SRMSC Redevelopment Study

Final Report

Prepared by SeaTec LLC

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Executive Summary

Background

The Stanley R. Mickelsen Safeguard Complex (SRMSC) was built during the Cold War in the early 1970's as America's first operational anti-ballistic missile (ABM) defense system. The complex was briefly operational until changing defense priorities and new treaties resulted in its shutdown. Recently, the Army declared SRMSC to be excess property, and plans are now underway to transfer ownership to Cavalier County Job Development Authority (CCJDA) during 2010.

The complex is comprised of a main 430-acre Missile Site Radar (MSR) facility located near Nekoma, North Dakota, and four Remote Sprint Launchers (RSLs), located 10-20 miles away in Cavalier, Walsh, and Ramsey Counties. The MSR facility and one of the RSLs retain most of their original buildings, roads, and infrastructure.

A number of government agencies, community leaders and commercial entities have identified future uses for the complex. There is considerable interest in Unmanned Aerial Systems (UAS) research and operations, education, technology development, light manufacturing, and training.

CCJDA has partnered with the University of North Dakota (UND), and state, local, community and Federal Government leaders to create a plan to redevelop SRMSC with emphasis on three missions:

- Technology—to provide a research and development center and test bed for Unmanned Aerial Systems (UAS) and other non-UAS technologies, bringing high skill, high wage jobs into the local area
- Education—to provide learning opportunities for North Dakota students of all ages
- Historic preservation—to maintain remaining structures and to interpret SRMSC's role in the Cold War for public benefit.

CCJDA retained SeaTec LLC to conduct a detailed site assessment and to devise a strategic redevelopment plan for SRMSC to fulfill the three missions. SeaTec formed a study team with experts from The Padina Group and Bucher, Willis, & Ratliff Corporation (BWR). The SeaTec study began in October 2009 and this document is the final report.

Report Overview

The SeaTec team determined the state of the SRMSC buildings and other facilities, conducted workshops with CCJDA and UND representatives to gather requirements, and developed detailed forecasts of user needs, required site capabilities, and financial projections. SeaTec also determined that airspace access is critical to success for SRMSC's UAS technology mission. The result is a practical and low risk plan for SRMSC redevelopment and future operations as a non-profit business entity for Cavalier County and North Dakota.

Summary of Study Findings and Recommendations

Site Condition

The on-site assessment revealed that the existing infrastructure is in better working condition than expected. However, all buildings, roads, utilities, and outdoor spaces require some modifications and upgrades to mitigate deterioration and bring them up to current standards. With only modest improvements, the MSR site can be ready to be used for UAS testing and other technology as early as mid-2011. Some environmental cleanup will be required. Under Federal Government policy, the GSA will be responsible for remediation of the environmental issues prior to ownership transfer.

Redevelopment Plan Recommendations

Recommendations for the physical plant include:

- Refurbishment of buildings to house services, offices, labs, classrooms, leisure activities, and hotel or dormitory accommodations
- Construction of UAS operating runways, launch pads, aprons, and hangars
- Addition of technical infrastructure for both UAS and non-UAS activities
- Construction of additional buildings and facilities to develop a Technology Park for educational and industrial tenants
- Preservation of historical structures and addition of visitor amenities
- Creation of a public park in the wetlands portion of the MSR site.

The SeaTec team recommends that CCJDA accomplish planning, redevelopment, and operational activities over ten years beginning in mid 2010 in four phases, each intended to achieve specific objectives:

- Pathfinder Phase – finalize SRMSC ownership transfer terms; secure initial redevelopment funding; accomplish overall land use planning and civil engineering; initiate airspace access advocacy and stakeholder outreach communications.
- Phase I – achieve initial small UAS operational capability; secure and service early technology tenants; begin building refurbishment; plan and design educational mission facilities, historical mission facilities, and public park.
- Phase II – add medium altitude/long endurance (MALE) UAS capability and primary runway; expand UAS operations services and facilities; continue building refurbishment; perform new construction as planned.
- Phase III – add high altitude/long endurance (HALE) UAS capability and second runway; construct hangars and aprons; expand operations and tenancy to fully occupy refurbished and new facilities including RSL sites; obtain UAS Center of Excellence (COE) recognition.

Economics Model

The SeaTec team prepared a detailed ten year Economics Model for SRMSC redevelopment and operation as a non-profit business. The model considers revenue from operations, financing from loans and government grants, operating expenses, and capital investments. The Economics Model predicts approximately $36M in revenue from all sources, and approximately the same amount for expenses — $14M of which is allocated to capital improvements.

Key Challenges

Successful SRMSC redevelopment depends on three critical concerns:

- Airspace Access: Federal Aviation Administration (FAA) standards for UAS airspace access are in development and their formulation will require close attention and proactive participation to assure success for the intended operation of SRMSC for academic, military, civil, and commercial UAS flights.
- Funding: Obtaining Government funds, winning grants and loans, and booking user revenues will require persuasive requests and marketing on all fronts.
- Redevelopment and Operations Management: The effective management of ongoing operations while undergoing facility refurbishment and expansion will require a dedicated team in residence plus the help of outside experts in aviation, civil engineering, marketing, and procurement.

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1. Introduction

This report and attachments are submitted to the Cavalier County Job Development Authority (CCJDA) and University of North Dakota (UND) Unmanned Aerial Systems (UAS) Center of Excellence (COE) in fulfillment of the final task in the performance of Consulting and Technical Assistance under Contract Number CC09-01.

2. Redevelopment Study Background and Objectives

SRMSC Background

The Stanley R. Mickelsen Safeguard Complex (SRMSC) was built in the early 1970's as part of the US missile defense initiative during the Cold War. The complex was briefly operational and then shut down as a result of the Strategic Arms Limitations Talks (SALT) with the USSR. After the shutdown, the site had a brief life as a Youth Corps site while owned by the Department of the Interior in the 1980s. In 1992, as a result of discussions about possible reactivation, the site was transferred back to the Department of Defense (DoD) and underwent extensive cleanup. However, the treaty with the Soviet Union, specifically the section offering anti-ballistic missile (ABM) protection, was abrogated in the late 1990s and the site went into caretaker status where it remains today. Recently, the Army declared SRMSC to be excess property, and now plans are underway to transfer ownership to CCJDA during 2010.

The complex is comprised of a main 430-acre Missile Site Radar (MSR) facility located near Nekoma, North Dakota, and four Remote Sprint Launchers (RSLs), located 10-20 miles away in Cavalier, Walsh, and Ramsey Counties. The MSR site still has most of its original buildings, roads, and utilities, and includes a wetlands area. The remote nature of the location, the reduced air traffic in the area, and the proximity to the aviation activities at UND and Grand Forks Air Force Base make this an ideal place for Unmanned Aircraft System (UAS) operations, training, education, and research.

Redevelopment Study Background

UND is uniquely positioned, as the first university to offer a degree in unmanned aerial systems, to help design a first class UAS facility with all requisite services. The University is already providing education, research, and testing in the UAS arena. They are working with manufacturers and users of UAS technology. The US Air Force has contracted UND to provide training for UAS instructor pilots and UAS software and training management programs, and has also contracted with UND for research into sense and avoid technology.

CCJDA has numerous non-UAS stakeholders that have expressed interest in using the SRMSC sites for conventional and unconventional training, offices, and commercial development. Conventional training uses generally include more traditional programs such as community college and job training programs, while unconventional training uses include civil and military training programs such as urban warfare, anti-terrorist and border protection training. Industrial tenants attracted by commercial development along with the other uses contemplated for SRMSC will bring new jobs to the Langdon-Nekoma area.

The CCJDA and UND partnership provides a well-balanced UAS/non-UAS/community approach to the future of SRMSC. These partners, along with state, local, community, and Federal Government leaders wish to create a vision and a plan for SRMSC with emphasis on three missions:

- Technology—to provide a research and development center and test bed for UAS and other non-UAS technologies, bringing high skill, high wage jobs into the local area

- Education—to provide learning opportunities for North Dakota students of all ages
- Historic preservation—to maintain remaining structures and to interpret SRMSC's role in the Cold War for public benefit.

CCJDA retained SeaTec LLC to conduct a detailed site assessment and to devise a strategic redevelopment plan for SRMSC to fulfill the three missions. SeaTec formed a study team with experts from The Padina Group and Bucher, Willis, & Ratliff Corporation (BWR).

The objective of this study was to explore the feasibility of converting SRMSC to pursue the three missions in a manner that promotes growth, minimizes impact to the community, and meets the Federal Aviation Administration's (FAA) safety standards. The study began in October 2009 and this document is the final report.

UAS Applications

The UAS revolution has been well underway for many years. A paradigm shift is occurring in the DoD and other Government agencies in favor of unmanned aircraft operations. Specifically, the DoD is rapidly transitioning a large fraction of its intelligence, surveillance, reconnaissance, and lethal operations to UAS of all kinds. The Department of Homeland Security (DHS), National Aeronautics and Space Administration (NASA), and the National Oceanic and Atmospheric Administration (NOAA) are flying UAS missions for security and science. The commercial and civil marketplaces are poised for an explosion of small UAS for remote sensing, photography and law enforcement. Commercial sector uses for UAS technologies are extremely promising. With UAS standards expected to be published in the next two years and the reorganization of the FAA to accommodate this emerging business sector in the National Airspace System (NAS), this is a perfect time to establish a UAS research facility in northeastern North Dakota.

Airspace Background

The introduction of UAS has resulted in a national need for greater airspace access for airworthiness validation, mission operations, and proficiency training for UAS pilots and operators. UAS safety must be demonstrated to enable increased military, civil and commercial use of UAS in the NAS. Although military units can currently use Special Use Airspace (SUA) for their UAS operations, SUA is limited, and is often not associated with UAS staging areas, thereby requiring UAS to transit through civil airspace to reach their operations or training areas. The DoD in particular continues to make UAS basing or "bed down" decisions at locations lacking the airspace infrastructure necessary for mission needs with routine access into the NAS. Other Federal Government agencies such as the DHS and NASA also need routine UAS access into the NAS for mission and training needs throughout the United States. In addition, UAS manufacturers have limited or no access to airspace for test and evaluation of developmental UAS for their customers. Airspace access is of critical importance for the growth of emerging civil and commercial UAS markets, which are forecasted to be a major new international industry.

UAS Standards, Regulations and Operations

Under the Federal Aviation Administration Act of 1958, Congress empowered the FAA to oversee and control all civilian and military use of airspace within the United States. Therefore, DoD, DHS, and NASA operations that access civil airspace must receive prior approval from the FAA. To date, the FAA has viewed UAS operations as an increased risk to civil operators, and has placed numerous restrictions on how, where and when UAS operations may occur. These restrictions are usually inefficient and quite costly to the requesters. UAS manufacturers and other commercial operators must receive an experimental airworthiness certificate from the FAA for operational access to a confined segment of airspace.

Unmanned Aerial Vehicles (UAV) have been in use by the US military for many years, and commercial sector applications continue to increase. UAS standards, policy, and regulations are critical for safe operations and testing of these vehicles within the NAS alongside commercial aviation. Key challenges include:

- Obtaining Certificates of Approval for Government flight and Special Airworthiness Certificates for commercial flight in the NAS
- Transitioning flight between Special Use Airspace and the NAS
- Implementing UAS collision avoidance, situational awareness, and communications spectrum for NAS access
- Educating new UAS vendors and avionics providers on NAS access issues such as product certification and safety.

Working groups have been formed in the FAA, in the European Organisation for the Safety of Air Navigation (EUROCONTROL), in the European Aviation Safety Agency (EASA), in other civil aviation authorities, and in industry to find a solution to the airspace access problem. In order to enable safe operations in the US, the FAA has supported the establishment of RTCA[1] SC 203[2] and individual UAS offices in FAA's Air Traffic & Safety organizations.

Since this is a new line of business for the FAA, organizations, regulations, policies, and processes will continue to lag UAS military and industry needs in the short-term. In addition, demand to designate UAS air space use and to speed up special use license approvals — which can currently take three to five years to accomplish — has increased. Non-DoD UAS use is highly dependent on airspace approvals. Civil use small UAS rules may be available as early as 2011, which will help alleviate some of the pressure. Additionally, Sense & Avoid and Command & Control Minimum Aviation System Performance Standards (MASPS) may be available in the 2014 time frame. To address near-term needs starting in 2010, the DoD is seeking FAA approval to use the small UAS rules outlined in FAA's Notice of Proposed Rule Making before the final rules are enacted.

3. Report Overview

This report consists of the material in this document and eight attachments. Attachment 8 summarizes the report in viewgraph form. The attachments are as follows:

1. Executive Summary (also included in this document)
2. SRMSC Site Condition Assessment
3. SRMSC Ground CONOPS
4. SRMSC Usage Scenarios
5. SRMSC Redevelopment Requirements
6. SRMSC Time Phased Redevelopment Plan
7. SRMSC Economics Model
8. Final Report Summary Presentation

[1] Originally Radio Technical Commission for Aeronautics. RTCA functions as a Federal Advisory Committee. Its recommendations are used by the FAA as the basis for policy, program, and regulatory decisions and by the commercial sector as the basis for development, investment and other business decisions.

[2] RTCA committee formed to produce minimum performance standards for unmanned aircraft systems and unmanned aircraft

The study recommendations provide a conservative, practical, and measured approach to SRMSC redevelopment. Where possible, lower cost, longer-term solutions and benefits were chosen over shorter-term, higher risk solutions. As site occupancy reaches capacity or if new tenants have unique requirements, new construction may be required; however, there are plenty of available buildings to start with. Access to existing buildings enables earlier operations, lowers risks and costs, and speeds up return on investment.

