



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

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

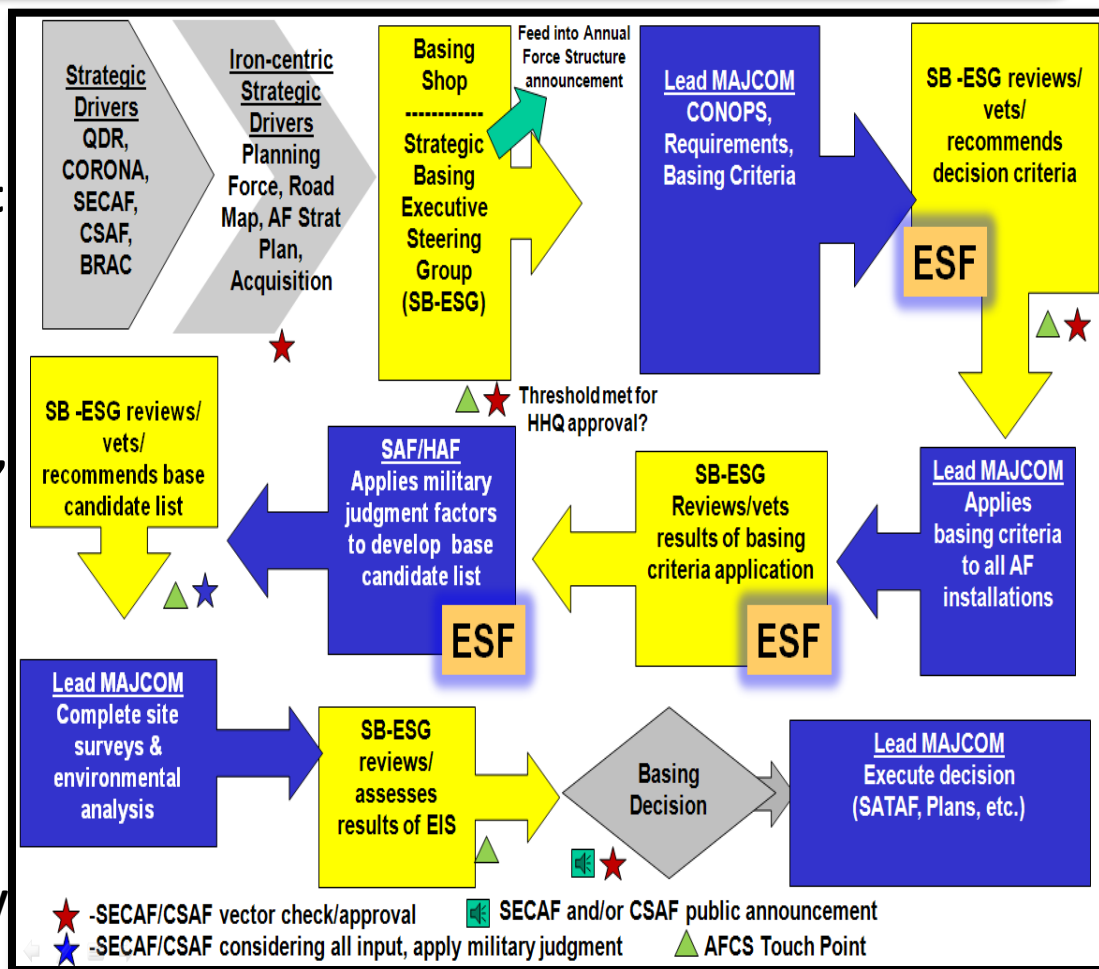
1. REPORT DATE 11 MAY 2011		2. REPORT TYPE		3. DATES COVERED 00-00-2011 to 00-00-2011	
4. TITLE AND SUBTITLE External Mission Sustainment				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. 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 Same as Report (SAR)	18. NUMBER OF PAGES 27	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

