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SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires
Amendment 003

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Title - Sujet Fixed-Wing Search and Rescue	
Solicitation No. - N° de l'invitation W8475-110004/A	**Amendment No. - N° modif.** 004
Client Reference No. - N° de référence du client W8475-110004	**Date** 2012-09-14
GETS Reference No. - N° de référence de SEAG PW-$FWS-003-22990	
File No. - N° de dossier 003fws.W8475-110004	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2012-12-21**	**Time Zone** **Fuseau horaire** Eastern Daylight Saving Time EDT
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AMENDMENT 004

This Amendment **004** to the Fixed Wing Search and Rescue Aircraft Replacement Project LOI (W8475-110004/A) is publish to incorporate the Essential Elements V.2.0 document that was missing from Amendment 003(reference paragraph #6).

ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME

ESSENTIAL ELEMENTS OF THE FIXED WING SEARCH AND RESCUE (FWSAR) CAPABILITY

(Version 2.0)

FWSAR Environment in Canada

Defence Policy Context and Foundation

SUPPORTING DOCUMENTATION

Canada First Defence Strategy

The Canada First Defence Strategy (CFDS) provides a detailed road map for the modernization of the Canadian Forces. This Strategy is based on the Government's vision for defence as well as an extensive and rigorous analysis of the risks and threats facing Canada and Canadians in the years to come. The three roles of the Canadian Forces, as defined by the Government of Canada in the CFDS are as follows:

a. Defend Canada;

b. Defend North America; and

c. Contribute to international peace and security.

These three roles have been further defined into six (6) core missions. The military will fulfil the three roles by maintaining its ability to conduct these six (6) core missions within Canada, in North America and globally, at times simultaneously. Specifically, the Forces will have the capacity to:

a. Conduct daily domestic and continental operations, including in the Arctic and through NORAD;

b. Support a major international event in Canada;

c. Respond to a major terrorist attack;

d. Support civilian authorities during a crisis in Canada;

e. Lead and/or conduct a major international operation for an extended period; and

f. Deploy forces in response to crises elsewhere in the world for shorter periods.

To carry out these missions, the CFDS directs that "the Canadian Forces will need to be a fully integrated, flexible, multi-role and combat-capable military, working in partnership with the knowledgeable and responsive civilian personnel of the Department of National Defence. This integrated Defence team will constitute a core element of a whole-of-government approach to meeting security requirements, both domestically and internationally."

The CFDS explicitly states the Government policy direction for the Canadian Forces to acquire FWSAR aircraft. It also reaffirms the military's responsibility to "maintain search and rescue response capabilities that are able to reach those in distress anywhere in Canada on a 24/7 basis."

The operating environment in which any of these six (6) tasks may be required to be executed plays a significant role in determining what capabilities are required. Each Government defined role can be further defined into a multitude of tasks and procedures that are required in order to achieve the aim of the role. By examining and defining both current and envisioned tasks and procedures it is possible to define the minimum requirements for FWSAR.

SAR POLICY GUIDANCE

SAR Evolution in Canada

The RCAF was formally tasked to establish an aeronautical SAR service on 18 June 1947. At this time, the Cabinet Defence Committee authorized establishment of primary SAR aircraft to conduct operations in support of all aircraft distress incidents in the Canadian environment. Over the years, various acts, international conventions and government directives and policies have reinforced and broadened the scope of this mandate and created a framework for a National SAR Program.

In 1982, Cabinet established the National SAR Program (NSP) to provide common goals and cooperation for all federal agencies involved in SAR. At the Federal level, primary responsibility for delivery of the National SAR Program rests with the CF and Transport Canada/Canadian Coast Guard (CCG), with the CF having the ultimate responsibility for the setting of priorities pertaining to the allocation of SAR resources during response to SAR incidents. As partners, and with the assistance of other federal departments, particularly the Department of Fisheries and Oceans (DFO), the CF and the CCG deliver an effective aeronautical and maritime SAR program within the Canadian area of responsibility.

Today, the Canadian area of responsibility, which covers 18,000,000 square kilometres, has been divided into three SAR regions, each with a variety of federal departmental resources dispatched by three Joint Rescue Coordination Centres (JRCCs) located in Victoria, British Columbia; Trenton, Ontario; and Halifax, Nova Scotia.

International Agreements

Canada participates in a number of international organizations such as ICAO and the IMO, and has agreed to adopt SAR standards and practices in accordance with the International Civil Aviation and Maritime SAR convention for Safety Of Life At Sea (SOLAS) 1974. Additionally, agreements between Canadian and American SAR agencies enhance coordination and mutual support in operations adjacent to our common border. Finally, Canada as a member of COSPAS/SARSAT participates in providing payloads for and operationally monitoring SAR satellites.

National SAR Policy Guidance

The Government of Canada, through the Canada First Defence Strategy, has re-affirmed Canada's long-standing commitment that the CF will continue to serve Canadians in the search and rescue role. Search and rescue represents a significant challenge for Canadian Forces personnel

and their equipment. The distances involved can be enormous and the operating conditions very difficult and challenging. Nevertheless, for Canadians, safeguarding human life remains an absolute priority, and the Canadian Forces will continue to play a major role in this vital area.

The National Search and Rescue Manual, issued under the joint authority of the Deputy Minister of National Defence, the Chief of Defence Staff and the Commissioner of the Canadian Coast Guard, describes the federal SAR organization and interdepartmental structure that has been established to provide effective SAR. The National SAR objective as defined in the National SAR Manual is to "prevent loss of life and injury through search and rescue alerting, responding and aiding activities which use public and private resources, including where possible and directly related thereto, reasonable efforts to minimize damage to or loss of property, and by ensuring appropriate priority to aviation and marine safety and prevention measures focused on owners and operators most commonly involved in SAR incidents".

FWSAR Delivery in Canada

MISSION AND SCENARIOS

Search and Rescue in Canada

As described in the National SAR Manual, the Canadian Forces (CF) has the primary responsibility for the provision of aeronautical SAR services and the effective operation of the coordinated Federal aeronautical and maritime SAR system. The Canadian area of responsibility for air search and rescue is as defined under ICAO agreements, and for marine search and rescue is as defined under IMO agreements, and includes Canadian waters of the Great Lakes and the St. Lawrence River system (see Figure 1 below). The CF has the following primary SAR tasks within the Canadian SAR area which extends up to 1,000 nautical miles off the East Coast, and 800 nautical miles off the West Coast:

a. To exercise ultimate authority in the allocation of all SAR resources during a SAR incident;

b. To coordinate, control and conduct SAR operations in relation to air SAR incidents;

c. To provide air resources in support of the execution of marine SAR operations;

d. To insert and extract rescue personnel, rescue/survival equipment and personnel involved in SAR incidents;

e. To conduct visual and electronic searches in relation to the aeronautical and maritime SAR incidents; and

f. To conduct ground searches in relation to air and marine SAR incidents where survivors have moved away from the scene or coast.

Notwithstanding the CF SAR policy stated above, CF SAR resources are frequently called upon to respond to other distress incidents or secondary missions. Because of their continuous standby posture for SAR and their life-saving capability, Canadian Forces SAR Squadrons are normally in an optimal position to conduct these other secondary missions, such as humanitarian relief, Aeromedical Evacuation (AE) from remote areas, searches for lost hunters or children, assistance in floods, forest fires and many others.

Approximately one quarter of the yearly SAR flying rate for the CF primary FWSAR aircraft has been expended on secondary response incidents in recent years. From a public perspective, the distinction between primary and secondary roles is not understood and the response to the large number of humanitarian incidents has evolved to become a de facto responsibility of the SAR system. This is particularly true for Aeromedical Evacuation (AE) from remote locations. Although CF primary SAR resources will continue to provide a humanitarian response, the acquisition of SAR resources, fleet numbers, equipment capabilities, and resource employment cannot be based primarily on such requirements. However, because of the importance of this secondary SAR role, humanitarian mission requirements must be considered when defining the CF's FWSAR project requirements.

