire station would require renovation due to an increase in the number of aircraft and type of operations being relocated to Redstone Arsenal. Under the Proposed Action, four new facilities and an addition to one existing facility would be constructed, as described below.

Facility	Existing and New Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Other Features (sf)	Total Area (sf)
Rotary Wing Center – Test and Evaluation Facility	235	175,154	0	99,288	Hardstand 199,998; Parking Apron 328,248; New Roads 16,803; Access Aprons 8,253	827,744
Rotary Wing Center - Secure Storage	5	25,000	0	Included w/ Rotary Wing Center	0	25,000
Redstone Arsenal Airfield Fire Station	12	3,840 – Addition	0	9,900	0	13,740
Redstone Arsenal Airfield Fuel Tanks	Not Applicable	3,200	0	0	0	3,200
Rotary Wing Center of Excellence	228	50,478	0	80,001	0	130,479

Rotary Wing Center – A new rotary wing technical test and evaluation center would be constructed that would include a rotary wing test and evaluation facility and a secure storage facility. Major features would include high bay/hanger space, maintenance shops, machine shops, a 15-ton bridge-crane, weapon system laboratories, test operations and control rooms, flight operations and planning office, permanent and transient aircrew space, engineering and administrative space, storage space, runway, and rotary wing parking apron. The high bay, an open-area conducive for pretest preparation and instrumentation testing activities involving aviation assets, would be sized for simultaneous activities on one Chinook helicopter, two Apache/Longbow helicopters, two Kiowa Warrior helicopters, two Black Hawk helicopters, and one general aviation platform. The relocation of the ATTC to Redstone Arsenal would increase

the number of aircraft on-post by 24 consisting of the following: T34 fixed wing naval trainer, C12 twin engine turbo prop aircraft, UH1, OH58, UH60A and M models, AH64 Apache A and D models, CH47 D and F models, and UAV (Burkhead 2006a). These aircraft would reside at the Rotary Wing Center.

According to a Center for Health Promotion and Preventive Medicine (CHPPM) study entitled the *Operational Noise Consultation 52-ON-04CB-06, Operational Noise Contours for Redstone Arsenal, AL, July 2006*, provided in Appendix B of this EA, routine training operations would include takeoffs, landings, hover patterns, and closed patterns (which could include activities such as touch-and go's or low approaches). Each takeoff or landing would constitute one operation. Training operations would be arranged to minimize noise impacts during nighttime hours and other specific time periods (Sundays, holidays, etc.).

Included in the total square footage for the test and evaluation facility are the following smaller facilities that directly support the Rotary Wing Center: Visitor System Checkout Facility, Battery Servicing Facility, Aircraft Ground Support Equipment Facility, High Pressure Gas Storage Facility, Hazardous Materials (HAZMAT)/Flammables Facility, Nondestructive Test Facility, and Outdoor Covered Helicopter Wash Station. A sanitary sewer including an oil/water separator, an elevated water storage tank, sewage lift station with outfall lines, and aircraft wash rack with oil/water separator would also be included.

Redstone Arsenal Airfield Fire Station – The existing fire station at the Redstone Arsenal Airfield would be renovated to accommodate additional crash/rescue vehicles. This would be accomplished by constructing an addition to the existing structure (Building 4813). An elevated water storage tank and a sewage lift station with outfall lines would also be included.

Redstone Arsenal Airfield Fuel Tanks – The existing airfield fuel tanks would be upgraded to meet the needs of the Rotary Wing Center. The existing underground storage tanks (USTs) that store JP-8 fuel would be removed and replaced with two fixed horizontal aboveground storage tanks (ASTs). The existing fuel storage area includes two fill pits and associated dispensing systems. One pit contains two 11,500-gallon USTs and the other contains two 5,500-gallon USTs. The new ASTs would be located to the southeast of the existing fuel storage area. Each AST would have an approximate capacity of 30,000 gallons and approximate dimensions of 35 feet in length and 12 feet in diameter.

Rotary Wing Center of Excellence – A new facility would be constructed for the Rotary Wing Center of Excellence to meet BRAC requirements for establishing a Center for Rotary Wing Air Platform DAT&E at Redstone Arsenal. This facility would provide workspace for a portion of the realigning ATTC and Warner Robins AFB personnel. Major features would include administrative, conference room, information processing, SCIF, and video teleconferencing spaces.

2.2.4 2ND RECRUITING BRIGADE

The 2nd Recruiting Brigade would relocate to Redstone Arsenal from Fort Gillem, GA. This would include relocating 113 personnel (SERO 2006). Brigade operations space is needed to support nine battalions, 51 companies, and 312 recruiting stations located in the southeastern U.S. Redstone Arsenal does not have sufficient administrative space to meet the 2nd Recruiting

Brigade's requirements. Under the Proposed Action, a new facility would be constructed as described below.

Facility	New Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
2 nd Recruiting Brigade HQ	113	26,000	0	8,000 (plus 200 existing spaces)	6,000 (loading area/ fire lane)	40,000

A new HQ facility would be constructed for the 2nd Recruiting Brigade. The operations building would include a brigade operations center, computer training classroom, local area network (LAN) room, automated data processing (ADP) staging area, ADP storage room, mail room, file room, conference room, legal library, graphics art room, lunch/break room, and general purpose storage room.

2.3 Implementation Proposed for BRAC-Discretionary Actions

The implementation proposed for accomplishing the BRAC-discretionary portion of the Proposed Action is described below.

2.3.1 AMC LOG CAP

Three personnel with the AMC LOG CAP from Fort Belvoir, VA would relocate to Redstone Arsenal as part of an approved BRAC-discretionary move (SERO 2006). This is a small organization that provides 100 percent of their effort to support AMC HQ activities. AMC HQ is moving to Redstone Arsenal due to BRAC law. BRAC language should have identified this small organization as moving with AMC HQ, but did not due to an oversight. Under the Proposed Action, the AMC LOG CAP personnel would be placed in the proposed AMC HQ facility which is described in Section 2.2.1.

2.3.2 USASAC FIELD OFFICE

Twenty-seven personnel with the USASAC Field Office from St. Louis, MO would relocate to Redstone Arsenal as part of an approved BRAC-discretionary move (SERO 2006). The USASAC Field Office is currently not located on an Army installation. USASAC HQ decided to consolidate all security assistance personnel with associated missions to Redstone Arsenal. This move would result in substantial savings and efficiencies. Under the Proposed Action, the USASAC Field Office personnel would be placed in the proposed USASAC HQ facility which is described in Section 2.2.1.

2.4 Implementation Requirements Proposed for Non-BRAC Installation Support and Associated Future Master Planning Actions

The implementation requirements proposed for accomplishing the Non-BRAC installation support and associated future master planning portion of the Proposed Action are described below.

2.4.1 AMC HQ/USASAC HQ COMPLEX FUTURE EXPANSION

Expansion adjacent to the proposed AMC HQ and USASAC HQ facilities (Phase I) is proposed to support future reasonable foreseeable master planning needs at Redstone Arsenal. Under the Proposed Action, additional administrative facilities would be constructed as described below.

Facility	New Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
Phase II	400	105,000	0	132,300	0	237,300
Phase III	1,200	300,000	0	396,900	0	696,900

A new building would be constructed to the east of the proposed AMC HQ facility under Phase II, while two new buildings would be constructed to the west of the proposed USASAC HQ facility under Phase III. Major features would be similar to those proposed for the AMC HQ and USASAC HQ facilities including administrative space, conference rooms, classrooms, computer rooms, and SCIF areas.

2.4.2 VON BRAUN COMPLEX FUTURE EXPANSION

Expansion of the Von Braun Complex is proposed to support future master planning needs at Redstone Arsenal. Phase IV would be constructed to house personnel from off-post locations, including people who occupy off-post leased commercial facilities in Huntsville, AL. Currently, Redstone Arsenal has a backlog of about 240,000 square feet of administrative space requests that cannot be filled, in addition to the off-post leases.

Facility	New Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
Von Braun – Phase IV	515	138,400	0	109,197	0	247,597

Required functional areas include administrative space, command suite, reception and security, SCIF with intrusion detection system, special access area, central mail, files area, technical library, telecommunications center, computer operations and secure computer operations center, conference and meeting rooms, training area, break rooms, storage, exhibit area, restrooms, and mechanical, electrical, fire protection and alarm systems, and communications support areas.

2.4.3 ROTARY WING SIMULATION CENTER

Existing U.S. Army ATTC (USAATTC) Technology Directorate Modeling and Simulation and Systems Integration personnel currently located in several on-post facilities would be relocated to a single facility to support future master planning needs at Redstone Arsenal. Under the Proposed Action, a new facility would be constructed as described below.

Facility	Existing Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
Rotary Wing Simulation Center	41	42,316	0	8,010	0	50,326

A new facility would be constructed to provide primary occupancy space for the USAATTC personnel and technical laboratory space for aviation systems test functional areas. The facility would provide capabilities unique to both modeling and simulation and systems test; however, each functional area would capitalize by being collocated and having the ability to share information, data collection and reduction equipment, and common use items of equipment. The facility would incorporate a high bay aircraft flight test simulation laboratory (with ramp access to the airfield); computer laboratory; crew station interface room; two computer server rooms (one classified level); aircraft instrumentation development room; equipment calibration room; Virtual Proving Ground (VPG) Distributed Test Control Center (DTCC); electro-optic infrared laboratory; navigation laboratory; aircraft survivability equipment laboratory; and a digital communications laboratory.

2.4.4 CHILD DEVELOPMENT CENTER

A new Child Development Center (CDC) is needed to comply with current and future requirements for CDC facilities in the military. In 2005, there were 63 children on the waiting list for the existing child care facility at Redstone Arsenal. In light of the recent waiting list together with the projected increase in personnel resulting from the recommended BRAC realignments to Redstone Arsenal, the Army master planners have determined that a new 60 child capacity CDC is needed. Under the Proposed Action, a new facility would be constructed as described below to provide installation support.

Facility	Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Other Features (sf)	Total Area (sf)
CDC	75	5,600	0	10,395	Playgrounds 8,450	24,445

A new CDC facility would be constructed that includes administrative areas, kitchen, two multi-age modules, learning center module, motor/music area, circulation space, restrooms, and mechanical/electrical space. Two associated playgrounds for toddlers and preschool/school age children would be constructed adjacent to the center.

2.4.5 GATE 1 AND GATE 3 FACILITIES

The projected increase in personnel resulting from the recommended BRAC realignments to Redstone Arsenal creates the need for a new visitor center at Martin Road. Gate 9 will not be adequate to handle the increased traffic load in the long term. The new visitor center would be located in the vicinity of Gate 1 which is the main access from the City of Huntsville to Redstone Arsenal. This gate was identified based on an analysis of traffic counts, future on-post master planning needs, and forecasted off-post growth.

Based on the installation's future master plans, a separate visitor center and truck inspection area would be required to separate visitor and commercial traffic and to expedite traffic flow. Truck and commercial vehicle traffic would be diverted to Gate 3, where a new truck inspection area would be constructed. This location would coincide with the installation's future master plans to construct a new shipping and receiving warehouse strategically located at Gate 3, which would account for a large percentage of the truck traffic. The current shipping and receiving activities are performed in two 60-year old warehouses (Buildings 8022 and 8024). The existing buildings

have exceeded their service lives, do not meet current standards, have known deficiencies including roof leaks and mildew/mold covered wallboard, and are not strategically located near an installation gate.

Gates 1 and 3 would also require upgrades or relocation to meet the new Army standards for access control points. Future plans for the construction of the Southern Bypass also conflicts with the existing Gate 1 and Gate 3 locations. Therefore, these gates and their associated facilities would need to be relocated in the future (around 2020) to avoid conflict with the future proposed route.

Under the Proposed Action, Gates 1 and 3 would be relocated and a new visitor center, truck inspection area, and shipping and receiving warehouse would be constructed, as described below. These actions would provide installation support and meet future master planning needs.

Facility	New or Existing Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
Gate 1 and Visitor Center	15	2,400	0	63,162	Included w/ parking	65,562
Gate 3 and Truck Inspection Area	4	500	0	9,999	0	10,499
Gate 3 Shipping and Receiving Warehouse	33	120,000	0	7,200	0	127,200

Gate 1 Replacement and Visitor Center – A new visitor center would be constructed near Gate 1 and the existing gate access point would be replaced. Major features include a lobby/reception area, guards desk, restrooms, and covered vehicle inspection station. Access control and a secondary gate to Redstone Arsenal would also be constructed. Work would include the demolition and reconstruction of the guard house, roadways, approach zone, inspection zone, and active barrier system to meet the new Army standards for access control points. Two existing canopies would be relocated to the Gate 3 area. The project also includes demolition of the old welcome center (Building 5105) and water well house (Building 5107) adjacent to the existing Gate 1.

Gate 3 Replacement and Truck Inspection Area – A new truck inspection area would be constructed near Gate 3 and the existing gate access point would be replaced. Major features include construction of a hardstand area for truck inspection and installation of the two Gate 1 canopies. Work would include the demolition and reconstruction of the guard house, roadways, approach zone, inspection zone, and active barrier system to meet the new Army standards for access control points.

Gate 3 Shipping and Receiving Warehouse – A new shipping and receiving warehouse would be constructed near Gate 3. Major features would include administrative office space, storage space, special purpose space for secure storage, and a clean room for storage and packing of missile circuit boards. One of the existing warehouses would be demolished (Building 8022).

2.4.6 FIRE AND EMERGENCY SERVICES FACILITY

The projected increase in personnel and proposed construction of 1.4 million square feet (sf) of new structures along Martin Road, resulting from the recommended BRAC realignments to Redstone Arsenal, creates the need for a new Fire and Emergency Services Facility to service these personnel and structures. The existing fire station (Fire Station #1, Building 4424) has reached its limit to provide the necessary support for fire and emergency services to this area. Fire Station #1 was built in 1944 and does not meet many of the current design and space requirements for a fire station. Over time the building has deteriorated and has had numerous maintenance problems including electrical, mechanical, and roof issues. The facility does not meet the Americans with Disabilities Act requirements for visitors, does not have drive through stall capability, and safety and force protection standards are currently not being met based on the facility's proximity to Rideout Road and lack of required provisions. Additionally, the facility does not have space for HAZMAT and medical equipment decontamination, contains no physical or educational training space, and contains no space for the fire inspectors (who are currently housed in a separate facility). The 911 call center is currently collocated with other tenants that are general administrative in nature. Under the Proposed Action, a new facility would be constructed as described below to provide installation support.

Facility	Personnel	New Construction Footprint (sf)	Renovation Footprint (sf)	Parking (sf)	Paved Roadways (sf)	Total Area (sf)
Fire and Emergency Services	40	19,828	0	13,203	0	33,031

A new standard design two-company HQ fire station and full service 911 Call Center would be constructed. The two-company HQ fire station would include five drive-through apparatus bays for ladder truck, engine, tanker, brush truck, HAZMAT truck, and HAZMAT trailer; apparatus equipment and maintenance areas; fire chief's office suite; offices for the deputy chief, assistant chief/staff supervisor, assistant chief of fire prevention, inspectors, training officer, dispatch, Emergency Medical Services, and HAZMAT/Safety; training room and storage; computer training/testing room; general storage; information technology (IT) space; shower and toilet facilities; fitness room; laundry room; physical therapy/sauna; recreation room; and dormitory rooms for two fire companies. The 911 Call Center would include operator space, office, meeting room, restrooms, break room, and mechanical, electrical, and communications space.

3.0 ALTERNATIVES

This section discusses the alternatives that were considered feasible, including all site locations, facilities, the Preferred Alternative, and the No Action Alternative.

3.1 Introduction

In an effort to support and sustain its current and future mission, Redstone Arsenal has programmed the construction of new facilities or renovation of existing facilities, including structures, roads, and parking lots. Details for each of the proposed alternatives are described in Section 3.2. Section 3.3 discusses which alternatives are carried forward in this EA and Section 3.4 discusses the alternatives eliminated from detailed evaluation.

This EA considers three types of actions (i.e., BRAC-directed, BRAC-discretionary, and non-BRAC installation support and associated future master planning actions). The Proposed Action components were organized into “Facility Groups” to help identify and evaluate the alternatives and to ensure an efficient environmental analysis. The facility groups are based on the action’s general location and related functions. This allows the grouping of different actions that will take place at the same or an adjacent location. Table 3.1-1 lists the 12 facility groups that were identified and their corresponding Proposed Action components, including their associated EA section numbers for cross referencing.

Table 3.1-1. Facility Groups.

Facility Group Identifier	Facility Group Name	Proposed Action Components and Associated Section Numbers
A	AMC HQ and USASAC HQ	AMC and USASAC HQ Facilities (Phase I) - Section 2.2.1 AMC LOG CAP personnel - Section 2.3.1 USASAC Field Office personnel - Section 2.3.2 AMC HQ/USASAC HQ Complex (Phase II and III) - Section 2.4.1
B	AMC Band Facility	AMC Band Facility - Section 2.2.1
C	AMC Mail Facility	AMC Mail Facility - Section 2.2.1
D	Von Braun Complex	Von Braun Complex (Phase III) - Section 2.2.2 Von Braun Complex (Phase IV) - Section 2.4.2
E	Rotary Wing Center	Rotary Wing Center, Test and Evaluation Facility and Secure Storage - Section 2.2.3 Rotary Wing Simulation Center - Section 2.4.3
F	Rotary Wing Center of Excellence	Rotary Wing Center of Excellence - Section 2.2.3
G	Redstone Arsenal Airfield Facilities	Redstone Arsenal Airfield Fire Station and Fuel Tanks - Section 2.2.3
H	2 nd Recruiting Brigade HQ	2 nd Recruiting Brigade HQ Facility - Section 2.2.4
I	Child Development Center	Child Development Center - Section 2.4.4
J	Gate 1 Facilities	Gate 1 Replacement and Visitor Center - Section 2.4.5
K	Gate 3 Facilities	Gate 3 Replacement, Truck Inspection Area, and Shipping and Receiving Warehouse - Section 2.4.5
L	Fire and Emergency Services Facility	Fire and Emergency Services Facility - Section 2.4.6

AMC Army Materiel Command
 HQ Headquarters
 LOG CAP Logistics Civil Augmentation Program
 USASAC U.S. Army Security Assistance Command

3.2 Alternatives Considered

Three categories of alternatives were considered in this EA, including alternatives that represent 1) construction/renovation, 2) use of existing facilities, and 3) no action. The number of alternatives initially considered as feasible options varied depending on the specific facility group and whether it would be feasible to site a facility at a variety of locations. The alternatives were screened for inclusion in this EA using the following criteria: operational constraints, safety constraints, geographic/environmental constraints, and existing facility and mission constraints. Constraints were identified based on information derived by Redstone Arsenal through the formal master planning site selection and evaluation process. Several factors were considered during selection of potential site locations for a particular project, including environmental issues, compliance with the existing Installation Master Plan, the project's relationship to other tenants, infrastructure availability, the lay of the land, site access, future projects impacts, etc. As part of this process, three to four potential location options are typically identified for a particular project. The alternative site locations identified through the master planning process for the Proposed Action were compiled and considered in this EA.

Table 3.2-1 briefly describes the alternatives for BRAC-directed actions and their associated constraints. The BRAC-discretionary actions involve personnel being placed within facilities that are evaluated under the BRAC-directed actions (identified in Table 3.2-1). Therefore, these actions would have similar alternatives and constraints. However, unlike BRAC-directed actions, discretionary relocations are not exempt from the need to consider whether to realign a unit or activity to another installation/location. Alternate installations were not evaluated for the BRAC-discretionary actions due to the following reasons:

- AMC LOG CAP (3 personnel) – No other Army installation or command would require the support of this organization. Additionally, their mission could not be adequately performed with this unit remaining at Fort Belvoir, VA.
- USASAC Field Office (27 personnel) – No other Army installation has a security assistance mission with which to align this mission and personnel.

Table 3.2-2 briefly describes the alternatives for the non-BRAC installation support and associated future master planning actions and their associated constraints. Several of the future master planning actions may include relocating personnel/functions to Redstone Arsenal from off-post locations.

Alternate installations were not evaluated for these actions due to the following reasons:

- AMC HQ/USASAC HQ Complex (Phase II and III) – Through the expansion of this complex, Redstone Arsenal's master planners intend to address the backlog of administrative space requirements at Redstone Arsenal. Therefore, consideration of an alternate installation is not applicable.
- Von Braun Complex, Phase IV – Personnel are currently located in two leased commercial facilities in Huntsville, AL. These personnel support functions associated with Redstone Arsenal. Therefore, relocation to another installation would not be appropriate.

Table 3.2-1. Alternatives Considered for the BRAC-Directed Actions.

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
Facility Group A - AMC HQ and USASAC HQ (Phase I)						
1a	Construct two facilities east of Building 4488 on Martin Road (north side); Demolish Building 4489	None	None	None	None	Considered in EA
1b	Construct two facilities on Mills Road (west side), south of Martin Road	None	None	Occurrence of cultural resources restricts expansion in this area.	None	Dismissed
1c	Construct two facilities on Rideout Road, east of the Redstone Arsenal Airfield	Traffic flow would be impeded by future construction of Southern Bypass.	Southern Bypass construction would create force protection issues.	Deviation in topography limits expansion in this area and necessitates significant fill of low lying areas. Fill material must be trucked. Borrow volume is estimated to be 2 to 3 times the area required for similar construction on a level site resulting in a significant natural resource and economic impact.	None	Dismissed
1d	Construct two facilities on Martin Road (south side) across from the Sparkman Center	None	None	Insufficient land area due to environmental concerns would restrict Phase I parking capacity and eliminate potential future complex expansions. Traffic congestion due to proximity to Sparkman Center and McMarrow Labs.	None	Dismissed
2	Use of existing facilities	None	None	None	Existing facilities do not have adequate space for incoming personnel and mission requirements.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
Facility Group B - AMC Band Facility						
1	Renovate Building 3712 (Post Theater) and construct addition (on south side) for AMC Band training facility	None	None	None	None	Considered in EA
2	Use of existing facilities (Building 3712)	None	None	None	Existing Post Theater does not have adequate space for AMC Band mission requirements.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group C - AMC Mail Facility						
1a	Construct addition to Building 3648 (current Post Office) on west side	None	None	None	None	Considered in EA
1b	Construct mail facility adjacent to proposed AMC HQ facility	Mail screening process would require additional transport and handling of the mail if not collocated in or adjacent to the Post Office facility.	Potential hazard to AMC HQ facility personnel due to mail facility's function (screening for potentially contaminated chemical or biological mail).	None	None	Dismissed
2	Use of existing facilities (Building 3648)	Existing mail facility does not meet mission requirements (no capability for screening potentially contaminated mail).	None	None	Existing facilities do not have adequate space.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group D - Von Braun Complex (MDA/SMDC - Phase III)						
1	Construct up to four facilities in the Von Braun Complex, north of the SMDC Center (Phase I) and east of the MDA Center (Phase II – currently under construction)	None	None	None	None	Considered in EA
2	Use of existing facilities	None	None	Collocation of incoming personnel with existing, similar functions/mission is advantageous.	Existing facilities do not have adequate space for incoming personnel and mission requirements.	Dismissed

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group E - Rotary Wing Center						
1a	Construct new Rotary Wing Center (test & evaluation facility and secure storage facility) adjacent to the west side of Redstone Arsenal Airfield	None	None	None	None	Considered in EA
1b	Expand current Redstone Arsenal Airfield facilities (Building 4832)	None	Expansion to the west is restricted by the 1,000 ft runway clear zone. Expansion to the south is restricted by the runway's 7:1 and 40:1 glide slopes. New facility height would violate clear zone requirements.	Topography decreases to the east. Expansion to the east would require significant fill material to maintain apron grade.	Expansion to the north would require relocation of existing parking apron to the west (in the runway's 1,000 ft clear zone) or to the north (infringe on transient aircraft parking apron). Expansion to the east would require airfield access road and utilities relocation (causing extended shut down of current mission activities).	Dismissed
1c	Construct new Rotary Wing Center (test & evaluation facility and secure storage facility) on northeast side of Redstone Arsenal Airfield (as northern most facility)	None	None	Deviation in topography will necessitate fill of lower lying areas. Fill material must be trucked. Borrow volume is estimated to be 2 to 3 times the area required for similar construction on a level site resulting in a significant natural resource and economic impact.	None	Dismissed
2	Use of existing facilities	Rotary Wing Center must be located at or adjacent to an airfield to meet mission requirements.	None	Rotary Wing Center must be located at or adjacent to an airfield to meet mission requirements.	Existing aviation facilities do not have adequate space for incoming personnel and mission requirements.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
Facility Group F - Rotary Wing Center of Excellence						
1a	Construct addition to Building 4500 on north side, on Martin Road	None	None	None	None	Considered in EA
1b	Construct facility on Mills Road (west side), south of Martin Road	None	None	Cultural resources site in northeast corner limits land area availability.	Collocation of incoming ATTC personnel and current RTTC personnel is required due to consolidation into a single organization.	Dismissed
1c	Construct facility on Hale Road (south side), southwest of Redstone Arsenal Airfield	None	None	Not centrally located in proximity to the other HQ organizations on Martin Road. Higher utility infrastructure costs.	Collocation of incoming ATTC personnel and current RTTC personnel is required due to consolidation into a single organization.	Dismissed
1d	Construct facility inside proposed Rotary Wing Center footprint	None	None	Not centrally located in proximity to the other HQ organizations on Martin Road. No potential for administration space expansion. Reduces valuable runway real estate.	Collocation of incoming ATTC personnel and current RTTC personnel is required due to consolidation into a single organization.	Dismissed
2	Use of existing facilities	None	None	None	Existing facilities do not have adequate space for incoming personnel and mission requirements.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group G - Redstone Arsenal Airfield Facilities						
1	Renovate Building 4813 and construct an addition; Remove existing USTs and replace with two ASTs	None	None	None	None	Considered in EA
2	Use of existing facilities	None	None	None	Existing facilities do not have adequate space or capability for mission requirements.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
Facility Group H - 2nd Recruiting Brigade HQ						
1a	Construct facility and demolish Building 3440	None	None	None	None	Considered in EA
1b	Construct facility on northeast side of the Redstone Arsenal Airfield (as northern most facility)	None	None	Deviation in topography will necessitate fill of lower lying areas. Estimated that 25,000 to 35,000 truck loads of fill material would be required (12 yd ³ per truck). Borrow pit footprint is estimated to be 2 to 3 times the area required for similar construction on a level site resulting in a significant natural resource and economic impact.	None	Dismissed
2	Use of existing facilities (Renovate Buildings 3300 and 3301)	None	None	None	Space will not be available until 2010 when current occupants vacate facilities as part of BRAC realignment. High cost associated with renovation.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA

NOTE: 1 = Construction/Renovation Alternatives, 2 = Existing Facility Alternatives, 3 = No Action Alternatives

AMC Army Materiel Command
 AST aboveground storage tank
 ATTC Aviation Technical Test Center
 EA environmental assessment

ft feet
 HQ Headquarters
 MDA Missile Defense Agency
 RTTC Redstone Technical Test Center

SMDC Space and Missile Defense Command
 yd³ cubic yards
 USASAC U.S. Army Security Assistance Command
 UST underground storage tank

Table 3.2-2. Alternatives Considered for the Non-BRAC Installation Support and Associated Future Master Planning Actions.

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
Facility Group A - AMC HQ and USASAC HQ (Phase II and III)						
1a	Construct one building east of the proposed AMC HQ (Phase II); Construct two buildings west of the proposed USASAC HQ (Phase III)	None	None	None	None	Considered in EA
2	Use of existing facilities on Redstone Arsenal	None	None	None	Existing facilities do not have adequate space for the estimated number of personnel that would occupy the Phase II and III structures.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group D - Von Braun Complex (Phase IV)						
1	Construct one facility in the Von Braun Complex (Phase IV) east of the SMDC Center	None	None	None	None	Considered in EA
2	Use of existing facilities on Redstone Arsenal	Existing facilities are not available or adequate to accommodate mission requirements.	None	None	Existing facilities do not have adequate space for the estimated number of personnel that would occupy Phase IV.	Dismissed
3	No Action (Continued Off-Post, Leased Space)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group E - Rotary Wing Simulation Center						
1a	Construct facility within the footprint of the proposed Rotary Wing Center	None	None	None	None	Considered in EA
2	Use of existing facilities	None	None	None	A single on-post facility is not available to relocate all personnel involved in this function.	Dismissed
3	No Action (Personnel will remain in various existing on-post facilities)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
Facility Group I - Child Development Center						
1a	Construct facility on Mills Road (west side), south of Martin Road	None	None	None	None	Considered in EA
1b	Construct facility on Mills Road (east side), north of Fowler Road	None	None	Environmental concerns to the east (former landfill site).	Adjacent R&D related land use conflicts with proposed child care environment.	Dismissed
1c	Construct facility on Dodd (east side), south of Martin Road	None	None	Insufficient land area, adjacent to NASA/ Army boundary.	Adjacent R&D related land use conflicts with proposed child care environment.	Dismissed
2	Use of existing facilities (Building 3145)	None	None	Child care facility should be located in close proximity to proposed AMC and USASAC HQs.	Existing on-post child care facility does not have adequate space.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group J - Gate 1 Facilities						
1	Construct new Gate 1 access point and visitor center on Martin Road, east of Patton Road; Demolish existing Gate 1 facilities and move two canopies to Gate 3 area	None	None	None	None	Considered in EA
2	Use of existing facilities	Existing facilities do not meet mission requirements – Army standards for access control points. Traffic must be halted when vehicles are turned away at existing gate.	None	Existing gate area conflicts with proposed future location of Southern Bypass.	None	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA

Alternative Number	Alternative Description	Operational Constraints	Safety Constraints	Geographic/ Environmental Constraints	Existing Facility and Mission Constraints	Carried Forward to EA or Dismissed
Facility Group K - Gate 3 Facilities						
1	Construct new Gate 3 access point on Redstone Road, west of existing location; Relocate the two Gate 1 canopies and construct hardstand area for truck inspections (north of Redstone Road); Construct new shipping and receiving warehouse (north of Redstone Road); Demolish Building 8022	None	None	None	None	Considered in EA
2	Use of existing Gate 3 facilities and two Shipping and Receiving Warehouses (Buildings 8022 and 8024)	Existing gate facilities do not meet mission requirements – Army standards for access control points. Traffic would need to be halted if vehicles are turned away at the gate.	Existing shipping and receiving warehouses have exceeded their service lives and do not meet current standards.	Existing gate area conflicts with proposed future location of Southern Bypass.	Existing shipping and receiving warehouses are not strategically located near an installation gate (located 6 to 9 miles from a gate).	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA
Facility Group L - Fire and Emergency Services Facility						
1	Construct facility on Morris Road, west of Building 4488 in parking area; Demolish Building 4424; Construct 200 additional parking spaces to augment parking that is under building site footprint	None	None	None	None	Considered in EA
2	Use of existing facilities (Building 4424)	Existing facility does not meet many current design and space requirements.	Existing facility does not meet safety and force standards.	None	Existing facility does not have adequate space to meet increased mission requirements.	Dismissed
3	No Action	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Considered in EA

NOTE: 1 = Construction/Renovation Alternatives, 2 = Existing Facility Alternatives, 3 = No Action Alternatives

AMC Army Materiel Command
EA environmental assessment
HQ Headquarters

NASA National Aeronautics and Space Administration
R&D Research and Development

SMDC Space and Missile Defense Command
USASAC U.S. Army Security Assistance Command

Table 3.2-3 summarizes the alternatives identified for each facility group (based on the information presented in Tables 3.2-1 and 3.2-2). Figure 3.2-1a provides a general view of Redstone Arsenal and identifies the area that is detailed in subsequent Section 3 figures. Figure 3.2-1b shows the locations of the construction/renovation alternatives that are listed in Table 3.2-3.

Table 3.2-3. Facility Group Alternatives.

Facility Group Identifier	Facility Group Name	Alternatives*
A	AMC HQ and USASAC HQ	1a, 1b, 1c, 1d, 2, and 3
B	AMC Band Facility	1, 2, and 3
C	AMC Mail Facility	1a, 1b, 2, and 3
D	Von Braun Complex	1, 2, and 3
E	Rotary Wing Center	1a, 1b, 1c, 2, and 3
F	Rotary Wing Center of Excellence	1a, 1b, 1c, 1d, 2, and 3
G	Redstone Arsenal Airfield Facilities	1, 2, and 3
H	2 nd Recruiting Brigade HQ	1a, 1b, 2, and 3
I	Child Development Center	1a, 1b, 1c, 2, and 3
J	Gate 1 Facilities	1, 2, and 3
K	Gate 3 Facilities	1, 2, and 3
L	Fire and Emergency Services Facility	1, 2, and 3

NOTES: * Alternatives are described in Tables 3.2-1 and 3.2-2.

1 = Construction/Renovation Alternatives, 2 = Existing Facility Alternatives, 3 = No Action Alternatives

AMC Army Materiel Command

HQ Headquarters

USASAC U.S. Army Security Assistance Command

3.3 Alternatives Carried Forward

The Preferred Alternative and the No Action Alternative are carried forward and evaluated in this EA.

3.3.1 PREFERRED ALTERNATIVE

Table 3.3-1 lists the selected alternative for each of the facility groups. Table 3.3-1 comprises the Preferred Alternative.

Table 3.3-1. Preferred Alternative.

Facility Group Identifier	Facility Group Name	Selected Alternative*
A	AMC HQ and USASAC HQ	1a
B	AMC Band Facility	1
C	AMC Mail Facility	1a
D	Von Braun Complex	1
E	Rotary Wing Center	1a
F	Rotary Wing Center of Excellence	1a
G	Redstone Arsenal Airfield Facilities	1
H	2 nd Recruiting Brigade HQ	1a
I	Child Development Center	1a
J	Gate 1 Facilities	1

Facility Group Identifier	Facility Group Name	Selected Alternative*
K	Gate 3 Facilities	1
L	Fire and Emergency Services Facility	1

NOTES: * Alternatives are described in Tables 3.2-1 and 3.2-2.

1 = Construction/Renovation Alternatives

AMC Army Materiel Command

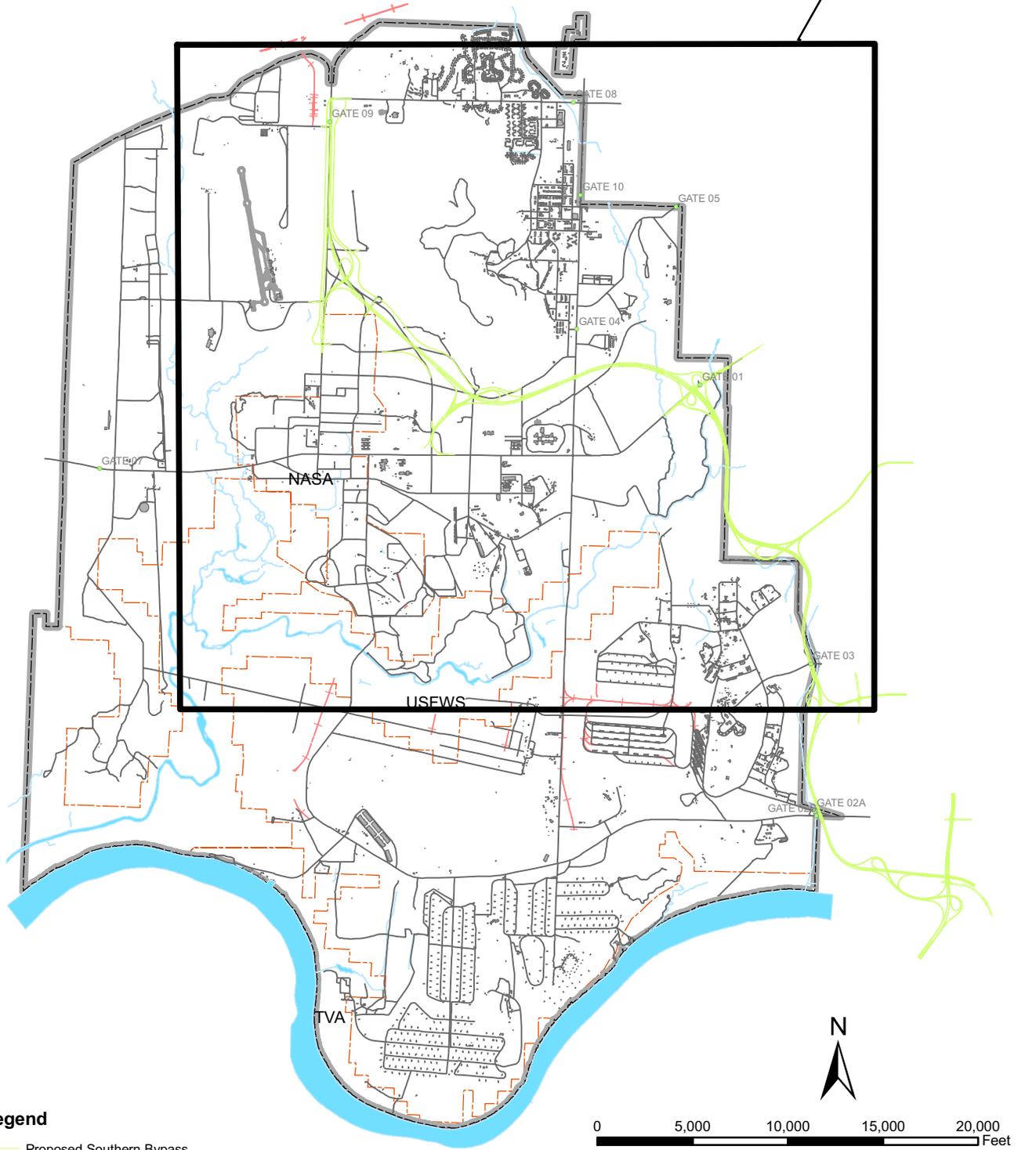
HQ Headquarters

USASAC U.S. Army Security Assistance Command

The Preferred Alternative is comprised of BRAC-directed actions, BRAC-discretionary actions, and a number of non-BRAC installation support and associated future master planning actions. Although not integral to implementation of the BRAC-directed actions, the non-BRAC installation support and associated future master planning actions have been included in this document since they will facilitate installation missions and were deemed sufficiently developed to merit NEPA analysis at this time. If these non-BRAC projects are not funded in the future, this would not affect construction of the BRAC projects. Figure 3.3-1 shows the proposed construction/renovation footprints for the Preferred Alternative and the location of associated proposed utilities that are located outside of these footprints (if this information is currently available). Figures 3.3-2 and 3.3-3 show the planned construction phases for the AMC and USASAC HQ and the Von Braun Complex, respectively. Detailed location information for many of the utility upgrades/additions will not be available until the engineering design phase. For the majority of the sites, the proposed utilities would be located within the identified construction/renovation footprints, with the following exceptions:

- Alternative A1a, AMC HQ and USASAC HQ – A new sewage lift station would be installed adjacent to the eastern portion of the Alternative A1a construction footprint. A new force main would be installed from this lift station to Fowler Road. A portion of the existing 14-inch sewer force main along Fowler Road would be replaced with a new 16-inch force main. The portion to be replaced would begin where the proposed facilities' new 3-inch force main connects and would end at the Patton Road connection. This upgrade and addition to the sewer main encompasses approximately 2 linear miles.
- Alternative E1a, Rotary Wing Center – The following utilities are proposed for installation outside of the proposed Alternative E1a construction footprint:
 - New water mains and a 500,000-gallon elevated water tank to meet fire protection requirements – A new water main would be located to the east, north and west of the Redstone Arsenal Airfield, connecting to an existing water main along Hale Road, to the south of the airfield. A new water main would also be installed along Rideout Road, from Hale Road north to Goss Road, connecting to the existing water main at Goss Road. Figure 3.3-1 shows the location of these features. Possible connection to city water supply could eliminate the requirement for the elevated water tank.

Area detailed on subsequent figures



Legend

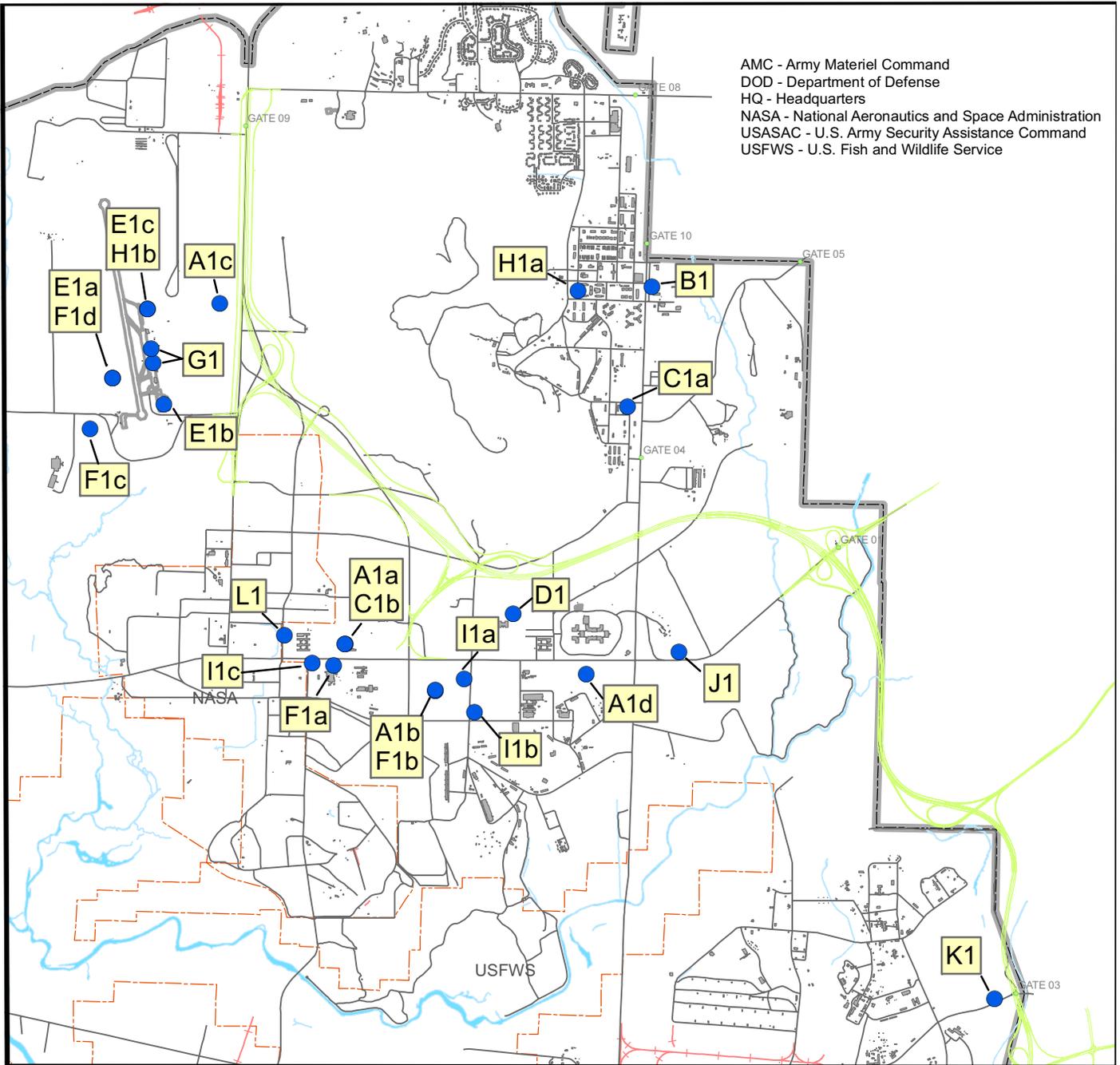
- Proposed Southern Bypass
- Road
- Railroad
- Buildings
- Airfield
- Surface water
- ▭ Redstone Boundary
- ▭ DOD Property Interest

DOD - Department of Defense
NASA - National Aeronautics and Space Administration
TVA - Tennessee Valley Authority
USFWS - U.S. Fish and Wildlife Service

Figure 3.2-1a

Location Map
Redstone Arsenal

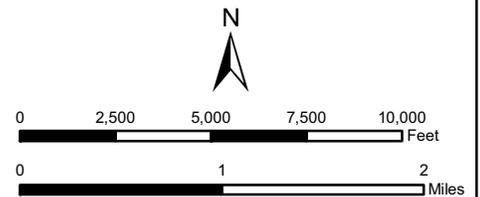
AMC - Army Materiel Command
 DOD - Department of Defense
 HQ - Headquarters
 NASA - National Aeronautics and Space Administration
 USASAC - U.S. Army Security Assistance Command
 USFWS - U.S. Fish and Wildlife Service



Legend

- Proposed Southern Bypass
- Road
- Railroad
- Buildings
- Airfield
- Surface water
- Redstone Boundary
- DOD Property Interest

A1a Facility Group A, Alternative 1a



Facility Groups and Alternatives *

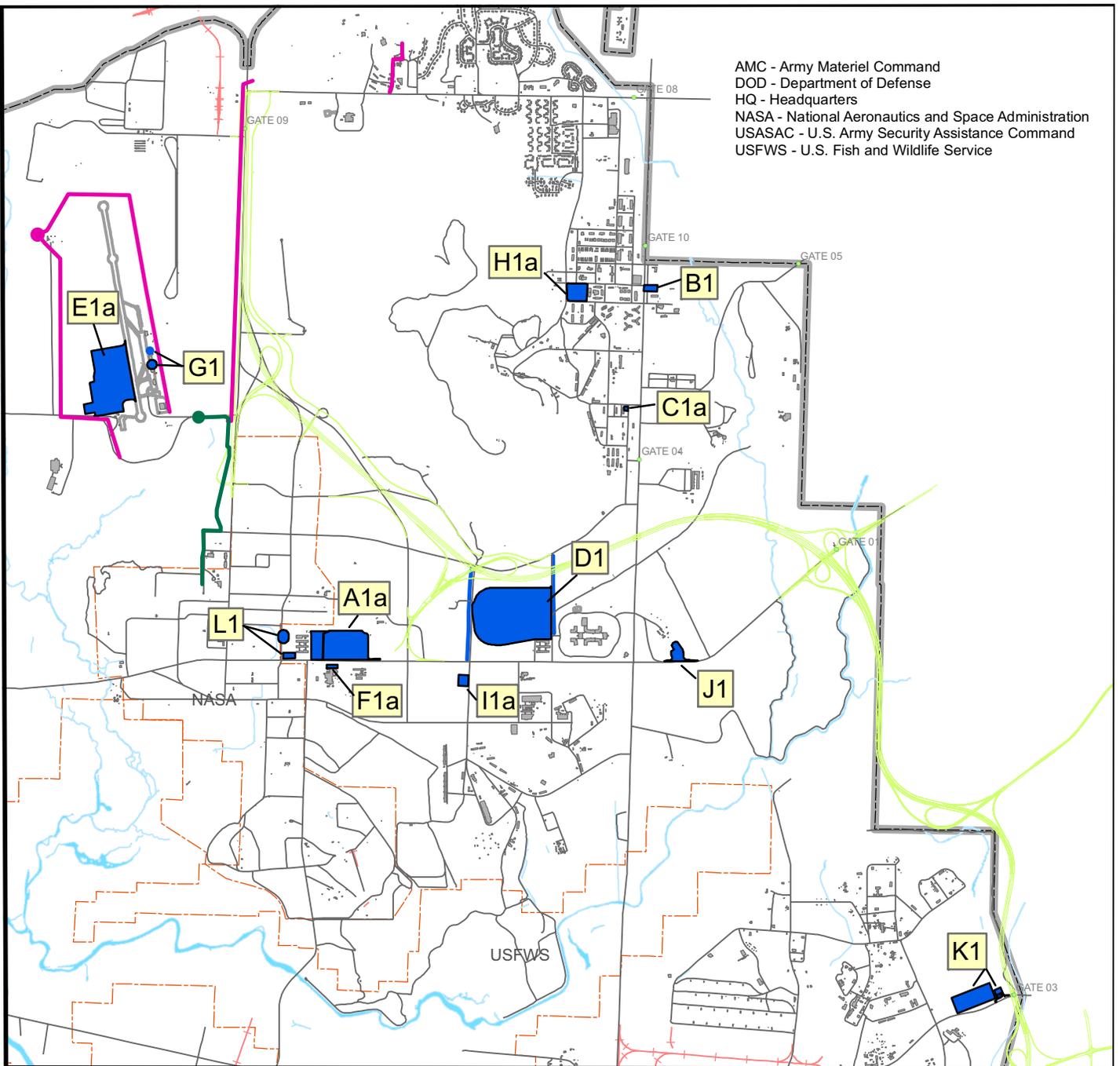
- A - AMC HQ and USASAC HQ (Alternatives 1a, 1b, 1c, 1d)
- B - AMC Band Facility (Alternative 1)
- C - AMC Mail Facility (Alternative 1a and 1b)
- D - Von Braun Complex (Alternative 1)
- E - Rotary Wing Center (Alternatives 1a, 1b, 1c)
- F - Rotary Wing Center of Excellence (Alternatives 1a, 1b, 1c, 1d)
- G - Redstone Arsenal Airfield Facilities (Alternative 1)
- H - 2nd Recruiting Brigade HQ (Alternatives 1a and 1b)
- I - Child Development Center (Alternatives 1a, 1b, 1c)
- J - Gate 1 Facilities (Alternative 1)
- K - Gate 3 Facilities (Alternative 1)
- L - Fire and Emergency Services Facility (Alternative 1)

* See Table 3.2-1 and 3.2-2 for a description of the alternatives.

Figure 3.2-1b

Proposed Facility Group Construction/Renovation Site Locations

AMC - Army Materiel Command
 DOD - Department of Defense
 HQ - Headquarters
 NASA - National Aeronautics and Space Administration
 USASAC - U.S. Army Security Assistance Command
 USFWS - U.S. Fish and Wildlife Service

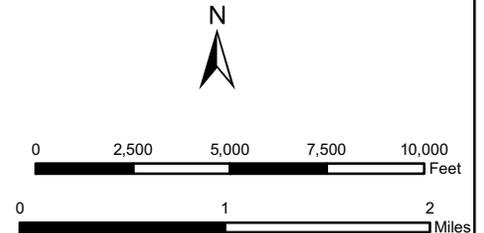


Legend

- Proposed Water Tower
- Proposed Potable Water
- Proposed Lift Station
- Proposed Sanitary Sewer
- Proposed Southern Bypass
- Road
- Railroad
- Buildings
- Airfield
- Surface water
- A1a Facility Group A, Alternative 1a
- Redstone Boundary
- DOD Property Interest

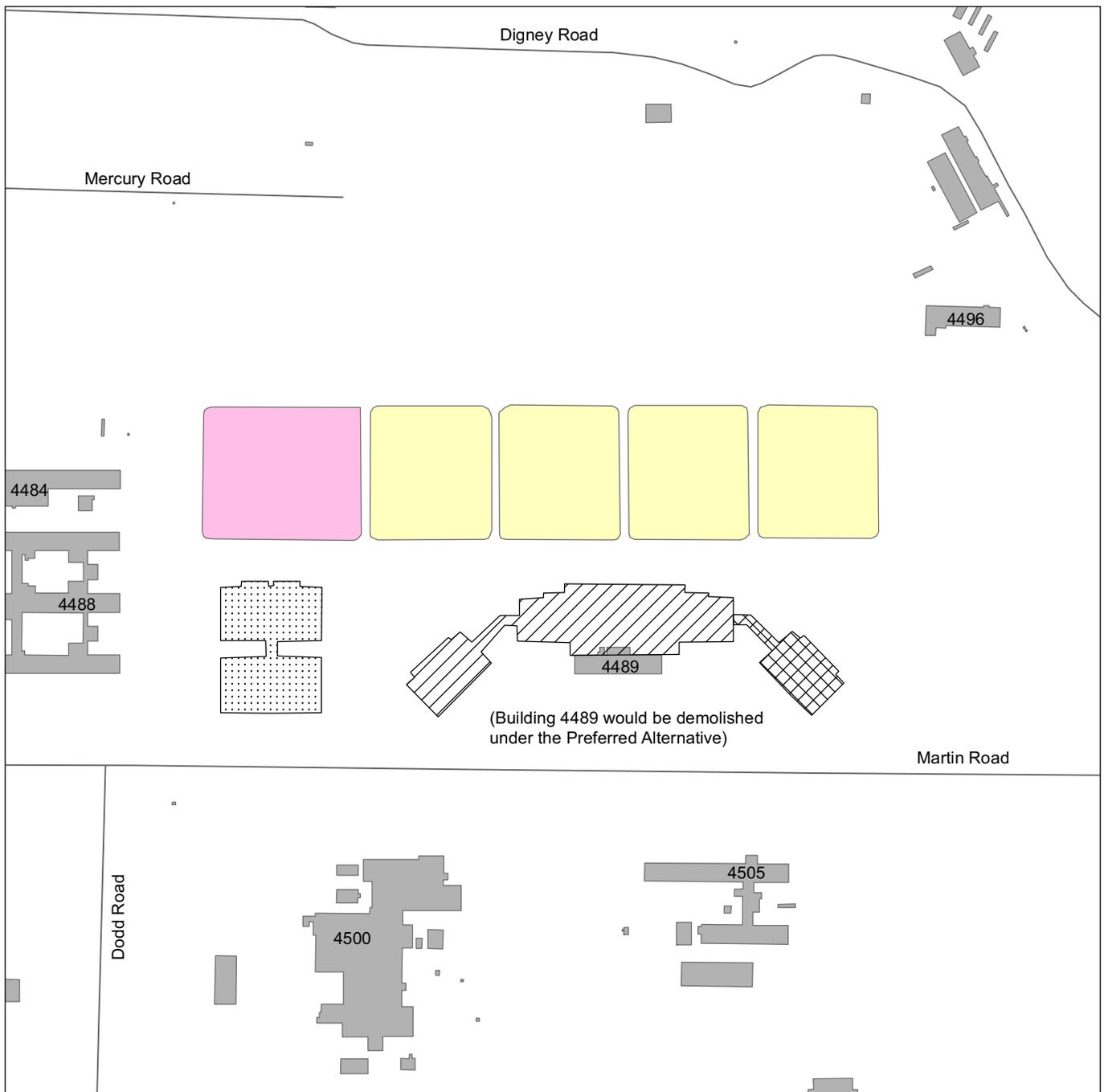
- Facility Groups and Selected Alternatives ***
- A - AMC HQ and USASAC HQ (Alternative 1a)
 - B - AMC Band Facility (Alternative 1)
 - C - AMC Mail Facility (Alternative 1a)
 - D - Von Braun Complex (Alternative 1)
 - E - Rotary Wing Center (Alternative 1a)
 - F - Rotary Wing Center of Excellence (Alternative 1a)
 - G - Redstone Arsenal Airfield Facilities (Alternative 1)
 - H - 2nd Recruiting Brigade HQ (Alternative 1a)
 - I - Child Development Center (Alternatives 1a)
 - J - Gate 1 Facilities (Alternative 1)
 - K - Gate 3 Facilities (Alternative 1)
 - L - Fire and Emergency Services Facility (Alternative 1)

* See Table 3.2-1 and 3.2-2 for a description of the alternatives.



NOTE: Detailed location information for many utility upgrades/additions will not be available until the engineering design phase. See text for more detail regarding utilities.

Figure 3.3-1
Preferred Alternative and Proposed Utilities



Legend

- Existing Buildings
- Proposed Phase I Building
- Proposed Phase II Building
- Proposed Phase III Building
- Road

Parking

- Proposed Phase I
- Proposed Phase III

AMC - Army Materiel Command
 HQ - Headquarters
 USASAC - U.S. Army Security Assistance Command

* See Tables 3.2-1 and 3.2-2 for a description of the alternatives.

Note: Proposed building and infrastructure locations shown are preliminary facility designs.

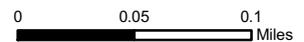
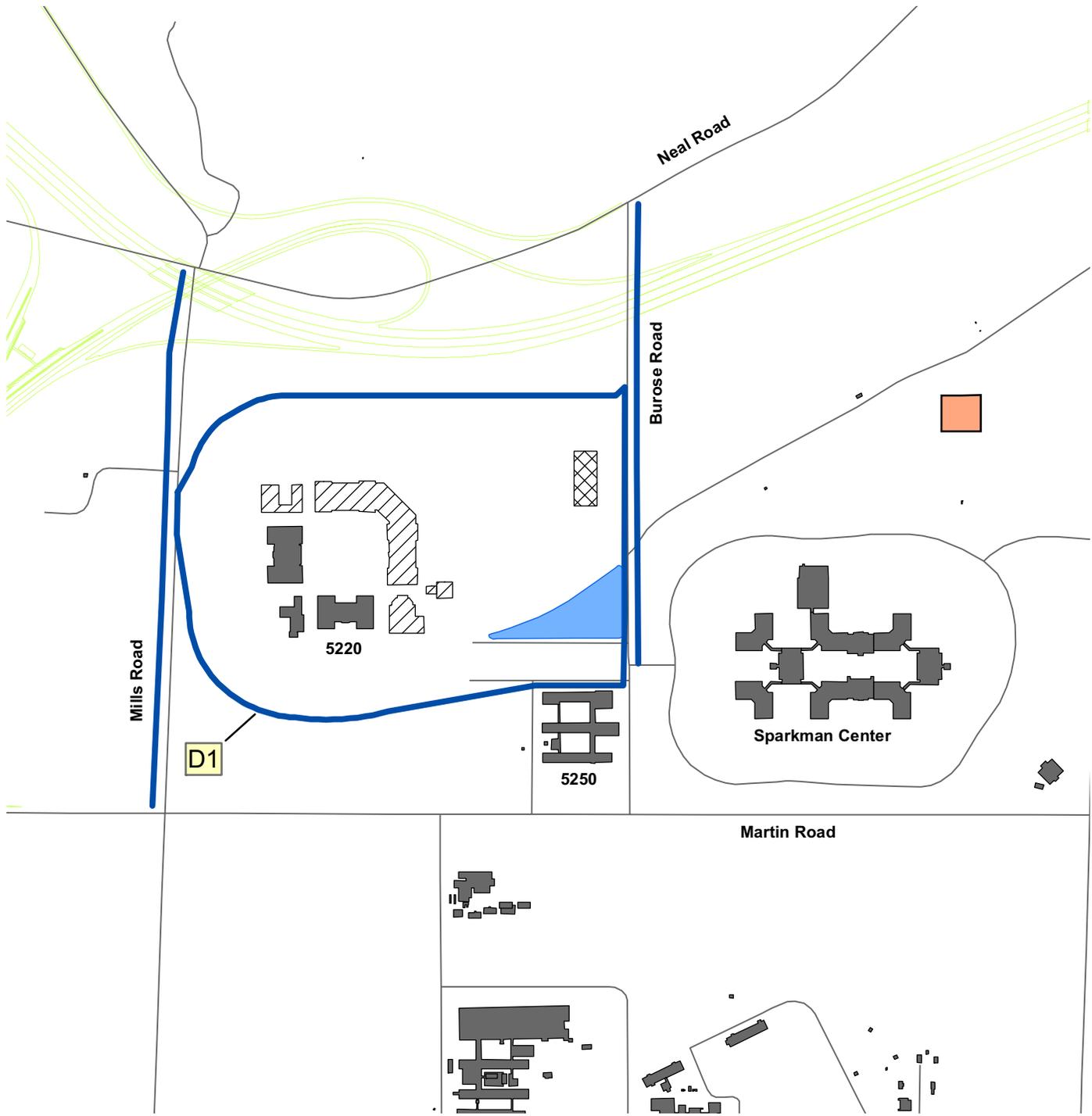


Figure 3.3-2

Phased Construction of the AMC HQ and USASAC HQ Complex (Facility Group A, Alternative 1a*)



Legend

- Existing Building
- Phase III Building
- Phase IV Building
- Proposed rebuild of Substation #8
- Proposed Detention Pond
- Proposed Southern Bypass
- Buildings
- Road
- Facility Group D, Alternative 1, Von Braun Complex Expansion *
- Road Widening for Facility Group D, Alternative 1 *

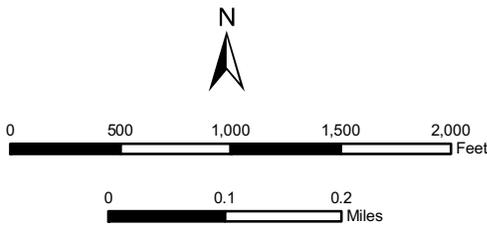


Figure 3.3-3
Phased Expansion of the Von Braun Complex
(Facility Group D, Alternative 1*)

* See Tables 3.2-1 and 3.2-2 for a description of the alternatives.

- A new sewage lift station and force main – The new lift station would be installed in the construction footprint. A new force main would connect this lift station to an existing sewer main located along Hale Road, south of the airfield. The existing force main along Rideout Road may require replacement. In this case, a new sewer main would be installed along Hale Road, east of the airfield to Rideout Road, and south along Rideout Road to an existing lift station. Figure 3.3-1 shows the location of these features.
 - New natural gas lines – New gas lines would be installed from the facilities to an existing gas main located along Hale Road, south of the airfield.
 - New primary electric lines – New electric lines would be installed from the facilities running west to connect with the proposed lines that will provide service to the Software Engineering Directorate expansion.
 - New communications lines – New communication cables would be installed from the facilities either to the east, to connect with existing lines serving the existing airfield facilities, or to the south, to connect with existing lines serving the Software Engineering Directorate facilities.
- Alternative F1a, Rotary Wing Center of Excellence – Substantial communications upgrades would be required with lines running under Martin Road.
 - Alternative I1a, Child Development Center – Substantial communications upgrades would be required with lines running under Martin Road. Water/sewer lines would be routed from Martin Road along Mills Road to the facility (within the existing right of way).
 - Alternative J1, Gate 1 Facilities – Communication cable would be buried along north side of Martin Road from the visitor center to existing manhole MH-RS-1.
 - Alternative K1, Gate 3 Facilities – Telephone cable would be required from the corner of Redstone Road and Line Road to the proposed shipping and receiving warehouse. Fiber optics cable would be required from Building 7770, south of Redstone Road, to the proposed warehouse.
 - Alternative L1, Fire and Emergency Services Facility – Communication conduit would require boring under Martin Road.

The analysis in this EA only includes those actions/activities that would be conducted within the construction/renovation footprints and associated proposed utility corridors identified on Figure 3.3-1. The Redstone Arsenal Directorate of Public Works, Master Planning Division assumes a 20-ft wide disturbed area is associated with installing the proposed utilities in areas outside of the construction/renovation footprints.

3.3.2 NO ACTION ALTERNATIVE

Although implementation of the BRAC-directed actions is mandated by law, an environmental analysis of a No Action Alternative is required by CEQ Regulations to serve as a benchmark against which the Proposed Action can be evaluated. Under the No Action Alternative, the Proposed Action would not be implemented.

3.4 Alternatives Considered and Not Carried Forward

A BRAC-directed-actions only alternative was considered, but was not carried forward in this EA because there are related projects which will facilitate implementation of BRAC on Redstone or will become an integral part of administrative complexes which are BRAC funded.

The alternatives listed in Table 3.4-1 are deemed not to meet the screening criteria for further development, based upon the constraints identified in Tables 3.2-2 and 3.2-3. These alternatives will not be carried forward for environmental analysis.

Table 3.4-1. Alternatives Considered and Not Carried Forward.

Facility Group Identifier	Facility Group Name	Alternatives Considered and Not Carried Forward*
A	AMC HQ and USASAC HQ	1b, 1c, 1d, and 2
B	AMC Band Facility	2
C	AMC Mail Facility	1b and 2
D	Von Braun Complex	2
E	Rotary Wing Center	1b, 1c, and 2
F	Rotary Wing Center of Excellence	1b, 1c, 1d, and 2
G	Redstone Arsenal Airfield Facilities	2
H	2 nd Recruiting Brigade HQ	1b and 2
I	Child Development Center	1b, 1c, and 2
J	Gate 1 Facilities	2
K	Gate 3 Facilities	2
L	Fire and Emergency Services Facility	2

NOTES: * Alternatives are described in Tables 3.2-1 and 3.2-2.

1 = Construction/Renovation Alternatives, 2 = Existing Facility Alternatives

AMC Army Materiel Command

HQ Headquarters

USASAC U.S. Army Security Assistance Command

4.0 AFFECTED ENVIRONMENT AND CONSEQUENCES

4.1 Introduction

This chapter describes the existing environmental and human resources that could potentially be affected by the Preferred Alternative and the No Action Alternative. The environment described in this chapter is the baseline for the consequences that are presented for each resource and each alternative. The region of influence (ROI), or study area for each resource category is Redstone Arsenal and its surroundings, unless stated otherwise in the individual resource category discussion. The affected environment and baseline conditions are described for each resource in general terms for Redstone Arsenal. As described in Section 3.3, the Preferred Alternative is composed of a selected alternative for each of 12 identified facility groups. If a facility group location exhibits a unique environment or baseline condition this location is described specifically. Most of the baseline information was taken from existing Redstone Arsenal documentation.