General Redevelopment Ground Rules and Assumptions

The redevelopment recommendations and comprehensive strategy are based on the following assumptions:

- A non-profit entity will accomplish redevelopment
- Redevelopment will focus on the MSR site, although the other sites may also be used
- The planning horizon for this study is 2010 – 2020
- The SRMSC redevelopment and recurring operations will be funded by a combination of public funds, private funds, and service charges collected from some users
- The Federal Government will continue to staff and at least partially fund the facility caretaker until official ownership transfer occurs.

UAS–Specific Redevelopment Ground Rules and Assumptions

The assumptions specific to redevelopment for UAS operations are as follows:

- The SRMSC will be redeveloped to provide an active UAS test bed with runway, facilities, and services
- UND will be an anchor tenant, using the SRMSC for UAS research and education, training, operations, and services
- Redevelopment plans contemplate only US users
- Redevelopment plans consider a mix of university, military, civil, and commercial sector users
- The SRMSC may need to serve piloted and Optionally Piloted Vehicles (OPV) in addition to UASs
- Users may bring their own UAS-peculiar ground support equipment (GSE); the SRSMC will provide fixed assets generic to all aircraft, such as NAVAIDS, lighting, fuel service, etc.
- The SRMSC will accommodate several simultaneous users performing UAS testing, training or operations
- The SRMSC will accommodate UAS operations for both aircraft launched and recovered locally as well as aircraft launched and recovered elsewhere
- The SRMSC airspace operations may include chase planes.

References

Source data for this study includes:

- Site Condition Documents[3]
- Site Survey Results
- RTCA Special Committee (SC) 203 Operational Services & Environment Definition (OSED) Report (Draft Aug 09)

[3] Site Condition Documents are in possession of Kaya Associates and were examined by the SeaTec team at the MSR caretaker facilities.

- Joint UAS CONOPS, Edition 2, OPR: Joint Unmanned Aircraft Systems Center of Excellence (approved Nov 08)
- Unmanned Aerial Vehicle (UAV) National Task Force (NTF) Report , March 2005
- Code of Federal Regulations (CFR) Title 14 Part 77, "Objects Affecting Navigable Airspace"
- FAA Advisory Circular 150/5300-13, "Airport Design"
- Input on priorities from CCJDA and UND.

4. Site Condition Assessment Findings

The Survey

The SRMSC site has been unused for a number of years. The caretaker, Jerry Greenwood of Kaya Associates, Inc., leads a team responsible for the basic upkeep and maintenance of the SRMSC; this includes activities such as minor maintenance, snow removal, payment for utilities, and grounds keeping. Upon project start, SeaTec conducted, with Jerry's help, an on-site survey which comprised detailed review of existing documents and plans, site inventory, and assessment of the state of the MSR site buildings, grounds, utilities, and RSL sites. The site survey also provided an opportunity for the SeaTec team to become familiar with the surrounding geography and structures.

SeaTec inspected the following MSR site structures and facilities:

- Chapel
- Gymnasium
- Community Center
- Telephone building
- Administrative building
- Industrial building
- Sentry building
- Missile Launch Silos
- Missile Site Control building
- Bunkers
- Helipad.

SeaTec assessed the buildings and site assets to determine usability and to understand the scope of improvements required to meet future needs. This included the ease of reuse or conversion to space such as offices, classrooms, labs, housing, dining, recreation, and UAS operations. Roads, parking lots, walkways, access between buildings, condition of paving, and proximity to other buildings were also assessed to identify improvements required for future use. Figure 1 shows an overhead view of the MSR site facilities.

In addition to the MSR site, there are four RSL sites ranging between 36 and 45 acres in size. Each RSL is comprised of security stations, heat sinks, fuel storage tanks, waste stabilization ponds, and a Sprint missile launch area containing 12 to 16 launch stations. Each RSL site also contains a hardened, buried, reinforced-concrete Remote Launch Operations Building (RLOB) -- a single-story structure that housed the monitor and control functions for Sprint launch as directed by the MSR. The RLOBs are each approximately 142 feet long by 80 feet wide by 17 feet high. Each RLOB also has an access tunnel, 11 feet wide and 90 feet long. SeaTec inspected two of the four RSL sites.

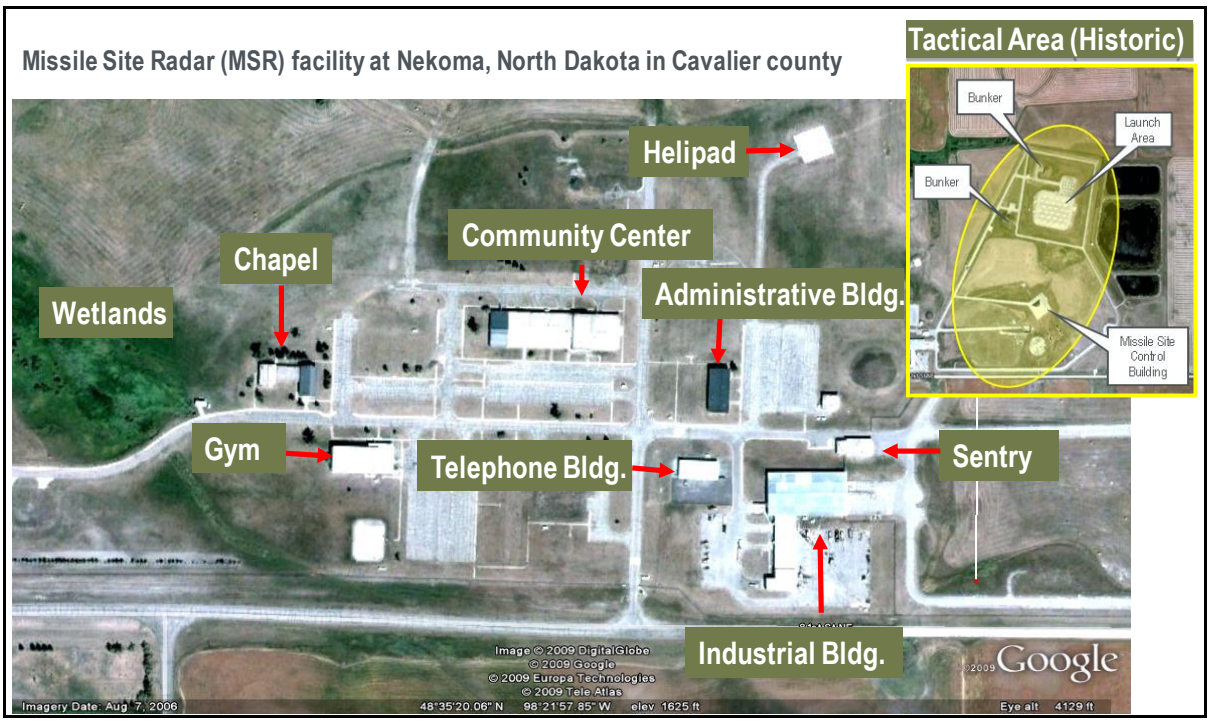


Figure 1. MSR Site Overhead View

The location and the number of launchers for each RSL site are as follows:

- RSL# 1: 12.2 miles southwest of the MSR and 3 miles east of Hampden – 12 launchers
- RSL# 2: eight miles north of Langdon and 20.8 miles north-northwest of the MSR – 12 launchers
- RSL# 3: At the edge of the Pembina escarpment, 4.4 miles northwest of the PAR[4] – 16 launchers (Note: Since deactivation, only RSL# 3 has remained relatively intact in its external appearance).
- RSL# 4: nine miles southeast of the MSR and one mile southwest of Fairdale – 14 launchers.

RSL# 1, 2 and 4 have been partially dismantled. Provisions for the dismantlement of RSL# 1, 2 and 4 were a part of the 1996 Programmatic Agreement with the North Dakota State Historic Preservation Office; however, the status of this activity is unclear.

SeaTec analyzed adjacent geography and structures to understand if there will be any interference issues or constraints for the projected future site uses. In order to determine the maximum runway sizes that could be built on the site, an airspace analysis was conducted. UAS operating surfaces were laid out with guidance from CFR Part 77 regulations regarding airspace obstructions and using the planning guidelines in FAA Advisory Circular 150/5300-13. The wind turbines northeast of the MSR site are a particular airspace obstruction concern.

The land north of the community center was identified as the preferred location for the future UAS Launch and Recovery Area (LRA).

[4] Perimeter Acquisition Radar, part of the original Safeguard complex. The PAR is still operated by the US Air Force as part of Cavalier Air Force Station.

The Survey Results

Table 1 presents a summary of building square footage and a summary site condition assessment. Attachment 2, the SRMSC Site Condition Assessment presentation, contains specific findings for each building, photos of site assets, options for potential building uses, and recommendations for building improvements.

Table 1. MSR Site Condition Assessment Summary

Site Inventory	Size	Site Condition Findings
Chapel 340	8,378	Good condition
Gymnasium 346	11,544	Good condition
Community Center 350	33,620	Good condition, needs roof replacement
Telephone building 371	4,753	Good condition
Administrative building 360	17,568	Good condition, needs roof replacement
Industrial building 364	34,433	Good condition
Sentry building 401	3,431	Good condition
RSL sites	~40 acres each	Good condition
Helipad	80 x 80 feet	Usable as is
Utilities-gas, power, telephone, water, sewer	N/A	Meet or exceed initial capacity requirement May need upgrade to current codes
Roads and parking	N/A	Roads fair, parking surfaces good condition
Landscaping	N/A	None
Environmental	N/A	Some hazardous materials remain

NOTE: Some environmental site clean-up is required. Under Federal Government policy, the GSA will be responsible for remediation of the environmental issues prior to ownership transfer.

The MSR site assessment revealed that the site is in better working condition than expected. The existing helipad could be used to launch small UAS vehicles until permanent launch surfaces are built. All the buildings, roads, utility infrastructure, and outdoor spaces require some modifications and refurbishment to mitigate deterioration and bring them up to current codes and standards. However, with modest improvements, the main site can be ready for UAS and other technology uses as early as mid 2011.

5. Usage Scenarios

SeaTec conducted workshops with CCJDA and UND UAS program representatives to gather high level requirements, to understand site uses, and to identify strategic goals and objectives. SeaTec also used available public information on UAS such as the technology and industry trends, current UAS technology uses, and future UAS technology uses. The SeaTec team used past experience, aviation industry knowledge, and UAS operations understanding to formulate additional requirements and develop the scenarios. A common set of data for each scenario was established and a data collection sheet was designed to compile data for each usage scenario. The scenarios address current and future UAS capabilities.

Another driver for scenarios was the synthesis of a ground Concept of Operations (CONOPS) for the overall operation of SRMSC. The CONOPS organized the services and management of the

redeveloped SRMSC into functional clusters and showed their relationships. The CONOPS details are in Attachment 3.

UAS Test Bed Usage Scenarios

In developing UAS scenarios, the SeaTec team considered the UAS categories contained in the RTCA 203 OSED Report:

- Turbojet fixed-wing
- Turboprop fixed-wing
- Reciprocating/electric fixed-wing
- Vertical take-off and landing (VTOL)
- Airship.

Turbojet operations were eliminated due to known runway limitations; airship was considered but not included at this time due to the ten year study horizon. In recognition that different users will have different requirements, UAS user types were also identified:

- Military (including DARPA),
- Civil (local governments, state governments, NASA),
- Commercial, and
- Academic.

Three UAS types with four potential user types each yielded twelve UAS-user combinations:

- Turboprop fixed-wing – Military
- Turboprop fixed-wing – Civil
- Turboprop fixed-wing – Commercial
- Turboprop fixed-wing – Academic
- Reciprocating/Electric – Military
- Reciprocating/Electric – Civil
- Reciprocating/Electric – Commercial
- Reciprocating/Electric – Academic
- VTOL – Military
- VTOL – Civil
- VTOL – Commercial
- VTOL – Academic.

A common data collection sheet was used to develop each scenario. Data collection items include:

- A scenario mission example
- Typical pilot location (local/remote) and flight type
- Usage parameters at four different points in time out to year 2020
- User facility needs at four different points in time out to year 2020

The scenarios are representative of future site users and were used to estimate total site usage and to develop cost and revenue estimates. The scenarios coupled with UAS technical maturity projections were used to determine the time frame for Initial Operating Capabilities (IOC) and redevelopment phasing.

As future users are identified, the data sheets can be updated to reflect actual user needs and details. Figure 2 is an example of one of the UAS usage scenarios. All the UAS usage scenarios can be found in Attachment 4.