FIGURE 1. CANADA'S AREA OF SAR RESPONSIBILITY

Military SAR.

a. Military SAR commitments involve the rescue of downed aircrew and/or SAR support for naval operations in Canadian territory or in the Canadian area of responsibility for NATO, which by design is essentially identical to the area of responsibility for National SAR under ICAO. Therefore, military SAR differs from National SAR in that it is the provision of SAR services to military (vice civilian) resources involved in air and marine distresses. Accordingly, the missions evolving from these military SAR contributions are essentially identical to those for the National SAR contribution.

Transport.

a. The FWSAR aircraft will occasionally be required to perform medium lift, multi-role, cargo and passenger transport missions in support of SAR or other utility airlift operations. Such missions may include transporting major search operations staff and equipment, transporting SAR aircraft repair crews and equipment, and conducting crew rotations. For example, FWSAR aircraft from Greenwood provided airlift in support of Op Hestia for earthquake victims in Haiti in January 2010.

b. While the requirement to support limited transport missions in support of SAR operations must be considered in defining the FWSAR project requirement, it is not the intent of the FWSAR project to replace any portion of the non-SAR airlift capacity of Buffalo and Hercules aircraft.

Environment

Flight Safety. A typical SAR operation is carried out under stressful conditions with minimal time for planning. It may be a highly time-sensitive, life-saving mission, and is often conducted at low level in poor weather. In western Canada, SAR operations are routinely conducted in mountainous terrain and frequently encounter marginal weather conditions. The FWSAR aircraft must be capable of conducting visual and instrument flying operations over a wide range of diverse climatic, geographic, and aviation environments, during day and night conditions.

Climate. FWSAR aircraft will operate in extremes of weather throughout the Canadian SAR area of responsibility, during day, night and twilight conditions, with a wide range of hot and cold temperatures. High density altitude, turbulent conditions occur in the mountains, while heavy icing and fog are often prevalent in coastal regions. FWSAR aircraft must be suitably equipped for operations in a broad range of climatic conditions and various environments.

Geography. CF SAR resources currently operate, and will continue to operate, in extremely diverse geographical conditions including arctic, mountainous, and maritime regions. The aircraft is therefore to be suitable for operating over land and water in these regions with the accompanying exposure to snow, ice, and salt.

Aviation. The FWSAR aircraft will operate domestically and internationally in high altitude controlled and uncontrolled airspace, as well as in low-level controlled and uncontrolled airspace, under instrument or visual conditions. It will also operate in austere locations, on semi-prepared and gravel airfields with minimal support facilities and thus must have self-start capabilities. Some airfields may only have short take-off and landing distances available.

Threats

Operating within their primary domestic role, key threats faced by the FWSAR fleet are environmental and geographic in nature. Weather phenomena such as mountain waves and katabatic winds pose significant risks to safety of flight. The risks associated with flight operations in mountainous terrain can be mitigated by aircraft possessing a high power to weight ratio, excellent cockpit field of view, Heads-Up Displays (HUD), Terrain Avoidance and Warning Systems (TAWS), and automated flight control systems. Similarly, flight operations in Arctic and coastal environs are enabled through the ability to function in icing conditions.

Concepts of Operations (CONOPS)

Fixed-Wing Search and Rescue Response. Upon notification of a potential incident requiring the involvement of Canadian Forces Fixed Wing Search and Rescue assets, one of three Joint Rescue Coordination Centres will notify an appropriate Wing Operations Duty Officer and the Aircraft Commander of the dedicated Search and Rescue asset. The crew will be briefed with a summary of the distress case and weather for the area. Transit to the search area is accomplished via the shortest route possible and may require an en route stop to refuel. Once at the search area, a search will be conducted via electronic or visual means. Once the incident site has been located, contact with the party in distress will be attempted, and the crew will commence activities to dispatch medical equipment and Search and Rescue Technicians (SAR Techs) via parachute to attend to the emergency if required. SAR Techs remain with casualties until a recovery vehicle can reach the scene. Once SAR Techs are dispatched, the aircraft typically remains on scene as long as possible to provide a communication link and guide the recovery vehicle to the scene. Time overhead is a function of remaining endurance and elapsed crew day. Initial failure to locate the incident scene may result in the allocation of additional SAR resources (Figure 2).

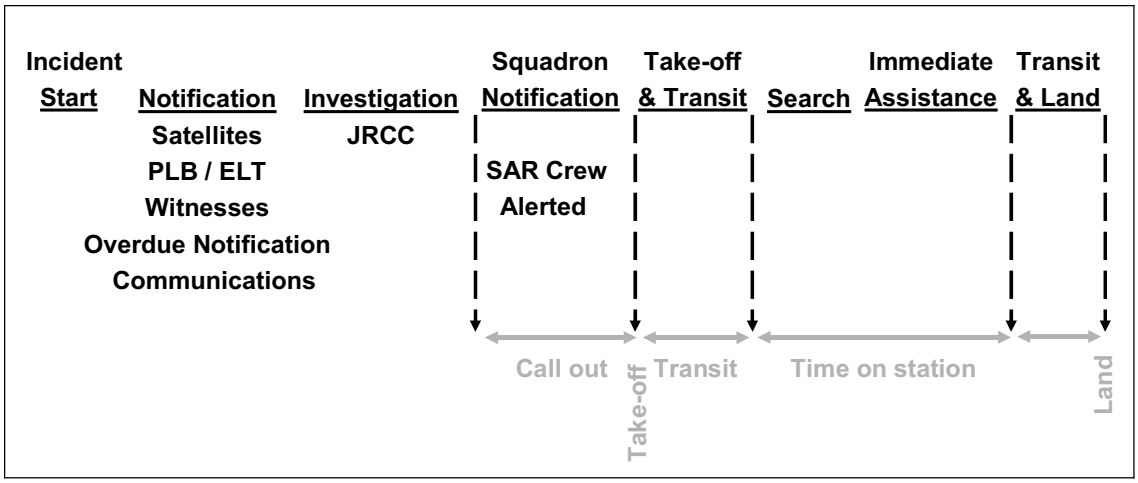

FIGURE 2. MAJOR STEPS IN A SAR EVENT PROSECUTION

SAR Standby and Readiness Posture Requirements. As defined in the National SAR Manual, the normal SAR standby posture is 2 hours for aeronautical units. In addition to that, each SRR must provide 30 minute SAR standby on each aircraft type for a minimum of 40 hours per week (National SAR Manual, Chap 4, Annex 4A — State of Readiness for Primary SAR Aircraft). Although normally planned from 8:00 a.m. to 4:00 p.m. Monday through Friday, each SRR commander may realign the standby posture to coincide with historically higher dispatch periods.

On-Scene Commander (OSC) or Coordinator Air Search (Coord AS). During searches, coordinating SAR operations at the incident site is critical. SAR aircraft act as communication platforms to coordinate movement of military and civilian aircraft in the vicinity of the incident scene. This enables the OSC and Coord AS to coordinate inter-agency support requirements, monitor on-scene weather and issue situation reports to the required agencies.

Mission Profile. The following diagram (Figure 3) depicts a typical FWSAR mission profile. En route legs are flown at optimal cruise altitudes for best airspeed and range advantage, with a fuel stop if required.