This chapter also describes potential impacts for each environmental and human resource. An impact is defined as a consequence from modification to the existing environment brought about by the implementation of a proposed action or alternative. Impacts can be beneficial or adverse, can be a primary result of an action (direct) or a secondary result (indirect), and can be permanent or long lasting (long term) or temporary and of short duration (short term). For this EA, short-term impacts are defined as those impacts resulting from construction, renovation, or demolition activities (e.g., those that are of temporary duration), whereas long-term impacts are those resulting from the presence of new facilities and operation of the proposed new facilities once they are constructed and commissioned for operation.

Significance criteria were developed for the affected resource categories, and for many resource categories, are necessarily qualitative in nature. Quantitative criteria can be established when there are specific numerical limits established by regulation or industry standard. These criteria are based on existing regulatory standards, scientific and environmental documentation, and/or professional judgment. Impacts are classified as significant or not significant based on the significance criteria. Impacts do not necessarily connote negative changes, and any detectable change is not, in and of itself, considered to be negative. In the following discussions, to highlight adverse impacts for the decision maker, the impacts are considered adverse unless identified as beneficial.

4.2 Land Use

4.2.1 AFFECTED ENVIRONMENT

This section describes existing land use conditions on and surrounding Redstone Arsenal. It considers natural land uses and land uses that reflect human modification. Natural land use classifications include wildlife areas, forests, and other open or undeveloped areas. Human land uses include residential, commercial, industrial, utilities, agricultural, recreational, and other developed uses. Management plans, policies, ordinances, and regulations determine the types of uses that are allowable, or protect specially designated or environmentally sensitive uses.

The following sections discuss the regional geographic setting and location, installation land use, and current and future development. The ROI for land use is the land within and adjacent to the limits of the Preferred Alternative project areas.

4.2.1.1 Regional Geographic Setting and Location

Redstone Arsenal is located in Madison County, Alabama, nearly surrounded by the City of Huntsville, and southwest of downtown Huntsville. Redstone Arsenal currently comprises 37,910 acres (including special-use permit land). The site is approximately 6 miles wide and 10 miles long (U.S. Army Missile Command 1994).

4.2.1.2 Installation Land Use

Redstone Arsenal has completed an Integrated Natural Resources Management Plan (U.S. Army Aviation and Missile Command 2002a). The plan is designed to provide an inventory of natural resources and outlines procedures for managing soil, timber, grassland, and wildlife resources.

A Real Property Master Plan, Land Use Analysis for Redstone Arsenal was prepared in April of 1999. This plan assists in planning for future growth and development, and promotes compatible and coordinated uses of land. The land on the arsenal is divided into 15 major use areas (U.S. Army Garrison 2006), including the following: Administration; Community Service; Family Housing; Leased Land, including the National Aeronautics and Space Administration's (NASA's) Marshall Space Flight Center; Maintenance; Manufacturing/Production; Medical/Dental; Operations; Recreational; Research, Development, Testing, and Engineering (RDTE); Storage; Test Range; Training; Troop Housing; and Utility.

Land on Redstone Arsenal is owned by the U.S. Army (30,920 acres), Wheeler National Wildlife Refuge (4,085 acres), and the Tennessee Valley Authority (2,905 acres). The bulk of the land on the arsenal is comprised of woodlands, ponds, and streams (19,189 acres), followed in area by semi-improved grounds such as test areas and ranges, agricultural leases and open fields, firebreaks, picnic areas, wildlife food plots, and utility rights-of-way (11,572 acres). Buildings and pavement cover 3,544 acres and there are 3,605 acres of actively maintained grounds, including lawns, athletic fields, parade and drill grounds, cemeteries, the golf course, airfield, and heliports (Makkouk 2006a; U.S. Army Aviation and Missile Command 2002a).

The Agricultural Leasing and Grazing Program has been ongoing on the arsenal since shortly after World War II. Currently, there are 3,769 acres of available agricultural land leased to private individuals for production of hay crops and pasture for cattle grazing. Approximately 30 acres of Agricultural Lease Unit 128 is within the construction footprint for the proposed Rotary Wing Center (Facility Group E, Selected Alternative 1a) and approximately 5 acres of lease unit 5 is within the footprint for the Gate 3 Facilities (Facility Group K, Selected Alternative 1).

According to the Redstone Arsenal forest inventory, 15,656 acres are covered in forest. These forestlands are distributed across 41 percent of the arsenal's landscape. Forestlands on Redstone Arsenal are managed on an ecosystem basis for conservation and protection of natural resources, proper maintenance of military grounds, facilitation of the military mission, production of forest products for local and national needs, and protection of downstream property from flood and erosion damage (U.S. Army Aviation and Missile Command 2002a). Pine plantations consisting of approximately 58 acres are within the construction footprints of the Preferred Alternative.

There are 47 known private cemeteries located on Redstone Arsenal. These cemeteries are not located within any construction footprints. Table 4.2-1 shows the existing and future land use

classifications for the Preferred Alternative project areas. Existing land use at Redstone Arsenal is shown on Figure 4.2-1.

Table 4.2-1. Current and Future Land Use Classifications (On-Post) for Lands Potentially Affected by the Proposed Action.

Facility Group Selected Alternative	Facility Group Name	Current Land Use Categories	Future Land Use Categories
A1a	AMC HQ and USASAC HQ	Administration	Administration
B1	AMC Band Facility	Administration	Administration
C1a	AMC Mail Facility	Operations	Storage
D1	Von Braun Complex	Administration	Administration
E1a	Rotary Wing Center	Operations; Test Range	Aircraft Operations & Maintenance; RDTE
F1a	Rotary Wing Center of Excellence	RDTE	Administration
G1	Redstone Arsenal Airfield Facilities	Operations	Aircraft Operations & Maintenance
H1a	2 nd Recruiting Brigade HQ	Training Area	Administration
I1a	Child Development Center	RDTE	Administration
J1	Gate 1 Facilities	Recreation	Outdoor Recreation; Training
K1	Gate 3 Facilities	Manufacturing/Production	RDTE
L1	Fire and Emergency Services Facility	Administration	Administration

Source: U.S. Army Garrison 2006
 AMC Army Materiel Command
 HQ Headquarters
 RDTE Research, Development, Training, and Engineering
 USASAC U.S. Army Security Assistance Command

4.2.1.3 Current and Future Development in the Region of Influence

The Preferred Alternative project areas are widely distributed across Redstone Arsenal, although many are in the central administrative and RDTE areas. Table 4.2-2 shows the existing facilities nearest to locations of Preferred Alternative project areas.

Table 4.2-2. Existing Facilities Nearest to Preferred Alternative Project Locations.

Facility Group Selected Alternative	Facility Group Name	Nearest Existing Facility	Approximate Distance
A1a	AMC HQ and USASAC HQ	Garrison Headquarters	100 feet
B1	AMC Band Facility	<ul style="list-style-type: none"> Post Theater (associated with B1) bowling alley 	<ul style="list-style-type: none"> adjacent 400 feet
C1a	AMC Mail Facility	<ul style="list-style-type: none"> Post Office (associated with C1a) storage facility 	<ul style="list-style-type: none"> adjacent 500 feet
D1	Von Braun Complex	<ul style="list-style-type: none"> Von Braun Complex Phases I and II other administrative facilities 	<ul style="list-style-type: none"> adjacent 500 feet
E1a	Rotary Wing Center	<ul style="list-style-type: none"> Redstone Airfield Redstone Flying Club 	<ul style="list-style-type: none"> adjacent 200 feet
F1a	Rotary Wing Center of Excellence	RDTE facility (associated with F1a)	adjacent

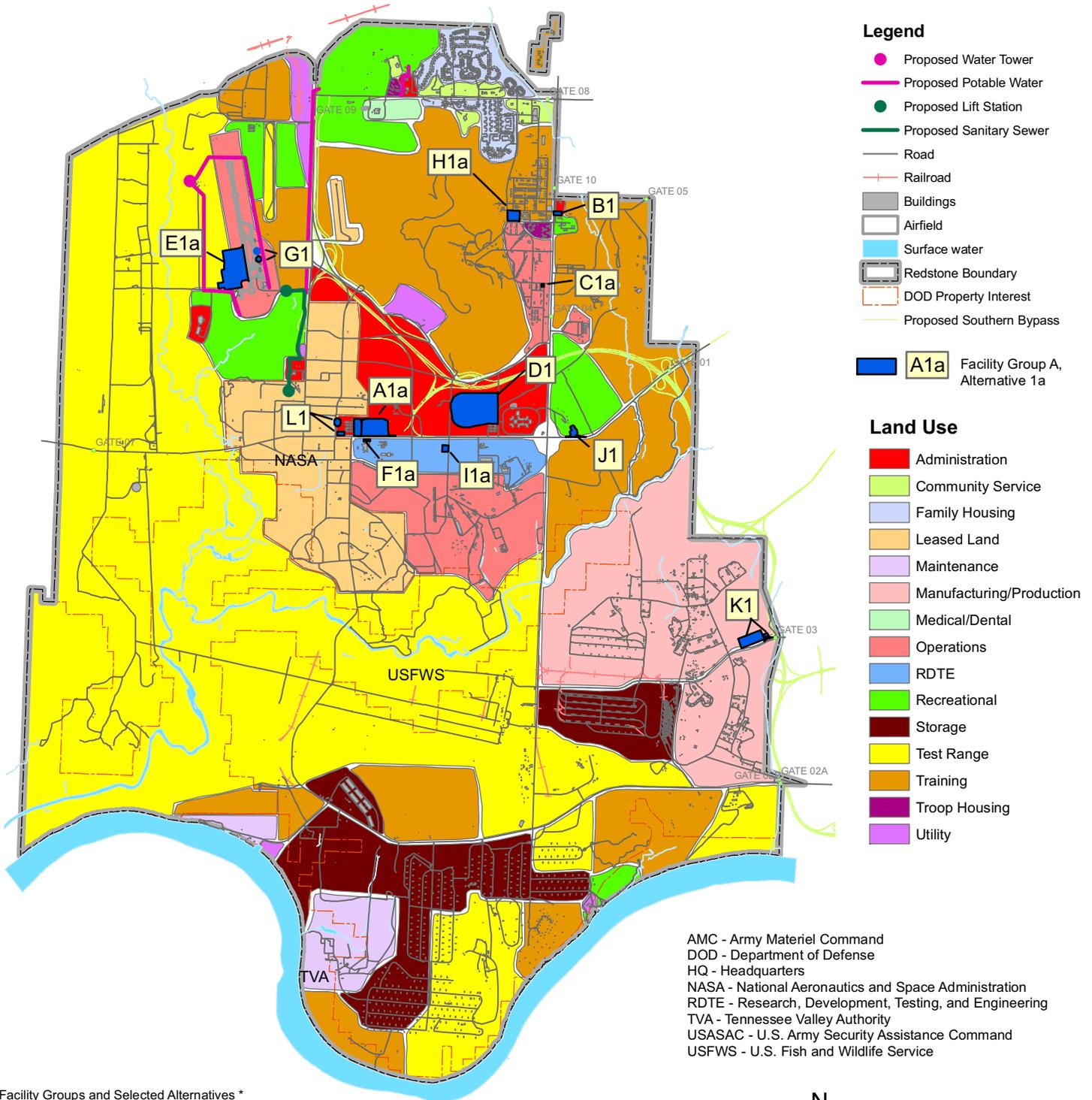
Facility Group Selected Alternative	Facility Group Name	Nearest Existing Facility	Approximate Distance
G1	Redstone Arsenal Airfield Facilities	Redstone Airfield and facilities (associated with G1)	adjacent
H1a	2 nd Recruiting Brigade HQ	administrative facilities, gymnasium	300 feet
I1a	Child Development Center	Fennell Cemetery	100 feet
J1	Gate 1 Facilities	Outdoor Recreation Center	600 feet
K1	Gate 3 Facilities	RDTE and administrative facilities	600 feet
L1	Fire and Emergency Services Facility	Garrison Headquarters	200 feet

AMC Army Materiel Command
 HQ Headquarters
 RDTE Research, Development, Testing, and Engineering
 USASAC U.S. Army Security Assistance Command

Land available to develop on Redstone Arsenal is constrained by operational arcs (explosive safety quantity-distance zones) and natural features, such as wetlands. The current property inventory available to develop on Redstone Arsenal is approximately 4,542 acres, or 12 percent of the arsenal's total area. Approximately 47 percent of that property is intended for administrative uses, 19 percent for training areas and testing ranges, and the remaining 34 percent for operational and maintenance uses, outdoor recreation uses, family housing, and community services. There is no unconstrained land reserved for utilities on the arsenal. Table 4.2-1 shows the future land use categories identified for the Preferred Alternative project areas.

The 1-mile off-post portion of Redstone Road between the arsenal's existing Gate 3 and Memorial Parkway (U.S. Highway 231) consists of green space owned by the City of Huntsville and the Land Trust of Huntsville and North Alabama, apartments and condominiums, several single-family residences, a church, and commercial properties, including a Wal-Mart department store and Ruby Tuesday restaurant. The Renaissance housing area, currently in the development stage, is also located along this part of Redstone Road. This portion of road is within the Preferred Alternative ROI for land use, because Redstone Arsenal-bound commercial traffic would be diverted to Gate 3 from Gate 1.

The 2-mile off-post portion of Martin Road between Redstone Arsenal's Gate 1 and Memorial Parkway consists of privately owned land, including the Carlton Cove development, and one parcel of Disposal Storage District-zoned land owned by the City of Huntsville. This stretch of road is also within the Preferred Alternative ROI for land use, because Redstone Arsenal-bound commercial traffic would be diverted to Gate 3 from Gate 1.

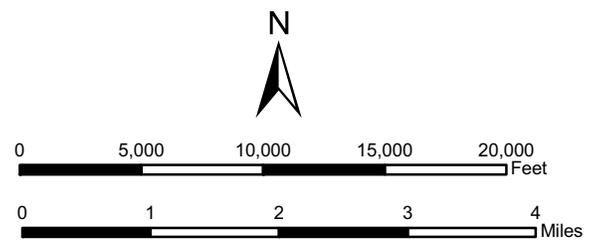


- Legend**
- Proposed Water Tower
 - Proposed Potable Water
 - Proposed Lift Station
 - Proposed Sanitary Sewer
 - Road
 - Railroad
 - Buildings
 - Airfield
 - Surface water
 - Redstone Boundary
 - DOD Property Interest
 - Proposed Southern Bypass
- A1a** Facility Group A, Alternative 1a

- Land Use**
- Administration
 - Community Service
 - Family Housing
 - Leased Land
 - Maintenance
 - Manufacturing/Production
 - Medical/Dental
 - Operations
 - RDTE
 - Recreational
 - Storage
 - Test Range
 - Training
 - Troop Housing
 - Utility

AMC - Army Materiel Command
 DOD - Department of Defense
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- Facility Groups and Selected Alternatives ***
- A - AMC HQ and USASAC HQ (Alternative 1a)
 - B - AMC Band Facility (Alternative 1)
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 - D - Von Braun Complex (Alternative 1)
 - E - Rotary Wing Center (Alternative 1a)
 - F - Rotary Wing Center of Excellence (Alternative 1a)
 - G - Redstone Arsenal Airfield Facilities (Alternative 1)
 - H - 2nd Recruiting Brigade HQ (Alternative 1a)
 - I - Child Development Center (Alternatives 1a)
 - J - Gate 1 Facilities (Alternative 1)
 - K - Gate 3 Facilities (Alternative 1)
 - L - Fire and Emergency Services Facility (Alternative 1)



* See Table 3.2-1 and 3.2-2 for a description of the alternatives.

NOTE: Detailed location information for many utility upgrades/additions will not be available until the engineering design phase. See text for more detail regarding utilities.

Figure 4.2-1
Land Use on Redstone Arsenal

4.2.2 CONSEQUENCES

Considerations for impacts to land use include the land on and adjacent to each Preferred Alternative project area, the physical features that influence current or proposed uses, pertinent land use plans and regulations, and land availability. Conformity with existing land use is of utmost importance. Potential impacts to land use are considered significant if the Preferred Alternative would:

- Conflict with applicable ordinances and/or permit requirements;
- Cause nonconformance with the current general plans and land use plans, or preclude adjacent or nearby properties from being used for existing activities; or
- Conflict with established uses of an area requiring mitigation.

4.2.2.1 Preferred Alternative

Overall, potential impacts to land use from the Preferred Alternative would not be significant. The Preferred Alternative would be contained within Redstone Arsenal, which sets its own land use and zoning designations, and would not present conflicts or nonconformance with current local or state land use or zoning designations. Existing land uses external to the installation would not be foreclosed by on-post land-use decisions related to the Preferred Alternative; thus, there would be no discernible impact to these land uses. The 58 acres of pine plantation within the construction footprints of the Preferred Alternative would be harvested prior to construction. The area would be removed from future timber production. The Preferred Alternative would not conflict with currently planned land uses on-post, nor would it conflict with Redstone Arsenal's land management plans.

4.2.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to land use due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal. The 58 acres of pine plantations would be harvested in the future according to the Redstone Arsenal Forest Management Plan, in accordance with the 70-year rotation for pine stand and this acreage would remain in the arsenal's Forest Management Program.

4.3 Aesthetics and Visual Resources

4.3.1 AFFECTED ENVIRONMENT

This section describes the existing aesthetic and visual resource conditions at Redstone Arsenal. Visual resources include natural and manmade physical features that provide the landscape its character and value as an environmental resource. Landscape features that form a viewer's overall impression about an area include landform, vegetation, water, color, adjacent scenery, scarcity, and constructed modifications to the natural setting.

Redstone Arsenal's natural characteristics illustrate the Tennessee Valley's contrast between tree-covered, low mountains and gently rolling agricultural areas. Another landform, forested wetland, or swampland, is characteristic of much of the arsenal's southern half as well as the Gate 1 vicinity. Taken together with the relatively low density of buildings, they reinforce a pastoral feeling (U.S. Army Missile Command 1994).

There is no unrestricted public access to Redstone Arsenal. Safety and functionality are the primary considerations for use of Redstone Arsenal land to support mission-related and support activities. The exterior appearance of structures and landscaping are considered only when all other functional needs are fulfilled; however, because visually appealing and calming surroundings promote worker productivity and morale, aesthetics on the arsenal are approached with due consideration by planners and facility managers.

A mix of architectural styles is present on the arsenal: formal, informal, and purely functional examples of architecture are all present. In general, World War II and Cold-War era buildings reflect a utilitarian sense of purpose, whereas many newer buildings resemble corporate offices in aesthetically-pleasing, campus-like complexes. Additionally, newer buildings have force protection measures incorporated into the landscape design to minimize the obtrusiveness of bollards, berms, and other protective features. Where buildings are present at higher density, as in the centrally-located administrative and RDTE area, the presence of large lawns or grassy open spaces with trees provides aesthetic relief. Site planning and development along the major traffic corridors preserve and enhance the natural environment and beauty of the area and coordinate the aesthetic values of buildings and background.

4.3.2 CONSEQUENCES

Potential impacts to aesthetic and visual resources are considered significant if the Preferred Alternative would substantially degrade the natural or constructed physical features at Redstone Arsenal that provide the installation its character and value as an environmental resource. The magnitude of any impact would be primarily determined by the number of viewers affected, viewer sensitivity to changes, distance of viewing, and compatibility with existing land use.

4.3.2.1 Preferred Alternative

Overall, potential impacts to aesthetics and visual resources from the Preferred Alternative would not be significant. The Preferred Alternative would cause short-term visual impacts resulting from ground disturbance associated with construction of the facilities and utility corridors and the widening of Martin and Burose Roads. However, timely completion of these projects, including surrounding landscaping, would ensure these visual impacts are only short term.

Long-term visual impacts include the addition of facilities to previously undeveloped land, elimination of approximately 58 acres of pine plantations, including a centrally-located 45-acre stand of planted pines, and increased vehicle traffic resulting from approximately 6,800 additional personnel. Table 4.3-1 shows the direct effects that the Preferred Alternative would have upon existing structures. In the four cases where existing buildings would be demolished (see Table 4.3-1), visual impacts would be beneficial, as older, utilitarian buildings would be replaced by well-landscaped, contemporary structures. Replacement of two entrance gates may have especially beneficial impacts to aesthetics, because gates provide the first and last impression of the arsenal. In the four cases where additions would be built to existing buildings, visual impacts would also be beneficial, as exterior upgrades or site improvements would beautify older, utilitarian buildings.

Table 4.3-1. Direct Effects of the Preferred Alternative on Existing Structures.

Facility Group Selected Alternative	Facility Group Name	Impact on Existing Facilities
A1a	AMC HQ and USASAC HQ	Demolition of Building 4489
B1	AMC Band Facility	Renovation and addition to Building 3712
C1a	AMC Mail Facility	Addition to Building 3648
F1a	Rotary Wing Center of Excellence	Addition to Building 4500
G1	Redstone Arsenal Airfield Facilities	Renovation and addition to Building 4813
H1a	2 nd Recruiting Brigade HQ	Demolition of Building 3440
J1	Gate 1 Facilities	Demolition of exiting Gate 1 facilities
K1	Gate 3 Facilities	Demolition of exiting Gate 3 facilities and Building 8022

AMC Army Materiel Command
 HQ Headquarters
 USASAC U.S. Army Security Assistance Command

None of the Preferred Alternative project areas are visible from off-post. On-post viewers would be familiar with the purpose and process of military or defense-related activities, and would likely accept them as a necessary part of the arsenal's mission and thus be less sensitive to the visual impacts. The only group of off-post viewers that would be impacted by implementation of the Preferred Alternative would be those who live, work, or travel along Redstone Road between Gate 3 and Memorial Parkway (U.S. Highway 231), and along Memorial Parkway between Martin Road and Redstone Road, where Redstone Arsenal-bound commercial traffic would be routed. Because much of this corridor already consists of commercial and light industrial land uses, visual impacts would not be significant.

4.3.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to aesthetics and visual resources due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.4 Air Quality

4.4.1 AFFECTED ENVIRONMENT

This section describes the existing air quality conditions at Redstone Arsenal and in Madison County, Alabama. Ambient air quality conditions are discussed first, followed by emission sources at Redstone Arsenal, and regional air pollutant emissions.

4.4.1.1 Ambient Air Quality Conditions

The ambient air quality in an area can be characterized in terms of whether it complies with the primary and secondary National Ambient Air Quality Standards (NAAQS). The Clean Air Act Amendments of 1990 (CAAA) require the U.S. Environmental Protection Agency (EPA) to set NAAQS for pollutants considered harmful to public health and the environment. NAAQS have been established for seven criteria pollutants: carbon monoxide (CO); lead (Pb); nitrogen dioxide (NO₂); ozone (O₃); particulate matter with an aerodynamic size less than or equal to 10 microns (PM₁₀); particulate matter with an aerodynamic size less than or equal to 2.5 microns

(PM_{2.5}); and sulfur dioxide (SO₂). These pollutants are believed to be detrimental to public health and the environment and are known to cause property damage. Table 4.4-1 lists the NAAQS values for each criteria pollutant.

Table 4.4-1. National Ambient Air Quality Standards.

Pollutant	Standard Value
Carbon monoxide (CO)	
8-hour average	9 ppm (10 mg/m ³)
1-hour average	35 ppm (40 mg/m ³)
Lead (Pb)	
Quarterly average	1.5 µg/m ³
Nitrogen dioxide (NO₂)	
Annual arithmetic mean	0.053 ppm (100 µg/m ³)
Ozone (O₃)	
1-hour average	0.12 ppm (235 µg/m ³)
8-hour average	0.08 ppm (157 µg/m ³)
Particulate matter less than 10 microns (PM₁₀)	
Annual arithmetic mean	50 µg/m ³
24-hour average	150 µg/m ³
Particulate matter less than 2.5 microns (PM_{2.5})	
Annual arithmetic mean	15 µg/m ³
24-hour average	65 µg/m ³
Sulfur dioxide (SO₂)	
Annual arithmetic mean	0.03 ppm (80 µg/m ³)
24-hour average	0.14 ppm (365 µg/m ³)

Source: EPA 2004
 µg/m³ micrograms per cubic meter
 mg/m³ milligrams per cubic meter
 ppm parts per million

Redstone Arsenal is located in Madison County within the Tennessee River Valley – Cumberland Mountains Air Quality Control Region. The Madison County area has an attainment designation for all primary and secondary pollutant standards stipulated under NAAQS (U.S. Army Missile Command 1994). Regions that are in compliance with the NAAQS standards are designated as attainment areas.

4.4.1.2 Air Emission Sources at Redstone Arsenal

Air pollution sources located in attainment areas require a Title V operating permit if they have the potential to emit greater than 100 tons per year (tpy) of any criteria air pollutant, 10 tpy of any single hazardous air pollutant (HAP), or 25 tpy of all hazardous pollutants combined. In determining Title V applicability in the State of Alabama, these emissions levels are calculated on the basis of the potential to emit (PTE), which is considered by the Alabama Department of Environmental Management (ADEM) to be full operation for 24 hours per day, 365 days per year (Redstone Arsenal 2006).

Because Redstone Arsenal is subject to Title V, a Title V Major Source Operating Permit was applied for, and subsequently was issued to Redstone Arsenal by ADEM. Five emission source categories at Redstone Arsenal have emission limitations established under the Title V permit, including the following: 1) woodworking operations – particulate matter (PM) and opacity; 2) surface coating operations – PM; 3) natural gas boilers – PM and Can Only Burn Natural Gas; 4) #2 oil fired boilers – PM and Can Only Burn #2 Fuel Oil Containing Less Than 0.5 % Sulfur; and 5) peak shaving generators – nitrogen oxides, carbon monoxide, and opacity (Redstone Arsenal 2006).

Actual and potential emissions on Redstone Arsenal for 2005 are summarized in Table 4.4-2. Table 4.4-2 also includes the ozone season nitrogen oxides (NO_x) emissions, which are required to be reported by the Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone (Commonly called the NO_x SIP Call and Clean Air Interstate Rule) (Redstone Arsenal 2006).

Table 4.4-2. 2005 Air Emissions Inventory Summary for Redstone Arsenal.

Pollutant	2005 Actual Emissions (tpy)	2005 Potential to Emit (tpy)
Particulate matter (PM)	27.8	833
NO _x (Ozone Season)	4.34	*
Carbon monoxide (CO)	890	4,919
Nitrogen oxides (NO _x)	23.2	265
Sulfur oxides (SO _x)	17.6	401
Volatile organic compounds (VOCs)	17.9	226
HAP (non PM and VOC)	32.4	52.3
HAP-VOC	4.46	50.9
HAP-PM	0.055	0.26

Source: Redstone Arsenal 2006

tpy tons per year

* Pollutant not analyzed

The major contributors to actual and potential emissions of CO, NO_x, PM, and SO₂ are natural gas, fuel oil, and dual-fueled boilers; diesel and gasoline generators; operations at International Specialty Products, a tenant organization; test areas; open burning and open detonation (OB/OD); woodworking; and landfill operations. Significant contributors to actual and potential volatile organic compound (VOC) emissions are gasoline storage tanks and painting operations. Operations at OB/OD, test areas, painting, and water treatment contribute most to the actual and potential HAP emissions (Redstone Arsenal 2006).

On the basis of the air emission inventory, criteria pollutant emissions of CO, NO_x, sulfur oxides (SO_x), PM, and VOCs exceed the major source threshold of 100 tpy for the PTE, as shown in Table 4.4-2. The HAP emissions also exceed the major-source threshold of 10 tpy for a single HAP and 25 tpy of combined HAPs, as shown in Table 4.4-2. Therefore, Redstone Arsenal is considered a major source and continues to be subject to the Title V operating permit program administered by ADEM (Redstone Arsenal 2006).

4.4.1.3 Regional Air Pollutant Emissions Summary

Regional air pollutant emissions from reported values are listed below in Table 4.4-3 for Madison County, Alabama.

Table 4.4-3. 2001 Reported Air Emissions for Madison County, Alabama.

Pollutant	2001 Air Emissions (tpy)
Carbon monoxide (CO)	102,245
Nitrogen dioxide (NO ₂)	11,449
Ozone (O ₃)	*
Particulate matter less than 10 microns (PM ₁₀)	15,543
Particulate matter less than 2.5 microns (PM _{2.5})	3,720
Sulfur dioxide (SO ₂)	4,967
Volatile organic compounds (VOCs)	15,315

Source: EPA 2001

*Pollutant not analyzed.

tpy tons per year

4.4.2 CONSEQUENCES

Potential impacts to air quality are considered significant if the Preferred Alternative would:

- Increase ambient air pollution above any NAAQS;
- Contribute to an existing violation of any NAAQS;
- Interfere with or delay timely attainment of NAAQS; or
- Impair visibility within any federally mandated Prevention of Significant Deterioration Class I area.

4.4.2.1 Preferred Alternative

Overall, potential impacts to air quality from the Preferred Alternative would not be significant. Short-term air quality impacts from the Preferred Alternative would occur from construction activities associated with the operation of heavy equipment. Construction activities would be temporary and occur in a localized area. Contaminants generated from construction would include PM, vehicle emissions, and increased wind-borne dust (i.e., fugitive dust). Erosion Control Measures (ECMs) would be implemented to minimize the generation of fugitive dust. Within the construction sites, appropriate ECMs would be identified that would provide optimum soil suppression. ECMs typically utilize (but are not limited to) water suppression strategies during demolition, construction, and renovation by wetting areas of soil disturbance and debris. In addition to identifying the type of surface treatment, an alternative ECM would be identified in case the original is found to be ineffective. Vehicular and construction equipment exhaust from construction activities and workers traveling to and from the site would not be substantial compared to the total existing vehicular emissions in the area. Impacts would not be significant.

Long-term impacts associated with the Preferred Alternative include external combustion emissions, fuel storage tank emissions, other emissions, and mobile emission sources. All air emissions, with the exception of mobile emission sources, would be regulated under Redstone

Arsenal's Title V permit (Dunn 2006a and Wassell 2006). External combustion emissions, fuel storage tank emissions, and other emissions would necessitate a permit modification to the current Title V permit. The individual permits and permit modifications would be submitted by Redstone Arsenal with final approval by the ADEM (Wassell 2006). The expected air emissions would not cause a significant impact to regional air emissions in Madison County, Alabama.

External Combustion Emissions. Long-term air quality impacts from the use of natural gas at each proposed facility would include emissions from external combustion units for building heating and domestic hot water heaters. External combustion emissions were estimated based on assumptions and calculations explained in Appendix A of this EA. For the intent and purpose of this EA, natural gas is assumed as the primary fuel based on its prevalence in the region. No fuel oil is planned for any of the proposed furnaces. Furthermore, there are no plans for emission critical buildings that may require fuel oil as back-up (Green 2006b). The estimated annual emission rates (tons per year) from the proposed furnaces to heat approximately 2,336,201 square feet of facilities are shown in Table 4.4-4. Certain facilities such as the 2nd Recruiting Brigade, Rotary Wing Center of Excellence, AMC Band Facility, and AMC Mail Facility would use steam only and therefore were not included in the calculations.

The proposed heating requirements for the Preferred Alternative would require individual permits for all new source furnaces. The annual emission rates and total expected PTE annual emission rates do not exceed PTE air quality standards on Redstone Arsenal (refer to Table 4.4-4).

Table 4.4-4. Actual, Expected, and Potential to Emit Air Emissions at Redstone Arsenal.

Pollutant	2005 Actual emissions (tpy) ^a	2005 Potential to emit (tpy)	Expected potential to emit annual emission rates (tpy)			
			Proposed Furnaces	Proposed Tanks	Proposed Generators	Total
PM	27.8	833	1.11	N/A	6.72	7.83
NO _x (ozone season)	4.34	*	*	N/A	*	*
CO	890	4,919	12.22	N/A	20.37	32.59
NO _x	23.2	265	14.55	N/A	94.31	108.86
SO _x	17.6	401	0.09	N/A	6.27	6.36
VOC	17.9	226	0.80	0.013	7.68	8.49
Total HAPs	36.9	103.46	0.58	N/A	0.0848	0.664

a. Source: Redstone Arsenal 2006

* Pollutant not analyzed

CO carbon monoxide

HAPs hazardous air pollutants

N/A not applicable

NO_x nitrogen oxides

PM_{2.5} particulate matter less than 2.5 microns

PM₁₀ particulate matter less than 10 microns

SO_x sulfur oxides

tpy tons per year

VOC volatile organic compound

Fuel Storage Tank Emissions. Two 30,000-gallon ASTs would be used for fueling aircraft at the Redstone Arsenal Airfield. The proposed tanks would hold JP-8 fuel (Burkhead 2006b). Emissions from the fuel storage tanks were calculated using the EPA's *TANKS 4.09* software. *TANKS* is a Windows-based computer software program, developed by the American Petroleum

Institute, that estimates VOC emissions from fixed- and floating-roof storage tanks. The assumptions and results from the *TANKS* calculations can be found in Appendix A of this EA. These results indicate that the JP-8 storage tanks would create a total of 0.013 tons per year of VOC emissions.

The proposed tanks associated with the Preferred Alternative may require an individual permit. The annual emission rate for VOCs and total expected PTE annual emission rate for VOCs do not exceed PTE air quality standards on Redstone Arsenal (refer to Table 4.4-4).

Other Emissions. One paint booth is anticipated to be used at the Rotary Wing Center (Facility Group E, Selected Alternative 1a). This area would be an approximate 20-foot by 40-foot facility that would contain one overhead high velocity hood with filtration for painting small parts and touch up. Sandblasting is not expected to take place. It is undetermined at the time of this EA as to what extent this facility would be used as it would depend on the frequency needed to maintain parts.

Painting activities may result in HAP emissions. To reduce potential impacts of HAP emissions, water based paint, such as Chemical Agent Resistant Coating products are recommended (Wassell 2006). Furthermore, the National Emission Standards for Hazardous Air Pollutants (NESHAP): Defense Land Systems and Miscellaneous Equipment (DLSME) of 40 CFR Part 63 will be in effect by January 2007. This new regulation will control emissions of HAPs from surface coating operations performed on-site at installations owned by DoD. Due to the limited nature of anticipated paint operations and the new DLSME regulation, the painting booth is not expected to increase ambient air pollution above any NAAQS. Anticipated painting operations and emissions would have proper record keeping and reporting to stay in compliance with the Title V permit, which may also require that the opacity of the painting booth be regulated (Wassell 2006).

The Preferred Alternative would require a total of six standby generators (two at 3,000 KW, two at 1,500 KW, one at 75 KW and one at 25 KW) (Green 2006b). The generators would be used during emergency situations and use of 500 hours per generator per year was assumed for calculations. Generator emissions were estimated based on assumptions and calculations explained in Appendix A of this EA. The generators may require an individual permit. The annual emission rates and total expected PTE annual emission rates do not exceed PTE air quality standards on Redstone Arsenal (refer to Table 4.4-4).

Mobile Emission Sources. Additional mobile emission sources would result from the Preferred Alternative. The relocation of the ATTC to Redstone Arsenal would increase the number of aircraft on-post by 24. Future aircraft operations would include a small number of fixed-wing aircraft such as the T34 fixed-wing naval trainer and the C12 twin turbo prop. The remainder would include a variety of rotary-wing aircraft such as the UH-1, OH-58, UH-60A and M models, AH-64 Apache A and D models, etc (Burkhead 2006c).

Mobile sources are not considered under the arsenal's CAAA Title V operating permit program. Emissions from mobile sources at Redstone are not estimated in the arsenal's air emissions inventory. The requirements of 40 CFR 93, Subpart B, Determining Conformity of General Federal Actions to State or Federal Implementation Plans, §93.153 Applicability, do not apply to

the movement of mobile assets, such as ships and aircraft, in homeport reassignments and stations to perform as operational groups and/or for repair or overhaul.

4.4.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to air quality due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.5 Noise

4.5.1 AFFECTED ENVIRONMENT

This section describes the existing noise conditions at Redstone Arsenal. Noise measurement is discussed first, followed by noise sources at Redstone Arsenal.

4.5.1.1 Noise Measurement

Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses, e.g., housing tracts or industrial plants. Transient noise sources move through the environment, either along established paths or randomly (FICUN 1980).

Different sounds have different frequency content. When describing sound and its effect on a human population, A-weighted decibel (dBA) sound levels are typically used to account for the response of the human ear. The term “A-weighted” refers to a filtering of the sound signal to emphasize frequencies in the middle of the audible spectrum and to deemphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. The A-weighted noise level has been found to correlate well with people’s judgments of the noisiness of different sounds and has been used for many years as a measure of community noise. Table 4.5-1 depicts the typical A-weighted sound pressure levels for various sources.

Table 4.5-1. Typical Levels of Noises Encountered in Daily Life and Industry.

Noise	Level (dBAs)
Rustling leaves	20
Room in a quiet dwelling at midnight	32
Window air conditioner	55
Conversational speech	60
Busy restaurant	65
Loudly reproduced orchestral music in large room	82
*UH-60 Black Hawk helicopter (500 feet)	83
Beginning of hearing damage (if prolonged exposure)	85
*UH-60 Black Hawk helicopter (200 feet)	91
Heavy city traffic	92
Home lawn mower	98
150 cubic foot air compressor	100
Jet airliner (500 feet overhead)	115
F-15 aircraft (500 feet overhead, afterburner power)	123

Note: When distances are not specified, sound levels are the values at the typical location of the machine operators.

Sources: Newman and Beattie 1985, modified; *USACHPPM 1999

dBA A-weighted decibel

The Federal noise measure used for assessing aircraft noise exposures in communities in the vicinity of airfields/airports is the day-night average sound level (Ldn), in units of the decibel (dB). Ldn is an average sound level generated by all aviation-related operations during an average or busy 24-hour period, with sound levels of nighttime noise events emphasized by adding a 10-dB weighting. The standard threshold for determining at what point noise impacts become a nuisance is 65 Ldn.

4.5.1.2 Noise Sources at Redstone Arsenal

Few specific regulations controlling noise sources have been promulgated under Federal law. Many state and local governments do enforce noise restrictions, but the Army has concluded that “the precise extent to which a state or local government may regulate the noise of a Federal agency under Section 4 of the Noise Control Act is unclear” (U.S. Army 1989). Congress has exempted the military from noise emission law because noise controls could, in some cases, reduce the combat effectiveness of military equipment. Chapter 7 of AR 200-1, Environmental Protection and Enhancement, implements all Federal laws concerning operational noise from Army activities. The cornerstone of the Army regulations on operational noise is prevention. Redstone Arsenal maintains compliance as established by the Installation Environmental Noise Management Plan (USACHPPM 2003). Noise sources at Redstone Arsenal include munitions and aircraft.

Munition Noise Sources. At Redstone Arsenal, the majority of noise created from day-to-day operations comes from the demolition ranges. However, three of the four demolition ranges (McKinley Range, Hazardous Devices Range, and the Open Burn/Open Detonation Range) are clustered fairly close to one another in the sparsely populated southern portion of Redstone Arsenal. The fourth, Corken Range, is located just below Martin Road, south of the Skeet Range. Due to the fact that the demolition ranges are remotely located (and where very few people actually live within the noise zones), Redstone receives very few noise complaints (USACHPPM 2003).

Aircraft Noise Sources. Another noise source is the Redstone Arsenal active airfield. Records indicate that from January 2005 to July 2006, an average of 90 aircraft operations per day occurred between the hours of 7:30 a.m. and 3:30 p.m. Redstone Arsenal currently has a total of 44 aircraft operating from the airfield. Inventory includes 24 rotary-wing aircraft (AH-64, UH-60, UH-1, and CH-47 helicopters), 17 fixed-wing aircraft (private, C152, and C172 airplanes), and three unmanned aerial vehicles (UAVs) (Burkhead 2006c). The majority of the aviation mission is to provide rotary-wing aircraft support to Redstone Arsenal and its tenant activities for research and development purposes. Private aircraft that use the airfield are associated with the Redstone Arsenal flying club, which operates a facility at the south end of the airfield.

4.5.2 CONSEQUENCES

Potential noise impacts resulting from the Preferred Alternative would be considered significant if they resulted in:

- Increased annoyance such that the performance of various every day activities such as communication and watching television in residential areas was impacted.

- Hearing loss - the EPA recommends limiting daily equivalent energy to 70 dBA, approximately 75 Ldn, to protect against hearing impairment over a period of 40 years.
- Sleep interference, which is of great concern in residential areas.
- Startle response of wildlife to high intensity, sporadic noise levels. However, studies have determined there are no long-term behavioral or breeding effects on animals caused by aircraft noise.

4.5.2.1 Preferred Alternative

Overall, potential noise impacts from the Preferred Alternative would not be significant. For purposes of this section, the assessment of long-term noise impacts refers specifically to the Rotary Wing Center (Facility Group E, Selected Alternative 1a), which consists of the consolidation of the ATTC from Fort Rucker, Alabama with the RTTC. The relocation of the ATTC to Redstone Arsenal would increase the number of aircraft on-post by approximately 24. There would be a total of 68 aircraft on the arsenal after implementation of the Preferred Alternative. Future aircraft operations would include a small number of fixed-wing aircraft such as the T34 fixed-wing naval trainer and the C12 twin turbo prop. The remainder would include a variety of rotary-wing aircraft such as the UH-1, OH-58, UH-60A and M models, AH-64 Apache A and D models, etc (Burkhead 2006c). The assessment of short-term noise impacts refers to the associated construction of all 12 facility groups of the Preferred Alternative.

Construction Noise Impacts. Short-term noise impacts would be generated by standard construction equipment such as excavators, graders, backhoes, and dump trucks. This type of equipment may generate noise levels up to 80 dBA. Construction equipment generally operates about 40 percent of the time when it is being used at a construction site. Noise would also be generated by increased construction traffic on area roadways. Only a slight increase in ambient noise levels is expected to occur.

Munitions Noise Impacts. Although the Ordnance Munitions and Electronics Maintenance School would relocate under the Preferred Alternative from Redstone Arsenal to Fort Lee, VA, their departure and associated demolition activity does not change the noise contours and therefore has a negligible effect on overall noise levels at Redstone Arsenal (See Enclosures 4 and 5 of Appendix B of this EA) (USACHPPM 2006).

Aircraft Noise Impacts. Long-term noise impacts resulting from increased aircraft operations associated with the Preferred Alternative were assessed by the Center for Health Promotion and Preventive Medicine (CHPPM) in the *Operational Noise Consultation 52-ON-04CB-06, Operational Noise Contours for Redstone Arsenal, AL, July 2006*, provided in Appendix B of this EA. According to the CHPPM study, a certain amount of increased noise is expected from routine training and testing operations of the approximately 24 additional aircraft that would be housed at the new Rotary Wing Center. Routine training operations would include takeoffs, landings, hover patterns, and closed patterns (which could include activities such as touch-and-go's or low approaches). Each takeoff or landing would constitute one operation. Training operations would be arranged to minimize noise impacts during nighttime hours and other specific time periods (Sundays, holidays, etc.). Based on the limited number of planned daily aircraft operations that would utilize the Redstone Army Airfield, flight corridors, flight tracks, and/or training areas, there would be no A-weighted Ldn contours of 65 dBA or greater.

Therefore, there is not sufficient qualifying sound based on operational flight data and frequency to generate conventional contours using the currently approved noise models.

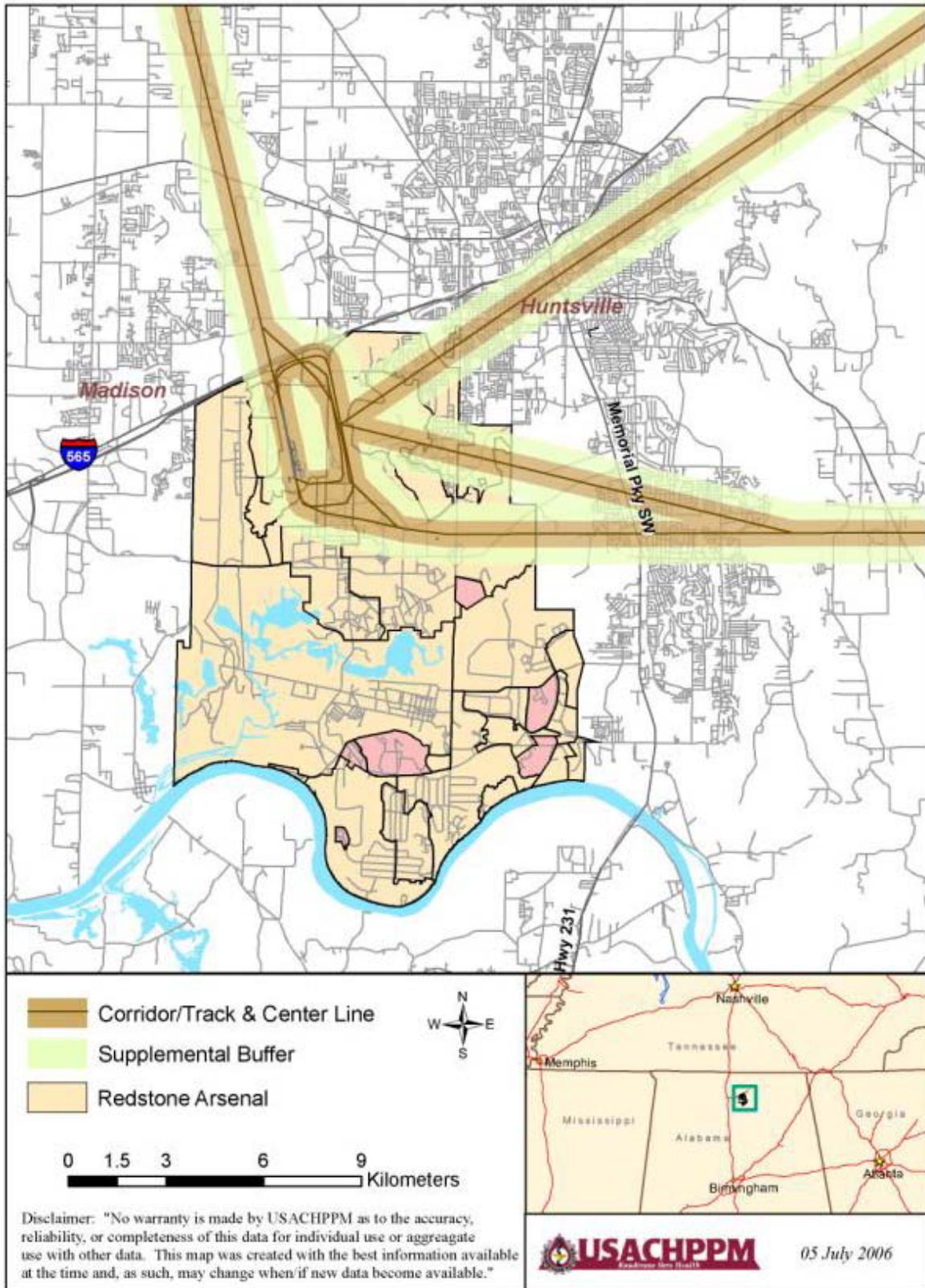
Flight corridors vary in width depending upon the type of aircraft and type of activity. Generally the aircraft fly the center line of the flight corridor but can vary anywhere within the corridor. Thus, to account for possible annoyance, the area of possible noise impact must be expanded based on the actual aircraft location within the corridor. Flight annoyance corridor buffers for Redstone Arsenal airspace are illustrated in Figure 4.5-1. The model was created by Army CHPPM, using the largest rotary-wing supplemental buffer at 1,000 feet above ground level, the approximate flight track location, and is based on the assumption that the flight corridor is 0.25-mile wide.

4.5.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to noise levels on or surrounding Redstone Arsenal due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

Figure 4.5-1

REDSTONE ARSENAL FLIGHT CORRIDOR ANNOYANCE BUFFERS ROTARY WING -- 1,000' AGL



4.6 Geology and Soils

4.6.1 AFFECTED ENVIRONMENT

This section describes the existing geology and soil conditions at Redstone Arsenal. Geologic and topographic conditions are discussed first, followed by soils, and prime farmland. The ROI for geology and soils is the land within the Preferred Alternative project areas.

4.6.1.1 Geologic and Topographic Conditions

In general Redstone Arsenal's topography is gently rolling with elevations primarily in the range of 600 to 650 feet above mean sea level (MSL). The terrain generally slopes southward towards the Tennessee River. Topographically high areas on the arsenal are at elevations up to approximately 1,200 feet above MSL and topographically low areas are approximately 560 feet above MSL (U.S. Army Missile Command 1994).

The underlying bedrock in Madison County is sedimentary in origin, consisting predominately of several varieties of limestone, sandstone, and a few acid shales. Most of Redstone Arsenal is underlain by Tuscumbia Limestone, which is the uppermost formation (i.e., surface formation) for more than half of Madison County. This limestone has an average thickness of 150 feet; consists of gray, medium to coarse-grained, fossiliferous limestone; and contains chert nodules. It often contains enlarged openings that have developed along joints, fractures, bedding planes, and faults. These cavities (called solution cavities) are often formed by the dissolution of limestone and contribute to the formation of sinkholes and depressions in the land surface (U.S. Army Missile Command 1994).

The Tuscumbia Limestone is underlain by the Fort Payne Chert, which is the surface formation on the northeast and northwest portions of the arsenal. Fort Payne Chert is generally 155 to 185 feet thick, and consists of alternating beds of bluish-gray chert and fine-grained, fossiliferous limestone. The Fort Payne Chert is in turn underlain by the Chatanooga Shale and other older geologic units. Overlying the Tuscumbia Limestone are successively younger formations including the St. Genevieve Limestone and Hartselle Sandstone (U.S. Army Missile Command 1994).

The surface geology of Redstone Arsenal and much of Madison County consists of unconsolidated material known as regolith, which is mainly derived from weathering of the bedrock. Regolith derived from Tuscumbia Limestone consists of moderate red to moderate red-orange clay and porous, powdery rectangular to irregular blocks of chert. Dense chert or rectangular blocks of fossiliferous chert are also present due to the weathering of the Fort Payne Chert where it is the surface bedrock formation (U.S. Army Missile Command 1994).

4.6.1.2 Soils

According to the U.S. Department of Agriculture Natural Resources Conservation Service Soil Survey of Redstone Arsenal, a total of 43 map units representing 19 different soil series are mapped within the installation's grounds (Natural Resources Conservation Service 2002). The predominant soil type mapped for the arsenal consists of a deep, well-drained to moderately well-drained, silt loam to silty clay loam. These soils typically possess a loamy surface horizon underlain by a loamy to clayey subsoil layer with lenses of silty and/or sandy clay. Rock

fragments generally occur throughout the clayey material. The soil colors range from a brownish-red in the northern portion to a brownish-gray in the southern portion of the arsenal. Darker gray soils are found in areas of topographic lows. Soil depths range from very shallow on the mountains to much deeper along the larger tributaries of the Tennessee River, where broad floodplain areas have been formed by the river and its tributaries (U.S. Army Missile Command 1994).

Throughout the arsenal, pavement and other infrastructure reduce soil infiltration. The subsoil is capped with 1,031 acres of pavement, including roadways, driveways, and parking areas, and 2,513 acres of buildings, representing in total approximately 9.3 percent of land on the arsenal (Makkouk 2006a).

4.6.1.3 Prime Farmland

Of the 43 soil units mapped for Redstone Arsenal, 18 phases representing 12 soil series are listed as potential prime farmland (Natural Resources Conservation Service 2002). Prime farmland is protected by the Farmland Protection Policy Act; however, lands that are used for national defense purposes are exempt from the provisions of the Farmland Protection Policy Act (7 CFR Parts 657 and 658).

4.6.2 CONSEQUENCES

Potential impacts to geology or soils are considered significant if the Preferred Alternative would:

- Expose people or structures to major geologic hazards;
- Cause substantial erosion or siltation;
- Cause substantial land sliding; or
- Cause substantial damage to project structures/facilities.

4.6.2.1 Preferred Alternative

Overall, potential impacts to geology and soils from the Preferred Alternative would not be significant. The presence of karst geology, including numerous sinkholes throughout the arsenal, necessitates that site-specific geotechnical surveys would have to be completed by the selected contractor prior to construction; however, no adverse environmental impacts are expected (Smith 2006). Construction sites may require some slight grading, but would not require or generate any cut or fill since the areas are relatively flat. Best management practices for erosion control, topsoil management, and revegetation would be required and stated in the construction contract. Erosion control during construction activities would be undertaken with the use of hay bales and silt fencing to reduce the movement of soils into drainage ditches or low-lying areas.

The proposed facilities would reduce water infiltration by capping the subsoil with impervious surfaces. The Preferred Alternative would result in the addition of approximately 140 acres of impervious surfaces to Redstone Arsenal, an installation-wide increase in impervious surfaces of approximately 4 percent. This increase represents approximately 0.4 percent of the land area of Redstone Arsenal. Table 4.6-1 lists the estimated total disturbed area for each of the 12 facility groups. This total includes the estimated area associated with the construction/renovation

footprints, parking, paved roads, and proposed utilities that are located outside of the construction/renovation footprints. The addition of 140 acres of impervious surfaces would reduce habitat and some surface water infiltration, as discussed in Sections 4.8 and 4.7, respectively, but would not be significant.

Table 4.6-1. Estimated Disturbed Area for the Preferred Alternative by Facility Group.

Facility Group Selected Alternative	Facility Group Name	Area of Construction/ Renovation Footprints, Parking, and Paved Roads (sf)	Area of Proposed Utilities Outside of Footprints (sf)	Estimated Total Disturbed Area (sf)
A1a	AMC HQ and USASAC HQ	2,253,979	*	2,253,979
B1	AMC Band Facility	81,197	0	81,197
C1a	AMC Mail Facility	13,280	0	13,280
D1	Von Braun Complex	2,412,584	0	2,412,584
E1a	Rotary Wing Center	903,070	812,967	1,716,037
F1a	Rotary Wing Center of Excellence	130,479	*	130,479
G1	Redstone Arsenal Airfield Facilities	16,940	0	16,940
H1a	2 nd Recruiting Brigade HQ	40,000	0	40,000
I1a	Child Development Center	24,445	*	24,445
J1	Gate 1 Facilities	65,562	*	65,562
K1	Gate 3 Facilities	137,699	*	137,699
L1	Fire and Emergency Services Facility	33,031	*	33,031
Grand Total				6,925,233

* Proposed utilities in areas outside of the construction/renovation footprint will be located during the design phase.

AMC Army Materiel Command

HQ Headquarters

sf square feet

USASAC U.S. Army Security Assistance Command

4.6.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to geology and soils due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.7 Water Resources

4.7.1 AFFECTED ENVIRONMENT

This section describes existing water resources on Redstone Arsenal, including surface and groundwater resources. Surface water includes lakes, rivers, and streams and is important for a variety of reasons, including economic, ecological, recreational, and human health. Groundwater comprises the subsurface hydrogeologic resources of the arsenal's physical environment. This section also discusses floodplains. Wetlands are discussed in Section 4.8.1.4. The ROI for water resources is Redstone Arsenal and areas downstream from the Preferred Alternative project areas.

4.7.1.1 Surface Water

The Tennessee River forms the southern boundary of the arsenal. Major watercourses that flow through the arsenal include Indian Creek, McDonald Creek, and Huntsville Spring Branch. Each of these tributaries flows generally south and then west toward the city of Triana to empty into the Tennessee River (U.S. Army Missile Command 1994).

The majority of the western portion of the arsenal is drained by Indian Creek, and the eastern half by Huntsville Spring Branch. Indian Creek originates north of the arsenal in northwestern Madison County and flows southward across the arsenal to Wheeler Reservoir. Indian Creek drains approximate 63 square miles of area (U.S. Army Missile Command 1994). Indian Creek has been classified for fish and wildlife use by ADEM (U.S. Army Missile Command 1994). McDonald Creek runs along the eastern edge of the arsenal and drains approximately 14 square miles of the northeastern corner of the arsenal before joining Huntsville Spring Branch, which originates from a spring in the City of Huntsville. Huntsville Spring Branch flows southwesterly across the arsenal and drains approximately 83 square miles of area (U.S. Army Missile Command 1994), emptying into Wheeler Lake, which is drained by Indian Creek. Huntsville Spring Branch is also classified by ADEM as a fish and wildlife use area, and the Tennessee River reach near the arsenal has been classified by ADEM for use as a public water supply and for fish and wildlife use.

4.7.1.2 Hydrogeology/Groundwater

The hydrogeology at the arsenal can be characterized by three units: the regolith, the Tuscumbia/Fort Payne formation, and the Chattanooga Shale. The Fort Payne Chert and the Tuscumbia Limestone comprise a limestone aquifer. This aquifer is characterized by abundant groundwater supplies suitable for potable and industrial uses. Due to the confining nature of the regolith and Chattanooga Shale, the limestone aquifer is under artesian conditions in many areas. Groundwater movement reflects the surface topography and generally flows from the north to the south towards the Tennessee River. The aquifer's potentiometric surface ranges from 560 feet above MSL to greater than 600 feet above MSL. Groundwater in the limestone aquifer moves to lowland areas in the stream basin where it discharges through available openings and provides base flow to the streams. The aquifer beneath the arsenal is one of the most productive in Madison County. None of the aquifers in Madison County have been designated as sole source aquifers per Section 1424(2)g of the Safe Drinking Water Act of 1974 (U.S. Army Missile Command 1994).

Groundwater from shallow wells drilled into the Tuscumbia Limestone generally produces good quality water that is moderate in dissolved minerals. Due to past disposal and operations, several potential contaminants are present in the groundwater in varying concentrations including arsenic, trichloroethylene (TCE), benzene, and dichlorodiphenyltrichloroethane (DDT) (U.S. Army Missile Command 1994). In 1994, Redstone officials began planning an interim remediation to treat groundwater that contained residual TCE resulting from a 1989 TCE spill at a tenant facility on Redstone Arsenal. The pump-and-treat facility went on line in early 1997, demonstrated good results, and entered full operation in early April 1997 (U.S. Army Aviation and Missile Command 2002b). However, groundwater contaminated with solvents and perchlorate has migrated from Redstone Arsenal to off-post residential communities located along the eastern boundary in the vicinity of Gate 3. Off-post contamination in springs, ponds,

and a creek are currently below levels of health concern. In addition, remedial investigations by the Army are proceeding at 85 sites, and pump-and-treat systems are operating to control the movement of contaminated groundwater (EPA 2006b).

4.7.1.3 Floodplains

Approximately one-third of the arsenal lies within the 100-year floodplain of the Tennessee River. The 100-year floodplain lies at elevations ranging from 570 to 575 feet above MSL. For planning purposes, the 100-year flood level for the arsenal has been determined to be 572.5 feet above MSL (U.S. Army Missile Command 1994).

4.7.2 CONSEQUENCES

Potential impacts to water resources, including surface water, groundwater, and wells, are considered significant if the Preferred Alternative would:

- Irreversibly diminish water resource availability, quality, and beneficial uses;
- Reduce water availability or interfere with a potable supply or water habitat;
- Create or contribute to overdraft of groundwater or exceed a safe annual yield of water supply sources;
- Result in an adverse effect on water quality or an endangerment to public health by creating or worsening adverse health hazard conditions;
- Result in a threat or damage to unique hydrological characteristics; or
- Violate an established law or regulation that has been adopted to protect or manage water resources of an area.

Potential impacts related to floodplain management include:

- Potential damage to structures located in the floodplain; and
- Changes to the extent, elevation, or other features of the floodplain as a result of flood protection measures or other structures being silted in or removed from the floodplain.

EO 11988, *Flood Plain Management*, requires Federal agencies to avoid actions, to the extent practicable, which would result in the location of facilities in floodplains.

4.7.2.1 Preferred Alternative

Overall, potential impacts to water resources from the Preferred Alternative would not be significant. Best management practices during construction would minimize the movement of soils via surface waters. National Pollutant Discharge Elimination System storm water permits would regulate discharges from the construction sites to minimize impacts to water quality. Under the Preferred Alternative, the well adjacent to the existing Gate 1 that currently provides water for the restroom facilities in Building 5105 would be demolished in accordance with the specific requirements of ADEM regarding well abandonment (Smith 2006). The Preferred Alternative projects would not use any additional groundwater. The Preferred Alternative facilities are unlikely to have any impact upon existing groundwater contamination areas, because these facilities would not interfere with groundwater flow, nor would they be expected to contribute additional pollutants to groundwater.

The Preferred Alternative would have no impacts on unique hydrological characteristics. Redstone Arsenal requirements for protection of the endangered Alabama cave shrimp would further minimize the possibility of groundwater contamination in the airfield area (see Section 4.8.2.1).

By capping the subsoil with impervious surfaces, the proposed facilities would reduce groundwater recharge locally by reducing the infiltration of precipitation (see Section 4.6.2.1). Approximately 140 acres of impervious surfaces would be added to Redstone Arsenal, an installation-wide increase of approximately 4 percent, or approximately 0.4 percent of the land area of Redstone Arsenal. Regardless of the total amount of impervious surfaces, through implementation of best management practices for controlling surface water runoff and adherence to applicable laws and regulations, the Preferred Alternative would not have any significant impacts to surface water quality (see Section 4.12.2.1 for details regarding the storm water system), and the overall impact to groundwater supplies due to reduced infiltration would not be significant.

With the exception of the Fire and Emergency Services Facility (Facility Group L, Selected Alternative 1), none of the Preferred Alternative construction sites are within the 100-year floodplain. The Fire and Emergency Services Facility would partially encroach upon the 100-year floodplain, but would be designed to prevent damage to the facility and the floodplain. The slab of the facility would be designed to be above the 100-year flood level, although there would possibly be parking slightly below this elevation (Burleson 2006). No significant impacts to the floodplain or the facility due to its location in a floodplain are expected.

4.7.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to water resources due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.8 Biological Resources

4.8.1 AFFECTED ENVIRONMENT

This section describes existing biological resources at Redstone Arsenal. It focuses on plant and animal species or habitat types that are typical or are an important element of the ecosystem, are of special category importance (of special interest due to societal concerns), or are protected under state or Federal law or statute regulatory requirement. Vegetation is discussed first, followed by wildlife, sensitive species, and wetlands. The ROI for biological resources is the land within the Preferred Alternative project areas.

4.8.1.1 Vegetation

Redstone Arsenal is within the southern portion of a region dominated by oak–hickory forest and other hardwood species, although most of this native forest has been cut for timber or cleared for other uses. Seven primary ecological units make up Redstone Arsenal: pine plantations, mixed hardwood and pine forest, upland hardwood forest, bottomland hardwood forest, pastures, wetlands, and developed/disturbed areas. The commercial forestry program on the arsenal is for the most part limited to pine stands, which are managed on a 70-year rotation. Pastures are

generally leased agricultural lands used for cattle grazing. Wetland areas consist of permanently and occasionally inundated land and associated areas, which may include bottomland hardwood forest. The developed and disturbed areas, which may be landscaped with native and/or nonnative vegetation, include roadways, parking lots, administrative and industrial buildings, personnel/family housing and specialized facilities, park/recreational land, landfill areas, and vacant previously disturbed open areas. Table 4.8-1 shows the existing ecological units and associated acreages that occur in the Preferred Alternative project areas. A comprehensive listing of common and scientific names of native vegetation occurring within Redstone Arsenal boundaries is found in the *Integrated Natural Resources Management Plan for Redstone Arsenal* (U.S. Army Aviation and Missile Command 2002a).

Table 4.8-1. Ecological Units and Affected Area in Preferred Alternative Project Areas.

Facility Group Selected Alternative	Facility Group Name	Existing Ecological Unit and Potentially Affected Acres	Primary Vegetation ¹
A1a	AMC HQ and USASAC HQ	Pine Plantation – 45 Developed – 6.6	<u>Pine Plantation:</u> 40-year old loblolly pine (average dbh: 5”) with scattered wild cherry, plum, oak <u>Developed:</u> lawn-type grasses
B1	AMC Band Facility	Developed – 2.1	lawn-type grasses
C1a	AMC Mail Facility	Developed – 0.44	lawn-type grasses
D1	Von Braun Complex	Pasture – 51 Pine Plantation – 3.5 Pine Plantation – 1.0 Wetlands – 0.49	<u>Pasture:</u> hay crops, grass and legume species, scattered miscellaneous hardwood trees <u>Pine Plantations:</u> 35-year old loblolly pine (dbh: 4 to 15”) with scattered hackberry, maple, oak; wild privet (<i>Ligustrum</i> spp.) problems <u>Wetlands:</u> red maple, sweet gum, soft rush, canegrass, sugarberry, black willow, cattails
E1a	Rotary Wing Center	Developed – 31 Pasture – 30	<u>Developed:</u> lawn-type grasses <u>Pasture:</u> hay crops, grass and legume species, scattered miscellaneous hardwood trees
F1a	Rotary Wing Center of Excellence	Developed – 3.0	lawn-type grasses
G1	Redstone Arsenal Airfield Facilities	Developed – 1.7	lawn-type grasses
H1a	2 nd Recruiting Brigade HQ	Developed – 8.7	lawn-type grasses
I1a	Child Development Center	Pine Plantation – 2.7	<u>Pine Plantations:</u> loblolly pine (average dbh: 10”)
J1	Gate 1 Facilities	Pine Plantation – 5.4	<u>Pine Plantations:</u> loblolly pine (average dbh: 7”)

Facility Group Selected Alternative	Facility Group Name	Existing Ecological Unit and Potentially Affected Acres	Primary Vegetation ¹
K1	Gate 3 Facilities	Pasture – 4.4	Pasture: hay crops, grass and legume species
L1	Fire and Emergency Services Facility	Developed – 1.9	lawn-type grasses

Notes: Acreages derived from project designs and Redstone Arsenal GIS data; dbh obtained from Redstone Arsenal GIS data.

