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U.S. AIR FORCE

# External Mission Sustainment

## Environment, Energy, Security and Sustainability (E2S2) Symposium

New Orleans, LA
11 May 2011

**Jennifer Graham**
Marstel-Day, LLC

# Report Documentation Page

*Form Approved*
*OMB No. 0704-0188*



| 1. REPORT DATE | 2. REPORT TYPE | 3. DATES COVERED |
|---|---|---|
| **11 MAY 2011** | | **00-00-2011 to 00-00-2011** |

| 4. TITLE AND SUBTITLE | 5a. CONTRACT NUMBER |
|---|---|
| **External Mission Sustainment** | 5b. GRANT NUMBER |
| | 5c. PROGRAM ELEMENT NUMBER |
| 6. AUTHOR(S) | 5d. PROJECT NUMBER |
| | 5e. TASK NUMBER |
| | 5f. WORK UNIT NUMBER |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Marstel-Day, LLC,2217 Princess Anne Street Suite 101-1A,Fredericksburg,VA,22401** | 8. PERFORMING ORGANIZATION REPORT NUMBER |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | 10. SPONSOR/MONITOR'S ACRONYM(S) |
| | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) |

12. DISTRIBUTION/AVAILABILITY STATEMENT
**Approved for public release; distribution unlimited**

13. SUPPLEMENTARY NOTES
**Presented at the NDIA Environment, Energy Security & Sustainability (E2S2) Symposium & Exhibition held 9-12 May 2011 in New Orleans, LA.**

14. ABSTRACT

15. SUBJECT TERMS

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
|---|---|---|---|---|---|
| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | |
| **unclassified** | **unclassified** | **unclassified** | **Same as Report (SAR)** | **27** | |

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# Presentation Outline

- Project Purpose and Objectives
- Intended Outcomes
- Semantics of Sustainability
- Resulting Product
- Methodology
- Installation Fact Sheets and Narratives
- Conclusions/Lessons Learned
- Recommendations/Way Ahead
- Acknowledgements

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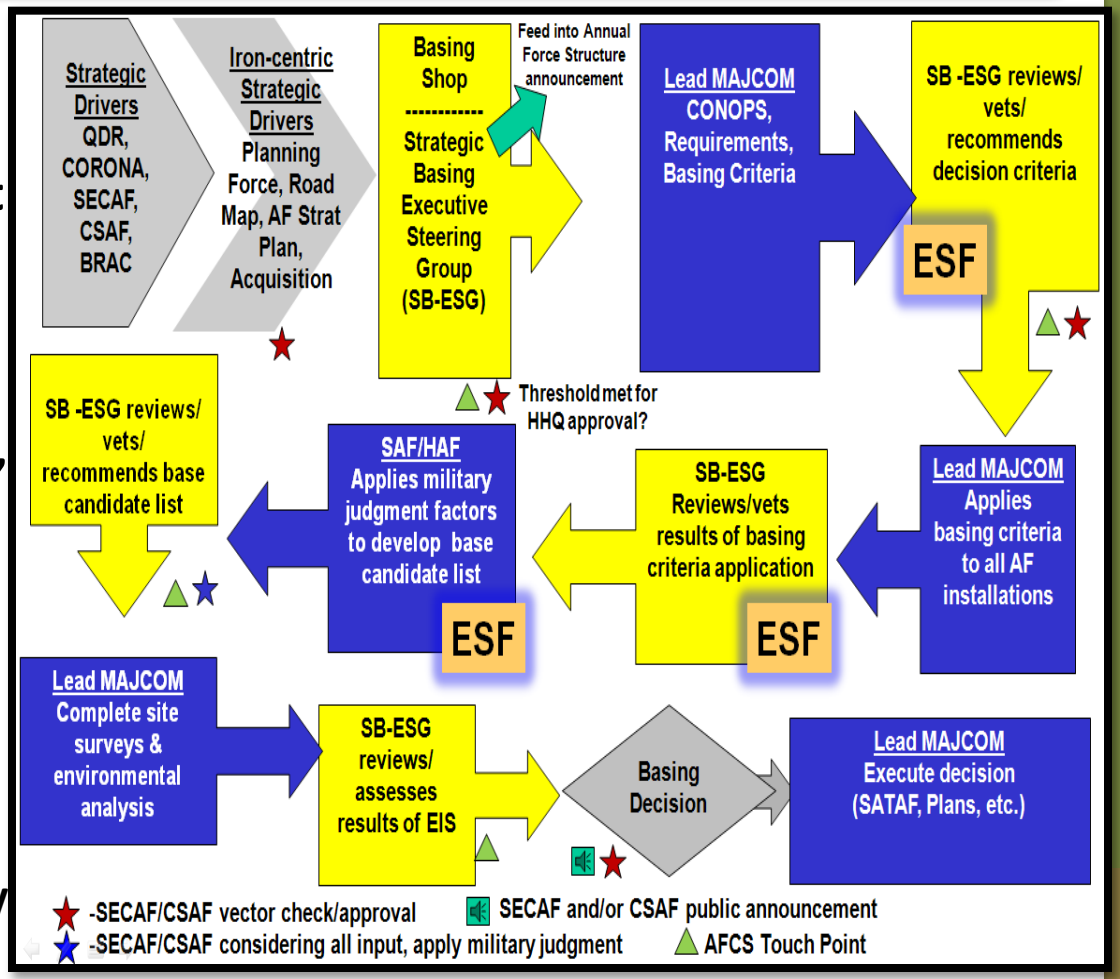
# Project Purpose and Objectives

- Support Air Force's Strategic Basing Process
- Develop a decision support tool for consideration of external mission sustainment issues in resource allocation, basing, and mission bed-down decisions
- Looking at only "inside the fence" neglects factors "outside the fence" that influence long-term capacity of an installation to effectively undertake its mission or undertake new ones



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# Intended Outcomes

- **Support the sustainability of Air Force installation core functions as outlined in the 2010 Air Force Posture Statement**
- **Further develop a deliberative planning and analysis process, as well as the tools necessary to support:**
  - **Strategic basing and mission requirements**
  - **Mission sustainability, BRAC analysis, encroachment management**
  - **Overall situational awareness of external conditions and factors**