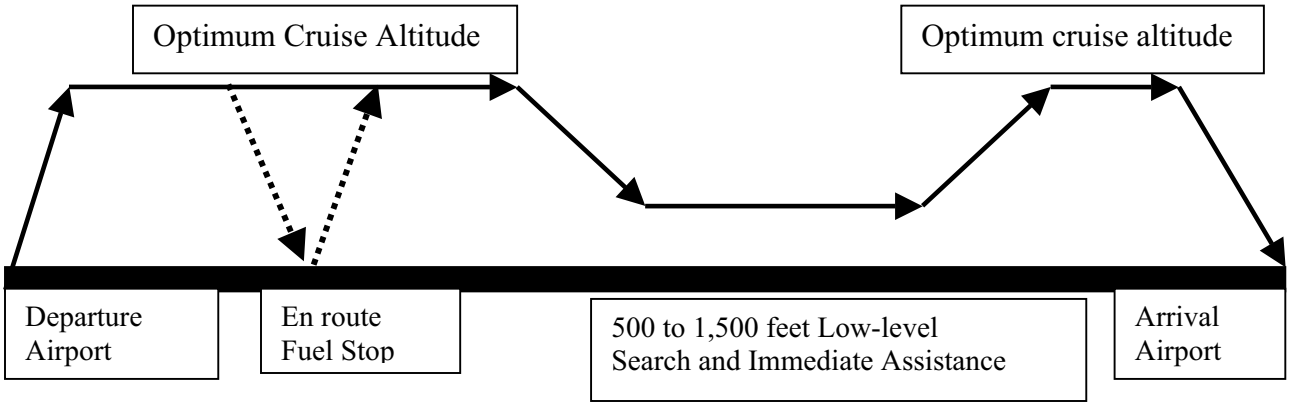

FIGURE 3. SAR MISSION PROFILE

Range Considerations. Canada is the second largest country in the world, with the longest coastline of any nation. Transit distances to incident locations vary widely and often exceed 1000 kilometres. For each SAR incident, the crew determines a transit plan that optimizes effective search time upon arrival over the incident site. Among the factors considered are the range and endurance of the aircraft, recovery airfields available for use, and the meteorological conditions. Ideally, the crew will optimize arrival time overhead with enough fuel onboard to commence effective search operations. With incidents occurring in the Arctic or beyond littoral waters, crews will normally refuel at the last usable en route aerodrome before proceeding to the incident site. In order to provide effective coverage the FWSAR aircraft shall be capable of reaching any point within Canada's area of responsibility while maximizing search time available within a SAR crew-day. The following scenarios illustrate the geographic challenges present within Canada's area of responsibility.

Victoria Search and Rescue Region (SRR) — Maritime Scenario. When considering a maritime search scenario in the Victoria SRR, the longest transit distance would be to the western boundary of the SRR, 797nm from Comox. The nearest suitable recovery aerodrome in this scenario would be Sandspit BC, a return distance of 581 nm. Thus an aircraft operating overwater in the Victoria SRR must be capable of carrying enough fuel for a 1,378 nm flight at en route cruise power settings, descent to search altitude and conduct operations for the minimum time specified, climb back to altitude for flight to a recovery aerodrome, and maintain minimum Instrument Flight Rules (IFR) fuel reserves (as per para 37.b of the 1 Canadian Air Division (CAD) Orders, Vol 2.). This scenario is represented below at Figure 4.

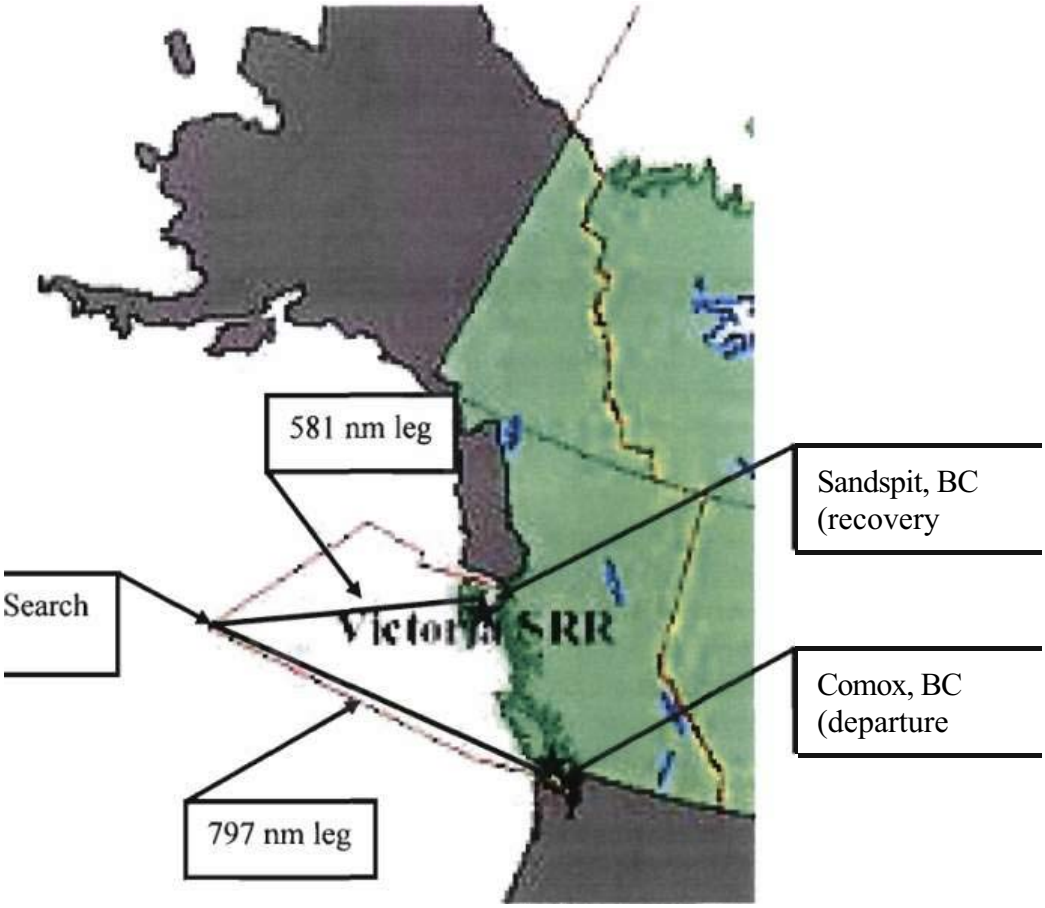

FIGURE 4. SCENARIO #1 - VICTORIA SRR - MARITIME

Trenton SRR — Arctic Scenario. The Trenton SRR is the largest search region within Canada's area of responsibility. It is serviced by two FWSAR Main Operating Bases, Trenton, Ontario and Winnipeg, Manitoba. A mission from Winnipeg to the North Pole equates to 2,414 nm direct distance. The nearest recovery base is Alert, 451 nm distant. Meaningful time on-scene can only be provided via the utilization of an en- route refuelling stop. Although the decision rests with the crew after evaluating each situation, an en route refuelling stop will normally be planned if the search area is located in the high Arctic. This enables meaningful search time and sufficient IFR fuel reserves (as per para 37.b of the 1 CAD Orders, Vol 2.) to recover at one of the remote Arctic aerodromes. Due to a variety of factors, Resolute Bay is often selected as the most appropriate location to refuel prior to continuing operations in the high Arctic. Transit distance from Winnipeg to Resolute Bay is 1,493 nm direct. The North Pole is a further 921 nm distant, and closest recovery aerodrome an additional 451 nm to Alert. In this mission, the greatest un-refuelled distance flown would be 1,493 nm. This is represented below at Figure 5.