Scenario C3	SRMSC Test Bed Usage Scenarios - by User and Vehicle Types	11/3/2009
VTOL-Commercial	**Mission Example: Precision crop spraying--commercial spray services test small VTOL crop sprayers on local fields or on base test areas. Operators train for field operations.**	

Usage Parameters	2011	2013	2015	2020
Visits per Year	1	2	4	4
Visit Duration (days)	5	5	10	10
Typical Flight Time (hours)	1	1	2	2
Typical Flight Range (nm)	1	1	2	2
Max Flight Altitude (feet)	400	400	400	400
Typical no. sorties per visit	5	10	15	15
ATC				
Airworthiness/Safety	X	X	X	X

User Type		Launch & Recovery		UAS Flight Type	
	Military		Remote L&R		Point To Point
	Civil	X	Local L&R	X	Planned Aerial
X	Commercial				Unplanned Aerial
	Academic				

UAS Category		Pot'l Test Bed Revenue	
	Turbojet fixed-wing		Reimburse Only
	Turboprop fixed-wing	X	Service Charges
	Reciprocating/electric fixed-wing		
X	Vertical take-off and landing (VTOL)		
	Airship		

User Needs	2011	2013	2015	2020
Airstrip				
Hangar				
Office/Classroom Space	X	X	X	X
Transient Housing	X	X	X	X
Lab Space				
Temp L&R Pad	X	X	X	X
Transient/Resident	Trans	Trans	Trans	Trans
Sense & Avoid Infrastructure				
Calibrated Rem Sens Targets				

Figure 2. Precision Crop Spraying UAS Usage Scenario

Non-UAS Usage Scenarios and Opportunities

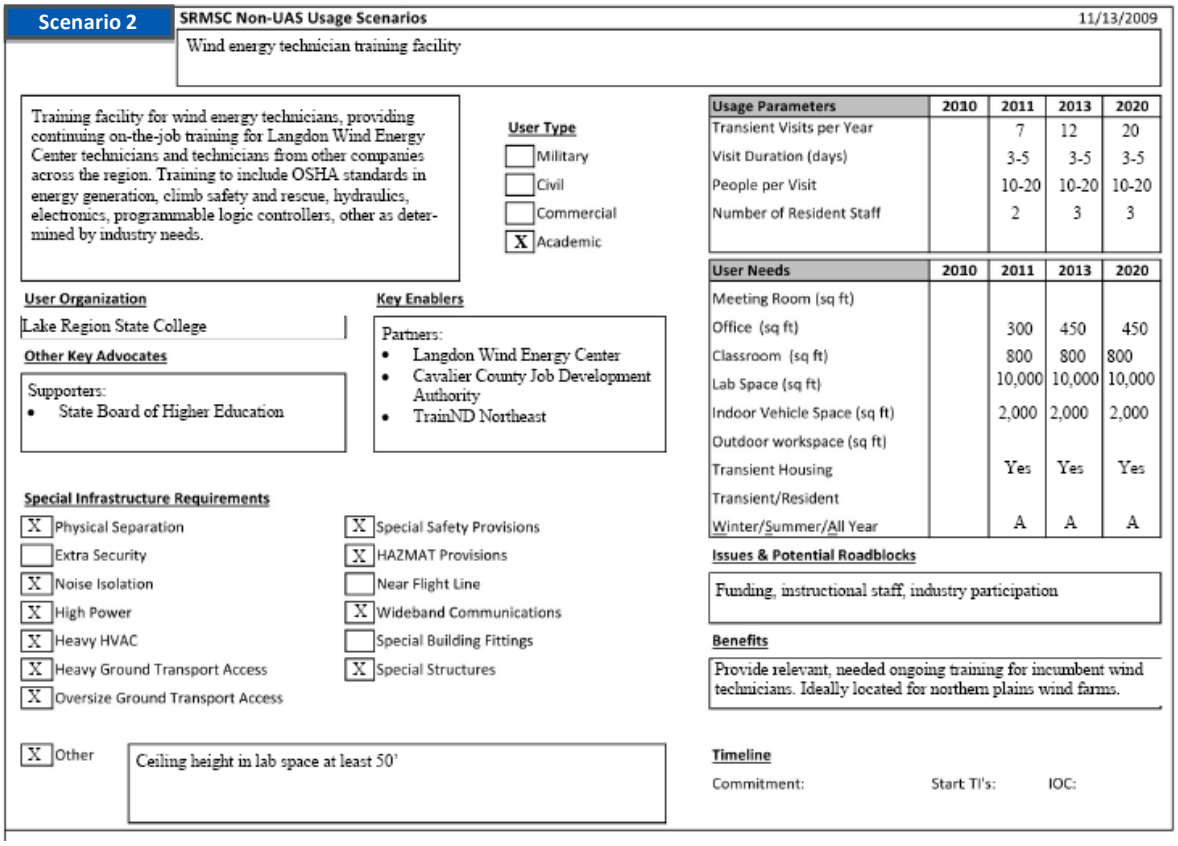
Even before the study began, several military, civil, and commercial entities expressed interest in and inquired about potential non-UAS uses at SRMSC. Also, both conventional and unconventional training opportunities have been identified. Furthermore, the Cold War assets provide a rich historical opportunity for future generations.

The SeaTec team developed a non-UAS data collection sheet to capture requirements and tenant details for potential non-UAS uses. CCJDA worked with interested parties to capture potential use details for each scenario. Non-UAS data collection items include:

- A brief description of the scenario
- Advocates and enablers
- Special infrastructure requirements
- Usage parameters at four different points in time out to year 2020
- User facility needs at four different points in time out to year 2020

- Additional data: Issues, Benefits, Timeline.

There are several education opportunities with a community college, with TrainND[5], and with middle and high school science and technology camps. In addition, opportunities exist with commercial businesses that wish to remain anonymous and conduct proprietary work. As each opportunity arises, CCJDA will work with the initiator to fill in the data sheet and use the information to assess the timing, priority and validity of the opportunity. Figure 3 is an example from the non-UAS usage scenarios. All non-UAS usage scenarios can be found in Attachment 4. As with the UAS scenarios, the non-UAS scenarios were used to estimate the time frame for the site redevelopment phases.



Scenario 2 — **SRMSC Non-UAS Usage Scenarios** — 11/13/2009

Wind energy technician training facility

Training facility for wind energy technicians, providing continuing on-the-job training for Langdon Wind Energy Center technicians and technicians from other companies across the region. Training to include OSHA standards in energy generation, climb safety and rescue, hydraulics, electronics, programmable logic controllers, other as determined by industry needs.

User Type
- [ ] Military
- [ ] Civil
- [ ] Commercial
- [X] Academic

Usage Parameters	2010	2011	2013	2020
Transient Visits per Year		7	12	20
Visit Duration (days)		3-5	3-5	3-5
People per Visit		10-20	10-20	10-20
Number of Resident Staff		2	3	3

User Needs	2010	2011	2013	2020
Meeting Room (sq ft)				
Office (sq ft)		300	450	450
Classroom (sq ft)		800	800	800
Lab Space (sq ft)		10,000	10,000	10,000
Indoor Vehicle Space (sq ft)		2,000	2,000	2,000
Outdoor workspace (sq ft)				
Transient Housing		Yes	Yes	Yes
Transient/Resident				
Winter/Summer/All Year		A	A	A

User Organization
Lake Region State College

Other Key Advocates
Supporters:
- State Board of Higher Education

Key Enablers
Partners:
- Langdon Wind Energy Center
- Cavalier County Job Development Authority
- TrainND Northeast

Special Infrastructure Requirements
- [X] Physical Separation
- [ ] Extra Security
- [X] Noise Isolation
- [X] High Power
- [X] Heavy HVAC
- [X] Heavy Ground Transport Access
- [X] Oversize Ground Transport Access
- [X] Special Safety Provisions
- [X] HAZMAT Provisions
- [ ] Near Flight Line
- [X] Wideband Communications
- [ ] Special Building Fittings
- [X] Special Structures
- [X] Other — Ceiling height in lab space at least 50'

Issues & Potential Roadblocks
Funding, instructional staff, industry participation

Benefits
Provide relevant, needed ongoing training for incumbent wind technicians. Ideally located for northern plains wind farms.

Timeline
Commitment: Start TI's: IOC:

Figure 3. TrainND Wind Technician Training Usage Scenario

6. SRMSC Redevelopment Requirements

The SRMSC Strategy envisions that the MSR will evolve into a combination of specialized "airport" for UAS flight operations, a "technology business park," and a public-access historical interpretive/educational venue. As such, the evolved MRS will require some general services to manage and maintain buildings and grounds. Also, the evolved MSR will need to provide the type of services often provided to general aviation at smaller airports, including fuel, aircraft storage, flight scheduling, training, testing, and repair operations. The SeaTec team developed a ground Concept of Operations (CONOPS) for SRMSC to include these services. Elements of the CONOPS were then used to generate requirements for the three missions of technology, education, and historical preservation. General requirements apply to all the missions, while some requirements arise from individual mission

[5] Employer funded business and vocational training offered by the North Dakota State Colleges

needs. The requirements address the ten year planning horizon of this study. Detailed requirements can be found in Attachment 5.

7. SRMSC Vision for UAS

With the expanding use of UAS in DoD operations and use in newly emerging civil and commercial applications, the timing is excellent for the development of a UAS research and development facility in northeastern North Dakota.

One Stop Shopping

The redeveloped SRMSC will evolve into a dedicated, "one-stop-shopping" UAS Center of Excellence (COE) with services, technical expertise and facilities for continuous UAS operations. SRMSC offers a unique strategic advantage. Unlike other current or potential UAS Centers of Excellence (e.g., Technical Analysis and Applications Center (TAAC), Dryden Flight Research Center (DFRC), Camp Roberts, Michael Army Airfield, China Lake), SRMSC could provide 24/7 unencumbered access to airspace while not significantly impacting the safety or environment of nearby communities.

In other words, it is the ideal flight test laboratory to host a wide variety of air operations on a non-interference basis with other users of the NAS. It can be operated by CCJDA, the UND or another mutually agreed upon neutral entity, similar to TAAC with New Mexico State University (NMSU). Direct access to airspace and operations at reasonable, commercial-rate pricing will appeal to many customers, enabling the growth of the commercial UAS sectors.

UND Leadership

UND has established the first Aerospace UAS four year degree program, has tested UAS prototypes, worked on research studies for the FAA and military services, and has recently purchased a Boeing ScanEagle UAS. UND is uniquely poised to test, conduct research studies, and provide training for and establish services for UAS operations. They have been a consistent leader in this field and are pursuing the establishment of a national laboratory in North Dakota. The SRMSC will provide unfettered access to air space and further enhance UND's pursuit of education and research excellence in UAS technology.

UAS Supply Chain

SRMSC redevelopment has the potential to provide access and services for the entire UAS supply chain over time. With the buildout of the SRMSC UAS test bed a significant portion of the supply chain will be established, including education, research, operations, training, facilities, and services. In addition, a local community college has requested use of the site to provide a training program for UAS repair technicians; civil and commercial sector businesses have expressed interest in establishing offices on the site; military, civil and commercial sector users have expressed interest in conducting unconventional training which would include the use of UAS. With access to all aspects of UAS technology and its supply chain, SRMSC UAS businesses and customers would be well-positioned to collaborate, work out issues, and troubleshoot and refine business models real-time, significantly increasing their return on investment and the progress of the UAS industry at large.

Virtual Global Laboratory

When successful, the SRMSC will become a major enabler and expander of UAS businesses worldwide. Careful planning and marketing could result in significant expansion of UAS operations in three to five years. If airspace access and good services are provided at attractive prices, many new aerospace jobs will be created in Cavalier County. Broadband communications, including broadband internet services, will make this new laboratory available to experimenters, engineers and scientists anywhere on the planet, thereby creating a virtual global laboratory. The benefits to the local community will be the development and expansion of a new high-tech industry base, with the

attendant social benefit of local young people staying home to work at the new tech jobs that will be created.

8. Airspace Access Considerations

Airspace Planning

The North Dakota airspace is a prime location for UAS operations. It is remote, low in air traffic and there are few residents. As such, it is a desirable location for UAS users. CCJDA is committed to establishing a UAS-friendly air space in North Dakota and to working and collaborating with other seekers of North Dakota airspace for UAS use. This study provides UAS solutions that can enable military, civil, and commercial sector use of UAS and proposes a holistic approach to allocating airspace in North Dakota—one that balances the needs of a growing and developing UAS industry while minimizing the impact to the local community and local aviation. To that end, airspace access solutions that minimize or eliminate use of FAA Restricted Areas for UAS flight operations are the preferred approach.

CCJDA and UND are working closely with local leaders, the state governor and legislators, North Dakota Department of Commerce and Economic Development, Federal leaders (Senators Dorgan and Pomeroy), and with interested industrial firms that support the SRMSC redevelopment goals. The SRMSC strategy recommends a detailed action plan for proactively engaging the appropriate UAS organizations in the FAA and the DoD on specific UAS Airspace Access policy issues that must be resolved. Figure 4 depicts the recommended timeline for parallel efforts to enable routine UAS air operations in North Dakota. In structuring this timeline, SeaTec considered a probable realistic schedule of Federal Government regulatory/safety decisions, combined with SRMSC goals for progressively increasing UAS test bed capabilities. These goals are defined by the three IOC milestones depicted in Figure 4. SRMSC redevelopment strategy details described in Section 10 are organized to accomplish meeting the IOC objectives in the timeframes indicated in Figure 4.

Airspace Strategy for SRMSC

There is general agreement both within Government and the commercial sector that successful UAS operations for mission, development, testing and training are contingent upon routine access to NAS airspace. The FAA's response to these needs has been credible, as demonstrated by the fact that the United States is the only country that allows any UAS access to non-segregated airspace at all, albeit with significant restrictions.

The recommended airspace strategy consists of several key elements and related "go-forward" action plans. A fundamental element of the airspace strategy is to establish partnerships between Cavalier County/UND and:

- Government agencies that require airspace access for mission support
- UAS manufacturers that require airspace access for validation
- The emerging UAS commercial industry that requires airspace access for systems and applications development
- The FAA.

These partnerships will serve to discover UAS airspace access solutions. The over-arching goal is to position the State of North Dakota as leader and champion of a world class UAS development and training center in Cavalier County.