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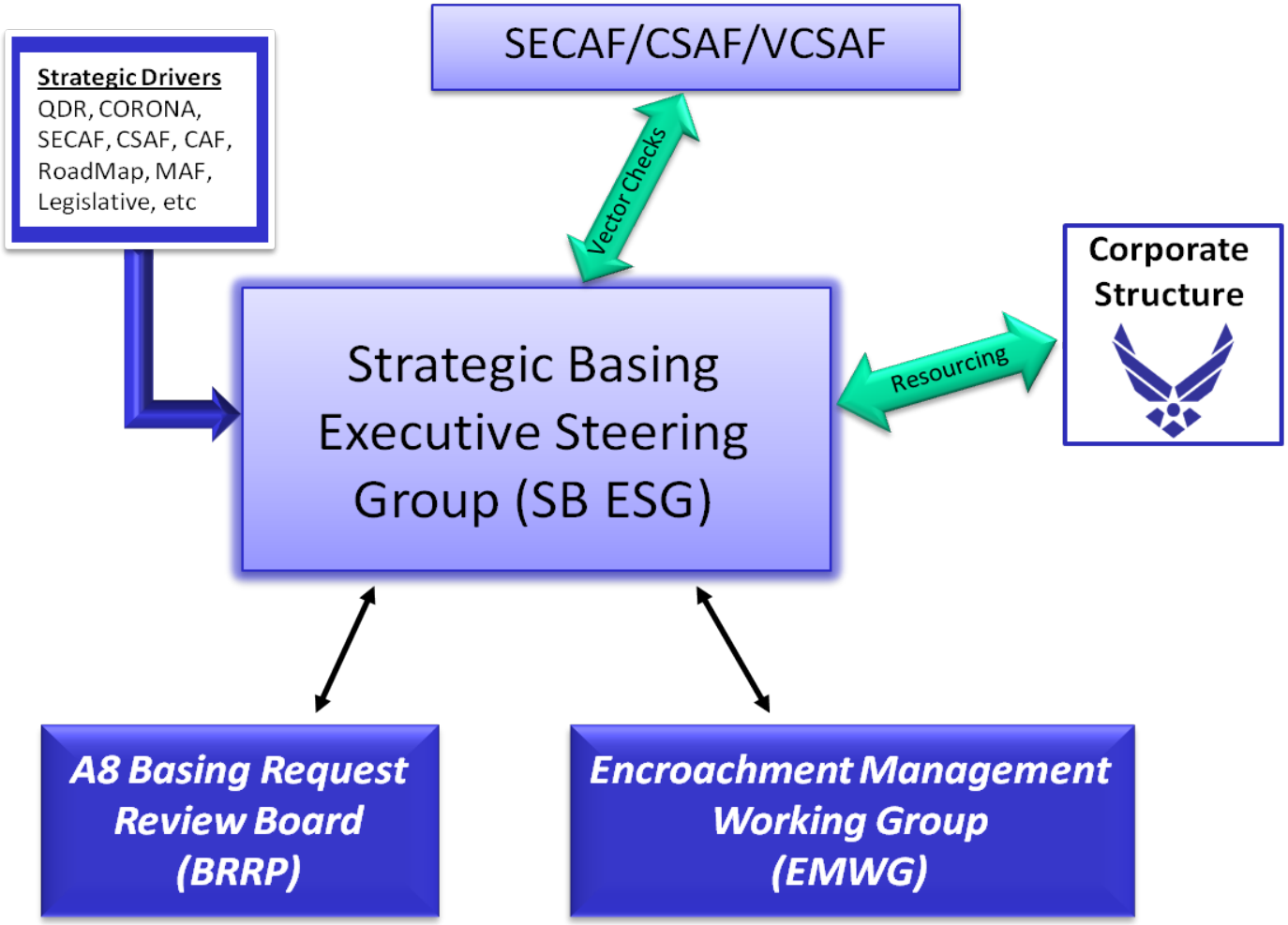
# Encroachment Management Working Group



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# Semantics of "Sustainability"

- **Definition for purposes of this project:**
  - ***A sustainable installation is defined as one "that is capable of supporting current and future missions without degrading or exhausting key resources and mission capability.***
  - ***A sustainable installation is supported by a planning process that takes a holistic view of the interactions and inter-relationships of the natural and built environment, and considers both internal and external stakeholders.***

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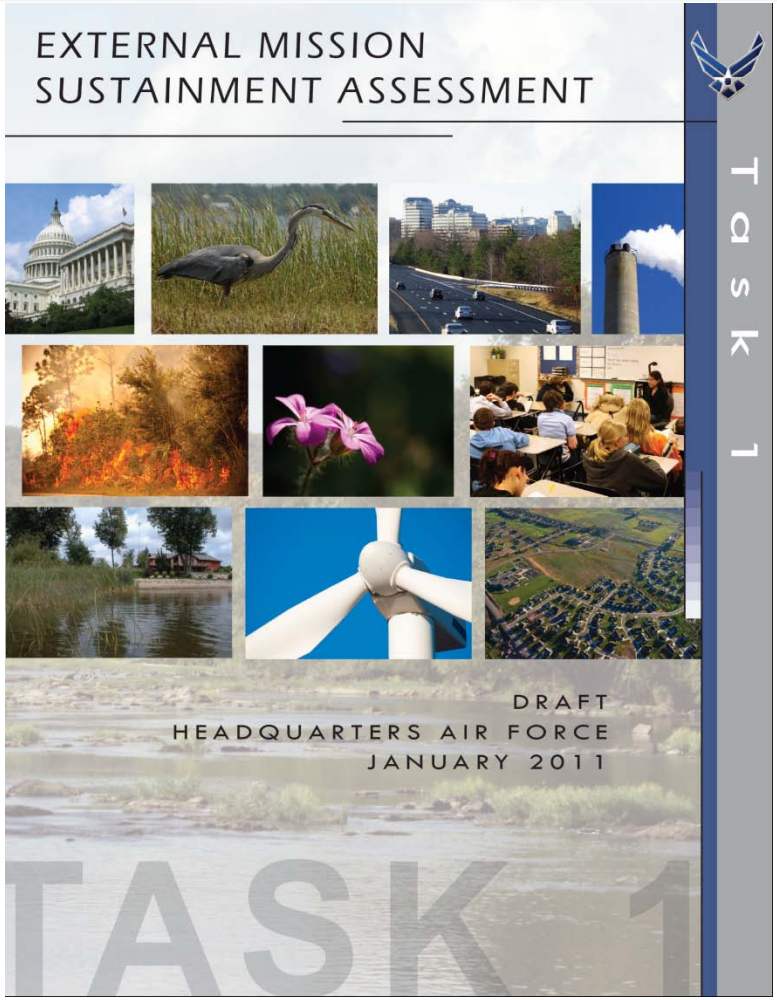
# Resulting Product