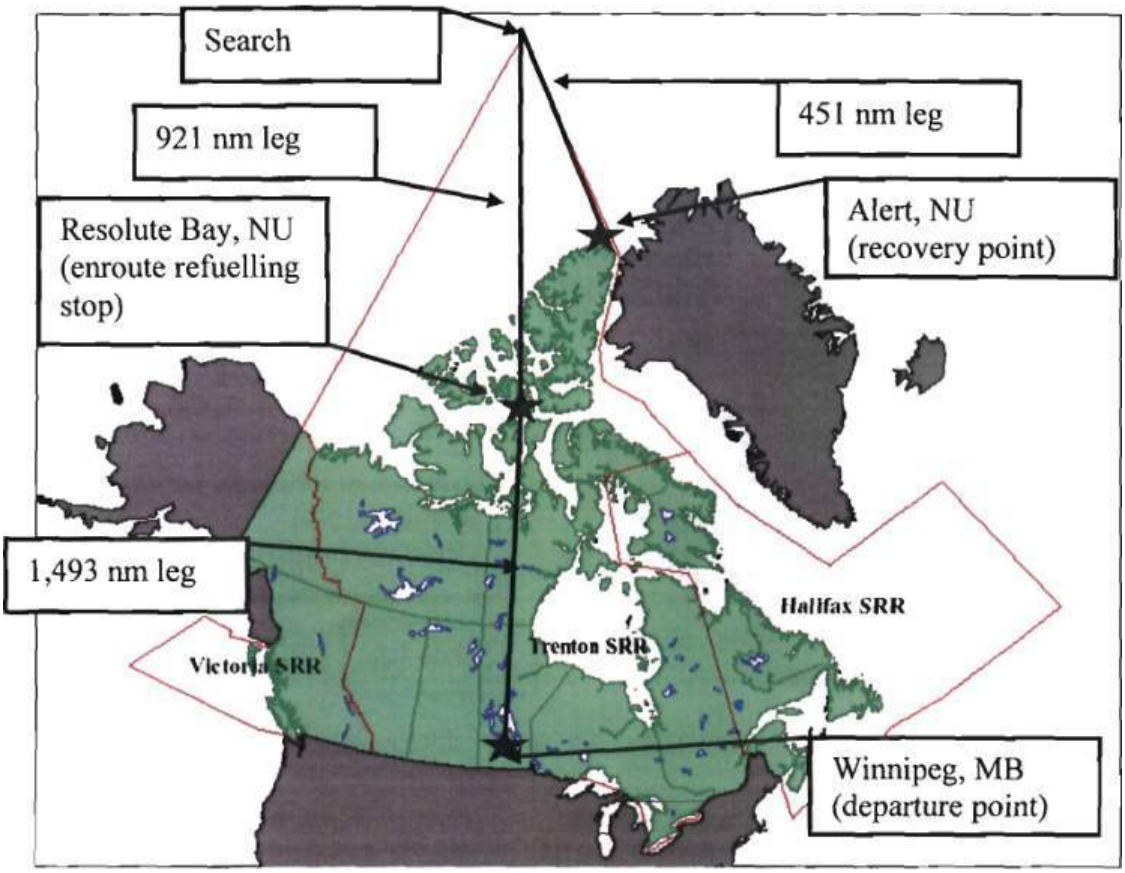

FIGURE 5. SCENARIO #2 - TRENTON SRR - ARCTIC

Halifax SRR. The Halifax SRR encompasses a portion of the Arctic and a particularly large maritime area extending to 30° West longitude. There is one FWSAR MOB located in Greenwood, Nova Scotia, (and an additional rotary-wing SAR base in Gander, Newfoundland). Depending on the transit distance from Greenwood to the search area, an en route refuelling stop may be planned if operating a significant distance from the coast. The most challenging scenario involves responding to an incident in proximity to the eastern boundary, at 30° West longitude. From this area, possible recovery aerodromes are located in Newfoundland, Iceland, the Azores or Ireland. As the winds in the North Atlantic are predominantly from the West, recovery to Shannon, Ireland would likely result in the shortest flying time. Departing from Greenwood then refuelling in St. John's, Newfoundland, the FWSAR aircraft would then fly approximately 912 nm to 51° North, 30° West, search and recover to Shannon at an additional distance of 787 nm. Total endurance requires a 1,699 nm transit distance at cruise power settings, plus requisite search time and Instrument Flight Rules (IFR) fuel reserves (as per para 37.b of the 1 CAD Orders, Vol 2.) (Figure 6). In order to keep primary SAR assets in Canada for immediate tasking, and better facilitate crew changes in the event of an extended search, sufficient endurance to return to a suitable aerodrome on Canada's east coast would be deemed highly desirable. This would increase the total transit distance to 1,824 nm.

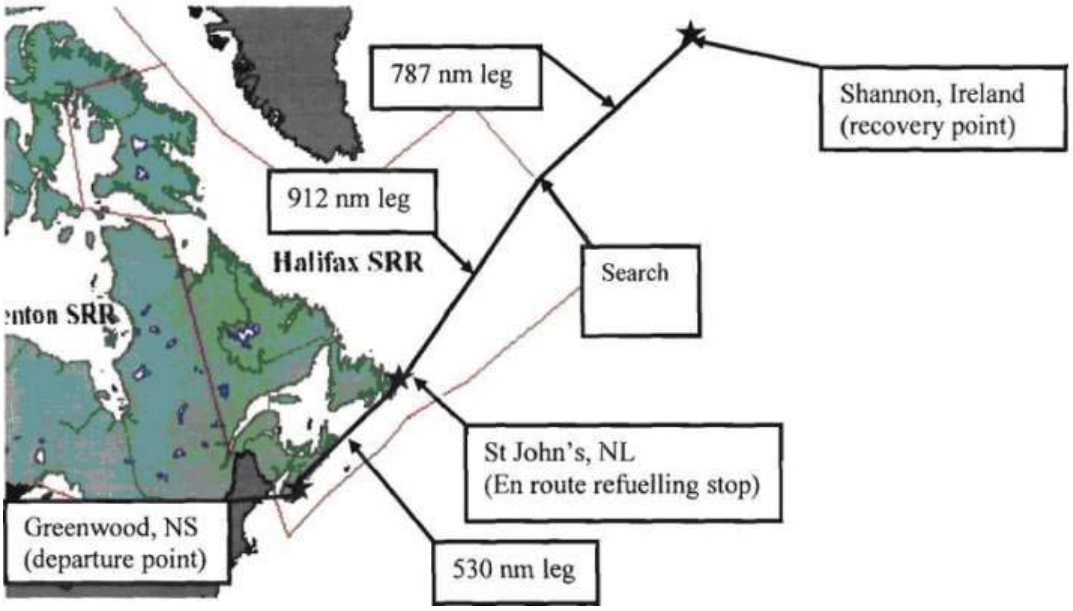

FIGURE 6. SCENARIO #3 - HALIFAX SRR - MARITIME

Range Requirement Summary. The range requirements summarized in Figure 7 below are based on the current FWSAR MOBs and operating concepts. From the perspective of completing a mission within the limitations of a crew day, the scenario to the North Pole (Scenario #2) is the most demanding. From an un-refuelled range perspective, the scenario to 51° North, 30° West (Scenario #3) is the most demanding, with a single leg distance of 1,699 nrn while holding IFR alternate fuel.

Range Requirement Summary							
Scenario	Departure Aerodrome	Search Location	To fuel Stop **(NM)**	To Search Location **(NM)**	To Landing Airport **(NM)**	Longest Leg (NM)	Total Transit **(NM)**
1	Comox	Western Edge of SRR	**0**	**797**	**581** (Sandspit)	**1,378**	**1,378**
2	Winnipeg	Northern Edge of SRR	**1,493**	**921**	**451** (Alert)	**1493**	**2,865**
3	Greenwood	Eastern Edge of SRR	**530**	**912**	**787** (Shannon)	**1,699**	**2,229**

FIGURE 7. RANGE REQUIREMENT SUMMARY

Search Altitudes. Search altitudes vary considerably depending on the circumstances. Electronic searches are normally initiated at high altitudes to provide a rough position, which is then refined at lower altitudes. Visual searches are conducted from lower altitudes, typically from between 500 to 1,500 feet above ground level (AGL), or 300 to 1,500 feet above water level (AWL).

Cruise Speed. The cruise speed utilized by the FWSAR aircraft to transit to the incident scene is an important factor in determining the elapsed time in providing an initial response in any SAR scenario. Higher speeds enable SAR Tech support to arrive on scene more rapidly. Cruise speed must be sustained at a normal engine power setting as per the Aircraft Operating Instructions (AOIs) of the FWSAR aircraft, while carrying the specified SAR payload.

Search Speeds. Search speeds are dependent upon the search altitude, search pattern, sensors employed, aircraft type, stall speed all up weight, terrain and the object being located. They typically vary between 110 to 140 knots for visual searches, to higher speeds while conducting high altitude electronic searches. During low altitude searching, it is desirable to have the lowest safe search speed possible, taking into account:

a. Manoeuvring capability;

b. Engine out performance;

c. Bank angle / "G" limits;

d. Acceleration capabilities;

e. Observation qualities; and

f. Stall speed.

On-scene Actions. Once a SAR scene has been located and confirmed as the incident site, there are a number of possible actions. If people are visible at the scene, the crew will normally attempt to establish communications first. Once communications are established, the crew would provide whatever assistance possible, including airdropping survival equipment or dispatching SAR technicians via parachute if required. If communications cannot be established, or if visual inspection of the scene indicates that a medical emergency exists, the crew will normally dispatch SAR technicians immediately to attend to the scene. Once on the ground, the SAR technicians will remain with the casualties until an extraction team arrives.