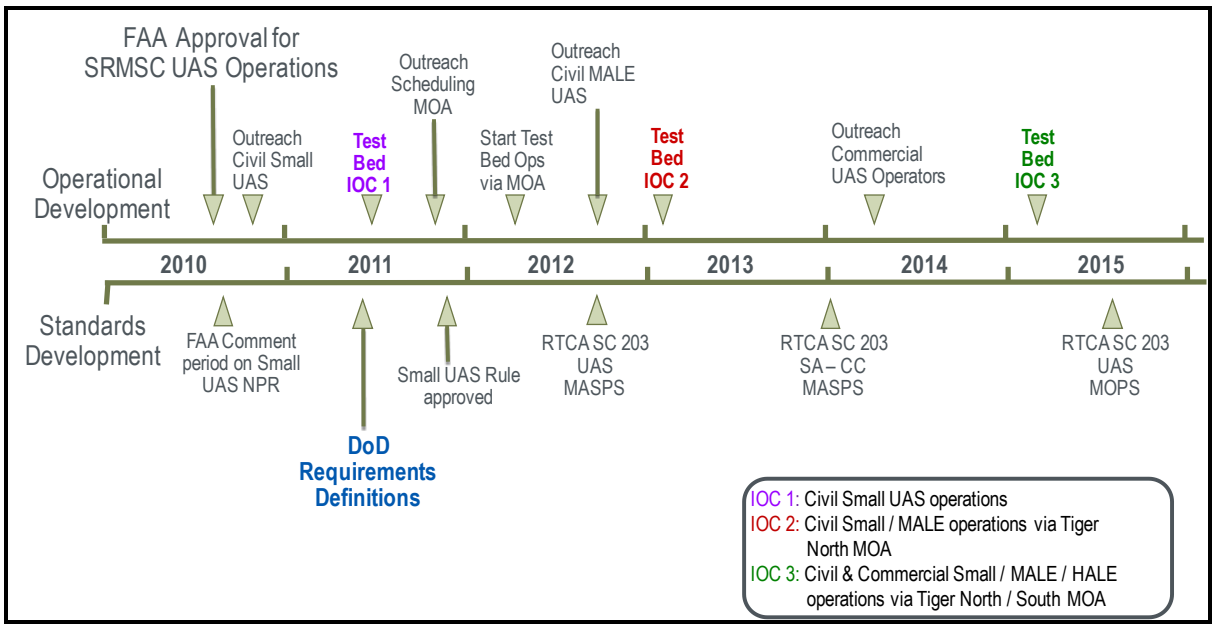


Figure 4. UAS Standards and Operational Development Timelines--Notional

The partners in this UAS airspace strategy should undertake these key actions:

- Increase UAS operational capabilities in phases that parallel FAA rules and standards evolution
- Achieve early UAS airspace access capabilities for small UAS through cooperation and agreement with the FAA
- Leverage alliances with the USAF at Grand Forks AFB and other DoD UAS activities
- Establish a direct partnership with the multi-federal agency UAS Executive Committee comprised of the FAA, DoD, NASA and DHS
- Establish a long term relationship with UAS standards organizations such as RTCA and American Society for Testing and Materials (ASTM), with the goal of accelerating near term airspace access initiatives
- Establish infrastructure at the redeveloped SRMSC for a virtual UAS test bed
- Establish, in partnership with the FAA, a designated UAS airspace operating area for UAS operations, which includes (at a minimum):
  - FAA approved airspace use by the SRMSC facility
  - Pre-approved SRMSC UAS Certificate of Authorization (COA)
  - UAVs flying under FAA authorized UAS Experimental Certificate validation
  - UAS training capabilities for both pilot and operations.

Success Model

Recent meetings with North Dakota state government officials have revealed a willingness on the part of the state to embrace this forwarding thinking initiative, as it will bring both national and international recognition as well as tangible economic benefits to North Dakota. Achieving the milestones in this plan requires the establishment of both an internal and external dynamic stakeholder outreach plan. It is of critical importance that the energy behind this plan comes from key stakeholders within North Dakota. Once North Dakota momentum is established for the SRMSC

UAS Center in Cavalier County, an external stakeholder plan should be framed on a foundation of state support. Through stakeholder planning a solid technical basis will emerge, allowing for opportunities to develop, barriers to be identified, and mitigation options to find agreement. Equally important, aligning key priorities with national leaders and champions (e.g. the Federal UAS Executive Committee) will assure a successful UAS airspace strategy.

Recommended Action Plans

Here are some recommended actions in the indicated time frames for a successful airspace strategy:

Recommended technical "go forward" airspace strategy actions 2010-2012

Establish a solid technical foundation for critical policy changes (help remove barriers, roadblocks, mitigate concerns, and develop opportunities):

- Develop a UAS airspace action plan that establishes next steps consistent with national UAS Early Implementation Planning (EIP) activities (RTCA, ASTM, and UAS Executive Committee); this effort to be funded by North Dakota state level entities (e.g. Department of Commerce); action plan to be prepared by UND, with input from SeaTec.
- Charter and execute a study for FAA on UAS flight safety imperatives; sponsored by FAA, through RTCA, and aligned with the UAS Executive Committee Airspace Access Team; study to be led by SeaTec with participation from UND.
- Prepare UAS Pilot Training/Certification standards recommendations jointly with RTCA and ASTM under contract to FAA UAS Program Office (AFS-407); study to be led by SeaTec, with participation from UND, Embry-Riddle Aeronautical University, and possibly Kansas State University.
- Conduct a study funded by FAA Air Traffic Planning Office to define Air Traffic Control training requirements & workload implications during ramp up of UAS ops in the NAS; study to be led by SeaTec in partnership with UND.
- Establish a new joint UND/FAA/GE Aviation Systems[6] /AAI[7] demonstration activity to validate evolving UAS pilot training/certification standards; demonstration capability to be established by UND.
- Prepare white paper under RTCA sponsorship, jointly with FAA/GE Aviation Systems/AAI, on "Required Navigation Performance Implications for UAS in NAS;" white paper to be prepared by SeaTec.

Recommended operational "go forward" airspace strategy actions 2011-2015

Create "energy" involving UAS operations in northeast North Dakota:

- Commence initial flight ops in mid-2011 with small UAS flying from SRMSC under 400 feet and within line-of-sight; this activity assumes that the small UAS rules currently in the FAA vetting cycle are approved. These flights can be accomplished by UND and North Dakota Air National Guard units on exercise.
- Establish "Ground-Based Sense & Avoid" capability to facilitate airborne sensor testing for both Optionally Piloted Vehicles and UAS; this test bed could be accomplished by a technology coalition led by UND, and involving participation from FAA, Raytheon, USAF, Volpe, GE and possibly others.
- Establish phased UAS partnership program with USAF at Grand Forks AFB; initial phase focused on DoD small UAS operations.

[6] General Electric Aviation Systems, formerly Smiths Aerospace
[7] AAI Corporation, an operating unit of Textron Systems

- Partner with FAA/GE/AAI in developing UAS 4D Trajectory[8] flight testing.

Recommended alliance "go forward" airspace strategy actions 2010-2015

Align priorities with National UAS champions and thought leaders:

- Assist the Undersecretary of Defense for Acquisition and Technology in participation in the Inter-Agency UAS Executive Committee.
- Create a "Northern UAS Task Force," chartered by the UAS Executive Committee with the intent of developing North Dakota airspace as a National Airspace Laboratory for the safe introduction of UAS with piloted aircraft in all airspace.
- Establish a mutually beneficial alliance between North Dakota UAS interests and New Mexico State University.
- Establish a working relationship with DoD Policy Board for Federal Aviation (PBFA) as well as USAF Airspace/Ranges Office.
- Establish "Ground Based Sense and Avoid" capability to allow initial sensor test bed via technology coalition (FAA, UND, Raytheon, USAF, Volpe, GE, AAI).
- Participate actively in developing RTCA SC 203 UAS Standards that accelerate the FAA UAS "File and Fly" regulations expected by 2013-2016.

Set expectations for mid to long term UAS Airspace use in North Dakota:

- Develop partnership agreements with federal agencies, industry and UND for development of mid to long term UAS projects.
- Develop UAS roadmap for the introduction and growth of commercial UAS market (mid to long term), including:
  - Fire fighting industry UAS
  - State and local police UAS
  - Infrastructure grid UAS operations, e.g., electrical transmission lines, gas pipe line, etc.
- Partner with a small cargo operator to use North Dakota as a "proving ground" for UAS cargo operations (e.g., www.caravanpilots.com).

9. SRMSC Redevelopment Recommendations

The recommended strategy uses the MSR site to build UAS operating surfaces consisting of one circular LRA and two runways. The existing MSR site buildings can house offices, labs, meeting rooms, dormitories, and UAS services during the initial phases. There are areas suitable for adding box hangars and Technology Park buildings in later phases. Future plans also include new construction to meet new tenant needs when existing facilities are saturated, or for specific requests that require new construction before buildings are fully occupied. CCJDA will need to weigh benefits versus cost for new construction.

In addition, some of the historical structures that were fundamental to the Cold War mission can be opened to the public. These include the Missile Site Control Building, missile silos, and possibly RSL #3. An Interpretive Center created by remodeling the Sentry building can host guidance to the SRMSC complex for visitors and researchers. The wetlands at the southwest corner of the MSR site can become a public park to provide a recreation and relaxation haven for visitors and staff.

[8] An optimized airbase approach or departure plan

RSL sites #1, #2, and #4 can be reserved for unconventional training and special uses as identified by future partners, tenants and customers. RSL site users may require separation from other others due to privacy requirements, safety, noise, or other tenant specific requirements.

General Requirements

General requirements for the redeveloped SRMSC serve all users and include roads and parking, buildings, site security, and other facilities and services. They also address business activities. The gaps between current conditions and general requirements are listed in Attachment 5 and are summarized as follows:

- Existing roads and vehicle surfaces need minor resurfacing
- Additional roads and parking areas are needed
- Need signage and gates
- Existing buildings need refurbishment and upgrade to current building codes to incorporate offices and other work, leisure, and transient uses
- Buildings need furnishings and fixtures
- Security and safety provisions and services need review and augmentation
- Other general facilities and services need to be put in place or reviewed for function or capacity:
    - Buildings and grounds maintenance
    - Utilities
    - Transport and vehicle services
    - Food and dining
    - Recreation and leisure
    - Supplies and consumables
- Business and management functions with a suitable organizational structure will be needed.

Green Technology

MRS site buildings that were constructed in the 1970's need to be brought up to current codes and built out to accommodate tenant needs. This is a great opportunity to employ "green" technology and building practices.

The US Green Building Council, a private non-profit organization made up of organizations and individuals from the building industry, has developed standards, rating systems, and certifications that encourage the adoption of sustainable green building and development practices. The certifications recognize projects that implement strategies for better environmental and health performance. This system of standards is known as Leadership in Energy and Environmental Design (LEED).

State and local governments across the country are adopting LEED for public-owned and public-funded buildings; there are LEED initiatives in federal agencies, including the Departments of Defense, Agriculture, Energy, and State. The redevelopment process proposed for SRMSC will incorporate the LEED green building certification program. LEED for SRMSC will address whole-building cleaning and maintenance issues (including chemical use), recycling programs, exterior maintenance programs, and systems upgrades.

UAS Requirements

UAS requirements for the redeveloped SRMSC cover all UAS activities. Aside from requirements shared with non-UAS, educational, and historical missions, UAS operations require unique operating surfaces, special buildings, and aviation ground equipment and services. The UAS requirements gaps are listed in Attachment 5.

UAS Operating Surfaces

Design and build plans will be required and will need to address current small UAS operations and future UAS growth opportunities. The land directly north of the Community Center is an undeveloped open space in which the MSR site could accommodate three UAS surfaces:

- A surface containing a circular 350 foot diameter LRA for small UAS
- A primary runway 2500 feet long and 60 feet wide
- A secondary runway 5000 feet long and 60 feet wide

The analysis that led to the runway layout can be seen in Attachment 2. Figure 5 shows the UAS operating surfaces at scale in green overlays on the MRS site. The recommended LRA and runways can be built without adding new easements. However, retention of the existing easements north of the perimeter is recommended to protect the future ability to purchase more land and build a longer runway.

Figure 5. UAS Operating Surfaces

UAS Buildings and Structures

UAS operations do not require a control tower; manned operations require a control tower only if operations exceed 75,000 events per year (each takeoff and landing is counted as one event). An observation deck may be desirable for UAS users—if deemed a requirement, it should be further defined in the UAS surfaces planning effort during the Pathfinder Phase.

In addition to the offices mentioned under general requirements, UAS activities will need space and furnishings for labs, classrooms, meeting rooms, and an auditorium. Transient housing and dining would enhance the work environment for temporary site users. The existing Community Center is ideally located to house UAS ground activities because it is close to the proposed LRA and runways. The Industrial building has high ceilings and is ideal for housing and storing UAS vehicles and ground support equipment. Box hangars can be added in later phases if hangar space demand is high. Some new roads may be required between the UAS flight line and new UAS buildings.

UAS Technical Infrastructure

A number of UAS requirements address facilities and services for UAS operations that do not currently exist at SRMSC. These include:

- Operating surface cleaning, foreign object patrol
- NAVAIDS, runway lighting, collision avoidance equipment
- UAS ground instrumentation, weather sensors and service
- Communications facilities
- Fuel, deicing services
- Air and ground traffic scheduling and control services

Non-UAS Requirements

As in the case of UAS requirements, non-UAS activities will also need space and furnishings for labs, classrooms, meeting rooms, and an auditorium. Transient housing and dining are also desirable. There may be special needs for unique structures, hardstand work areas, and/or enhancements to security, depending on the nature of the client's use of the site.

Tailoring office space for new tenants will be straightforward; CCJDA can work with potential tenants to gather detailed requirements and capture them on the data collection sheets, enabling opportunity assessment, prioritization, and planning. Each opportunity can be assessed against strategy, goals, and objectives of the key stakeholders, taking the best opportunities forward first. Opportunities that don't meet goals and objectives may not be accepted or may be accepted to meet short-term goals and objectives for a specified period of time.

Education and Training Requirements

There are a wide range of opportunities and uses identified for the site related to unconventional training. Several military, government and civil organizations have expressed an interest in urban warfare training and other military training. The unconventional training may require some separation to lessen its impact on other tenants. Initial recommendations include holding these activities at the RSL sites.

There is also interest in using the MSR site to conduct specialized job training in the fields of wind energy and precision agriculture. CCJDA and site designers will need to be flexible and creative in developing a lab environment capable of accommodating tenants with very different needs.

Other proposed educational uses include the following:

- University courses under the UND UAS Aerospace program

- Other university partnerships to be determined
- Community college courses and job training
  - UAS technology
  - Wind energy technology
  - Agriculture
  - Border Patrol
- Middle school and high school science and technology camp programs
- Hosting UAS industry/academic symposia and seminars.