- **Part I – Methodology**
- **Part II – Installation Fact Sheets and Narratives**
- **Part III – Conclusions, Lessons Learned, and Recommendations**



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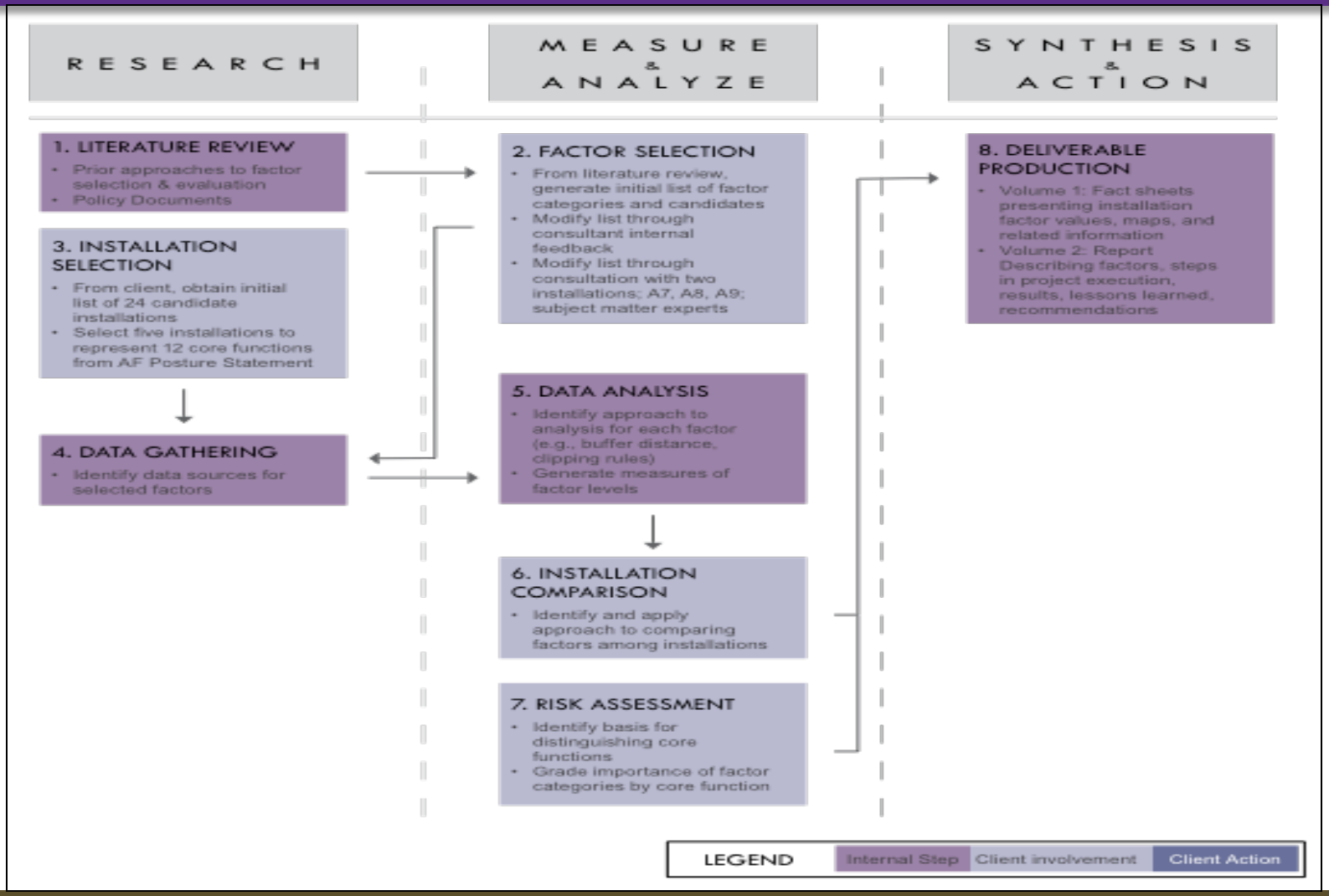
# Overview of Methodology



# Overview of Methodology Installation Selection

- **Representation across:**
- **Seven MAJCOMs**
- **12 Core Mission Areas**
- **Geographic locations**
- **Urban / Rural mix**

Patrick AFB – Atlas V Orbital Test Vehicle Rollout

Lackland AFB - Basic Training

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# Installation Selection and Core Mission Areas

---- = notes (to be removed for final product)

| Installations | AF Core Missions | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nuclear Deterrence Operations (ICBM, B52) | Air Superiority (F22) | Space Superiority (GPS, wx, satellite) | Cyberspace Superiority (internet offense defense) | Global Precision Attack (F35) | Rapid Global Mobility (cargo) | Special Operations (SOF) | Global Integrated ISR (MQ12, MQ-9 UAV) | Command and Control (AOCs, TACs) | Personnel Recovery (CRO) | Building Partnerships (Iraq, Afghan, I35) | Agile Combat Support (training, AQ) |
| Davis-Monthan | | | | | ■ | ■ | ■ | | | ■ | | ■ |
| Hill | ■ | ■ | | | | ■ | | ■ | | | | ■ |
| Holloman | | ■ | ■ | | | | | | ■ | | ■ | ■ |
| Lackland | | | | ■ | | ■ | | ■ | | | ■ | ■ |
| Patrick | ■ | | ■ | ■ | | | | ■ | ■ | | | ■ |

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# Overview of Methodology Literature Review

- **Key Observations:**
  - **Extraordinary number of characteristics of the environment and the community surrounding installations**
  - **Grading of factor levels (e.g., high, medium, low) can be based on many possible approaches**
  - **Several methods have been previously suggested or applied**

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# Overview of Methodology Factor Selection

- **Factors selected based on the following characteristics:**
  - **Relevant to Air Force decision-making process**
  - **Measureable on a scale that represents conditions local to the installation**
  - **Current (and can be kept current)**
  - **Accurate**
  - **Comparable among installations**
  - **Authoritative source**
  - **Cost-effective to obtain and evaluate**

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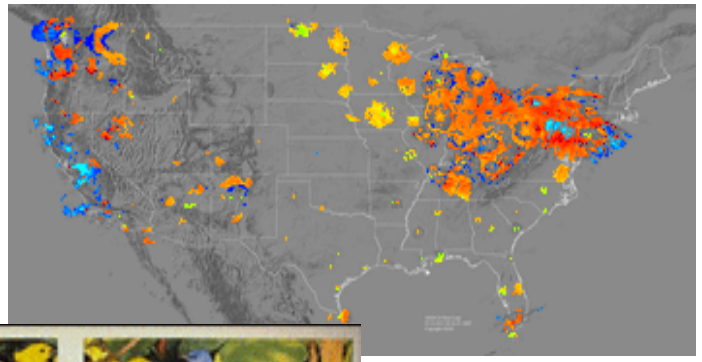
# Overview of Methodology Factor Selection (cont.)