Night Illumination of Incident Scene. If operations at the incident scene require activities to be conducted during periods of darkness, the FWSAR aircraft is capable of providing illumination of the scene using para-flares. This procedure involves establishing a wind corrected orbit over the scene to dispatch para-flares to illuminate the area. The orbit is timed such that each successive salvo of para-flares is dispatched before the preceding salvo extinguishes.

Aeromedical Evacuation (AE) Flights. Occasionally, SAR resources may be tasked to conduct Aeromedical Evacuation (AE) flights. This involves moving medically stabilized patients from remote areas to receive treatment. During AE flights, the standard SAR crew will be augmented by operationally qualified Aeromedical Evacuation Crew Members (AECMs) or qualified civilian medical personnel (flight nurse and/or paramedic) and will carry additional AE equipment requiring dedicated power connections. The FWSAR aircraft should have sufficient access to allow for loading, unloading and accommodating of AECMs, AE patients, and all associated equipment and supplies required for their care.

Airlift Support for SAR Operations. In the conduct of a major search, there is often a requirement to transport additional SAR crews, equipment, and material. Presently, FWSAR aircraft are capable of transporting additional personnel and equipment in support of SAR operations. During the course of a search, it may also be necessary to transport a mobile repair party (MRP) and/or aircraft spare parts to the deployed FWSAR base. Ideally, any new FWSAR aircraft should be capable of fleet self-support such that it can transport its own propeller and/or engine assembly as required.

Operations Policy.

a. General. At the present time, operational employment of the FWSAR aircraft will be integrated into the existing Command and Control (C^2) structure for SAR operations in the Canadian Forces. Currently, the four designated FWSAR basing locations are Comox, British Columbia; Winnipeg, Manitoba; Trenton, Ontario; and Greenwood, Nova Scotia.

b. Primary SAR Mission Assignments. Missions are tasked under the authority of the SRR Commander. Tasking authority is delegated to the JRCCs for primary SAR missions. Routine mission planning will be incorporated into the current yearly planning and Monthly Airlift Plan (MAP) process. This provides an annual forecast of SAR and airlift requirements for both training and operations, and prioritizes mission requests to optimize the use of available resources. Planning is further refined with monthly adjustments to mission allocation.

c. Non-Forecast Airlift (NFA). Provision is made for Non-Forecast Airlift (NFA) requirements as circumstances warrant. Mission tasking is adjusted as required.

Execution. Conduct of missions will be in accordance with applicable orders, such as National Defence Flying Orders and 1 CAD Orders. During major search operations, search planning and the assignment of a Search Master will be determined by the appropriate SRR Commander, as described in the B-GA-209-001/FP-001 National SAR Manual.

Disposal. When retired from service, the FWSAR aircraft will be disposed of through the Crown Assets structure in accordance with appropriate regulations, as required.

Concept of Support

The planned ISS procurement approach for the FWSAR project is based on departmental policy, specifically, the In-Service Support Contracting Framework (ISSCF). As the title indicates the policy provides a framework for informing decisions in the acquisition of in-service support solutions. At the heart of the ISSCF policy is the requirement to establish with the platform supplier a single, long-term, performance-based and incentivized ISS contract concurrently with the acquisition of the platform. Amongst other benefits, this arrangement gives the Government of Canada long-term leverage on IRB delivery. For the FWSAR project, the full requirements of the ISSCF policy will be pursued to the maximum extent possible. Components of the ISS solution will include:

a. Provision and management of spare parts;

b. Tools, test and support equipment;

c. Training;

d. Provision of technical data;

e. Intellectual property as required;

f. Facilities; and

g. Information systems.

Key Roles

Operators. During FWSAR operations, there is a requirement for two crewmembers, other than the pilots and SAR Technicians, to dispatch equipment and para-flares from the cargo compartment after the SAR Technicians have deployed. Therefore, this requirement, based on safetyman procedures during open-door operations, demands a minimum crew of six for the FWSAR aircraft. The primary crew roles shall include:

a. Pilot;

b. Co-pilot;

c. Sensor Operator;

d. Technical Crewman;

e. SAR Technician (Team Leader); and

f. SAR Technician (Team Member).

Support. The key support staff roles consist of the following occupations:

a. Aerospace Engineering Officers (AERE) or contracted equivalent;

b. Avionics technicians (AVS) or contracted equivalent;

c. Aviation technicians (AVN) or contracted equivalent;

d. Aircraft structure technicians (ACS) or contracted equivalent; and

e. Logistics Officer - Air Mobility Support (Logistics Officer Air Movement Squadron (LOAMS) qualified or equivalent.

Key Tasks

Aircrew tasks must be performed in all environmental conditions described previously while performing the missions and scenarios outlined above. During the project definition phase a task analysis will be conducted to define the key tasks of the crew.

User Characteristics

Aircrew. Before undertaking conversion training or flying the new FWSAR aircraft operationally, all aircrew will have attained CF wings standard or equivalent for their Military Occupation Structure Identification (MOS ID). The anthropometrical characteristics of the target aircrew population are as follows:

a. CF Pilots - donning associated Aviation Life-Support Equipment (ALSE), as defined by the 5th percentile female to the 99th percentile male population as specified in the Anthropometric CF Survey of the Land Forces;

b. Sensor Operators (Sens O), Technical Crewman and Search and Rescue Technicians (SAR Techs) - donning associated ALSE, as represented by the 5th percentile female to the 97th percentile male population as specified in the Anthropometric CF Survey of the Land Forces.

Engineering Officer. All AERE Officers will have completed their required training for MOS ID 00185 and will be authorized for appropriate engineering or maintenance decision-making in accordance with the policies of their Accredited Maintenance Organization (AMO) or Accredited Technical Organization (ATO).

Maintainers. All Maintenance Personnel will have completed appropriate technical trades training for their MOS ID (or contracted equivalent) and will have completed the FWSAR aircraft type specific course and experience requirements prior to being authorized to perform maintenance actions on the FWSAR aircraft in accordance with their accredited authorized maintenance organization.

FWSAR Capability

The FWSAR aircraft requirement shall be fulfilled by a certified aircraft to reduce the technical/schedule risk and cost. The ideal solution will maximize SAR capability and interoperability with CF resources while minimizing development costs and risks. Any re-design or modification must be capable of achieving both technical and operational airworthiness approval by the Initial Operating Capability (IOC) target date. The implementation of the new FWSAR capability must not disrupt the level of service to Canada.

Personnel and Training

Current policy is that the FWSAR project must be designed around the existing establishment of military personnel currently employed for fixed-wing SAR. The FWSAR capability must provide the required level of service to Canada while maintaining a simultaneous force generation capability.

FWSAR Essential Capability Elements

SYSTEM EFFECTIVENESS

General Requirements

FWSAR aircraft shall possess characteristics that enable successful employment in its designated primary mission while offering both the versatility and flexibility to conduct secondary missions in support of other Canadian Forces roles.

FWSAR aircraft shall be capable of carrying out all FWSAR missions currently performed by the existing fleets.

Operability

Response Performance Mandatory Requirements.

a. The overall fleet performance must be capable of responding to any point within the Canadian SAR area of responsibility and remain on scene for at least one hour before recovering at a suitable aerodrome with standard IFR fuel reserves (as per para 37.b of the 1 CAD Orders, Vol 2.) within 13 hours (13 hours is based on a maximum15-hour crew day minus the maximum stand-by response time of two hours) from initial take-off. The aircraft must follow the flight profile in Figure 3 while carrying the FWSAR crew (6) and the minimum SAR payload of 3366.1 lb/1526.8 kg.