¹ Source: Horton 2006; U.S. Army Corps of Engineers 2006

AMC Army Materiel Command

dbh diameter at breast height

HQ Headquarters

USASAC U.S. Army Security Assistance Command

4.8.1.2 Wildlife

The wide range of terrestrial and aquatic habitats and the large size of Redstone Arsenal result in the use of the area by numerous wildlife species. Species such as deer, rabbit, raccoon, opossum, and fox are commonly sighted on Redstone Arsenal. More than 250 species of birds are known to occur on Redstone Arsenal and transit the area occasionally, although large nesting colonies are not prevalent. Game birds such as wild turkey, quail, and dove are common on the installation. There are no substantial, permanent fish or other aquatic populations located in the vicinity of the Preferred Alternative project areas.

In general, due to the close proximity of populated buildings and roads, extensive wildlife populations are not observed in areas identified as developed in Table 4.8-1, although individuals of species such as rabbit and squirrel are commonly seen. Pastures and pine plantations provide marginal habitat for wildlife such as deer, small mammals, game birds, and songbirds. Temporary pools and wetland areas provide breeding habitat for amphibians. A comprehensive listing of fish and wildlife species potentially occurring within Redstone Arsenal boundaries is found in the *Integrated Natural Resources Management Plan for Redstone Arsenal* (U.S. Army Aviation and Missile Command 2002a).

4.8.1.3 Sensitive Species

In compliance with the Endangered Species Act, consultation and coordination was initiated with the U.S. Fish and Wildlife Service by letter dated July 31, 2006, as shown in Appendix C of this EA. Under Section 7 of the Endangered Species Act, the Army is mandated to use their authority to ensure actions are approved, funded, or carried out to protect both flora and fauna that are considered threatened and endangered species or proposed for listing as threatened or endangered species on the installation. Table 4.8-2 shows species that occur on Redstone Arsenal which are currently or were formerly listed as threatened, endangered, or candidates for listing pursuant to the Endangered Species Act of 1973.

The recovery plan for the endangered Alabama cave shrimp identifies non-point source groundwater contamination as the major threat to the species (USFWS 1997); therefore, a broad habitat buffer area has been established to protect the aquatic habitat of a population of shrimp that reside over 1.25 miles from the Redstone Airfield. The Rotary Wing Center (Facility Group E, Selected Alternative 1a) and Redstone Arsenal Airfield Facilities upgrades (Facility Group G, Selected Alternative 1) are located within this habitat buffer area, which covers the northwest

portion of the installation and is roughly bounded by Rideout Road to the east and Martin Road to the south. However, none of the species discussed in this section are likely to be direct residents in the ROI of the Preferred Alternative project areas.

Species found on Redstone Arsenal that are not current, former, or proposed protected species under Federal regulations, but that have state protection through Non-Game Species Regulation, are the southern cave fish (*Typhlichthys subterraneus*) and the green salamander (*Aneides aeneus*).

Table 4.8-2. Federally Listed Species and Species of Concern at Redstone Arsenal.

Scientific Name	Common Name	Federal Status	State Status
<i>Palaemonias alabamiae</i>	Alabama cave shrimp	LE	SP
<i>Myotis grisescens</i>	Gray bat	LE	SP
<i>Myotis sodalis</i>	Indiana bat	LE	SP
<i>Haliaeetus leucocephalus</i>	Bald eagle	LT	SP
<i>Falco peregrinus anatum</i>	Peregrine falcon	Former LE	SP
<i>Etheostoma tuscumbia</i>	Tuscumbia darter	Former proposed candidate	SP
<i>Alligator mississippiensis</i>	American alligator	LT*	None
<i>Apios priceana</i>	Price's potato bean	LT	None
<i>Eriogonum longifolium</i> <i>var. harperi</i>	Harper's umbrella plant	Former proposed candidate	None
<i>Panax quinquefolius</i>	American ginseng	Former proposed candidate	Regulated by permit
<i>Trillium pusillum</i> <i>var.</i> <i>alabamicum</i>	Dwarf trillium	Former proposed candidate	None

* Listed as threatened due to similarity of appearance to American crocodile

LE Federally listed endangered species (in danger of extinction throughout all or a significant portion of their range)

LT Federally listed threatened species (likely to become an endangered species within the foreseeable future throughout all or a significant portion of their range)

SP Species protected by Non-game Species Regulation

Source: U.S. Army Garrison – Redstone 2005a

4.8.1.4 Wetlands

Wetlands are defined by the U.S. Army Corps of Engineers (USACE) and the EPA based on the presence of wetland vegetation, wetland hydrology, and hydric soils with certain land area considerations. Wetlands and other surface water features, which may include intermittent and perennial streams, are generally considered “waters of the United States” by the USACE, and under their definition of “jurisdictional waters/features,” are protected under Section 404 of the Clean Water Act.

Wetlands on Redstone Arsenal are home to a large number and variety of plant and animal species. Approximately 9,500 acres of the installation are covered by wetlands. The wetlands are mostly associated with creeks or spring runs that are easily affected by the elevation of the Tennessee River and have bottomland hardwood forests associated with the Tennessee River and its major tributaries. The water levels in the Tennessee River and its tributary system fluctuate seasonally according to the flood control mission of Wheeler Dam. Beaver activity also influences low-lying areas with periodic and sometimes permanent inundation (U.S. Army Aviation and Missile Command 2001).

The *Wetlands Inventory Report for Redstone Arsenal, Madison County, Alabama*, was prepared by the U.S. Fish and Wildlife Service in March 2002 as a planning-level survey for the

installation. In 2005, a site-specific delineation of jurisdictional wetlands within the ROI of the Preferred Alternative was conducted and coordinated with USACE. Of the Preferred Alternative project areas, only the Von Braun Complex expansion (Facility Group D, Selected Alternative 1) contains jurisdictional wetlands (U.S. Army Corps of Engineers 2006).

Figure 4.8-1 shows the relationship between the general project area for the Von Braun Complex expansion and these jurisdictional wetlands. Measuring approximately 0.5 acre in the south-central portion of the proposed site, this wetland area is composed of an ephemeral headwater stream with minor adjacent wetlands. The ephemeral stream is a tributary of Huntsville Spring Branch, which flows into the Wheeler National Wildlife Refuge approximately 1.5 miles downstream from the proposed Von Braun Complex expansion.

4.8.2 CONSEQUENCES

Potential impacts to biological resources are considered significant if the Preferred Alternative would:

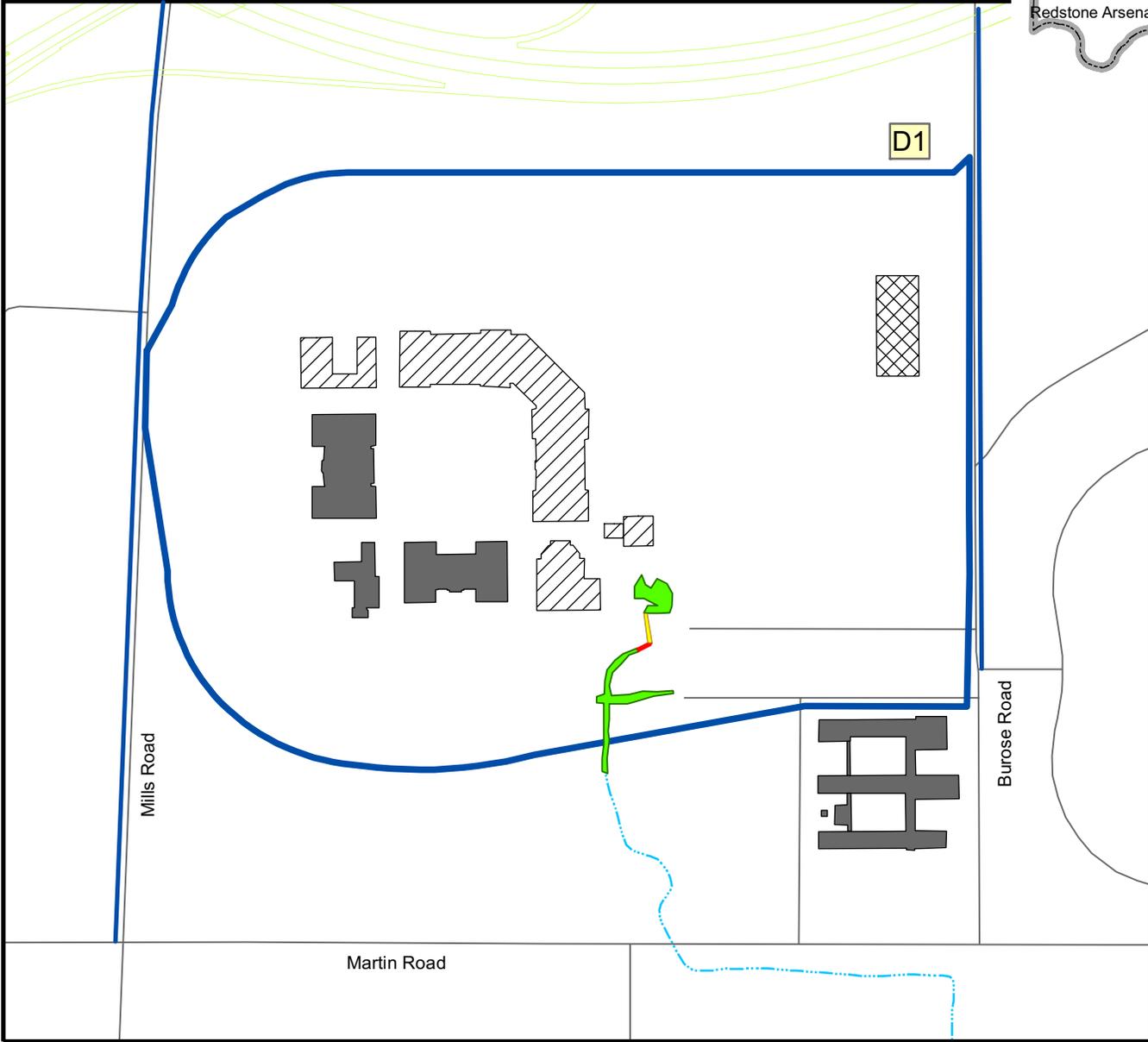
- Affect a threatened or endangered species;
- Substantially diminish habitat for a plant or animal species;
- Substantially diminish a regionally or locally important plant or animal species;
- Interfere substantially with wildlife movement or reproductive behavior;
- Result in a substantial infusion of exotic plant or animal species; or
- Destroy, lose, or degrade jurisdictional wetlands (as defined by Section 404 of the Clean Water Act).

EO 11990, *Protection of Wetlands*, requires Federal agencies to avoid actions, to the extent practicable, which would result in the location of facilities in wetlands.

4.8.2.1 Preferred Alternative

Overall, potential impacts to biological resources from the Preferred Alternative would not be significant based on the above criteria.

Vegetation. Construction/renovation of the Preferred Alternative facilities would cause short-term impacts on the vegetation surrounding construction sites, but over the long term, vegetation around the sites would be expected to remain the same. Populations of plant species and their habitats would not be substantially diminished. Any exposed soil resulting from the construction activities would be quickly stabilized using best management practices, thereby minimizing loss of plant habitat. Prior to construction, timber stands and individual trees that do not interfere with construction activities, and which are at least 5 inches in diameter, would be saved. Existing native vegetation on the site would be retained and incorporated into the proposed complex design to the maximum extent possible. Any new landscaping in the Preferred Alternative project areas shall comply with the installation's requirements for planting native vegetation and be subject to approval by Redstone Environmental Office.



Legend

- Jurisdictional Wetlands
- Culvert
- Riprap
- Minor Drainage
- Proposed Southern Bypass
- Road
- Existing Building
- Phase III Building
- Phase IV Building

- Facility Group D, Alternative 1, Von Braun Complex Expansion *
- Road Widening for Facility Group D, Alternative 1 *

* See Table 3.2-1 and 3.2-2 for a description of the alternatives

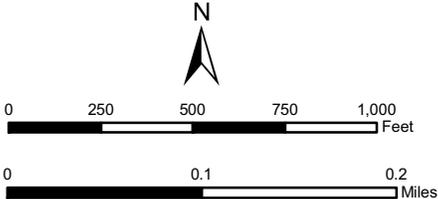


Figure 4.8-1
Jurisdictional Wetlands on the Site of the Proposed Von Braun Complex Expansion

Long-term impacts to vegetation include the loss of productive capacity where facilities are built. Pine plantations that would be cleared for construction would be harvested prior to their economic maturity, and approximately 1 percent of the installation's pine forest type would be permanently removed from the installation's commercial forestry program.

Development on pastures would permanently remove approximately 35 acres of land from the Agricultural Leasing and Grazing Program; the 51 acres of pasture on the site of the proposed Von Braun Complex expansion (Facility Group D, Selected Alternative 1) have already been removed from the lease program. The losses to commercial forestland and pasture would not substantially diminish any regionally or locally important plant species or plant habitat, but the eradication of a wild privet infestation in the course of construction activities would represent a beneficial impact to the installation's invasive plant control program.

Wildlife. Construction of the Preferred Alternative facilities may have adverse impacts to on-site wildlife through disturbance and some direct mortality of individuals in construction zones, but would not have noticeable impacts upon local wildlife populations. Road and facility construction would result in the loss of foraging and breeding habitat for some species, although where feasible construction would be timed to minimize any possible impacts to potential habitat for migratory/seasonal birds and their nesting sites.

Project locations for the Preferred Alternative have been selected to minimize impacts to migratory birds and other wildlife species, as pasturelands and pine plantations support relatively low productivity for these species. Some species, including deer, wild turkey, and small mammals, do use these habitats though, and these species would experience adverse impacts resulting from permanent habitat loss. Facilities built on currently undeveloped land would result in the direct long-term loss of approximately 143 acres of habitat for ground-dwelling or nesting species (58 acres of pine plantation and 85 acres of pasture, or approximately 0.5 percent of existing undeveloped, unpaved land on the arsenal). However, impacts to overall habitat diversity, genetic diversity, and species diversity would be minimal because of the types of habitat affected.

Increased traffic from the net addition of approximately 6,800 personnel would likely result in an increase in wildlife-vehicle collisions, especially during seasons when the start and/or end of the work day coincides with dawn and/or dusk; however, the increase in wildlife mortality due to vehicle collisions would be unlikely to have a noticeable impact on local wildlife populations.

Sensitive Species. Although there is no habitat for protected species located in the vicinity of the Preferred Alternative facilities, the Rotary Wing Center (Facility Group E, Selected Alternative 1a) and Redstone Arsenal Airfield Facilities upgrades (Facility Group G, Selected Alternative 1) are located within the habitat buffer area for the federally endangered Alabama cave shrimp. Redstone Arsenal has requirements for activities occurring in this habitat buffer area that go beyond standard best management practices; these requirements provide an extra level of protection to the Alabama cave shrimp by reducing the likelihood of any discharges of pollutants into groundwater or surface water. As these requirements are in place to ensure that activities are consistent with the installation's Endangered Species Management Plan, they are components of the projects rather than mitigation. Redstone Arsenal's requirements would necessitate an oil-water separator upstream from a bioremediation pond or other bioretention

area to treat storm water runoff from parking areas at these facilities. Runoff from maintenance areas and other hardstand would also have to be routed through an oil-water separator prior to treatment in the arsenal's wastewater system or through bioremediation. There may also be other requirements under the Endangered Species Management Plan. The design and operation of the two proposed ASTs and the airfield fire station upgrade would also be required to comply with the installation's cave shrimp protection plan.

The U.S. Fish and Wildlife Service and the Alabama Department of Conservation and Natural Resources have reviewed the Preferred Alternative. In a letter dated August 15, 2006, the U.S. Fish and Wildlife Service concurred that the Preferred Alternative is not likely to adversely affect the Alabama cave shrimp or any other listed or candidate species; this letter can be found in Appendix C of this EA. In another letter dated August 15, 2006, the Alabama Department of Conservation and Natural Resources concurred that the Preferred Alternative is not likely to adversely affect any state protected species; this letter can also be found in Appendix C.

Wetlands. With the exception of the Von Braun Complex expansion (Facility Group D, Selected Alternative 1) and the new or upgraded sewer force main from the proposed AMC HQ/USASAC HQ complex (Facility Group A, Selected Alternative 1a), the Preferred Alternative would not affect wetlands. As described in Section 4.8.1.4, jurisdictional wetlands comprising approximately 0.5 acre occur in the south-central portion of the Von Braun Complex site (Figure 4.8-1). If these wetlands will be affected by the final design, the Army will obtain the necessary CWA Section 404 permit and appropriate mitigation will be coordinated and developed through USACE. The permit and any mitigation required by the permit would become part of the construction project. Wetlands located at Wheeler National Wildlife Refuge approximately 1.5 miles downstream of the proposed site would be protected from non-point source pollution caused by erosion and sedimentation through the implementation of best management practices.

The new or upgraded sewer force main from the proposed AMC HQ/USASAC HQ complex would cross the ephemeral stream (which flows from the wetland described above on the site of the Von Braun Complex expansion) in the vicinity of Fowler Road between the Von Braun Complex and the stream's junction with Huntsville Spring Branch. If the stream is to be impacted by utility upgrades, the Army will obtain the necessary CWA Section 404 permit and appropriate mitigation will be coordinated and developed through USACE.

4.8.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to biological resources due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.9 Cultural Resources

4.9.1 AFFECTED ENVIRONMENT

This section describes the existing cultural resource conditions at Redstone Arsenal, including the historical background of Redstone Arsenal, the status of cultural resource inventories and Section 106 consultations, and Native American Resources. Cultural resources at Redstone Arsenal are managed in accordance with the Integrated Cultural Resources Management Plan for

U.S. Army Garrison-Redstone, Redstone Arsenal, AL, 2006-2011 (ICRMP) (U.S. Army 2006). Redstone Arsenal is located in an area with substantial numbers of prehistoric and historic resources. Detailed descriptions of the prehistoric and historic background of the area can be found in Redstone's ICRMP (U.S. Army 2006). A summary of the historic background is provided below.

4.9.1.1 Historic Background

During World War II, what is now Redstone Arsenal was actually three separate installations, all of which were devoted to the production and storage of chemical warfare materials. The first of these three was Huntsville Arsenal, established in July 1941, under the Chemical Warfare Service (CWS). Also administered by the CWS was the Huntsville Depot, which was later named the Gulf Chemical Warfare Depot (GCWD). The third installation, established in the fall of 1941, was originally known as the Redstone Ordnance Plant, and was renamed Redstone Arsenal in 1943. The World War II Redstone Arsenal was operated by the Ordnance Corps. After World War II in 1949, Huntsville Arsenal and GCWD were absorbed into Redstone Arsenal as one installation which was called Redstone Arsenal. After World War II, Redstone Arsenal underwent many retrenchments, and in 1947, the facilities were placed in standby status, and the size of the workforce was drastically reduced. The arsenal seemed destined for closure. However, the rise of new technology spurred by the Cold War rescued the arsenal from obscurity, and spurred additional growth subsequent to World War II. The Arsenal was officially reactivated as the home of the Army's Ordnance Rocket Center on June 1, 1949. With the relocation of rocket operations to Huntsville, Redstone Arsenal became the center of an ambitious mission that contributed greatly to national defense and took the United States to the new frontier of outer space (U.S. Army 2006, Appendix B). For a detailed discussion of the World War II years, see *Redstone Arsenal: World War II Resource Study* (Langdale and Nolte 2003). For a discussion and explanation of the years after the rise of rocketry and offensive/defensive technologies, see *Rocket Science: A Historic Context and Assessment of U.S. Army Cold War Properties, Redstone Arsenal, Alabama* (Wright 2000).

4.9.1.2 Status of Cultural Resource Inventories and Section 106 Consultations

Section 110 of the National Historic Preservation Act (NHPA) requires Federal agencies to locate, inventory, and nominate to the National Register of Historic Places (NRHP) all resources that are recommended eligible for inclusion in the NRHP. Redstone Arsenal has been extensively studied/inventoried. Several Historic Districts have been proposed to preserve important historic and technological aspects of Redstone Arsenal's history (U.S. Army 2006). The cultural resource inventories conducted at Redstone Arsenal meet the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-42). The proposed facilities are not sited within or near the boundaries of the proposed Historic Districts eligible for listing on the NRHP; however, prehistoric and historic resources have been found in the general location of the Preferred Alternative. The ICRMP lists cultural resources studies and reports related to Redstone Arsenal (U.S. Army 2006).

As of this writing, the field work for a Phase I Archaeological Survey of the installation property is one hundred percent complete; data compilation and reporting is ongoing (U.S. Army 2006). Results of this survey were utilized in identifying appropriate sites for facilities included in the

Preferred Alternative, so as to avoid effects to known sites, particularly those potentially eligible or eligible for the NRHP.

All buildings and structures on Redstone Arsenal have been inventoried for eligibility for listing on the NRHP. The only building eligible for listing on the NRHP which the Preferred Alternative would impact is 4489 which will be demolished to construct the AMC HQ facilities. Redstone Arsenal has a Memorandum of Agreement (MOA) with the Alabama SHPO which allows alteration, renovation or demolition of the building without further coordination with the SHPO (Table 4.9-1). Redstone Arsenal also has another MOA, and a third one pending, to manage the Redstone Arsenal buildings and structures eligible for listing on the NRHP as shown in Table 4.9-1.

Table 4.9-1. Memoranda of Agreement for NRHP-eligible Buildings and Structures.

MOA ID Number	Date Approved	Undertaking
MOA-03170-117	October 2, 2003	Treatment and Management Program to Include Remediation, Renovation, Alteration, and Demolition Actions for the World War II Huntsville Arsenal Plant Area 2 Mustard Gas Line District; World War II Gulf Chemical Warfare Depot Igloo Area II District; the Cold War Guided Missile Center District; and Cold War Individually Eligible Buildings at Redstone Arsenal, Alabama.
MOA-06159-199	August 24, 2006	Safety Concerns Require Demolition and Replacement of Three Bridges including the National Register Eligible Work Projects Administration (WPA) Bridge 12 on Martin Road at Redstone Arsenal, Alabama.
MOA-06159-200	Under review	Treatment and Management Actions on the World War II Huntsville Arsenal Plant Area 2: Carbonyl Iron Unit District; the Cold War Ordnance Guided Missile School District; Cold War Test Area 5 District, and Cold War Individually Eligible Buildings 4566, 7120, and 7625 at Redstone Arsenal, Alabama that are eligible for listing on the National Register of Historic Places to Include: Ongoing operations, maintenance and repair, rehabilitation, renovation, alteration, mothballing, cessation of maintenance, new construction, demolition, deconstruction and salvage, remediation activities, and transfer, sale, lease, and closure of the above facilities.

Section 106 of the NHPA requires consultation and coordination if there is potential for effects upon historic properties due to proposed actions (“undertakings”). As required by the U.S. Department of the Interior standards and the procedures established in the ICRMP, Redstone Arsenal has determined that the Proposed Action is an “undertaking” within the meaning of the NHPA, but has determined the Proposed Action to have “no effect” on historic properties. Accordingly, consultation/coordination in conformance with Section 106 of the NHPA was initiated with the Alabama SHPO by letter dated July 12, 2006, as shown in Appendix C of this EA.

4.9.1.3 Native American Resources

An ethnohistoric and ethnographic assessment of Native American cultural affiliations has been conducted for Redstone Arsenal, which identifies tribes historically associated with the region (U.S. Army 2006). Redstone Arsenal has complied with the summary and inventory requirements of the Native American Graves Protection and Repatriation Act (NAGPRA). No human remains, associated grave goods, unassociated grave goods, sacred objects, or objects of cultural patrimony have been recovered in the vicinity of the proposed new construction under the Preferred Alternative (U.S. Army 2006).

The Preferred Alternative is not expected to cause Native American concerns, given that construction locations were specifically selected to avoid such concerns. Redstone Arsenal consults with 17 federally recognized Native American Tribes that may be culturally affiliated with the lands of Redstone Arsenal (see Appendix C of this EA).

4.9.2 CONSEQUENCES

Potential impacts to historic properties and/or archaeological resources that are potentially eligible or eligible for the NRHP are considered significant if the Preferred Alternative would:

- Physically destroy, damage, or alter all or part of the property;
- Physically destroy, damage, alter or remove items from archaeological contexts without a proper mitigation plan;
- Isolate the property from or alter the character of the property's setting when that character contributes to the property's qualification for the NRHP;
- Introduce visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
- Neglect a property resulting in its deterioration or destruction; or
- Transfer, lease, or sell the property (36 CFR 800.9[b]) without a proper preservation plan.

4.9.2.1 Preferred Alternative

Overall, potential impacts to cultural resources from the Preferred Alternative would not be significant based on the above criteria. The Preferred Alternative would not affect any NRHP-eligible archeological sites. The proposed facilities have been sited to avoid effects on historic structures and the portion of the installation within the boundaries of the proposed Historic Districts.

The finding of no adverse effect by the Redstone Arsenal has been concurred in by the Alabama SHPO in a letter dated September 11, 2006, as shown in Appendix C of this EA. Consistent with the SHPO recommendation and with the directives of the ICRMP, if any potential cultural or archaeological resource is uncovered during construction, Redstone Arsenal would implement their standard operating procedures to minimize impacts (U.S. Army 2006).

4.9.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to cultural resources due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.10 Socioeconomics

4.10.1 AFFECTED ENVIRONMENT

This section describes the existing socioeconomic conditions for Huntsville, Alabama as well as an ROI that consists of a 20-mile radius from Redstone Arsenal, including Madison, Marshall, Morgan, and Limestone counties. Socioeconomic factors include economic development, demographics, housing, quality of life, environmental justice, and protection of children.

4.10.1.1 Economic Development

The Tennessee Valley region's economy is highly dependent on the presence of Redstone Arsenal. In fact, more than half of the employment in Madison County is influenced by the DoD and space initiative. However, the City of Huntsville's economy has diversified in the fields of manufacturing, telecommunications, electronics, software and information technology development, and retail. Research parks and industrial parks have been developed in the area to encourage this economic diversity. The success of the City of Huntsville economy has influenced major development and redevelopment by private sectors in the region (City of Huntsville 2006).

Employment. The four major job sectors in 2001 for the ROI are shown in Table 4.10-1; together, these industry sectors accounted for more than 50 percent of regional employment. All other industry sectors accounted for six percent or less of regional employment (U.S. Army Corps of Engineers 2005).

Table 4.10-1. Major Job Sectors in the Region of Influence in 2001.

Job Sector	Percent of Total Employment
Manufacturing	17.9
Defense	17
Retail trade	11.6
Professional and technical services	9.1

Source: U.S. Army Corps of Engineers 2005

Three of ten jobs in the City of Huntsville and Madison County were directly or indirectly dependent upon defense spending in 2002. The defense sector directly employed 25,619 personnel in Madison County during 2002; this comprised 14.9 percent of all wage and salary employment in the county (U.S. Army Corps of Engineers 2005 and City of Huntsville 2006).

Regional unemployment is fairly low due to the economic stability of the defense sector, local businesses, and private sectors. The ROI's annual average unemployment rate for 2001 was 4.3 percent. Within the ROI, Marshall County had the highest unemployment rate at 6.1 percent (U.S. Army Corps of Engineers 2005). The annual unemployment rate for the City of Huntsville in 2004 was 4.6 percent, which was 1.1 percent less than the United States average for 2004 (City of Huntsville 2006).

Cost of Living and Income. The costs of living within the ROI and the City of Huntsville metropolitan area are among the lowest in the United States based on the cost of living composite index (City of Huntsville 2006).

The per capita personal income for the ROI in 2001 was \$26,994 (U.S. Army Corps of Engineers 2005). The median income of residents in the Huntsville metropolitan area, according to 2000 U.S. Census data, was \$52,248 and the per capita income was \$22,073 (City of Huntsville 2006). In 2000, 12.8 percent of individuals and 9.8 percent of families in the City of Huntsville had an income below the poverty level (U.S. Census Bureau 2000).

4.10.1.2 Demographics

The ROI's population grew by 21 percent between 1990 and 2005, as shown in Table 4.10-2. The population increase was due mostly to net migration, with the largest growth focused in suburban metropolitan counties such as Madison and Limestone, which are part of the Huntsville Metropolitan Statistical Area (U.S. Census Bureau 1990 and 2000).

Table 4.10-2. Population of Region of Influence.

Location	1990	2000	2005*	Percent Change, 1990-2005
Madison County, Alabama	238,912	281,931	298,192	24
Marshall County, Alabama	70,832	82,329	85,634	20
Morgan County, Alabama	100,043	111,429	113,740	13
Limestone County, Alabama	54,135	66,980	70,469	30
Region of influence	465,912	542,669	568,035	21

Sources: U.S. Census Bureau 1990; U.S. Census Bureau 2000, *Addy 2006

The year 2000 demographics of Huntsville are listed below in Table 4.10-3.

Table 4.10-3. Demographics of Huntsville, Alabama (2000).

Race	Total in Urbanized Area	Percent of Total*
White	101,998	64.5
Black	47,792	30.2
Asian	3,519	2.2
Hispanic or Latino	3,225	2.0
Two or more races	2,915	1.8
Some other race	1,047	0.7
American Indian and Alaska Native	857	0.5
Native Hawaiian and Other Pacific Islander	88	0.1

Source: U.S. Census Bureau 2000

* Individual percents do not total 100 because of rounding.

Redstone Arsenal serves a diverse population of approximately 250,000 personnel as of 2005. This number is based on Active Duty and their families, National Guard/Reserve, Civil Service employees, Civil Service retirees, contractors, and Military retirees and their families (U.S. Army Garrison 2006).

4.10.1.3 Housing

On-Post Family Housing. Redstone Arsenal currently has 453 family housing units in the northern portion of the installation (Lewis 2006). Approximately 340 units are designated for enlisted personnel and about 110 units are for officers. The family housing consists mostly of three-bedroom units and four-bedroom units with some two-bedroom and five-bedroom units. Demand for on-post family housing exceeds supply. On-post housing is fully occupied, although some units may be temporarily unavailable due to maintenance issues. The waiting time for on-post family housing can range from four months to one year, depending on the rank and number of bedrooms required (U.S. Army Corps of Engineers 2005).

A future on-post family housing demolition and renovation project is scheduled to begin in the fall of 2006. This project is planned for future privatization, and was assessed in the *Final Environmental Assessment for the Residential Communities Initiative at Redstone Arsenal, Alabama* (U.S. Army Corps of Engineers 2005). Approximately 10 to 15 houses will be demolished in the beginning of October 2006. By the year 2009, roughly 105 houses are planned for demolition (Pearsall 2006).

Off-Post Housing. In 2002, the housing stock in the ROI was estimated at 135,500 units, which increased from 102,400 units in 1990. This reflected an average annual growth of 2.4 percent per year. The overall vacancy rate in 2002 was 7.1 percent, which was up from 6.7 percent in 1990 and was consistent with rapidly increasing housing development compared to population growth in the region. For the rental-housing market, vacancy rates were estimated to be 10.2 percent in 2002, up from 9.6 percent estimated in 1990 (U.S. Army Corps of Engineers 2005).

According to a count of all residential preliminary or final subdivisions that were approved by the City of Huntsville Planning Commission between January 1, 2003 and October 31, 2005, a total of 5,144 lots were being prepared for new housing construction. The construction is located mostly to the west, northwest, southeast, and east of Redstone Arsenal. Additionally, several apartment complexes yielding a total of 254 units are also under development. Plans for major subdivisions have also been under development during this same time period, providing an additional 6,437 residential lots for future home construction (City of Huntsville 2006).

According to the 2000 U.S. Census Bureau, 71 percent of residents within the City of Huntsville metropolitan area are homeowners (City of Huntsville 2006). The median value selling price in 2006 of houses in the Huntsville metro area is \$130,500 and that of Madison County is \$132,750 (Huntsville Chamber of Commerce 2006).

4.10.1.4 Quality of Life

Quality of life is discussed in terms of law enforcement, fire protection, and medical services, schools, and recreation.

Law Enforcement Services. Law enforcement within the ROI currently ranges from 40 to 296 patrol deputies (depending on the county) that respond to road patrol and investigative and emergency response facets. Operations include 24-hour patrol as well as criminal and narcotics investigations (Limestone County Sheriff's Office 2006, Madison County Sheriff's Office 2006, Marshall County Sheriff's Office 2006, and Morgan County Sheriff's Office 2006).

Response to police matters in the Huntsville jurisdiction is handled by the City of Huntsville Police Department. A review of crime statistics for the Huntsville metropolitan area revealed that the overall Crime Index, or rate of crime, reported for 2002 was 4,243.9. This number was 5.2 percent below the State of Alabama average (City of Huntsville 2006).

Redstone Arsenal Military Police conduct police operations on Redstone Arsenal from a station in Building 3623. The Military Police station is staffed by 20 military and 32 Department of the Army civilians for a total of 52 law enforcement officers. Services include policing operations, patrols, and general investigations and training (U.S. Army Corps of Engineers 2005).

Fire Protection Services. Fire protection within the ROI consists of several local and volunteer fire departments with at least one or more stations (depending on the jurisdiction) that respond to fire suppression, fire prevention, advanced life support, and hazardous situation mitigation (Alabama Fire Departments 2006).

Fire suppression in the City of Huntsville is handled by Huntsville Fire and Rescue. Other entities are also involved in emergency response. For example, the Huntsville-Madison County Airport Authority and Redstone Arsenal have a signed mutual aid agreement for any emergency services that both departments provide. A relationship is maintained between Huntsville International Airport's Director of Public Safety and the fire chief at Redstone Arsenal through monthly discussion meetings (City of Huntsville 2006).

The Redstone Arsenal Fire Department operates on Redstone Arsenal from four stations, Building 3320 on Vincent Drive, Building 4424 on Rideout Road, Building 7801 on Patton Road, and Building 4813 at the Redstone Arsenal Army Airfield. The Redstone Arsenal Fire Department consists of three engine companies, one ladder company, one rescue unit, and one hazardous material unit. The Department has a van, two command vehicles, and administrative offices (U.S. Army Corps of Engineers 2005).

Medical Services. The ROI currently has a total of nine hospitals with a total of 1,106 beds (U.S. Army Corps of Engineers 2005).

A range of health care services is available within the City of Huntsville. Area care facilities include Crestwood Medical Center, Huntsville Hospital, and HealthSouth Rehab Hospital of North Alabama (U.S. Army Corps of Engineers 2005).

The Fox Army Health Center at Redstone Arsenal is an ambulatory care center consisting of several services and public health and education classes (U.S. Army Corps of Engineers 2005).

Schools. There are 12 public school districts in the ROI. Madison County has three districts, Marshall County has four, Morgan County has three, and Limestone County has two (U.S. Army Corps of Engineers 2005). Information on each school district's enrollment and number of schools can be found in Table 4.10-4.

The Huntsville City School District has an enrollment of 23,065 students as of 2006, which has increased slightly from 2004 (refer to Table 4.10-4) (City of Huntsville 2006 and Williams 2006). Typical student/teacher ratios are 19.49:1 at the elementary level and 18:1 at the

secondary level. Approximately four percent of the students come from military families, with over half of those students living on-post at Redstone (City of Huntsville 2006).

Table 4.10-4. School District Information.

School District	County	Enrollment for 2004	Number of Elementary Schools*	Number of Middle Schools*	Number of High Schools*
Albertville City	Marshall	3,621	3	1	1
Arab City	Marshall	2,705	2	2	1
Athens City	Marshall	2,702	4	2	1
Decatur City	Morgan	8,880	12	4	3
Guntersville City	Marshall	1,803	2	1	1
Hartselle City	Morgan	3,070	3	1	2
Huntsville City	Madison	22,590	32	17	11
Limestone County	Limestone	8,038	10	6	7
Madison City	Madison	6,848	6	2	1
Madison County	Madison	17,023	15	9	7
Marshall County	Marshall	7,148	8	6	5
Morgan County	Morgan	7,607	11	12	7

Source: SchoolMatters 2004, *GreatSchools 2004

Redstone Arsenal has no primary or secondary education schools on-post. Children living on-post attend J.E. Williams Elementary School, J.E. Williams Technology Middle School or Westlawn Middle School, or Butler High School in Huntsville. The schools are part of the Huntsville City School District (U.S. Army Corps of Engineers 2005).

Redstone Arsenal has one primary child care facility. The Child Development Center accommodates 176 children ages six weeks through five years old. This facility stays at full operational capacity with a waiting list that averages 45-63 children year round. This Child Development Center is the only National Association for the Education of Young Children-accredited facility that operates 12.5 hours per day and bases fees on a sliding scale in the Huntsville area (U.S. Army Corps of Engineers 2005).

The ROI has a number of other child care facilities. The City of Huntsville has 90 licensed day care facilities, 109 home licensed facilities, and 32 church day care facilities. Cummings Research Park, directly north of the arsenal, has three accredited day care facilities (Kling 2006a).

The ROI has a number of colleges and universities, including Alabama A&M University, University of Alabama in Huntsville, Embry-Riddle Aeronautical University-Alabama Center, Calhoun State Community College, Athens State University, and Snead State Community College (U.S. Army Corps of Engineers 2005).

Recreation. The ROI offers many opportunities for outdoor recreation including Lake Guntersville State Park, Wheeler National Wildlife Refuge, and Monte Sano State Park. The City of Huntsville has the U.S. Space and Rocket Center, 48 parks, 11 recreation centers, public golf courses, a botanical garden, and an art museum (U.S. Army Corps of Engineers 2005).

Redstone Arsenal has many recreational opportunities including fishing, hiking, skeet and trap shooting, camping along the Tennessee River, hunting (by permit only), golf, and archery (U.S. Army Corps of Engineers 2005).

4.10.1.5 Environmental Justice

Environmental justice is the fair treatment for people of all races, cultures, and incomes, regarding the development and implementation (or lack thereof) of environmental laws, regulations, and policies. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to address environmental and human health conditions in minority and low-income communities. A memorandum from former President Clinton concerning EO 12898 stated that Federal agencies would collect and analyze information concerning a project's effects on minorities or low-income groups when required by NEPA. If such investigations find that minority or low-income groups experience a disproportionate adverse effect, then avoidance or mitigation measures are necessary.

The ROI has a lower percentage of minority residents than either Alabama or the United States. In 2000, 20.5 percent of the ROI population was of a minority race. In Alabama, 28.9 percent of the population was of a minority race and 24.8 percent was of a minority race in the United States (U.S. Army Corps of Engineers 2005).

According to the 2004 Huntsville Area Transportation Study, non-white citizens comprise 28 percent or more of the population in areas mostly west of Highway 231 in the Huntsville metropolitan region. Areas where individuals or families below poverty level comprise 11 percent or more of the population are located throughout Madison County. Both the non-white population and population below poverty level surround Redstone Arsenal (City of Huntsville 2004).

4.10.1.6 Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health and Safety Risks*, requires Federal agencies, to the extent permitted by law and mission, to identify and assess environmental health and safety risks that might disproportionately affect children (U.S. Army Corps of Engineers 2005).

Children occupying Redstone Arsenal are residents or visitors (e.g., family housing, schools, and users of recreational facilities). Special precautions are taken at Redstone Arsenal for their safety including the use of fencing, limitations on access to certain areas, and provision of adult supervision (U.S. Army Corps of Engineers 2005).

4.10.2 CONSEQUENCES

Potential socioeconomic impacts are considered significant if the Preferred Alternative would cause:

- Substantial gains or losses in population and/or employment; or
- Disequilibrium in the housing market, such as severe housing shortages or surpluses, resulting in substantial property value changes.

- Disequilibrium in the quality of life, such as severe shortages of hospitals, emergency response services, and schools.

Potential environmental justice impacts are considered significant if the Preferred Alternative would cause disproportionate adverse effects on low-income and/or minority populations.

4.10.2.1 Preferred Alternative

Overall, potential socioeconomic impacts from the Preferred Alternative are considered long-term beneficial. No negative significant impacts are expected.

Economic Development and Demographics. Redstone Arsenal would undergo a net increase of 4,050 personnel by implementing the BRAC-directed actions and the approved BRAC-discretionary actions (SERO 2006). Existing installation facilities do not have the required space and/or capabilities to accommodate all of the incoming personnel and functions. Therefore, construction of new facilities or renovation of existing facilities would be required. Non-BRAC installation support and associated future master planning actions on Redstone Arsenal would necessitate relocating several existing facilities and constructing a number of new facilities. It is estimated that up to an additional 2,800 personnel would relocate to Redstone Arsenal for non-BRAC installation support and associated future master planning actions.

The total projected population changes in the ROI from 2005 to 2030, including the anticipated BRAC-directed actions, as well as the non-BRAC installation support and associated future master planning actions, are listed below in Table 4.10-5. The largest percent change in the ROI would be for Limestone County followed by Marshall County. The total percent change in the ROI would be an increase of 26 percent.

Table 4.10-5. Projected Population in the Region of Influence from 2005 to 2030.

Location	2005	2010	2015	2030	Percent Change, 2005-2030
Madison County, Alabama	298,192	325,367	345,130	372,873	25
Marshall County, Alabama	85,634	92,183	98,668	114,284	33
Morgan County, Alabama	113,740	119,128	124,090	133,494	17
Limestone County, Alabama	70,469	77,259	83,974	97,412	38
Region of influence	568,035	613,937	651,862	718,063	26

Source: Addy 2006

Based on preliminary information from the City of Huntsville, the increased personnel from BRAC-directed actions (excluding future master planning actions), would directly create about 4,000 jobs in the ROI. The average income expected would be approximately \$70,000 and the new payroll into the area would be roughly \$280.7 million. Indirect service jobs such as retail and services are expected to bring 5,500 new jobs. The number of contractor jobs that are expected to follow would be approximately 2,500 to 5,000 depending upon the amount of money spent for contracts in the state. The City of Huntsville indicates a total of approximately 12,000 to 14,500 new permanent jobs. Temporary jobs anticipated between the years 2006 and 2010 are expected to number about 11,200 for temporary construction to support both residential and

military construction efforts. Temporary construction jobs statewide are expected to number 17,100 (Kling 2006b).

Economic effects for the BRAC-directed portion of the Preferred Alternative were evaluated using the Economic Impact Forecast System (EIFS). The EIFS model is a computer-based economic tool that calculates multipliers to estimate the direct and indirect effects resulting from a given action. Changes in spending and employment represent the direct effects of the action. Based on the input data and calculated multipliers, the model estimates ROI changes in sales volume, income, employment, and population resulting from the direct and indirect effects of the action. Table 4.10-6 shows the EIFS model output for the anticipated BRAC-directed actions. Similar results could be expected for the non-BRAC installation support and associated future master planning actions.

Table 4.10-6. Economic Impact Forecast System Report Summary for BRAC-Directed Actions.

Indicator	Projected change	Percentage change	RTV Range
Direct sales volume	\$510,555,100	NC	NC
Induced sales volume	\$1,189,593,000	NC	NC
Total sales volume	\$1,700,148,000	10.62%	12.1% to -5.85%
Direct income	\$352,557,100	NC	NC
Induced income	\$269,303,200	NC	NC
Total income	\$621,860,200	5.17%	11.07% to -4.74%
Direct employment	6,972	NC	NC
Induced employment	6,619	NC	NC
Total employment	13,591	4.22%	4.16% to -2.71%
Local population	4,735	0.91%	1.54% to -0.55%

Source: U.S. Army Corps of Engineers Mobile District 2006

NC not calculated

RTV Rational Threshold Value

The results of the EIFS analysis indicate indirect and direct beneficial effects. The expenditures associated with the BRAC-directed actions would increase sales volume, employment, and income in the ROI, as determined by the EIFS analysis. The EIFS analysis indicates an increase of about 13,600 jobs, increased income by more than \$620 million, and increased business sales by about \$1.7 billion. Based on the comparison to historical fluctuations (i.e., within the Rational Threshold Value (RTV) range), employment would deviate from the RTV range in that it would increase slightly from the highest historical fluctuation of 4.16 percent (see Table 4.10-6). Because this increase is only 0.06 percent higher than the highest historical fluctuation, it is not considered a significant impact and would be a beneficial impact. All other indicators (sales volume, income, and local population) would fall within the RTV range. The EIFS report can be found in Appendix D of this EA.

Housing. Approximately 87 enlisted military personnel are expected with the Preferred Alternative. Therefore, approximately 87 on-post military family housing units may be required to adequately support these personnel. An on-post family housing demolition and renovation project, which will result in the loss of roughly 105 houses by the year 2009, will be underway prior to the implementation of the Preferred Alternative. Although there will be a reduction in

housing, there will also be a loss of 289 enlisted military personnel as a result of BRAC 2005. Therefore, adequate on-post housing to support the anticipated enlisted military personnel should be available (Pearsall 2006).

The Preferred Alternative would create roughly 12,000 to 13,600 new permanent jobs and would result in a net increase of about 4,000 civilian and contractor employees. The civilian and contractor employees may require re-location into Huntsville or the ROI area. The remaining permanent jobs would either be filled by individuals currently within the Huntsville or ROI area or by re-location of individuals from other areas of the state or United States. The City of Huntsville and ROI are experiencing a surge in the housing market with an anticipated 5,100 lots being prepared for new housing construction and possible 6,400 future residential lots under preliminary planning. Furthermore, approximately 300 apartment complexes are under development (City of Huntsville 2006). Therefore, housing and rental property in Huntsville and the ROI are market driven and should be able to support the Preferred Alternative.

Quality of Life. The Preferred Alternative would result in short-term impacts from construction activities, which may create adverse impacts, such as noise and traffic within the areas of construction. These short-term impacts may create inconvenience but are not considered significant. The following paragraphs identify long-term effects on the specific components of quality of life.

Law Enforcement and Fire Protection. The increase of individuals into the area may require increases in law enforcement or fire protection services. These services would be based on the number of long-term residents in the ROI and tax-based income in the area.

On-post changes to fire protection would occur as a result of future master planning actions (non-BRAC) of the Preferred Alternative. The Preferred Alternative would result in the demolition of the outdated Rideout Fire Station (Building 4424) and addition of a more modern, efficient, and centrally located Fire and Emergency Services Facility (Facility Group L, Selected Alternative 1). In addition, the Preferred Alternative would renovate and upgrade the airfield fire station at the Redstone Arsenal Airfield (Facility Group G, Selected Alternative 1). These additions would create substantial beneficial impacts to fire protection on-post and off-post.

Medical Services. Implementation of the Preferred Alternative may require an increase in medical services as a result of additional individuals in the area. The number and size of hospitals, clinics, and emergency centers would be expected to increase as they would be market driven.

Schools. The Preferred Alternative would increase the number of students in the Huntsville and ROI area. The current school capacity in the Huntsville area is at 75 percent. Two new schools have recently been built for kindergarten to eighth grade and high school (Providence and Columbia H.S.). These schools are located near Redstone Arsenal. The schools currently are at a low to moderate capacity. Based on the overall capacity and addition of schools in the area, adequate school capacity should be available for the anticipated rise in the number of children (Williams 2006).

Future master planning actions (non-BRAC) of the Preferred Alternative would result in the addition of a 60-child day care facility. Although there is currently a waiting list of 45 to 63 children for the existing child care facility, this would decrease as a result of loss of military families by BRAC. Therefore the new child care facility would be sufficient to support children living on-post. For children living off-post, there are several child care facility options as well as potential future facilities that would be market driven. This additional child day care facility would create beneficial impacts to children living on-post after implementation of this future master planning action.

Recreation. Long-term beneficial effects to recreation are expected as a result of the Preferred Alternative. Increased walking trails, parks, recreation areas, and community centers would be market driven and would also result from new housing areas.

Overall long-term impacts to quality of life would be beneficial.

Environmental Justice. Based on general review of the communities surrounding Redstone Arsenal, residential areas tend to have similar ethnic diversity and lower poverty levels; therefore, no adverse disproportionate effects on minority or low-income populations would occur.

Protection of Children. The Preferred Alternative would create short-term adverse effects on the protection of children as a result of construction activity. Because construction sites can be enticing to children, construction activity could be an increased safety risk. To avoid safety concerns, safety measures would need to be followed to protect the health and safety of children. This may include but is not limited to barriers, “no trespassing” signs, and construction vehicles and equipment secured when not in use.

No long-term effects on protection of children would be expected as a result of the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.10.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to socioeconomic resources due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.11 Transportation

4.11.1 AFFECTED ENVIRONMENT

This section describes the existing transportation conditions at and within 1 mile surrounding Redstone Arsenal. Roadways and traffic are discussed first, followed by Redstone Arsenal air transportation, and public transportation.

4.11.1.1 Roadways and Traffic

This section discusses access to Redstone Arsenal, traffic on roadways on-post, and traffic on roadways off-post.

Access to Redstone Arsenal. Interstate Highway 565 borders Redstone Arsenal to the north and northwest and is the primary connector between the City of Huntsville and Interstate Highway 65 to the west. Other major highways in the area include Memorial Parkway (U.S. Highway 231) to the east, Governors Drive (U.S. Highway 431) to the northeast, and University Drive (U.S. Highway 72) to the north. Drake Avenue near the northeast side of the installation links the on-post housing area to Memorial Parkway (U.S. Army Corps of Engineers 2005).

Redstone has seven active gates surrounding the installation in all directions except the southwest (refer to Figure 4.11-1). These gates consist of two, three, or four lanes. Family housing residents primarily use Gates 8, 9, and 10 (U.S. Army Corps of Engineers 2005). The most widely used gates are Gates 1, 7, and 9. Gates 4, 5, and 6 are currently closed (Noles 2006b).

On-post Roadways. Major on-post roads include Martin Road, Rideout Road, Toftoy Thruway, and Patton Road. Because there was no current, quantified road use information for Redstone Arsenal prior to preparation of this EA, traffic counts were conducted on July 12, 13, and 26, 2006. Nineteen locations were chosen for electronic data collection to determine traffic conditions in the vicinity of the Redstone Arsenal Airfield and the Martin Road administrative area. Electronic data-loggers (tube-machine counters) were placed at the selected locations, and vehicle count data was collected for a 24-hour period at each location.

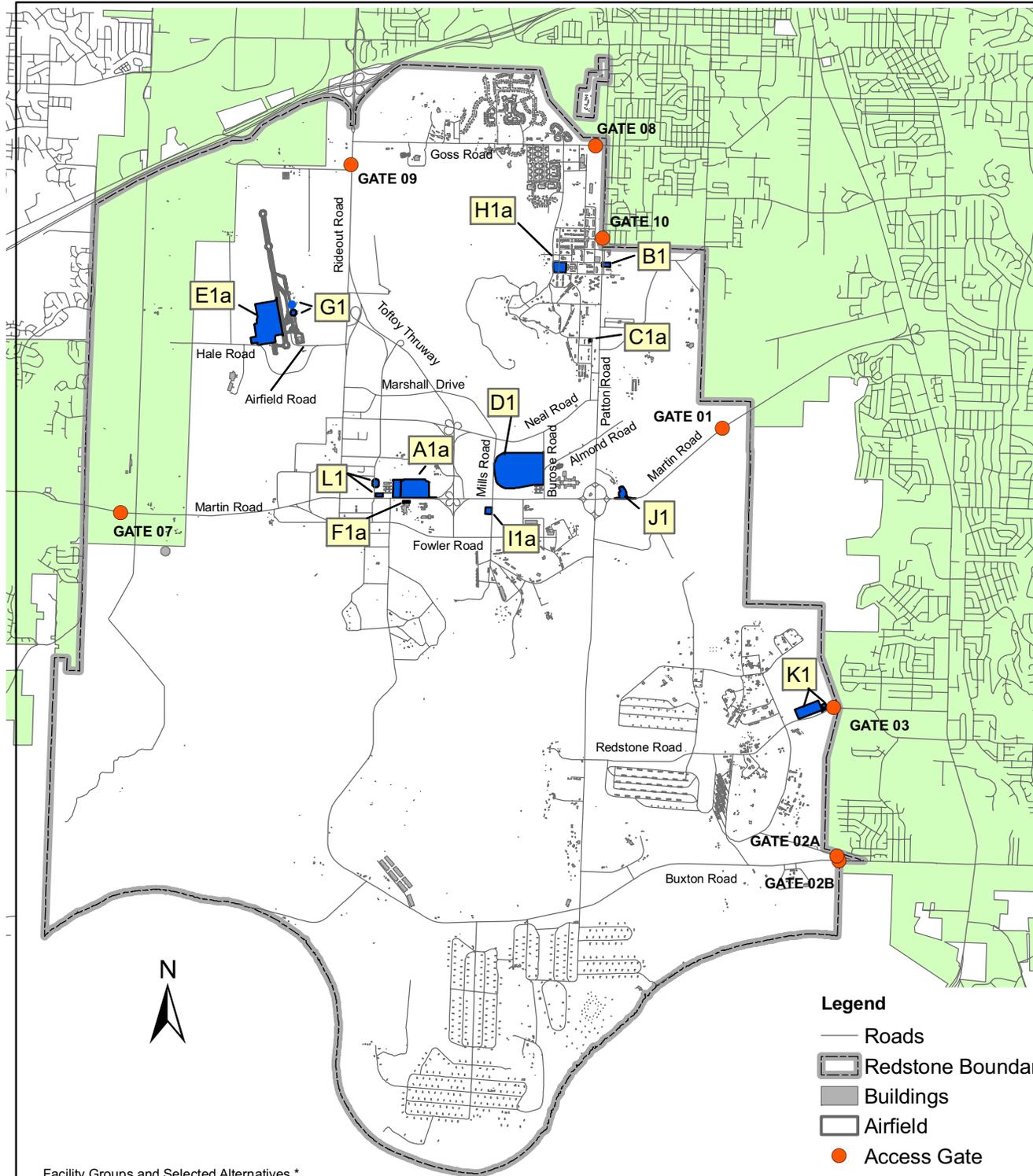
One human observer was positioned at Gate 1 to visually collect vehicle count data to determine baseline traffic conditions at this gate and to distinguish between passenger vehicles and commercial traffic. The observer collected data between the hours of 5:45 a.m. and 9:00 a.m., 10:45 a.m. and 1:15 p.m., and 3:00 p.m. and 6:00 p.m. at this location. Electronic and visual vehicle counts/observations are summarized in Appendix E of this EA. Tables E-2 and E-3 summarize counts/observations by peak a.m. and p.m. intervals as well as by day total.

Based on the general rule that roads on the arsenal have a capacity of 500 vehicles per hour per lane (Noles 2006b), these data suggest that several roads are near or at capacity, including portions of Martin, Patton, Neal, Marshall, Burose, and Mills Roads. The data also suggest that Toftoy Thruway south of the Morris Road interchange may be at 2 to 3 times its capacity, southbound during the morning peak and northbound during the afternoon peak.

Off-post Roadways. According to the Huntsville Report on Mobility (March 2006), several areas within the Huntsville metropolitan area are congested (refer to Figure 4.11-2). The main areas of congestion near Redstone Arsenal include a section of Madison Boulevard (Old State Route 20) west of Research Park Boulevard near Gate 9, and a portion of U.S. Highway 231 south of Martin Road near Gate 1. These areas of traffic congestion are considered deficient roadways, which are roadways upon which traffic volume exceeds road capacity (Huntsville Planning Division 2006).

4.11.1.2 Redstone Arsenal Air Transportation

Redstone Army Airfield is on-post, approximately 2.5 miles west-southwest of the housing areas. It supports the aircraft assigned to the arsenal (and additional NASA and NASA-related flights). The airfield's 7,300-foot runway is large enough to accommodate large military cargo and personnel transport aircraft.

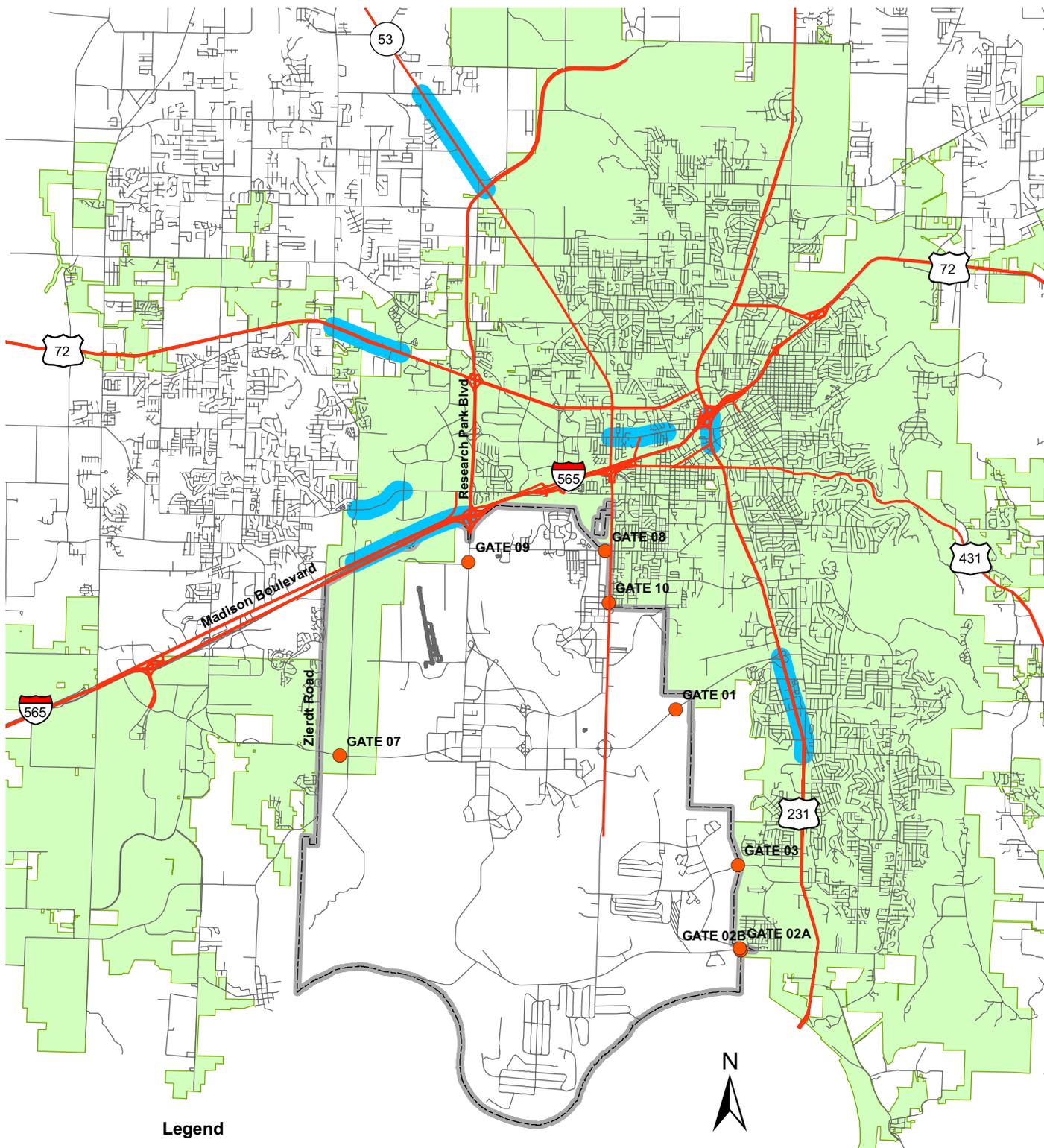


- Facility Groups and Selected Alternatives *
- A - AMC HQ and USASAC HQ (Alternative 1a)
 - B - AMC Band Facility (Alternative 1)
 - C - AMC Mail Facility (Alternative 1a)
 - D - Von Braun Complex (Alternative 1)
 - E - Rotary Wing Center (Alternative 1a)
 - F - Rotary Wing Center of Excellence (Alternative 1a)
 - G - Redstone Arsenal Airfield Facilities (Alternative 1a)
 - H - 2nd Recruiting Brigade HQ (Alternative 1a)
 - I - Child Development Center (Alternatives 1a)
 - J - Gate 1 Facilities (Alternative 1)
 - K - Gate 3 Facilities (Alternative 1)
 - L - Fire and Emergency Services Facility (Alternative 1)

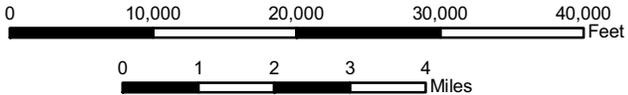
* See Table 3.2-1 and 3.2-2 for a description of the alternatives.

AMC - Army Materiel Command
 HQ - Headquarters
 USASAC - U.S. Army Security Assistance Command

Figure 4.11-1
 Active Entrance Gates at Redstone Arsenal



- Legend**
- Roads
 - ⎓ Redstone Boundary
 - Airfield
 - Huntsville City Limits
 - Access Gate
 - Major Roads
 - Congested Areas



Source: City of Huntsville 2006

Note: Areas shown as congested are those where traffic volume exceeds road capacity.

Figure 4.11-2
Current Congested Roadways in Huntsville, Alabama

4.11.1.3 Public Transportation

Redstone Arsenal operates a school bus system that picks up children of military personnel from the housing areas and transports them to off-post schools. The City of Huntsville operates a bus line that includes a stop near Gate 10. Off-post commercial taxicab companies also provide service to Redstone Arsenal, including the housing areas. There is no public transportation system that directly serves the installation, and the installation does not operate a public transportation system to serve the residents and employees of the installation (U.S. Army Corps of Engineers 2005). No commuter rail or waterborne transportation serves the installation.

Huntsville International Airport, which is off-post approximately 5 miles west of Redstone Arsenal, provides commercial passenger and cargo service and operates two runways (U.S. Army Corps of Engineers 2005).

4.11.2 CONSEQUENCES

Potential impacts to transportation are considered significant if the Preferred Alternative would:

- Disrupt or improve current transportation patterns and systems;
- Change existing levels of safety;
- Create severe gridlock and back up substantially on to public roadways; or
- Disrupt and deteriorate airfield activities.

4.11.2.1 Preferred Alternative

Overall, potential impacts to transportation from the Preferred Alternative would not be significant. This determination is contingent on continued implementation of Redstone Arsenal's administrative mechanisms, primarily the use of flex-time in personnel schedules, for distributing peak traffic over three-hour periods in the morning and afternoon. While the Preferred Alternative has the potential to increase traffic congestion in and near Redstone Arsenal, severe gridlock is not expected. Some inconvenience, which may be lessened by the use of Redstone Arsenal's administrative mechanisms, may result; however, impacts to safety, severe gridlock, or substantial back up onto public roadways are not expected.

Potential short-term impacts from the Preferred Alternative include an increase in vehicular traffic as a result of construction projects. The majority of BRAC-directed construction is anticipated to begin in 2007 through 2009 and would be complete by 2011, with other non-BRAC installation support and associated future master planning facilities completed from 2013 through 2016. Construction traffic would therefore be in intervals as a result of the construction schedule. The majority of new personnel would likely not commute to Redstone Arsenal until the BRAC-directed construction projects are completed. Therefore, it is unlikely that large increases in construction traffic and traffic from new personnel would occur at the same time. However, proper planning and scheduling would reduce possible traffic congestion.

Commercial vehicles associated with construction activities would most likely utilize Gate 1, which is currently the only gate used for commercial traffic. Heavy machinery required for site preparation and trenching would be transported by trailer or flatbed to reduce impacts to area roads. Impacts as a result of construction activities would not be significant.

Potential long-term impacts from the Preferred Alternative include an increase in traffic on and surrounding Redstone Arsenal. An approximate net increase of 6,800 personnel on Redstone Arsenal would result from the Preferred Alternative. Gates that would be subjected to increased use for access to the installation, based on the proposed facility locations, include Gates 1, 3, 7, 8, 9, and 10 (refer to Figure 4.11-1). The major on-post roads that would be subjected to increased use, also based on proposed facility locations, include the following: Martin Road, Burose Road, Almond Road, Neal Road, Marshall Drive, Mills Road, Toftoy Thruway, Redstone Road, Fowler Road, Rideout Road, Hale Road, Airfield Road, and Patton Road.

Projected gate selection and traffic volume were determined using the most likely scenario of routes that coincide with each facility group, as well as a consideration of off-site future housing development. The projected vehicular traffic was estimated from the criteria listed above as well as projected routes chosen. Both projected gate volume and on-post vehicular traffic were adjusted based on the assumption that 85 percent would travel on the installation as single drivers, and that 15 percent would travel with two or more occupants per vehicle (Noles 2006a).