Education requirements gaps include classrooms, study areas, housing, dining and recreational needs. Students will likely have more service needs than other tenants. Students will need transportation, three meals a day, dorms to live in and all the associated staff to accommodate those services. In addition, walkways and student gathering areas will be needed.

Historical Preservation Requirements

The SRMSC has one primary historic asset and a number of contributing assets that may be added to the National Historical Registry. The assets are not required to actually be listed in order to achieve historical recognition, they are only required to be eligible for listing, as they are now. The CCJDA will have to do further research with the State Office for Historic Preservation to determine if the assets will be listed and if listing the assets could impact future development in the area.

The Sentry building in the Tactical Area on the MSR site is recommended to house a future Interpretive Center with the Missile Site Control Building and a launch silo open for visitors. RSL #3 could be opened for visitors with suitable arrangements for transport between locations. The key gaps in this area are designing the Interpretive Center, building it out to be a tourist friendly educational experience, establishing a docent program, and providing the appropriate signage to direct tourists across the various locations so they can easily identify the historical assets. There are significant documents, pictures, and materials that exist; down-selecting the right amount and type of content to provide a historically rich experience will take some time and planning. A gift shop is also planned for the site and will be housed in the Interpretive Center.

Some of the historical structures are shown in Figure 6, a view of the pyramidal MSR antenna turret. The air intake and exhaust stacks for the underground power station are in the foreground.

Photo courtesy of srmsc.org

Figure 6. SRMSC MSR Turret and Power Plant Stacks

Summary of Recommendations

MSR site easements should be transferred to CCJDA to allow for future land acquisition and expansion. The RSL sites will only need easements for access.

Some buildings are over 15,000 square feet and can accommodate multiple functions in the early stages of occupancy, reducing expenses for managing and maintaining the buildings until full occupancy is reached. This approach appears in the phased redevelopment plan.

There is quite a bit of land that is designated as wetlands and it is perfect for a park, providing an outdoor leisure area for resident site users and visitors.

Rework of Existing Facilities

Existing buildings and facilities are recommended for upgrade and repurpose as shown in **Error! Not a valid bookmark self-reference.**.

Table 2. Facility Rework

Site Inventory	Action	Use
Chapel 340	Upgrade interior	Offices, meeting space, UAS mission control
Gymnasium 346	Upgrade interior	Office, lab, multipurpose meeting/presentation/recreation space
Community Center 350	Upgrade interior, replace roof	Offices, classrooms, labs, library
Telephone building 371	Upgrade interior	Offices, multipurpose UAS activities
Administrative building 360	Upgrade interior, replace roof	Offices, classrooms, labs, transient housing or dormitory
Industrial building 364	Use as is, upgrade for specific use if required	UAS and other manufacturing, assembly, maintenance
Sentry building 401	Upgrade interior	Interpretive Center, history mission offices
Tactical Area	Select historical structures and visitor-proof	Historical tours
RSL sites	Visitor-proof RSL #3, rework other RSL sites per usage requirements	Historical tours of RSL #3, special uses for remaining RSLs
Helipad	Use as is	Use as helipad, possible interim use as small UAS LRA
Utilities-gas, power, telephone, water, sewer	Upgrade to current codes	General
Roads and parking	Resurface, add signage, gates	General
Landscaping	Add	Enhance working environment
Environmental	Clean up, hopefully by Government	Legal requirement, health and welfare of site users
Bunkers	Clean up, run power lines to bunkers	Private company commercial development

Additional Facilities

Additional buildings and facilities are recommended as follows:

- UAS LRA pad and runways
- UAS technical infrastructure
- UAS taxiways, aprons, connecting roads
- Pedestrian walkways, bicycle paths, leisure areas such as wetlands park
- Box hangars
- Technology Park buildings and facilities as demand arises

New Supplies and Services

New supplies and services are recommended as follows:

- Fixtures and furnishings
- Security and safety provisions and services
- Maintenance services
- Transport and vehicle services
- Food and dining services
- Recreation and leisure equipment and areas
- Hotel and dormitory services
- Office consumables and other supplies
- Business and management functions

10. Phased Redevelopment

CCJDA can accomplish planning, recommended redevelopment and operational activities over ten years beginning in mid 2010. This is recommended to be done in four phases, each designed to achieve specific objectives:

- Pathfinder Phase – finalize SRMSC ownership transfer terms, secure initial redevelopment funding, accomplish overall land use planning and civil engineering, and initiate airspace access advocacy and stakeholder outreach communications
- Phase I – achieve initial small UAS operational capability: complete LRA surface engineering & construction, begin UAS operations, secure and service early UAS and non-UAS technology tenants, complete initial plans and designs for educational mission, refurbish and upgrade several buildings, complete preliminary design for park land and interpretive center; service initial tenants
- Phase II – add medium altitude/long endurance UAS capability: construct primary runway, expand building use for education & research, expand UAS operations services, house UAS mission control, refurbish additional buildings, provide UAS instrumentation on RSL sites, host early RSL site tenants, perform new construction as planned
- Phase III – add high altitude UAS capabilities: construct second runway, host UAS partners, construct hangars, design and build apron, add initial international UAS capability, obtain UAS COE recognition, fully occupy existing Technology Park buildings, start new construction, host permanent RSL site tenants.

The duration of each phase is designed to achieve UAS, non-UAS, education, and historical preservation capabilities at a moderate pace. The durations are flexible and should be adjusted to accommodate the tenant and partner growth demands and to take advantage of opportunities which may not be evident yet.

The following is a summary of each phase, the duration of the phase, the building(s) recommended for use in each phase and a diagram depicting the areas of the site in use. More detail about Time Phased Redevelopment can be found in Attachment 6.

Pathfinder Phase Summary

Duration: begins now and extends until terms for transfer of SRMSC ownership transfer to CCJDA are agreed upon (approx 1Q2011). Figure 7 depicts the facilities in use during the Pathfinder Phase.

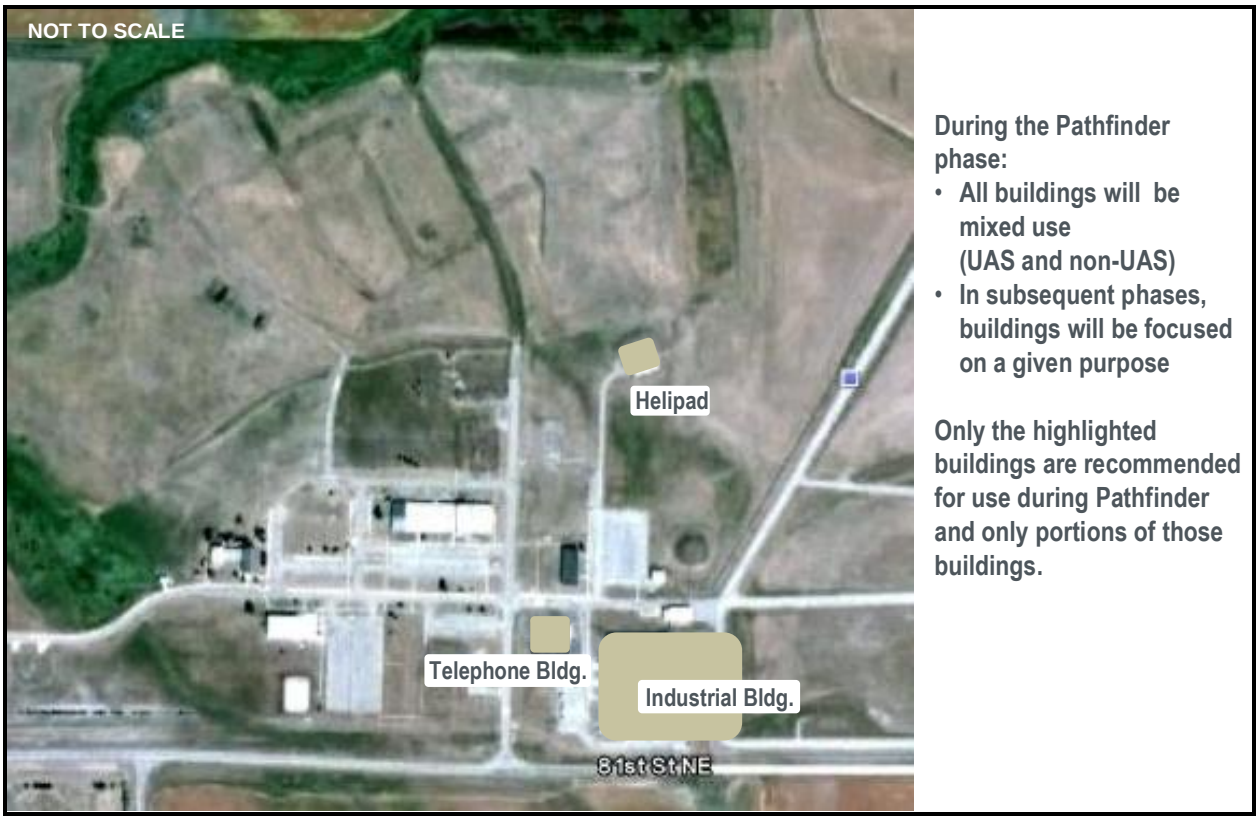


Figure 7. Future State—Pathfinder Phase

SeaTec recommends establishing an onsite office during the Pathfinder Phase to facilitate UAS surfaces design, Technology Park design, and marketing efforts to future tenants. CCJDA will need to lease approximately 1000 square feet of office(s) from the GSA until the site ownership transfer occurs. CCJDA may need storage facilities for early tenants and early activities; one Industrial building bay, approximately 4000 square feet, has been identified for storage. The caretaker and his staff are currently located in the Telephone building. CCJDA could share space with the Caretaker if CCJDA needs do not exceed available space. Otherwise, many buildings are available and/or the Caretaker staff could be temporarily relocated to the Industrial building. During the Pathfinder Phase, the overall Technology Park and the SRMSC UAS surfaces will be designed and planned. The engineering work associated with these efforts will occur with the build in the next phase.

A closer look at the Pathfinder Phase tasks can be found in Section 13.

Phase I Summary

Duration: begins at agreement on terms for SRMSC site ownership transfer to CCJDA (approx 1Q2011) and extends until Phase I build and capabilities are achieved (approx 2Q2012). Figure 8 depicts the facilities in use during Phase I.

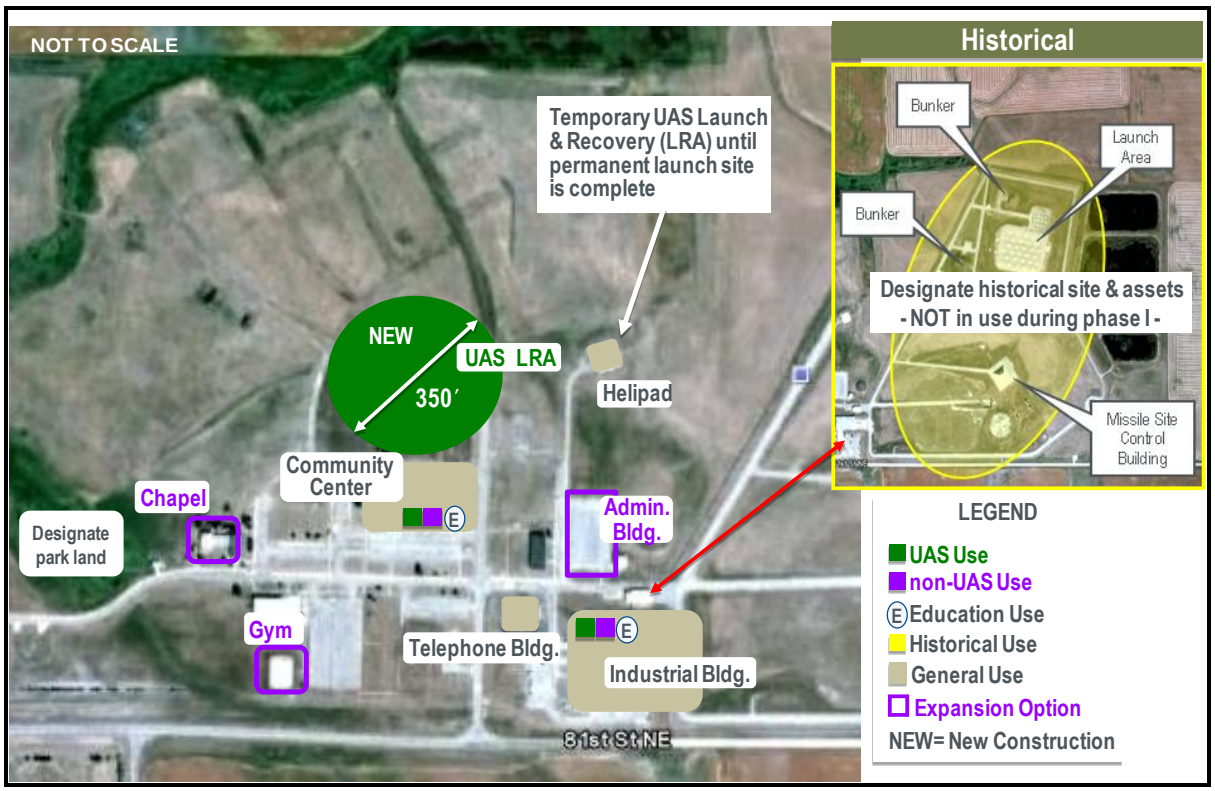


Figure 8. Future State—Phase I

The Phase I strategy is to provide a reasonable, conservative, flexible approach to SRMSC site redevelopment. To that end, initially, the Community Center will be used for both UAS and non-UAS activities. The close proximity to the open space makes it a prime location for the permanent UAS headquarters. With over 33,000 square feet, there will be adequate space to house early tenants in both the UAS and non-UAS areas. Space allocations of 12,000 square feet (divided equally but can be distributed as needed) have been made for UAS and non-UAS uses for phase 1 efforts. Although only 12,000 square feet of the Community Center will be used, all required Community Center building upgrades identified in the site condition assessment will be made at this time. This approach will reduce overall costs, thereby ensuring that the building will be ready for new tenant expansion. The helipad can be used as-is to enable UAS launch and recovery until a permanent surface is built. The helipad will eventually need to be painted with the appropriate special use markings required for aviation surfaces. The Industrial building will continue to be used for storage for both construction needs and to serve as a secure hangar for UAS vehicle and equipment storage (including storage of GSE). The area used will increase to 8000 square feet. The Telephone building will continue to be used for planning and marketing and will increase usage to include site administration; at this point approximately 2000 of the available 3400+ square feet will be required to house these functions and

staff. The Telephone building will be razed during Phase III to make room for new construction. The administrative functions will be moved to a permanent location in one of the remodeled buildings.