Rescue Mandatory Requirements.

a. Aircraft must be equipped with an air-operable rear ramp to serve as the primary exit door for the aerial delivery of SAR Techs and equipment. The ramp dimensions must be compatible with the payload requirements;

b. Aircraft must be equipped with an alternate air operable exit door for aerial delivery in the case of a rear ramp malfunction. Its location and dimensions must provide for safe parachute delivery of personnel and equipment without undue risk from airflow to personnel, equipment and aircraft;

c. Aircraft must be capable of safely manoeuvring at 140 KIAS or less during aerial delivery operations, while executing turns up to and including 45° of bank at aircraft weights with the minimum SAR payload and crew, and sufficient fuel for recovery with IFR reserves (as per para 37.b of the 1 CAD Orders, Vol 2.);

d. Aircraft must be capable of airdropping personnel of a minimum weight of 350 lb (159 kg) from the rear ramp and the alternate exit door, at airspeeds less than or equal to 148 KIAS (using the CSAR-7 parachute), for free-fall and static line parachuting;

e. Aircraft must be capable of airdropping, from the rear ramp and alternate exit door, individual equipment loads of 450 pounds (204 kg);

f. Aircraft must be equipped with rigging (anchor line cable(s)) for static line personnel parachuting that will permit jumping from the rear ramp door and the alternate exit door (not simultaneously);

g. Aircraft must have winching capability to facilitate loading of equipment through the rear ramp and to provide for a retrieval system capable of retrieving a hung-up, fully equipped, SAR Tech utilizing a tandem parachute system weighing up to 600 pounds (272 kg) at speeds up to 148 KIAS from the rear ramp and the alternate exit door (not simultaneously); and

h. Aircraft must have at least three separate crew harness hook-up points for each aircraft door that will be opened in flight. These points are to be stressed for 2,250 pounds each from all directions and strategically located to allow for access to all para/cargo doors for airdrop of equipment, while attached to the SAR crewman restraint harness.

Search Mandatory Requirements.

a. Aircraft manoeuvrability for search manoeuvres will be determined through a bid evaluation test flight. The aircraft must be able to perform a simulated critical engine failure manoeuvring task with a Cooper-Harper handling qualities rating of 6 or better to ensure the survivability of an engine failure during searches in confined mountainous areas. The manoeuvring task will be defined as follows:

   i. The aircraft will be tested in a search configuration at 5000 feet Mean Sea Level (MSL) at an aircraft weight with the standard SAR load, FWSAR crew, and sufficient fuel for recovery IFR reserves; and

   ii. With the critical engine failed, the aircraft must execute both a left and right level or climbing turn in the search configuration through 180 degrees of turn using 45 degrees angle of bank. The search airspeed proposed by the applicant shall be used and should remain within +/-5 knots from the point of entry to the completion of the turn. The airspeed for this manoeuvre must be 140 knots or less;

b. Aircraft shall be equipped with a minimum of two bubble-style spotter windows with one located on each side of the cargo compartment, approximately opposite one

another, to facilitate effective visual searching. The bubble windows must be large enough to accommodate at least one spotter wearing helmet mounted ANVIS 9 Night Vision Goggle (NVG) type systems;

c. The spotter stations shall have ergonomically-designed, comfortable seating positions optimized for visual searching for extended durations;

d. Spotter windows must have a demist/defrost capability;

e. The spotter bubble windows must allow the observer to con the aircraft by looking down the side and to the front of the aircraft to a target on the surface while allowing the observer to see a single point directly below the aircraft to accurately conduct aerial delivery of life saving equipment and personnel;

f. Aircraft must be fully NVG/Night Vision Imaging System (NVIS) compatible, including interior/exterior lighting, the cockpit and cargo compartment;

g. Aircraft must be equipped with dedicated distress frequency homing devices optimized for the detection, homing and decoding of distress signals at 121.5, 243.0, COSPAS/SARSAT 406.025 MHz, 406.028 MHz and on all other UHF-AM, VHF-AM and VHF-FM frequency ranges with a minimum reception range of 40nm (line of sight at 10,000 feet altitude); and

h. Aircraft must incorporate an integrated sensor suite including radar and multi-spectral electro-optical/infra-red (EO/IR) permitting all-weather day/night detection, classification and identification for all targets of interest. Provision of an integrated sensor suite will augment the traditional visual search methods.

SAR Payload Mandatory Requirements.

a. Aircraft must be capable of carrying the minimum standard SAR payload of 3366.1 lb/1526.8 kg consisting of containerized SAR equipment and crew ALSE dispersed upon pallets;

b. If standardized NATO pallets (88"X108") are not used, then the selected pallets must fit upon a standard NATO pallet;

c. The aircraft must allow SAR equipment to be stowed and placed in a manner that allows for visual spotting and conning of the aircraft from both spotter windows;

d. The aircraft must allow SAR personnel to be capable of loading and unloading three patients on the NATO pattern litter and palletized SAR equipment without specialized airfield loading or unloading equipment;

e. Aircraft must have a cabin floor roller and securing system or cargo handling system optimized for the loading, securing, transport, and off-loading pallets; and

f. The aircraft must allow the palletized SAR load to be loaded/unloaded via the ramp.

Operating Environment Mandatory Requirements.

a. The geographical, climatic, meteorological and operational environments in which FWSAR aircraft operate will be consistent with conditions described in STANAG 4370. The aircraft must be able to sustain hot and severe cold temperatures, marine cold conditions, blowing dust, snow, precipitation and sea spray;

b. Aircraft must be capable of certification for dispatch and sustained flight in known icing conditions in accordance with FAR 25.1419 and FAR 25 Appendix C;

c. Aircraft must be approved for ground de-icing using type I de-icing and type II and type IV anti-icing fluids;

d. Aircraft must be capable of flight in moderate turbulence at any aircraft weight or configuration;

e. Aircraft must be capable of operating in environments with lightning and must be equipped with the appropriate lightning strike protection;

f. Aircraft must be capable of operation from semi-prepared (including gravel) runways, taxiways and aerodromes;

g. Must be capable of operating from austere aerodromes, including extreme northern aerodromes such as Alert in year-round conditions. Aircraft start up, shutdown, loading/unloading and overnight parking must be achievable without airfield support;

h. Aircraft must be compatible with civilian operating rules and equipped to meet Canadian and International civilian airspace requirements for operation in IMC and VMC; and

i. Aircraft must be capable of operating anywhere in the Canadian AOR, transit areas (North Atlantic Ocean) and recovery locations, including United Kingdom (UK), Ireland, Greenland, Iceland, Azores, United States (US) and Caribbean.

Certification Mandatory Requirements.

a. By the close of the competitive process, the aircraft design (the configuration prior to the incorporation certification of the specific FWSAR design modifications) must be certified by a civil or military aviation (airworthiness) authority to airworthiness certification standards recognized by Canada. These standards must be either civil or military airworthiness certification standards that are acceptable to the Technical Airworthiness Authority (TAA) as specified in the DND Airworthiness Design Standards Manual Part 2, Chapter 1. In addition, any modifications to the basic

aircraft to meet the operational requirement as outlined in this document shall be designed to meet the certification basis for the aircraft;

b. To minimize duplication of effort, Canada is prepared to give maximum credit to certification work performed by other airworthiness authorities and design organizations, provided that the work is acceptable to the DND Technical Airworthiness Authority. To reduce the level of effort required to certify a fully operational FWSAR design, the intent is to use a process known as Type Design Examination (TDE) to grant credit for any existing civil and/or military certifications;

c. Certified to Civil or Military standards as follows:

   i. Civil Type Certificate: Certified to a transport category airworthiness standard acceptable to the DND Technical Airworthiness Authority. These standards include Federal Aviation Regulations (FAR) 25, Canadian Airworthiness Manual (AWM) Chapter 525, or European Aviation Safety Agency standards (CS25 / JAR 25); or

   ii. Military Type Certificate or Military Airworthiness Qualification Certificate: Certified/qualified to military transport aircraft airworthiness design standards acceptable to the DND Technical Airworthiness Authority. These military airworthiness standards include the U.S. Department of Defence (DoD) Mil Hdbk-516B Department of Defence Handbook – Airworthiness Certification Criteria and the UK Ministry of Defence (MoD) Standard 00970/971 (Design and Airworthiness Requirements for Service Aircraft/Engines); and

d. The aircraft must be capable of meeting the eligibility requirements to obtain an Airworthiness Clearance from the DND Airworthiness Authority (AA) as specified in the DND Document A-GA-0005-000/AG-001 DND/CF Airworthiness Program - Part 2, Section 3. The contractor and CF technical and operational airworthiness authorities will work closely to develop a schedule and plan in order to ensure the timely issuing of the Airworthiness Clearance.