Projected gate use. Table 4.11-1 displays the projected gate use resulting from the Preferred Alternative. Gate projections were derived from calculations and assumptions explained in Appendix E of this EA. Projected commercial traffic appears as zero for Gate 1 because this traffic would be rerouted to Gate 3 as a result of the Preferred Alternative. Commercial traffic to Gate 3 was projected to be the current commercial traffic through Gate 1 plus an additional 50 vehicles. The 50 vehicles are the projected commercial traffic anticipated for the Preferred Alternative. Based on the projections, the most widely used gates would be Gate 1, Gate 7, and Gate 9. These gates may experience increased congestion as a result of the increase in personnel; however congestion would be alleviated by Redstone Arsenal's continued use of administrative mechanisms, primarily the use of flex-time in personnel schedules, for distributing peak traffic over three-hour periods in the morning and afternoon. Implementation of a mass-transit or carpool strategy could also help to alleviate the impact of the additional vehicles at Redstone Arsenal.

Table 4.11-1. Projected Redstone Gate Use Resulting from the Preferred Alternative.

Gate	Projected additional personnel	Projected additional vehicular traffic	Current day total	Projected day total	Projected change in use
Gate 1 outbound (passenger)	1017	941	4635	5576	20%
Gate 1 inbound (passenger)	1017	941	4360	5301	22%
Gate 1 outbound (commercial)	NA	0	226*	0	-100%
Gate 1 inbound (commercial)	NA	0	101*	0	-100%
Gate 3 inbound (passenger)	327	302	3442	3744	9%
Gate 3 outbound (passenger)	327	302	3111	3413	10%
Gate 3 outbound (commercial)	NA	276*	0	276	100%
Gate 3 inbound (commercial)	NA	151*	0	151	100%
Gate 7 inbound	2329	2154	3281	5435	66%

Gate	Projected additional personnel	Projected additional vehicular traffic	Current day total	Projected day total	Projected change in use
Gate 7 outbound	2329	2154	3112	5266	69%
Gate 8 inbound	396	366	3264	3630	11%
Gate 8 outbound	396	366	3109	3475	12%
Gate 9 inbound	2344	2168	11169	13337	19%
Gate 9 outbound	2344	2168	11290	13458	19%
Gate 10 inbound	396	366	4758	5124	8%
Gate 10 outbound	396	366	3778	4144	10%

* During peak hours: 5:45 a.m. – 9:00 a.m., 10:45 a.m. – 1:15 p.m., and 3:00 p.m. – 6:00 p.m.

NA not applicable

In the future, traffic problems at Gate 1 would be alleviated with implementation of the non-BRAC installation support and associated future master planning actions included in the Preferred Alternative. First, the addition of a Visitor's Center for processing visitors to the installation at Gate 1 would eliminate the delays currently caused by having to process visitors through the main lanes. Second, the Gate 1 gatehouse and Visitor's Center would be moved approximately 1 mile on-post, so that a 1-mile portion of Martin Road would act as a buffer to help alleviate backups on Memorial Parkway caused by delays at Gate 1 (see Figure 4.11-2).

Projected road use. Projected road use of selected areas on Redstone Arsenal was derived from calculations and assumptions explained in Appendix E of this EA. Based on the projected hourly use, traffic volume on several on-post roads would exceed capacity. Full capacity is considered 500 vehicles per hour per lane (Noles 2006b); this number is used as a general guideline. The roads that would exceed capacity are Martin Road east of Rideout, Patton Road, Neal Road east of Mills, Mills Road north of Martin, Burose Road, Marshall Road north of Neal, and Toftoy Thruway. Although no surveys were conducted on Martin Road west of Rideout, this area may also be impacted because it is reduced to two lanes.

As part of the BRAC-directed actions, the Preferred Alternative calls for the widening of Burose Road and portions of Mills Road. This would make both roads four lanes from Neal Road to Martin Road. Traffic signals would be installed at the main entrance into the Von Braun Complex from Burose Road. This road widening would alleviate some roadway congestion. Additionally, Redstone Arsenal would continue to rely on administrative measures to help control roadway congestion.

Planned future road improvement projects include the widening of Martin Road to four lanes from Rideout to Zierdt Road, and the widening of Mills Road from Toftoy Thruway to Fowler Road. These on-post projects would eventually help congestion but mostly would not be available during implementation of BRAC-directed actions.

Traffic signals along Martin Road between Rideout and Patton Roads may also need to be synchronized due to the increase in personnel (Noles 2006b). Otherwise, traffic signals along the

major roads are well placed and timed and should be able to accommodate the increase in personnel (Noles 2006b).

Public transportation. No changes or impacts to public transportation are expected. Although an additional 6,800 personnel would be working at Redstone Arsenal, the number of families and children using the school bus system are not expected to increase substantially.

4.11.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to transportation due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.12 Utilities

4.12.1 AFFECTED ENVIRONMENT

This section describes the existing utilities and operating systems on Redstone Arsenal that provide power, water, wastewater treatment, and the collection and disposal of solid waste. In general, the utility systems on Redstone are classified as distribution and collection systems. The communications system is also discussed in this section.

4.12.1.1 Potable Water Supply

Water consumption on Redstone Arsenal for FY 2005 was 1.1 billion gallons. The average daily usage of potable water is 3.3 million gallons per day (MGD) in summer and 3.0 MGD in winter. The peak in the last 12 months was 4.3 MGD on July 6, 2005 (Hinson 2006).

In June, 2006, Redstone began purchasing all potable water from Huntsville Utilities, which is owned by the City of Huntsville. Huntsville Utilities' water supply system is made up of five wells and two surface water treatment plants. The combined capacities of the five wells and the two surface plants are 16 MGD and 54 MGD, respectively, providing a total maximum supply of 70 MGD to the system (Huntsville Utilities 2005).

The Huntsville Utilities distribution system is connected to Redstone's domestic water distribution system in three locations. The first connection point is at the north east corner of the arsenal west of Patton Road and north of Goss Road. There is approximately 300 feet of new 8-inch distribution line connecting the existing Redstone Arsenal 10-inch line to the City's existing 18-inch line. The second connection point is at the west central side of the arsenal on Martin Road. There is approximately 3,850 feet of new 8-inch distribution line connecting the City's 24-inch line at Zeirdt Road to Redstone's 8-inch line at Martin Road southeast of Building 6211. The third connection point is at the southeast corner of the arsenal near the intersection of Buxton and Green Cove roads. The existing abandoned 8-inch line running northwest toward Line road was connected to the City's 12-inch line near the intersection (Hinson 2006).

4.12.1.2 Wastewater System

Wastewater is treated in an on-post centralized plant owned and operated by Proctor, Davis, and Ray (PDR) Properties. Three old treatment plant sites serve as collection and pumping stations for the centralized plant. Flow from the pumping stations is monitored to ensure that the

combined flow does not exceed the capacity of the treatment plant, 9.0 MGD. The average daily load is approximately 1.85 MGD (Hinson 2006).

Wastewater is collected by over 50 miles of sewer lines and transported to the three primary wastewater-pumping stations. In the past, differences in dry weather and wet weather flow data did indicate significant infiltration of groundwater and inflow of storm water into the system. However, recent substantial upgrades have been made to the sewer line system, thereby reducing infiltration while also improving overall capacity (Hinson 2006). Wastewater discharges at Redstone Arsenal are regulated under a National Pollutant Discharge Elimination System (NPDES) permit issued by ADEM. This permit specifies discharge limitations and monitoring requirements for wastewater outfall points on Redstone Arsenal (U.S. Army Aviation and Missile Command 2001).

4.12.1.3 Storm Water System

Storm water drainage on Redstone Arsenal is provided through a system of open drainage ditches, swales, culverts, and retention ponds. Storm water travels through this system and eventually flows into McDonald Creek, Huntsville Spring Branch, or Indian Creek. As these three tributaries traverse the arsenal, they convey storm water drainage to the Tennessee River which forms the southern boundary of the installation (U.S. Army Missile Command 1994). Redstone Arsenal is permitted to discharge storm water into these waters based on their NPDES permit issued by ADEM; there is no maximum limit for discharge set under this permit, although there are limits for certain constituents of the discharge. The NPDES permit was issued on August 5, 2005 and will expire on August 31, 2010.

4.12.1.4 Energy Sources

Electricity, natural gas, fuel oil and a steam-pipe heating system are the available energy sources at Redstone Arsenal.

Electricity. The Tennessee Valley Authority (TVA) through a number of local distribution companies provides electric service to Redstone Arsenal and the surrounding communities. Substantial excess capacity is available within the area to meet all current and foreseeable requirements (U.S. Army Missile Command 1994).

The average daily electrical use on Redstone Arsenal is approximately 55 to 70 megavolt amperes (MVA), with a peak demand limit of approximately 80 MVA (U.S. Army Aviation and Missile Command 2001).

Natural Gas System. Natural gas at Redstone Arsenal is obtained through Huntsville Utilities at two locations. An uninterruptible supply is metered to the family housing areas, and a second uninterruptible supply is metered to the rest of Redstone Arsenal through a meter station on Patton Road. Natural gas is used for heating in family housing and is the primary fuel for boilers and heating plants on the arsenal (Dunn 2006b; U.S. Army Missile Command 1994).

The average daily use of natural gas is roughly 1.125 million cubic feet per day in January, down to a low of just over 0.5 million cubic feet per day in July. This can be attributed to the use of

fewer boiler houses in the summer than winter (U.S. Army Aviation and Missile Command 2001).

Fuel Oil. No. 2 fuel oil is used as a primary/auxiliary fuel by small boilers and heating plants in the isolated areas of the arsenal. This fuel is stored in approximately 30 ASTs on the installation (Software Engineering Directorate 2003).

Steam System. Redstone also uses steam for heating and other activities throughout the arsenal. The primary source of steam is the Waste-to-Energy Incinerator Plant owned and operated by the Huntsville Solid Waste Disposal Authority (Software Engineering Directorate 2003). The fuel for the plant consists of household garbage and other burnable waste collected from Redstone Arsenal and the City of Huntsville. All steam produced by the plant goes directly to Redstone. The steam distribution system for Redstone consists of approximately 423,000 feet of mains and branches, including condensation returns (Dunn 2006b; U.S. Army Missile Command 1994).

The steam demand for fiscal year 2005 was 1,001,861 kilopounds, and the average monthly use was 83,488 kilopounds. For fiscal year 2005, a maximum monthly use of 129,663 kilopounds occurred in January, and a minimum monthly use of 55,360 kilopounds occurred in October. Although the total monthly capacity of the steam plant is 420,000 kilopounds, the line's capacity is only 292,000 kilopounds of steam per month (Hinson 2006).

4.12.1.5 Communications

Telecommunications on Redstone Arsenal include telephone, trunked radio, television services (broadband and IPTV), and Local Area and Wide Area Network data and Defense Message System (DMS) facilities. Telephone Central Office, located in Building 5298, provides inbound/outbound access to the Defense Switched Network (DSN), BellSouth Local Exchange Services (local and extended calling area), and Federal Technology Services (FTS) long distance. Support includes Secure Telephone Equipment (STE) secure voice terminals and secure and non-secure Video Teleconferencing services.

The Garrison Directorate of Information Management provides all data (both broadband and IP) and telephone carrier infrastructure (including Optical Carrier Services) for telecommunications on Redstone Arsenal. The system consists of aerial and buried twisted pair copper cable and fiber optic cable alongside roads and in buried concrete and duct systems. Data and message facilities are located in the Redstone Arsenal Telecommunications Center (Building 5300) (Prince 2006).

4.12.1.6 Solid Waste

Solid waste is defined under the Resource Conservation and Recovery Act (RCRA) as any solid, semi-solid, liquid, or contained gaseous materials discarded from industrial, commercial, mining, or agricultural operations, and from community activities. Solid waste includes garbage, construction and demolition debris, commercial refuse, sludge from water supply or waste treatment plants or air pollution control facilities, and other discarded materials (Redstone Environmental Management Division, Compliance Branch 2006).

In 2005, Redstone Arsenal generated a total of 84,461 tons of solid waste. Fifty-six percent was diverted for recycling with the remaining 44 percent divided between the construction/demolition landfill (CDL) and the Huntsville Solid Waste Disposal Authority Waste-to-Energy Incinerator Plant.

Redstone Arsenal operates an on-post Qualified Recycling Program. Concrete, millable asphalt, and trees are recycled at the landfill for use on the installation. Paper, cardboard, steel, scrap metal, printer toner cartridges, and telephone books are also recycled on post. Plastics, aluminum, and batteries are contracted out to the Defense Reutilization and Marketing Office (DRMO) (Hewitt 2006).

The CDL is a 43-acre permitted landfill operated by Redstone Arsenal for the disposal of inert material such as construction rubble, insulation, asbestos material, treated lumber, masonry waste, rock, roofing, sand, and sheetrock. The landfill has a solid waste permit from ADEM (No. 45-03) that allows the disposal of up to 600 cubic yards per day. The current quantity of waste in the landfill is 2,419,886 cubic yards and the total capacity is 3,400,000 cubic yards, which means the landfill is currently at approximately 71 percent of capacity (Hewitt 2006).

All household trash and garbage generated on Redstone Arsenal is hauled off-post to the Huntsville Solid Waste Disposal Authority Waste-to-Energy Plant adjacent to the installation. The plant is designed to process up to 690 tons of household, industrial, and commercial waste per day (U.S. Army Garrison 2005b).

4.12.2 CONSEQUENCES

Effects on infrastructure are considered in terms of increases in demands on systems and the ability of existing systems to meet those demands. Potential effects to the environment could occur if the existing systems are insufficient to handle the increased demands, thus requiring construction and operation of a new system that may affect the environment. Utility demands include both construction and operations usage. Utility demands during the operations of the Preferred Alternative are based on the additional facility square footage and personnel requirements. Individual segments that comprise the totality of the infrastructure are discussed below.

Potential impacts to the potable water system are considered significant if the Preferred Alternative would:

- Reduce potable water availability;
- Disrupt potable water distribution systems;
- Change water demands that affect regional potable supplies; or
- Generate contaminants that adversely affect water quality.

Potential impacts to storm water conveyance systems are considered significant if the Preferred Alternative would:

- Cause flow obstructions and increases to the storm water drainage system;
- Accelerate deterioration of the storm water drainage system; or
- Cause long-term interruptions of storm water drainage system components.

Potential impacts to the electrical systems are considered significant if the Preferred Alternative would:

- Change regional electricity demands requiring major new components such as transmission lines, transformers, and substations; or
- Cause long-term disruptions in available electrical services.

Potential impacts to the heating and cooling system are considered significant if the Preferred Alternative would:

- Increase demand for heating and cooling above currently available capacities; or
- Cause long-term interruptions in heating and cooling capacities and availability.

Potential impacts to liquid fuel systems are considered significant if the Preferred Alternative would:

- Cause unsafe, inadequate, or noncompliant temporary or long-term storage or distribution systems; or
- Cause unreliable distribution of liquid fuels that cannot meet the mission and support requirements.

Potential impacts to solid waste disposal systems are considered significant if the Preferred Alternative would increase solid waste such that it exceeds the capacity of local landfills.

Potential impacts to the sanitary sewer system are considered significant if the Preferred Alternative would:

- Cause additional inflow and infiltration and increased loads on the wastewater treatment plant that cannot be adequately treated; or
- Change wastewater composition that would alter wastewater treatment plant processes or consistently cause upsets of the wastewater treatment plant.

Potential impacts to the communications system are considered significant if the Preferred Alternative would:

- Exceed the capacity of the existing system such that the reliability of the system is substantially diminished;
- Cause long-term disruptions to the system; or
- Impair communications systems used by military or public safety personnel.

4.12.2.1 Preferred Alternative

Overall, potential impacts to utilities from implementation of the Preferred Alternative would not be significant. The following provides an evaluation of the environmental impacts to potable water supply, wastewater system, storm water system, energy sources, communications, and solid waste that may result from implementation of the Preferred Alternative. Figure 3.3-1 shows the proposed construction/renovation footprints for the Preferred Alternative and associated proposed utilities that are located outside of these footprints. For the majority of the sites, the proposed utilities would be located within the identified construction/renovation

footprints. Exceptions are discussed in detail in the specific resource areas outlined below. Detailed location information for most utility upgrades/additions will not be available until the engineering design phase.

Potable Water Supply. The Preferred Alternative would increase the demand for potable water by 1,088,000 gallons per day (based on 6,800 incoming personnel). Regional water consumption is based on 160 gallons per capita day and includes all operational on-post uses (Merritt 1983).

The percent increase to daily water consumption and the associated load on Huntsville's three water treatment plants and the well system is summarized below in Table 4.12-1. As indicated, with the combined capacity of Huntsville's well system and two surface water treatment plants being 70 MGD, the percent increase to the daily average load for water consumption and for the treatment plants is not substantial and therefore would not result in significant impacts to the City of Huntsville water supply system.

Table 4.12-1. Preferred Alternative Percent Increases in Potable Water Demand.

Parameter	Current Average Daily Load (MGD)	Percent Increase
Redstone daily water consumption	3.3	33.5
Huntsville daily water consumption	40	2.76
South Parkway water treatment plant	16	6.91
Southwest water treatment plant	13	8.51
Well system	11	10.05

MGD million gallons per day

New water mains and a 500,000-gallon elevated water tank to meet fire protection requirements would be installed outside of the proposed Rotary Wing Center (Facility Group E, Selected Alternative 1a) construction footprint. A new water main would be located to the east, north and west of the Redstone Arsenal Airfield, connecting to an existing water main along Hale Road, to the south of the airfield. A new water main would also be installed along Rideout Road, from Hale Road north to Goss Road, connecting to the existing water main at Goss Road.

Wastewater System. The wastewater system on Redstone Arsenal has a capacity of 9 MGD. Currently, the system is running at 1.85 MGD, approximately 20 percent of capacity (Hinson 2006). Expected increase in wastewater discharges from implementation of the Preferred Alternative would be 0.34 MGD, based on 50 gallons per capita day and are shown in Table 4.12-2. As indicated, the increase to the PDR Wastewater Treatment Plant is not substantial, and therefore no significant impacts to the wastewater system are expected.

Table 4.12-2. Preferred Alternative Wastewater Increase to PDR Wastewater Treatment Plant.

Parameter	No Action/Baseline (MGD)	Preferred Alternative/Future (MGD)
Capacity	9	9
Average daily load	1.85	2.19
Expected increase	0	0.34

MGD million gallons per day

A new sewage lift station would be installed adjacent to the eastern portion of the construction footprint of the AMC HQ and USASAC HQ (Facility Group A, Selected Alternative 1a). A new force main would be installed from this lift station to Fowler Road. A portion of the existing 14-inch sewer force main along Fowler Road would be replaced with a new 16-inch force main. The portion to be replaced would begin where the proposed facilities' new 3-inch force main connects and would end at the Patton Road connection. This upgrade and addition to the sewer main encompasses approximately 2 linear miles.

A new sewage lift station would be installed within the construction footprint of the Rotary Wing Center (Facility Group E, Selected Alternative 1a). A new force main would connect this lift station to an existing sewer main located along Hale Road, south of the airfield. The existing force main along Rideout Road may require replacement. In this case, a new sewer main would be installed along Hale Road, east of the airfield to Rideout Road, and south along Rideout Road to an existing lift station.

Based on the most current information available at the time of this EA, the minor amount of storm water that infiltrates the wastewater system during a major rainfall event does not cause a capacity problem to either the wastewater piping system or the treatment plant itself (Hinson 2006).

The Rotary Wing Center (Facility Group E, Selected Alternative 1a) and the Airfield Fire Station Facilities and ASTs (Facility Group G, Selected Alternative 1) are located within the habitat buffer area for the Alabama cave shrimp, presently listed as endangered under the Endangered Species Act. Therefore, the outdoor covered helicopter wash station and fuel/de-fuel area would be equipped with an oil/water separator. The remaining wastewater would be diverted to the wastewater system for treatment (Green 2006c). This would reduce the likelihood of contaminated water entering the groundwater system.

Storm Water System. Because implementation of the Preferred Alternative would require construction disturbances greater than 1 acre, construction storm water permits would be required. In order to minimize short-term construction impacts to the storm water system, best management practices outlined in the construction permits would be followed.

Potential long-term impacts from storm water runoff could occur from the implementation of the Preferred Alternative. Storm water runoff, including sheet flow, would increase due to the construction of hardstand areas. Run-off from parking lots and roofs could be handled by a variety of methods. These methods could include filtration swales and/or retention ponds for the bioremediation of materials in the run-off, possibly in conjunction with constructed wetlands; utilization of pervious materials for parking lot surfaces; and/or rain gardens in and around parking lots. Currently, Redstone Arsenal has 3,544 acres of impervious roads, buildings, and parking lots, which are 9.3 percent of the total acreage of Redstone Arsenal (Makkouk 2006b). Implementation of the Preferred Alternative would increase impervious covering by approximately 4 percent.

Because the Rotary Wing Center (Facility Group E, Selected Alternative 1a) and the Redstone Arsenal Airfield Facilities upgrades (Facility Group G, Selected Alternative 1) are located within the habitat buffer area for the endangered Alabama cave shrimp, extra measures would be

required to prevent storm water runoff from entering the groundwater system. Such measures would include an oil-water separator, with all maintenance activities occurring on the concrete hardstand so that all releases would pass through the separator. Parking lot runoff would be routed through an oil-water separator before further treatment, which would include bioremediation (bioretention) areas.

Energy Sources. The following energy sources are evaluated for impacts: natural gas, electricity, and the steam heating system.

Natural Gas and Electricity. Preliminary planning has proposed that for the Rotary Wing Center (Facility Group E, Selected Alternative 1a), new gas lines would be installed from the facilities to an existing gas main located along Hale Road, south of the airfield. In addition, new electric lines would be installed from the facilities running west to connect with the proposed lines that will provide service to the Software Engineering Directorate expansion. The 2nd Recruiting Brigade Headquarters (Facility Group H, Selected Alternative 1a), which would involve demolition of Building 3440 and construction of a new building in the same location, would be heated with natural gas.

Steam Heating System. The AMC Band Facility (Facility Group B, Selected Alternative 1), the AMC Mail Facility (Facility Group C, Selected Alternative 1a), and the Rotary Wing Center of Excellence (Facility Group F, Selected Alternative 1a) would utilize the current steam heating system on Redstone Arsenal. These projects consist of renovating existing buildings, all of which are currently heated with steam. The Solid Waste Disposal Authority of the City of Huntsville, which operates the Waste-to-Energy Incinerator Plant, has indicated that no sizeable increases in steam demand are expected due to implementation of the Preferred Alternative and these three facilities (Holladay 2006).

Communications. The Preferred Alternative would require a substantial increase in telecommunications infrastructure to support new activities, facilities, and an increasing number of employees at the sites. However, the Army's Installation Information Infrastructure Modernization Program (I3MP) recently completed the construction phase and systems acceptance testing for the data network backbone nodes at Redstone Arsenal. This I3MP infrastructure provides the potential to utilize underground facilities for voice and data communications requirements with minimal impacts to the environment (Prince 2006). Although all proposed facilities would require communications upgrades, those that would include substantial work outside of the proposed footprints are shown in Table 4.12-3. Because the necessary upgrades to the communications system are included as part of the Preferred Alternative, capacity of the system would not be exceeded and service would not be disrupted, and therefore impacts to the existing system would not be significant.

Table 4.12-3. Preferred Alternative Projects with Substantial Communications Upgrades.

Facility Group Selected Alternative	Facility Group Name	Required Upgrade
E1a	Rotary Wing Center	Communication lines would either be run east to join lines servicing existing airfield facilities, or south to manhole servicing Building 6263.

Facility Group Selected Alternative	Facility Group Name	Required Upgrade
F1a	Rotary Wing Center of Excellence	Communications lines would be run beneath Martin Road.
I1a	Child Development Center	Communications lines would be run beneath Martin Road.
J1	Gate 1 Facilities	Communication lines would be buried along the north side of Martin Road from the visitor center to existing manhole MH-RS-1.
K1	Gate 3 Facilities	Telephone cable would be run from the corner of Redstone Road and Line Road to the proposed shipping and receiving warehouse. Fiber optics cable would be run from Building 7700, south of Redstone Road, to the proposed warehouse.
L1	Fire and Emergency Services Facility	Communication conduit would require boring under Martin Road.

AMC Army Materiel Command
 HQ Headquarters
 USASAC U.S. Army Security Assistance Command

Solid Waste. All new facilities constructed under the Preferred Alternative would be added to the refuse collection schedule for solid waste disposal. All household type trash and garbage generated would be hauled off-post and incinerated at Huntsville's Waste-to-Energy Plant, with the exception of white paper, cardboard, toner cartridges, and other recyclables. These items would be stockpiled and sold through the installation's Qualified Recycling Program.

Projected solid waste increase is approximately 70 tons per day. This figure is derived from a solid waste emission rate of 20 pounds per capita day multiplied by 6,800 (the total BRAC and non-BRAC incoming personnel). These figures, when compared with the capability of the Qualified Recycling Program, the remaining capacity of the CDL, and the capacity of the incinerator plant indicate that the Preferred Alternative would not have significant impacts to solid waste handling on Redstone Arsenal.

The installation's CDL allows for the disposal of up to 600 cubic yards per day of inert materials such as construction debris, stumps, tree limbs, concrete, asphalt, and similar type waste or material collected from the installation. All incombustible construction wastes generated from the Preferred Alternative would be deposited at the landfill, except concrete, valuable metals, yard waste, and other recyclable commodities. Although the Preferred Alternative includes demolition of six on-post buildings, the short-term construction/demolition impacts to the landfill would amount to 0.2 percent of the CDL's remaining capacity. Table 4.12-4 shows projected quantities of demolition waste material.

Table 4.12-4. Projected Quantities of Demolition Waste Material to Landfill.

Building Number	Area (square feet)	Waste Material (cubic yards)
4489	15,615	937
3440	9,909	594

Building Number	Area (square feet)	Waste Material (cubic yards)
4424	8,127	488
5105	4,020	241
5107	111	7
5108	149	9
Total	37,931	2,276

4.12.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to utility resources on or surrounding Redstone Arsenal due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.13 Hazardous Materials, Hazardous Waste, and Environmental Restoration Sites

4.13.1 AFFECTED ENVIRONMENT

This section describes the existing conditions of hazardous and toxic materials and waste at Redstone Arsenal. Management of hazardous materials and hazardous wastes are discussed as well as asbestos, lead-based paint (LBP), and environmental restoration sites.

4.13.1.1 Hazardous Materials

Hazardous materials are those useable corrosive, toxic, flammable, and reactive materials that, when spilled or released, are dangerous to public health or the environment. At Redstone Arsenal, hazardous materials are used in cleaning, maintenance, and repair of aircraft and vehicle parts. Hazardous materials are usually housed in designated hazardous materials storehouses or pharmacies. Currently, approximately 76,000 hazardous materials are being tracked by Redstone Arsenal's Hazardous Material and Waste Management System (Seaver 2006). Hazardous materials are required to be handled, managed, treated, or stored properly by trained personnel under the following regulating agencies: Department of Transportation Hazardous Materials, 49 CFR 172.101; EPA, 40 CFR 260 et seq; and the Occupational Safety and Health Administration (OSHA), 29 CFR part 1910. At Redstone Arsenal, the Directorate of Environmental Safety oversees hazardous materials activities on the installation (Redstone Arsenal 2003b).

4.13.1.2 Hazardous Wastes

Hazardous wastes are generated when substances, usually originating as hazardous materials, are disposed of and are no longer useable or recyclable and exhibit hazardous characteristics as defined by the EPA. A number of hazardous wastes are generated from the normal operations of Army programs at Redstone Arsenal, and the arsenal is listed as a large-quantity generator of hazardous waste. In 2005, the installation generated 84,446 pounds of hazardous waste. Typical hazardous waste consists of petroleum products, solvents, adhesives, paints, photographic waste, and waste antifreeze. All hazardous wastes are stored and managed in accordance with local, state, and Federal regulations (Seaver 2006).

There are several 90-day storage areas and RCRA-permitted storage areas located across Redstone Arsenal for hazardous waste storage. To facilitate the disposal of hazardous waste,

Redstone environmental coordinators ensure the material is properly packaged, the paperwork is complete, and the DRMO is contacted. The DRMO has a contract with a certified private contractor to transport the hazardous waste to an off-site RCRA-permitted treatment, storage, and disposal facility for ultimate disposal. Redstone Arsenal complies with the Alabama State Hazardous and Toxic Waste Regulations, ADEM Land Division – Hazardous Waste Program Regulations, Division 335-14, as revised April 4, 2006 (Seaver 2006).

4.13.1.3 Asbestos and Lead-Based Paint

All buildings constructed prior to 1981 are presumed to contain Asbestos Containing Material (ACM) if no survey has been recorded. Prior to 1981, ACMs were used extensively in plaster, wall board, joint compound, felt material, roofing material, floor tile, mastic, piping insulation, gaskets, ceiling tiles, and sprayed on soundproofing and insulation. All confirmed ACM subject to disturbance resulting from demolition or renovation must be abated by trained and qualified asbestos personnel. Redstone Arsenal has established policies and procedures for the safe and proper operational procedures and responsibilities for testing, handling, removing, and disposing of ACM (U.S. Army Corps of Engineers 2005).

Lead was used in many paints applied before the early 1980's. It was also used in flooring, piping, cable sheaths, batteries, and solder. Lead is regulated in the workplace for exposure to workers although most documented health effects relate to pregnant women and children. Current Army policy calls for controlling LBP by using in-place management rather than mandated removal procedures. In-place management is used to prevent deterioration over time of those surfaces likely to contain LBP, followed by replacement as necessary (U.S. Army Corps of Engineers 2005).

4.13.1.4 Environmental Restoration Sites

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA) established the nationwide process to clean up hazardous waste disposal and waste sites. The Installation Restoration Program (IRP) is a subcomponent of the DoD-wide Defense Environmental Restoration Program (DERP) that addresses the identification, investigation, and clean-up of contamination from hazardous substances and pollutants associated with past practices.

Redstone Arsenal is on the National Priorities List (NPL) for environmental clean-up under the Federal Facility provisions of Section 120 of CERCLA. The IRP at Redstone Arsenal consists of 97 surface media sites divided into 18 geographical operable units. Thirteen groundwater operable units have also been established to address extensive contamination in the complex karst geology of the region. Contaminants of concern include solvents, metals, pesticides, chemical warfare materiel, and hazardous remnants from rocket fuel research, development, and testing. These contaminants have impacted groundwater, soil, sediments, and surface waters (EPA 2006a).

Additionally, Redstone Arsenal has environmental sites under the Army Operational Range Assessment Program (ORAP). This is a relatively new program that addresses potential environmental contamination at operational ranges throughout Army installations.

4.13.2 CONSEQUENCES

Potential impacts to hazardous materials or waste management are considered significant if the Preferred Alternative would:

- Result in noncompliance with applicable Federal and state regulations; or
- Increase the amounts of generated or procured hazardous materials or wastes beyond current permitted capacities or management capabilities.

Potential impacts to the IRP and ORAP are considered significant if the Preferred Alternative would:

- Disturb, create, or contribute to contamination at a site resulting in potential adverse effects to human health or the environment; or
- Cause regulatory noncompliance.

4.13.2.1 Preferred Alternative

Overall, potential impacts to hazardous materials and wastes and IRP and ORAP sites would not be significant. Impacts to hazardous materials, hazardous wastes, asbestos/LBP, and IRP and ORAP sites are discussed below.

Hazardous Materials. The Preferred Alternative proposes the relocation of the ATTC from Fort Rucker to Redstone Arsenal. The ATTC would be consolidated with the RTTC to form a single organization and to establish a center for Rotary Wing Air Platform DAT&E. The current inventory of hazardous materials utilized by the ATTC is similar to the types of materials that the RTTC on Redstone currently uses. Additionally, because the activities are being consolidated, the Preferred Alternative is not expected to substantially increase the approximately 76,000 hazardous materials that are currently being tracked by Redstone's Hazardous Material and Waste Management System (Seaver 2006); impacts from hazardous materials, are thus, not considered significant.

Hazardous Wastes. During the construction process, hazardous wastes that are regulated by EPA, Department of Transportation, and the state would be generated and would require transport. Maintenance of construction equipment would also be conducted. The construction contractor generating the waste would coordinate the removal of waste and manifests with personnel on Redstone Arsenal. The avoidance of spills and their treatment in the event of an accident would be addressed through existing pollution prevention, spill response, hazardous waste, and air quality regulations. These plans also address and specify procedures to be followed should previously undocumented materials be required at the facility. Equipment and vehicles parked overnight, or left for lengthy periods on-site, would be fitted with drip pans.

In day-to-day operations, the new facility would generate hazardous wastes. These waste streams may include adhesives, paints, thinners, byproducts used in painting, solvents, and oil and lubricants. However, based on the 2005 inventory of hazardous waste generated by the ATTC, the increase of hazardous waste at Redstone Arsenal would only be approximately 4 percent (Green 2006a). Consolidation of the ATTC and the RTTC does not change Redstone Arsenal's status as a large quantity generator of hazardous waste. Any long-term hazardous wastes that are generated from the new facility would be categorized and shipped according to

Redstone's Hazardous Material/Waste Management Program: Hazardous Material/Waste Management Plan. The small increase in hazardous waste volume resulting from the Preferred Alternative can easily be managed under Redstone's current permit; thus, the impacts from hazardous wastes are not considered significant.

Asbestos and Lead-Based Paint. The Preferred Alternative involves the demolition of Buildings 3440, 4424, and 4489. Even though not considered a hazardous waste according to RCRA, this debris would likely contain ACMs. Acceptable, residual levels of lead may also remain after thermal treatment and be contained in the demolition debris. In accordance with Redstone Arsenal's procedures for disposing of ACM, the CDL on Redstone would accept this type of debris if the asbestos is properly bagged and the Toxicity Characteristic Leaching Procedure of the lead is below 5 parts per million. Disposal of relatively small amounts of ACM and LBP would be in accordance with Redstone's current procedures, and thus, the impacts from ACMs and LBP are not considered significant.

IRP and ORAP Sites. Of the 12 facility groups within the Preferred Alternative, there are three that are in close proximity to five identified IRP or ORAP sites on Redstone Arsenal, as summarized in Table 4.13-1 and shown on Figure 4.13-1.

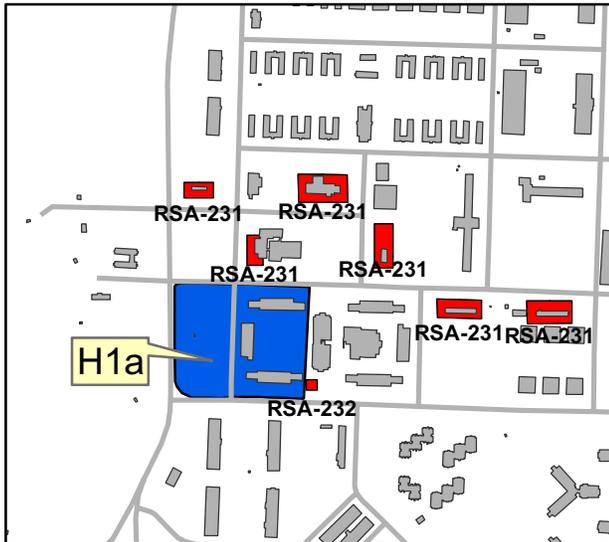
Table 4.13-1. Summary of Pertinent IRP and ORAP Sites as related to the Preferred Alternative Location.

Facility Group Selected Alternative	Facility Group Name	Adjacent/Nearby IRP or ORAP Site	Status ¹
H1a	2 nd Recruiting Brigade Headquarters	RSA-231, Smoke Munitions Filling #1 Mixing and Prep Facilities	Anticipate no further action ²
		RSA-232, Smoke Munitions Filling #1 Service Station	<ul style="list-style-type: none"> • PRO exceeded screening criteria in subsurface soil. • Groundwater could not be sampled; PRO is suspected to be elevated. • Metals exceeded the Redstone Arsenal background level in the soil. • Site may be a potential source of fuel-related compounds and metals. • Further investigations may be performed to characterize contamination.

Facility Group Selected Alternative	Facility Group Name	Adjacent/Nearby IRP or ORAP Site	Status ¹
D1	Von Braun Complex Phases III-IV	RSA-223, Former Nashville, Chattanooga and St. Louis Railroad Classification Yard and Surface Drainage Feature	<ul style="list-style-type: none"> • IRP site is partially overlain by facility footprint. • SVOCs and metals exceeded screening criteria in surface soil. • Metals exceeded screening criteria in subsurface soil. • PRO was detected at a maximum concentration of 510 mg/kg in surface soil and 470 mg/kg in subsurface soil. • Metals and SVOCs exceeded screening criteria in groundwater. • No PRO was detected in groundwater. • May require additional investigation as part of CERCLA in order to further characterize contamination, and is scheduled to be cleaned up by 2007.
		RSA -224, Former Ton Container and 55-Gallon Drum Storage Area	<ul style="list-style-type: none"> • SVOCs and metals exceeded screening criteria in surface soil. • Metals exceeded screening criteria in subsurface soil. • PRO was detected at a maximum concentration of 170 mg/kg in surface soil. • VOCs and metals exceeded screening criteria in groundwater. • PRO was detected in groundwater at a maximum concentration of 160 µg/L.
E1a	Rotary Wing Center	RSA-072, Field Used for Mortar Shell Testing and Explosives Training during WW II	<ul style="list-style-type: none"> • ORAP site is partially overlain by the proposed footprint for this facility. • Lead detected in subsurface soils. • Explosives detected in surface and subsurface soils. • VOCs detected in groundwater. • Further investigations may be performed to further characterize contamination at this site. • Possibility exists of encountering UXO at RSA-072.

1 Redstone Arsenal 2005a and 2005b
 2 Redstone Arsenal 2003a
 µg/L microgram(s) per liter
 CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
 IRP Installation Restoration Program
 mg/kg milligram(s) per kilogram
 ORAP Operational Range Assessment Program
 PRO petroleum range organic compounds
 SVOC semi-volatile organic compound
 UXO unexploded ordnance

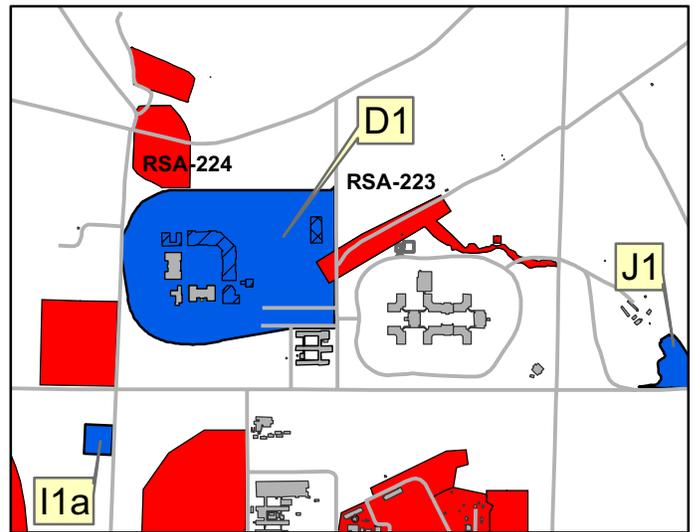
2nd Recruiting Brigade Headquarters



0 500 1,000 1,500 2,000 Feet

A

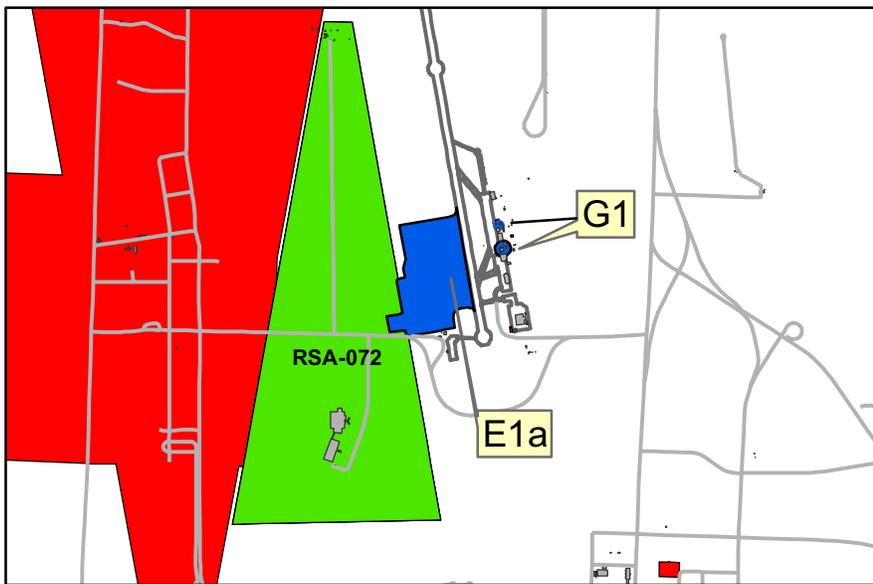
Von Braun Complex



0 1,500 3,000 4,500 6,000 Feet

B

Rotary Wing Center Complex



0 2,500 5,000 7,500 10,000 Feet

C

Legend

- Road
 - IRP Sites
 - ORAP Sites
 - ▭ Redstone Boundary
 - ▭ Airfield
 - ▭ Existing Building
 - ▨ Phase III Building - Von Braun Complex
 - ▩ Phase IV Building - Von Braun Complex
 - A1a Facility Group A, Alternative 1a
- IRP - Installation Restoration Program
ORAP - Operational Range Assessment Program

Facility Groups and Selected Alternatives *

- D - Von Braun Complex (Alternative 1)
- E - Rotary Wing Center (Alternative 1a)
- G - Redstone Arsenal Airfield Facilities (Alternative 1)
- H - 2nd Recruiting Brigade HQ (Alternative 1a)
- I - Child Development Center (Alternatives 1a)
- J - Gate 1 Facilities (Alternative 1)

* See Table 3.2-1 and 3.2-2 for a description of the alternatives.

NOTE: Detailed location information for many utility upgrades/additions will not be available until the engineering design phase. See text for more detail regarding utilities.



Figure 4.13-1

Installation Restoration Program (IRP) and Operational Range Assessment Program (ORAP) Sites in the Vicinity of the Proposed Von Braun Complex Expansion, 2nd Recruiting Brigade Headquarters, and Rotary Wing Center Complex

When construction for the 2nd Recruiting Brigade Headquarters, the Von Braun Complex, and the Rotary Wing Center commences, coordination with the Redstone Arsenal's IRP and ORAP should occur. The most recent data regarding the nature and extent of soil and groundwater contamination would be reviewed to determine if safety monitoring during construction (especially intrusive activities adjacent to the IRP and ORAP sites) is necessary. Construction workers should receive unexploded ordnance (UXO) awareness training for construction activities at RSA-072. Following these safety precautions would reduce the likelihood of safety incidents related to IRP and ORAP sites, and thus impacts from working in the vicinity of these sites would not be considered significant. The presence of these IRP and ORAP sites is not likely to impact the long-term operation of the Preferred Alternative facilities. Redstone Arsenal will continue to further investigate the contaminated sites and proceed with the appropriate remedial actions as required by state regulations and/or Federal mandates.

4.13.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to the current protocol for management and disposal of hazardous materials and wastes or to IRP and ORAP sites due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.14 Safety and Occupational Health

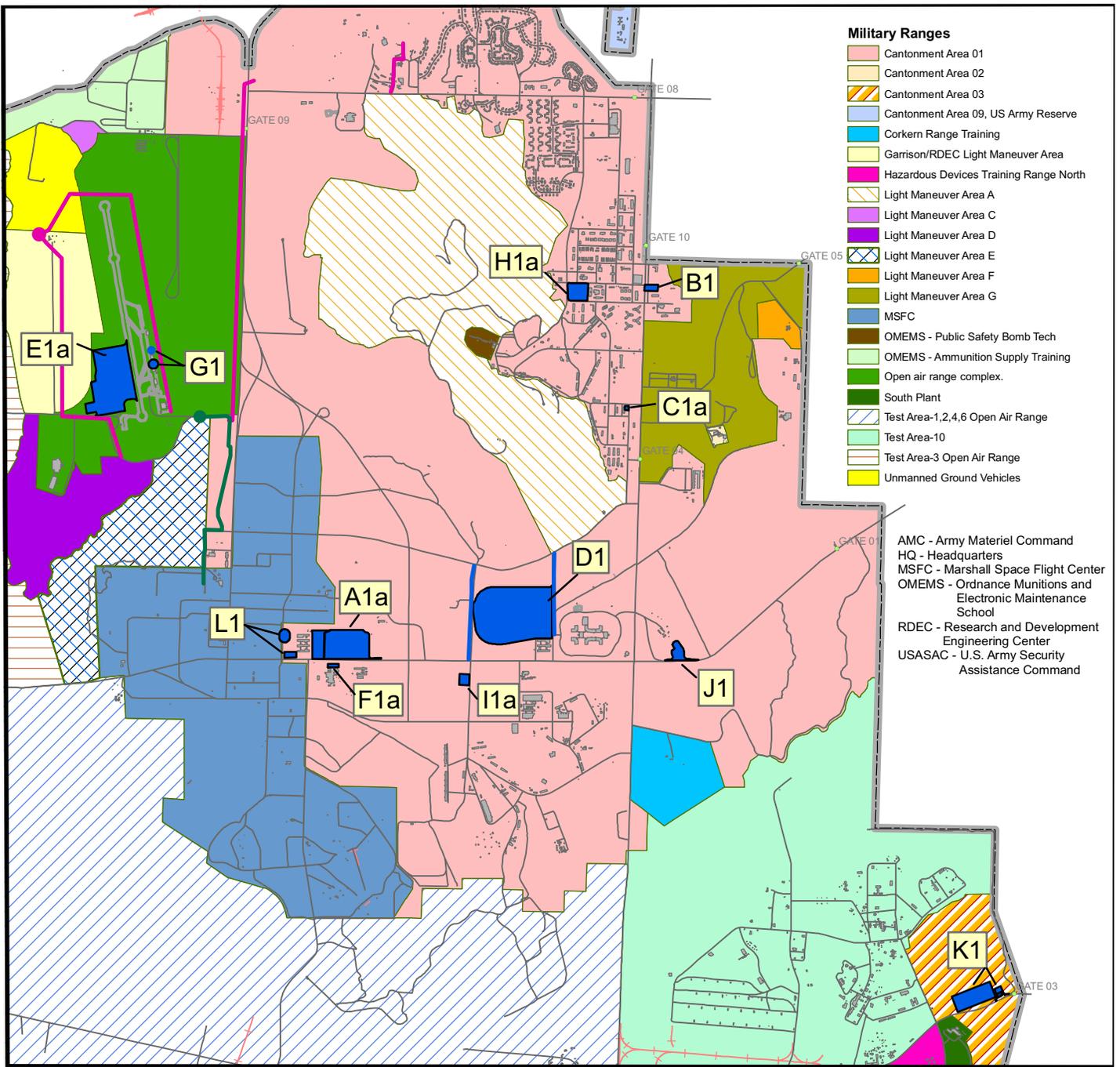
4.14.1 AFFECTED ENVIRONMENT

This section describes the existing safety and occupational health conditions at Redstone Arsenal. Some operations have caused various safety concerns from test ranges and flight activities.

4.14.1.1 Test Ranges

Operations on Redstone Arsenal have involved testing of military weapon-systems and components. Seven test areas comprise approximately 15,800 acres, or over 40 percent, of Redstone Arsenal and are primarily located in the western and southern portions of the arsenal. Three of these test areas are shown on Figure 4.14-1 (U.S. Army Missile Command 1994). Some of these test areas have been used extensively as ranges for testing missiles, rockets, warheads, explosives, guns, and slugs (simulated rockets) (U.S. Army Missile Command 1994). Known or suspected unexploded ordnance (UXO) areas have been identified.

Certain test areas have also been used for detonation and burning activities. These areas also store high explosives (U.S. Army Missile Command 1994). The storage and handling of high explosives create unique safety hazards. To address these hazards, facilities that are designated to handle or store explosives are set apart from other facilities. This separation is governed by a designated area classified as an explosive safety quantity-distance (Q/D) zone, designed to safeguard the installation's population and civilian community from potential explosions. All development impacted by an explosive safety zone must comply with DoD Directive 6055.9, "DoD Explosives Safety Board (DDESB) and DoD Component Explosives Safety Responsibilities" (DoD 1997). Within these zones, certain separation distances are mandated to minimize explosive hazards. These clear zones include areas surrounding explosive storage facilities and are shown on Figure 4.14-2.



AMC - Army Materiel Command
 HQ - Headquarters
 MSFC - Marshall Space Flight Center
 OMEMS - Ordnance Munitions and Electronic Maintenance School
 RDEC - Research and Development Engineering Center
 USASAC - U.S. Army Security Assistance Command

Legend

- Proposed Water Tower
- Proposed Potable Water
- Proposed Lift Station
- Proposed Sanitary Sewer
- Road
- Railroad
- Buildings
- Airfield
- Redstone Boundary

Facility Groups and Selected Alternatives *

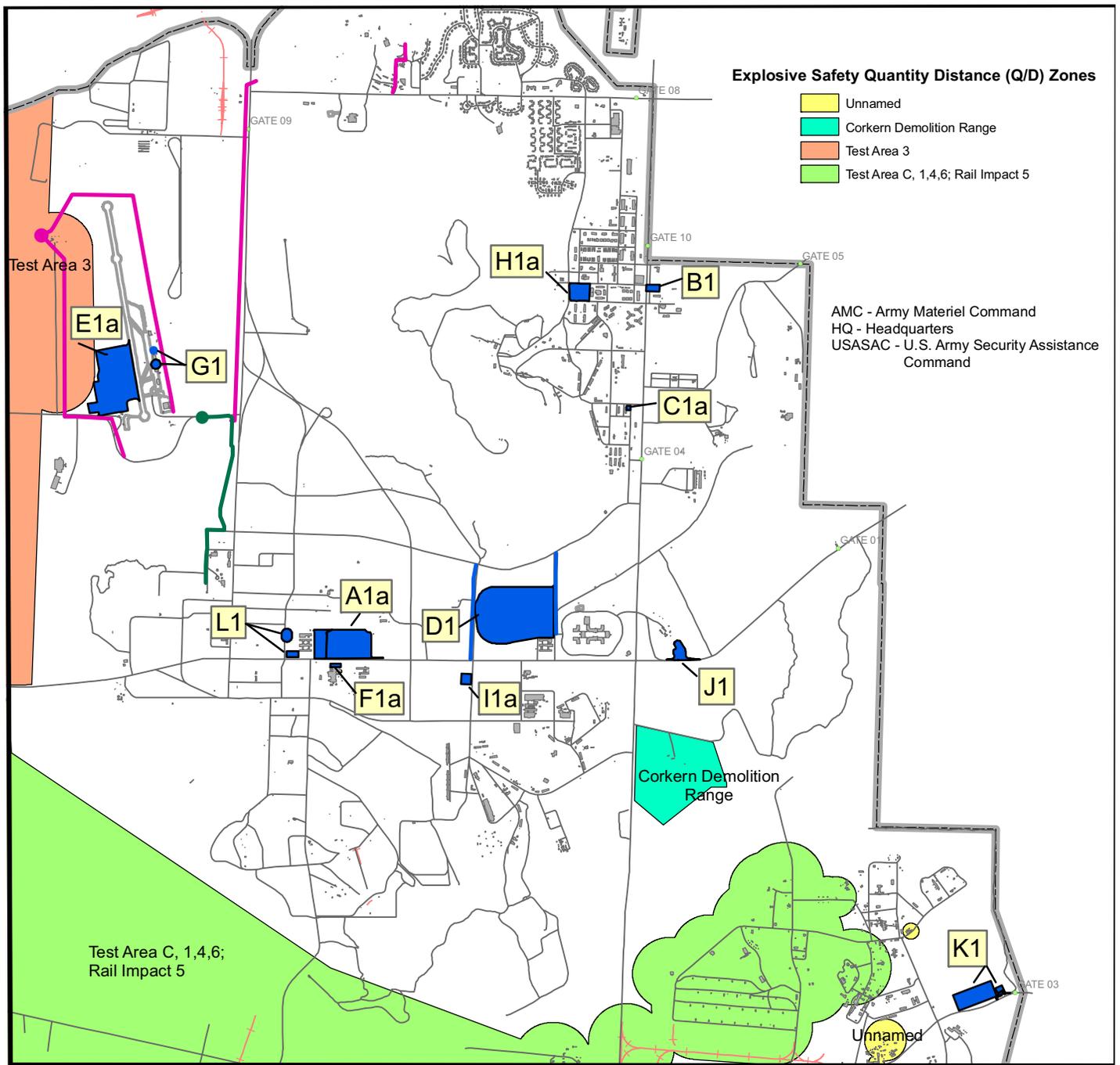
- A - AMC HQ and USASAC HQ (Alternative 1a)
- B - AMC Band Facility (Alternative 1)
- C - AMC Mail Facility (Alternative 1a)
- D - Von Braun Complex (Alternative 1)
- E - Rotary Wing Center (Alternative 1a)
- F - Rotary Wing Center of Excellence (Alternative 1a)
- G - Redstone Arsenal Airfield Facilities (Alternative 1)
- H - 2nd Recruiting Brigade HQ (Alternative 1a)
- I - Child Development Center (Alternatives 1a)
- J - Gate 1 Facilities (Alternative 1)
- K - Gate 3 Facilities (Alternative 1)
- L - Fire and Emergency Services Facility (Alternative 1)

* See Table 3.2-1 and 3.2-2 for a description of the alternatives.

A1a Facility Group A, Alternative 1a

NOTE: Detailed location information for many utility upgrades/additions will not be available until the engineering design phase. See text for more detail regarding utilities.

Figure 4.14-1
 Military Ranges



Explosive Safety Quantity Distance (Q/D) Zones

- Unnamed
- Corkern Demolition Range
- Test Area 3
- Test Area C, 1,4,6; Rail Impact 5

AMC - Army Materiel Command
 HQ - Headquarters
 USASAC - U.S. Army Security Assistance Command

Legend

- Proposed Water Tower
- Proposed Potable Water
- Proposed Lift Station
- Proposed Sanitary Sewer
- Road
- Railroad
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- Airfield
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Facility Groups and Selected Alternatives *

- A - AMC HQ and USASAC HQ (Alternative 1a)
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- I - Child Development Center (Alternatives 1a)
- J - Gate 1 Facilities (Alternative 1)
- K - Gate 3 Facilities (Alternative 1)
- L - Fire and Emergency Services Facility (Alternative 1)

* See Table 3.2-1 and 3.2-2 for a description of the alternatives.

A1a Facility Group A, Alternative 1a

NOTE: Detailed location information for many utility upgrades/additions will not be available until the engineering design phase. See text for more detail regarding utilities.



0 2,500 5,000 7,500 10,000 Feet

0 1 2 Miles

Figure 4.14-2

Explosive Safety Quantity Distance (Q/D) Zones

Future storage of explosives on Redstone Arsenal may require the development of an Explosives Site Plan (ESP) for any facility that handles or stores explosive ordnance. The ESP must be processed through an approval process. The DDESB is the final approval authority for proposed explosive facilities.

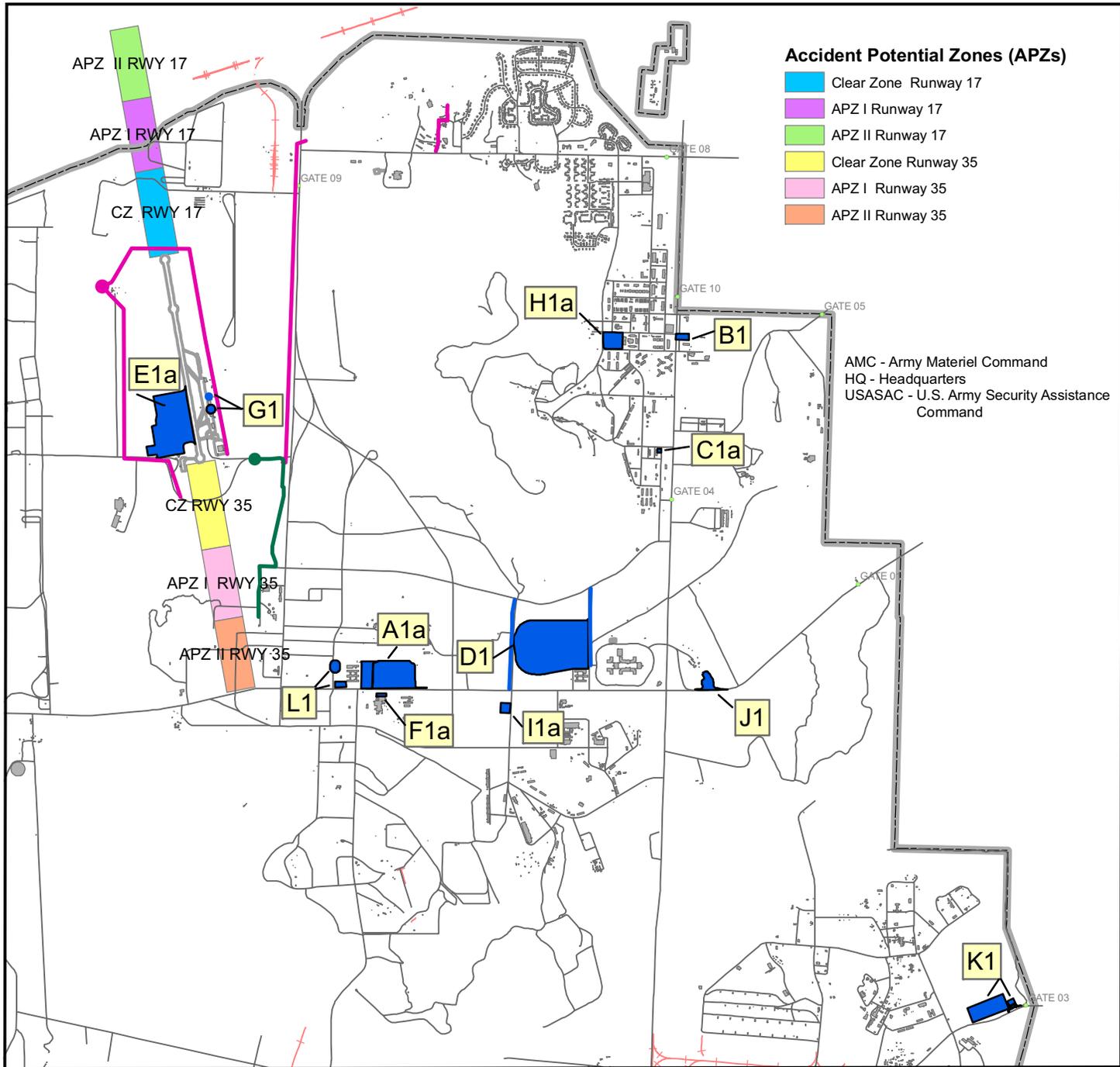
4.14.1.2 Flight Activities

The primary public concern with regard to flight safety is the potential for aircraft accidents and accidental drops over nonmilitary areas. Such mishaps may occur as a result of mid-air collisions, collisions with man-made structures or terrain, weather-related accidents, mechanical failure, pilot error, or bird-aircraft collisions (U.S. Air Force 1998 and 2004).

Aircraft at the Redstone Army Airfield have established flight corridors, flight tracks, and training areas. These aircraft operations have resulted in establishment of accident potential zones (APZ) near the runway. APZs are areas on the ground located beyond a runway's clear zone. APZs are categorized into classes (I and II). Runway clear zones are areas on the ground, located at the ends of each runway. APZ I starts at the end of a clear zone, and is centered and measured along the extended centerline of the runway.

APZ II starts at the end of APZ I, and is also centered and measured on the extended runway centerline. The Redstone Army Airfield has clear zones and both APZ I and APZ II as shown on Figure 4.14-3. Land use restrictions apply to both APZs according to *DoD Land Use Compatibility Guidelines for Clear Zone and Accident Potential Zones* (Unified Facilities Criteria 2001). According to these standards, it is not acceptable for most residential structures to be built within either APZ. Certain commercial, industrial, and transportation uses are allowed in either APZ, however, more restrictions apply to APZ I (Unified Facilities Criteria 2001).

According to Army Regulation 385-10, the Army defines four categories of accident probability: Category I, II, III, and IV. Category I mishaps result in a loss of life or permanent total disability, loss of major or mission-critical system or equipment, major property (facility) damage, severe environmental damage, mission-critical security failure, or unacceptable collateral damage. Category II mishaps result in significantly degraded mission capability or unit readiness, permanent partial disability, temporary total disability exceeding three months time, extensive damage to equipment or systems, significant damage to property or the environment, security failure, and significant collateral damage. Category III mishaps result in degraded mission capability or unit readiness, minor damage to equipment or systems, property or the environment, lost day due to injury or illness not exceeding three months, and minor damage to property or the environment. Category IV mishaps result in little or no adverse impact on mission capability, first aid or minor medical treatment, slight equipment or system damage, but fully functional and serviceable, and little or no property or environmental damage (Department of the Army 1999 and 2000).



Accident Potential Zones (APZs)

- Clear Zone Runway 17
- APZ I Runway 17
- APZ II Runway 17
- Clear Zone Runway 35
- APZ I Runway 35
- APZ II Runway 35

AMC - Army Materiel Command
 HQ - Headquarters
 USASAC - U.S. Army Security Assistance
 Command

Legend

- Proposed Water Tower
- Proposed Potable Water
- Proposed Lift Station
- Proposed Sanitary Sewer
- Road
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 - I - Child Development Center (Alternatives 1a)
 - J - Gate 1 Facilities (Alternative 1)
 - K - Gate 3 Facilities (Alternative 1)
 - L - Fire and Emergency Services Facility (Alternative 1)



* See Table 3.2-1 and 3.2-2 for a description of the alternatives.

A1a Facility Group A, Alternative 1a

NOTE: Detailed location information for many utility upgrades/additions will not be available until the engineering design phase. See text for more detail regarding utilities.

Figure 4.14-3
Accident Potential Zones (APZs)

4.14.2 CONSEQUENCES

Potential impacts to health and safety are considered significant if the Preferred Alternative would:

- Expose workers, residents, or visitors to hazardous substances; or
- Cause significant aircraft mishaps of Category I or II.

4.14.2.1 Preferred Alternative

Overall, potential impacts to safety and occupational health from the Preferred Alternative would not be significant. The Preferred Alternative would create working conditions in and around construction activities that would require proper safety precautions, including operation of machinery, and handling hazardous materials.

Construction workers would be subject to OSHA's safety and health regulations which include, but are not limited to, 29 CFR 1910.132, General Requirements for Personal Protective Equipment; 29 CFR 1900.1200 and 29 CFR 1926.59, Hazard Communication; 29 CFR 1926, Safety and Health Regulations for Construction; and any other applicable safety regulations for construction.

Other potential worker safety concerns would include possible UXO from prior operations on Redstone Arsenal. Although most all surface UXO have been removed throughout the installation, there may be the potential of undiscovered explosive hazards in the subsurface soils. More specifically, RSA-072, which is a designated RCRA site, is an old range that may have buried UXO. Therefore, there may be some risk to worker safety if UXO is encountered during the construction of the Rotary Wing Center (Facility Group E, Selected Alternative 1a). Consequently, all site workers would need to be trained in identification and proper reporting of UXO to reduce safety risks.

In addition to the above-mentioned safety precautions, there may be special precautions, such as monitoring, necessary for any ground disturbance related to the 2nd Recruiting Brigade Headquarters (Facility Group H, Selected Alternative 1a), the Von Braun Complex Phases III-IV (Facility Group D, Selected Alternative 1), and the Rotary Wing Center (Facility Group E, Selected Alternative 1a) due to the fact that these facilities would be located in the vicinity of designated IRP or ORAP sites. Based on the proximity of these sites to the proposed facility sites (see Figure 4.13-2), future excavation or construction activities may require monitoring and the use of personal protective equipment for worker health and safety.

Long-term safety and occupational health impacts associated with the Preferred Alternative are discussed below.

Test Ranges. The majority of the Preferred Alternative project areas is located within the cantonment area and would not overlay current test ranges. However, the proposed Rotary Wing Center (Facility Group E, Selected Alternative 1a) is located in an open air range complex. This test range is used primarily for routine air operations, which would coincide with the planned development.

The proposed Rotary Wing Center is also located near Test Area 3 Q/D Zone, and consequently its proposed potable water line and water tower are within this test area. Although the proposed utilities are located within Test Area 3 Q/D Zone, these are non-occupied structures. Therefore, the personnel associated with the Preferred Alternative would not be impacted by potential explosive hazards (Figure 4.14-2). Part of the proposed Rotary Wing Center is also located on Test Area B, which is an inactive test area that is currently a RCRA site as mentioned above. This area may have undiscovered UXO and UXO worker awareness training would be required.

Flight Safety. The Preferred Alternative would not be located within any APZs. However, a proposed potable water line and water tower associated with the Rotary Wing Center (Facility Group E, Selected Alternative 1a) (see Figure 4.14-3) would be located near the runway. Previous studies have determined that its elevation would not impact any imaginary surfaces at the airfield and would not be located in any APZs or runway clear zone. Notification of construction to the Federal Aviation Administration would be required (Greene 2006d). Furthermore, the anticipated flight operations from the Rotary Wing Center would use the existing runway at the Redstone Army Airfield and would not create any additional APZs.