Three buildings have been identified for growth and expansion during Phase I: the Administrative building, the Gymnasium, and the Chapel. These buildings can be used in the event that site growth exceeds available building space and/or a future tenant has unique requirements that would entail the use of a separate building. During Phase I, the historical assets on the main site and RSL# 3 will be identified, land will be allocated for the park, planning and design for the Interpretive Center will be conducted, the engineering and build of the first 350 foot diameter UAS surface will occur, and the first tenants and UND will occupy their temporary and permanent facilities. The CCJDA will build out the Community Center to suit the various tenant needs for building use during this phase. Phase I will be complete when IOC 1 capabilities are achieved and when anchor tenants are in place.

Phase II Summary

Duration: begins at upon Phase I build complete and once IOC 1 capabilities are achieved (approx 2Q2012) and ends upon once IOC 2 capabilities are achieved and Phase II build is complete (approx 1Q2015). Figure 9 depicts the state of facility usage at the end of Phase II.

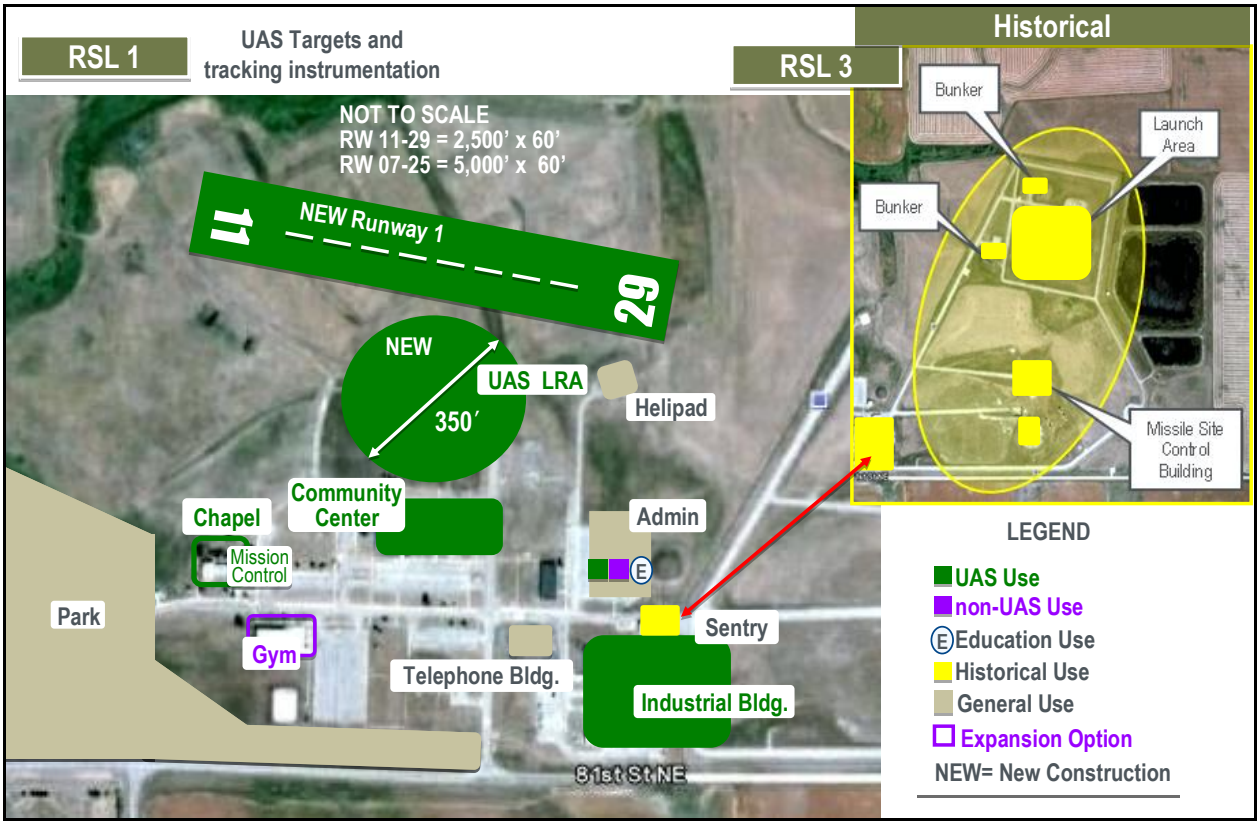


Figure 9. Future State—Phase II

During Phase II, many of the buildings will continue to be mixed use—housing both UAS and non-UAS tenants. UAS capability will be mature, the Technology Park will be established, and occupancy rates will continue to rise. Site administration and marketing will continue to be an important function to manage the growth, development and maintenance of the site. A little over 50% of the UAS and non-UAS office (includes classroom, lab, etc.) space will be in use. Approximately 12,000 square feet will have been allocated for UAS storage, manufacturing, and testing, but more space is readily

available as needed. As site occupancy increases, CCJDA, the UND, or another agreed upon third party will need to consider moving the UAS ground services and overall maintenance services in-house to reduce costs. However, to ensure continuity during Phase II, it would be prudent to contract with Kaya & Associates to continue providing these services.

UAS capabilities will move beyond project-based activities to a continuous activity role. The UAS site headquarters will be in full use and will have mature capabilities in all aspects of services. As growth continues in the UAS space, some tenants may be required to move to other available buildings. The Administrative building will be used for both UAS education and non-UAS Technology Park offices. It will provide housing, dining, classrooms and offices. The Interpretive Center will be operational, the historical assets on RSL# 3 will be available for viewing and the site will provide a tourist-friendly experience. Unconventional training will begin to occur on the RSLs as required by interested tenants. New construction considerations and plans will begin as required. The helipad, UAS LRA, and UAS Runway #1 will be operational. Runway #2 will begin engineering design and build. UAS roads and perimeters will be completed. The park design and build will be complete and trails and seating areas will be added. Roads and surfaces will need to be maintained and landscaping added to new areas.

Phase III Summary

Duration: begins at Phase II build complete and once IOC 2 capabilities are achieved (approx 1Q2015) and ends once IOC 3 capabilities are achieved and Phase III build is complete (TBD). Figure 10 depicts the state of SRMSC at the end of Phase III.

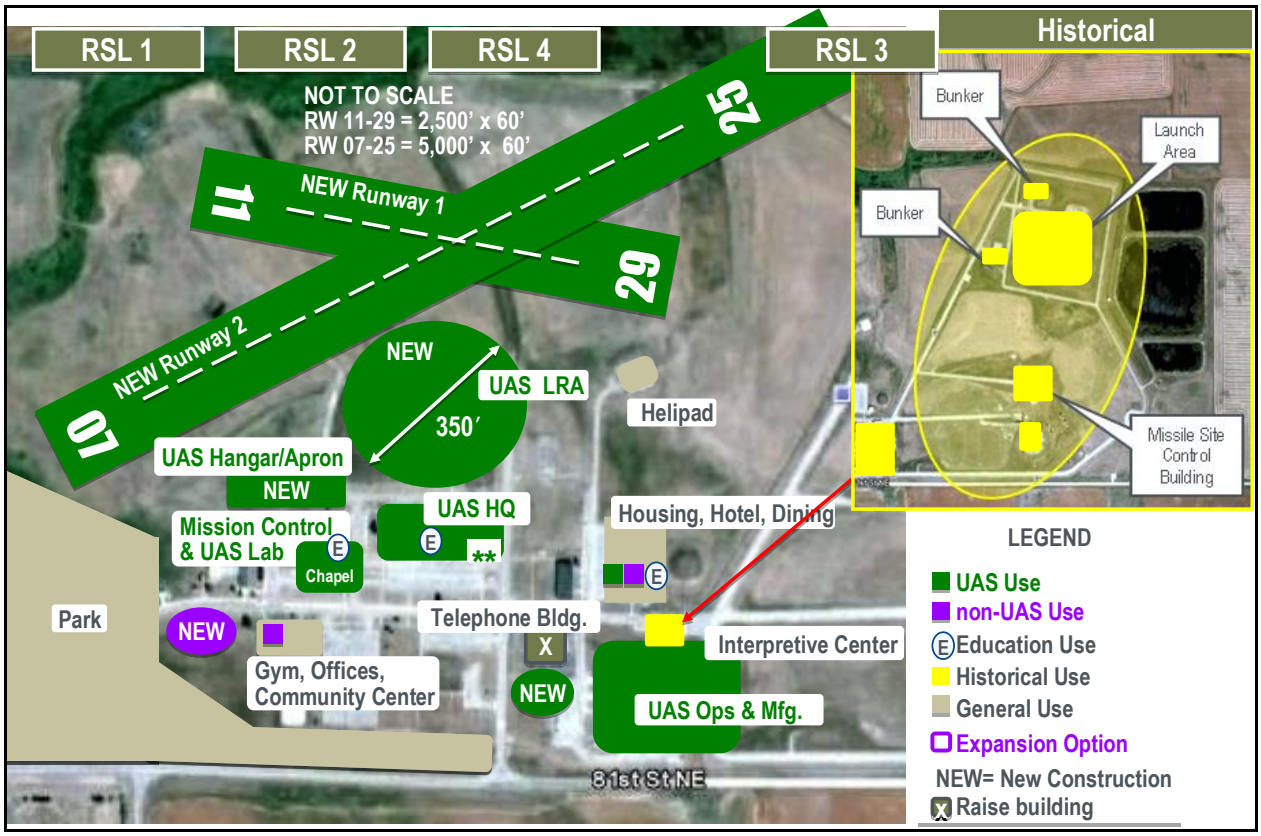


Figure 10. Future State—Phase III

During Phase III, all the existing SRMSC buildings will have their upgrades completed and full occupancy will be achieved. Full capability in UAS and non-UAS, technology research, training, education and historical preservation will be realized. The site will house students, faculty, military, commercial and civil UAS users, manufacturers and business partners, and will be able to host conventional and unconventional training. Over 65,000 square feet of office and leisure space will be in use. Over 50,000 square feet of UAS storage and industrial use buildings will be available, not including new construction.

The second runway will be built, completing all UAS surface builds planned for this effort. UAS standards will be in effect for military and civil UAS operations by this time frame. SRMSC capabilities will be mature and upgrades to UAS instrumentation, operations and services will continue. Budgets have been provided for a 200 foot by 100 foot apron and for a 10 unit box hangar located closer to the UAS surfaces. This will free up space in the Industrial building for vehicle maintenance while enabling greater flexibility for users of the UAS services. The RSL sites will be in use and UAS instrumentation will need to be upgraded for future capabilities.

At this point, most buildings will be dedicated to a specific purpose. Tenants will be resident in their permanent locations. A UAS headquarters will be established for UAS services, and classrooms, labs, and offices will be located in close proximity to each other. Students will have access to study and gathering areas as well as leisure activities. Services such as housing and dining will be fully operational and in use. The CONOPs for UAS operations and for the site in general will be fully capable, and permanent staff will be in place to operate these functions. The Interpretive Center and gift shop will be well established and tourist-friendly designs will enable visitors to fully appreciate the historical significance of the site.

In the non-UAS space, the offices will be filled with tenants and the gym will be available for use by all. Conference and meeting rooms will be available for use and unconventional training will be in full swing at the RSLs. New construction will be required for new partners and new tenant opportunities. The Telephone building will be razed to make room for a new, modern and large building. The facilities will be able to accommodate science and technology camps for the middle and high school communities. Landscaping, parking and roads will be added for new buildings. Walkways and paths will be added to accommodate new buildings and access. At this point, CCJDA will begin to consider expansion considerations to new sites to accommodate future use requirements and new UAS capability requirements.

Beyond Phase III Summary

Duration: begins at Phase III build complete and once IOC 3 capabilities are achieved (beyond 2015). Figure 11 depicts the SRMSC beyond Phase III.

The SRMSC will be in full use and self-sustaining. It will be a recognized Center of Excellence and international expansion, if not already in progress, should be considered at this time. Additional expansion to other North Dakota site locations may be required. New LRAs may be required and high-end specialized services should be considered.

Beyond Phase III capabilities are notional; revenue, financing, and cost estimates for beyond Phase III efforts are not included in the Economics Model.