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**

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

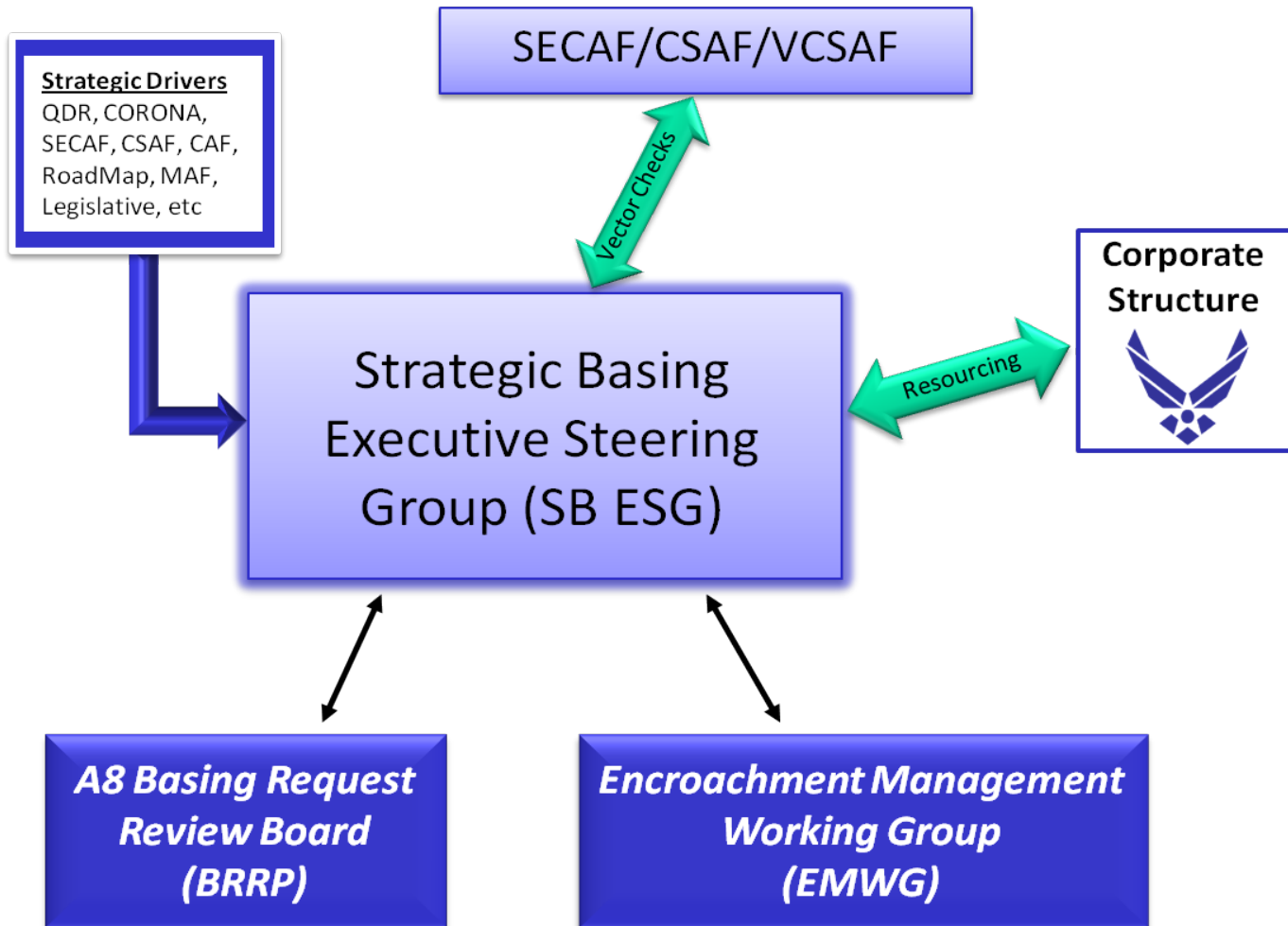


Intended Outcomes

- **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**



Encroachment Management Working Group