Aircraft mishaps at Redstone Army Airfield may increase as a result of the increase in aircraft operations. The Preferred Alternative would utilize roughly 24 aircraft consisting of the following: T34 fixed wing naval trainer, C12 twin engine turbo prop aircraft, UH1, OH58, UH60A and M models, AH64 Apache A and D models, CH47 D and F models, and UAV (Burkhead 2006a). It is difficult to predict the precise location of an aircraft accident, should one occur. Major considerations in any accident are loss of life and damage to property. The aircrew's ability to exit from a malfunctioning aircraft is dependent on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors limit the probability of impacts from a disabled aircraft in a populated area. These factors include: the ROI and immediate surrounding areas have relatively low population densities; aircraft pilots are instructed to avoid direct over flight of population centers at very low altitudes; and, finally the limited amount of time the aircraft is over any specific geographic area (Department of the Army 1999 and U.S. Air Force 1998).

Secondary effects of an aircraft crash include the potential for fire and environmental contamination. Again, because the extent of these secondary effects is situation-dependent, they are difficult to quantify (Department of the Army 1999 and U.S. Air Force 1998). The terrain that would be flown over in the ROI consists of a diverse assemblage of wetlands and surface water, forests, grasslands, karst features, and developed areas. Should a mishap occur, vegetated areas would have a higher risk of experiencing extensive fires during the relatively dry summer or fall months than during the moister winter or spring. When an aircraft crashes, it may release hydrocarbons. Petroleum, oils, and lubricants not consumed in a fire could contaminate soil and water, and the presence of numerous sinkholes across the ROI increases the chance that contaminants would enter the groundwater system; surface or groundwater contamination in the vicinity of the Redstone Arsenal Airfield would be especially problematic because of a nearby groundwater-dependent endangered species (see Section 4.8.1.3). Local terrain conditions, along with emergency response time and subsequent spill response actions, would determine the effect on the surrounding soil and water resources including the extent and direction of a potential contaminant spill or plume.

4.14.2.2 No Action Alternative

Under the No Action Alternative, no changes or impacts would occur to safety and occupational health due to the BRAC-directed, BRAC-discretionary, and non-BRAC installation support or associated future master planning actions at Redstone Arsenal.

4.15 Cumulative Effects

Cumulative effects are those environmental impacts that result from the incremental effects of other past, present, or reasonably foreseeable future actions when combined with the Proposed Action. CEQ regulations stipulate that the cumulative effects analysis within an EA consider the potential environmental impacts resulting from the “incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions” (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively substantial, actions undertaken over a period of time by various agencies (Federal, state, and local) or individuals.

The scope of the cumulative effect analysis involves evaluating impacts to environmental resources by geographic extent of the effects and the time frame in which the effects would be expected to occur. Past, present, and reasonably foreseeable actions are identified first, followed by the cumulative effects that could result from these actions when combined with the Preferred Alternative. Irreversible and irretrievable commitments of resources are also discussed in this section.

4.15.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

The geographic area analyzed for cumulative effects includes both Redstone Arsenal and approximately 1 mile surrounding the base. To assess the potential cumulative effects, projects were identified that could reasonably be expected to occur through 2016, the estimated completion date of the final master planning project in the Preferred Alternative. Six reasonably foreseeable future projects and two ongoing projects were identified on Redstone Arsenal. One of these future projects would occur both on- and off-post. Three reasonably foreseeable actions were identified within 1 mile surrounding the base. No relevant past or present actions were identified in the area 1 mile surrounding the base. The identified projects are summarized below.

- Patton Road bridge replacement at Martin Road (on-post) – ongoing project to repair the bridge, which was badly damaged in June 2006. This project is scheduled to be completed in early 2007.
- Marshall Space Flight Center renovations (on-post) – ongoing project to consolidate similar NASA functions into campus-like complexes, involving construction of new facilities and demolition of outdated ones within Redstone Arsenal’s NASA lease area. No new permanent personnel are expected as a result of these renovations. Most construction and demolition is expected to be completed by 2015.
- School Age Children Facility, Ages 6-10 (on-post) – future project involving an addition to the Buildings 3145 and 3148 complex in the family housing area. This facility would absorb the personnel and children in the after-school care program

currently housed in a different facility. Construction is expected to commence in late 2006.

- System Software Engineering Facility, Phase I of Phase II (on-post) – future project involving construction of a facility that would be connected to Building 6263 in the Software Engineering Directorate complex south of Redstone Airfield. Although some personnel would relocate to this facility from elsewhere on-post, approximately 200 new personnel are expected from off-post. Construction is expected to commence in late 2006.
- Residential Communities Initiative (on-post) – future project with the broad objective to transfer management of the arsenal’s 457 military family housing units to a limited liability company composed of the Army and a development partner to improve the overall quality of on-post housing and ancillary facilities. As part of this initiative, 227 housing units would be demolished during the first two years of implementation, which is in line with the decreasing number of enlisted personnel at the arsenal. Demolition is expected to begin in October 2006.
- Secure Operations Site (on-post) – future project involving an addition to the Federal Bureau of Investigation’s Hazardous Devices School located in the Buildings 7010 through 7012 complex on Post Road south of Redstone Road. This project will not bring new personnel from off-post. Construction is expected to commence in late 2006.
- National Center for Explosives Training and Research (on-post) – future project including an administration and classroom facility in the Corporal Road area on the lower northeastern portion of the arsenal and an explosives training range east of Pershing Road on the southern portion of the arsenal. This facility is expected to bring in approximately 65 new permanent personnel and would accommodate groups of students present for 2 to 3 weeks at a time. Construction is expected to commence in late 2008.
- Southern Bypass Highway (on- and off-post) – future project, which has been studied since 1988, entailing construction of an approximately 14.9-mile long, multi-lane, limited access roadway connecting Interstate Highway 565 to the north of Redstone Arsenal with U.S. Highway 231 to the southeast of the arsenal (see Figure 3.2-1a). Portions of this highway would lie within the limits of the City of Huntsville, and approximately 9.5 miles of the project would lie within the arsenal’s boundaries. The project would require an average right-of-way of 200 feet (U.S. Department of Transportation Federal Highway Administration and Alabama Department of Transportation 1996). Phase I of the project, which would run south from Interstate Highway 565, around the southern edge of Madkin Mountain, and then east to Martin Road near the arsenal’s Gate 1, and which comprises the largest on-post portion of the highway, awaits full Congressional Appropriation. However, some preliminary engineering work for Phase I has commenced. Phases II and III of the project skirt the eastern boundary of the arsenal as they run south from Martin Road and then east to U.S. Highway 231, and also await full Congressional Appropriation (City of Huntsville 2004). On-post highway interchanges would be located at Rideout Road, Toftoy Thruway, and Martin Road. No major construction can begin on the project until full appropriations have been made, and therefore no reliable timeframe for the project is

available. However, the Southern Bypass is a high priority on the National Highway System, and therefore it is assumed for the purpose of this analysis that construction on Phase I would commence between 2010 and 2015.

- Rotary Wing Stage Field (off-post) – future project involving the construction of a facility that would be used by ATTC engineers from the on-post Rotary Wing Center (Facility Group E, Selected Alternative 1a) to conduct rotary wing aircraft test exercises. This facility would most likely be located on off-post leased land. Construction is expected to commence prior to 2010.
- Zierdt Road expansion (off-post) – future project to widen this road, which trends north-south along the western boundary of Redstone Arsenal, from 2 to 5 lanes. The portion of this project between the Huntsville city limits south to a point south of Martin Road is expected to commence in 2006 and would be completed in 2007. The portion of the project from south of Martin Road south to Beadle Lane is expected to commence in 2006 and would be completed in 2009 (City of Huntsville 2004).
- Martin Road expansion (off-post) – future project to widen the portion of this road running east-west between Zierdt Road and Wall Triana Highway from 2 to 4 lanes. Construction is expected to take place between 2009 and 2012 (City of Huntsville 2004).

4.15.2 CUMULATIVE EFFECTS SUMMARY

4.15.2.1 Land Use

No cumulative effects to land use would occur.

4.15.2.2 Aesthetics and Visual Resources

The Marshall Space Flight Center renovations, construction of the National Center for Explosives Training and Research, and construction of the Southern Bypass highway would each occur within the visual range of various Preferred Alternative locations, and construction activities may occur simultaneously. Aesthetic impacts from the Preferred Alternative construction activities would combine with the aesthetic impacts from these temporally and spatially proximate construction activities to cause temporary cumulative effects to aesthetic resources, but these effects would be short term and would not be significant.

4.15.2.3 Air Quality

Overlapping timeframes of construction activities for the Preferred Alternative and ongoing and future projects would result in temporary cumulative effects to air quality from increased PM, vehicle emissions, and wind-borne dust (i.e., fugitive dust), although these effects are not considered significant. Once completed, the two road expansion projects west of the arsenal should have beneficial effects on air quality by reducing off-post traffic congestion. Conversely, increased vehicular traffic on Redstone Arsenal due to personnel increases would contribute to vehicle emissions from the Southern Bypass highway once it is operational. The increases in polluting emissions would result in long-term cumulative effects to air quality, but these effects are not considered significant.

4.15.2.4 Noise

The Marshall Space Flight Center renovations, construction of the National Center for Explosives Training and Research, and construction of the Southern Bypass highway would each occur within the auditory range of various Preferred Alternative locations, and construction activities may occur simultaneously. These temporally and spatially proximate construction activities would cause temporary cumulative effects to noise levels, but the impacts would not be significant. Noise due to increased traffic on Redstone Arsenal (resulting from personnel increases) and noise from increased aviation functions at the Rotary Wing Center complex (Facility Group E, Selected Alternative 1a) would combine with vehicle noise from traffic using the Southern Bypass highway once it is operational. The increases in noise would result in long-term cumulative effects to noise levels, but the impacts would not be significant.

4.15.2.5 Geology and Soils

Through the addition of impervious surfaces to the arsenal, construction of the Preferred Alternative and ongoing and future projects would result in long-term cumulative effects to soil resources by reducing soil infiltration of precipitation. These cumulative effects would not be significant.

4.15.2.6 Water Resources

Through the addition of impervious surfaces to the arsenal, construction of the Preferred Alternative and ongoing and future projects would result in long-term cumulative effects to water resources by reducing groundwater recharge via soil infiltration. These cumulative effects would not be significant.

4.15.2.7 Biological Resources

Construction of the Preferred Alternative and ongoing and future projects would result in cumulative effects to biological resources by removing native vegetation and causing the direct loss of plant and wildlife habitats, although data are not presently available to quantify the amount and type of land disturbance. Most of the future projects would be built on previously or currently developed land, and should therefore have few long-term impacts to wildlife. However, the Southern Bypass highway (minus interchanges and access roads) would cross numerous habitat types, and would disturb approximately 360 acres of land of various types, assuming an average 200-foot right-of-way. Although many wildlife species would become acclimated to the highway and its associated traffic, the highway may still serve as a barrier to movement for some species, and for other species the addition of traffic from incoming personnel on arsenal roads due to the Preferred Alternative and traffic on the Southern Bypass may result in cumulative effects through increased wildlife-vehicle collisions. Overall, however, cumulative effects to biological resources would not be significant.

4.15.2.8 Cultural Resources

Ground disturbance due to the Preferred Alternative and ongoing and future projects would involve the potential for discovery of or impact to previously unrecorded cultural artifacts. Strict adherence to standard operating procedures would minimize the chance for adverse impacts, and therefore cumulative effects to cultural resources would not be significant.

4.15.2.9 Socioeconomics

Short-term effects on employment would occur due to the overlapping timeframes for construction activities of the Preferred Alternative and ongoing and future projects, as the number of construction jobs would increase to meet demand. The increase in population growth would increase the demand for services and infrastructure, ultimately resulting in increases in the types and amount of infrastructure and services available. Overall, cumulative effects to socioeconomics would be beneficial, but would not be significant.

4.15.2.10 Transportation

Overlapping timeframes of construction activities for the Preferred Alternative and ongoing and future projects would result in temporary cumulative effects to transportation. The Patton Road bridge repair project could overlap slightly with the commencement of construction of Von Braun Complex Phase III (Facility Group D, Selected Alternative 1), which may require that construction traffic entering Gate 1 be detoured to access the construction site, and construction traffic will already be increased before that time for work on other future project construction. Once bridge repairs are complete, construction traffic for Preferred Alternative projects which are scheduled to commence later in 2007 and in 2008 would still have to compete with construction traffic going to or from concurrent future project sites.

Once the first Preferred Alternative projects become operational in 2009, approximately 4,200 new personnel would be working at Preferred Alternative and ongoing and future project locations. These new personnel would have to compete with construction traffic still working on renovations at the Marshall Space Flight Center and construction projects for the National Center for Explosives Training and Research, and the Southern Bypass highway. By the time construction of the last Preferred Alternative project is complete in 2016, approximately 7,065 new personnel will be working at Preferred Alternative and future project locations, and these drivers will still be competing with construction traffic for the Southern Bypass highway.

Without on-post road improvements, the two off-post road expansion projects to the west of Redstone Arsenal will have no effect upon on-post traffic. Because there are no on-post road expansion projects currently planned, Redstone Arsenal would need to continue to alleviate traffic congestion through administrative mechanisms such as flex-time. Additional traffic from the Preferred Alternative would add to the effects of traffic from the ongoing and future projects, and although these effects would result in inconveniences, the effects would not be significant.

4.15.2.11 Utilities

Utilities at the Marshall Space Flight Center are considered adequate to serve the needs for renovated facilities there, although distribution modifications and trenching will be required within the NASA lease area. Likewise, utilities are available on-site for the majority of the other future projects, although water, sewage, and communications would have to be extended 2,300 feet to serve the National Center for Explosives Training and Research training range. Overall, these impacts when combined with those of the Preferred Alternative would not cause significant effects to utilities.

4.15.2.12 Hazardous Materials, Hazardous Waste, and Environmental Restoration Sites

Overlapping timeframes of demolition and construction activities for the Preferred Alternative and ongoing and future projects would result in the increased flow of hazardous waste to disposal facilities, presumably including ACM and/or LBP debris as well as other by-products of demolition and construction activities. Strict adherence to local, state, and Federal regulations, as well as Army and Redstone Arsenal policies and procedures, would minimize any adverse cumulative effects from these materials.

The System Software Engineering Facility, Phase I of Phase II project lies fully within ORAP site RSA-072 (discussed in Section 4.13.2.1), which would also be partially overlain by the Rotary Wing Center complex (Facility Group E, Selected Alternative 1a). The proposed route of the Southern Bypass highway overlays IRP site RSA-224, which is adjacent to the location of Von Braun Complex Phase III (Facility Group D, Selected Alternative 1). However, the presence of these IRP and ORAP sites is not likely to directly impact either the construction process or the long-term operation of these facilities. Personnel at Redstone Arsenal will continue to further investigate the contaminated sites and proceed with the appropriate remedial actions as required by state regulations and/or Federal mandates. Overall, cumulative effects from or to hazardous materials, hazardous waste, and IRP and ORAP sites would not be significant.

4.15.2.13 Safety and Occupational Health

Construction of the ongoing and future projects will involve risks to worker safety and health similar to those that would be encountered during construction of the Preferred Alternative facilities. With proper training and education of personnel, cumulative effects due to construction would not be significant.

Operation of the National Center for Explosives Training and Research training range will involve risks to personnel in the form of high explosives. Again, through proper training and education of personnel, cumulative effects due to the Preferred Alternative and these activities would not be significant.

Operation of the Southern Bypass highway through Redstone Arsenal would have adverse impacts upon security and force protection by allowing unsecured, undocumented travel across the installation. The proposed route of the Southern Bypass would come within 220 feet of the northern edge of the Von Braun Complex footprint (Facility Group D, Selected Alternative 1), although the Von Braun Complex buildings would be set back approximately 680 feet from the highway, and would be separated from the highway by parking areas and force protection measures. A security checkpoint would have to be constructed at the Toftoy Thruway interchange, and security measures put in place along the highway corridor to ensure that personnel and asset safety is not compromised. Cumulative effects to safety and occupational health would not be significant.

4.15.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Under NEPA, a review of significant irreversible and irretrievable effects that result from development of the Proposed Action is required (40 CFR 1502.16). Irreversible commitments of resources are those resulting from impacts to resources so they cannot be completely restored to their original condition. Irretrievable commitments of resources are those that occur when a resource is removed or consumed and will therefore never be available to future generations for their use.

Under the Preferred Alternative, irretrievable commitments of resources would occur from the consumptive use of electrical energy and fuel during the construction and operations phase. There would be a relatively long-term commitment of the land resources required for construction and operation of new facilities; this commitment of land resources is irreversible because the land likely cannot be completely restored to its original condition and other uses will be precluded during the time the land is being used for the proposed use, but it does not constitute an irretrievable commitment of resources because the use is not consumptive and the land would remain available to future generations. Other irreversible or irretrievable commitments of resources would include the following: a minimal amount of soil loss through either wind or water erosion during construction activities and a small loss of native vegetation.

Under the No Action Alternative, no additional irreversible or irretrievable commitments of resources would occur.

4.16 Mitigation Summary

Mitigation measures are measures that are integral to an alternative to reduce impacts. No mitigation measures are required for the Preferred Alternative discussed in this EA, because resulting impacts are not significant.

5.0 FINDINGS AND CONCLUSIONS

As noted in this analysis, direct, indirect, and cumulative impacts of the Preferred Alternative and the No Action Alternative have been considered. No significant adverse impacts were identified. In the case of aesthetics and visual resources and socioeconomics, beneficial impacts were identified. Therefore, the issuance of a FNSI is warranted, and preparation of an environmental impact statement is not required. Implementation of the No Action Alternative would result in the continuation of conditions that cannot support the mission and appropriate living and working conditions at Redstone Arsenal. For the BRAC-directed actions, it is noted that for the No Action Alternative, maintenance of current conditions is not feasible, since the BRAC actions are required by law to be implemented.

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*Environmental Assessment for Base Realignment and Closure,
Installation Support, and Associated Future Master Planning
Actions at Redstone Arsenal, Alabama*

APPENDIX A

AIR EMISSIONS

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APPENDIX A. AIR EMISSIONS

This appendix provides background and supporting information on the estimation and calculation of external combustion, fuel storage tank, and generator emissions.

A1.0 External Combustion Emissions

Anticipated energy requirements for the Preferred Alternative have been determined to be natural gas or steam (Green 2006). For the facilities requiring natural gas, heating requirements in British thermal units per hour (BTU/hr) have been determined (Green 2006) and are the basis for the external combustion calculations (see Table A-1). Long-term air quality impacts from the use of natural gas at each proposed facility would include emissions from external combustion units used to provide building heating and domestic hot water heaters. Boiler requirements were not determined as they would depend upon the number of personnel using the buildings and the type of activities. Furthermore, heating furnaces may also serve as a boiler.

Table A-1. Heating Requirements for the Preferred Alternative.

Facility	Expected Heating Requirement (MMBTU/hr)
AMC HQ	12
USASAC HQ	2.62
AMC/USASAC HQ Phase II	2.62
AMC/USASAC HQ Phase III	7.5
Rotary Wing Center	7.2
Von Braun Phase III	27.24
Von Braun Phase IV	4.68
Von Braun Phase V	4.56
Fire and Emergency Center	0.696
Child Development Center	0.540
Visitor Center and Gate 1	0.260

AMC Army Materiel Command
 HQ Headquarters
 MMBTU/hr million British thermal units
 USASAC U.S. Army Security Assistance Command

To estimate the seasonal variation of heating demand, the “heating hours per month” were assumed to vary from 100 percent in the winter months to 5 percent during the summer months as shown in Table A-2. This estimation, when combined with the proposed facilities heating capacity, yielded an annual natural gas consumption of 290.93 million cubic feet per year.

Table A-2. Estimated Seasonal Heating Demand.

Month	Days/month	Hours/month	Assumed monthly heating rate	Estimated heating hours
January	31	744	100%	744
February	28	672	100%	672
March	31	744	75%	558
April	30	720	50%	360
May	31	744	25%	186
June	30	720	10%	72
July	31	744	5%	37.2
August	31	744	5%	37.2
September	30	720	15%	108
October	31	744	25%	186
November	30	720	75%	540
December	31	744	100%	744
Total heating hours/year				4,244

This gas consumption rate was applied to emission factors from Chapter 1 of the U.S. Environmental Protection Agency's (EPA's) *Compilation of Air Pollutant Emission Factors* (AP-42). Emissions from the combustion of natural gas in an external combustion unit would include nitrogen oxides (NO_x), particulate matter [total, particulate matter with an aerodynamic size less than or equal to 10 microns (PM₁₀), and particulate matter with an aerodynamic size less than or equal to 2.5 microns (PM_{2.5})], sulfur oxides (SO_x), volatile organic compounds (VOCs), carbon monoxide (CO), and hazardous air pollutants (HAPs). Emissions calculations are presented in the following spreadsheet.

Criteria Pollutants:

Source	Annual Gas Consumption (Mil Cu ft / yr)	Tons/Year					Total HAPs
		PM ₁₀	SO ₂	CO	NO _x	VOC	
Boilers and Furnaces (Base-Wide)	290.93	1.11	0.09	12.22	14.55	0.80	0.58
AP-42 Emission Factor (lb/mil cu ft) =		7.60	0.60	84.00	100.00	5.50	3.9803

A2.0 Fuel Storage Tank Emissions

Two 30,000-gallon above-ground fixed horizontal storage tanks (ASTs) would be used for fueling aircraft at the Redstone Arsenal Airfield. The proposed tanks would hold JP-8 fuel. Emissions from the fuel storage tanks were calculated using the EPA's *TANKS 4.09* software. *TANKS* is a Windows-based computer software program, developed by the American Petroleum Institute, that estimates VOC emissions from fixed- and floating-roof storage tanks. *TANKS* is based on the emission estimation procedures from Chapter 7 of EPA's *Compilation of Air Pollutant Emission Factors* (AP-42). The following spreadsheet shows the tank specifications, climate, and fuel characteristics that were used to calculate the tank emissions and the results of those calculations.

TANK EMISSION SUMMARY

Jun-06

Two X 30,000 Gallon Horizontal Tanks		Material Handling Data					VOC Emission Rates (From Tanks 4.1)						
Product	Config-uration	Capacity (gal)	Length (ft)	Diam (ft)	Total Annual Throughput (gal/yr)	No. of tanks	Througput (gal/yr)	Turnovers per Year	Max Fill Rate (gal/hr)	Working Losses ** (lb/yr)	Breathing Losses (lb/yr)	Maximum Hourly** (lb/hr)	Annual VOC Emissions (ton/yr)
Jet Kerosene (JP-8)	Horizontal	30,000	35.00	12.07	382,263	2	191,132	6.37	3,000	5.23	7.27	0.0821	0.0063
							191,132	6.37	3,000	5.23	7.27	0.0821	0.0063

A3.0 Generator Emissions

Six emergency generators would be required for the Preferred Alternative to provide backup electrical power when needed. Emissions from combustion of diesel fuel in these generator engines were estimated based on the size of the generator engine and the number of hours the unit would operate in a given year (500 hours). The hours each unit operates along with the unit capacity were applied to emission factors from Chapter 3 of EPA's *Compilation of Air Pollutant Emission Factors* (AP-42). The following spreadsheet shows the size and capacity that were used to calculate the generator emissions and the results of those calculations.

Redstone Arsenal, AL

Assume

500 Hours of Operation per Year

Generator Emissions

Generator ID No.	Location	Power Rating (kW)	Annual Operation (hr/yr)	kW-hr/yr
Redstone 001	Von Braun Complex	1,500	500	750,000
Redstone 002	Von Braun Complex	1,500	500	750,000
Redstone 003	AMC/HQ	3,000	500	1,500,000
Redstone 004	AMC/HQ	3,000	500	1,500,000
Redstone 005		75	500	37,500
Redstone 006		25	500	12,500

Total: 4,550,000

Source	Annual Operational Rate (kw-hr)	Annual Emissions (Tons/Year)				
		PM₁₀	SO₂	CO	NO_x	VOC
Generator Operations	4,550,000	6.72	6.27	20.37	94.31	7.68

Emission Factor (lb/kw-hr) = 0.0030 0.0028 0.0090 0.0415 0.0034

*Environmental Assessment for Base Realignment and Closure,
Installation Support, and Associated Future Master Planning
Actions at Redstone Arsenal, Alabama*

APPENDIX B

NOISE

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APPENDIX B. NOISE

This appendix provides the Center for Health Promotion and Preventive Medicine's *Operational Noise Consultation 52-ON-04CB-06, Operational Noise Contours for Redstone Arsenal, AL, July 2006*.



DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-EON

10 JUL 2006

MEMORANDUM FOR

Environmental Planning Support Branch (SFIM-AEC-TSP/Ms. Alicia Booher), U.S. Army
Environmental Center, 5179 Hoadley Road, Aberdeen Proving Ground, MD 21010-5401
Environmental Management Division (IMSE-RED-PWE-IC/Mr. John Souza), U.S. Army
Garrison – Redstone, 4488 Martin Road, Redstone Arsenal, AL 35898-5000

SUBJECT: Operational Noise Consultation 52-ON-04CB-06, Operational Noise Contours for
Redstone Arsenal, AL, July 2006

1. REFERENCES. Enclosure 1 contains the references utilized in the consultation.
2. AUTHORITY. The Army Environmental Center, Aberdeen Proving Ground, MD funded this study.
3. PURPOSE. To provide Redstone Arsenal noise contours for the appropriate National Environmental Policy Act (NEPA) documentation for realignment under Base Realignment and Closure (BRAC) actions.
4. BACKGROUND. Redstone Arsenal is located in northern Alabama between the Tennessee River and the City of Huntsville. Under BRAC actions, Redstone Arsenal will gain the Aviation Technical Test Center from Fort Rucker, Alabama and lose the Ordnance Missile and Munitions Center and School (OMMCS) to Fort Lee, Virginia.
5. NOISE ZONE DESCRIPTIONS. Enclosure 2 contains the Noise Zone Descriptions and Land Use Guidelines used in this consultation.
6. NOISE CONTOURING PROCEDURES.
 - a. LARGE CALIBER OPERATIONS.

(1) The noise simulation program used to assess large caliber weapons (20mm and greater) noise is BNOISE2 (U.S. Army 2003). The BNOISE2 program requires operational data concerning type of weapons fired from each range or firing point including demolitions, the number and type of rounds fired from each weapon, the location of targets for each range or

Readiness thru Health

firing point, and the amount of propellant used to reach the target. Existing records on range utilization along with reasonable assumptions are used as BNOISE2 inputs. The assessment period used to create the Redstone Arsenal C-weighted Day-Night Level (CDNL) contours is 104 days.

(2) The inputs used to generate the demolition noise contours for this report were created using the data summarized in Tables 1 and 2.

TABLE 1. EXISTING DEMOLITION EXPENDITURE.

RANGE	WEIGHT	QUANTITY PER YEAR
Hazardous Devices	1.5 lbs	6,870
OB/OD	25 lbs	700
Corkern	0.25 lbs	108
McKinley	0.25 lbs	256
	0.5 lbs	112
	1.25 lbs	32
	2 lbs	92
	2.5 lbs	200

TABLE 2. FUTURE DEMOLITION EXPENDITURE.

RANGE	WEIGHT	QUANTITY PER YEAR
Hazardous Devices	1.5 lbs	6,870
OB/OD	25 lbs	700

b. AIRCRAFT OPERATIONS.

(1) The low number of aircraft operations utilizing the Redstone Army Airfield (RAAF), flight corridors, flight tracks, or training areas (herein referred to as Redstone Arsenal Airspace) will not generate A-weighted day-night average level noise contours of 65 dBA or greater. Yet, there is the potential for aircraft to cause annoyance leading to noise complaints while entering/exiting the airspace. The annual RAAF activity is summarized in Table 3.

TABLE 3. ANNUAL REDSTONE ARMY AIRFIELD ACTIVITY.

AIRCRAFT TYPE	ANNUAL NUMBER OF OPERATIONS	
	DAYTIME (0700-2200)	NIGHTTIME (2200-0700)
Rotary Wing:	4,214	0
Fixed Wing: Personnel Transport (C12)	886	0
Fixed Wing: Trainer (T34)	366	0

(2) 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 three noisiest events. The maximum noise levels for the aircraft utilized in the Redstone Arsenal Airspace are listed in Tables 4 and 5. These maximum levels are compared with the levels listed in Table 6 to determine the percent of the population that would consider itself highly annoyed. While levels may be lower in the 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 4. MAXIMUM NOISE LEVELS OF ROTARY WING AIRCRAFT OPERATING IN THE REDSTONE ARSENAL AIRSPACE.

Slant Distance (Feet)	Maximum Level, dBA				
	AH-64	CH-47	OH-58	UH-1	UH-60
100	98	98	93	97	94
200	92	92	87	91	88
500	83	84	79	83	80
1,000	77	78	72	76	73
1,500	73	74	68	73	69
2,000	70	71	65	70	66
2,500	67	68	62	68	63
5,000	60	61	54	60	55

TABLE 5. MAXIMUM NOISE LEVELS OF FIXED WING AIRCRAFT OPERATING IN THE REDSTONE ARSENAL AIRSPACE.

Slant Distance (Feet)	Maximum Level, dBA				
	C-5*	C-12	C-17*	T-34	UC-35*
100	130	94	120	91	107
200	124	88	113	85	101
500	114	79	104	77	92
1,000	106	73	96	70	85
1,500	101	69	91	66	80
2,000	97	67	88	63	77
2,500	94	65	85	61	74
5,000	83	57	77	53	65
10,000	70	50	68	45	54

*Note: These aircraft are infrequent users of RAAF; less than twenty-four flights a year.

TABLE 6. PERCENTAGE OF POPULATION HIGHLY ANNOYED FROM AIRCRAFT NOISE.

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

(3) Flight corridors vary in width depending upon the type of aircraft and type of activity. Generally the aircraft fly the center line of the flight corridor but can vary anywhere within the corridor. Thus, to account for possible annoyance, the area of possible noise impact must be expanded based on the actual aircraft location within the corridor. For example, if a flight corridor is one quarter mile in width for an AH-64 at 1,000' above ground level (AGL), to account for variation in aircraft location, the overall area of noise impact would be an additional one-third mile on each side of the corridor. This gives an adequate buffer to reduce possible annoyance. The buffer dimensions were determined based on results from the SelCalc Program (U.S. Air Force 2005) which calculated areas which may receive a max level dBA above 70, based on the altitude and slant distance of the aircraft. Enclosure 3 contains a graphic description of AGL, ground track, and slant distance.

7. NOISE CONTOUR MODELING RESULTS.

a. LARGE CALIBER WEAPONS NOISE CONTOURS.

(1) For comparison purposes, the existing demolition noise contours for Redstone Arsenal that were contained in the Redstone Arsenal Installation Environmental Noise Management Plan, August 2003, are shown in enclosure 4 (Figures 4-5 and 4-6). The Land Use Planning Zone (LUPZ) (57 CDNL) extends beyond the eastern, southern, and southwestern boundaries between 1,700 and 3,300 meters. The Noise Zone II (62 CDNL) extends beyond the eastern, southern, and southwestern boundaries between 650 and 2,000 meters. The Noise Zone III (70 CDNL) extends beyond the eastern, southern, and southwestern boundaries between 800 and 1,000 meters.

(2) The future demolition noise contours for Redstone Arsenal are shown in enclosure 5. These contours reflect the existing operations at Redstone Arsenal without the demolition activity related to the OMMCS. This document does not reflect the possible addition of any other activity that may be relocated to Redstone Arsenal after the OMMCS departure. The departure of the OMMCS demolition activity has a negligible effect.

(3) To predict the risk of complaints for large caliber weapon operations, PK15(met) contours were developed. The Redstone Arsenal future demolition PK15(met) noise contours are shown in enclosure 6. The PK15(met), 115 dB contour extends beyond the eastern, southern, and southwestern boundaries between 1,200 and 6,400 meters. The PK15(met) 130 dB noise contour extends beyond the eastern, southern, and southwestern boundaries between 750 and 1,800 meters. The contours indicate a moderate probability of receiving noise complaints from most locations; with a higher probability of receiving noise complaints from certain locations.

b. AVIATION NOISE CONTOURS. The distances in Table 7 are added to the flight corridors width to account for annoyance created by activity taking place at the edge of the flight corridor. Enclosure 7 contains an example of how to illustrate the annoyance flight corridor buffers for Redstone Arsenal Airspace. The example was created using the largest rotary wing supplemental buffer at 1,000' AGL, the approximate flight track location, and is based on the assumption that the flight corridor is one-quarter of a mile wide. Use the following tables to create the buffers as appropriate and necessary for the Redstone Arsenal Airspace.

TABLE 7. REDSTONE ARSENAL AIRSPACE SUPPLEMENTAL BUFFER FLIGHT CORRIDOR WIDTHS TO REDUCE ANNOYANCE POTENTIAL.

Aircraft Type	Supplemental Buffer Width to Flight Corridors			
	<1,000' AGL	1,500' AGL	2,000' AGL	5,000' AGL
Rotary Wing:				
AH-64	1/3 Mile	1/4 Mile	1/8 Mile	--
CH-47	1/3 Mile	1/3 Mile	1/4 Mile	--
OH-58	1/4 Mile	1/8 Mile	1/8 Mile	--
UH-1	1/3 Mile	1/4 Mile	1/8 Mile	--
UH-60	1/4 Mile	1/8 Mile	1/8 Mile	--
Fixed Wing:				
Personnel Transport				
C12	1/4 Mile	1/8 Mile	1/8 Mile	--
UC35*	2/3 Mile	2/3 Mile	2/3 Mile	1/8 Mile
Cargo Transport				
C5*	1 2/3 Mile	1 2/3 Mile	1 2/3 Mile	1 1/2 Mile
C17*	1 2/3 Mile	1 2/3 Mile	1 2/3 Mile	1 1/2 Mile
Trainer				
T34	1/8 Mile	1/8 Mile	1/8 Mile	--

*Note: These aircraft are infrequent users of RAAF; less than twenty-four flights a year.

8. RECOMMENDATIONS.

a. Include the information from this consultation in the appropriate Redstone Arsenal NEPA documentation for realignment under Base Realignment and Closure actions.

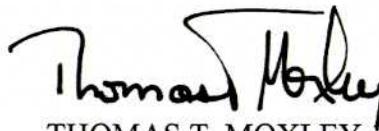
b. Although no Federal Law prohibits the Department of Defense training and testing activities from making noise, the Services have always tried to be good neighbors. Due to the risk of noise complaints from off-post neighboring residents related to the proposed training noise, Redstone Arsenal should continue the existing operational noise management and outreach program to inform the public of possible noise from training.

9. Please contact us if this report or any of our services did not meet your needs or expectations.

10. The point of contact is Ms. Kristy Broska or Dr. William Russell, Operational Noise Program, USACHPPM, at DSN 584-3829, commercial (410) 436-3829, or e-mail: kristy.broska@us.army.mil or william.russell4@us.army.mil.

FOR THE COMMANDER:

7 Encls
as



THOMAS T. MOXLEY
LTC, MS
Director, Environmental Health Engineering

CF:
COE (CESAM-PD-M) (w/encls)

REFERENCES

1. U.S. Air Force, 2005, SELCAL Noise Model, Wright-Paterson Air Force Base, OH.
2. U.S. Army, 2003, U.S. Army Construction Engineering Research Laboratories, BNOISE2 Computer Model, Version 1.3.2003-07-03.
3. 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.
4. Rylander and Bjorkman, 1988, "Maximum Noise Levels as Indicators of Biological Effects," *Journal of Sound and Vibration*, Volume 127, pages 555 - 563.

NOISE ZONES DESCRIPTIONS AND LAND USE GUIDELINES

1. Day Night Level Descriptions.

(a) The Noise Zone III consists of the area around the source of the noise in which the level is greater than 70 decibels (dB), C-weighted day-night sound level (CDNL) for large caliber weapons activity. The noise level within Noise Zone III is considered so severe that noise-sensitive land uses should not be considered therein.

(b) The Noise Zone II consists of an area where the day-night sound level is between 62 and 70 dB CDNL for large caliber weapons activity. Land use within Noise Zone II should normally be limited to activities such as industrial, manufacturing, transportation, and resource production. However, if the community determines that land in Noise Zone II areas must be used for residential purposes, then noise level reduction features of 25 to 30 decibels should be incorporated into the design and construction of the buildings.

(c) The Noise Zone I includes all areas around a noise source in which the day-night sound level is less than 62 dB CDNL for large caliber weapons activity. This area is usually acceptable for all types of land use activities.

(d) The Land Use Planning Zone (LUPZ) DNL noise contours, 57 dB CDNL represent an annual average that separates the Noise Zone II from the Noise Zone I. Taking all operations that occur over the year and dividing by the number of training days generates the contours. But, the noise environment varies daily and seasonally because operations are not consistent through all 365 days of the year. In addition, the Federal Interagency Committee on Urban Noise document states “Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.” For residential land uses, depending on attitudes and other factors, a 57 CDNL may be considered by the public as an impact on the community environment. In order to provide a planning tool that could be used to account for days of higher than average operations and possible annoyance, the LUPZ contour is being included on the noise contour maps.

(e) See Table 1 for land use guidelines.

Table 1. Land Use Planning Guidelines.

Noise Zones	Large-Caliber Weapons (CDNL)
LUPZ	57 – 62
I	< 62
II	62 - 70
III	> 70

Note: LUPZ = Land Use Planning Zone

2. PK15(met) Noise Contour Description.

(a) Community annoyance due to many types of transportation and industrial noise is typically and appropriately assessed based on average noise level over a protracted time period. The DNL is the primary descriptor used for this purpose in the United States. The DNL is the time weighted energy average sound level with a 10-dB penalty added to the nighttime levels (2200 to 0700 hours). The use of average noise level over a protracted time period generally does not adequately assess community noise impact and complaint potential due to relatively infrequent blast noise events. For example, for a demolition range at which a few rounds are detonated each year the resultant peak levels (PK) can easily exceed 115 dB in regions that annual DNL values indicate to be adequately quiet for housing.

(b) To account for statistical variation in received weapons noise level due to weather, it is recommended that the PK15(met) noise level be calculated. The peak contours show the expected level that one would get on a sound level meter when a weapon was fired. Since weather conditions can cause noise levels to vary significantly from day to day (even from hour to hour) the programs calculate a range of peak levels. This range is based on weather conditions that favor or hinder sound propagation. By plotting the PK15(met) contour, events would be expected to fall within the contours 85% of the time. This gives the installation and the community a more realistic means to consider the areas impacted by training noise without putting stipulations on land that would only receive high sound levels under infrequent weather conditions that favor sound propagation. This metric represents the best available scientific quantification for assessing the complaint risk of large and small caliber weapons ranges. The complaint risk areas for PK15(met) noise contours are defined as follows:

(1) The high risk of complaint area consists of the area around the source of the noise in which PK15(met) noise contour is greater than 130 dB for large caliber weapons.

(2) The moderate risk of complaint area consists of an area where the PK15(met) noise contour is between 115 dB and 130 dB for large caliber weapons.

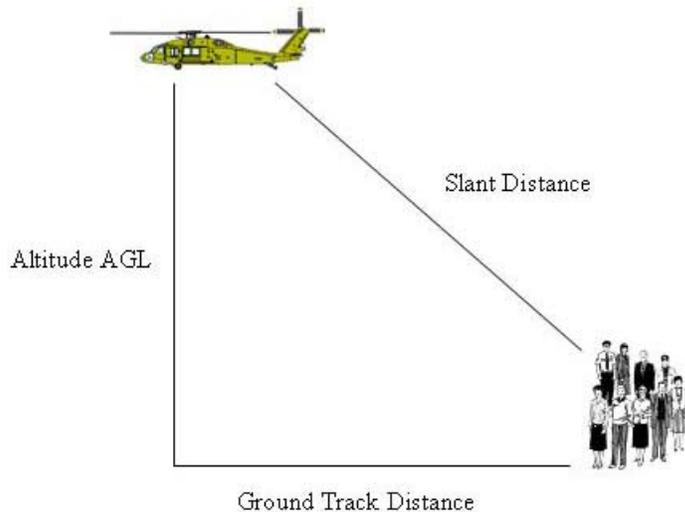
(3) The low risk of complaint area includes all areas around a noise source in which the PK15(met) noise contour is less than 115 dB for large caliber weapons.

(c) See Table 2 for complaint risk guidelines.

Table 2. Complaint Risk Guidelines.

Risk of Complaints	Demolition Activity
	PK15(met) dB Noise Contour
Low	< 115
Moderate	115 - 130
High	> 130

SUPPLEMENTAL BUFFER FLIGHT CORRIDOR



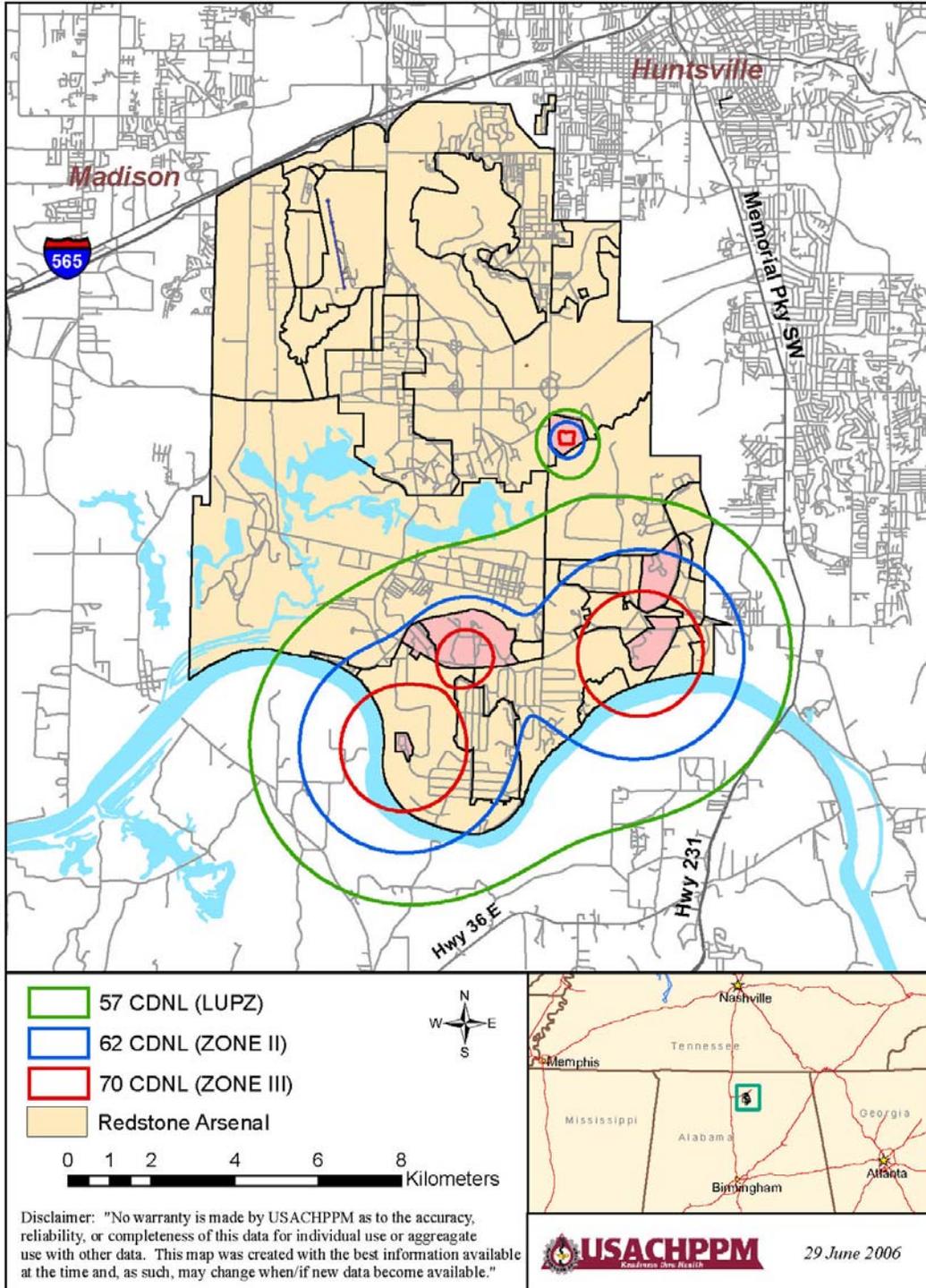
DEFENITIONS:

Altitude/AGL (Above Ground Level). Distance of the aircraft above the ground.

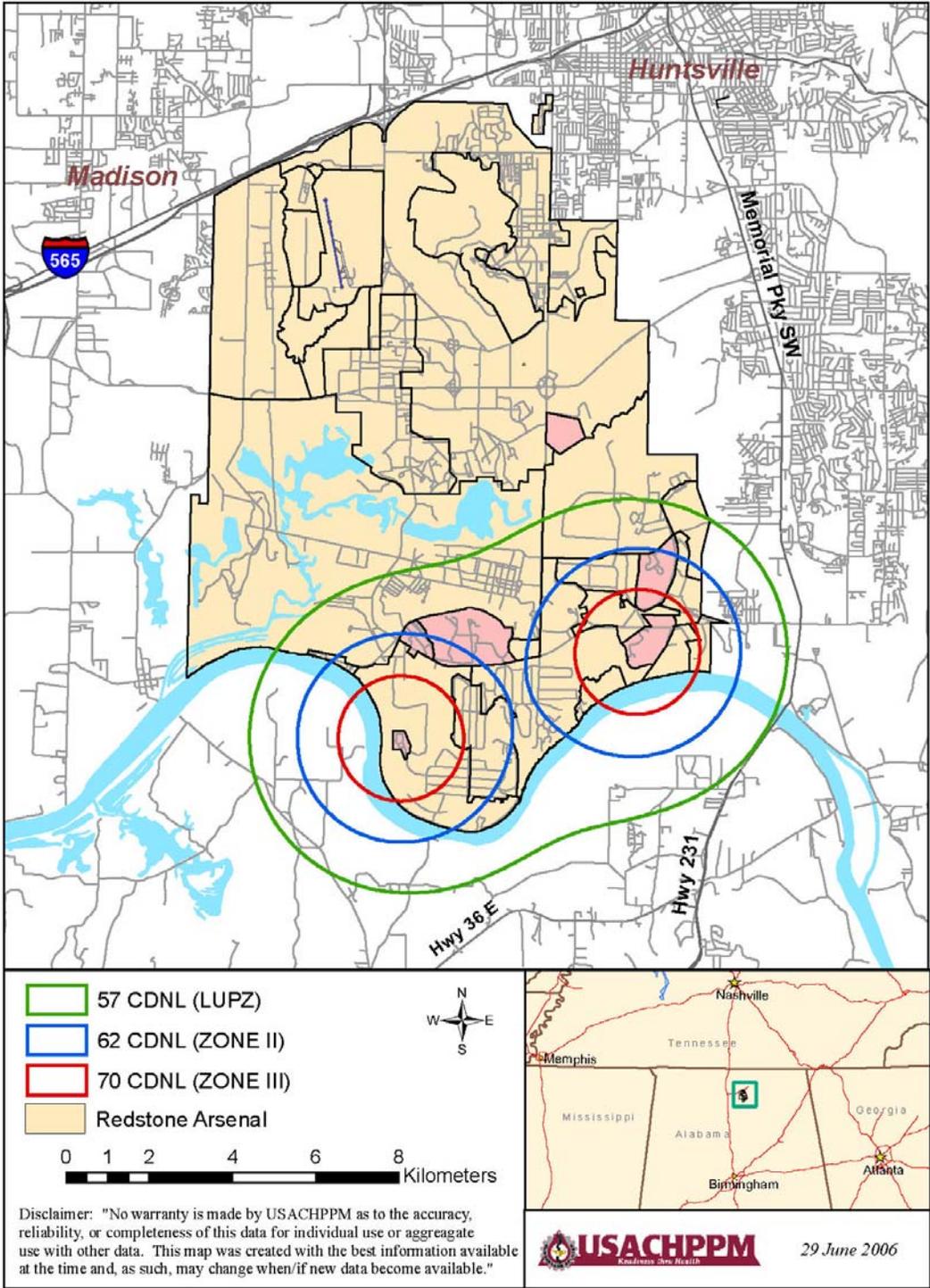
Ground Track Distance. The distance between receiver and the point on the Earth at which the aircraft is directly overhead.

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 of the aircraft and the distance between the receiver and the aircraft's ground track distance.

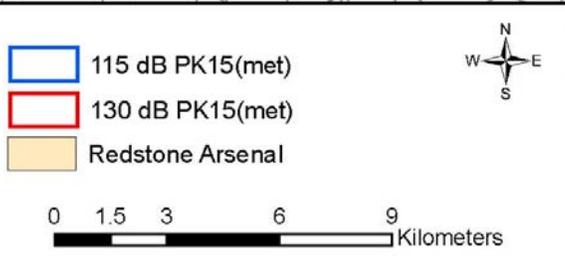
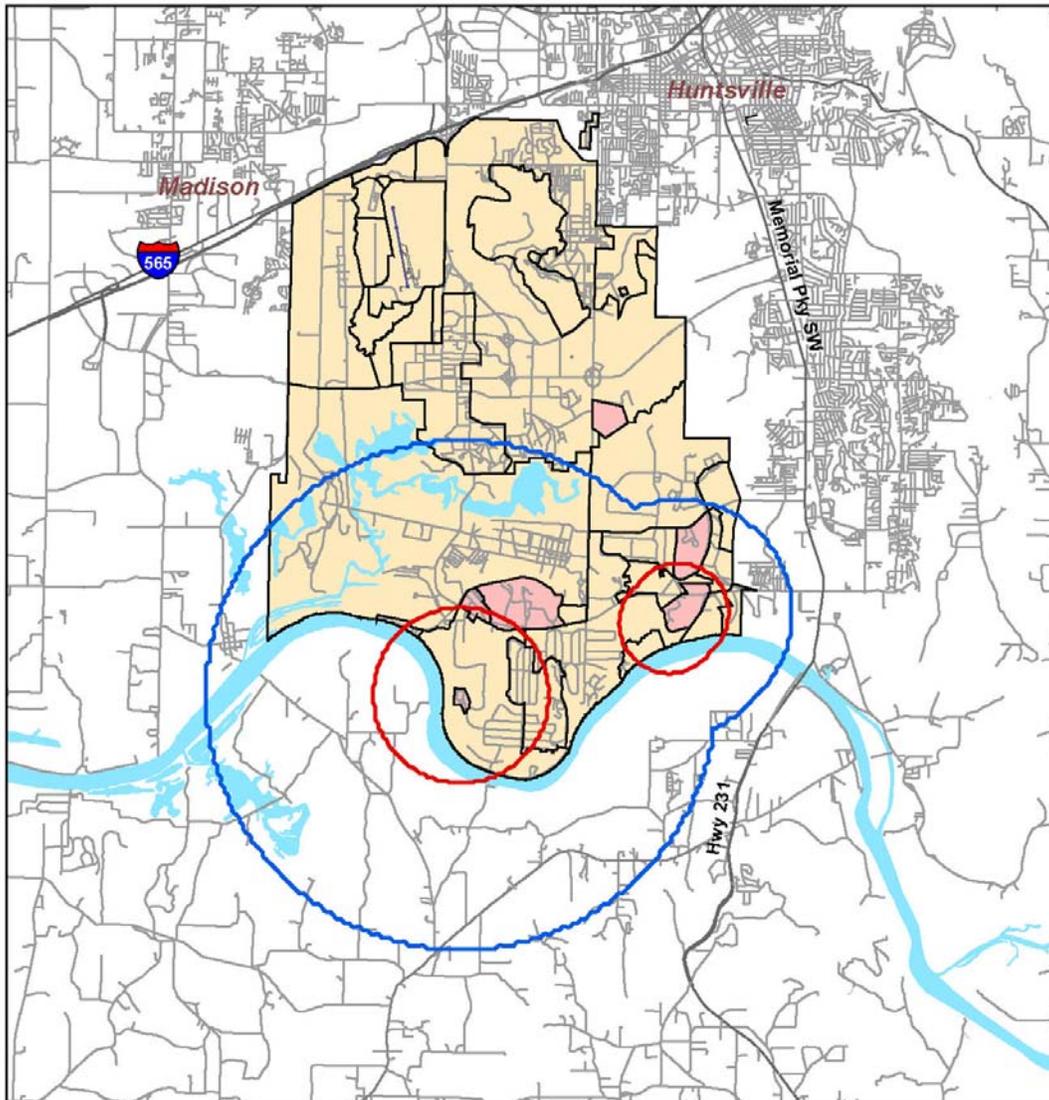
REDSTONE ARSENAL EXISTING DEMOLITION NOISE CONTOURS



REDSTONE ARSENAL FUTURE DEMOLITION NOISE CONTOURS

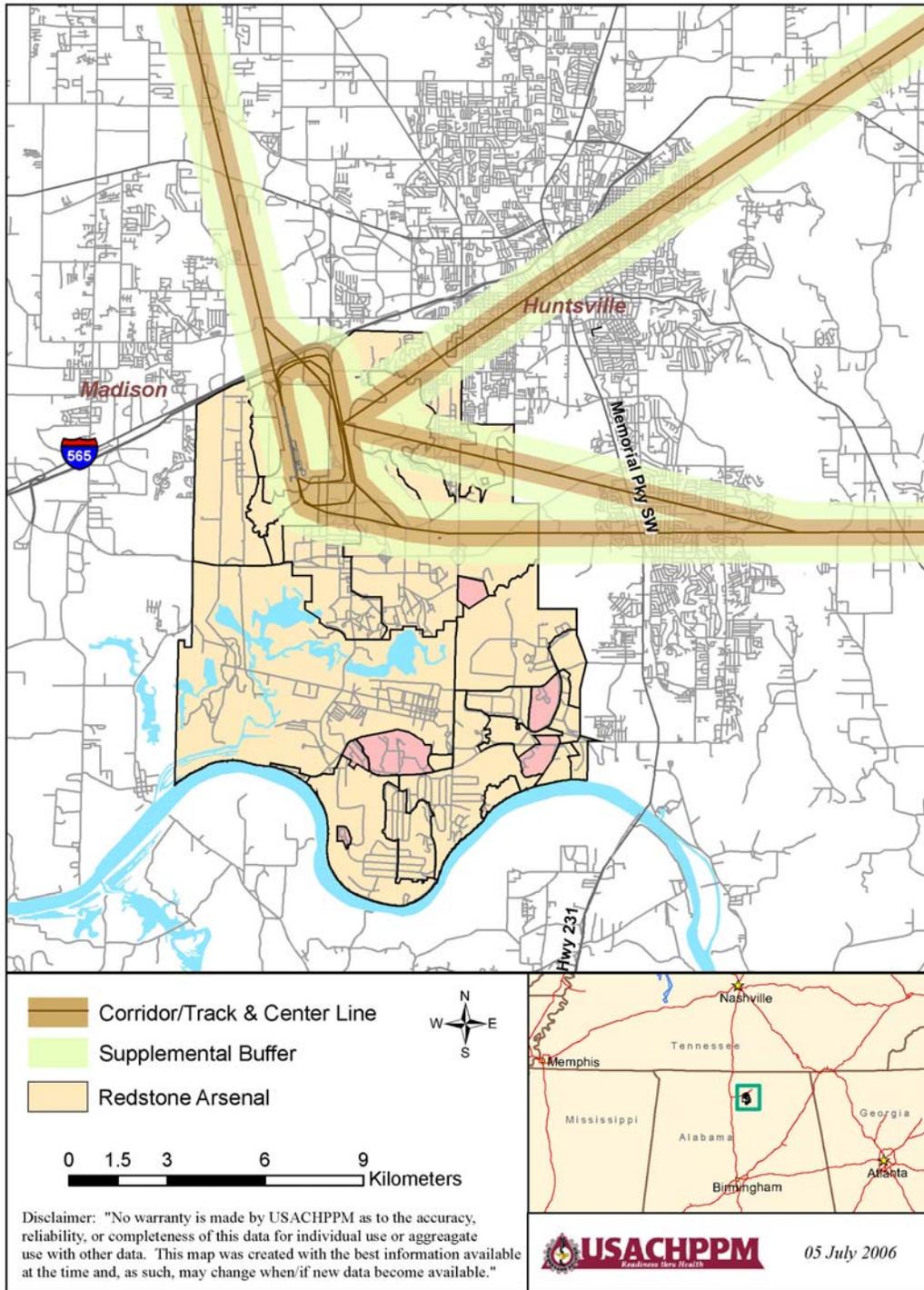


REDSTONE ARSENAL FUTURE DEMOLITION PK15(met) NOISE CONTOURS



Disclaimer: "No warranty is made by USACHPPM as to the accuracy, reliability, or completeness of this data for individual use or aggregate use with other data. This map was created with the best information available at the time and, as such, may change when/if new data become available."

REDSTONE ARSENAL FLIGHT CORRIDOR ANNOYANCE BUFFERS ROTARY WING -- 1,000' AGL



*Environmental Assessment for Base Realignment and Closure,
Installation Support, and Associated Future Master Planning
Actions at Redstone Arsenal, Alabama*

APPENDIX C

CONSULTATION AND COORDINATION

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APPENDIX C. CONSULTATION AND COORDINATION

This appendix contains the following consultation and coordination letters:

- Letter sent to the U.S. Fish and Wildlife Service dated July 31, 2006 in compliance with the Endangered Species Act
- Letter sent to the Alabama State Historic Preservation Officer dated July 12, 2006 in conformance with Section 106 of the National Historic Preservation Act
- Letter sent to the Federal Facilities Branch of the U.S. Environmental Protection Agency and the Government Facilities Section, Land Division, Alabama Department of Environmental Management dated July 13, 2006
- Letter sent to the Wildlife and Freshwater Fisheries Division of the Alabama Department of Conservation and Natural Resources dated July 13, 2006
- Letter received from the U.S. Fish and Wildlife Service dated August 15, 2006
- Letter received from the State of Alabama Department of Conservation and Natural Resources dated August 15, 2006
- Letter received from the Alabama State Historic Preservation Officer dated September 11, 2006

This appendix also contains a list of the 17 federally recognized Indian Tribes with whom Redstone Arsenal consults.



DEPARTMENT OF THE ARMY
UNITED STATES ARMY GARRISON – REDSTONE
4488 MARTIN ROAD
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

JUL 31 2006

Environmental Management Division

MEMORANDUM FOR Mr. Bruce Porter, US Fish and Wildlife Service, Daphne ES Field Office, 1208-B Main Street, Daphne, AL 36526

SUBJECT: Defense Base Realignment and Closure Commission (BRAC) Realignment Actions

1. On September 8, 2005, Defense Base Realignment and Closure Commission (BRAC) recommended certain realignment actions at Redstone Arsenal, Alabama.
2. To enable implementation of these recommendations, the Army proposes to provide necessary facilities to support the changes in force structure and is therefore preparing an environmental assessment to analyze and document environmental effects associated with its Proposed Action at Redstone Arsenal.
3. Redstone Arsenal would undergo a net increase of 4,024 personnel by implementing the BRAC Commission's realignment recommendations and the approved BRAC discretionary actions. This includes 4,763 new incoming personnel and 739 outgoing personnel. Existing installation facilities do not have the required space and/or capabilities to accommodate all of the incoming personnel and functions. Therefore, construction of new facilities or renovation of existing facilities would be required. Additionally, Installation Support and Associated Future Master Planning requirements on Redstone Arsenal necessitate relocating several existing facilities and constructing a number of new facilities. It is estimated that up to an additional 2,300 personnel could relocate to Redstone Arsenal based on Installation Support and Associated Future Master Planning Actions.
4. The Proposed Action includes constructing or renovating a number of facilities on Redstone Arsenal to implement the BRAC Commission's recommendations (BRAC directed actions), BRAC discretionary actions, and Installation Support and Associated Future Master Planning requirements that together support the proposed changes in force structure. These new facilities would allow for effective and efficient utilization of resources and personnel in support of the Army's soldiers. The enclosed map illustrates the preferred locations being considered. Specifics of the Proposed Action are enclosed.

IMSE-RED-PWE

SUBJECT: Defense Base Realignment and Closure Commission (BRAC) Realignment Actions

5. You will be provided with a copy of the Draft Environmental Assessment when it is complete; however, we would appreciate any initial input you may have on these proposed actions.

6. If you have any questions or require any additional information, please feel free to contact Ms. Carolene Wu, Environmental Management Division (IMSE-RED-PWE), e-mail carolene.wu@redstone.army.mil, 256-876-0211.



TERRY W. HAZLE
Chief, Environmental Management
Division

Encl

Army Materiel Command (AMC)/U.S. Army Security Assistance Command (USASAC) –

The AMC and USASAC Headquarters (HQs) would relocate to Redstone Arsenal as part of the Fort Belvoir, Virginia realignment. Four new facilities would be constructed and one existing facility would be renovated. A new facility would be constructed for the AMC HQ and for the USASAC HQ. The two facilities would be located adjacent to one another, and would be located at the site designated A1a on the enclosed map. A mail facility would be constructed to provide the capability to scan AMCs mail for chemical and biological agents; this facility would be located at the site designated C1a on the enclosed map. The existing Post Theater would be renovated to provide the AMC Band with rehearsal space and an addition to this building would be constructed for a band training facility; this facility would be located at the site designated B1 on the enclosed map.

Missile Defense Agency (MDA)/Space and Missile Defense Command (SMDC) –

MDA functions from leased facilities in Arlington, Virginia, Falls Church, Virginia, and Huntsville, Alabama would relocate to Redstone Arsenal, as would the HQ component of the SMDC from Arlington, Virginia. This would be the third construction phase at the Von Braun Complex, which would be expanded to provide administrative space and technical laboratories. A central utility plant would also be constructed, and portions of Burose and Mills Roads would be widened. These facilities would be located at the site designated D1 on the enclosed map.

Aviation Technical Test Center (ATTC)/Rotary Wing Air Platform Research, Development and Acquisition, Test and Evaluation (RDAT&E) –

The ATTC would relocate to Redstone Arsenal as part of the Fort Rucker, Alabama realignment. The Rotary Wing Air Platform RDAT&E would also relocate to Redstone Arsenal as part of the Warner Robbins Air Force Base, Georgia realignment. Four new facilities and an addition to one existing facility would be constructed. A new rotary wing technical test center would be constructed that would include a rotary wing test and evaluation facility and a secure storage facility; this facility would be located at the site designated E1a on the enclosed map. An addition to the existing fire station at the Redstone Arsenal Airfield would be constructed to accommodate additional crash/rescue vehicles. The existing underground storage tanks (USTs) that store JP-8 fuel would be removed and replaced with two fixed horizontal aboveground storage tanks (ASTs). The fire station addition and the new ASTs would be located at the sites designated G1 on the enclosed map. A new facility would be constructed for the Rotary Wing Center of Excellence to meet BRAC requirements for establishing a Center for Rotary Wing Air Platform DAT&E at Redstone Arsenal; this facility would be located at the site designated F1a on the enclosed map.

2^d Recruiting Brigade – The 2^d Recruiting Brigade would relocate to Redstone Arsenal as part of the Fort Gillem, Georgia realignment. A new HQ facility would be constructed for the 2^d Recruiting Brigade. This facility would be located at the site designated H1a on the enclosed map.

AMC HQ and USASAC HQ (Phase II and III) – An expansion adjacent to the AMC and USASAC HQ facilities is proposed to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. A new building would be constructed to the east of the proposed AMC HQ facility under Phase II, while two new buildings would be constructed to the west of the proposed USASAC HQ facility under Phase III. These facilities would be located at the site designated A1a on the enclosed map.

Von Braun Complex (Phase IV and V) – Expansion of the Von Braun Complex is proposed to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. Two new facilities would be constructed, including a consolidated operations center to the east of the SMDC Center under Phase IV to accommodate the Program Executive Office for Missiles and Space (PEO MS) that would be relocated and an operation and communication center in the northeast corner of the Von Braun Complex under Phase V to support the Reagan Test Site (RTS) mission areas on US Army Kwajalein Atoll (USAKA) from Redstone Arsenal. These facilities would be located at the site designated D1 on the enclosed map.

Rotary Wing Simulation Center – Existing US Army ATTC (USAATTC) Technology Directorate Modeling and Simulation and Systems Integration personnel currently located in several on-post facilities would be relocated to a single facility to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. A new facility would be constructed to provide primary occupancy space for the USAATTC personnel and technical laboratory space for aviation systems test functional areas. This facility would be located at the site designated E1a on the enclosed map.

Child Development Center – A new Child Development Center would be constructed to comply with current and future requirements for child development center facilities in the military. Two associated playgrounds for toddlers and preschool/school age children would be constructed adjacent to the center. This facility would be located at the site designated I1a on the enclosed map.