- **External Mission Sustainment Factors fall into 10 categories:**
  - **Air and Land Space Restrictions – Military Operations**
  - **Air and Land Space Restrictions – Land Use**
  - **Resource Reliability**
  - **Utility Reliability**
  - **Spectrum Encroachment**
  - **Quality of Life**
  - **Urban Growth – Transportation**
  - **Community Analysis – Relationship**
  - **Urban Growth – Trends**
  - **Natural Factors and Climate Effects**



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# Overview of Methodology Factor Selection Process

- Development of preliminary list of categories based on:
  - Sustainable Installations Regional Resource Assessment (SIRRA) developed by CERL
  - Encroachment Control Plans
- Initial consultation with HQ Air Force
- Input from Langley and Homestead AFBs during site visits
- Addition of factors from the Evaluation of Basing Request Review Panel (BRRP) Basing Criteria Stoplight Template Guide
- Consultation with HQ Air Force

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# Installation Fact Sheets

## External Sustainability Fact Sheet for Davis-Monthan Air Force Base

**Current External Encroachment Management Status**

| Studies | Completed | Planned or In Progress | Not Applicable |
|---|---|---|---|
| AICUZ | X | | |
| RAICUZ | | | X |
| JLUS | | X | |
| Encroachment Assessment | | X | |
| INRMP | X | | |
| NIA | X | | |

- **State**: Arizona Department of Environmental Quality; Arizona Department of Homeland Security; Arizona Department of Water Resources; Arizona Department of Transportation
- **Regional**: Pima County Department of Environmental Quality; Pima County Public Works Administration
- **Local:** Tucson Office of Conservation and Sustainable Development; Tucson Office of Intergovernmental Relations; Tucson Planning and Development Services

**Proposed Actions**

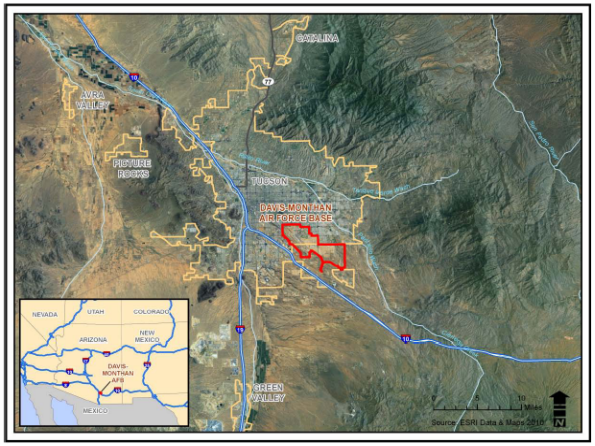
None. This information provides baseline values representing current status of selected external sustainability factors.

**Unusual Characteristics at this Installation**

The desert climate is ideal for outdoor storage of large metal structures such as aircraft. For this reason, many hundreds of retired military aircraft, such as F-4 Phantoms, A-6 Intruders, and B-52 bombers are neatly arranged, either intact or in a state of disassembly, to the east of the airstrip. The airstrip itself, at approximately 3 miles in length, is one the Air Force's longest.

**Air Force Almanac Information**

- **MAJCOM:** ACC
- **Host:** 355th FW
- **Mission:** A-10 combat crew training; OA-10 and FAC HC-130 training and operations; EC-130H, HH-60 Pave Hawk, and CSAR operations.
- **Major Tenants:** 12th Air Force (ACC); 309th Aerospace Maintenance and Regeneration Group (AFMC); DoD's single location for regeneration, maintenance, parts reclamation and preservation, storage, and disposal of excess DoD and government aerospace vehicles; 943rd Rescue Gp. (ARFC). HH-60; 55th ECG (ACC); 563rd RQG (AFSOC); U.S. Customs and Border Protection
- **Runways:** 13,643 ft.
- **Altitude:** 2,404 ft.
- **Area:** 10,654 acres




**Mission Summaries**

***Administration***

**Air Combat Command** is the primary force provider of combat airpower to America's warfighting commands. To support global implementation of national security strategy, ACC operates fighter, bomber, reconnaissance, battle-management and electronic- combat aircraft. It also provides command, control, communications and intelligence systems, and conducts global information operations. As a force provider, ACC organizes, trains, equips, and maintains combat-ready forces for rapid deployment and employment while ensuring strategic air defense forces are ready to meet the challenges of peacetime air sovereignty and wartime air defense.

**The 12th Air Force** has the responsibility for 10 active-duty wings and one direct reporting unit, including 520 aircraft and 42,000 uniformed and civilian airmen. The 12th Air Force is also responsible for units in the Air Force Reserves and Air National Guard in Western and Midwestern states in the U.S.

***Operational***

**The 355th Fighter Wing** the host unit at Davis-Monthan AFB, operates and maintains one of the largest fighter bases in Air Combat Command. The wing flies the A-10A/C "Warthog", HC-130, EC-130H, HH-60 Pave Hawk, and carries out CSAR operations. Mission: "Deploy, employ and sustain expeditionary combat and combat support forces while enabling critical JFACC and HLS operations."

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# Installation Fact Sheets
## (cont.)

### Geographic Context

***Setting***
Davis-Monthan AFB (AZ) is located approximately 4 miles south-southeast of Tucson, 115 miles southeast of Phoenix and 56 miles north of the U.S.-Mexico border. Elevation above mean sea level is approximately 2,650 feet and is situated on an alluvial plain in the Sonoran desert, surrounded by five minor ranges of mountains: the Santa Catalina Mountains and the Tortolita Mountains to the north, the Santa Rita Mountains to the south, the Rincon Mountains to the east, and the Tucson Mountains to the west.