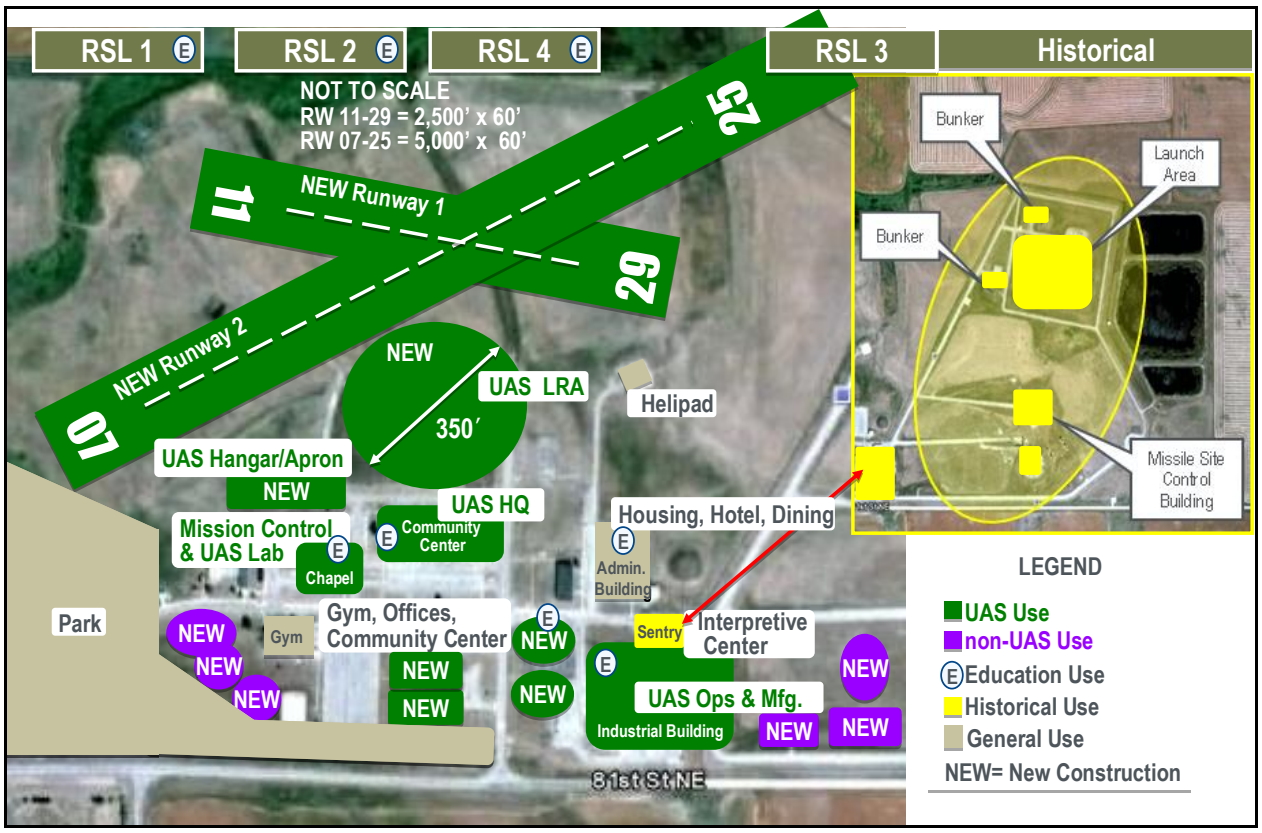


Figure 11. Future State--Beyond Phase III

11. Economics Model

The purpose of the Economics Model is to provide a realistic and credible forecast of the key economic factors associated with SRMSC redevelopment, over a ten year planning period. The model is implemented in an interactive Excel tool which can be used to conduct trade studies of alternative scenarios, determine sensitivities of economic forecasts to key parameters, and analyze the materiality of model elements.

The model includes expenses associated with both one-time/non-recurring and recurring work activities. It includes activities for the three primary missions – Technology (UAS and Non-UAS), Education and Historic Preservation. The model was constructed in accordance with industry best practices for economic forecasting. However, due to the preliminary and visionary nature of this study, the model forecasts should be used for high level budgetary planning purpose only, and should not be construed to be a commitment by the authors, the CCJDA or UND.

This section provides a high level description of the forecasting methodology and the resulting forecasts. Additional details are contained in Attachment 7.

Economics Model Inputs

The SeaTec team's initial study findings resulted in the following inputs to the Economics Model:

- Ground rules and assumptions
- CONOPS
- Requirements
- UAS Test Bed usage scenarios
- Non-UAS usage scenarios
- Stakeholder needs
- Redevelopment strategy
- Market segmentation analysis
- Funding sources

The ground rules and assumptions, CONOPS, and requirements established context, phases, and boundaries for the Economics Model. The UAS and non-UAS scenarios guided the estimates of facility refurbishment, buildout, and usage for the ten year study horizon. The site condition assessment results were used to estimate the costs for the specific building improvements to meet the missions. Standard construction rates for the North Dakota area were applied.

Stakeholder needs helped define key outputs to include new jobs and local economic impact as a result of visitor flow. The redevelopment strategy's technical, educational, and historical missions provided expense and revenue categories for the model's secondary outputs.

Market Segmentation Analysis

In order to quantify of each type of SRMSC user, market segmentation analysis was employed. The UAS market segments include military, academic, civil, and commercial. Beginning with the recently published RTCA 203 OSED Report, the flight UAS scenario parameters were combined with capture rate assumptions to pro-rate the OSED forecast for each market segment and type of UAS during the ten-year study period. The result was a set of forecasts of UAS flight operations at the SRMSC. These forecasts drove both potential revenue (mainly earned in the form of service fees) and the quantitative needs of infrastructure services. Similar analysis techniques were employed to develop the non-UAS usage forecasts and related revenue and expenses.

Model Structure

The model is comprised of four distinct integrated sub-models, as depicted in Figure 12. The primary model outputs are cash flow, new jobs created and visitors to Cavalier County.

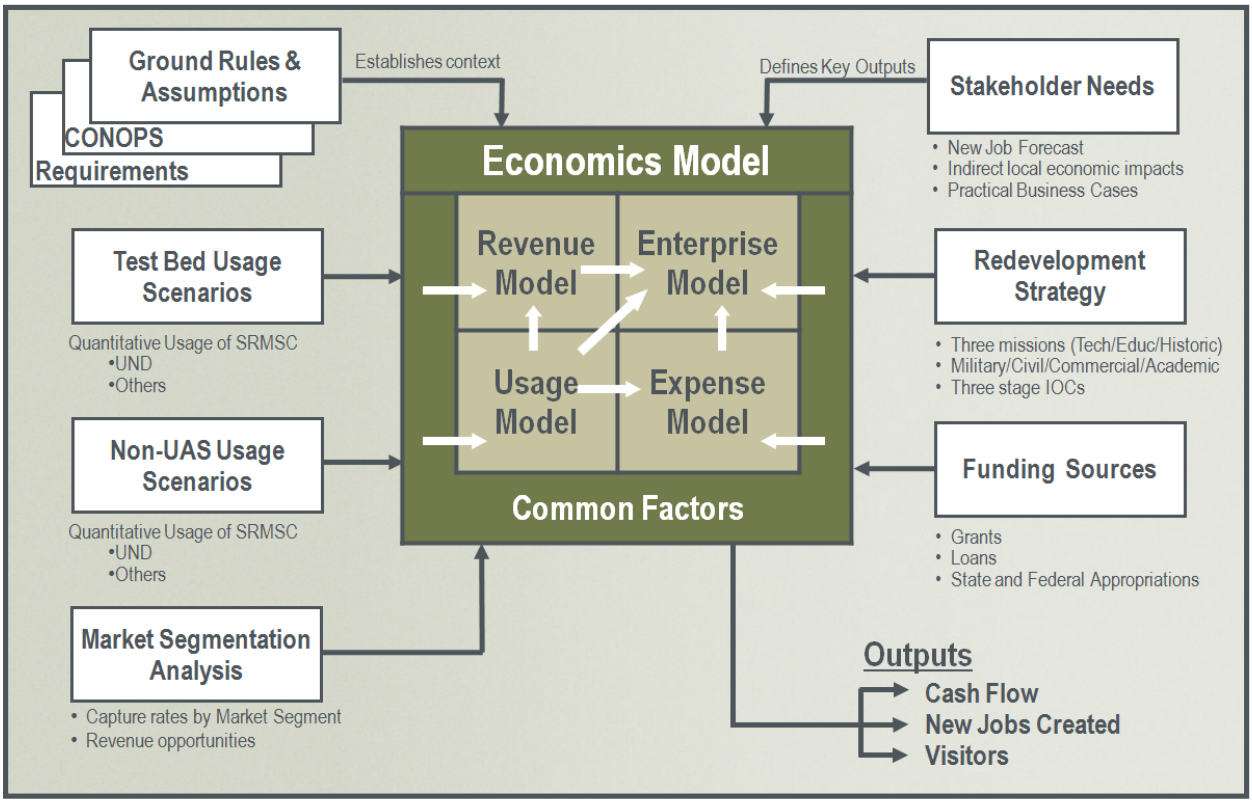


Figure 12. Economics Model

Revenue and Funding Sources

The Economics Model includes the following sources of revenue and funding:

- Service fees charged to provide facilities and infrastructure for ground testing, flight test operations and training exercises related to developmental UAS for civil and commercial applications
- Lease payments by transient and permanent tenants for use of office space, lab space, hangers and light manufacturing areas
- Contracts with federal government agencies for demonstration technologies and safe interoperation of military, civil and commercial UAS with conventional aircraft in the US National Airspace System
- Tourist and concession fees
- Federal and state grants
- Construction loans.

The potential funding sources were distributed in the model across projected redevelopment cost categories to cover the expected expenses.

Expense Forecasts

Expense forecasts were based on the recommended refurbishment and construction timeline for buildings, grounds, UAS operating surfaces, utilities, related infrastructure and personal needs. For construction expenses, standard industry estimating methods were employed, using locally adjusted

rates and factors. For the other expenses, a work breakdown structure method was employed to develop time-phase estimates of personal needs and non-labor outlays.

Expense categories include:

- Staffing to operate the Technology Park and perform related property management and other business functions
- Program management for the three primary missions (Technology, Education and Historic)
- Routine maintenance, security, utilities and administration of building, grounds and UAS surfaces
- Business development/communications
- Ongoing UAS test bed operation
- Insurance
- Capital improvements
- Debt service.

Model Results

SeaTec prepared the detailed Economics Model for SRMSC redevelopment and operation as a non-profit public business. The model predicts approximately $35M in revenue from all sources for the ten year study horizon, and approximately the same amount for expenses — $15M of which will be invested in capital improvements.

Table 3 summarizes expenses and revenues over the ten year period. Figure 13 depicts the relative magnitude of the various expense, revenue and financing factors.

Local Economic Impact

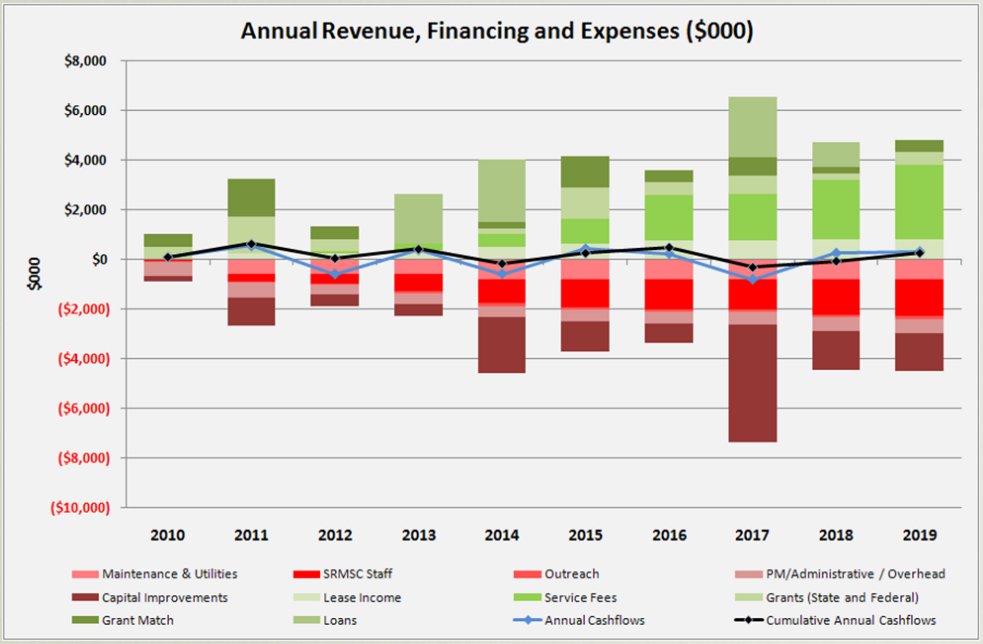
In addition to the cash flow analysis, the model predicts over 670 new jobs created and over 70,000 new visitors to Cavalier County. The time phasing of both jobs and visitors is shown in Figure 13. The new jobs totals include project office, base ops, resident tenants (UAS and Non-UAS), educators and support staff, transportation services, historic venue staff, and construction (> 6 months). The visitor totals include tourists, collaborators, military (excluding units on exercises), university students, science camp students, temporary construction workers, and service providers.

Table 3. SRMSC Redevelopment Cash Flow Analysis

SRMSC Cashflows Revised 01/20/10

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Expenses ($000)										
Maintenance & Utilities	$0	($600)	($600)	($600)	($800)	($800)	($800)	($800)	($800)	($800)
SRMSC Staff	($75)	($300)	($375)	($675)	($975)	($1,125)	($1,200)	($1,200)	($1,425)	($1,500)
Outreach	($50)	($50)	($50)	($100)	($100)	($100)	($100)	($100)	($100)	($100)
PM/Administrative / Overhead	($544)	($595)	($380)	($405)	($450)	($475)	($500)	($525)	($550)	($575)
Capital Improvements	($240)	($1,128)	($502)	($483)	($2,277)	($1,200)	($754)	($4,717)	($1,580)	($1,514)
Total Expenses	**($909)**	**($2,673)**	**($1,907)**	**($2,263)**	**($4,602)**	**($3,700)**	**($3,354)**	**($7,342)**	**($4,455)**	**($4,489)**
Revenue / Financing ($000)										
Lease Income	$0	$220	$260	$390	$520	$640	$740	$775	$805	$825
Service Fees	$0	$0	$50	$251	$490	$990	$1,850	$1,850	$2,405	$2,990
Grants (State and Federal)	$500	$1,500	$500	$0	$250	$1,250	$500	$750	$250	$500
Grant Match	$500	$1,500	$500	$0	$250	$1,250	$500	$750	$250	$500
Loans	$0	$0	$0	$2,000	$2,500	$0	$0	$2,400	$1,000	$0
Total Income / Financing	**$1,000**	**$3,220**	**$1,310**	**$2,641**	**$4,010**	**$4,130**	**$3,590**	**$6,525**	**$4,710**	**$4,815**
Annual Cashflows	**$92**	**$547**	**($597)**	**$378**	**($592)**	**$430**	**$236**	**($817)**	**$255**	**$326**
Cumulative Annual Cashflows	**$92**	**$639**	**$42**	**$420**	**($173)**	**$258**	**$494**	**($324)**	**($69)**	**$258**

The economic model represents current known priorities and opportunities; the order that opportunities present themselves will impact the model and may impact the redevelopment plan.