Gate 1 and Gate 3 Facilities – The projected increase in personnel resulting from the recommended BRAC realignments to Redstone Arsenal creates the need for a new visitor center at Martin Road in the vicinity of Gate 1, which is the main access from the City of Huntsville to the Redstone Arsenal. A separate visitor center and truck inspection area is also required to separate visitor and commercial traffic and to expedite traffic flow. Truck and commercial vehicle traffic would be diverted to Gate 3, where a new truck inspection area would be constructed, and new shipping and receiving warehouse would be constructed near Gate 3. Gates 1 and 3 also require upgrades or relocation to meet the new Army standards for access control points. Future plans for the construction of the Southern Bypass highway also conflicts with the existing Gate 1 and Gate 3 locations. Therefore, these gates and their associated facilities would need to be relocated in the future (around 2020) to avoid conflict with the future proposed route. Gate 1 and Gate 3 facilities would be located at the sites designated J1 and K1, respectively, on the enclosed map.

Fire and Emergency Services Facility – The projected increase in personnel and proposed construction of 1.4 million square feet of new structures along Martin Road, resulting from the recommended BRAC realignments to Redstone Arsenal, creates the need for a new Fire and Emergency Services Facility to service these personnel and structures. The existing fire station was built in 1944 and does not meet many of the current design and space requirements for a fire station. A new standard design two-company HQ fire station and full service 911 Call Center would be constructed. This facility would be located at the site designated L1 on the enclosed map.

As the above actions are grouped by function and not by geographical location, the planned new facilities are grouped as follows. Please see the attached map, Figure 1, showing the location of the planned new facilities on Redstone Arsenal.

Facility Group Identifier	Facility Description
A	AMC HQ and USASAC HQ
B	AMC Band Facility
C	AMC Mail Facility
D	Von Braun Complex
E	Rotary Wing Center
F	Rotary Wing Center of Excellence
G	Redstone Arsenal Airfield Facilities
H	2 nd Recruiting Brigade HQ
I	Child Development Center
J	Gate 1 Facilities
K	Gate 3 Facilities
L	Fire and Emergency Services Facility

Summary of Potential Effects on Protected Species

Federally Protected Species and Habitats

Redstone Arsenal is aware of the potential presence of the following species currently or formerly listed as threatened, endangered, or candidates for listing pursuant to the Endangered Species Act of 1973:

Scientific Name	Common Name	Federal Status
<i>Palaemonias alabamiae</i>	Alabama cave shrimp	LE
<i>Myotis grisescens</i>	Gray bat	LE
<i>Myotis sodalis</i>	Indiana bat	LE
<i>Haliaeetus leucocephalus</i>	Bald eagle	LT
<i>Falco peregrinus anatum</i>	Peregrine falcon	Former LE
<i>Etheostoma tuscumbia</i>	Tuscumbia darter	Formerly proposed candidate
<i>Alligator mississippiensis</i>	American alligator	LT/Similarity of Appearance
<i>Apios priceana</i>	Price’s potato bean	LT
<i>Eriogonum longifolium var. harperi</i>	Harper’s umbrella plant	Formerly proposed candidate
<i>Trillium pusillum var. alabamicum</i>	Dwarf trillium	Formerly proposed candidate

LE: Federally listed endangered species

LT: Federally listed threatened species

The preferred sites for the Proposed Action were selected to minimize impact on the environment; therefore, these locations would not impact any known threatened, endangered, or candidate species or critical habitats. The proposed construction perimeters do not fall within or overlap any designated critical habitats or other areas set aside by State or Federal statute or regulation for species protection.

Wetlands

Redstone Arsenal has a planning level wetland survey, and a site-specific survey for regulatory wetlands within project sites has been conducted and coordinated with the Nashville District, U.S. Army Corps of Engineers (USACE). Of the sites for the Proposed Action, only the site of the Von Braun Complex Expansion contains regulatory wetlands. Figure 2 (attached) shows the relationship between the general project area for the Von Braun Complex Expansion and these jurisdictional wetlands. Measuring approximately 0.49 acre, this wetland area is composed of a headwater stream with minor adjacent wetlands. Currently, it is anticipated that in the development of the final construction footprint, regulatory wetlands will be avoided. If the final construction footprint cannot be changed to avoid regulatory wetlands, appropriate mitigation will be coordinated and developed through USACE.



DEPARTMENT OF THE ARMY
UNITED STATES ARMY GARRISON - REDSTONE
4488 MARTIN ROAD
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

Environmental Management Division

JUL 12 2006

Ms. Elizabeth Brown, Deputy
State Historic Preservation Officer
Alabama Historical Commission
468 South Perry Street
Montgomery, Alabama 36130-0900

Dear Ms. Brown:

On September 8, 2005, the Defense Base Realignment and Closure Commission (BRAC Commission) recommended certain realignment actions at Redstone Arsenal, Alabama. To enable implementation of these recommendations, the Army proposes to provide necessary facilities to support the changes in force structure and is therefore preparing an environmental assessment to analyze and document environmental effects associated with its Proposed Actions at Redstone Arsenal.

We are requesting your comments to the enclosed proposed actions pursuant to 36 CFR 800, including your statement of concurrence in the finding of no adverse effect providing you agree with our analyses. Though these activities constitute an "undertaking" within the meaning of the National Historic Preservation Act, we have determined that this project will have no adverse effect on archeological sites or historic properties or districts of the Redstone Arsenal.

If you need further information, or wish to discuss our requests or conclusions, please contact Ms. Carolene Wu, Environmental Management Division (IMSE-RED-PWE), e-mail carolene.wu@redstone.army.mil, 256-876-0211.

Sincerely,

A handwritten signature in black ink, appearing to read "Terry W. Hazle".

Terry W. Hazle
Chief, Environmental Management
Division

Enclosure

Description of the Proposed Actions

Redstone Arsenal would undergo a net increase of 4,024 personnel by implementing the BRAC Commission's realignment recommendations and the approved BRAC discretionary actions. This includes 4,763 new incoming personnel and 739 outgoing personnel. Existing installation facilities do not have the required space and/or capabilities to accommodate all of the incoming personnel and functions. Additionally, Installation Support and Associated Future Master Planning requirements on Redstone Arsenal necessitate relocating several existing facilities and constructing a number of new facilities; up to an additional 2,300 personnel could relocate to Redstone Arsenal based on Installation Support and Associated Future Master Planning Actions. Therefore, construction of new facilities or renovation of existing facilities would be required. The Proposed Action includes constructing or renovating the following facilities on Redstone Arsenal to implement the BRAC Commission's recommendations (BRAC directed actions), BRAC discretionary actions, and Installation Support and Associated Future Master Planning requirements that together support the proposed changes in force structure. These new facilities would allow for effective and efficient utilization of resources and personnel in support of the Army's soldiers. Specifics of the Proposed Action are as follows:

As the below actions are grouped by function and not by geographical location, the planned new facilities are grouped as follows. Please see the maps at enclosure 1 showing the location of the planned new facilities on Redstone Arsenal and enclosure 2 showing their proximity to archeological sites and historic structures identified on the Arsenal.

Facility Group Identifier	Facility Description
A	AMC HQ and USASAC HQ
B	AMC Band Facility
C	AMC Mail Facility
D	Von Braun Complex
E	Rotary Wing Center
F	Rotary Wing Center of Excellence
G	Redstone Arsenal Airfield Fire Station
H	2 ^d Recruiting Brigade HQ
I	Child Development Center
J	Gate 1 Facilities
K	Gate 3 Facilities
L	Fire and Emergency Services Facility

Army Materiel Command (AMC)/US Army Security Assistance Command (USASAC) – AMC and USASAC Headquarters (HQs) would relocate to Redstone Arsenal, and four new facilities would be constructed and one existing facility would be renovated. A new facility would be constructed for the AMC HQ and for the USASAC HQ. The two facilities would be located adjacent to one another, and would be located at the site designated *A1a*. A mail facility would be constructed to provide the capability to scan AMC's mail for chemical and biological agents; this facility would be located at the site designated *C1a*. The existing Post Theater would be renovated to provide the AMC Band with rehearsal space and an addition to this building

would be constructed for a band training facility; this facility would be located at the site designated **BI** on the enclosed maps.

- **Missile Defense Agency (MDA)/Space and Missile Defense Command (SMDC)** – MDA functions would relocate to Redstone Arsenal, as would the HQ component of the SMDC. This would be the third construction phase at the Von Braun Complex, which would be expanded to provide administrative space and technical laboratories. A central utility plant would also be constructed, and portions of Burose and Mills Roads would be widened. These facilities would be located at the site designated **DI** on the enclosed maps.
- **Aviation Technical Test Center (ATTC)/Rotary Wing Air Platform Research, Development & Acquisition, Test & Evaluation (RDAT&E)** – The ATTC and the Rotary Wing Air Platform RDAT&E would relocate to Redstone Arsenal. Four new facilities and an addition to one existing facility would be constructed. A new rotary wing technical test center would be constructed that would include a rotary wing test and evaluation facility and a secure storage facility; this facility would be located at the site designated **E1a**. An addition to the existing fire station at the Redstone Arsenal Airfield would be constructed to accommodate additional crash/rescue vehicles. The existing underground storage tanks (USTs) that store JP-8 fuel would be removed and replaced with two fixed horizontal above-ground storage tanks (ASTs). The fire station addition and the new ASTs would be located at the sites designated **GI**. A new facility would be constructed for the Rotary Wing Center of Excellence to meet BRAC requirements for establishing a Center for Rotary Wing Air Platform DAT&E at Redstone Arsenal; this facility would be located at the site designated **F1a** on the enclosed maps.
- **2^d Recruiting Brigade** – The 2^d Recruiting Brigade would relocate to Redstone Arsenal, and a new HQ facility would be constructed. This facility would be located at the site designated **H1a** on the enclosed maps.
- **AMC HQ and USASAC HQ (Phase II and III)** – An expansion adjacent to the AMC and USASAC HQ facilities is proposed to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. A new building would be constructed to the east of the proposed AMC HQ facility under Phase II, while two new buildings would be constructed to the west of the proposed USASAC HQ facility under Phase III. These facilities would be located at the site designated **A1a** on the enclosed maps.
- **Von Braun Complex (Phase IV and V)** – Expansion of the Von Braun Complex is proposed to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. Two new facilities would be constructed, including a consolidated operations center to the east of the SMDC Center under Phase IV to accommodate the Program Executive Office for Missiles and Space (PEO MS) that would be relocated and an operation and communication center in the northeast corner of the Von Braun Complex under Phase V to support the Reagan Test Site (RTS) mission areas on US Army Kwajalein Atoll (USAKA) from Redstone Arsenal. These facilities would be located at the site designated **DI** on the enclosed maps.
- **Rotary Wing Simulation Center** – Existing US Army ATTC (USAATTC) Technology Directorate Modeling and Simulation and Systems Integration personnel currently located

in several on-post facilities would be relocated to a single facility to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. A new facility would be constructed to provide primary occupancy space for the USAATTC personnel and technical laboratory space for aviation systems test functional areas. This facility would be located at the site designated *E1a* on the enclosed maps.

- **Child Development Center** – A new Child Development Center would be constructed to comply with current and future requirements for child development center facilities in the military. Two associated playgrounds for toddlers and preschool/school age children would be constructed adjacent to the center. This facility would be located at the site designated *I1a* on the enclosed maps.
- **Gate 1 and Gate 3 Facilities** – The projected increase in personnel resulting from the recommended BRAC realignments to Redstone Arsenal creates the need for a new visitor center at Martin Road in the vicinity of Gate 1, which is the main access from the City of Huntsville to the Redstone Arsenal. A separate visitor center and truck inspection area is also required to separate visitor and commercial traffic and to expedite traffic flow. Truck and commercial vehicle traffic would be diverted to Gate 3, where a new truck inspection area would be constructed, and new shipping and receiving warehouse would be constructed near Gate 3. Gates 1 and 3 also require upgrades or relocation to meet the new Army standards for access control points. Future plans for the construction of the Southern Bypass highway also conflicts with the existing Gate 1 and Gate 3 locations. Therefore, these gates and their associated facilities would need to be relocated in the future (around 2020) to avoid conflict with the future proposed route. Gate 1 and Gate 3 facilities would be located at the sites designated *J1* and *K1*, respectively, on the enclosed maps.
- **Fire and Emergency Services Facility** – The projected increase in personnel and proposed construction of 1.4 million square feet of new structures along Martin Road, resulting from the recommended BRAC realignments to Redstone Arsenal, creates the need for a new Fire and Emergency Services Facility to service these personnel and structures. The existing fire station was built in 1944 and does not meet many of the current design and space requirements for a fire station. A new standard design two-company HQ fire station and full service 911 Call Center would be constructed. This facility would be located at the site designated *L1* on the enclosed maps.

Description of Cultural Resources Potentially Affected

The BRAC associated actions are mandated by law and the schedule for accomplishing the realignment activities is also mandated by law. Therefore, the schedule for the proposed actions requires a “fast track” approach to assessing the environmental impacts of the proposed actions. This in turn necessitates that various compliance activities, including those related to compliance with the National Historic Preservation Act (NHPA) and associated Acts and Regulations designed to protect and preserve cultural resources, be conducted in concert with the analyses performed to meet the requirements of the National Environmental Policy Act (NEPA) and associated regulations. Therefore, we are providing the cultural resources effects analysis to you in advance of issuance of the Draft Environmental Assessment (EA) so that your comments and

concurrence can be included in the findings of the EA and in the published Final EA and Record of Decision.

In order to minimize the potential for effects on archeological sites or structures, the locations within the boundaries of the Redstone Arsenal were specifically selected to avoid known NRHP listed or eligible properties (except as allowed for under the Memorandum of Agreement (MOA-03170-117) between the United States Army Garrison, - Redstone, Redstone Arsenal, Alabama and the Alabama State Historic Preservation Officer, executed October 2003).

The “Cultural Resources Matrix” at enclosure 3 provides a summary of the proposed actions grouped by geographic location on Redstone Arsenal, as well as additional detail on the construction activities planned at each location. The table also provides a color-coded summary of the archeological sites and structures that could be affected at each geographic location together with a summary of eligibility status and likely effects. In addition, for your reference, please see the Historic Area Location Map and Archeological Area Location Map for the relative location of structures/sites vis-à-vis the planned new construction activities.

For your ready review, site/inventory forms are also provided for all sites and properties in proximity to the planned new construction that are potentially eligible or eligible for inclusion on the National Register of Historic Places.

Archeological Sites

A summary of the archeological sites potentially affected and an indication of those properties is as follows:

Site Number	Description	NR Status	Comments
1MA0698	Middle Woodland	Potentially eligible	Near but not within construction perimeter; no effect
1MA0713	Unknown aboriginal	Potentially eligible	Near but not within construction perimeter; no effect
1MA0747	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect
1MA0748	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect
1MA0779	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect

Site Number	Description	NR Status	Comments
1MA0783	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect
1MA0785	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect
1MA0809	Late 19th to early 20th century historic	Potentially eligible	Alignment will be adjusted and/or site will be avoided/protected during construction
1MA0844	Unknown aboriginal	Potentially eligible	Alignment will be adjusted and/or site will be avoided/protected during construction
1MA0916	Late 19th/early 20th century (historic)	Potentially eligible	Near but not within construction perimeter; no effect
1MA1383	Early 20th century (house site)	Potentially eligible	Alignment will be adjusted and/or site will be avoided/protected during construction
IMA0152*	Archaic; Woodland; Late 19th to early 20th century (historic)	Not eligible	A portion of this site appears to be within/near the construction perimeter; not eligible; no effect
1MA0492*	Unknown aboriginal	Not eligible	Appears to be within construction perimeter; not eligible; no effect
1MA0704*	Late 19th to early 20th century historic	Not eligible	This site appears to be within the construction perimeter and could be affected, but it is not eligible for the NR; no effect
1MA0708*	Unknown aboriginal	Not eligible	Appears to be within construction perimeter; not eligible; no effect
1MA0709*	Traditional Paleoindian: Archaic; Early, Middle, Late Woodland; Late 19th to 20th Century Historic	Not eligible	Appears to be within construction perimeter; not eligible; no effect

* Indicates site is within construction perimeter
Structures shown in **Boldface** are potentially eligible or eligible for listing in the National Register of Historic Places

In addition, the following sites are near but not within the construction perimeter. These sites are not eligible:

Site Number	Description	NR Status	Comments
1MA0130	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0161	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0266	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0403	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0707	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0746	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0749	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0752	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0776	Late 19th to early 20th century historic	Not eligible	Near but not within construction perimeter; not eligible; no effect
1MA0784	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect

Historic Buildings/Structures

A summary of the buildings/structures potentially affected and an indication of those properties is as follows:

Bldg/ Structure Number	Description	NR Status	Comments
Bldg 3712*	Constructed 1957	Not eligible (no MOA)	This building will be modified/partly demolished; not eligible; no effect
Bldg 4484	Constructed 1955; Cold War era; not in historic district	Eligible; MOA-03170-11	This building is near but not within the construction perimeter; no effect
Bldg 4488	Constructed 1956; Cold War era; not in historic district; building can be modified so long as two offices (offices of Dr. Von Braun and Maj. Gen. Medaris) are preserved intact, per MOA	Eligible; MOA-03170-11	This building is near but not within the construction perimeter; no effect
Bldg 4489*	Constructed 1959; Cold War era; not in historic district	Eligible; MOA-03170-11	This building will be demolished; MOA allows for demolition of this NR eligible building
Bldg 4806*	Constructed 1945	Not eligible (no MOA)	This building appears to be within the construction perimeter; not eligible; no effect
Bldg 4807*	Constructed 1956	Not eligible (no MOA)	This building appears to be within the construction perimeter; not eligible; no effect
Bldg 4812*	Constructed 1945	Not eligible (no MOA)	This building appears to be within the construction perimeter; not eligible; no effect

* Indicates building/structure is within construction perimeter or will be modified by construction activities

Structures shown in **Boldface** are potentially eligible or eligible for listing in the National Register of Historic Places

In addition, the following structures are near but not within the construction perimeter. There is also one cemetery that is near but not within the construction perimeter. These structures/features are not eligible and are not within the construction perimeter.

Bldg/ Structure Number	Description	NR Status	Comments
Bldg 3467	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
Bldg 3474	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
Bldg 3478	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
Bldg 3479	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
Bldg 3648	Constructed 1942	Not eligible (no MOA)	Not within construction perimeter; not eligible; no effect
Bldg 3711	Constructed 1956	Not eligible (no MOA)	This building is near but not within the construction perimeter; not eligible; no effect
Bldg 5250	Constructed 1960	Not eligible (no MOA)	Not within construction perimeter; not eligible; no effect
Bldg 7702	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
Fennell Cemetery	Southwest corner of intersection of Martin Road and Mills Road	Not applicable	Construction perimeter 100 ft from cemetery boundary; no effect

Summary of Potential Effects on Cultural Resources

As noted above, in order to minimize the potential for effects on archeological sites or structures, the locations within the boundaries of the Redstone Arsenal were selected to avoid known NRHP listed or eligible properties (except as allowed for under the Memorandum of Agreement (MOA-03170-117)).

No NRHP listed or eligible archeological sites will be affected by the proposed activities, although utilities (water/sewer lines) will run near several sites. Specific locations for facilities and the associated utilities were selected based upon avoidance of any sites. In the case of utility lines, the underground lines will be aligned so as to avoid known sites, and sites will be protected during construction to avoid any effects during the construction phase.

One NRHP listed or eligible building/structure will be affected by the proposed activities (Building 4489, which will be demolished as part of the AMC Headquarters and USASAC Field Office and associated construction). Demolition of this building is permitted under the terms of MOA-03170-11. In addition, two NRHP listed or eligible buildings/structures (Building 4484 and Building 4488) could be affected by the proposed activities, as they are near the construction perimeter for the AMC Headquarters and USASAC Field Office and the new Fire and Emergency Services Facility. These two buildings are also covered by MOA-03170-11, and in any event, no modifications to these buildings are planned.

Request for Concurrence

Though these activities constitute an “undertaking” within the meaning of the National Historic Preservation Act, we have determined that this project will have no adverse effect on archeological sites or historic properties or districts of the Redstone Arsenal. By this letter, we are requesting your comments pursuant to 36 CFR 800, including your statement of concurrence in the finding of no adverse effect providing you agree with our analyses.

REDSTONE CULTURAL RESOURCES MATRIX
 Analysis of Planned Activities, BRAC EA

Revised: 07/10/06

Facility Group Identifier	Facility Group Name	Proposed Action Components and Associated Section Numbers	Archaeological Sites (* indicates feature is within construction perimeter)				Historic Structures (* indicates feature is within construction perimeter)			
			Site Number	Description	NR Status	Comments	Bldg/ Structure Number	Description	NR Status	Comments
E	Rotary Wing Center	Rotary Wing Center, Test and Evaluation Facility and Secure Storage - Section 2.2.3 Rotary Wing Simulation Center - Section 2.4.3 (includes potable water line, sewage lift station, force main)	1MA0130	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0266	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0403	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0698	Middle Woodland	Potentially eligible	Near but not within construction perimeter; no effect				
			1MA0747	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect				
			1MA0748	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect				
			1MA0749	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0752	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0776	Late 19th to early 20th century historic	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0779	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect				
			1MA0783	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect				
			1MA0784	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0785	Late 19th to early 20th century historic	Potentially eligible	Near but not within construction perimeter; no effect				
			1MA0809	Late 19th to early 20th century historic	Potentially eligible	Alignment will be adjusted and/or site will be avoided/protected during construction				
1MA0844	Unknown aboriginal	Potentially eligible	Alignment will be adjusted and/or site will be avoided/protected during construction							
1MA1383	Early 20th century (house site)	Potentially eligible	Alignment will be adjusted and/or site will be avoided/protected during construction							
F	Rotary Wing Center of Excellence	Rotary Wing Center of Excellence - Section 2.2.3	None				None	None		

REDSTONE CULTURAL RESOURCES MATRIX
Analysis of Planned Activities, BRAC EA

Revised: 07/10/06

Facility Group Identifier	Facility Group Name	Proposed Action Components and Associated Section Numbers	Archeological Sites (* indicates feature is within construction perimeter)				Historic Structures (* indicates feature is within construction perimeter)			
			Site Number	Description	NR Status	Comments	Bldg/ Structure Number	Description	NR Status	Comments
G	Redstone Arsenal Airfield Fire Station	Redstone Arsenal Airfield Fire Station - Section 2.2.3	None				Bldg 4806*	Constructed 1945	Not eligible (no MOA)	This building appears to be within the construction perimeter; not eligible; no effect
							Bldg 4807*	Constructed 1956	Not eligible (no MOA)	This building appears to be within the construction perimeter; not eligible; no effect
							Bldg 4812*	Constructed 1945	Not eligible (no MOA)	This building appears to be within the construction perimeter; not eligible; no effect
H	2 nd Recruiting Brigade HQ	2 nd Recruiting Brigade HQ Facility - Section 2.2.4	None				Bldg 3467	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
							Bldg 3474	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
							Bldg 3478	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
							Bldg 3479	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
I	Child Development Center	Child Development Center - Section 2.4.4	1MA0916	Late 19th/early 20th century (historic)	Potentially eligible	Near but not within construction perimeter; no effect	Fennell Cemetary	Southwest corner of intersection of Martin Road and Mills Road	Not applicable	Construction perimeter 100 ft from cemetery boundary; no effect
J	Gate 1 Facilities	Gate 1 Replacement and Visitor Center - Section 2.4.5	None				None	None		
K	Gate 3 Facilities	Gate 3 Replacement, Truck Inspection Area, and Shipping & Receiving Warehouse - Section 2.4.5	IMA0152*	Archaic; Woodland; Late 19th to early 20th century (historic)	Not eligible	A portion of this site appears to be within/near the construction perimeter; not eligible; no effect	Bldg 7702	Constructed 1942	Not eligible (no MOA)	Near construction perimeter; not eligible; no effect
L	Fire and Emergency Services Facility	Fire and Emergency Services Facility - Section 2.4.6	None				Bldg 4484	Constructed 1955; Cold War era; not in historic district	Eligible; MOA-03170-11	This building is near but not within the construction perimeter; no effect
							Bldg 4488	Constructed 1956; Cold War era; not in historic district; building can be modified so long as two offices (offices of Dr. Von Braun and Maj. Gen. Medaris) are preserved intact, per MOA	Eligible; MOA-03170-11	This building is near but not within the construction perimeter; no effect

- * = site/structure appears to be within construction perimeter and thus has potential for destruction/disturbance
-  = property is potentially eligible or eligible for NR listing (potential for effects), but effects have been avoided
-  = property is potentially eligible or eligible for NR listing and effects cannot be avoided
-  = property is not eligible
-  = property is eligible but covered by MOA, and planned activities are allowable within scope of MOA and considered to have no effect

REDSTONE CULTURAL RESOURCES MATRIX
 Analysis of Planned Activities, BRAC EA

Revised: 07/10/06

Facility Group Identifier	Facility Group Name	Proposed Action Components and Associated Section Numbers	Archeological Sites (* indicates feature is within construction perimeter)				Historic Structures (* indicates feature is within construction perimeter)			
			Site Number	Description	NR Status	Comments	Bldg/ Structure Number	Description	NR Status	Comments
A	AMC HQ and USASAC HQ	AMC and USASAC HQ Facilities - Section 2.2.1	1MA0704*	Late 19th to early 20th century historic	Not eligible	This site appears to be within the construction perimeter and could be affected, but it is not eligible for the NR; no effect	Bldg 4484	Constructed 1955; Cold War era; not in historic district	Eligible; MOA-03170-11	This building is near but not within the construction perimeter; no effect
		Bldg 4488					Constructed 1956; Cold War era; not in historic district; building can be modified so long as two offices (offices of Dr. Von Braun and Maj. Gen. Medaris) are preserved intact, per MOA	Eligible; MOA-03170-11	This building is near but not within the construction perimeter; no effect	
		Bldg 4489*					Constructed 1959; Cold War era; not in historic district	Eligible; MOA-03170-11	This building will be demolished; MOA allows for demolition of this NR eligible building	
B	AMC Band Facility	AMC Band Facility - Section 2.2.1	None				Bldg 3712*	Constructed 1957	Not eligible (no MOA)	This building will be modified/partly demolished; not eligible; no effect
							Bldg 3711	Constructed 1956	Not eligible (no MOA)	This building is near but not within the construction perimeter; not eligible; no effect
C	AMC Mail Facility	AMC Mail Facility - Section 2.2.1	None				Bldg 3648	Constructed 1942	Not eligible (no MOA)	Not within construction perimeter; not eligible; no effect
D	Von Braun Complex	Von Braun Complex (Phase III) - Section 2.2.2	1MA0492*	Unknown aboriginal	Not eligible	Appears to be within construction perimeter; not eligible; no effect	Bldg 5250	Constructed 1960	Not eligible (no MOA)	Not within construction perimeter; not eligible; no effect
		SMDC personnel - Section 2.3.3	1MA0708*	Unknown aboriginal	Not eligible	Appears to be within construction perimeter; not eligible; no effect				
		Von Braun Complex (Phase IV and V) - Section 2.4.2	1MA0709*	Traditional Paleoindian: Archaic; Early, Middle, Late Woodland; Late 19th to 20th Century Historic	Not eligible	Appears to be within construction perimeter; not eligible; no effect				
			1MA0161	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0707	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect				
			1MA0713	Unknown aboriginal	Potentially eligible	Near but not within construction perimeter; no effect				
	1MA0746	Unknown aboriginal	Not eligible	Near but not within construction perimeter; not eligible; no effect						

End 3

End 3



DEPARTMENT OF THE ARMY
UNITED STATES ARMY GARRISON – REDSTONE
4488 MARTIN ROAD
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

JUL 13 2006

Environmental Management Division

MEMORANDUM FOR Federal Facilities Branch (Raphael Santa Maria), US Environmental Protection Agency, Region 4, 61 Forsyth Street, SW, Atlanta, Georgia 30303-8960
Government Facilities Section (Mr. Gerald Hardy), Land Division, Alabama Department of Environmental Management, Post Office Box 301463, Montgomery, Alabama 36130-1463

SUBJECT: Defense Base Realignment and Closure Commission (BRAC) Realignment Actions

1. On September 8, 2005, Defense Base Realignment and Closure Commission (BRAC) recommended certain realignment actions at Redstone Arsenal, Alabama.
2. To enable implementation of these recommendations, the Army proposes to provide necessary facilities to support the changes in force structure and is therefore preparing an environmental assessment to analyze and document environmental effects associated with its Proposed Action at Redstone Arsenal.
3. Redstone Arsenal would undergo a net increase of 4,024 personnel by implementing the BRAC Commission's realignment recommendations and the approved BRAC discretionary actions. This includes 4,763 new incoming personnel and 739 outgoing personnel. Existing installation facilities do not have the required space and/or capabilities to accommodate all of the incoming personnel and functions. Therefore, construction of new facilities or renovation of existing facilities would be required. Additionally, Installation Support and Associated Future Master Planning requirements on Redstone Arsenal necessitate relocating several existing facilities and constructing a number of new facilities. It is estimated that up to an additional 2,300 personnel could relocate to Redstone Arsenal based on Installation Support and Associated Future Master Planning Actions.
4. The Proposed Action includes constructing or renovating a number of facilities on Redstone Arsenal to implement the BRAC Commission's recommendations (BRAC directed actions), BRAC discretionary actions, and Installation Support and Associated Future Master Planning requirements that together support the proposed changes in force structure. These new facilities would allow for effective and efficient utilization of resources and personnel in support of the Army's soldiers. The enclosed map illustrates the preferred locations being considered. Specifics of the Proposed Action are enclosed.

IMSE-RED-PWE

SUBJECT: Defense Base Realignment and Closure Commission (BRAC) Realignment Actions

5. You will be provided with a copy of the Draft Environmental Assessment when it is complete; however, we would appreciate any initial input you may have on these proposed actions.

6. If you have any questions or require any additional information, please feel free to contact Ms. Carolene Wu, Environmental Management Division (IMSE-RED-PWE), e-mail carolene.wu@redstone.army.mil, 256-876-0211.



TERRY W. HAZLE
Chief, Environmental Management
Division

Encl

Army Materiel Command (AMC)/U.S. Army Security Assistance Command (USASAC) –

The AMC and USASAC Headquarters (HQs) would relocate to Redstone Arsenal as part of the Fort Belvoir, Virginia realignment. Four new facilities would be constructed and one existing facility would be renovated. A new facility would be constructed for the AMC HQ and for the USASAC HQ. The two facilities would be located adjacent to one another, and would be located at the site designated A1a on the enclosed map. A mail facility would be constructed to provide the capability to scan AMCs mail for chemical and biological agents; this facility would be located at the site designated C1a on the enclosed map. The existing Post Theater would be renovated to provide the AMC Band with rehearsal space and an addition to this building would be constructed for a band training facility; this facility would be located at the site designated B1 on the enclosed map.

Missile Defense Agency (MDA)/Space and Missile Defense Command (SMDC) – MDA functions from leased facilities in Arlington, Virginia, Falls Church, Virginia, and Huntsville, Alabama would relocate to Redstone Arsenal, as would the HQ component of the SMDC from Arlington, Virginia. This would be the third construction phase at the Von Braun Complex, which would be expanded to provide administrative space and technical laboratories. A central utility plant would also be constructed, and portions of Burose and Mills Roads would be widened. These facilities would be located at the site designated D1 on the enclosed map.

Aviation Technical Test Center (ATTC)/Rotary Wing Air Platform Research, Development and Acquisition, Test and Evaluation (RDAT&E) –

The ATTC would relocate to Redstone Arsenal as part of the Fort Rucker, Alabama realignment. The Rotary Wing Air Platform RDAT&E would also relocate to Redstone Arsenal as part of the Warner Robbins Air Force Base, Georgia realignment. Four new facilities and an addition to one existing facility would be constructed. A new rotary wing technical test center would be constructed that would include a rotary wing test and evaluation facility and a secure storage facility; this facility would be located at the site designated E1a on the enclosed map. An addition to the existing fire station at the Redstone Arsenal Airfield would be constructed to accommodate additional crash/rescue vehicles. The existing underground storage tanks (USTs) that store JP-8 fuel would be removed and replaced with two fixed horizontal aboveground storage tanks (ASTs). The fire station addition and the new ASTs would be located at the sites designated G1 on the enclosed map. A new facility would be constructed for the Rotary Wing Center of Excellence to meet BRAC requirements for establishing a Center for Rotary Wing Air Platform DAT&E at Redstone Arsenal; this facility would be located at the site designated F1a on the enclosed map.

2^d Recruiting Brigade – The 2^d Recruiting Brigade would relocate to Redstone Arsenal as part of the Fort Gillem, Georgia realignment. A new HQ facility would be constructed for the 2^d Recruiting Brigade. This facility would be located at the site designated H1a on the enclosed map.

AMC HQ and USASAC HQ (Phase II and III) – An expansion adjacent to the AMC and USASAC HQ facilities is proposed to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. A new building would be constructed to the east of the proposed AMC HQ facility under Phase II, while two new buildings would be constructed to the west of the proposed USASAC HQ facility under Phase III. These facilities would be located at the site designated A1a on the enclosed map.

Von Braun Complex (Phase IV and V) – Expansion of the Von Braun Complex is proposed to accommodate Installation Support and Associated Future Master Planning needs at Redstone Arsenal. Two new facilities would be constructed, including a consolidated operations center to the east of the SMDC Center under Phase IV to accommodate the Program Executive Office for Missiles and Space (PEO MS) that would be relocated and an operation and communication center in the northeast corner of the Von Braun Complex under Phase V to support the Reagan Test Site (RTS) mission areas on US Army Kwajalein Atoll (USAKA) from Redstone Arsenal. These facilities would be located at the site designated D1 on the enclosed map.

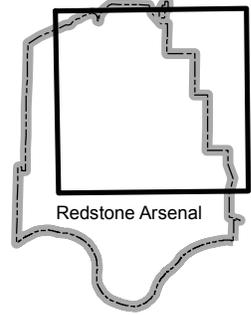
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Child Development Center – A new Child Development Center would be constructed to comply with current and future requirements for child development center facilities in the military. Two associated playgrounds for toddlers and preschool/school age children would be constructed adjacent to the center. This facility would be located at the site designated I1a on the enclosed map.

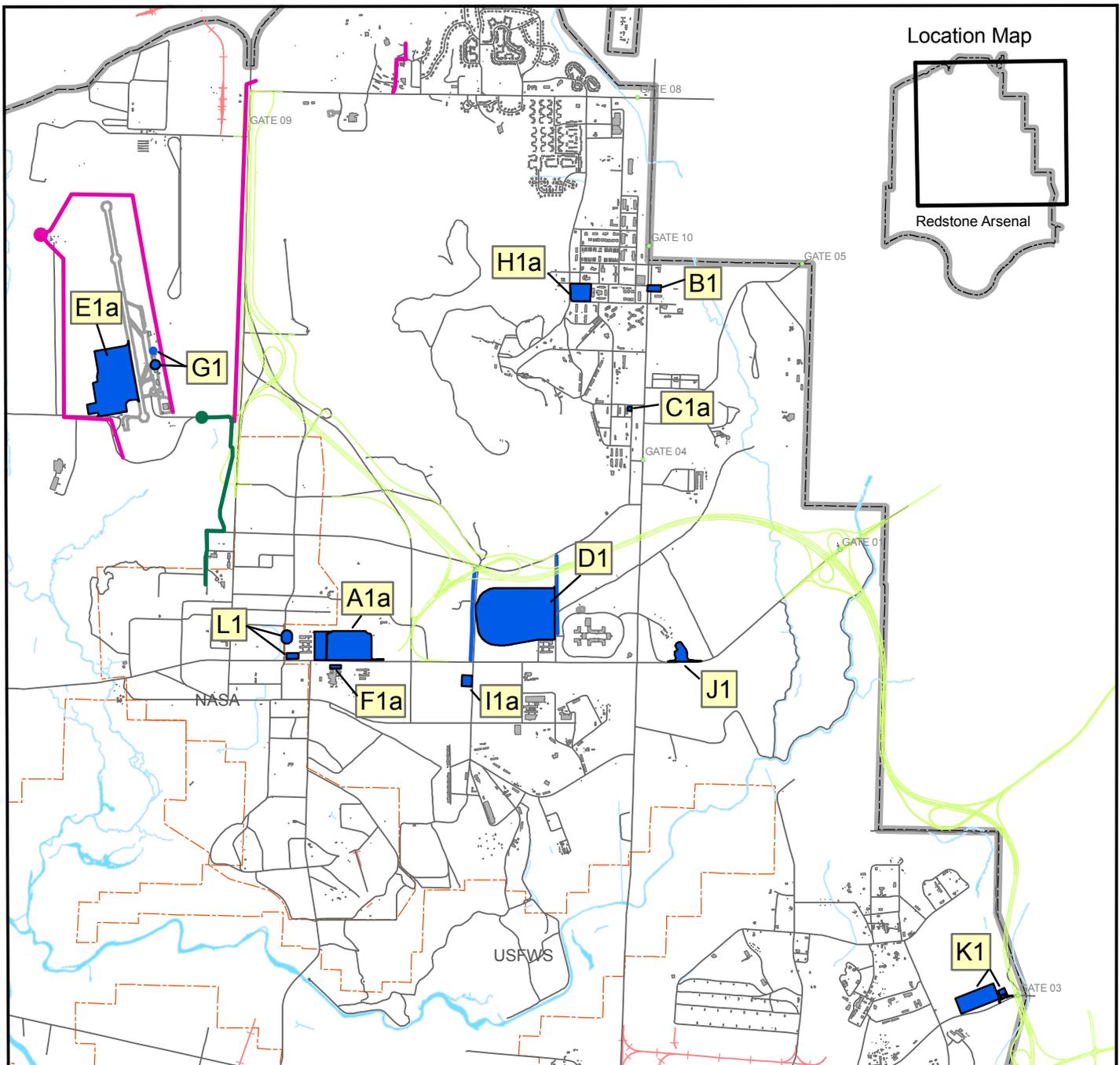
Gate 1 and Gate 3 Facilities – The projected increase in personnel resulting from the recommended BRAC realignments to Redstone Arsenal creates the need for a new visitor center at Martin Road in the vicinity of Gate 1, which is the main access from the City of Huntsville to the Redstone Arsenal. A separate visitor center and truck inspection area is also required to separate visitor and commercial traffic and to expedite traffic flow. Truck and commercial vehicle traffic would be diverted to Gate 3, where a new truck inspection area would be constructed, and new shipping and receiving warehouse would be constructed near Gate 3. Gates 1 and 3 also require upgrades or relocation to meet the new Army standards for access control points. Future plans for the construction of the Southern Bypass highway also conflicts with the existing Gate 1 and Gate 3 locations. Therefore, these gates and their associated facilities would need to be relocated in the future (around 2020) to avoid conflict with the future proposed route. Gate 1 and Gate 3 facilities would be located at the sites designated J1 and K1, respectively, on the enclosed map.

Fire and Emergency Services Facility – The projected increase in personnel and proposed construction of 1.4 million square feet of new structures along Martin Road, resulting from the recommended BRAC realignments to Redstone Arsenal, creates the need for a new Fire and Emergency Services Facility to service these personnel and structures. The existing fire station was built in 1944 and does not meet many of the current design and space requirements for a fire station. A new standard design two-company HQ fire station and full service 911 Call Center would be constructed. This facility would be located at the site designated L1 on the enclosed map.

Location Map



Redstone Arsenal



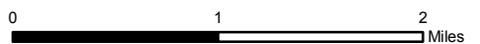
Legend

- Proposed Water Tower
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- Road
- Railroad
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- DOD Property Interest
- A1a** Facility Group A, Alternative 1a

NOTE: Proposed utilities are incomplete. Additional information will be added to the draft EA version of this figure when GIS data becomes available.

Facility Groups and Selected Alternatives *

- A - AMC HQ and USASAC HQ (Alternative 1a)
- B - AMC Band Facility (Alternative 1)
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* See accompanying letter for a description of the alternatives.

Prepared For:

U.S. Army Corps of Engineers, Mobile District

Preferred Alternative and Proposed Utilities
at Redstone Arsenal, Alabama



Final



DEPARTMENT OF THE ARMY
UNITED STATES ARMY GARRISON – REDSTONE
4488 MARTIN ROAD
REDSTONE ARSENAL, ALABAMA 35898-5000

REPLY TO
ATTENTION OF

JUL 13 2006

Environmental Management Division

Mr. Jon Hornsby
Wildlife and Freshwater Fisheries Division
AL Dept of Conservation and Natural Resources (ADCNR)
64 N. Union Street, Suite 567
Montgomery, Alabama 36130

Dear Mr. Hornsby:

On September 8, 2005, Defense Base Realignment and Closure Commission (BRAC) recommended certain realignment actions at Redstone Arsenal, Alabama.

To enable implementation of these recommendations, the Army proposes to provide necessary facilities to support the changes in force structure and is therefore preparing an environmental assessment to analyze and document environmental effects associated with its Proposed Action at Redstone Arsenal.

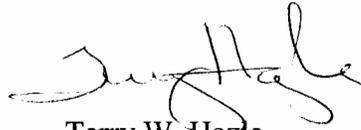
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You will be provided with a copy of the Draft Environmental Assessment when it is complete; however, we would appreciate any initial input you may have on these proposed actions.

If you have any questions or require any additional information, please feel free to contact Ms. Carolene Wu, Environmental Management Division (IMSE-RED-PWE), e-mail carolene.wu@redstone.army.mil, 256-876-0211.

Sincerely,

A handwritten signature in black ink, appearing to read "Terry W. Hazle". The signature is fluid and cursive, with the first name being the most prominent.

Terry W. Hazle
Chief, Environmental Management
Division

Enclosure

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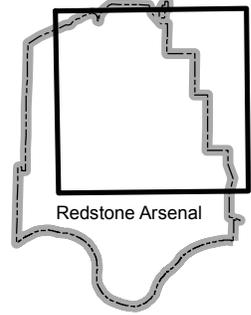
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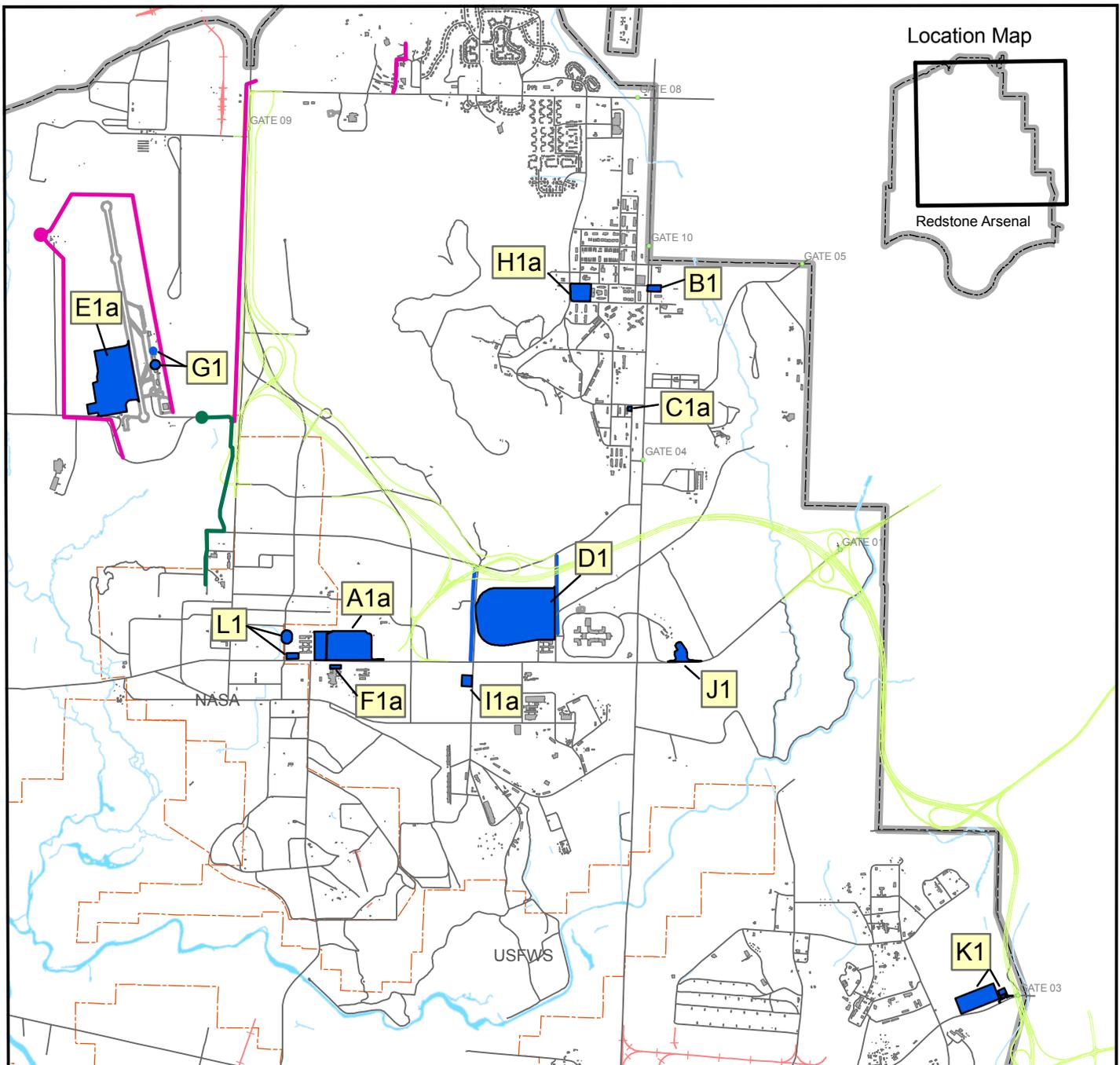
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Redstone Arsenal



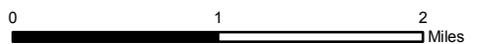
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* See accompanying letter for a description of the alternatives.

Prepared For:

U.S. Army Corps of Engineers, Mobile District

Preferred Alternative and Proposed Utilities
at Redstone Arsenal, Alabama



Final



United States Department of the Interior

FISH AND WILDLIFE SERVICE
1208-B Main Street
Daphne, Alabama 36526

IN REPLY REFER TO:

06-FA-0347

August 15, 2006

Commander, U.S. Army Garrison-Redstone Arsenal
Attn: IMSE-RED-PWE (Mr. Terry W. Hazle)
4488 Martin Road
Redstone Arsenal, AL 35898-5000

Dear Sir:

Thank you for your letter, dated July 31, 2006, requesting concurrence with the Defense Base Realignment and Closure Commission (BRAC) Realignment Actions at Redstone Arsenal, Alabama. We have reviewed the information you enclosed and are providing the following comments in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

The Service concurs that the proposed construction/renovation of facilities and increase in personnel strength is not likely to adversely affect listed species. Therefore, no further endangered species consultation will be required for this project unless: 1) the identified action is subsequently modified in a manner that causes an effect on listed species or designated Critical Habitat; 2) new information reveals the identified action may affect Federally protected species or designated Critical Habitat in a manner or to an extent not previously considered; or 3) a new species is listed or Critical Habitat is designated under the Endangered Species Act that may be affected by the identified action.

If you need any additional information, please contact Mr. Bruce Porter, at 251-441-5864 and kindly refer to the reference number above.

Sincerely,

Elaine Snyder-Conn
Acting Field Supervisor

PHONE: 251-441-5181



FAX: 251-441-6222



BOB RILEY
GOVERNOR

M. BARNETT LAWLEY
COMMISSIONER

RICHARD C. LILES
OPERATIONS DIRECTOR

STATE OF ALABAMA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
64 NORTH UNION STREET
MONTGOMERY, AL 36130

August 15, 2006

JAMES H. GRIGGS, DIRECTOR
GREGORY M. LEIN, ASSISTANT DIRECTOR
STATE LANDS DIVISION

TELEPHONE (334) 242-3484
FAX NO. (334) 242-0999

Mr. Terry W. Hazle, Chief
Environmental Management Division
Department of the Army
4488 Martin Road
Redstone Arsenal, Alabama 35898-5000

RE: Defense Base Realignment and Closure Commission at Redstone Arsenal, Alabama

Dear Mr. Hazle:

The Department of Conservation and Natural Resources has reviewed the information submitted associated with the BRAC for Redstone Arsenal, Alabama. The proposed action includes constructing or renovating a number of facilities. We submit the following comments regarding the proposed actions. The Department has no object to the BRAC directed actions provided that:

- If the proposed project will impact habitat types known to support protected species, the applicant should have a professional survey completed to determine if such species currently inhabit the project site. The applicant is also advised that it is necessary to coordinate with the U. S. Fish and Wildlife Service (USFWS) regarding potential impacts to federally-protected species, but please note that USFWS does not provide information on state-protected species. If protected species are adversely impacted by the project, additional coordination with the Department of Conservation and Natural Resources (334-242-3851) and/or with USFWS (251-441-5181) will be required.
- No net loss of stream or wetland functions occurs as a result of the project. Adverse functional impacts may result from physical impacts to a stream or wetland, from the alteration of a stream's natural flow regime, or from the impairment of wetland hydrology. If flowing streams, ditches, or wetlands will be impacted by the proposed activity, the Nashville District, Army Corps of Engineers should be contacted at 615-369-7500 to determine if the activity falls under a Corps regulation requiring mitigation for adverse ecological, morphological, or hydrological impacts. If mitigation is required, then we request the opportunity to review and comment on the proposed mitigation plan.
- The use of sod strips, silt fences, or superior means of erosion control to minimize siltation downstream of a project site.
- State water quality standards (particularly those related to erosion control, water turbidity, and dissolved oxygen) should be strictly adhered to.

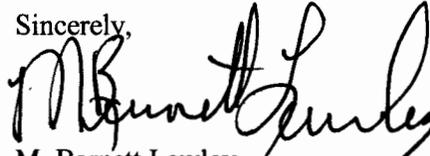
Additionally, the Natural Heritage Section has reviewed the Natural Heritage Database and provides the following information as an aid in project planning. The closest sensitive species is recorded in our database as occurring approximately 0.3 miles from the subject site. This state protected species (the Tuscumbaria Darter) inhabits vegetated spring pools and runs with slow current, although the species has been found around small (four to five feet high) dams and small impoundments (beaver ponds), larger structures pose a barrier to dispersal. Destruction and



Page 2
Mr. Hazle
Redstone BRAC

disturbance of these habitats should be avoided and "taking" of the animal itself is prohibited. Another, sensitive species is recorded in our database as occurring approximately 0.5 miles from the subject site. This endangered cave roosting bat will forage over land and water and occurs throughout the Tennessee River system habitat.

Sincerely,

A handwritten signature in black ink, appearing to read "M. Barnett Lawley". The signature is fluid and cursive, with a long, sweeping underline that extends downwards and to the right.

M. Barnett Lawley
Commissioner

September 11, 2006



Mr. Terry Hazle
US Army Garrison - Redstone
4488 Martin Rd.
Redstone Arsenal, AL 35898-5000

Re: AHC 06-0809
Environmentla Assessment
BRAC Realignment Procedures
Madison County, AL

468 South Perry Street
Montgomery, Alabama
36130-0900

tel 334 242•3184
fax 334 240•3477

Dear Mr. Hazle:

Upon review of the proposed project, the Alabama Historical Commission has determined that the project activities will have no effect on any known cultural resources listed on or eligible for the National Register of Historic Places. Therefore, our office can concur with the proposed activities.

However, should any archaeological cultural resources be encountered during project activities, work shall cease and our office shall be consulted immediately. This stipulation shall be placed on the construction plans to insure contractors are aware of it.

We appreciate your efforts on this issue. If we may be of further service or if you have any questions or comments, please contact Amanda McBride of our office and be sure to *include the project number referenced above.*

Sincerely,

A handwritten signature in cursive script that reads "Elizabeth Ann Brown".

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

Redstone Arsenal consults with the following 17 federally recognized Indian Tribes:

Absentee Shawnee Tribe of Indians of Oklahoma
Alabama-Coushatta Tribe of Texas
Alabama-Quassarte Tribal Town
Cherokee Nation of Oklahoma
Chickasaw Nation
Choctaw Nation of Oklahoma
Coushatta Tribe of Louisiana
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Kialegee Tribal Town
Muscogee (Creek) Nation of Oklahoma
Poarch Band of Creek Indians
Seminole Nation of Oklahoma
Shawnee Tribe of Oklahoma
Thlopthlocco Tribal Town
Tunica-Biloxi Indian Tribe of Louisiana
United Keetoowah Band of Cherokee Indians

*Environmental Assessment for Base Realignment and Closure,
Installation Support, and Associated Future Master Planning
Actions at Redstone Arsenal, Alabama*

APPENDIX D

ECONOMIC IMPACT FORECAST SYSTEM REPORT

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APPENDIX D. ECONOMIC IMPACT FORECAST SYSTEM REPORT

This appendix provides the Economic Impact Forecast System Report for Redstone Arsenal.

Economic Impact Assessment System
 US Army Corps of Engineers
 Mobile District

EIFS REPORT

PROJECT NAME

Redstone

STUDY AREA

01083 Limestone, AL
 01089 Madison, AL
 01095 Marshall, AL
 01103 Morgan, AL

FORECAST INPUT

Change In Local Expenditures	\$280,000,000
Change In Civilian Employment	4046
Average Income of Affected Civilian	\$70,000
Percent Expected to Relocate	45
Change In Military Employment	85
Average Income of Affected Military	\$70,000
Percent of Militart Living On-post	5

FORECAST OUTPUT

Employment Multiplier	3.33
Income Multiplier	3.33
Sales Volume - Direct	\$510,555,100
Sales Volume - Induced	\$1,189,593,000
Sales Volume - Total	\$1,700,148,000 10.62%
Income - Direct	\$352,557,100
Income - Induced)	\$269,303,200
Income - Total(place of work)	\$621,860,200 5.17%
Employment - Direct	6972
Employment - Induced	6619
Employment - Total	13591 4.22%
Local Population	4745
Local Off-base Population	4735 0.91%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	12.1 %	11.07 %	4.16 %	1.54 %
Negative RTV	-5.85 %	-4.74 %	-2.71 %	-0.55 %

RTV DETAILED

SALES VOLUME

Year	Value	Adj_Value	Change	Deviation	%Deviation
1969	1029281	4497958	0	0	0
1970	1111299	4589665	91707	-91959	-2
1971	1199766	4751073	161408	-22258	-0.47

1972	1310268	5018326	267253	83587	1.67
1973	1411288	5094750	76423	-107243	-2.1
1974	1543188	5015361	-79389	-263055	-5.24
1975	1654005	4928935	-86426	-270092	-5.48
1976	1855019	5231153	302219	118553	2.27
1977	2081392	5494875	263722	80056	1.46
1978	2340526	5757694	262819	79153	1.37
1979	2609914	5767910	10216	-173450	-3.01
1980	2845919	5521083	-246827	-430493	-7.8
1981	3121760	5494298	-26785	-210451	-3.83
1982	3332857	5532543	38245	-145421	-2.63
1983	3780978	6087375	554832	371166	6.1
1984	4348464	6696634	609260	425594	6.36
1985	4877437	7267381	570747	387081	5.33
1986	5256353	7674276	406894	223228	2.91
1987	5767269	8939267	1264991	1081325	12.1
1988	6316182	8590008	-349259	-532925	-6.2
1989	6711960	8658428	68421	-115245	-1.33
1990	7159669	8806393	147965	-35701	-0.41
1991	7520525	8874219	67826	-115840	-1.31
1992	8193472	9340558	466339	282673	3.03
1993	8466069	9397337	56779	-126887	-1.35
1994	8738960	9438077	40740	-142926	-1.51
1995	9077710	9531595	93518	-90148	-0.95
1996	9225852	9410369	-121226	-304892	-3.24
1997	9678474	9678474	268105	84439	0.87
1998	10241296	10036470	357996	174330	1.74
1999	10571483	10148623	112153	-71513	-0.7
2000	11156218	10375283	226659	42993	0.41

INCOME

Year	Value	Adj_Value	Change	Deviation	%Deviation
1969	1144312	5000643	0	0	0
1970	1248316	5155545	154902	-93716	-1.82
1971	1361379	5391061	235516	-13102	-0.24
1972	1488477	5700867	309806	61188	1.07
1973	1632629	5893791	192924	-55694	-0.94
1974	1782611	5793486	-100305	-348923	-6.02
1975	1956692	5830942	37456	-211162	-3.62
1976	2200175	6204493	373551	124933	2.01
1977	2433518	6424488	219994	-28624	-0.45
1978	2745299	6753436	328948	80330	1.19
1979	3077590	6801474	48038	-200580	-2.95
1980	3393912	6584189	-217285	-465903	-7.08
1981	3817562	6718909	134720	-113898	-1.7
1982	4128832	6853861	134952	-113666	-1.66
1983	4537542	7305443	451582	202964	2.78
1984	5217008	8034192	728749	480131	5.98
1985	5779574	8611565	577373	328755	3.82
1986	6224575	9087880	476314	227696	2.51
1987	6773398	10498767	1410887	1162269	11.07
1988	7418260	10088887	-100785	-658402	-6.52

1988	7416307	10006702	-709783	-030403	-0.33
1989	8015088	10339463	250481	1863	0.02
1990	8593032	10569430	229966	-18652	-0.18
1991	9109087	10748722	179293	-69325	-0.64
1992	9862006	11242687	493965	245347	2.18
1993	10175806	11295145	52458	-196160	-1.74
1994	10626109	11476198	181053	-67565	-0.59
1995	11126451	11682773	206575	-42043	-0.36
1996	11474638	11704131	21358	-227260	-1.94
1997	12033527	12033527	329396	80778	0.67
1998	12773410	12517942	484415	235797	1.88
1999	13208702	12680354	162412	-86206	-0.68
2000	13931633	12956419	276065	27447	0.21

EMPLOYMENT

Year	Value	Change	Deviation	%Deviation
1969	160589	0	0	0
1970	161728	1139	-4470	-2.76
1971	161406	-322	-5931	-3.67
1972	167499	6093	484	0.29
1973	172315	4816	-793	-0.46
1974	175047	2732	-2877	-1.64
1975	173642	-1405	-7014	-4.04
1976	178842	5200	-409	-0.23
1977	187121	8279	2670	1.43
1978	196643	9522	3913	1.99
1979	199472	2829	-2780	-1.39
1980	198741	-731	-6340	-3.19
1981	200223	1482	-4127	-2.06
1982	200980	757	-4852	-2.41
1983	211874	10894	5285	2.49
1984	226914	15040	9431	4.16
1985	239582	12668	7059	2.95
1986	248723	9141	3532	1.42
1987	261583	12860	7251	2.77
1988	272850	11267	5658	2.07
1989	280192	7342	1733	0.62
1990	287571	7379	1770	0.62
1991	287996	425	-5184	-1.8
1992	293590	5594	-15	-0.01
1993	302406	8816	3207	1.06
1994	301187	-1219	-6828	-2.27
1995	309913	8726	3117	1.01
1996	314905	4992	-617	-0.2
1997	322003	7098	1489	0.46
1998	330126	8123	2514	0.76
1999	334529	4403	-1206	-0.36
2000	340063	5534	-75	-0.02

POPULATION

Year	Value	Change	Deviation	%Deviation
1969	353377	0	0	0

1970	360493	7116	1381	0.38
1971	366672	6179	444	0.12
1972	370579	3907	-1828	-0.49
1973	373685	3106	-2629	-0.7
1974	375305	1620	-4115	-1.1
1975	378743	3438	-2297	-0.61
1976	383223	4480	-1255	-0.33
1977	387981	4758	-977	-0.25
1978	392290	4309	-1426	-0.36
1979	395521	3231	-2504	-0.63
1980	399662	4141	-1594	-0.4
1981	402284	2622	-3113	-0.77
1982	406538	4254	-1481	-0.36
1983	412448	5910	175	0.04
1984	419093	6645	910	0.22
1985	427907	8814	3079	0.72
1986	435528	7621	1886	0.43
1987	444213	8685	2950	0.66
1988	452339	8126	2391	0.53
1989	458922	6583	848	0.18
1990	465920	6998	1263	0.27
1991	476066	10146	4411	0.93
1992	488383	12317	6582	1.35
1993	501834	13451	7716	1.54
1994	509180	7346	1611	0.32
1995	511722	2542	-3193	-0.62
1996	515830	4108	-1627	-0.32
1997	520454	4624	-1111	-0.21
1998	528063	7609	1874	0.35
1999	532234	4171	-1564	-0.29
2000	536894	4660	-1075	-0.2

***** End of Report *****

*Environmental Assessment for Base Realignment and Closure,
Installation Support, and Associated Future Master Planning
Actions at Redstone Arsenal, Alabama*

APPENDIX E

TRAFFIC

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APPENDIX E. TRAFFIC

This appendix provides information regarding the traffic analysis for Redstone Arsenal.

Traffic was counted near Gates 3, 7, 8, 9, and 10 in 2004. This data was collected with electronic counters in fifteen minute increments within a 24-hour period. Table E-1 shows the day totals, peak total by hour a.m. and peak total by hour p.m. The complete data set is provided in Attachment 1 of this appendix.

Table E-1. 2004 Traffic Counts on Redstone Arsenal, Alabama

Area	Day total	Peak total by hour (a.m.)	Peak total by hour (p.m.)
Gate 3 inbound	3,442	1,032 (6:00 – 7:00)	344 (12:00 – 1:00)
Gate 3 outbound	3,111	336 (11:00 – 12:00)	992 (4:00 – 5:00)
Gate 7 inbound	3,281	1,044 (7:00 – 8:00)	231 (12:00 – 1:00)
Gate 7 outbound	3,112	119 (7:00 – 8:00)	960 (4:00 – 5:00)
Gate 8 inbound	3,264	349 (7:00 – 8:00)	366 (12:00 – 1:00)
Gate 8 outbound	3,109	375 (11:00 – 12:00)	451 (4:00 – 5:00)
Gate 9 inbound	11,169	2,185 (7:00 – 8:00)	1,085 (12:00 – 1:00)
Gate 9 outbound	11,290	1,104 (11:00 – 12:00)	2,475 (4:00 – 5:00)
Gate 10 inbound	4,758	819 (7:00 – 8:00)	533 (12:00 – 1:00)
Gate 10 outbound	3,778	390 (11:00 – 12:00)	536 (4:00 – 5:00)

Source: Redstone Arsenal (2004)

Traffic was counted at 19 locations in the vicinity of the Redstone Arsenal Airfield and the Martin Road administrative area in July 2006. Electronic data-loggers (tube-machine counters) were placed at the selected locations and vehicle count data was collected for a 24-hour period at each location. Table E-2 shows the day totals, peak total by hour a.m. and peak total by hour p.m. The complete data set is provided in Attachment 2 of this appendix.

Table E-2. 2006 Traffic Counts on Redstone Arsenal, Alabama.