***Local Governments***
Cities: Tucson is the major city near Davis-Monthan AFB and its major incorporated suburbs include Oro Valley and Marana northwest of the city, Sahuarita south of the city, and South Tucson in an enclave south of downtown.
Counties: Davis-Monthan AFB and Tucson are located in Pima County. The nearest outlying counties are Cochise, Santa Cruz, Graham, and Pinal. Each is approximately 25 to 30 miles from the base.

***Climate***
Tucson has a desert climate and has two major seasons, summer and winter, plus three minor seasons: fall, spring, and monsoon. Though Tucson receives more precipitation (11.8 inches per year) than most other locations with desert climates, it still qualifies as desert because it experiences a high net loss of water. Summers are extremely hot and winters are temperate. However, Tucson is almost always cooler and wetter than Phoenix. In this regard, its higher elevation is more a factor than its more southern latitude.

***Relationship***
Davis-Monthan AFB's web site includes links to the following:
Local Government: City of Tucson, City of Yuma, City of Casa Grande, City of Sierra Vista, Town of Marana, Town of Oro Valley, Town of Vail, Town of Sahuarita, Pima County, Pinal County, and Maricopa County.
State Government: Arizona's Amber Alert, Arizona Department of Education, Arizona Division of Emergency Management, Arizona Department of Game and Inland Fisheries, Arizona Department of Motor Vehicles, Arizona Department of Veterans Services, and Arizona State Police.

***Economics***
The 355 FW is composed of four groups: the 355th Operations Group (355 OG), the 355th Maintenance Group (355 MG), the 355th Mission Support Group (355 MSG), and the 355th Medical Group (355 MDG). Together, along with their tenant organizations, they make up the 6,000 Airmen and 1,700 civilian personnel at Davis-Monthan AFB.

| Category | AF Core Functions at Davis-Monthan AFB | | | | |
|---|---|---|---|---|---|
| | Global Precision Attack | Rapid Global Mobility | Special Operations | Personnel Recovery | Agile Combat Support |
| Air & Land Space Restrictions - Military Ops | ● | ● | ● | ● | ● |
| Air & Land Space Restrictions - Land Use | ● | ● | ● | ● | ● |
| Resource Reliability | ● | ● | ● | ● | ● |
| Utility Reliability | ● | ● | ● | ● | ● |
| Spectrum Encroachment | ● | ● | ● | ● | ● |
| Quality of Life | ● | ● | ● | ● | ● |
| Urban Growth - Transportation | ● | ● | ● | ● | ● |
| Community Analysis | ● | ● | ● | ● | ● |
| Urban Growth - Trends | ● | ● | ● | ● | ● |
| Natural Factors/ Climate Effects | ● | ● | ● | ● | ● |

Relative Importance of Category to Core Function
● = High ● = Medium ● = Low

### Sustainability Factor Ratings

| Category | Used in Encroachment Reflections | Map | Factor | Value | | Measurement Unit |
|---|---|---|---|---|---|---|
| Air & Land Space Restrictions - Military Ops | | ✔ | Bird Aircraft Strike Hazard (BASH) Enhancers | 15.9 | | % of BASH enhancing bird features within 5 nautical miles |
| | | ✔ | Critical Infrastructure (DCIP) | 25 | | Facilities within 10 nautical miles of installation |
| | | ✔ | Obstructions: Imaginary Surfaces | 1 | | penetrations in obstacle evaluation area |
| | | ✔ | Obstructions: TERPS | 0 | | penetrations in obstacle evaluation area |
| Air & Land Space Restrictions - Land Use | | ✔ | Local Government (City/County) | 2.0 | 9 | % of land within 25 mi of installation / number of entities |
| | | ✔ | State Government | 0.4 | 1 | % of land within 25 mi of installation / number of entities |
| | | ✔ | Federal Government | 27.8 | 4 | % of land within 25 mi of installation / number of entities |
| | | ✔ | Native American | 1.3 | 2 | % of land within 25 mi of installation / number of entities |
| | | ✔ | Private Property | 64.8 | NA | % of land within 25 mi of installation / number of entities |
| Resource Reliability | | | Air Quality | 1.6 | | % days unhealthy for sensitive groups (1998-2008) |
| | | | Water Quality | 4 | | impaired stream segments in zip code |
| | | ✔ | Threatened and Endangered Species | 18 | | T&E species in all counties crossed by base perimeter |
| Utility Reliability | | ✔ | Electric Energy | 0 | | Avg Annual Regional Transmission Loading Relief Procedures |
| | | | Water Supply | 5,201,516 | | gal/day excess availability |
| Spectrum Encroachment | | ✔ | Spectrum Interference: Physical | 66 | | obstructions > 100' tall within 26 nautical miles |
| | | ✔ | Spectrum Interference: Wind Energy | 4.75 | | average wind speed (≥6.5 m/s = criteria for wind projects) |
| Quality of Life | | | Economic Housing | 56.4 | | % within 15 mi spending less than 30% on housing |
| | | | Skilled Trades | 8.7 | | % of craftsmen in county labor force w/in 15 miles |
| | | ✔ | Small Businesses | 18,875 | | businesses with < 500 employees within 15 miles |
| | | ✔ | Schools: Number of Districts | 17 | | districts within 30 miles |
| | | ✔ | Schools: District Enrollment | 154,114 | | students (K-12) |
| | | ✔ | Schools: Rating | 85 | | proportion of districts that met/exceeded AYP goals |
| | | | Schools: Meeting Proficiency Standards | 97.2 | | % of National Assessment of Educational Progress average |
| | | ✔ | Schools: Number of Private Schools | 66 | | schools within 30 miles |
| | | ✔ | Schools: Institutions of Higher Education | 19 | | Higher Education institutions within 30 miles |
| Urban Growth - Transportation | | ✔ | National Highway System | 5.1 | | miles to nearest Interstate via STRAHNET |
| | | ✔ | Scheduled Air Transport | 10.9 | | miles to nearest major airport |
| Community Analysis | | | Engagement: Local Ex Officio Membership | 28.57 | | % positive survey response |
| | | | Engagement: Media Monitoring | 100 | | % positive survey response |
| | | | Engagement: MOU with Police & Fire | 66.66 | | % positive survey response |
| | | | Engagement: MOU with Regional Councils | 0 | | % positive survey response |
| Urban Growth - Trends | | | Cost of Living: BAH | 140.8 | | % of National Low |
| | | | Cost of Living: Per Diem | 138.8 | | % of National Standard |
| | | | Population Growth Rate | 20.9 | | 10-year % change within 15 miles |
| | | | Unemployment Rate | 3.7 | 8.5 | 2000 / 2010 |
| | | ✔ | Urban Sprawl | 51 | | 25-year square mile metropolitan growth (1980-2005) |
| Natural Factors/ Climate Effects | | ✔ | Drought | Extreme | | NIDIC Water Supply Sust. Index (2050) With Climate Change |
| | | ✔ | Flooding | 0 | | acres in 100-year flood zone within 15 miles |
| | | ✔ | Lightning Density | 15 | | annual flashes per square kilometer |
| | | | Sea Level Rise (Climate Change) | NA | | % of base area acreage covered by 0.5 meter sea level rise |
| | | ✔ | Seismic Activity | 2.5 | | peak acceleration (%g) exceeded 10% every 50 years |
| | | ✔ | Storms (Tropical and Hurricane) | 3 | | storms within 30 miles (1950-2008) |
| | | | Tornadoes | 0 | | tornadoes within 30 miles (1950-2008) |
| | | ✔ | Wildfires | 7 | | wildfires within 30 miles (2000-2009) |