Local (Cavalier County) Economic Impact

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Direct New Jobs Created	0	20	27	41	71	77	88	105	115	127
Visitors (Person-Days)	20	574	921	1,912	4,259	6,680	9,057	12,083	15,390	19,557

Figure 13. Non-profit Enterprise Economics Model and Local Economic Impacts

12. Key Challenges

Airspace Access

Standards for small UAS flights under a 400 foot altitude are currently being developed by the FAA. However, policy for safe and efficient UAS flight operations in the NAS at higher altitude are problematic at this time and are the subject of considerable debate within and between FAA, DoD, NASA, DHS and various aviation stakeholders. Adjustments to SRMSC usage timelines may be required once the UAS airspace standards are finalized. It is extremely important that the project team maintain relationships with RTCA and the federal agencies in order to contribute to standards development, to meet regulatory obligations, and to obtain necessary operational approvals. A concerted effort is required to successfully maneuver through the regulations and to assure success for the intended operation of SRMSC for academic, military, civil, and commercial UAS flights. Continuous proactive engagement will be required.

Funding

CCJDA plans to work with local, state and federal governments to obtain the necessary funds to purchase the SRMSC. During the Pathfinder Phase, $600K of interim funding will be required to manage the ownership transition, secure initial redevelopment funding, accomplish overall land use planning and civil engineering, and initiate airspace access advocacy and stakeholder outreach communications. For subsequent phases, the Economics Model projects revenues and expenses for incremental redevelopment and can be used to plan and secure funding for each phase. Revenue streams incorporated in the model include loans, grants, government budgets, partnerships, service fees, and leases. Proactive management of relationships with these funding sources and understanding their budget and decision cycles will require creativity and focus. Although there is great support for economic development in North Dakota, all possible funding sources should be considered and investigated to ensure redevelopment success.

Redevelopment and Operations Management

A dedicated core team plus the help of outside experts in aviation, civil engineering, marketing, and procurement will be required to manage ongoing operations while undergoing facility refurbishment and expansion. The team must assemble, assess, and manage the tenant opportunities; gather new requirements; and manage the various UAS, educational and historical programs and integrate them across the enterprise. SRMSC redevelopment has been established based on known opportunities, but changing priorities will require re-planning over time.

13. Next Steps: Pathfinder Tasks

This section summarizes tasks to be performed during the Pathfinder Phase of redevelopment. Activities will focus on four distinct areas:

- Airspace Access Advocacy
- Civil Engineering and Site Redevelopment
- Stakeholder Outreach Communications
- Management and Operations

These activities should be undertaken in parallel, with periodic reviews to ensure consistent objectives and ground rules. Figure 14 depicts a timeline for Pathfinder activities.

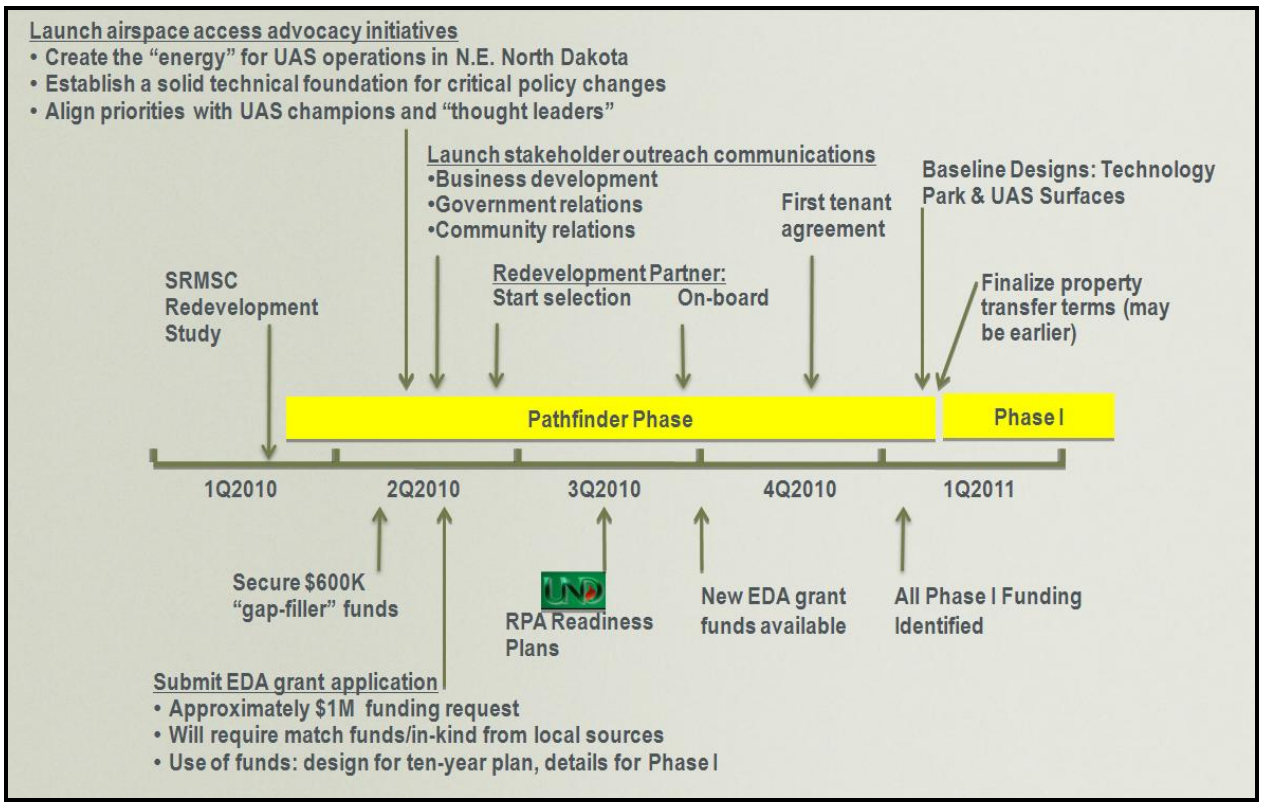


Figure 14. Pathfinder Activities and Timeline

During Pathfinder, CCJDA and UND should provide strategic guidance, project oversight, and policy decisions. Although SRMSC Redevelopment will operate on a non-profit basis, the CCJDA and UND contemplate running the initiative in a manner that is similar to a commercial start-up business to establish a long-lasting business culture.

Section 8 outlines some Airspace Access Advocacy actions recommended to be undertaken during the Pathfinder time frame.

For the Civil Engineering and Site Redevelopment activity, it is recommended that a redevelopment partner be qualified and selected to accomplish the civil engineering designs needed for Phase 1. This partner should be willing to invest in the project as well as execute it, and should be capable of incorporating LEED standards into the buildings. The partner will prepare detailed plans and designs with cost estimates for each of the next redevelopment phases, focusing on Phase 1 sufficiently to enable its scheduled construction to proceed on time.

The objective of the Stakeholder Outreach Communications activities is to develop and deliver essential communications about the SRMSC redevelopment project, and to conduct related outreach to potential customers, collaborators, and key funding and policy influencers. Communications activities will enhance public perception that the project is real and is rapidly building momentum. Outreach efforts will focus on building a broad based coalition of support including local, state and national elected officials, economic development authorities, businesses, educational institutions and potential project partners.

Management and Operations activities during Pathfinder include:

- Planning and accomplishing fund-raising
- Establishing and maintaining overall project priorities
- Defining tasks
- Assigning staff responsibilities
- Developing project schedules
- Refining and updating the Economics Model projections
- Monitoring environmental cleanup
- Negotiating terms for transfer of the property ownership from GSA to a local entity.

14. SRMSC Strategy Summary

The Stanley R. Mickelsen Safeguard Complex (SRMSC) near Nekoma, North Dakota, was built during the Cold War in the early 1970's as America's first operational anti-ballistic missile defense system. The Cavalier County Job Development Authority (CCJDA) at nearby Langdon, in partnership with the University of North Dakota (UND) at Grand Forks, plans to acquire SRMSC and develop it for use in:

- Technology—providing a research and development center and test bed for Unmanned Aerial Systems (UAS) and other non-UAS technologies, bringing high skill, high wage jobs into the local area
- Education—providing learning opportunities for North Dakota students of all ages
- Historic preservation—maintaining remaining structures and interpreting SRMSC's role in the Cold War for visitors.

With the expanding use of UAS in DoD operations and use in newly emerging civil and commercial applications, the timing is excellent for the development of a UAS research and development facility in northeastern North Dakota. An assessment of the facility revealed that with some modifications, building and grounds refurbishments, and environmental cleanup, the SRMSC can be ready to be used for UAS and other technology as early as mid-2011. The Economics Model predicts a $36 million cash flow over ten years of non-profit operations.

Key challenges for CCJDA and UND include getting efficient UAS access to the national airspace, obtaining funds from Government and other sources, and managing the enterprise as a growing technology center.

15. About the Report Contributors

Cavalier County Job Development Authority (CCJDA)

CCJDA is headquartered in Langdon, North Dakota, about 13 miles from the SRMSC MSR site. They are chartered under the North Dakota Century Code to encourage and assist in the development of employment and promotion of tourism within Cavalier County.

University of North Dakota (UND)

UND's Department of Aviation at Grand Forks offers a liberal arts core curriculum combined with a comprehensive professional aviation education and all-season flight training. The Aviation Department is known around the world for academic excellence. They boast technologically advanced simulators and the world's largest collegiate aviation training fleet. The John D. Odegard School Of Aerospace Sciences at UND is a world-renowned center for aerospace learning, nationally acclaimed

for achievements in collegiate aviation education, atmospheric research, space studies, and computer science applications.

SeaTec

Systems Engineering and Technology, LLC ("SeaTec") is an innovative, high-performing technology and business consulting firm serving clients in aerospace, defense, medical devices and consumer software-as-a-service sectors. Since its founding in 2000, SeaTec has consulted with large systems integrators, aircraft manufacturers, airlines, airports, aviation service providers, maintenance repair and overhaul (MRO) providers, regulatory agencies, and startups on a wide variety of projects including new business incubation, new aircraft systems engineering, product development and other advanced technology programs.

The Padina Group

The Padina Group provides executive aerospace consulting services especially tailored to customer needs. Proven leaders and managers, the three founders have extensive experience domestically and internationally in air and space related fields. Executive program management experience in the FAA and DoD, coupled with global network relationships, enables The Padina Group to provide pre-eminent access to senior officials in Government, industry and academia for almost any challenge.

Bucher, Willis, & Ratliff Corporation (BWR)

The roots for Bucher, Willis & Ratliff date back to 1957 when James D. Bucher, PE, and Shelby K. Willis, PE, established the firm. BWR is a multidiscipline firm offering services in surface transportation planning and design; architecture; comprehensive community planning; recreational/landscape architecture; environmental engineering; and compliance and structural engineering.

16. Abbreviations

ABM	Anti-ballistic Missile
AFB	Air Force Base
ASTM	American Society for Testing and Materials
ATC	Air Traffic Control
BTUH	British Thermal Units per Hour
BWR	Bucher, Willis, & Ratliff Corporation
CCJDA	Cavalier County Job Development Authority
CFM	Cubic Feet per Minute
CFR	Code of Federal Regulations
CRN	Concrete Masonry Unit
COE	Center of Excellence
CONOPS	Concept of Operations
DARPA	Defense Advanced Research Projects Agency
DFRC	Dryden Flight Research Center
DHS	Department of Homeland Security
DoD	Department of Defense
EASA	European Aviation Safety Agency
EDA	Economic Development Act
EUROCONTROL	European Organisation for the Safety of Air Navigation
FAA	Federal Aviation Administration
FF&E	Furniture, Fixtures, and Equipment
GE	General Electric
GSE	Ground Support Equipment
GSA	General Services Administration (US Government)
HALE	High Altitude Long Endurance
HAZMAT	Hazardous Materials
HR	Human Resources
HVAC	Heating, Ventilation, Air Conditioning
IOC	Initial Operating Capability
LEED	Leadership in Energy and Environmental Design

LF, L.F.	Linear Feet
LRA	Launch and Recovery Area
LLC	Limited Liability Corporation
MALE	Medium Altitude Long Endurance
MASPS	Minimum Aviation System Performance Standards
MFG	Manufacturing, Manufacturers
MOA	Military Operations Area
MOPS	Minimum Operation Performance Standard
MOUT	Military Operations in Urban Terrain
MSR	Missile Site Radar
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NAVAIDS	Navigational Aids
ND	North Dakota
NOAA	National Oceanic and Atmospheric Administration
NTF	National Task Force
OPV	Optionally Piloted Vehicle
OSED	Operational Services & Environment Definition
PBFA	Policy Board for Federal Aviation
RLOB	Remote Launch Operations Building
RPA	Remotely Piloted Aircraft – used in lieu of UAS, UAV
RSL	Remote Sprint Launcher
RTCA	Radio Technical Commission for Aeronautics
SRMSC	Stanley R. Mickelsen Safeguard Complex
STEM	Science, Technology, Engineering & Mathematics
SUA	Special Use Airspace
TAAC	Technical Analysis and Applications Center
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle
UND	University of North Dakota
US	United States
USAF	United States Air Force
VTOL	Vertical Takeoff and Landing