Location	Area	Day total	Peak total by hour (a.m.)	Peak total by hour (p.m.)
1	Martin Road east of Mills Road – eastbound	5,304	565 (10:45 – 11:45)	818 (4:00 – 5:00)
	Martin Road east of Mills Road – westbound	4,957	735 (6:45 – 7:45)	561 (12:00 – 1:00)
2	Martin Road west of Mills Road – eastbound	4,828	501 (6:30 – 7:30)	655 (6:45 – 7:45)
	Martin Road west of Mills Road – westbound	4,720	721 (4:15 – 5:15)	527 (4:15 – 5:15)
3	Martin Road west of Patton Road – westbound	5,633	1,181 (6:45 – 7:45)	835 (12:00 – 1:00)
	Martin Road west of Patton Road – eastbound	6,826	1,039 (10:45 – 11:45)	1,479 (4:15 – 5:15)

Appendix E
Traffic

Location	Area	Day total	Peak total by hour (a.m.)	Peak total by hour (p.m.)
4	Martin Road west of Toftoy Thruway – eastbound	4,343	533 (7:00 – 8:00)	590 (4:00 – 5:00)
	Martin Road west of Toftoy Thruway – westbound	3,749	478 (7:00 – 8:00)	446 (4:00 – 5:00)
5	Patton Road south of Martin Road – southbound – one lane	3,954	336 (7:15 – 8:15)	746 (4:00 – 5:00)
	Patton Road south of Martin Road – northbound – one lane	4,260	775 (6:30 – 7:30)	358 (3:30 – 4:30)
6	Patton Road south of Neal Road – southbound – one lane	2,385	369 (6:30 – 7:30)	408 (12:00 – 1:00)
	Patton Road south of Neal Road – northbound – one lane	2,155	335 (10:45 – 11:45)	373 (3:45 – 4:45)
7	Neal Road east of Burose Road – eastbound – one lane	3,047	496 (10:30 – 11:30)	454 (3:15 – 4:15)
	Neal Road east of Burose Road – westbound – one lane	2,752	383 (7:00 – 8:00)	376 (12:00 – 1:00)
8	Neal Road east of Mills Road – eastbound – one lane	3,244	563 (6:30 – 7:30)	278 (12:00 – 1:00)
	Neal Road east of Mills Road – westbound – one lane	2,813	258 (11:15 – 12:15)	432 (4:00- 5:00)
9	Hale Road west of Airfield runway – eastbound – one lane	1,182	143 (10:45 – 11:45)	300 (4:15 – 5:15)
	Hale Road west of Airfield runway – westbound – one lane	1,174	247 (7:30 – 8:30)	131 (12:15 – 1:15)
10	Hale Road west of Rideout Road – eastbound – one lane	1,578	186 (10:45 – 11:45)	352 (4:00 – 5:00)
	Hale Road west of Rideout Road – westbound – one lane	1,574	329 (7:00 – 8:00)	179 (4:00 – 5:00)
11	Marshall Road north of Neal Road – southbound –one lane	2,191	616 (6:30 – 7:30)	195 (12:15 – 1:15)
	Marshall Road north of Neal Road – northbound –one lane	2,379	282 (10:45 – 11:45)	565 (4:00 – 5:00)
12	Neal Road west of Mills Road – westbound – one lane	1,226	206 (10:45 – 11:45)	124 (12:00 – 1:00)

Location	Area	Day total	Peak total by hour (a.m.)	Peak total by hour (p.m.)
	Neal Road west of Mills Road – eastbound – one lane	1,245	186 (10:45 – 11:45)	139 (3:45 – 4:45)
13	Burose Road south of Neal Road – southbound – one lane	3,022	621 (6:45 – 7:45)	322 (12:00 – 1:00)
	Burose Road south of Neal Road – northbound – one lane	2,958	433 (10:45 – 11:45)	649 (4:00 – 5:00)
14	Toftoy Thruway north of Neal Road – northbound – one lane	2,668	263 (10:45 – 11:45)	610 (4:00 – 5:00)
	Toftoy Thruway north of Neal Road – southbound – one lane	2,477	595 (6:15 – 7:15)	199 (12:00 – 1:00)
15	Mills Road west of Jugerman Road – westbound – one lane	2,865	606 (6:45 – 7:45)	231 (3:30 – 4:30)
	Mills Road west of Jugerman Road – eastbound – one lane	1,805	194 (6:45 – 7:45)	310 (4:00 – 5:00)
16	Mills Road south of Martin Road – northbound	2,175	267 (10:45 – 11:45)	265 (4:00 – 5:00)
	Mills Road south of Martin road – southbound – one lane	1,684	278 (6:45 – 7:45)	254 (12:15 – 1:15)
17	Toftoy Thruway south of Morris Road – southbound – one lane	4,551	1167 (6:15 – 7:15)	358 (12:15 – 1:15)
	Toftoy Thruway south of Morris Road – northbound – one lane	6,195	501 (10:45 – 11:45)	1,508 (4:00 – 5:00)
18	Toftoy Thruway south of Neal Road – northbound	2,691	548 (6:15 – 7:15)	232 (12:00 – 1:00)
	Toftoy Thruway south of Neal Road – southbound – one lane	2,049	223 (10:30 – 11:30)	446 (3:30 – 4:30)
19	Mills Road north of Martin Road – northbound – one lane	1,537	198 (10:45 – 11:45)	224 (3:45 – 4:45)
	Mills Road north of Martin Road – southbound – one lane	1,269	225 (7:15 – 8:15)	157 (12:00 – 1:00)

Source: Traffic Data, LLC 2006

Data was collected by a human observer positioned at Gate 1 to visually collect vehicle count data and to distinguish between passenger vehicles and commercial traffic on July 12, 2006. The observer collected data between the hours of 5:45 a.m. and 9:00 a.m., 10:45 a.m. and 1:15 p.m., and 3:00 p.m. and 6:00 p.m. Table E-3 shows the day totals, peak total by hour a.m. and peak total by hour p.m. The complete data set is provided in Attachment 2 of this appendix.

Table E-3. 2006 Passenger and Commercial Traffic Counts at Gate 1 on Redstone Arsenal, Alabama.

Area	Day total	Peak total by hour (a.m.)	Peak total by hour (p.m.)
Gate 1 outbound (passenger)	4,635	1,270 (7:00 – 8:00)	818 (12:00 – 1:00)
Gate 1 inbound (passenger)	4,360	831 (11:00 – 12:00 p.m.)	1,265 (4:00 – 5:00)
Gate 1 outbound (commercial)	226	39 (11:00 – 12:00 p.m.)	47 (12:00 – 1:00)
Gate 1 inbound (commercial)	101	33 (11:00 – 12:00 p.m.)	15 (12:00 – 1:00; 3:00 – 4:00; 4:00 – 5:00)

Source: Traffic Data, LLC 2006

Projected gate use was determined using the most likely scenario of routes that coincide with each facility group as well as off-site future housing development. The personnel projected to access the gates were derived based on a percentage of personnel associated with each facility group. The percentage was based on the proximity of a gate to a facility group, the projected future housing (north, west, and east), and the current gate usage. Table E-4 indicates the projected percentages of each facility group to a particular gate. The projected personnel were then adjusted to projected vehicular traffic (85 percent single drivers and 15 percent with at least two occupants). The projected vehicular traffic was then added to the current day total to determine the projected day total and percent change. Note: The day total was determined as the projected personnel to enter and leave the base only one time a day.

Table E-4. Projected Gate Percentage and Personnel Based on Facility Location and Future Housing Development.

Area	Percent of Personnel Expected						Personnel Projected					
	Gate 1	Gate 3	Gate 7	Gate 8	Gate 9	Gate 10	Gate 1	Gate 3	Gate 7	Gate 8	Gate 9	Gate 10
A	20%		40%		40%		599		1198		1198	
B/C	10%			45%		45%	4			18		18
D	10%	10%	30%	10%	30%	10%	319	319	957	319	957	319
E/G			50%		50%				101		101	
F	20%		40%		40%		37		73		73	
H	10%			45%		45%	11			51		51
I	50%	10%		10%	20%	10%	39	7		7	15	7
J	70%	10%		10%		10%	8	1		1		1

Table E-5 shows the projected road use in select areas of Redstone Arsenal, as well as current peak hour use in a.m. and p.m., and projected peak hour use in a.m. and p.m. Unless otherwise noted, the roads consist of two lanes in each direction. The projected personnel for each road segment were determined based on the proximity to a particular facility group. The projected personnel associated with a particular facility group, and ultimately road segment selection, were derived based on a percentage. The percentage was determined based on the proximity of a road segment to a particular gate and the anticipated gate usage (as discussed above). The projected peak hour use in a.m. and p.m. was then determined based on the projected vehicular traffic (85 percent single drivers and 15 percent with at least two occupants). The vehicular traffic projected for peak hourly use also took into consideration a.m. and p.m. baseline trends. For example, a percentage of projected vehicular traffic was projected for a.m. and a percentage of this was anticipated for p.m. based on current traffic trends.

Table E-5. Projected Traffic in Select Areas of Redstone, Arsenal.

Area	Projected Additional Personnel	Projected Additional Vehicular Traffic	Current Peak Hour Use AM	Current Peak Hour Use PM	Projected Peak Hour Use AM	Projected Peak Hour Use PM
Martin Road east of Mills Road - eastbound	497	460	282	409	470	681
Martin Road east of Mills Road - westbound	497	460	367	280	628	479
Martin Road west of Patton Road - eastbound	497	460	519	739	709	1009
Martin Road west of Patton Road - westbound	497	460	590	417	859	607
Martin Road west of Toftoy Thruway - eastbound	1114	1030	266	295	755	837
Martin Road west of Toftoy Thruway - westbound	1114	1030	239	223	772	720
Patton Road south of Martin Road - southbound - one lane	327	302	336	746	430	955
Patton Road south of Martin Road - northbound - one lane	327	302	775	358	982	454
Patton Road south of Neal Road - southbound - one lane	342	316	369	408	519	574
Patton Road south of Neal Road - northbound - one lane	342	316	335	373	485	540
Neal Road east of Burose Road - eastbound - one lane	319	295	496	454	650	595
Neal Road east of Burose Road - westbound - one lane	319	295	383	376	532	522
Neal Road east of Mills Road - eastbound - one lane	478	442	563	278	859	424

Appendix E
Traffic

Area	Projected Additional Personnel	Projected Additional Vehicular Traffic	Current Peak Hour Use AM	Current Peak Hour Use PM	Projected Peak Hour Use AM	Projected Peak Hour Use PM
Neal Road east of Mills Road - westbound - one lane	478	442	258	432	423	709
Martin Road west of Mills Road - eastbound	804	744	250	327	572	748
Martin Road west of Mills Road - westbound	804	744	360	263	790	577
Hale Road west of airfield runway - eastbound - one lane	101	93	143	300	173	363
Hale Road west of airfield runway - westbound - one lane	101	93	247	131	308	163
Hale Road west of Rideout Road - eastbound - one lane	101	93	186	352	218	413
Hale Road west of Rideout Road - westbound - one lane	101	93	329	179	390	212
Marshall Road north of Neal Road - southbound - one lane	493	456	616	195	962	305
Marshall Road north of Neal Road - northbound - one lane	493	456	282	565	434	869
Neal Road west of Mills Road - westbound - one lane	493	456	206	124	491	295
Neal Road west of Mills Road - eastbound - one lane	493	456	186	139	447	334
Burose Road south of Neal Road - southbound - one lane	478	442	621	322	912	473

Area	Projected Additional Personnel	Projected Additional Vehicular Traffic	Current Peak Hour Use AM	Current Peak Hour Use PM	Projected Peak Hour Use AM	Projected Peak Hour Use PM
Burose Road south of Neal Road – northbound – one lane	478	442	433	649	610	914
Toftoy Thruway north of Neal Road – northbound – one lane	1129	1044	263	610	578	1340
Toftoy Thruway north of Neal Road – southbound – one lane	1129	1044	595	199	1378	461
Mills Road west of Jugerman Road – westbound – one lane	326	302	606	231	824	314
Mills Road west of Jugerman Road – eastbound – one lane	326	302	194	310	310	495
Mills Road south of Martin Road – northbound	163	151	133	132	209	207
Mills Road south of Martin road – southbound – one lane	326	302	278	254	436	398
Toftoy Thruway south of Morris Road – southbound – one lane	1129	1044	1167	358	1966	603
Toftoy Thruway south of Morris Road – northbound – one lane	1129	1044	501	1508	761	2292
Toftoy Thruway south of Neal Road – northbound	564	522	274	116	641	271
Toftoy Thruway south of Neal Road – southbound – one lane	1129	1044	223	446	571	1142
Mills Road north of Martin Road – northbound – one lane	478	442	198	224	405	459
Mills Road north of Martin Road – southbound – one lane	478	442	225	157	485	339

*Environmental Assessment for Base Realignment and Closure,
Installation Support, and Associated Future Master Planning
Actions at Redstone Arsenal, Alabama*

Attachment 1

Traffic Counts in 2004

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Table 1 - Gate 1

Time	Inbound Traffic Average WB	Outbound Traffic Average EB	Total Traffic Average
4:00 - 4:15	0	0	0
4:15 - 4:30	0	0	0
4:30 - 4:45	1	0	1
4:45 - 5:00	0	0	0
5:00 - 5:15	3	0	3
5:15 - 5:30	1	0	1
5:30 - 5:45	85	0	85
5:45 - 6:00	123	0	123
6:00 - 6:15	130	0	130
6:15 - 6:30	198	0	198
6:30 - 6:45	254	0	254
6:45 - 7:00	293	0	293
7:00 - 7:15	315	0	315
7:15 - 7:30	306	0	306
7:30 - 7:45	272	0	272
7:45 - 8:00	269	0	269
8:00 - 8:15	320	0	320
8:15 - 8:30	216	0	216
8:30 - 8:45	160	14	174
8:45 - 9:00	115	22	137
9:00 - 9:15	78	25	103
9:15 - 9:30	72	35	107
9:30 - 9:45	56	38	94
9:45 - 10:00	42	40	82
10:00 - 10:15	39	50	89
10:15 - 10:30	30	54	84
10:30 - 10:45	29	77	105
10:45 - 11:00	45	190	235
11:00 - 11:15	34	272	306
11:15 - 11:30	49	222	271
11:30 - 11:45	86	147	233
11:45 - 12:00	152	96	248
12:00 - 12:15	191	76	267
12:15 - 12:30	260	59	318
12:30 - 12:45	190	48	238
12:45 - 13:00	146	54	199
13:00 - 13:15	111	55	166
13:15 - 13:30	79	51	130
13:30 - 13:45	55	45	100
13:45 - 14:00	45	47	92
14:00 - 14:15	37	50	88
14:15 - 14:30	40	69	109
14:30 - 14:45	36	82	118
14:45 - 15:00	26	82	108
15:00 - 15:15	25	113	138
15:15 - 15:30	15	111	127
15:30 - 15:45	16	241	257
15:45 - 16:00	0	193	193
16:00 - 16:15	0	286	286
16:15 - 16:30	0	275	275
16:30 - 16:45	0	393	393
16:45 - 17:00	0	300	300
17:00 - 17:15	0	285	285
17:15 - 17:30	0	221	221
17:30 - 17:45	0	167	167
17:45 - 18:00	0	138	138
18:00 - 18:15	0	131	131
18:15 - 18:30	0	101	101
18:30 - 18:45	0	89	89
18:45 - 19:00	0	79	79
19:00 - 19:15	0	56	56
19:15 - 19:30	0	40	40
19:30 - 19:45	0	28	28
19:45 - 20:00	0	23	23
20:00 - 20:15	0	20	20
20:15 - 20:30	0	12	12
20:30 - 20:45	0	12	12
20:45 - 21:00	0	13	13
21:00 - 21:15	0	17	17
21:15 - 21:30	0	16	16
21:30 - 21:45	0	10	10
21:45 - 22:00	0	12	12
Total 18-Hour	5,042	5,382	10,424

Table 2 - Gate 3

Time	Inbound Traffic Average WB	Outbound Traffic Average EB	Total Traffic Average
4:00 - 4:15	0	0	0
4:15 - 4:30	0	0	0
4:30 - 4:45	0	0	0
4:45 - 5:00	0	0	0
5:00 - 5:15	0	0	0
5:15 - 5:30	6	2	8
5:30 - 5:45	101	1	102
5:45 - 6:00	120	0	120
6:00 - 6:15	173	2	175
6:15 - 6:30	240	3	243
6:30 - 6:45	274	6	280
6:45 - 7:00	345	4	349
7:00 - 7:15	241	9	250
7:15 - 7:30	254	10	264
7:30 - 7:45	228	6	234
7:45 - 8:00	260	16	276
8:00 - 8:15	139	14	153
8:15 - 8:30	84	11	95
8:30 - 8:45	77	15	92
8:45 - 9:00	53	22	75
9:00 - 9:15	6	12	18
9:15 - 9:30	0	8	8
9:30 - 9:45	0	13	13
9:45 - 10:00	0	4	4
10:00 - 10:15	5	17	22
10:15 - 10:30	2	16	18
10:30 - 10:45	5	23	28
10:45 - 11:00	7	56	63
11:00 - 11:15	20	125	145
11:15 - 11:30	61	53	114
11:30 - 11:45	67	80	147
11:45 - 12:00	72	78	150
12:00 - 12:15	104	34	138
12:15 - 12:30	85	32	117
12:30 - 12:45	91	17	108
12:45 - 13:00	64	31	95
13:00 - 13:15	39	28	67
13:15 - 13:30	32	29	61
13:30 - 13:45	14	24	38
13:45 - 14:00	18	19	37
14:00 - 14:15	19	26	45
14:15 - 14:30	14	25	39
14:30 - 14:45	25	79	104
14:45 - 15:00	6	55	61
15:00 - 15:15	8	87	95
15:15 - 15:30	15	108	123
15:30 - 15:45	11	206	217
15:45 - 16:00	11	155	166
16:00 - 16:15	15	259	274
16:15 - 16:30	6	238	244
16:30 - 16:45	3	249	252
16:45 - 17:00	9	246	255
17:00 - 17:15	6	153	159
17:15 - 17:30	6	155	161
17:30 - 17:45	0	128	128
17:45 - 18:00	0	106	106
18:00 - 18:15	1	13	14
18:15 - 18:30	0	0	0
18:30 - 18:45	0	0	0
18:45 - 19:00	0	0	0
19:00 - 19:15	0	0	0
19:15 - 19:30	0	0	0
19:30 - 19:45	0	0	0
19:45 - 20:00	0	1	1
20:00 - 20:15	0	0	0
20:15 - 20:30	0	0	0
20:30 - 20:45	0	0	0
20:45 - 21:00	0	0	0
21:00 - 21:15	0	0	0
21:15 - 21:30	0	0	0
21:30 - 21:45	0	2	2
21:45 - 22:00	0	0	0
Total 18-Hour	3,442	3,111	6,553

Table 3 - Gate 7

Time	Inbound Traffic Average EB	Outbound Traffic Average WB	Total Traffic Average
4:00 - 4:15	0	0	0
4:15 - 4:30	0	0	0
4:30 - 4:45	0	0	0
4:45 - 5:00	0	0	0
5:00 - 5:15	0	0	0
5:15 - 5:30	0	2	2
5:30 - 5:45	0	1	1
5:45 - 6:00	26	0	26
6:00 - 6:15	121	2	123
6:15 - 6:30	192	3	194
6:30 - 6:45	242	18	260
6:45 - 7:00	260	11	271
7:00 - 7:15	274	25	299
7:15 - 7:30	266	16	282
7:30 - 7:45	251	45	296
7:45 - 8:00	253	33	286
8:00 - 8:15	164	13	177
8:15 - 8:30	117	10	127
8:30 - 8:45	63	14	77
8:45 - 9:00	64	21	85
9:00 - 9:15	49	11	60
9:15 - 9:30	24	8	32
9:30 - 9:45	23	12	35
9:45 - 10:00	22	4	26
10:00 - 10:15	20	16	36
10:15 - 10:30	21	15	36
10:30 - 10:45	18	22	40
10:45 - 11:00	17	53	70
11:00 - 11:15	14	119	133
11:15 - 11:30	20	63	83
11:30 - 11:45	37	42	79
11:45 - 12:00	44	64	108
12:00 - 12:15	60	32	92
12:15 - 12:30	64	29	93
12:30 - 12:45	51	29	80
12:45 - 13:00	56	18	74
13:00 - 13:15	49	44	93
13:15 - 13:30	33	28	60
13:30 - 13:45	23	23	46
13:45 - 14:00	21	18	39
14:00 - 14:15	23	25	47
14:15 - 14:30	19	24	43
14:30 - 14:45	23	75	98
14:45 - 15:00	13	52	66
15:00 - 15:15	23	83	106
15:15 - 15:30	27	103	130
15:30 - 15:45	30	200	230
15:45 - 16:00	21	148	169
16:00 - 16:15	12	247	259
16:15 - 16:30	14	227	241
16:30 - 16:45	16	237	253
16:45 - 17:00	32	249	281
17:00 - 17:15	22	193	215
17:15 - 17:30	25	146	171
17:30 - 17:45	9	122	131
17:45 - 18:00	7	101	108
18:00 - 18:15	2	12	14
18:15 - 18:30	1	0	1
18:30 - 18:45	0	0	0
18:45 - 19:00	0	0	0
19:00 - 19:15	0	0	0
19:15 - 19:30	1	0	1
19:30 - 19:45	0	0	0
19:45 - 20:00	2	1	3
20:00 - 20:15	0	0	0
20:15 - 20:30	0	0	0
20:30 - 20:45	0	0	0
20:45 - 21:00	0	0	0
21:00 - 21:15	0	0	0
21:15 - 21:30	0	0	0
21:30 - 21:45	0	2	2
21:45 - 22:00	2	0	2
Total 18-Hour	3,281	3,112	6,393

Table 4 - Gate 8

Time	Inbound Traffic Average WB	Outbound Traffic Average EB	Total Traffic Average
4:00 - 4:15	0	0	0
4:15 - 4:30	0	0	0
4:30 - 4:45	0	0	0
4:45 - 5:00	0	0	0
5:00 - 5:15	1	0	1
5:15 - 5:30	2	0	2
5:30 - 5:45	0	0	0
5:45 - 6:00	2	1	3
6:00 - 6:15	26	5	31
6:15 - 6:30	41	5	46
6:30 - 6:45	54	8	62
6:45 - 7:00	75	15	90
7:00 - 7:15	86	22	108
7:15 - 7:30	93	28	121
7:30 - 7:45	85	39	124
7:45 - 8:00	85	28	114
8:00 - 8:15	79	28	106
8:15 - 8:30	66	27	93
8:30 - 8:45	52	28	79
8:45 - 9:00	57	25	82
9:00 - 9:15	53	35	89
9:15 - 9:30	56	41	97
9:30 - 9:45	58	38	96
9:45 - 10:00	60	41	101
10:00 - 10:15	70	42	112
10:15 - 10:30	66	54	120
10:30 - 10:45	72	59	131
10:45 - 11:00	68	74	142
11:00 - 11:15	74	86	160
11:15 - 11:30	83	91	175
11:30 - 11:45	88	101	189
11:45 - 12:00	88	97	185
12:00 - 12:15	102	90	191
12:15 - 12:30	95	84	179
12:30 - 12:45	83	84	166
12:45 - 13:00	86	80	166
13:00 - 13:15	77	74	151
13:15 - 13:30	74	73	147
13:30 - 13:45	62	87	148
13:45 - 14:00	63	71	133
14:00 - 14:15	64	73	137
14:15 - 14:30	60	71	131
14:30 - 14:45	49	74	123
14:45 - 15:00	62	81	143
15:00 - 15:15	56	83	139
15:15 - 15:30	62	84	146
15:30 - 15:45	71	103	173
15:45 - 16:00	70	114	184
16:00 - 16:15	61	113	174
16:15 - 16:30	69	102	170
16:30 - 16:45	60	124	184
16:45 - 17:00	62	112	174
17:00 - 17:15	54	80	134
17:15 - 17:30	53	83	136
17:30 - 17:45	49	76	125
17:45 - 18:00	47	55	102
18:00 - 18:15	22	23	45
18:15 - 18:30	1	0	1
18:30 - 18:45	1	0	1
18:45 - 19:00	0	0	0
19:00 - 19:15	1	0	1
19:15 - 19:30	0	0	0
19:30 - 19:45	0	0	0
19:45 - 20:00	1	0	1
20:00 - 20:15	0	0	0
20:15 - 20:30	0	0	0
20:30 - 20:45	0	0	0
20:45 - 21:00	2	0	2
21:00 - 21:15	3	0	3
21:15 - 21:30	2	0	2
21:30 - 21:45	0	0	0
21:45 - 22:00	1	0	1
Total 18-Hour	3,264	3,109	6,373

Table 5 - Gate 9

Time	Inbound Traffic Average SB	Outbound Traffic Average NB	Total Traffic Average
4:00 - 4:15	11	2	12
4:15 - 4:30	13	2	15
4:30 - 4:45	15	1	17
4:45 - 5:00	29	2	31
5:00 - 5:15	39	3	42
5:15 - 5:30	67	5	72
5:30 - 5:45	129	14	143
5:45 - 6:00	234	30	264
6:00 - 6:15	327	31	359
6:15 - 6:30	410	28	438
6:30 - 6:45	516	41	557
6:45 - 7:00	540	57	597
7:00 - 7:15	542	51	593
7:15 - 7:30	541	70	611
7:30 - 7:45	538	75	613
7:45 - 8:00	564	89	653
8:00 - 8:15	537	91	628
8:15 - 8:30	505	86	591
8:30 - 8:45	396	79	475
8:45 - 9:00	261	77	337
9:00 - 9:15	220	67	287
9:15 - 9:30	170	66	236
9:30 - 9:45	131	83	214
9:45 - 10:00	111	85	196
10:00 - 10:15	124	109	233
10:15 - 10:30	98	122	220
10:30 - 10:45	125	174	299
10:45 - 11:00	96	365	461
11:00 - 11:15	119	402	521
11:15 - 11:30	120	294	414
11:30 - 11:45	143	230	373
11:45 - 12:00	185	178	363
12:00 - 12:15	227	156	383
12:15 - 12:30	286	137	423
12:30 - 12:45	297	129	426
12:45 - 13:00	275	134	409
13:00 - 13:15	281	121	402
13:15 - 13:30	183	115	298
13:30 - 13:45	167	114	281
13:45 - 14:00	117	125	242
14:00 - 14:15	109	159	268
14:15 - 14:30	80	179	259
14:30 - 14:45	74	213	287
14:45 - 15:00	58	219	277
15:00 - 15:15	63	337	400
15:15 - 15:30	82	397	479
15:30 - 15:45	88	607	696
15:45 - 16:00	83	463	545
16:00 - 16:15	105	660	765
16:15 - 16:30	97	561	658
16:30 - 16:45	85	731	817
16:45 - 17:00	88	523	611
17:00 - 17:15	77	493	571
17:15 - 17:30	57	369	426
17:30 - 17:45	53	278	331
17:45 - 18:00	38	217	256
18:00 - 18:15	28	192	220
18:15 - 18:30	37	135	171
18:30 - 18:45	34	121	156
18:45 - 19:00	27	96	124
19:00 - 19:15	27	85	112
19:15 - 19:30	21	52	73
19:30 - 19:45	14	26	40
19:45 - 20:00	7	24	31
20:00 - 20:15	7	24	30
20:15 - 20:30	6	16	22
20:30 - 20:45	4	13	17
20:45 - 21:00	5	15	20
21:00 - 21:15	7	13	20
21:15 - 21:30	5	11	16
21:30 - 21:45	4	11	16
21:45 - 22:00	5	10	15
Total 18-Hour	11,169	11,290	22,459

Table 6 - Gate 10

Time	Inbound Traffic Average SB	Outbound Traffic Average NB	Total Traffic Average
4:00 - 4:15	0	0	0
4:15 - 4:30	0	0	0
4:30 - 4:45	0	1	1
4:45 - 5:00	21	3	24
5:00 - 5:15	41	3	44
5:15 - 5:30	51	3	54
5:30 - 5:45	76	7	83
5:45 - 6:00	95	11	106
6:00 - 6:15	123	11	134
6:15 - 6:30	122	22	143
6:30 - 6:45	165	19	183
6:45 - 7:00	214	27	241
7:00 - 7:15	205	26	231
7:15 - 7:30	196	17	213
7:30 - 7:45	216	25	242
7:45 - 8:00	202	39	241
8:00 - 8:15	202	41	243
8:15 - 8:30	162	50	212
8:30 - 8:45	90	22	113
8:45 - 9:00	79	27	105
9:00 - 9:15	49	24	73
9:15 - 9:30	37	26	63
9:30 - 9:45	60	17	78
9:45 - 10:00	48	25	73
10:00 - 10:15	37	32	69
10:15 - 10:30	40	22	62
10:30 - 10:45	46	42	88
10:45 - 11:00	53	76	128
11:00 - 11:15	58	114	172
11:15 - 11:30	67	93	160
11:30 - 11:45	76	97	173
11:45 - 12:00	98	86	184
12:00 - 12:15	121	65	186
12:15 - 12:30	134	48	182
12:30 - 12:45	134	38	172
12:45 - 13:00	144	35	179
13:00 - 13:15	98	42	140
13:15 - 13:30	71	36	107
13:30 - 13:45	57	34	92
13:45 - 14:00	49	34	83
14:00 - 14:15	30	52	82
14:15 - 14:30	25	67	92
14:30 - 14:45	31	86	117
14:45 - 15:00	34	77	111
15:00 - 15:15	44	105	149
15:15 - 15:30	49	115	164
15:30 - 15:45	46	159	205
15:45 - 16:00	42	101	143
16:00 - 16:15	49	140	189
16:15 - 16:30	56	130	185
16:30 - 16:45	44	165	209
16:45 - 17:00	43	101	144
17:00 - 17:15	32	118	150
17:15 - 17:30	26	86	111
17:30 - 17:45	37	65	102
17:45 - 18:00	32	62	94
18:00 - 18:15	44	83	127
18:15 - 18:30	40	81	121
18:30 - 18:45	34	84	118
18:45 - 19:00	41	76	117
19:00 - 19:15	48	65	112
19:15 - 19:30	30	62	92
19:30 - 19:45	19	41	61
19:45 - 20:00	23	43	66
20:00 - 20:15	18	35	54
20:15 - 20:30	18	31	49
20:30 - 20:45	18	30	49
20:45 - 21:00	16	44	60
21:00 - 21:15	20	32	52
21:15 - 21:30	13	29	42
21:30 - 21:45	11	34	45
21:45 - 22:00	10	40	51
Total 18-Hour	4,758	3,778	8,536

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*Environmental Assessment for Base Realignment and Closure,
Installation Support, and Associated Future Master Planning
Actions at Redstone Arsenal, Alabama*

Attachment 2

Traffic Counts in 2006

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TRAFFIC DATA, LLC

1409 Turnham Lane
Birmingham, AL 35216
205-824-0125

Redstone Arsenal

File Name : redstone01
Site Code : 00000000
Start Date : 07/12/2006
Page No : 1

Pass=Passenger; Comm=Commerical
Commerical is included in Passenger

Groups Printed- Unshifted

Start Time	GATE 01 - INBOUND Westbound		GATE 01 - OUTBOUND Eastbound		Int. Total
	pass	Comm	Comm	Pass	
10:45 AM	220	8	7	38	273
Total	220	8	7	38	273
11:00 AM	340	6	6	42	394
11:15 AM	234	2	5	63	304
11:30 AM	142	24	21	63	270
11:45 AM	115	1	7	142	265
Total	831	33	39	330	1233
12:00 PM	96	3	11	226	336
12:15 PM	84	2	11	235	332
12:30 PM	52	6	17	203	278
12:45 PM	58	4	8	154	224
Total	290	15	47	818	1170
01:00 PM	37	3	9	116	165
Total	37	3	9	116	165
03:00 PM	128	14	4	19	165
03:15 PM	132	0	6	21	159
03:30 PM	285	1	3	18	307
03:45 PM	185	0	0	13	198
Total	730	15	13	71	829
04:00 PM	300	4	2	20	326
04:15 PM	294	11	1	16	322
04:30 PM	383	0	2	17	402
04:45 PM	268	0	0	11	299
Total	1265	15	5	64	1349
05:00 PM	319	0	2	14	335
05:15 PM	227	0	1	14	242
05:30 PM	161	0	0	10	171
05:45 PM	144	0	0	5	149
Total	851	0	3	43	897
05:45 AM	2	0	6	127	135
Total	2	0	6	127	135
06:00 AM	4	0	7	161	172
06:15 AM	5	0	8	245	258
06:30 AM	4	0	8	279	291
06:45 AM	3	0	7	375	385
Total	16	0	30	1060	1106
07:00 AM	5	0	7	352	364
07:15 AM	5	0	5	314	324
07:30 AM	11	1	12	301	325
07:45 AM	18	1	13	303	335
Total	39	2	37	1270	1348
08:00 AM	15	3	13	248	279
08:15 AM	18	5	2	188	213
08:30 AM	19	1	6	168	194
08:45 AM	27	1	9	94	131
Total	79	10	30	698	817

Grand Total	4360	101	226	4635	9322
Apprch %	97.7	2.3	4.6	95.4	
Total %	46.8	1.1	2.4	49.7	

Start Time	App. Total	GATE 01 - INBOUND Westbound			GATE 01 - OUTBOUND Eastbound				Int. Total	
		pass	Comm	App. Total	App. Total	Comm	Pass	App. Total		
Peak Hour From 10:45 AM to 01:00 PM - Peak 1 of 1										
Intersection	10:45 AM									
Volume	0	936	40	976	0	39	226	265	1241	
Percent		95.9	4.1			14.7	85.3			
11:00 Volume	0	340	6	346	0	6	42	48	394	
Peak Factor										0.787
High Int.	10:30:00 AM	11:00 AM			10:30:00 AM	11:30 AM				
Volume	0	340	6	346	0	21	83	104		
Peak Factor				0.705				0.637		
Peak Hour From 10:45 AM to 01:00 PM - Peak 1 of 1										
By Approach	10:45 AM	10:45 AM			10:45 AM	12:00 PM				
Volume	0	936	40	976	0	47	818	865		
Percent		95.9	4.1			5.4	94.6			
High Int.	-	11:00 AM			-	12:15 PM				
Volume	-	340	6	346	-	11	235	246		
Peak Factor	-			0.705	-			0.879		
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1										
Intersection	04:15 PM									
Volume	0	1284	11	1295	0	5	58	63	1358	
Percent		99.2	0.8			7.9	92.1			
04:30 Volume	0	383	0	383	0	2	17	19	402	
Peak Factor										0.845
High Int.	-	04:30 PM			-	04:30 PM				
Volume	0	383	0	383	0	2	17	19		
Peak Factor	-			0.845	-			0.829		
Peak Hour From 03:00 PM to 05:45 PM - Peak 1 of 1										
By Approach	03:00 PM	04:15 PM			03:00 PM	03:00 PM				
Volume	0	1284	11	1295	0	13	71	84		
Percent		99.2	0.8			15.5	84.5			
High Int.	-	04:30 PM			-	03:15 PM				
Volume	-	383	0	383	-	6	21	27		
Peak Factor	-			0.845	-			0.778		
Peak Hour From 05:45 AM to 08:45 AM - Peak 1 of 1										
Intersection	06:45 AM									
Volume	0	24	1	25	0	31	1342	1373	1398	
Percent		96.0	4.0			2.3	97.7			
06:45 Volume	0	3	0	3	0	7	375	382	385	
Peak Factor										0.908
High Int.	-	07:30 AM			-	06:45 AM				
Volume	0	11	1	12	0	7	375	382		
Peak Factor	-			0.521	-			0.899		
Peak Hour From 05:45 AM to 08:45 AM - Peak 1 of 1										
By Approach	05:45 AM	08:00 AM			05:45 AM	06:45 AM				
Volume	0	79	10	89	0	31	1342	1373		
Percent		88.8	11.2			2.3	97.7			
High Int.	-	08:45 AM			-	06:45 AM				
Volume	-	27	1	28	-	7	375	382		
Peak Factor	-			0.795	-			0.899		

MicroCounts

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TRAFFIC DATA, LLC 205-824-0125

Location: PATTON RD south of MARTIN RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
12:00 - 12:14	66	67	133
12:15 - 12:29	60	75	135
12:30 - 12:44	65	78	143
12:45 - 12:59	65	57	122
Hour Total	256	277	533
13:00 - 13:14	43	59	102
13:15 - 13:29	51	47	98
13:30 - 13:44	52	61	113
13:45 - 13:59	42	33	75
Hour Total	188	200	388
14:00 - 14:14	46	45	91
14:15 - 14:29	64	47	111
14:30 - 14:44	76	48	124
14:45 - 14:59	66	50	116
Hour Total	252	190	442
15:00 - 15:14	113	79	192
15:15 - 15:29	88	46	134
15:30 - 15:44	150	109	259
15:45 - 15:59	124	54	178
Hour Total	475	288	763
16:00 - 16:14	195	105	300
16:15 - 16:29	175	90	265
16:30 - 16:44	209	84	293
16:45 - 16:59	167	60	227
Hour Total	746	339	1085
17:00 - 17:14	166	58	224
17:15 - 17:29	135	33	168
17:30 - 17:44	124	27	151
17:45 - 17:59	66	31	97
Hour Total	491	149	640
18:00 - 18:14	6	25	31
18:15 - 18:29	4	21	25
18:30 - 18:44	2	7	9
18:45 - 18:59	4	5	9
Hour Total	16	58	74
19:00 - 19:14	7	8	15
19:15 - 19:29	3	5	8
19:30 - 19:44	2	3	5

Location: PATTON RD south of MARTIN RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
19:45 - 19:59	11	6	17
Hour Total	23	22	45
20:00 - 20:14	4	8	12
20:15 - 20:29	2	3	5
20:30 - 20:44	1	7	8
20:45 - 20:59	0	0	0
Hour Total	7	18	25
21:00 - 21:14	3	5	8
21:15 - 21:29	1	5	6
21:30 - 21:44	2	3	5
21:45 - 21:59	1	5	6
Hour Total	7	18	25
22:00 - 22:14	1	2	3
22:15 - 22:29	0	1	1
22:30 - 22:44	0	14	14
23:45 - 22:59	3	6	9
Hour Total	4	23	27
23:00 - 23:14	4	3	7
23:15 - 23:29	0	1	1
23:30 - 23:44	5	7	12
23:45 - 23:59	1	4	5
Hour Total	10	15	25
Mid - 12:14	0	2	2
12:15 - 12:29	0	0	0
12:30 - 12:44	1	0	1
12:45 - 12:59	0	1	1
Hour Total	1	3	4
1:00 - 1:14	0	0	0
1:15 - 1:29	0	0	0
1:30 - 1:44	0	0	0
1:45 - 1:59	0	0	0
Hour Total	0	0	0
2:00 - 2:14	0	0	0
2:15 - 2:29	1	1	2
2:30 - 2:44	1	0	1
2:45 - 2:59	0	0	0
Hour Total	2	1	3
3:00 - 3:14	1	1	2
3:15 - 3:29	1	2	3
3:30 - 3:44	0	0	0
3:45 - 3:59	0	0	0
Hour Total	2	3	5
4:00 - 4:14	0	0	0
4:15 - 4:29	1	0	1
4:30 - 4:44	1	0	1
4:45 - 4:59	2	1	3
Hour Total	4	1	5

Location: PATTON RD south of MARTIN RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
5:00 - 5:14	3	1	4
5:15 - 5:29	5	0	5
5:30 - 5:44	10	50	60
5:45 - 5:59	15	69	84
Hour Total	33	120	153
6:00 - 6:14	35	85	120
6:15 - 6:29	56	148	204
6:30 - 6:44	54	173	227
6:45 - 6:59	80	217	297
Hour Total	225	623	848
7:00 - 7:14	77	170	247
7:15 - 7:29	78	215	293
7:30 - 7:44	93	162	255
7:45 - 7:59	81	220	301
Hour Total	329	767	1096
8:00 - 8:14	84	150	234
8:15 - 8:29	62	131	193
8:30 - 8:44	57	82	139
8:45 - 8:59	37	86	123
Hour Total	240	449	689
9:00 - 9:14	25	52	77
9:15 - 9:29	46	45	91
9:30 - 9:44	41	54	95
9:45 - 9:59	53	51	104
Hour Total	165	202	367
10:00 - 10:14	33	40	73
10:15 - 10:29	44	38	82
10:30 - 10:44	42	52	94
10:45 - 10:59	69	69	138
Hour Total	188	199	387
11:00 - 11:14	102	77	179
11:15 - 11:29	72	60	132
11:30 - 11:44	69	75	144
11:45 - 11:59	47	83	130
Hour Total	290	295	585
ADT	3954	4260	8214
AM Peak Time :	7:15- 8:15	6:30- 7:30	7:00- 8:00
AM Peak Volume:	336	775	1096
PM Peak Time :	16:00-17:00	15:30-16:30	16:00-17:00
PM Peak Volume:	746	358	1085

MicroCounts

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TRAFFIC DATA, LLC 205-824-0125

Location: PATTON RD south of NEAL RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
13:00 - 13:14	56	27	83
13:15 - 13:29	47	19	66
13:30 - 13:44	42	31	73
13:45 - 13:59	28	26	54
Hour Total	173	103	276
14:00 - 14:14	30	27	57
14:15 - 14:29	37	23	60
14:30 - 14:44	22	56	78
14:45 - 14:59	30	46	76
Hour Total	119	152	271
15:00 - 15:14	33	58	91
15:15 - 15:29	20	41	61
15:30 - 15:44	26	73	99
15:45 - 15:59	16	68	84
Hour Total	95	240	335
16:00 - 16:14	21	126	147
16:15 - 16:29	11	80	91
16:30 - 16:44	19	99	118
16:45 - 16:59	23	67	90
Hour Total	74	372	446
17:00 - 17:14	16	79	95
17:15 - 17:29	8	51	59
17:30 - 17:44	7	34	41
17:45 - 17:59	5	25	30
Hour Total	36	189	225
18:00 - 18:14	4	34	38
18:15 - 18:29	4	6	10
18:30 - 18:44	7	19	26
18:45 - 18:59	10	14	24
Hour Total	25	73	98
19:00 - 19:14	9	9	18
19:15 - 19:29	8	2	10
19:30 - 19:44	7	4	11
19:45 - 19:59	2	5	7
Hour Total	26	20	46
20:00 - 20:14	2	5	7
20:15 - 20:29	4	4	8
20:30 - 20:44	1	5	6

MicroCounts

Page 2

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Location: PATTON RD south of NEAL RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
20:45 - 20:59	3	6	9
Hour Total	10	20	30
21:00 - 21:14	3	5	8
21:15 - 21:29	2	3	5
21:30 - 21:44	6	2	8
21:45 - 21:59	2	1	3
Hour Total	13	11	24
22:00 - 22:14	2	0	2
22:15 - 22:29	1	2	3
22:30 - 22:44	0	0	0
23:45 - 22:59	4	1	5
Hour Total	7	3	10
23:00 - 23:14	3	2	5
23:15 - 23:29	0	1	1
23:30 - 23:44	0	4	4
23:45 - 23:59	1	0	1
Hour Total	4	7	11
Mid - 12:14	1	0	1
12:15 - 12:29	0	1	1
12:30 - 12:44	0	0	0
12:45 - 12:59	0	0	0
Hour Total	1	1	2
1:00 - 1:14	0	1	1
1:15 - 1:29	1	0	1
1:30 - 1:44	0	0	0
1:45 - 1:59	0	0	0
Hour Total	1	1	2
2:00 - 2:14	0	0	0
2:15 - 2:29	1	0	1
2:30 - 2:44	1	0	1
2:45 - 2:59	0	0	0
Hour Total	2	0	2
3:00 - 3:14	1	0	1
3:15 - 3:29	0	0	0
3:30 - 3:44	0	0	0
3:45 - 3:59	0	0	0
Hour Total	1	0	1
4:00 - 4:14	0	0	0
4:15 - 4:29	2	0	2
4:30 - 4:44	8	0	8
4:45 - 4:59	4	1	5
Hour Total	14	1	15
5:00 - 5:14	12	1	13
5:15 - 5:29	13	0	13
5:30 - 5:44	25	11	36
5:45 - 5:59	33	15	48
Hour Total	83	27	110

Location: PATTON RD south of NEAL RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
6:00 - 6:14	61	6	67
6:15 - 6:29	78	7	85
6:30 - 6:44	91	17	108
6:45 - 6:59	98	18	116
Hour Total	328	48	376
7:00 - 7:14	89	30	119
7:15 - 7:29	91	24	115
7:30 - 7:44	88	34	122
7:45 - 7:59	84	19	103
Hour Total	352	107	459
8:00 - 8:14	74	31	105
8:15 - 8:29	56	22	78
8:30 - 8:44	43	28	71
8:45 - 8:59	37	15	52
Hour Total	210	96	306
9:00 - 9:14	29	21	50
9:15 - 9:29	24	18	42
9:30 - 9:44	21	31	52
9:45 - 9:59	26	22	48
Hour Total	100	92	192
10:00 - 10:14	26	14	40
10:15 - 10:29	16	31	47
10:30 - 10:44	22	36	58
10:45 - 10:59	28	83	111
Hour Total	92	164	256
11:00 - 11:14	35	98	133
11:15 - 11:29	29	91	120
11:30 - 11:44	63	63	126
11:45 - 11:59	84	38	122
Hour Total	211	290	501
12:00 - 12:14	104	33	137
12:15 - 12:29	94	37	131
12:30 - 12:44	115	36	151
12:45 - 12:59	95	32	127
Hour Total	408	138	546
ADT	2385	2155	4540
AM Peak Time	6:30- 7:30	10:45-11:45	11:15-12:15
AM Peak Volume:	369	335	505
PM Peak Time	12:00-13:00	15:45-16:45	12:00-13:00
PM Peak Volume:	408	373	546

MicroCounts

dai

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TRAFFIC DATA, LLC 205-824-0125

Location: NEAL RD east of BUROSE RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
13:00 - 13:14	42	43	85
13:15 - 13:29	55	59	114
13:30 - 13:44	48	33	81
13:45 - 13:59	57	44	101
Hour Total	202	179	381
14:00 - 14:14	54	33	87
14:15 - 14:29	44	42	86
14:30 - 14:44	55	36	91
14:45 - 14:59	79	49	128
Hour Total	232	160	392
15:00 - 15:14	88	58	146
15:15 - 15:29	118	29	147
15:30 - 15:44	90	40	130
15:45 - 15:59	133	32	165
Hour Total	429	159	588
16:00 - 16:14	113	43	156
16:15 - 16:29	118	48	166
16:30 - 16:44	78	45	123
16:45 - 16:59	83	34	117
Hour Total	392	170	562
17:00 - 17:14	58	24	82
17:15 - 17:29	35	18	53
17:30 - 17:44	17	15	32
17:45 - 17:59	16	9	25
Hour Total	126	66	192
18:00 - 18:14	12	10	22
18:15 - 18:29	5	5	10
18:30 - 18:44	5	3	8
18:45 - 18:59	18	5	23
Hour Total	40	23	63
19:00 - 19:14	5	4	9
19:15 - 19:29	2	6	8
19:30 - 19:44	2	4	6
19:45 - 19:59	6	4	10
Hour Total	15	18	33
20:00 - 20:14	1	1	2
20:15 - 20:29	2	2	4
20:30 - 20:44	3	3	6

MicroCounts

dai

Page 2

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Location: NEAL RD east of BUROSE RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
20:45 - 20:59	2	1	3
Hour Total	8	7	15
21:00 - 21:14	0	4	4
21:15 - 21:29	2	3	5
21:30 - 21:44	7	2	9
21:45 - 21:59	0	3	3
Hour Total	9	12	21
22:00 - 22:14	0	2	2
22:15 - 22:29	2	2	4
22:30 - 22:44	1	2	3
23:45 - 22:59	2	1	3
Hour Total	5	7	12
23:00 - 23:14	0	1	1
23:15 - 23:29	4	0	4
23:30 - 23:44	1	0	1
23:45 - 23:59	0	0	0
Hour Total	5	1	6
Mid - 12:14	1	0	1
12:15 - 12:29	0	0	0
12:30 - 12:44	1	1	2
12:45 - 12:59	0	0	0
Hour Total	2	1	3
1:00 - 1:14	0	0	0
1:15 - 1:29	1	0	1
1:30 - 1:44	0	3	3
1:45 - 1:59	0	0	0
Hour Total	1	3	4
2:00 - 2:14	2	0	2
2:15 - 2:29	1	0	1
2:30 - 2:44	2	1	3
2:45 - 2:59	0	1	1
Hour Total	5	2	7
3:00 - 3:14	1	0	1
3:15 - 3:29	0	0	0
3:30 - 3:44	0	0	0
3:45 - 3:59	1	0	1
Hour Total	2	0	2
4:00 - 4:14	0	0	0
4:15 - 4:29	0	0	0
4:30 - 4:44	0	4	4
4:45 - 4:59	3	9	12
Hour Total	3	13	16
5:00 - 5:14	2	11	13
5:15 - 5:29	8	28	36
5:30 - 5:44	10	26	36
5:45 - 5:59	10	50	60
Hour Total	30	115	145

Location: NEAL RD east of BUROSE RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
6:00 - 6:14	28	50	78
6:15 - 6:29	37	65	102
6:30 - 6:44	25	70	95
6:45 - 6:59	29	85	114
Hour Total	119	270	389
7:00 - 7:14	47	101	148
7:15 - 7:29	49	91	140
7:30 - 7:44	51	85	136
7:45 - 7:59	32	106	138
Hour Total	179	383	562
8:00 - 8:14	34	55	89
8:15 - 8:29	36	41	77
8:30 - 8:44	43	38	81
8:45 - 8:59	30	28	58
Hour Total	143	162	305
9:00 - 9:14	35	44	79
9:15 - 9:29	37	58	95
9:30 - 9:44	52	34	86
9:45 - 9:59	42	31	73
Hour Total	166	167	333
10:00 - 10:14	42	28	70
10:15 - 10:29	69	59	128
10:30 - 10:44	147	36	183
10:45 - 10:59	134	39	173
Hour Total	392	162	554
11:00 - 11:14	142	59	201
11:15 - 11:29	73	64	137
11:30 - 11:44	74	67	141
11:45 - 11:59	71	106	177
Hour Total	360	296	656
12:00 - 12:14	38	87	125
12:15 - 12:29	43	116	159
12:30 - 12:44	49	95	144
12:45 - 12:59	52	78	130
Hour Total	182	376	558
ADT	3047	2752	5799
AM Peak Time	10:30-11:30	7:00- 8:00	10:30-11:30
AM Peak Volume:	496	383	694
PM Peak Time	15:15-16:15	12:00-13:00	15:30-16:30
PM Peak Volume:	454	376	617

MicroCounts

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TRAFFIC DATA, LLC 205-824-0125

Location: NEAL RD east of MILLS RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
13:00 - 13:14	57	52	109
13:15 - 13:29	50	35	85
13:30 - 13:44	40	31	71
13:45 - 13:59	26	35	61
Hour Total	173	153	326
14:00 - 14:14	47	31	78
14:15 - 14:29	33	34	67
14:30 - 14:44	25	54	79
14:45 - 14:59	31	40	71
Hour Total	136	159	295
15:00 - 15:14	52	64	116
15:15 - 15:29	40	67	107
15:30 - 15:44	73	95	168
15:45 - 15:59	41	72	113
Hour Total	206	298	504
16:00 - 16:14	72	131	203
16:15 - 16:29	67	94	161
16:30 - 16:44	80	126	206
16:45 - 16:59	37	81	118
Hour Total	256	432	688
17:00 - 17:14	46	106	152
17:15 - 17:29	37	53	90
17:30 - 17:44	21	48	69
17:45 - 17:59	10	39	49
Hour Total	114	246	360
18:00 - 18:14	5	40	45
18:15 - 18:29	10	17	27
18:30 - 18:44	5	17	22
18:45 - 18:59	5	17	22
Hour Total	25	91	116
19:00 - 19:14	6	4	10
19:15 - 19:29	4	7	11
19:30 - 19:44	3	3	6
19:45 - 19:59	1	4	5
Hour Total	14	18	32
20:00 - 20:14	3	3	6
20:15 - 20:29	1	1	2
20:30 - 20:44	1	2	3

Location: NEAL RD east of MILLS RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
20:45 - 20:59	2	1	3
Hour Total	7	7	14
21:00 - 21:14	2	1	3
21:15 - 21:29	0	2	2
21:30 - 21:44	1	2	3
21:45 - 21:59	3	1	4
Hour Total	6	6	12
22:00 - 22:14	1	2	3
22:15 - 22:29	1	1	2
22:30 - 22:44	3	3	6
23:45 - 22:59	4	0	4
Hour Total	9	6	15
23:00 - 23:14	0	3	3
23:15 - 23:29	2	1	3
23:30 - 23:44	4	0	4
23:45 - 23:59	3	0	3
Hour Total	9	4	13
Mid - 12:14	0	6	6
12:15 - 12:29	1	3	4
12:30 - 12:44	0	0	0
12:45 - 12:59	0	1	1
Hour Total	1	10	11
1:00 - 1:14	0	0	0
1:15 - 1:29	0	0	0
1:30 - 1:44	1	0	1
1:45 - 1:59	0	2	2
Hour Total	1	2	3
2:00 - 2:14	0	0	0
2:15 - 2:29	1	0	1
2:30 - 2:44	0	0	0
2:45 - 2:59	2	1	3
Hour Total	3	1	4
3:00 - 3:14	1	0	1
3:15 - 3:29	1	1	2
3:30 - 3:44	1	0	1
3:45 - 3:59	1	0	1
Hour Total	4	1	5
4:00 - 4:14	1	1	2
4:15 - 4:29	1	0	1
4:30 - 4:44	4	0	4
4:45 - 4:59	5	1	6
Hour Total	11	2	13
5:00 - 5:14	10	5	15
5:15 - 5:29	19	4	23
5:30 - 5:44	24	9	33
5:45 - 5:59	88	19	107
Hour Total	141	37	178

Location: NEAL RD east of MILLS RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
6:00 - 6:14	91	18	109
6:15 - 6:29	116	30	146
6:30 - 6:44	152	31	183
6:45 - 6:59	134	43	177
Hour Total	493	122	615
7:00 - 7:14	136	41	177
7:15 - 7:29	141	55	196
7:30 - 7:44	126	76	202
7:45 - 7:59	110	56	166
Hour Total	513	228	741
8:00 - 8:14	90	54	144
8:15 - 8:29	62	48	110
8:30 - 8:44	51	30	81
8:45 - 8:59	54	44	98
Hour Total	257	176	433
9:00 - 9:14	27	21	48
9:15 - 9:29	44	35	79
9:30 - 9:44	27	47	74
9:45 - 9:59	36	29	65
Hour Total	134	132	266
10:00 - 10:14	29	28	57
10:15 - 10:29	34	27	61
10:30 - 10:44	50	54	104
10:45 - 10:59	81	64	145
Hour Total	194	173	367
11:00 - 11:14	66	63	129
11:15 - 11:29	80	64	144
11:30 - 11:44	50	63	113
11:45 - 11:59	63	67	130
Hour Total	259	257	516
12:00 - 12:14	67	64	131
12:15 - 12:29	61	58	119
12:30 - 12:44	76	65	141
12:45 - 12:59	74	65	139
Hour Total	278	252	530
ADT	3244	2813	6057
AM Peak Time	6:30- 7:30	11:15-12:15	6:45- 7:45
AM Peak Volume:	563	258	752
PM Peak Time	12:00-13:00	16:00-17:00	16:00-17:00
PM Peak Volume:	278	432	688

MicroCounts

dai

C:\TDDAI56\REDST008.DAI

TRAFFIC DATA, LLC 205-824-0125

Location: MARTIN RD east of MILLS RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
11:00 - 11:14	161	116	277
11:15 - 11:29	122	90	212
11:30 - 11:44	103	94	197
11:45 - 11:59	78	104	182
Hour Total	464	404	868
12:00 - 12:14	85	159	244
12:15 - 12:29	89	160	249
12:30 - 12:44	84	135	219
12:45 - 12:59	74	107	181
Hour Total	332	561	893
13:00 - 13:14	61	100	161
13:15 - 13:29	62	68	130
13:30 - 13:44	53	52	105
13:45 - 13:59	59	61	120
Hour Total	235	281	516
14:00 - 14:14	57	45	102
14:15 - 14:29	63	52	115
14:30 - 14:44	70	49	119
14:45 - 14:59	79	53	132
Hour Total	269	199	468
15:00 - 15:14	102	64	166
15:15 - 15:29	98	67	165
15:30 - 15:44	179	83	262
15:45 - 15:59	123	73	196
Hour Total	502	287	789
16:00 - 16:14	207	123	330
16:15 - 16:29	192	116	308
16:30 - 16:44	227	141	368
16:45 - 16:59	192	87	279
Hour Total	818	467	1285
17:00 - 17:14	184	108	292
17:15 - 17:29	148	78	226
17:30 - 17:44	118	58	176
17:45 - 17:59	82	34	116
Hour Total	532	278	810
18:00 - 18:14	63	26	89
18:15 - 18:29	48	13	61
18:30 - 18:44	53	9	62

MicroCounts
Page 2

dai
C:\TDDAI56\REDSTO08.DAI

Location: MARTIN RD east of MILLS RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
18:45 - 18:59	30	11	41
Hour Total	194	59	253
19:00 - 19:14	18	5	23
19:15 - 19:29	15	5	20
19:30 - 19:44	13	9	22
19:45 - 19:59	15	10	25
Hour Total	61	29	90
20:00 - 20:14	10	1	11
20:15 - 20:29	4	2	6
20:30 - 20:44	9	1	10
20:45 - 20:59	4	2	6
Hour Total	27	6	33
21:00 - 21:14	6	4	10
21:15 - 21:29	2	3	5
21:30 - 21:44	0	2	2
21:45 - 21:59	3	3	6
Hour Total	11	12	23
22:00 - 22:14	6	1	7
22:15 - 22:29	4	0	4
22:30 - 22:44	6	0	6
23:45 - 22:59	0	0	0
Hour Total	16	1	17
23:00 - 23:14	3	0	3
23:15 - 23:29	4	0	4
23:30 - 23:44	2	1	3
23:45 - 23:59	3	7	10
Hour Total	12	8	20
Mid - 12:14	3	4	7
12:15 - 12:29	0	1	1
12:30 - 12:44	1	0	1
12:45 - 12:59	2	0	2
Hour Total	6	5	11
1:00 - 1:14	1	0	1
1:15 - 1:29	0	0	0
1:30 - 1:44	2	1	3
1:45 - 1:59	1	0	1
Hour Total	4	1	5
2:00 - 2:14	1	0	1
2:15 - 2:29	1	1	2
2:30 - 2:44	1	1	2
2:45 - 2:59	0	1	1
Hour Total	3	3	6
3:00 - 3:14	0	0	0
3:15 - 3:29	1	0	1
3:30 - 3:44	2	2	4
3:45 - 3:59	0	0	0
Hour Total	3	2	5

MicroCounts

dai

C:\TDDAI56\REDST008.DAI

Page 3

Location: MARTIN RD east of MILLS RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
4:00 - 4:14	0	0	0
4:15 - 4:29	0	0	0
4:30 - 4:44	1	2	3
4:45 - 4:59	1	2	3
Hour Total	2	4	6
5:00 - 5:14	0	6	6
5:15 - 5:29	2	3	5
5:30 - 5:44	16	61	77
5:45 - 5:59	35	74	109
Hour Total	53	144	197
6:00 - 6:14	49	73	122
6:15 - 6:29	93	124	217
6:30 - 6:44	117	138	255
6:45 - 6:59	136	199	335
Hour Total	395	534	929
7:00 - 7:14	128	188	316
7:15 - 7:29	128	186	314
7:30 - 7:44	115	162	277
7:45 - 7:59	129	153	282
Hour Total	500	689	1189
8:00 - 8:14	94	194	288
8:15 - 8:29	86	132	218
8:30 - 8:44	84	103	187
8:45 - 8:59	56	93	149
Hour Total	320	522	842
9:00 - 9:14	43	53	96
9:15 - 9:29	52	76	128
9:30 - 9:44	47	57	104
9:45 - 9:59	42	55	97
Hour Total	184	241	425
10:00 - 10:14	51	53	104
10:15 - 10:29	54	51	105
10:30 - 10:44	77	44	121
10:45 - 10:59	179	72	251
Hour Total	361	220	581
ADT :	5304	4957	10261
AM Peak Time : 10:45-11:45		6:45- 7:45	6:45- 7:45
AM Peak Volume: 565		735	1242
PM Peak Time : 16:00-17:00		12:00-13:00	16:00-17:00
PM Peak Volume: 818		561	1285

MicroCounts

dai

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TRAFFIC DATA, LLC 205-824-0125

Location: MARTIN RD west of MILLS RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
11:00 - 11:14	132	110	242
11:15 - 11:29	112	86	198
11:30 - 11:44	88	88	176
11:45 - 11:59	68	93	161
Hour Total	400	377	777
12:00 - 12:14	71	119	190
12:15 - 12:29	82	144	226
12:30 - 12:44	70	109	179
12:45 - 12:59	65	88	153
Hour Total	288	460	748
13:00 - 13:14	51	85	136
13:15 - 13:29	57	61	118
13:30 - 13:44	44	50	94
13:45 - 13:59	49	50	99
Hour Total	201	246	447
14:00 - 14:14	49	35	84
14:15 - 14:29	52	54	106
14:30 - 14:44	66	58	124
14:45 - 14:59	72	48	120
Hour Total	239	195	434
15:00 - 15:14	95	70	165
15:15 - 15:29	87	58	145
15:30 - 15:44	168	104	272
15:45 - 15:59	116	81	197
Hour Total	466	313	779
16:00 - 16:14	161	130	291
16:15 - 16:29	175	134	309
16:30 - 16:44	202	147	349
16:45 - 16:59	172	113	285
Hour Total	710	524	1234
17:00 - 17:14	172	133	305
17:15 - 17:29	139	93	232
17:30 - 17:44	100	69	169
17:45 - 17:59	75	40	115
Hour Total	486	335	821
18:00 - 18:14	48	31	79
18:15 - 18:29	51	17	68
18:30 - 18:44	51	10	61

MicroCounts

Page 2

dai

C:\TDDAI56\REDST021.DAI

Location: MARTIN RD west of MILLS RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
18:45 - 18:59	26	9	35
Hour Total	176	67	243
19:00 - 19:14	19	3	22
19:15 - 19:29	14	6	20
19:30 - 19:44	11	8	19
19:45 - 19:59	16	10	26
Hour Total	60	27	87
20:00 - 20:14	8	2	10
20:15 - 20:29	2	2	4
20:30 - 20:44	10	0	10
20:45 - 20:59	3	2	5
Hour Total	23	6	29
21:00 - 21:14	6	5	11
21:15 - 21:29	1	1	2
21:30 - 21:44	0	2	2
21:45 - 21:59	3	2	5
Hour Total	10	10	20
22:00 - 22:14	3	1	4
22:15 - 22:29	4	0	4
22:30 - 22:44	4	8	12
23:45 - 22:59	1	4	5
Hour Total	12	13	25
23:00 - 23:14	3	0	3
23:15 - 23:29	3	2	5
23:30 - 23:44	2	1	3
23:45 - 23:59	3	7	10
Hour Total	11	10	21
Mid - 12:14	2	4	6
12:15 - 12:29	0	2	2
12:30 - 12:44	1	0	1
12:45 - 12:59	2	1	3
Hour Total	5	7	12
1:00 - 1:14	1	0	1
1:15 - 1:29	0	0	0
1:30 - 1:44	1	2	3
1:45 - 1:59	1	1	2
Hour Total	3	3	6
2:00 - 2:14	0	0	0
2:15 - 2:29	2	1	3
2:30 - 2:44	1	1	2
2:45 - 2:59	0	0	0
Hour Total	3	2	5
3:00 - 3:14	0	0	0
3:15 - 3:29	0	0	0
3:30 - 3:44	2	2	4
3:45 - 3:59	0	0	0
Hour Total	2	2	4

MicroCounts
Page 3

dai
C:\TDDAI56\REDSTO21.DAI

Location: MARTIN RD west of MILLS RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
4:00 - 4:14	0	0	0
4:15 - 4:29	0	0	0
4:30 - 4:44	1	1	2
4:45 - 4:59	0	1	1
Hour Total	1	2	3
5:00 - 5:14	0	2	2
5:15 - 5:29	1	2	3
5:30 - 5:44	17	57	74
5:45 - 5:59	34	58	92
Hour Total	52	119	171
6:00 - 6:14	42	55	97
6:15 - 6:29	90	94	184
6:30 - 6:44	121	106	227
6:45 - 6:59	128	171	299
Hour Total	381	426	807
7:00 - 7:14	136	167	303
7:15 - 7:29	116	167	283
7:30 - 7:44	121	150	271
7:45 - 7:59	122	163	285
Hour Total	495	647	1142
8:00 - 8:14	89	169	258
8:15 - 8:29	82	136	218
8:30 - 8:44	77	92	169
8:45 - 8:59	62	85	147
Hour Total	310	482	792
9:00 - 9:14	46	59	105
9:15 - 9:29	49	63	112
9:30 - 9:44	43	53	96
9:45 - 9:59	41	50	91
Hour Total	179	225	404
10:00 - 10:14	45	43	88
10:15 - 10:29	55	55	110
10:30 - 10:44	73	49	122
10:45 - 10:59	142	75	217
Hour Total	315	222	537
ADT	4828	4720	9548
AM Peak Time	6:30- 7:30	6:45- 7:45	6:45- 7:45
AM Peak Volume:	501	655	1156
PM Peak Time	16:15-17:15	16:15-17:15	16:15-17:15
PM Peak Volume:	721	527	1248

MicroCounts

dai

C:\TDDAI56\REDST007.DAI

TRAFFIC DATA, LLC 205-824-0125

Location: MARTIN RD west of PATTON RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
12:00 - 12:14	196	111	307
12:15 - 12:29	242	97	339
12:30 - 12:44	228	68	296
12:45 - 12:59	169	81	250
Hour Total	835	357	1192
13:00 - 13:14	127	55	182
13:15 - 13:29	107	62	169
13:30 - 13:44	78	53	131
13:45 - 13:59	70	60	130
Hour Total	382	230	612
14:00 - 14:14	53	73	126
14:15 - 14:29	51	86	137
14:30 - 14:44	48	105	153
14:45 - 14:59	40	105	145
Hour Total	192	369	561
15:00 - 15:14	26	185	211
15:15 - 15:29	29	157	186
15:30 - 15:44	36	284	320
15:45 - 15:59	22	209	231
Hour Total	113	835	948
16:00 - 16:14	27	359	386
16:15 - 16:29	24	333	357
16:30 - 16:44	27	429	456
16:45 - 16:59	19	342	361
Hour Total	97	1463	1560
17:00 - 17:14	20	375	395
17:15 - 17:29	17	267	284
17:30 - 17:44	15	209	224
17:45 - 17:59	10	165	175
Hour Total	62	1016	1078
18:00 - 18:14	5	122	127
18:15 - 18:29	8	85	93
18:30 - 18:44	4	64	68
18:45 - 18:59	12	52	64
Hour Total	29	323	352
19:00 - 19:14	11	40	51
19:15 - 19:29	7	32	39
19:30 - 19:44	7	18	25