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.*

Resulting Product

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

EXTERNAL MISSION SUSTAINMENT ASSESSMENT



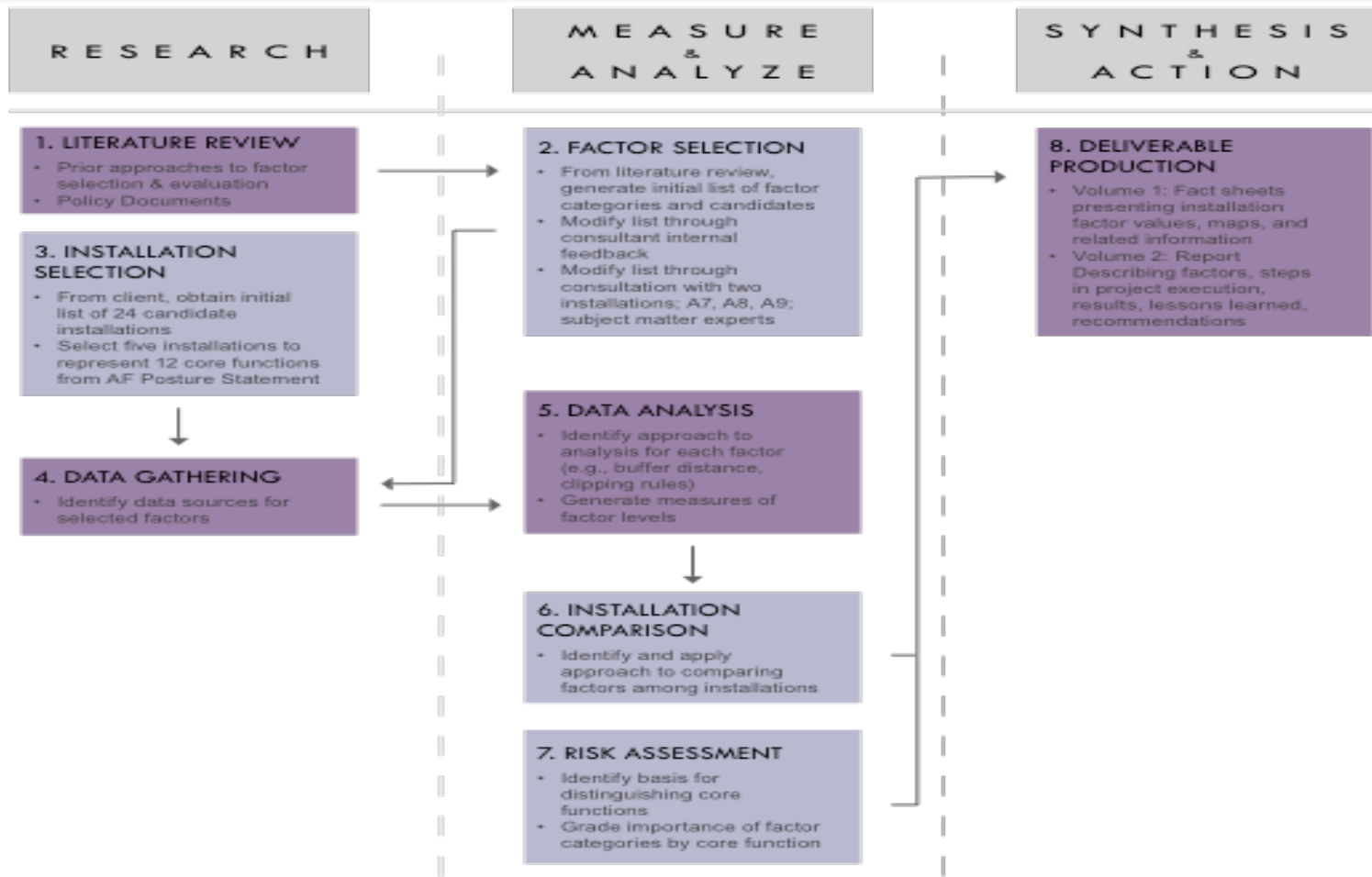
DRAFT
HEADQUARTERS AIR FORCE
JANUARY 2011