[Given the timelines involved to replace the FWSAR capability, in order to reduce the level of effort required to certify a fully operational FWSAR aircraft, the intent is to use a process known as Type Design Examination (TDE). An aircraft that has already achieved Civil Certification provides a good starting point for establishing a suitable Canadian Military Basis of Certification (BoC).]

Fleet Size Mandatory Requirements.

a. The Project Manager in conjunction with the Project Sponsor shall determine the optimum fleet size based on the following requirements:

   i. Sufficient aircraft to meet the overall Response Performance requirements;

   ii. Must meet or exceed the mission ready requirements (Availability) for sustained operations at each MOB and to maintain a simultaneous force generation capability; and

iii. Sufficient aircraft for scheduled maintenance to ensure the mission ready rates are achieved; and

b. The individual aircraft operational serviceability rate will have a significant effect on both the fleet size required and the cost of maintenance. Therefore the Project Manager in conjunction with the Project Sponsor will be required to determine the optimum combination of individual serviceability rate and fleet size from both an operational and cost perspective. This level of serviceability must be sustainable throughout the aircraft's foreseeable life.

Availability

FWSAR aircraft will be assessed with respect to the following mandatory aircraft mission readiness requirements:

a. Each FWSAR unit, located at a Main Operating Base (MOB), shall be capable of ensuring:

   i. 99% probability of having one aircraft continually ready to launch on a SAR mission as per mandated standby postures; and

   ii. 80% probability of having a second aircraft mission ready for SAR training; and

b. For the Operational Training Unit (OTU), co-located with a FWSAR unit, shall be capable of ensuring:

   i. 95% probability of having one aircraft mission ready during normal duty hours; and

   ii. 70% probability of having a second aircraft mission ready during normal duty hours.

Reliability

The design and manufacture of the FWSAR aircraft will make maximum use of state-of-the-art technology for all of its systems and components. Inherent in such an approach will be the delivery of a highly reliable FWSAR aircraft with high mean time between corrective and preventative maintenance and a low mission abort rate. It is therefore critical that the overall reliability of the FWSAR aircraft be consistent with the achievement of the aircraft mission ready requirements previously detailed.

Safety and Health

General. SAR Techs are highly trained specialists who regularly perform physically demanding tasks during SAR operations and training. Approximately 50% of their job requires lifting, carrying, and dragging heavy awkward loads such as air droppable equipment (e.g.

marine pump, toboggan, stretcher, equipment bundle, sea rescue kit) while wearing heavy cumbersome clothing. The study conducted at Ref J observed that the recommended occupational limitations for one-person static loads are regularly exceeded during SAR Tech duties based on the National Institute for Occupational Safety and Health (NIOSH) guidelines. Other factors that are unique to the aviation work environment, which increase SAR Tech load bearing demands, are in- flight turbulence and the effect of gravitational (G) loading during aircraft manoeuvres. In order to mitigate the risk of musculoskeletal injury to SAR Techs, the cargo compartment of the FWSAR aircraft must provide adequate space to permit safe and effective aerial delivery operations.

Mandatory Requirement: FWSAR aircraft must meet the following safety and health mandatory requirement:

a. A rear ramp is required to minimize the risk of SAR tech injury when jumping into the airflow compared to a side door exit. Equally important, the jump master's view of the airdrop operation from a rear ramp maximizes situational awareness and promotes operational efficiency and safety.

Delivery Requirements

Mandatory Requirement: FWSAR aircraft must meet the following delivery mandatory requirements:

a. Capability to achieve an Initial Operating Capability (IOC) to coordinate with the CC115 end of lifetime;

b. Full Operating Capability (FOC) coordinated with the CC130H end of lifetime; and

c. Implementation will be designed to ensure no disruption to the provision of FWSAR in Canada.

SUB-SYSTEM EFFECTIVENESS

Cockpit Field of View

Mandatory Requirements: The FWSAR aircraft will be assessed with respect to the following cockpit field of view requirements:

a. Aircraft must comply with FAR 25 Field of View (FOV) requirements;

b. For the production of Field of View (FOV) compliance plots, allowable upper torso movement is that which allows the pilot's eye point to move laterally 14 inches (10.7 inches plus 3.3 inches accommodation for head rotation), forward 10.7 inches and down 2 inches. The preceding upper torso movement shall be reduced if sufficient

headroom is not available to permit this eye point repositioning. A minimum of two inches of relief from the nearest point on the head to any obstacle must be maintained. The pilot's Design Eye Position (DEP) shall be the aircraft manufacturer's DEP or, if undefined, the point in 3D space representing the mean of the left and right eye positions intended for the pilot to optimize visual information acquisition during flight operations; and

c. During contour flight in steep terrain, the flight crew must be able to observe enough of the terrain near which they are operating, to safely conduct medium bank turns of 45 degrees Angle Of Bank (AOB). While initiating and maintaining a level 45 degree AOB turn in the direction of the side on which he or she is seated, the on-side flying pilot must be able to visually clear the turn by observing all terrain level with the aircraft (along the projected horizon) from directly ahead of the aircraft to a point 90 degrees from the longitudinal axis of the aircraft (from the nose/front of the aircraft). During 45 degree bank turns, the "cross-cockpit" flying pilot must be able to observe all terrain level with the aircraft from directly ahead of the aircraft to point 45 degrees from the longitudinal axis of the aircraft (from the nose/front of the aircraft). This must be shown in FOV compliance plots within the allowable upper torso movement as detailed in the above para.

Airframe

Mandatory Requirements: The FWSAR aircraft will be assessed with respect to the following Airframe requirement:

a. Aircraft must be equipped with a cockpit voice recorder (CVR) and flight data recorder (FDR) meeting the requirements of EUROCAE ED-112 to support crash and incident investigation and ground support equipment (hardware and software) necessary to perform download of the CVR and FDR at unit level, and review of date at the unit and third line facilities; and

b. Aircraft must be certified for ditching in accordance with FAR 25.801 or equivalent certification criteria.

Fuel System

Mandatory Requirements: The FWSAR aircraft will be assessed with respect to the following fuel system requirements:

a. Capable of carrying and burning aviation fuels, including JET-A, JET-A1, F-34 (JP-8), F-37 (JP-8+100 additive); and

b. Capable of refuelling using gravity and single point pressure refuelling.

Instruments, Controls and Cockpit

Mandatory Requirements: The FWSAR aircraft will be assessed with respect to the following Instruments, Controls and Cockpit requirements:

a. Cockpit seats must adjust vertically and fore/aft with at least a four-point restraint system;

b. Aircraft must be capable of Visual Flight Rules (VFR) and IFR flight at all latitudes with reference to true and magnetic north or alternate coordinate methods (such as the Universal Polar Stereographic datum), with the ability to easily select between the "true", "magnetic" or alternative coordinate reference settings and accurately display heading guidance in the appropriate compass orientation. Must be capable of operations at extreme northern latitudes including at or near the North Pole;

c. Sensor information (EO/IR, radar, Automatic Identification System (AIS), etc.) presented in the cockpit on an Electronic Flight Instrument System (EFIS) or a Multi-function Display (MFD) visible to both pilots; and

d. A controllable weather radar with the following mandatory requirements:

   i. Capable of weather detection and displaying such information to both pilots with suitable selectable range increments;

   ii. Capable of sea and ground clutter elimination;

   iii. Azimuth coverage that displays at least 120 degrees either side of the aircraft centreline, and elevation coverage of at least minus 25 to plus 10 degrees;

   iv. Capable of displaying data in multiple colours with a contouring feature; and

   v. Capable of performing without degradation while operating in icing conditions and moderate turbulence, and in weather obscuring conditions such as light rain and snow.