MicroCounts
Page 2

dai
C:\TDDAI56\REDST007.DAI

Location: MARTIN RD west of PATTON RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
19:45 - 19:59	11	25	36
Hour Total	36	115	151
20:00 - 20:14	2	17	19
20:15 - 20:29	4	8	12
20:30 - 20:44	2	12	14
20:45 - 20:59	3	4	7
Hour Total	11	41	52
21:00 - 21:14	4	9	13
21:15 - 21:29	4	11	15
21:30 - 21:44	6	5	11
21:45 - 21:59	2	7	9
Hour Total	16	32	48
22:00 - 22:14	4	9	13
22:15 - 22:29	2	11	13
22:30 - 22:44	0	3	3
23:45 - 22:59	6	7	13
Hour Total	12	30	42
23:00 - 23:14	2	9	11
23:15 - 23:29	1	2	3
23:30 - 23:44	3	8	11
23:45 - 23:59	5	3	8
Hour Total	11	22	33
Mid - 12:14	2	1	3
12:15 - 12:29	0	0	0
12:30 - 12:44	0	1	1
12:45 - 12:59	0	0	0
Hour Total	2	2	4
1:00 - 1:14	0	0	0
1:15 - 1:29	0	1	1
1:30 - 1:44	0	0	0
1:45 - 1:59	0	0	0
Hour Total	0	1	1
2:00 - 2:14	0	1	1
2:15 - 2:29	0	1	1
2:30 - 2:44	1	1	2
2:45 - 2:59	1	0	1
Hour Total	2	3	5
3:00 - 3:14	0	0	0
3:15 - 3:29	1	2	3
3:30 - 3:44	2	0	2
3:45 - 3:59	0	0	0
Hour Total	3	2	5
4:00 - 4:14	0	0	0
4:15 - 4:29	0	1	1
4:30 - 4:44	2	1	3
4:45 - 4:59	2	0	2
Hour Total	4	2	6

Location: MARTIN RD west of PATTON RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
5:00 - 5:14	6	0	6
5:15 - 5:29	8	5	13
5:30 - 5:44	77	5	82
5:45 - 5:59	107	5	112
Hour Total	198	15	213
6:00 - 6:14	118	14	132
6:15 - 6:29	202	34	236
6:30 - 6:44	252	23	275
6:45 - 6:59	311	44	355
Hour Total	883	115	998
7:00 - 7:14	314	31	345
7:15 - 7:29	289	40	329
7:30 - 7:44	267	45	312
7:45 - 7:59	270	43	313
Hour Total	1140	159	1299
8:00 - 8:14	264	45	309
8:15 - 8:29	194	44	238
8:30 - 8:44	144	39	183
8:45 - 8:59	127	35	162
Hour Total	729	163	892
9:00 - 9:14	94	29	123
9:15 - 9:29	89	43	132
9:30 - 9:44	57	49	106
9:45 - 9:59	68	44	112
Hour Total	308	165	473
10:00 - 10:14	52	52	104
10:15 - 10:29	38	59	97
10:30 - 10:44	39	93	132
10:45 - 10:59	50	211	261
Hour Total	179	415	594
11:00 - 11:14	59	335	394
11:15 - 11:29	66	299	365
11:30 - 11:44	106	194	300
11:45 - 11:59	158	123	281
Hour Total	389	951	1340
ADT :	5633	6826	12459
AM Peak Time :	6:45- 7:45	10:45-11:45	6:45- 7:45
AM Peak Volume:	1181	1039	1341
PM Peak Time :	12:00-13:00	16:15-17:15	16:15-17:15
PM Peak Volume:	835	1479	1569

MicroCounts

dai
C:\TDDAI56\REDST001.DAI

TRAFFIC DATA, LLC 205-824-0125

Location: MARTIN RD west of TOFTOY TRWY - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
11:00 - 11:14	108	94	202
11:15 - 11:29	83	57	140
11:30 - 11:44	59	75	134
11:45 - 11:59	71	74	145
Hour Total	321	300	621
12:00 - 12:14	65	96	161
12:15 - 12:29	80	101	181
12:30 - 12:44	68	81	149
12:45 - 12:59	57	67	124
Hour Total	270	345	615
13:00 - 13:14	37	65	102
13:15 - 13:29	59	44	103
13:30 - 13:44	34	39	73
13:45 - 13:59	36	45	81
Hour Total	166	193	359
14:00 - 14:14	56	30	86
14:15 - 14:29	40	44	84
14:30 - 14:44	51	44	95
14:45 - 14:59	69	40	109
Hour Total	216	158	374
15:00 - 15:14	89	72	161
15:15 - 15:29	88	47	135
15:30 - 15:44	122	82	204
15:45 - 15:59	97	73	170
Hour Total	396	274	670
16:00 - 16:14	135	110	245
16:15 - 16:29	141	122	263
16:30 - 16:44	165	123	288
16:45 - 16:59	149	91	240
Hour Total	590	446	1036
17:00 - 17:14	130	105	235
17:15 - 17:29	97	85	182
17:30 - 17:44	64	52	116
17:45 - 17:59	50	32	82
Hour Total	341	274	615
18:00 - 18:14	38	26	64
18:15 - 18:29	43	19	62
18:30 - 18:44	41	8	49

MicroCounts
Page 2

dai
C:\TDDAI56\REDST001.DAI

Location: MARTIN RD west of TOFTOY TRWY - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
18:45 - 18:59	15	5	20
Hour Total	137	58	195
19:00 - 19:14	19	4	23
19:15 - 19:29	7	4	11
19:30 - 19:44	12	5	17
19:45 - 19:59	11	7	18
Hour Total	49	20	69
20:00 - 20:14	4	0	4
20:15 - 20:29	4	3	7
20:30 - 20:44	7	0	7
20:45 - 20:59	3	2	5
Hour Total	18	5	23
21:00 - 21:14	2	2	4
21:15 - 21:29	1	1	2
21:30 - 21:44	2	1	3
21:45 - 21:59	2	0	2
Hour Total	7	4	11
22:00 - 22:14	2	1	3
22:15 - 22:29	3	0	3
22:30 - 22:44	2	6	8
23:45 - 22:59	1	1	2
Hour Total	8	8	16
23:00 - 23:14	2	0	2
23:15 - 23:29	3	1	4
23:30 - 23:44	0	2	2
23:45 - 23:59	1	1	2
Hour Total	6	4	10
Mid - 12:14	2	2	4
12:15 - 12:29	0	1	1
12:30 - 12:44	2	0	2
12:45 - 12:59	1	1	2
Hour Total	5	4	9
1:00 - 1:14	1	0	1
1:15 - 1:29	0	0	0
1:30 - 1:44	2	2	4
1:45 - 1:59	0	1	1
Hour Total	3	3	6
2:00 - 2:14	0	0	0
2:15 - 2:29	2	1	3
2:30 - 2:44	0	0	0
2:45 - 2:59	0	0	0
Hour Total	2	1	3
3:00 - 3:14	0	0	0
3:15 - 3:29	0	0	0
3:30 - 3:44	1	1	2
3:45 - 3:59	0	0	0
Hour Total	1	1	2

MicroCounts
Page 3

dai
C:\TDDAI56\REDST001.DAI

Location: MARTIN RD west of TOFTOY TRWY - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
4:00 - 4:14	0	0	0
4:15 - 4:29	0	0	0
4:30 - 4:44	0	0	0
4:45 - 4:59	3	1	4
Hour Total	3	1	4
5:00 - 5:14	1	2	3
5:15 - 5:29	3	2	5
5:30 - 5:44	24	47	71
5:45 - 5:59	34	45	79
Hour Total	62	96	158
6:00 - 6:14	53	41	94
6:15 - 6:29	109	78	187
6:30 - 6:44	110	92	202
6:45 - 6:59	129	128	257
Hour Total	401	339	740
7:00 - 7:14	143	126	269
7:15 - 7:29	124	128	252
7:30 - 7:44	128	94	222
7:45 - 7:59	138	130	268
Hour Total	533	478	1011
8:00 - 8:14	106	126	232
8:15 - 8:29	87	103	190
8:30 - 8:44	73	59	132
8:45 - 8:59	63	73	136
Hour Total	329	361	690
9:00 - 9:14	46	42	88
9:15 - 9:29	55	51	106
9:30 - 9:44	44	44	88
9:45 - 9:59	49	44	93
Hour Total	194	181	375
10:00 - 10:14	45	38	83
10:15 - 10:29	53	48	101
10:30 - 10:44	66	40	106
10:45 - 10:59	121	69	190
Hour Total	285	195	480
ADT	4343	3749	8092
AM Peak Time	7:00- 8:00	7:00- 8:00	7:00- 8:00
AM Peak Volume:	533	478	1011
PM Peak Time	16:00-17:00	16:00-17:00	16:00-17:00
PM Peak Volume:	590	446	1036

MicroCounts

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TRAFFIC DATA, LLC 205-824-0125

Location: HALE RD west of AIRPORT RUNWAY - REDSTONE

Count Interval: 15 minutes

Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
6:00 - 6:14	3	16	19
6:15 - 6:29	0	25	25
6:30 - 6:44	0	41	41
6:45 - 6:59	2	44	46
Hour Total	5	126	131
7:00 - 7:14	1	54	55
7:15 - 7:29	3	57	60
7:30 - 7:44	1	61	62
7:45 - 7:59	14	61	75
Hour Total	19	233	252
8:00 - 8:14	6	66	72
8:15 - 8:29	4	59	63
8:30 - 8:44	15	58	73
8:45 - 8:59	10	45	55
Hour Total	35	228	263
9:00 - 9:14	14	37	51
9:15 - 9:29	10	31	41
9:30 - 9:44	7	22	29
9:45 - 9:59	20	18	38
Hour Total	51	108	159
10:00 - 10:14	5	17	22
10:15 - 10:29	13	15	28
10:30 - 10:44	16	11	27
10:45 - 10:59	27	6	33
Hour Total	61	49	110
11:00 - 11:14	43	10	53
11:15 - 11:29	40	11	51
11:30 - 11:44	33	15	48
11:45 - 11:59	18	15	33
Hour Total	134	51	185
12:00 - 12:14	22	24	46
12:15 - 12:29	17	40	57
12:30 - 12:44	12	32	44
12:45 - 12:59	12	26	38
Hour Total	63	122	185
13:00 - 13:14	10	33	43
13:15 - 13:29	19	25	44
13:30 - 13:44	17	19	36

MicroCounts
Page 2

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Location: HALE RD west of AIRPORT RUNWAY - REDSTONE
Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
13:45 - 13:59	21	19	40
Hour Total	67	96	163
14:00 - 14:14	12	20	32
14:15 - 14:29	20	15	35
14:30 - 14:44	21	11	32
14:45 - 14:59	17	2	19
Hour Total	70	48	118
15:00 - 15:14	30	8	38
15:15 - 15:29	17	4	21
15:30 - 15:44	43	7	50
15:45 - 15:59	41	6	47
Hour Total	131	25	156
16:00 - 16:14	53	8	61
16:15 - 16:29	106	9	115
16:30 - 16:44	75	7	82
16:45 - 16:59	63	7	70
Hour Total	297	31	328
17:00 - 17:14	56	0	56
17:15 - 17:29	58	1	59
17:30 - 17:44	35	1	36
17:45 - 17:59	32	4	36
Hour Total	181	6	187
18:00 - 18:14	16	1	17
18:15 - 18:29	10	3	13
18:30 - 18:44	12	1	13
18:45 - 18:59	4	0	4
Hour Total	42	5	47
19:00 - 19:14	5	0	5
19:15 - 19:29	5	1	6
19:30 - 19:44	2	0	2
19:45 - 19:59	2	0	2
Hour Total	14	1	15
20:00 - 20:14	3	1	4
20:15 - 20:29	0	0	0
20:30 - 20:44	1	0	1
20:45 - 20:59	0	0	0
Hour Total	4	1	5
21:00 - 21:14	1	0	1
21:15 - 21:29	2	1	3
21:30 - 21:44	2	0	2
21:45 - 21:59	0	0	0
Hour Total	5	1	6
22:00 - 22:14	1	0	1
22:15 - 22:29	0	0	0
22:30 - 22:44	0	0	0
23:45 - 22:59	0	0	0
Hour Total	1	0	1

Location: HALE RD west of AIRPORT RUNWAY - REDSTONE
Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
23:00 - 23:14	1	0	1
23:15 - 23:29	0	0	0
23:30 - 23:44	0	0	0
23:45 - 23:59	0	0	0
Hour Total	1	0	1
Mid - 12:14	0	0	0
12:15 - 12:29	0	0	0
12:30 - 12:44	0	0	0
12:45 - 12:59	0	0	0
Hour Total	0	0	0
1:00 - 1:14	0	1	1
1:15 - 1:29	0	0	0
1:30 - 1:44	1	0	1
1:45 - 1:59	0	0	0
Hour Total	1	1	2
2:00 - 2:14	0	0	0
2:15 - 2:29	0	0	0
2:30 - 2:44	0	0	0
2:45 - 2:59	0	0	0
Hour Total	0	0	0
3:00 - 3:14	0	0	0
3:15 - 3:29	0	1	1
3:30 - 3:44	0	0	0
3:45 - 3:59	0	0	0
Hour Total	0	1	1
4:00 - 4:14	0	1	1
4:15 - 4:29	0	0	0
4:30 - 4:44	0	1	1
4:45 - 4:59	0	2	2
Hour Total	0	4	4
5:00 - 5:14	0	3	3
5:15 - 5:29	0	2	2
5:30 - 5:44	0	14	14
5:45 - 5:59	0	18	18
Hour Total	0	37	37
ADT :	1182	1174	2356
AM Peak Time :	10:45-11:45	7:30- 8:30	7:45- 8:45
AM Peak Volume:	143	247	283
PM Peak Time :	16:15-17:15	12:15-13:15	16:00-17:00
PM Peak Volume:	300	131	328

MicroCounts

dai

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TRAFFIC DATA, LLC 205-824-0125

Location: HALE RD west of RIDEOUT RD - REDSTONE

Count Interval: 15 minutes

Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
6:00 - 6:14	3	27	30
6:15 - 6:29	1	33	34
6:30 - 6:44	1	43	44
6:45 - 6:59	2	58	60
Hour Total	7	161	168
7:00 - 7:14	1	96	97
7:15 - 7:29	4	71	75
7:30 - 7:44	6	82	88
7:45 - 7:59	15	80	95
Hour Total	26	329	355
8:00 - 8:14	10	78	88
8:15 - 8:29	8	52	60
8:30 - 8:44	20	67	87
8:45 - 8:59	18	48	66
Hour Total	56	245	301
9:00 - 9:14	16	40	56
9:15 - 9:29	18	34	52
9:30 - 9:44	18	27	45
9:45 - 9:59	21	17	38
Hour Total	73	118	191
10:00 - 10:14	12	23	35
10:15 - 10:29	18	21	39
10:30 - 10:44	35	19	54
10:45 - 10:59	43	14	57
Hour Total	108	77	185
11:00 - 11:14	67	15	82
11:15 - 11:29	37	13	50
11:30 - 11:44	39	24	63
11:45 - 11:59	21	30	51
Hour Total	164	82	246
12:00 - 12:14	30	40	70
12:15 - 12:29	22	60	82
12:30 - 12:44	20	36	56
12:45 - 12:59	19	38	57
Hour Total	91	174	265
13:00 - 13:14	23	45	68
13:15 - 13:29	17	30	47
13:30 - 13:44	22	27	49

Location: HALE RD west of RIDEOUT RD - REDSTONE
 Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
13:45 - 13:59	37	33	70
Hour Total	99	135	234
14:00 - 14:14	15	21	36
14:15 - 14:29	30	19	49
14:30 - 14:44	32	11	43
14:45 - 14:59	35	8	43
Hour Total	112	59	171
15:00 - 15:14	36	12	48
15:15 - 15:29	30	7	37
15:30 - 15:44	51	9	60
15:45 - 15:59	61	3	64
Hour Total	178	31	209
16:00 - 16:14	88	16	104
16:15 - 16:29	109	8	117
16:30 - 16:44	86	8	94
16:45 - 16:59	69	13	82
Hour Total	352	45	397
17:00 - 17:14	64	11	75
17:15 - 17:29	58	9	67
17:30 - 17:44	44	1	45
17:45 - 17:59	30	6	36
Hour Total	196	27	223
18:00 - 18:14	20	1	21
18:15 - 18:29	16	3	19
18:30 - 18:44	15	0	15
18:45 - 18:59	3	0	3
Hour Total	54	4	58
19:00 - 19:14	6	1	7
19:15 - 19:29	16	1	17
19:30 - 19:44	9	1	10
19:45 - 19:59	6	1	7
Hour Total	37	4	41
20:00 - 20:14	4	1	5
20:15 - 20:29	0	1	1
20:30 - 20:44	6	1	7
20:45 - 20:59	1	0	1
Hour Total	11	3	14
21:00 - 21:14	2	1	3
21:15 - 21:29	2	0	2
21:30 - 21:44	2	0	2
21:45 - 21:59	0	0	0
Hour Total	6	1	7
22:00 - 22:14	1	0	1
22:15 - 22:29	0	0	0
22:30 - 22:44	0	0	0
23:45 - 22:59	0	0	0
Hour Total	1	0	1

Location: HALE RD west of RIDEOUT RD - REDSTONE
Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	EastBound Volume	WestBound Volume	Total Volume
23:00 - 23:14	2	1	3
23:15 - 23:29	0	0	0
23:30 - 23:44	0	0	0
23:45 - 23:59	0	0	0
Hour Total	2	1	3
Mid - 12:14	0	0	0
12:15 - 12:29	0	0	0
12:30 - 12:44	0	0	0
12:45 - 12:59	0	1	1
Hour Total	0	1	1
1:00 - 1:14	0	0	0
1:15 - 1:29	1	0	1
1:30 - 1:44	0	0	0
1:45 - 1:59	0	0	0
Hour Total	1	0	1
2:00 - 2:14	0	0	0
2:15 - 2:29	0	0	0
2:30 - 2:44	0	0	0
2:45 - 2:59	0	0	0
Hour Total	0	0	0
3:00 - 3:14	0	1	1
3:15 - 3:29	1	1	2
3:30 - 3:44	0	0	0
3:45 - 3:59	0	1	1
Hour Total	1	3	4
4:00 - 4:14	0	0	0
4:15 - 4:29	0	1	1
4:30 - 4:44	0	2	2
4:45 - 4:59	1	2	3
Hour Total	1	5	6
5:00 - 5:14	0	7	7
5:15 - 5:29	0	6	6
5:30 - 5:44	0	25	25
5:45 - 5:59	2	31	33
Hour Total	2	69	71

ADT :	1578	1574	3152
AM Peak Time :	10:45-11:45	7:00- 8:00	7:00- 8:00
AM Peak Volume:	186	329	355
PM Peak Time :	16:00-17:00	12:15-13:15	16:00-17:00
PM Peak Volume:	352	179	397

MicroCounts

dai

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TRAFFIC DATA, LLC 205-824-0125

Location: MARSHALL RD north of NEAL RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
12:00 - 12:14	45	28	73
12:15 - 12:29	42	20	62
12:30 - 12:44	62	19	81
12:45 - 12:59	44	36	80
Hour Total	193	103	296
13:00 - 13:14	47	24	71
13:15 - 13:29	23	11	34
13:30 - 13:44	25	15	40
13:45 - 13:59	25	18	43
Hour Total	120	68	188
14:00 - 14:14	14	18	32
14:15 - 14:29	3	24	27
14:30 - 14:44	19	56	75
14:45 - 14:59	7	38	45
Hour Total	43	136	179
15:00 - 15:14	18	60	78
15:15 - 15:29	12	55	67
15:30 - 15:44	7	127	134
15:45 - 15:59	13	86	99
Hour Total	50	328	378
16:00 - 16:14	12	173	185
16:15 - 16:29	12	114	126
16:30 - 16:44	20	174	194
16:45 - 16:59	20	104	124
Hour Total	64	565	629
17:00 - 17:14	7	143	150
17:15 - 17:29	15	77	92
17:30 - 17:44	6	77	83
17:45 - 17:59	3	46	49
Hour Total	31	343	374
18:00 - 18:14	2	45	47
18:15 - 18:29	3	23	26
18:30 - 18:44	1	23	24
18:45 - 18:59	0	19	19
Hour Total	6	110	116
19:00 - 19:14	1	9	10
19:15 - 19:29	1	9	10
19:30 - 19:44	1	4	5

Location: MARSHALL RD north of NEAL RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
19:45 - 19:59	1	2	3
Hour Total	4	24	28
20:00 - 20:14	0	1	1
20:15 - 20:29	0	2	2
20:30 - 20:44	0	3	3
20:45 - 20:59	0	3	3
Hour Total	0	9	9
21:00 - 21:14	1	2	3
21:15 - 21:29	0	2	2
21:30 - 21:44	0	2	2
21:45 - 21:59	0	1	1
Hour Total	1	7	8
22:00 - 22:14	0	1	1
22:15 - 22:29	2	1	3
22:30 - 22:44	3	1	4
23:45 - 22:59	2	1	3
Hour Total	7	4	11
23:00 - 23:14	1	5	6
23:15 - 23:29	1	1	2
23:30 - 23:44	4	1	5
23:45 - 23:59	1	0	1
Hour Total	7	7	14
Mid - 12:14	1	9	10
12:15 - 12:29	0	3	3
12:30 - 12:44	0	2	2
12:45 - 12:59	0	0	0
Hour Total	1	14	15
1:00 - 1:14	0	0	0
1:15 - 1:29	0	0	0
1:30 - 1:44	1	0	1
1:45 - 1:59	0	0	0
Hour Total	1	0	1
2:00 - 2:14	0	1	1
2:15 - 2:29	1	0	1
2:30 - 2:44	0	0	0
2:45 - 2:59	1	1	2
Hour Total	2	2	4
3:00 - 3:14	0	0	0
3:15 - 3:29	2	0	2
3:30 - 3:44	0	0	0
3:45 - 3:59	1	0	1
Hour Total	3	0	3
4:00 - 4:14	1	0	1
4:15 - 4:29	1	2	3
4:30 - 4:44	9	0	9
4:45 - 4:59	9	0	9
Hour Total	20	2	22

MicroCounts

dai

Page 3

C:\TDDAI76\REDST004.DAI

Location: MARSHALL RD north of NEAL RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
5:00 - 5:14	13	0	13
5:15 - 5:29	15	0	15
5:30 - 5:44	33	3	36
5:45 - 5:59	78	3	81
Hour Total	139	6	145
6:00 - 6:14	97	1	98
6:15 - 6:29	132	1	133
6:30 - 6:44	160	8	168
6:45 - 6:59	164	8	172
Hour Total	553	18	571
7:00 - 7:14	141	15	156
7:15 - 7:29	151	20	171
7:30 - 7:44	107	23	130
7:45 - 7:59	108	15	123
Hour Total	507	73	580
8:00 - 8:14	85	22	107
8:15 - 8:29	62	25	87
8:30 - 8:44	47	22	69
8:45 - 8:59	41	23	64
Hour Total	235	92	327
9:00 - 9:14	31	20	51
9:15 - 9:29	25	13	38
9:30 - 9:44	13	16	29
9:45 - 9:59	19	27	46
Hour Total	88	76	164
10:00 - 10:14	12	25	37
10:15 - 10:29	11	21	32
10:30 - 10:44	13	35	48
10:45 - 10:59	10	74	84
Hour Total	46	155	201
11:00 - 11:14	12	90	102
11:15 - 11:29	12	67	79
11:30 - 11:44	19	51	70
11:45 - 11:59	27	29	56
Hour Total	70	237	307
ADT	2191	2379	4570
AM Peak Time	6:30- 7:30	10:45-11:45	6:30- 7:30
AM Peak Volume	616	282	667
PM Peak Time	12:15-13:15	16:00-17:00	16:00-17:00
PM Peak Volume	195	565	629

MicroCounts

dai

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TRAFFIC DATA, LLC 205-824-0125

Location: NEAL RD west of MILLS RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
12:00 - 12:14	31	13	44
12:15 - 12:29	36	10	46
12:30 - 12:44	36	13	49
12:45 - 12:59	21	6	27
Hour Total	124	42	166
13:00 - 13:14	16	14	30
13:15 - 13:29	10	6	16
13:30 - 13:44	8	13	21
13:45 - 13:59	10	21	31
Hour Total	44	54	98
14:00 - 14:14	14	15	29
14:15 - 14:29	9	8	17
14:30 - 14:44	9	10	19
14:45 - 14:59	5	23	28
Hour Total	37	56	93
15:00 - 15:14	6	11	17
15:15 - 15:29	18	14	32
15:30 - 15:44	3	25	28
15:45 - 15:59	13	21	34
Hour Total	40	71	111
16:00 - 16:14	4	42	46
16:15 - 16:29	7	37	44
16:30 - 16:44	8	39	47
16:45 - 16:59	9	11	20
Hour Total	28	129	157
17:00 - 17:14	7	24	31
17:15 - 17:29	7	13	20
17:30 - 17:44	5	10	15
17:45 - 17:59	2	6	8
Hour Total	21	53	74
18:00 - 18:14	2	8	10
18:15 - 18:29	1	4	5
18:30 - 18:44	1	1	2
18:45 - 18:59	2	7	9
Hour Total	6	20	26
19:00 - 19:14	3	3	6
19:15 - 19:29	2	2	4
19:30 - 19:44	1	5	6

MicroCounts
Page 2

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C:\TDDAI56\REDST003.DAI

Location: NEAL RD west of MILLS RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
19:45 - 19:59	1	3	4
Hour Total	7	13	20
20:00 - 20:14	1	4	5
20:15 - 20:29	0	0	0
20:30 - 20:44	0	2	2
20:45 - 20:59	1	2	3
Hour Total	2	8	10
21:00 - 21:14	2	1	3
21:15 - 21:29	0	0	0
21:30 - 21:44	1	2	3
21:45 - 21:59	2	3	5
Hour Total	5	6	11
22:00 - 22:14	4	0	4
22:15 - 22:29	2	0	2
22:30 - 22:44	0	1	1
22:45 - 22:59	1	0	1
Hour Total	7	1	8
23:00 - 23:14	0	0	0
23:15 - 23:29	0	0	0
23:30 - 23:44	0	0	0
23:45 - 23:59	0	0	0
Hour Total	0	0	0
Mid - 12:14	2	0	2
12:15 - 12:29	0	1	1
12:30 - 12:44	0	0	0
12:45 - 12:59	0	0	0
Hour Total	2	1	3
1:00 - 1:14	1	0	1
1:15 - 1:29	0	0	0
1:30 - 1:44	0	0	0
1:45 - 1:59	0	0	0
Hour Total	1	0	1
2:00 - 2:14	0	0	0
2:15 - 2:29	0	0	0
2:30 - 2:44	1	0	1
2:45 - 2:59	0	0	0
Hour Total	1	0	1
3:00 - 3:14	0	1	1
3:15 - 3:29	2	1	3
3:30 - 3:44	0	0	0
3:45 - 3:59	0	0	0
Hour Total	2	2	4
4:00 - 4:14	1	1	2
4:15 - 4:29	0	0	0
4:30 - 4:44	0	0	0
4:45 - 4:59	1	0	1
Hour Total	2	1	3

Location: NEAL RD west of MILLS RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
5:00 - 5:14	8	5	13
5:15 - 5:29	12	4	16
5:30 - 5:44	15	8	23
5:45 - 5:59	16	16	32
Hour Total	51	33	84
6:00 - 6:14	15	14	29
6:15 - 6:29	27	20	47
6:30 - 6:44	28	25	53
6:45 - 6:59	31	27	58
Hour Total	101	86	187
7:00 - 7:14	41	29	70
7:15 - 7:29	53	39	92
7:30 - 7:44	50	48	98
7:45 - 7:59	45	42	87
Hour Total	189	158	347
8:00 - 8:14	31	48	79
8:15 - 8:29	21	24	45
8:30 - 8:44	27	23	50
8:45 - 8:59	27	18	45
Hour Total	106	113	219
9:00 - 9:14	23	24	47
9:15 - 9:29	30	29	59
9:30 - 9:44	32	24	56
9:45 - 9:59	26	22	48
Hour Total	111	99	210
10:00 - 10:14	25	20	45
10:15 - 10:29	32	20	52
10:30 - 10:44	32	29	61
10:45 - 10:59	60	54	114
Hour Total	149	123	272
11:00 - 11:14	42	39	81
11:15 - 11:29	55	55	110
11:30 - 11:44	49	38	87
11:45 - 11:59	44	44	88
Hour Total	190	176	366
ADT	1226	1245	2471
AM Peak Time	10:45-11:45	10:45-11:45	10:45-11:45
AM Peak Volume	206	186	392
PM Peak Time	12:00-13:00	15:45-16:45	15:45-16:45
PM Peak Volume	124	139	171

MicroCounts

dai

C:\TDDAI76\REDST015.DAI

TRAFFIC DATA, LLC 205-824-0125

Location: BUROSE RD south of NEAL RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
12:00 - 12:14	83	43	126
12:15 - 12:29	84	33	117
12:30 - 12:44	78	34	112
12:45 - 12:59	77	36	113
Hour Total	322	146	468
13:00 - 13:14	73	17	90
13:15 - 13:29	39	25	64
13:30 - 13:44	33	28	61
13:45 - 13:59	35	30	65
Hour Total	180	100	280
14:00 - 14:14	35	39	74
14:15 - 14:29	26	53	79
14:30 - 14:44	30	58	88
14:45 - 14:59	22	55	77
Hour Total	113	205	318
15:00 - 15:14	32	87	119
15:15 - 15:29	30	56	86
15:30 - 15:44	33	157	190
15:45 - 15:59	33	98	131
Hour Total	128	398	526
16:00 - 16:14	31	196	227
16:15 - 16:29	34	148	182
16:30 - 16:44	43	188	231
16:45 - 16:59	39	117	156
Hour Total	147	649	796
17:00 - 17:14	33	135	168
17:15 - 17:29	25	81	106
17:30 - 17:44	21	62	83
17:45 - 17:59	10	36	46
Hour Total	89	314	403
18:00 - 18:14	6	53	59
18:15 - 18:29	8	52	60
18:30 - 18:44	8	25	33
18:45 - 18:59	6	13	19
Hour Total	28	143	171
19:00 - 19:14	4	12	16
19:15 - 19:29	4	4	8
19:30 - 19:44	6	5	11

MicroCounts
Page 2

dal
C:\TDDAI76\REDSTO15.DAI

Location: BUROSE RD south of NEAL RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
19:45 - 19:59	5	6	11
Hour Total	19	27	46
20:00 - 20:14	5	2	7
20:15 - 20:29	4	5	9
20:30 - 20:44	0	5	5
20:45 - 20:59	0	2	2
Hour Total	9	14	23
21:00 - 21:14	2	0	2
21:15 - 21:29	3	1	4
21:30 - 21:44	2	1	3
21:45 - 21:59	4	2	6
Hour Total	11	4	15
22:00 - 22:14	2	1	3
22:15 - 22:29	3	1	4
22:30 - 22:44	4	2	6
22:45 - 22:59	3	4	7
Hour Total	12	8	20
23:00 - 23:14	4	2	6
23:15 - 23:29	1	1	2
23:30 - 23:44	4	1	5
23:45 - 23:59	2	2	4
Hour Total	11	6	17
Mid - 12:14	0	4	4
12:15 - 12:29	0	0	0
12:30 - 12:44	0	0	0
12:45 - 12:59	1	0	1
Hour Total	1	4	5
1:00 - 1:14	0	0	0
1:15 - 1:29	0	0	0
1:30 - 1:44	1	0	1
1:45 - 1:59	0	0	0
Hour Total	1	0	1
2:00 - 2:14	0	0	0
2:15 - 2:29	1	1	2
2:30 - 2:44	1	0	1
2:45 - 2:59	1	0	1
Hour Total	3	1	4
3:00 - 3:14	0	1	1
3:15 - 3:29	2	0	2
3:30 - 3:44	0	1	1
3:45 - 3:59	1	1	2
Hour Total	3	3	6
4:00 - 4:14	0	0	0
4:15 - 4:29	0	0	0
4:30 - 4:44	5	1	6
4:45 - 4:59	7	1	8
Hour Total	12	2	14

MicroCounts
Page 3

dai
C:\TDDAI76\REDST015.DAI

Location: BUROSE RD south of NEAL RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
5:00 - 5:14	9	1	10
5:15 - 5:29	20	0	20
5:30 - 5:44	32	4	36
5:45 - 5:59	73	3	76
Hour Total	134	8	142
6:00 - 6:14	95	4	99
6:15 - 6:29	139	13	152
6:30 - 6:44	146	11	157
6:45 - 6:59	174	7	181
Hour Total	554	35	589
7:00 - 7:14	154	16	170
7:15 - 7:29	144	25	169
7:30 - 7:44	149	22	171
7:45 - 7:59	123	23	146
Hour Total	570	86	656
8:00 - 8:14	103	33	136
8:15 - 8:29	73	20	93
8:30 - 8:44	64	23	87
8:45 - 8:59	68	21	89
Hour Total	308	97	405
9:00 - 9:14	36	16	52
9:15 - 9:29	26	29	55
9:30 - 9:44	21	17	38
9:45 - 9:59	22	38	60
Hour Total	105	100	205
10:00 - 10:14	22	35	57
10:15 - 10:29	30	42	72
10:30 - 10:44	26	54	80
10:45 - 10:59	28	108	136
Hour Total	106	239	345
11:00 - 11:14	29	158	187
11:15 - 11:29	30	100	130
11:30 - 11:44	45	67	112
11:45 - 11:59	52	44	96
Hour Total	156	369	525
ADT	3022	2958	5980
AM Peak Time	6:45- 7:45	10:45-11:45	6:45- 7:45
AM Peak Volume:	621	433	691
PM Peak Time	12:00-13:00	16:00-17:00	16:00-17:00
PM Peak Volume:	322	649	796

MicroCounts

dai

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TRAFFIC DATA, LLC 205-824-0125

Location: TOFTOY TRWY north of NEAL RD - REDSTONE

Count Interval: 15 minutes

Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
7:00 - 7:14	38	149	187
7:15 - 7:29	49	130	179
7:30 - 7:44	40	117	157
7:45 - 7:59	73	98	171
Hour Total	200	494	694
8:00 - 8:14	56	98	154
8:15 - 8:29	29	86	115
8:30 - 8:44	35	64	99
8:45 - 8:59	35	59	94
Hour Total	155	307	462
9:00 - 9:14	22	28	50
9:15 - 9:29	33	28	61
9:30 - 9:44	23	20	43
9:45 - 9:59	23	27	50
Hour Total	101	103	204
10:00 - 10:14	24	23	47
10:15 - 10:29	19	19	38
10:30 - 10:44	35	14	49
10:45 - 10:59	67	10	77
Hour Total	145	66	211
11:00 - 11:14	91	25	116
11:15 - 11:29	69	20	89
11:30 - 11:44	36	18	54
11:45 - 11:59	35	24	59
Hour Total	231	87	318
12:00 - 12:14	29	48	77
12:15 - 12:29	29	53	82
12:30 - 12:44	21	50	71
12:45 - 12:59	18	48	66
Hour Total	97	199	296
13:00 - 13:14	24	43	67
13:15 - 13:29	20	29	49
13:30 - 13:44	20	20	40
13:45 - 13:59	28	26	54
Hour Total	92	118	210
14:00 - 14:14	27	20	47
14:15 - 14:29	39	16	55
14:30 - 14:44	45	16	61

MicroCounts
Page 2

dai
C:\TDDAI76\RDSTONE08.DAI

Location: TOFTOY TRWY north of NEAL RD - REDSTONE
Count Date: Tuesday - July 25, 2006 / Wednesday - July 26, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
14:45 - 14:59	34	17	51
Hour Total	145	69	214
15:00 - 15:14	76	18	94
15:15 - 15:29	73	16	89
15:30 - 15:44	126	21	147
15:45 - 15:59	87	24	111
Hour Total	362	79	441
16:00 - 16:14	161	24	185
16:15 - 16:29	145	31	176
16:30 - 16:44	177	29	206
16:45 - 16:59	127	46	173
Hour Total	610	130	740
17:00 - 17:14	106	40	146
17:15 - 17:29	60	33	93
17:30 - 17:44	60	29	89
17:45 - 17:59	48	15	63
Hour Total	274	117	391
18:00 - 18:14	30	4	34
18:15 - 18:29	21	4	25
18:30 - 18:44	19	5	24
18:45 - 18:59	14	3	17
Hour Total	84	16	100
19:00 - 19:14	16	2	18
19:15 - 19:29	4	3	7
19:30 - 19:44	8	0	8
19:45 - 19:59	6	3	9
Hour Total	34	8	42
20:00 - 20:14	0	2	2
20:15 - 20:29	1	1	2
20:30 - 20:44	6	3	9
20:45 - 20:59	3	4	7
Hour Total	10	10	20
21:00 - 21:14	2	1	3
21:15 - 21:29	2	0	2
21:30 - 21:44	3	0	3
21:45 - 21:59	0	1	1
Hour Total	7	2	9
22:00 - 22:14	0	1	1
22:15 - 22:29	3	0	3
22:30 - 22:44	1	0	1
22:45 - 22:59	3	1	4
Hour Total	7	2	9
23:00 - 23:14	3	0	3
23:15 - 23:29	0	1	1
23:30 - 23:44	0	1	1
23:45 - 23:59	5	1	6
Hour Total	8	3	11

MicroCounts

Page 3

dai

C:\TDDAI76\RDSTONE08.DAI

Location: TOFTOY TRWY north of NEAL RD - REDSTONE

Count Date: Tuesday - July 25, 2006 /Wednesday - July 26, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
Mid - 12:14	1	4	5
12:15 - 12:29	0	1	1
12:30 - 12:44	2	0	2
12:45 - 12:59	2	0	2
Hour Total	5	5	10
1:00 - 1:14	3	0	3
1:15 - 1:29	0	0	0
1:30 - 1:44	0	0	0
1:45 - 1:59	0	0	0
Hour Total	3	0	3
2:00 - 2:14	0	0	0
2:15 - 2:29	0	0	0
2:30 - 2:44	0	0	0
2:45 - 2:59	0	0	0
Hour Total	0	0	0
3:00 - 3:14	0	0	0
3:15 - 3:29	0	0	0
3:30 - 3:44	0	0	0
3:45 - 3:59	0	0	0
Hour Total	0	0	0
4:00 - 4:14	0	1	1
4:15 - 4:29	0	2	2
4:30 - 4:44	0	3	3
4:45 - 4:59	0	8	8
Hour Total	0	14	14
5:00 - 5:14	0	8	8
5:15 - 5:29	0	18	18
5:30 - 5:44	10	38	48
5:45 - 5:59	9	54	63
Hour Total	19	118	137
6:00 - 6:14	4	84	88
6:15 - 6:29	16	130	146
6:30 - 6:44	20	152	172
6:45 - 6:59	39	164	203
Hour Total	79	530	609
ADT :	2668	2477	5145
AM Peak Time :	10:45-11:45	6:15- 7:15	6:30- 7:30
AM Peak Volume:	263	595	741
PM Peak Time :	16:00-17:00	12:00-13:00	16:00-17:00
PM Peak Volume:	610	199	740

MicroCounts

dai

C:\TDDAI76\REDST025.DAI

TRAFFIC DATA, LLC 205-824-0125

Location: MILLS RD west of JUGERMAN RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
10:00 - 10:14	23	9	32
10:15 - 10:29	18	15	33
10:30 - 10:44	30	19	49
10:45 - 10:59	33	30	63
Hour Total	104	73	177
11:00 - 11:14	38	40	78
11:15 - 11:29	41	29	70
11:30 - 11:44	40	19	59
11:45 - 11:59	29	25	54
Hour Total	148	113	261
12:00 - 12:14	46	29	75
12:15 - 12:29	41	26	67
12:30 - 12:44	58	23	81
12:45 - 12:59	48	30	78
Hour Total	193	108	301
13:00 - 13:14	52	17	69
13:15 - 13:29	30	19	49
13:30 - 13:44	33	17	50
13:45 - 13:59	30	21	51
Hour Total	145	74	219
14:00 - 14:14	33	16	49
14:15 - 14:29	21	29	50
14:30 - 14:44	25	34	59
14:45 - 14:59	38	20	58
Hour Total	117	99	216
15:00 - 15:14	56	47	103
15:15 - 15:29	54	40	94
15:30 - 15:44	60	82	142
15:45 - 15:59	50	53	103
Hour Total	220	222	442
16:00 - 16:14	56	108	164
16:15 - 16:29	65	54	119
16:30 - 16:44	56	88	144
16:45 - 16:59	39	60	99
Hour Total	216	310	526
17:00 - 17:14	44	79	123
17:15 - 17:29	18	51	69
17:30 - 17:44	23	65	88

MicroCounts
Page 2

dai
C:\TDDAI76\REDST025.DAI

Location: MILLS RD west of JUGERMAN RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
17:45 - 17:59	17	23	40
Hour Total	102	218	320
18:00 - 18:14	8	6	14
18:15 - 18:29	16	4	20
18:30 - 18:44	6	1	7
18:45 - 18:59	6	0	6
Hour Total	36	11	47
19:00 - 19:14	3	6	9
19:15 - 19:29	4	2	6
19:30 - 19:44	3	8	11
19:45 - 19:59	2	4	6
Hour Total	12	20	32
20:00 - 20:14	4	0	4
20:15 - 20:29	3	0	3
20:30 - 20:44	2	0	2
20:45 - 20:59	2	1	3
Hour Total	11	1	12
21:00 - 21:14	1	1	2
21:15 - 21:29	1	0	1
21:30 - 21:44	0	0	0
21:45 - 21:59	0	0	0
Hour Total	2	1	3
22:00 - 22:14	5	1	6
22:15 - 22:29	5	0	5
22:30 - 22:44	6	2	8
23:45 - 22:59	6	1	7
Hour Total	22	4	26
23:00 - 23:14	1	0	1
23:15 - 23:29	1	0	1
23:30 - 23:44	1	1	2
23:45 - 23:59	1	0	1
Hour Total	4	1	5
Mid - 12:14	0	3	3
12:15 - 12:29	0	1	1
12:30 - 12:44	0	0	0
12:45 - 12:59	0	0	0
Hour Total	0	4	4
1:00 - 1:14	0	0	0
1:15 - 1:29	2	0	2
1:30 - 1:44	1	0	1
1:45 - 1:59	0	0	0
Hour Total	3	0	3
2:00 - 2:14	0	0	0
2:15 - 2:29	0	0	0
2:30 - 2:44	0	1	1
2:45 - 2:59	0	0	0
Hour Total	0	1	1

MicroCounts
Page 3

dai
C:\TDDAI76\REDSTO25.DAI

Location: MILLS RD west of JUGERMAN RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	WestBound Volume	EastBound Volume	Total Volume
3:00 - 3:14	0	0	0
3:15 - 3:29	2	1	3
3:30 - 3:44	0	0	0
3:45 - 3:59	0	0	0
Hour Total	2	1	3
4:00 - 4:14	0	1	1
4:15 - 4:29	0	0	0
4:30 - 4:44	2	0	2
4:45 - 4:59	0	2	2
Hour Total	2	3	5
5:00 - 5:14	0	2	2
5:15 - 5:29	1	2	3
5:30 - 5:44	27	9	36
5:45 - 5:59	41	14	55
Hour Total	69	27	96
6:00 - 6:14	45	12	57
6:15 - 6:29	81	32	113
6:30 - 6:44	107	35	142
6:45 - 6:59	160	44	204
Hour Total	393	123	516
7:00 - 7:14	145	47	192
7:15 - 7:29	164	48	212
7:30 - 7:44	137	55	192
7:45 - 7:59	134	29	163
Hour Total	580	179	759
8:00 - 8:14	113	49	162
8:15 - 8:29	79	27	106
8:30 - 8:44	63	36	99
8:45 - 8:59	66	17	83
Hour Total	321	129	450
9:00 - 9:14	54	13	67
9:15 - 9:29	37	28	65
9:30 - 9:44	34	18	52
9:45 - 9:59	38	24	62
Hour Total	163	83	246
ADT	2865	1805	4670
AM Peak Time	6:45- 7:45	6:45- 7:45	6:45- 7:45
AM Peak Volume:	606	194	800
PM Peak Time	15:30-16:30	16:00-17:00	15:45-16:45
PM Peak Volume:	231	310	530

MicroCounts

dai

C:\TDDAI56\REDST010.DAI

TRAFFIC DATA, LLC 205-824-0125

Location: MILLS RD south of MARTIN RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
12:00 - 12:14	42	44	86
12:15 - 12:29	58	63	121
12:30 - 12:44	46	73	119
12:45 - 12:59	53	68	121
Hour Total	199	248	447
13:00 - 13:14	31	50	81
13:15 - 13:29	34	40	74
13:30 - 13:44	30	32	62
13:45 - 13:59	36	26	62
Hour Total	131	148	279
14:00 - 14:14	28	31	59
14:15 - 14:29	43	27	70
14:30 - 14:44	28	15	43
14:45 - 14:59	31	16	47
Hour Total	130	89	219
15:00 - 15:14	34	23	57
15:15 - 15:29	38	22	60
15:30 - 15:44	50	33	83
15:45 - 15:59	56	20	76
Hour Total	178	98	276
16:00 - 16:14	57	17	74
16:15 - 16:29	84	16	100
16:30 - 16:44	61	21	82
16:45 - 16:59	63	18	81
Hour Total	265	72	337
17:00 - 17:14	45	10	55
17:15 - 17:29	39	8	47
17:30 - 17:44	25	6	31
17:45 - 17:59	22	7	29
Hour Total	131	31	162
18:00 - 18:14	9	2	11
18:15 - 18:29	8	1	9
18:30 - 18:44	5	1	6
18:45 - 18:59	5	2	7
Hour Total	27	6	33
19:00 - 19:14	4	4	8
19:15 - 19:29	3	0	3
19:30 - 19:44	2	1	3

MicroCounts
Page 2

dai
C:\TDDAI56\REDSTO10.DAI

Location: MILLS RD south of MARTIN RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
19:45 - 19:59	1	1	2
Hour Total	10	6	16
20:00 - 20:14	0	1	1
20:15 - 20:29	3	0	3
20:30 - 20:44	1	0	1
20:45 - 20:59	0	1	1
Hour Total	4	2	6
21:00 - 21:14	1	1	2
21:15 - 21:29	2	1	3
21:30 - 21:44	1	0	1
21:45 - 21:59	0	1	1
Hour Total	4	3	7
22:00 - 22:14	0	0	0
22:15 - 22:29	2	1	3
22:30 - 22:44	1	0	1
23:45 - 22:59	8	0	8
Hour Total	11	1	12
23:00 - 23:14	6	0	6
23:15 - 23:29	2	0	2
23:30 - 23:44	2	0	2
23:45 - 23:59	2	0	2
Hour Total	12	0	12
Mid - 12:14	0	0	0
12:15 - 12:29	1	0	1
12:30 - 12:44	1	0	1
12:45 - 12:59	0	0	0
Hour Total	2	0	2
1:00 - 1:14	1	0	1
1:15 - 1:29	0	0	0
1:30 - 1:44	0	1	1
1:45 - 1:59	2	0	2
Hour Total	3	1	4
2:00 - 2:14	1	0	1
2:15 - 2:29	2	0	2
2:30 - 2:44	0	2	2
2:45 - 2:59	2	1	3
Hour Total	5	3	8
3:00 - 3:14	0	1	1
3:15 - 3:29	0	0	0
3:30 - 3:44	1	0	1
3:45 - 3:59	0	0	0
Hour Total	1	1	2
4:00 - 4:14	0	0	0
4:15 - 4:29	0	1	1
4:30 - 4:44	0	0	0
4:45 - 4:59	0	1	1
Hour Total	0	2	2

Location: MILLS RD south of MARTIN RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
5:00 - 5:14	1	1	2
5:15 - 5:29	0	4	4
5:30 - 5:44	1	4	5
5:45 - 5:59	5	7	12
Hour Total	7	16	23
6:00 - 6:14	13	23	36
6:15 - 6:29	22	31	53
6:30 - 6:44	27	53	80
6:45 - 6:59	43	69	112
Hour Total	105	176	281
7:00 - 7:14	61	73	134
7:15 - 7:29	53	72	125
7:30 - 7:44	68	64	132
7:45 - 7:59	61	61	122
Hour Total	243	270	513
8:00 - 8:14	72	56	128
8:15 - 8:29	55	60	115
8:30 - 8:44	41	24	65
8:45 - 8:59	39	31	70
Hour Total	207	171	378
9:00 - 9:14	32	44	76
9:15 - 9:29	29	13	42
9:30 - 9:44	27	29	56
9:45 - 9:59	21	37	58
Hour Total	109	123	232
10:00 - 10:14	26	26	52
10:15 - 10:29	32	31	63
10:30 - 10:44	26	14	40
10:45 - 10:59	42	29	71
Hour Total	126	100	226
11:00 - 11:14	95	23	118
11:15 - 11:29	78	29	107
11:30 - 11:44	52	29	81
11:45 - 11:59	40	36	76
Hour Total	265	117	382
ADT	2175	1684	3859
AM Peak Time	10:45-11:45	6:45- 7:45	7:00- 8:00
AM Peak Volume:	267	278	513
PM Peak Time	16:00-17:00	12:15-13:15	12:00-13:00
PM Peak Volume:	265	254	447

MicroCounts

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TRAFFIC DATA, LLC 205-824-0125

Location: TOFTOY TRWY south of MORRIS RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
10:00 - 10:14	28	39	67
10:15 - 10:29	33	31	64
10:30 - 10:44	24	74	98
10:45 - 10:59	25	147	172
Hour Total	110	291	401
11:00 - 11:14	38	158	196
11:15 - 11:29	32	110	142
11:30 - 11:44	47	86	133
11:45 - 11:59	59	81	140
Hour Total	176	435	611
12:00 - 12:14	83	85	168
12:15 - 12:29	94	77	171
12:30 - 12:44	103	62	165
12:45 - 12:59	77	55	132
Hour Total	357	279	636
13:00 - 13:14	84	43	127
13:15 - 13:29	48	34	82
13:30 - 13:44	39	54	93
13:45 - 13:59	31	55	86
Hour Total	202	186	388
14:00 - 14:14	42	44	86
14:15 - 14:29	30	58	88
14:30 - 14:44	27	154	181
14:45 - 14:59	28	111	139
Hour Total	127	367	494
15:00 - 15:14	33	160	193
15:15 - 15:29	18	184	202
15:30 - 15:44	22	355	377
15:45 - 15:59	32	242	274
Hour Total	105	941	1046
16:00 - 16:14	28	484	512
16:15 - 16:29	39	327	366
16:30 - 16:44	39	408	447
16:45 - 16:59	42	289	331
Hour Total	148	1508	1656
17:00 - 17:14	45	328	373
17:15 - 17:29	57	209	266
17:30 - 17:44	24	181	205

MicroCounts

dai

Page 2

C:\TDDAI56\REDST016.DAI

Location: TOFTOY TRWY south of MORRIS RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 / Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
17:45 - 17:59	12	113	125
Hour Total	138	831	969
18:00 - 18:14	5	118	123
18:15 - 18:29	9	67	76
18:30 - 18:44	2	60	62
18:45 - 18:59	1	40	41
Hour Total	17	285	302
19:00 - 19:14	3	18	21
19:15 - 19:29	6	17	23
19:30 - 19:44	4	18	22
19:45 - 19:59	5	14	19
Hour Total	18	67	85
20:00 - 20:14	3	7	10
20:15 - 20:29	1	6	7
20:30 - 20:44	0	4	4
20:45 - 20:59	3	3	6
Hour Total	7	20	27
21:00 - 21:14	0	6	6
21:15 - 21:29	0	6	6
21:30 - 21:44	2	5	7
21:45 - 21:59	0	2	2
Hour Total	2	19	21
22:00 - 22:14	2	3	5
22:15 - 22:29	2	4	6
22:30 - 22:44	3	3	6
23:45 - 22:59	3	15	18
Hour Total	10	25	35
23:00 - 23:14	2	5	7
23:15 - 23:29	4	3	7
23:30 - 23:44	3	1	4
23:45 - 23:59	1	11	12
Hour Total	10	20	30
Mid - 12:14	2	13	15
12:15 - 12:29	0	4	4
12:30 - 12:44	0	5	5
12:45 - 12:59	0	2	2
Hour Total	2	24	26
1:00 - 1:14	0	0	0
1:15 - 1:29	0	0	0
1:30 - 1:44	2	0	2
1:45 - 1:59	0	1	1
Hour Total	2	1	3
2:00 - 2:14	0	1	1
2:15 - 2:29	0	0	0
2:30 - 2:44	0	0	0
2:45 - 2:59	0	2	2
Hour Total	0	3	3

Location: TOFTOY TRWY south of MORRIS RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
3:00 - 3:14	2	0	2
3:15 - 3:29	1	0	1
3:30 - 3:44	1	2	3
3:45 - 3:59	2	0	2
Hour Total	6	2	8
4:00 - 4:14	2	0	2
4:15 - 4:29	0	2	2
4:30 - 4:44	11	0	11
4:45 - 4:59	23	2	25
Hour Total	36	4	40
5:00 - 5:14	22	0	22
5:15 - 5:29	32	0	32
5:30 - 5:44	65	6	71
5:45 - 5:59	131	7	138
Hour Total	250	13	263
6:00 - 6:14	189	10	199
6:15 - 6:29	297	13	310
6:30 - 6:44	299	37	336
6:45 - 6:59	277	40	317
Hour Total	1062	100	1162
7:00 - 7:14	294	49	343
7:15 - 7:29	261	62	323
7:30 - 7:44	253	75	328
7:45 - 7:59	222	78	300
Hour Total	1030	264	1294
8:00 - 8:14	187	73	260
8:15 - 8:29	141	76	217
8:30 - 8:44	112	64	176
8:45 - 8:59	88	69	157
Hour Total	528	282	810
9:00 - 9:14	66	42	108
9:15 - 9:29	65	59	124
9:30 - 9:44	37	44	81
9:45 - 9:59	40	83	123
Hour Total	208	228	436
ADT :	4551	6195	10746
AM Peak Time :	6:15- 7:15	10:45-11:45	6:30- 7:30
AM Peak Volume:	1167	501	1319
PM Peak Time :	12:15-13:15	16:00-17:00	16:00-17:00
PM Peak Volume:	358	1508	1656

MicroCounts

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TRAFFIC DATA, LLC 205-824-0125

Location: TOFTOY TRWY south of NEAL RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
11:00 - 11:14	20	68	88
11:15 - 11:29	24	44	68
11:30 - 11:44	30	34	64
11:45 - 11:59	39	26	65
Hour Total	113	172	285
12:00 - 12:14	61	24	85
12:15 - 12:29	65	18	83
12:30 - 12:44	54	20	74
12:45 - 12:59	52	10	62
Hour Total	232	72	304
13:00 - 13:14	41	25	66
13:15 - 13:29	27	22	49
13:30 - 13:44	27	24	51
13:45 - 13:59	25	23	48
Hour Total	120	94	214
14:00 - 14:14	26	10	36
14:15 - 14:29	31	15	46
14:30 - 14:44	24	37	61
14:45 - 14:59	27	37	64
Hour Total	108	99	207
15:00 - 15:14	25	46	71
15:15 - 15:29	19	63	82
15:30 - 15:44	35	118	153
15:45 - 15:59	36	86	122
Hour Total	115	313	428
16:00 - 16:14	38	134	172
16:15 - 16:29	40	108	148
16:30 - 16:44	55	106	161
16:45 - 16:59	42	77	119
Hour Total	175	425	600
17:00 - 17:14	56	82	138
17:15 - 17:29	53	47	100
17:30 - 17:44	38	48	86
17:45 - 17:59	23	30	53
Hour Total	170	207	377
18:00 - 18:14	12	25	37
18:15 - 18:29	9	23	32
18:30 - 18:44	7	14	21

MicroCounts

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Page 2

C:\TDDAI56\REDST009.DAI

Location: TOFTOY TRWY south of NEAL RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
18:45 - 18:59	2	7	9
Hour Total	30	69	99
19:00 - 19:14	6	5	11
19:15 - 19:29	2	2	4
19:30 - 19:44	5	5	10
19:45 - 19:59	5	0	5
Hour Total	18	12	30
20:00 - 20:14	4	2	6
20:15 - 20:29	0	1	1
20:30 - 20:44	1	2	3
20:45 - 20:59	2	0	2
Hour Total	7	5	12
21:00 - 21:14	0	1	1
21:15 - 21:29	0	4	4
21:30 - 21:44	2	0	2
21:45 - 21:59	0	2	2
Hour Total	2	7	9
22:00 - 22:14	1	2	3
22:15 - 22:29	0	1	1
22:30 - 22:44	2	1	3
23:45 - 22:59	0	5	5
Hour Total	3	9	12
23:00 - 23:14	1	0	1
23:15 - 23:29	1	1	2
23:30 - 23:44	2	0	2
23:45 - 23:59	1	2	3
Hour Total	5	3	8
Mid - 12:14	1	0	1
12:15 - 12:29	0	2	2
12:30 - 12:44	0	2	2
12:45 - 12:59	0	1	1
Hour Total	1	5	6
1:00 - 1:14	0	0	0
1:15 - 1:29	0	0	0
1:30 - 1:44	2	0	2
1:45 - 1:59	0	1	1
Hour Total	2	1	3
2:00 - 2:14	0	0	0
2:15 - 2:29	0	0	0
2:30 - 2:44	0	0	0
2:45 - 2:59	0	0	0
Hour Total	0	0	0
3:00 - 3:14	0	0	0
3:15 - 3:29	1	0	1
3:30 - 3:44	1	0	1
3:45 - 3:59	0	0	0
Hour Total	2	0	2

MicroCounts
Page 3

dai
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Location: TOFTOY TRWY south of NEAL RD - REDSTONE
Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	SouthBound Volume	NorthBound Volume	Total Volume
4:00 - 4:14	0	0	0
4:15 - 4:29	0	0	0
4:30 - 4:44	3	0	3
4:45 - 4:59	9	1	10
Hour Total	12	1	13
5:00 - 5:14	7	0	7
5:15 - 5:29	15	0	15
5:30 - 5:44	28	2	30
5:45 - 5:59	38	7	45
Hour Total	88	9	97
6:00 - 6:14	81	5	86
6:15 - 6:29	138	10	148
6:30 - 6:44	131	24	155
6:45 - 6:59	134	24	158
Hour Total	484	63	547
7:00 - 7:14	145	26	171
7:15 - 7:29	111	36	147
7:30 - 7:44	108	39	147
7:45 - 7:59	127	43	170
Hour Total	491	144	635
8:00 - 8:14	104	42	146
8:15 - 8:29	73	32	105
8:30 - 8:44	70	22	92
8:45 - 8:59	55	27	82
Hour Total	302	123	425
9:00 - 9:14	42	14	56
9:15 - 9:29	34	21	55
9:30 - 9:44	18	19	37
9:45 - 9:59	24	28	52
Hour Total	118	82	200
10:00 - 10:14	21	10	31
10:15 - 10:29	22	13	35
10:30 - 10:44	27	38	65
10:45 - 10:59	23	73	96
Hour Total	93	134	227
ADT	2691	2049	4740
AM Peak Time	6:15- 7:15	10:30-11:30	7:00- 8:00
AM Peak Volume:	548	223	635
PM Peak Time	12:00-13:00	15:30-16:30	15:45-16:45
PM Peak Volume:	232	446	603

MicroCounts

dai
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TRAFFIC DATA, LLC 205-824-0125

Location: MILLS RD north of MARTIN RD - REDSTONE

Count Interval: 15 minutes

Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
12:00 - 12:14	34	36	70
12:15 - 12:29	31	40	71
12:30 - 12:44	23	38	61
12:45 - 12:59	22	43	65
Hour Total	110	157	267
13:00 - 13:14	26	31	57
13:15 - 13:29	25	26	51
13:30 - 13:44	27	24	51
13:45 - 13:59	15	20	35
Hour Total	93	101	194
14:00 - 14:14	25	21	46
14:15 - 14:29	25	18	43
14:30 - 14:44	19	9	28
14:45 - 14:59	28	15	43
Hour Total	97	63	160
15:00 - 15:14	28	19	47
15:15 - 15:29	46	18	64
15:30 - 15:44	44	22	66
15:45 - 15:59	44	12	56
Hour Total	162	71	233
16:00 - 16:14	68	21	89
16:15 - 16:29	55	18	73
16:30 - 16:44	57	17	74
16:45 - 16:59	38	17	55
Hour Total	218	73	291
17:00 - 17:14	41	10	51
17:15 - 17:29	32	13	45
17:30 - 17:44	17	12	29
17:45 - 17:59	7	9	16
Hour Total	97	44	141
18:00 - 18:14	9	10	19
18:15 - 18:29	8	3	11
18:30 - 18:44	6	4	10
18:45 - 18:59	3	4	7
Hour Total	26	21	47
19:00 - 19:14	4	0	4
19:15 - 19:29	5	1	6
19:30 - 19:44	1	2	3

Location: MILLS RD north of MARTIN RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
19:45 - 19:59	1	0	1
Hour Total	11	3	14
20:00 - 20:14	2	1	3
20:15 - 20:29	1	0	1
20:30 - 20:44	1	0	1
20:45 - 20:59	2	2	4
Hour Total	6	3	9
21:00 - 21:14	1	0	1
21:15 - 21:29	0	0	0
21:30 - 21:44	1	0	1
21:45 - 21:59	0	0	0
Hour Total	2	0	2
22:00 - 22:14	1	2	3
22:15 - 22:29	0	0	0
22:30 - 22:44	1	2	3
23:45 - 22:59	2	0	2
Hour Total	4	4	8
23:00 - 23:14	1	0	1
23:15 - 23:29	0	0	0
23:30 - 23:44	2	0	2
23:45 - 23:59	0	0	0
Hour Total	3	0	3
Mid - 12:14	1	1	2
12:15 - 12:29	0	0	0
12:30 - 12:44	0	0	0
12:45 - 12:59	0	0	0
Hour Total	1	1	2
1:00 - 1:14	0	0	0
1:15 - 1:29	0	1	1
1:30 - 1:44	1	0	1
1:45 - 1:59	1	0	1
Hour Total	2	1	3
2:00 - 2:14	1	0	1
2:15 - 2:29	2	1	3
2:30 - 2:44	1	0	1
2:45 - 2:59	0	0	0
Hour Total	4	1	5
3:00 - 3:14	0	0	0
3:15 - 3:29	0	0	0
3:30 - 3:44	0	0	0
3:45 - 3:59	0	1	1
Hour Total	0	1	1
4:00 - 4:14	0	1	1
4:15 - 4:29	0	0	0
4:30 - 4:44	0	0	0
4:45 - 4:59	0	0	0
Hour Total	0	1	1

Location: MILLS RD north of MARTIN RD - REDSTONE
 Count Date: Wednesday - July 12, 2006 /Thursday - July 13, 2006

Time	NorthBound Volume	SouthBound Volume	Total Volume
5:00 - 5:14	0	0	0
5:15 - 5:29	1	3	4
5:30 - 5:44	6	4	10
5:45 - 5:59	8	8	16
Hour Total	15	15	30
6:00 - 6:14	10	15	25
6:15 - 6:29	12	34	46
6:30 - 6:44	20	30	50
6:45 - 6:59	25	41	66
Hour Total	67	120	187
7:00 - 7:14	26	42	68
7:15 - 7:29	38	49	87
7:30 - 7:44	37	69	106
7:45 - 7:59	35	60	95
Hour Total	136	220	356
8:00 - 8:14	29	47	76
8:15 - 8:29	25	33	58
8:30 - 8:44	29	27	56
8:45 - 8:59	21	27	48
Hour Total	104	134	238
9:00 - 9:14	20	16	36
9:15 - 9:29	20	21	41
9:30 - 9:44	16	32	48
9:45 - 9:59	21	17	38
Hour Total	77	86	163
10:00 - 10:14	19	13	32
10:15 - 10:29	21	15	36
10:30 - 10:44	33	24	57
10:45 - 10:59	55	18	73
Hour Total	128	70	198
11:00 - 11:14	60	18	78
11:15 - 11:29	47	14	61
11:30 - 11:44	36	16	52
11:45 - 11:59	31	31	62
Hour Total	174	79	253
ADT	1537	1269	2806
AM Peak Time	10:45-11:45	7:15- 8:15	7:15- 8:15
AM Peak Volume	198	225	364
PM Peak Time	15:45-16:45	12:00-13:00	15:45-16:45
PM Peak Volume	224	157	292