TASK 1



TASK 1

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

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												

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**

Overview of Methodology

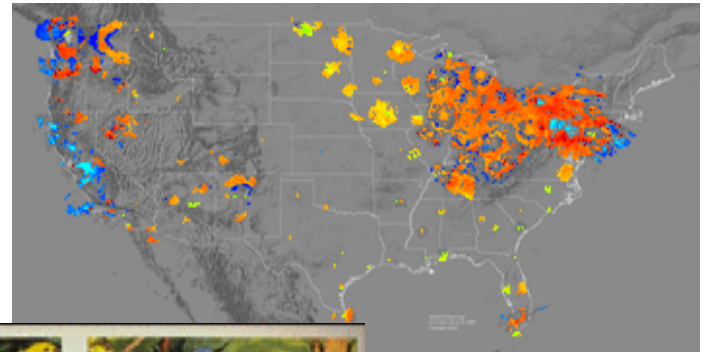
Factor Selection

- **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**

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



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**

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

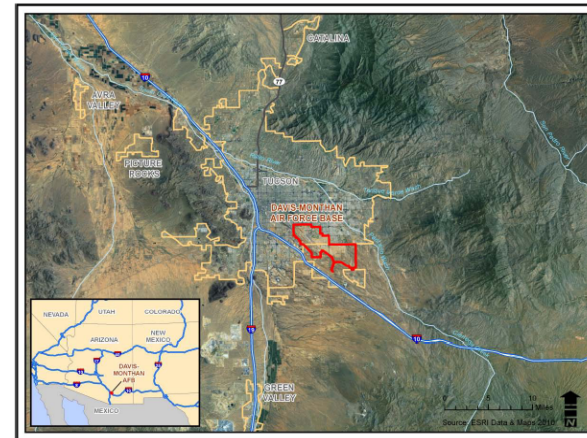
None. This information provides baseline values representing current status of selected external sustainability factors.

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 (AFMCG); 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."

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 a 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 PW 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				
	Mission Protection/Support	Readiness/Supportability	Special Operations	Personnel Resources	AFB/Global Support
Air & Land Space Restrictions - Military Ops	High	High	High	High	High
Air & Land Space Restrictions - Land Use	High	High	High	High	High
Resource Availability	High	High	High	High	High
Utility Reliability	High	High	High	High	High
Quality of Life	High	High	High	High	High
Urban Growth/Transportation	High	High	High	High	High
Community Analysis	High	High	High	High	High
Urban Growth Trends	High	High	High	High	High
Natural Factors/Climate Effects	High	High	High	High	High

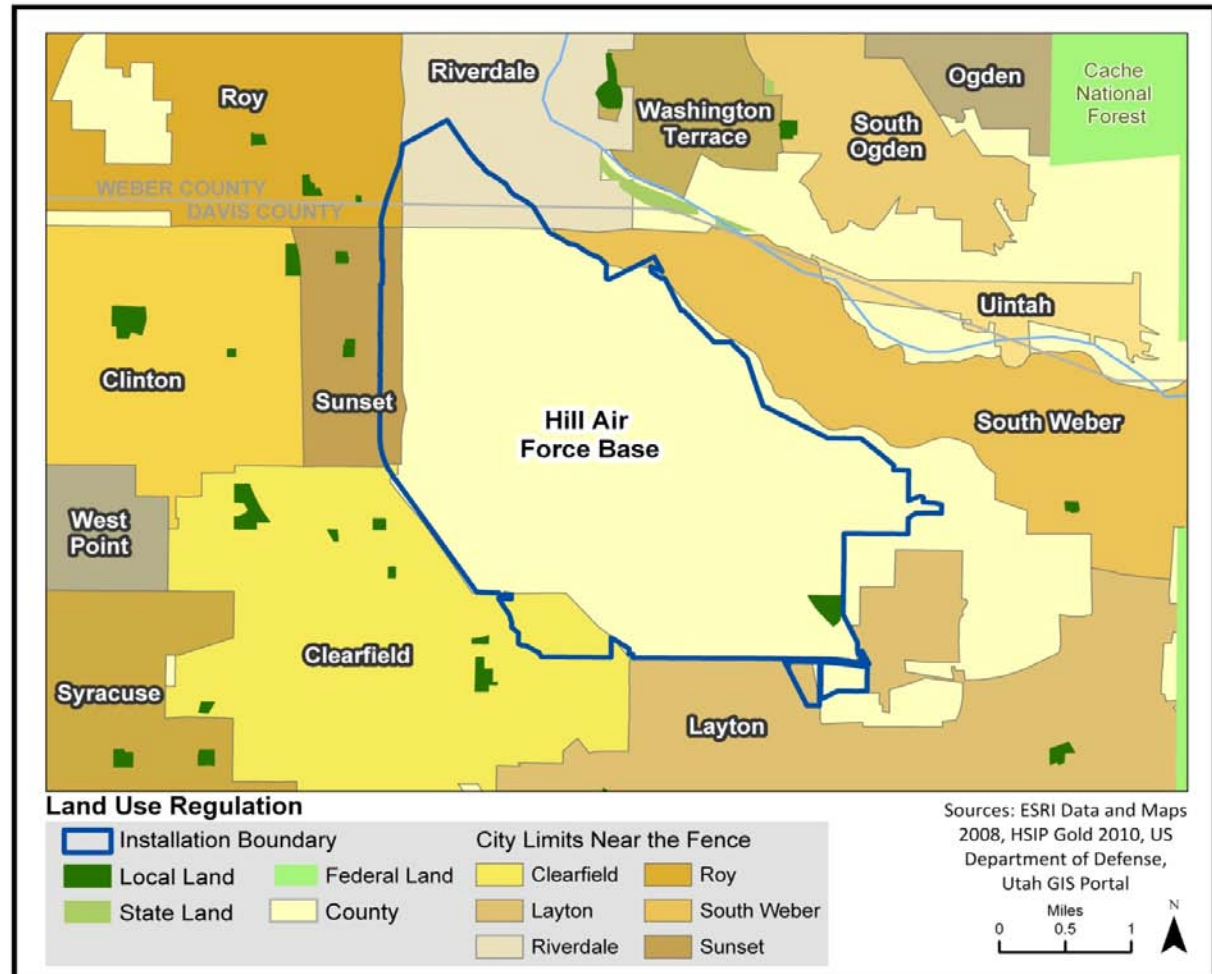
Relative Importance of Category to Core Function
● = High ● = Medium ● = Low