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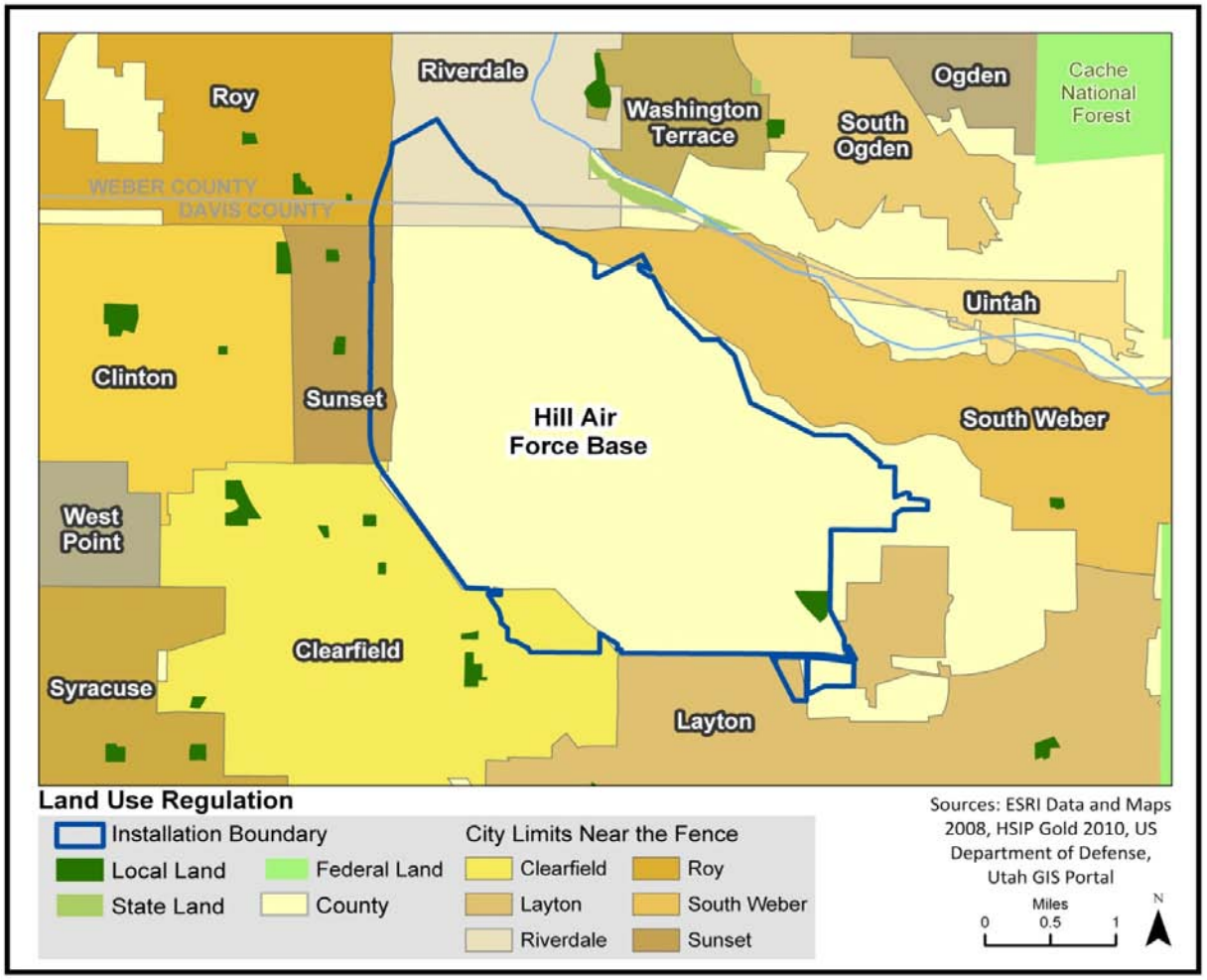
# Land Use Regulators

- ***Listing of government entities that regulate land use***
- ***Assists in identifying the type and number of entities***
- ***Assists in identifying the different engagement processes to be used***