Sustainability Factor Ratings

Category	AF Core Function	Rating	Factor	Value	Measurement Unit
Air & Land Space Restrictions - Military Ops	AF Core Function	High	Air Aircraft Strike Hazard (Short) Instructors	15.9	% of AAFH enhancing land 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	AF Core Function	High	Local Government (City/County)	2.0	% of land within 25 mi of installation
			State Government	0.4	% of land within 25 mi of installation
			Federal Government	27.8	% of land within 25 mi of installation
			Native American	5.3	% of land within 25 mi of installation
Resource Availability	AF Core Function	High	Air Quality	3.6	% days unhealthy for sensitive groups (1996-2006)
			Water Quality	4	Impaired stream segments in 102 code
			Threatened and Endangered Species	18	164 species in all counties crossed by base perimeter
			Electric Energy	0	Avg Annual Regional Transmission Loading Relief Procedures utility meters available
Spectrum Encroachment	AF Core Function	High	Spectrum Interference: Physical	56	obstructions > 100' tall within 76 nautical miles
			Spectrum Interference: Wind Energy	4.7%	average wind speed (16.1 mph) > collective for wind projects
			Economic Housing	56.4	% within 15 mi spending less than 10% on housing
			Skilled Trades	8.7	% of craftsmen in county labor force with 15 miles
Quality of Life	AF Core Function	High	Small Businesses	18,675	businesses with > 100 employees within 15 miles
			Schools: Number of Districts	17	districts within 30 miles
			Schools: District Enrollment	154,114	students (K-12)
			Schools: Rating	95	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	96	schools within 30 miles
Urban Growth/Transportation	AF Core Function	High	National Highway System	3.3	miles to nearest Interstate via I-19/805
			Scheduled Air Transport	10.5	miles to nearest major airport
Community Analysis	AF Core Function	High	Engagement: Local Ex-Officio Membership	38.57	% 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	AF Core Function	High	Cost of Living: S&P	140.6	% of National Low
			Cost of Living: Per Diem	138.8	% of National Inflation
			Population Growth Rate	-20.9	10-year % change within 15 miles
			Unemployment Rate	3.7	2000
Natural Factors/Climate Effects	AF Core Function	High	Urban Sprawl	91	20-year square mile metropolitan growth (1980-2000)
			Drought	Extreme	NRDC Water Supply Risk Index (2050) W58 Climate Change
			Flooding	0	acres in 100-year flood area within 15 miles
			Lighting Density	15	annual footcandle per square kilometer
			Sea Level Rise (Climate Change)	NA	% of base area acreage covered by 0.5-meter sea level rise
			Seismic Activity	2.3	great acceleration (%g) exceeded 10% every 50 years
Natural Factors/Climate Effects	AF Core Function	High	Storms (Tropical and Hurricanes)	3	storms within 30 miles (1950-2006)
			Tornadoes	0	tornadoes within 30 miles (1950-2006)
			Wildfires	7	wildfires within 30 miles (2000-2009)