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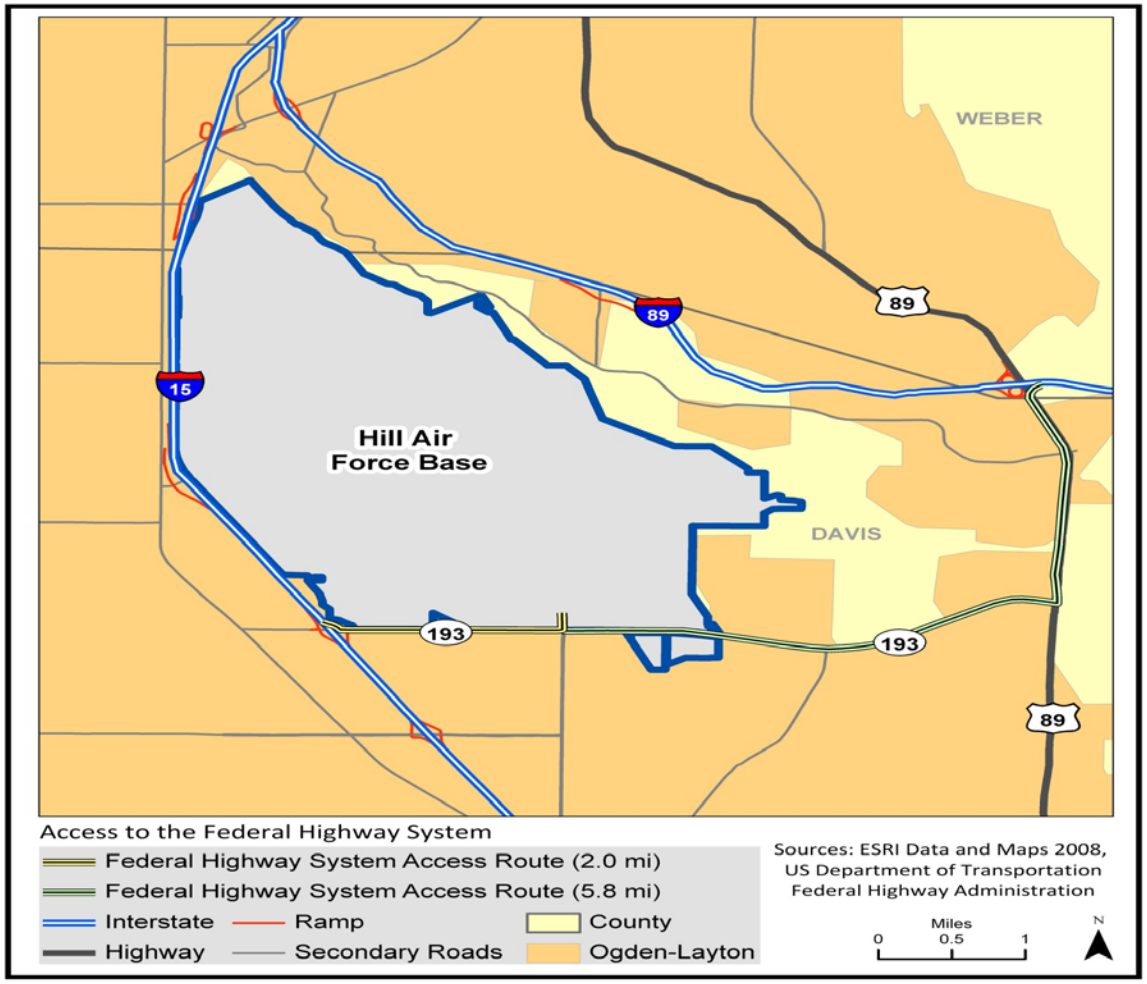
# Access to Federal/Military Highway System

- ***Demonstrates proximate location to Interstate Highways***
- ***Assists in identifying travel times and distances for use of the Interstate Highways to other key locations***



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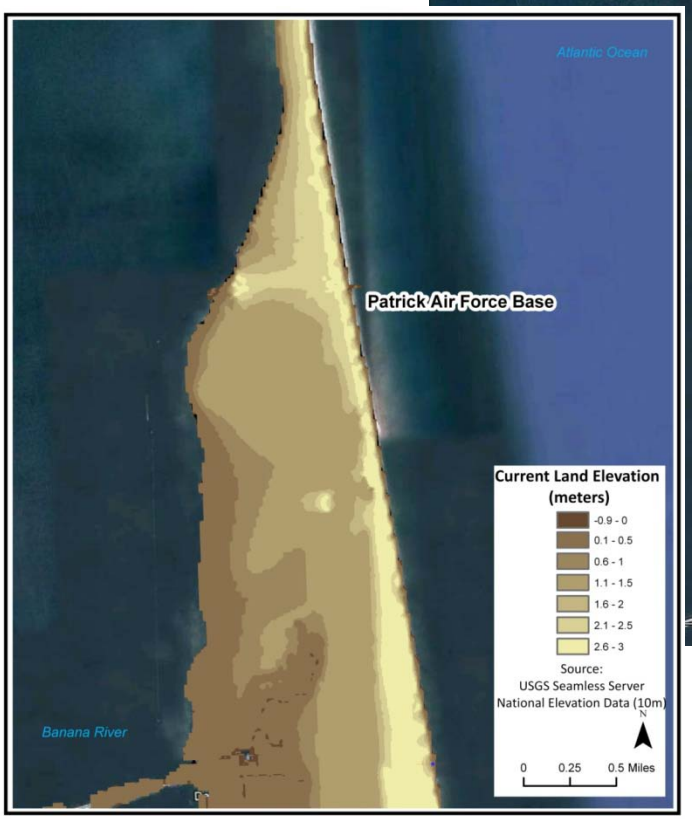
# Climate Change: Sea Level Rise

- ***Demonstrates potential areas subject to sea level rise***
- ***Assists in identifying risks that can be addressed in the installations planning processes***