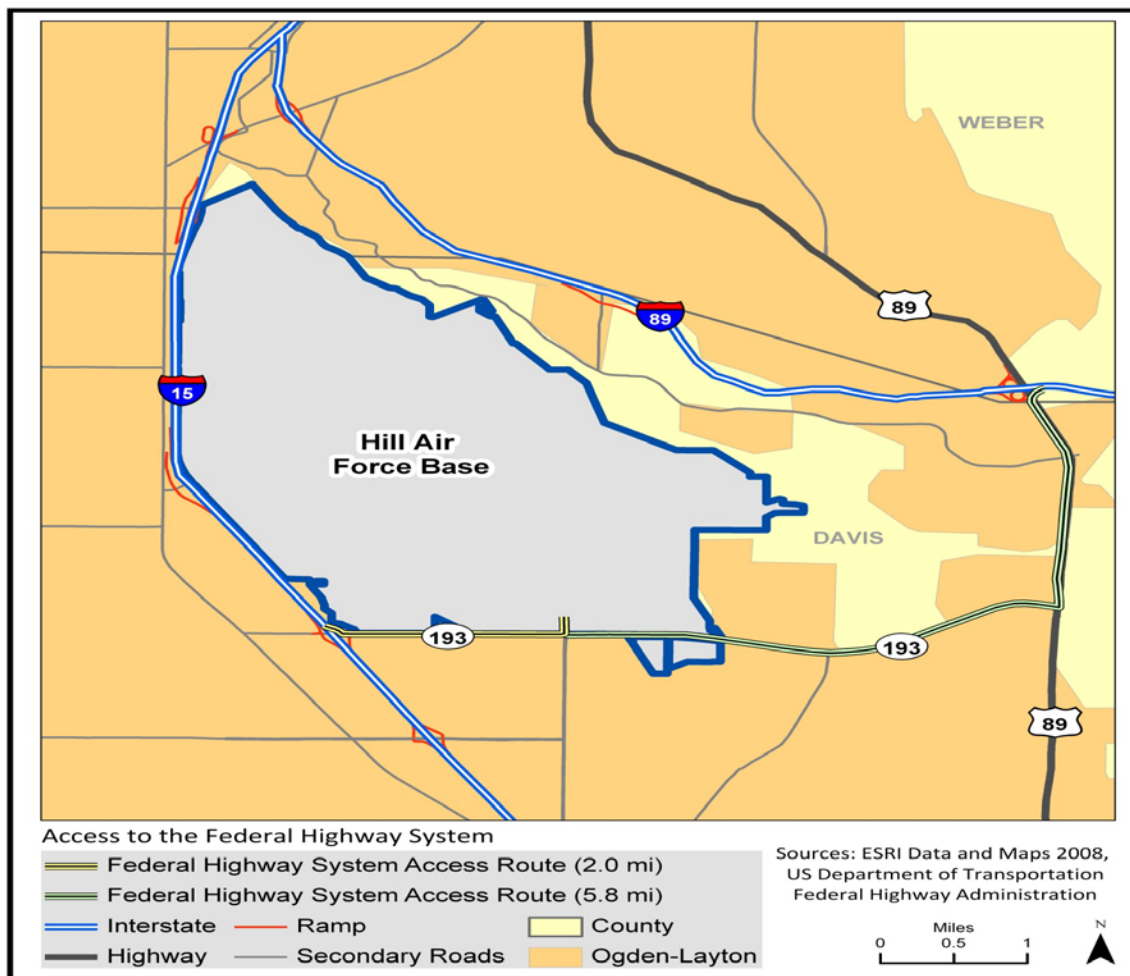
Land Use Regulators

- *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*



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*



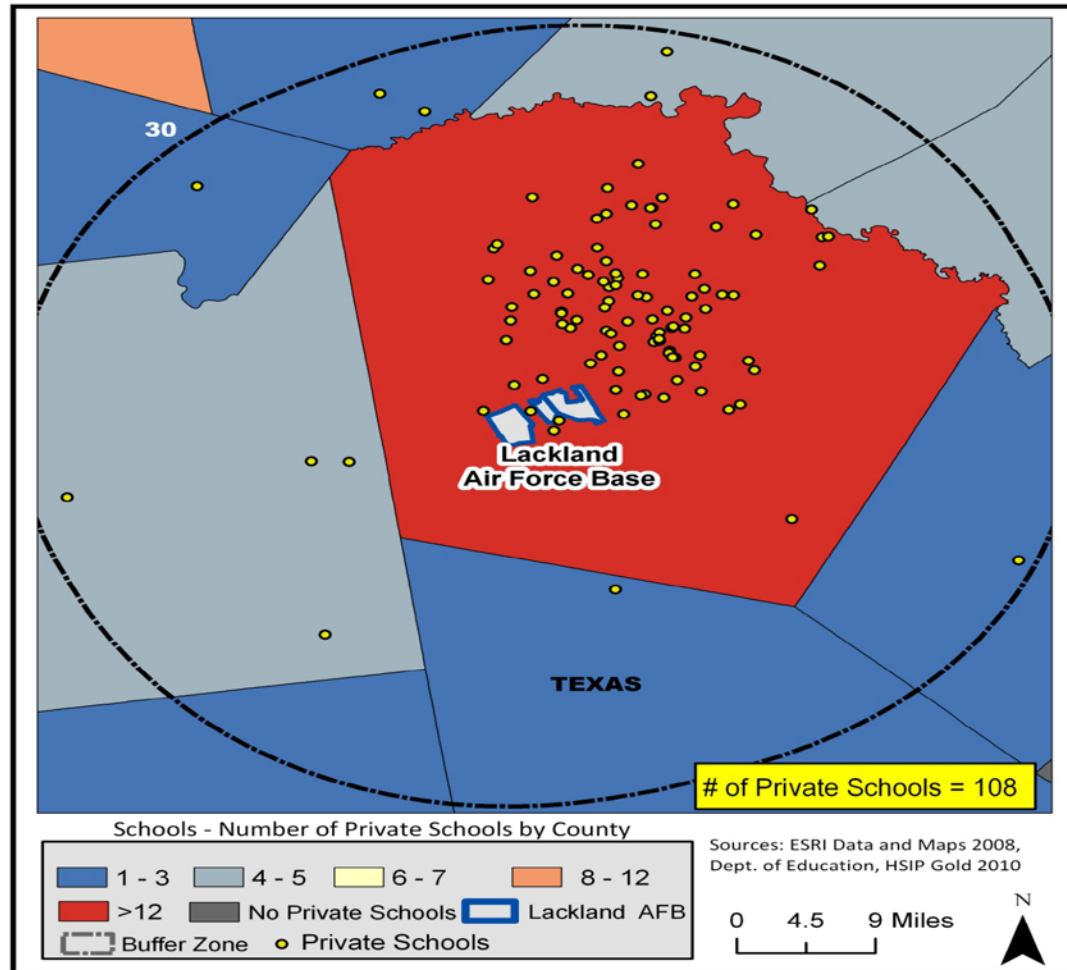
Climate Change: Sea Level Rise

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



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**



- **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

- **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

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**

Basing Criteria External Sustainability Decision Phases

SCORING		SITE VISIT	MILITARY JUDGEMENT	
Population Growth Rate	National Highway System	Bird Aircraft Strike Hazard (BASH) Enhancers	Small Businesses	Native American
Urban Sprawl	Regional Vehicle Miles Traveled	Critical Infrastructure (DCIP)	Skilled Trades	Local Government (City/County)
Cost of Living: BAH	Scheduled Air Transport	Obstructions: Imaginary Surfaces	Schools: Number of Private Schools	Private Property
Cost of Living: Per Diem	Sea Level Rise (Climate Change)	Obstructions: TERPS	Schools: Institutions of Higher Education	Engagement: Local Ex Officio Membership
Water Quality	Storms (Tropical and Hurricane)	Threatened and Endangered Species	Schools: District Enrollment	Engagement: Media Monitoring
Water Supply	Tornadoes	Spectrum Interference: Physical	Schools: Number of Districts	Engagement: MOU with Police & Fire
Air Quality	Flooding	Spectrum Interference: Wind Energy	Federal Government	Engagement: MOU with Regional Councils
Electric Energy	Drought		State Government	
Unemployment Rate	Seismic Activity			
Economic Housing	Wildfires			
Schools: Rating	Lightning Density			
Schools: Meeting Proficiency Standards				

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)

U.S. Air Force

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



Questions

Jennifer Graham

Senior Program Manager

Marstel – Day, LLC

Phone: (571) 340 – 4097

Email: jgraham@marstel-day.com