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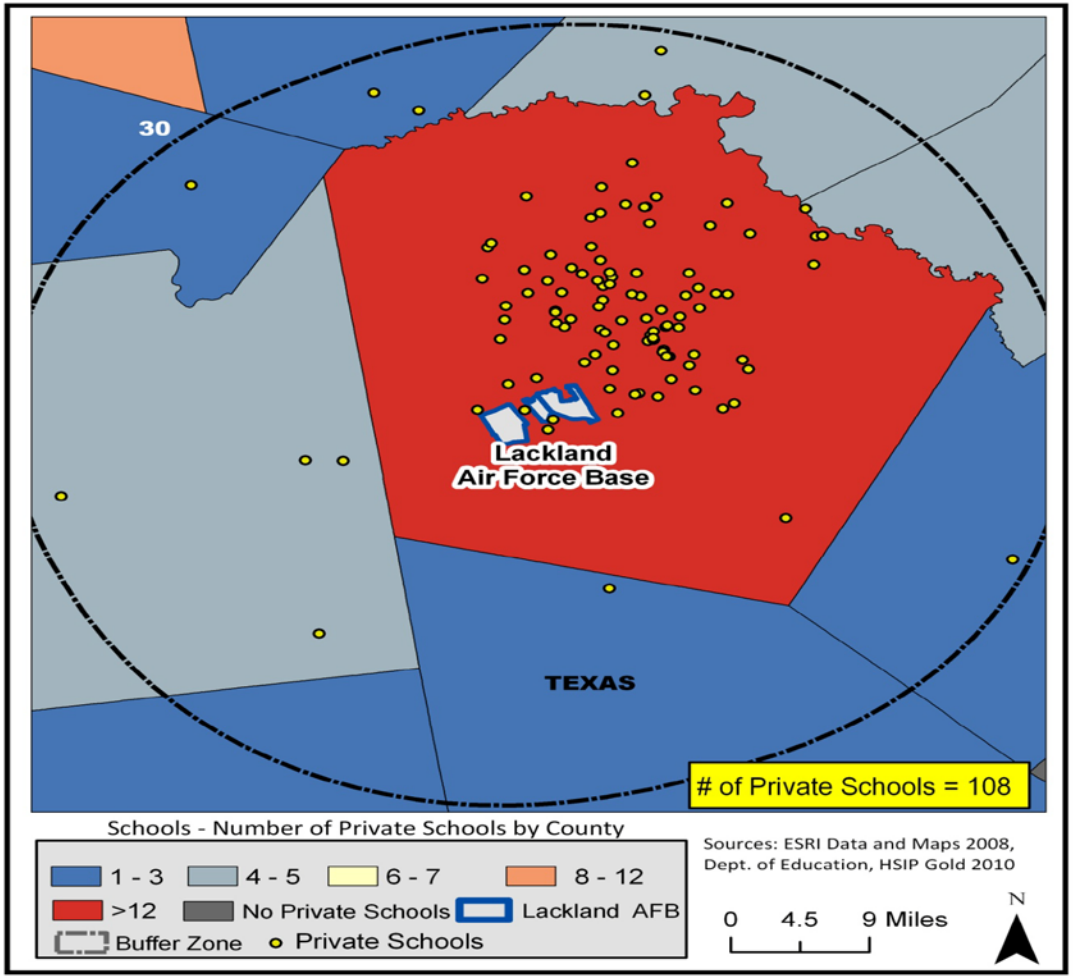
# Quality of Life: Schools

- ***Demonstrates proximate location of private schools to installation***
- ***One of six "school factors." Others include : Higher Learning, School Districts, Total District Enrollments, School Ratings, and Meeting Proficiency Ratings***



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# Conclusions/Lessons Learned

- **Factor Selection**
  - Factor selection should be contingent upon the nature of the decision supported
- **Data Collection for each factor can be influenced by:**
  - Whether or not a suitable data source has already been identified
  - How easily the data can be obtained
  - The number of data sources that need to be utilized
- **Data Quality and Completeness**
  - May vary from one installation to the next even when the data are compiled from the same national dataset

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# Conclusions/Lessons Learned (cont.)

- **Factor Analysis – Level of Effort can be influenced in several ways:**
  - Consistency of data
  - Complexity of the analysis necessary to calculate the factor value from the data obtained
  - Quality and completeness of the data set
  - Analyst's prior experience with the data set
- **Factor Level Assessment**
  - No single authoritative formula for normalizing and rating levels of factors
  - Rolling up values of groups of factors measured in different units will also require some judgment

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# Recommendations/Way Ahead

**External Factors contribute to more informed strategic decisions**

- **Continue to refine and foster factors and process**
- **Generate an External Mission Encroachment and Sustainment Factor Information Catalog**
- **Test the factors and process in a real-world strategic basing decision**
- **Migrate Qualitative Rating of Factor Importance to Quantitative Weighting**

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# Basing Criteria External Sustainability Decision Phases

| SCORING | |
|---|---|
| Population Growth Rate | National Highway System |
| Urban Sprawl | Regional Vehicle Miles Traveled |
| Cost of Living: BAH | Scheduled Air Transport |
| Cost of Living: Per Diem | Sea Level Rise (Climate Change) |
| Water Quality | Storms (Tropical and Hurricane) |
| Water Supply | Tornadoes |
| Air Quality | Flooding |
| Electric Energy | Drought |
| Unemployment Rate | Seismic Activity |
| Economic Housing | Wildfires |
| Schools: Rating | Lightning Density |
| Schools: Meeting Proficiency Standards | |

| SITE VISIT |
|---|
| Bird Aircraft Strike Hazard (BASH) Enhancers |
| Critical Infrastructure (DCIP) |
| Obstructions: Imaginary Surfaces |
| Obstructions: TERPS |
| Threatened and Endangered Species |
| Spectrum Interference: Physical |
| Spectrum Interference: Wind Energy |

| MILITARY JUDGEMENT | |
|---|---|
| Small Businesses | Native American |
| Skilled Trades | Local Government (City/County) |
| Schools: Number of Private Schools | Private Property |
| Schools: Institutions of Higher Education | Engagement: Local Ex Officio Membership |
| Schools: District Enrollment | Engagement: Media Monitoring |
| Schools: Number of Districts | Engagement: MOU with Police & Fire |
| Federal Government | Engagement: MOU with Regional Councils |
| State Government | |

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# Proposed Test Criteria

## Mission (55 pts):

- Receiver Demand vs. Avail (27)
- Airfield/Airspace Capability (8)
- Associate Unit (6)
- Fuels Dispensing (6)
- Fuels Storage (4)
- Fuels Receipt (4)

## Sustainment (10 pts):

- AICUZ Compatibility (3)
  - *Development/Encroachment (1)*
  - *Land Use (1)*
  - *Noise (1)*
- Utilities (3)
  - *Air Quality (1)*
  - *Water Quality/Supply (1)*
  - *Electric Energy (1)*
- Urban Growth (2)
  - *Urban Sprawl (1)*
  - *Population Growth Rate (1)*
- Natural Weather (1)
  - *Roll-up (Drought, Flooding, Lightning Density, Sea Level Rise, Seismic Activity, Storms, Tornadoes, Wildfires) (1)*
- Transportation (1)
  - *Roll-up (National Highway System, Regional Vehicle Miles Traveled) (1)*

## Facilities & Infrastructure (30 pts):

- Hangar Spaces (6)
- Squad Ops (3)
- WST Facility (2)
- Cargo Loading Training Facility (1)
- Runway (7)
- Ramp (7)
- Support Capability (4)
  - *Economic Housing (1)*
  - *Unemployment Rate (1)*
  - *Schools: Rating (1)*
  - *Schools: Meeting Proficiency Standards (1)*

## Cost (5 pts):

- Area Construction Cost Factor (4)
- Cost of Living (1)
  - *Roll-up (BAH, Per Diem) (1)*

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# Acknowledgements


## U.S. Air Force

- AF/A7
- AF/A8
- AF/A9


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# Questions

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