Communications Systems

Mandatory Requirements: The FWSAR aircraft must meet the following communications systems mandatory requirements:

a. Aircraft must have transceivers capable of Ultra High Frequency (UHF)/Very High Frequency (VHF)-Amplitude Modulation (AM)/Frequency Modulation (FM) operations and High Frequency (HF) transceivers with Selective Calling (SELCAL) capability capable of operating in civil and military bands in Canadian and foreign (United Kingdom, Ireland, Greenland, Iceland, Azores, United States and Caribbean) airspace and conducting voice and data communications on the reserved public safety

communications bands. Aircraft must have stand-alone manually-tuneable U/VHF transceivers with antenna placements optimized for SAR operations. Must include the capability to communicate on the SAR interagency frequency of 149.08 MHz;

b. Aircraft must be capable of Controller Pilot Data Link Communications;

c. Aircraft must be capable of commercial satellite communications (SATCOM), including Global Positioning System (GPS) tracking, operable from Pilot, Sens 0 and SAR Tech positions, and capable of transmitting and receiving voice and data from any point in the Canadian SAR AOR, the North Atlantic Ocean, the United Kingdom, Ireland, Greenland, Iceland, the Azores, the United States and the Caribbean;

d. Aircraft must be equipped with an Intercommunication Control System (ICS) with redundancy to allow communication between all crewmembers at all times. This ICS must include a compatible wireless intercommunication systems for the cargo compartment; and

e. Aircraft must be equipped with Emergency Locator Transmitters (ELTs) that meet the Canadian civil aviation operating rules in respect of ELT carriage over land and water and including operation on Cosmitscheskaja Sistema Poiska Awarinitsch Sudow (COSPAS) / Search and Rescue Satellite Aided Tracking (SARSAT) frequencies and GPS position reporting. In addition, the aircraft must have an underwater locator beacon.

Navigation and Flight Management Systems

Mandatory Requirements: The FWSAR aircraft must meet the following navigation and flight management systems mandatory requirements:

a. Aircraft must have redundant capability to conduct domestic and international IFR operations in all controlled and uncontrolled airspace (including all Northern Domestic Airspace) in accordance with DND, Transport Canada (TC) and International Civil Aviation Organization (ICAO) rules. International IFR operations must at least include the ability to operate in the countries that are adjacent to the Canadian SAR regions. For example, a SAR aircraft searching in the North Atlantic must have the ability to fly to European airspace if required for a fuel diversion;

b. Aircraft must be equipped with the latest Performance Based Navigation (PBN) equipment. PBN requirements are constantly evolving and can depend on the expected operating environment for each portion of the FWSAR fleet and the routes along which they fly. Therefore the Project Manager shall ensure that the latest PBN navigation system requirements are included in the selected aircraft and are appropriate for the aircraft's role within the fleet. This shall include the following ICAO PBN standards (but not limited to):

i. RNAV 10 (RNP 10);

ii. RNP 4;

iii. RNAV 5;

iv. RNAV 2;

v. RNAV 1;

vi. RNP 2;

vii. Basic RNP 1; and

viii. RNP 0.3;

c. Must be capable to conduct all published non-precision approaches and Category (CAT) 1 Instrument Landing System (ILS) precision instrument approaches (200 feet and i/2 mile visibility);

d. Must be capable to conduct Lateral Precision/Vertical Guidance (LPV) approaches;

e. Must be capable of determining aircraft position in GPS denied environments, such as confined mountain valleys, without the aid of visual ground references or ground based facilities;

f. Must be equipped with the latest appropriate version of a Traffic Alert and Collision Avoidance System, at least TCAS II Version 7.0;

g. Must be equipped with an Automatic Dependent Surveillance - Broadcast (ADS-B) system;

h. The minimum required navigation equipment for North Atlantic (NAT) Minimum Navigation Performance Specification (MNPS) operations;

i. Must be equipped with a Class A Terrain Awareness and Warning System (TAWS) system that can be inhibited during low-level flight operations to avoid nuisance warnings during certain SAR manoeuvres; and

j. Must be equipped with an Air Traffic Control (ATC) surveillance transponder capable of civil modes A, C and S (elementary and enhanced), or the equivalent.

Lighting

Mandatory Requirements: The FWSAR aircraft must meet the following lighting mandatory requirements:

a. Must provide all internal and external lighting, including cargo compartment compatible with, or have a selectable mode for, NVG/Night Vision Imaging System (NVIS) operations; and

b. Must have appropriate illumination levels and control for all instruments, displays, consoles, panels, workstations, and cabin area. Lighting of the warning/caution indicating system to be adjustable for day, and compatible with NVG/NVIS operations.

Cargo Compartment

The FWSAR aircraft must meet the following cargo compartment mandatory requirements:

a. While configured with the required SAR payload, the cargo compartment of FWSAR aircraft must provide adequate space to permit safe and effective aerial delivery operations. Placement of the SAR load within the cargo compartment shall ensure free and unencumbered access to all SAR equipment while providing sufficient flat and unobstructed workspace immediately adjacent to the rear ramp and alternate exit door to permit the preparation and aerial dispatch of personnel and SAR equipment, while minimizing the risk of musculoskeletal injury to SAR Techs during heavy lifting tasks. The 2-D dimensions of the SAR Tech workspace next to the exit doors shall have a lateral width of 73 inches (185.4 cm), and a longitudinal length of 81 inches (205.7 cm); and

b. The cargo compartment must be of sufficient size to provide an unobstructed aisle that is at least 30.5 inches (77.5 cm) in width measured from the intended standing surface along the full length of the utilized cargo compartment with the aircraft in the SAR configuration carrying the SAR payload proposed for the aircraft.

Integrated Sensor Suite Systems

Mandatory Requirements: The FWSAR aircraft must meet the following integrated sensor suite system mandatory requirements:

a. Must have an EO/IR system with the following mandatory requirements:

i. Must have the ability to detect, classify and identify various SAR targets of interest ranging in size from human-sized contacts to large vessels from normal search operating altitudes during day and night, with enhanced capability during low thermal contrast conditions through cloud, fog, smoke, haze and precipitation;

ii. Must have the ability to read aircraft and vessel registration from normal search operating altitudes during day and night, with enhanced capability during low thermal contrast conditions through cloud, fog, smoke, haze and precipitation;

iii. Must be capable of 360 degrees of coverage throughout the lower hemisphere of the aircraft;

iv. Must be self-stabilized (if sensors are distributed), or contained in a single stabilized platform. Jitter must be reduced as much as possible to maximize use of the sensors;

v. Must not suffer from reduction in image quality from the camera to the sensor displays to the recorder;

vi. Must be all-digital with no digital to analogue conversions;

vii. Must be capable of manually and automatically tracking surface targets;

viii. Must provide colour imagery; and

ix. Must be capable of reducing sensor system degradation caused by fogging, precipitation and icing;

b. Must have a radar with the following mandatory requirements:

i. Capable of over-water searching, detection and classification of surface targets in various sea states and target density conditions;

ii. Capable of sea and ground clutter elimination;

iii. Capable of manually and automatically tracking surface targets;

iv. Azimuth coverage that displays at least 120 degrees either side of the aircraft centreline and capable of tilt control;

v. Capable of displaying data in multiple colours with a contouring feature;

vi. Capable of simultaneously tracking and displaying a minimum of 50 targets of interest;

vii. Capable of operating in conditions of light to moderate airframe icing and moderate turbulence, and in weather obscuring conditions such as light rain and snow;

viii. Suitable selectable display range increments; and

ix. Capable of displaying raw radar returns;

c. Must have an Automatic Identification System (AIS) for identifying and locating surface vessels and displaying such information to the Sens O sensor station;

d. Must have a moving map for situational awareness;

e. Must include a sensor station for the Sens O with the following mandatory requirements:

i. Capability to record Full Motion Video (FMV) and single frame images with meta data as deemed appropriate by the Sens O and allow real-time use and review;

ii. Capable of receiving and displaying the sensor information (including weather information) in a format suitable for directing the aircraft to the target of interest;

iii. Enable use of all communications systems (VHF, UHF, HF, VHF-FM, SATCOM, ICS);

iv. Provide controls for all sensors (including weather detection) and the moving map display;

v. Provide supplemental oxygen system to include regulator;

vi. Provide MFDs for all sensors;

vii. Capable of downloading recorded mission data to an external device for long-term storage;

viii. Sensor information will be integrated to reduce the workload on the Sens O. This includes, at a minimum, multiple overlays, moving map display and auto-slewing of the EO/IR system to a radar target;

ix. Capable of detecting and cueing the operator to acquired objects of interest; and

x. Dual position sensor operators station, wide enough to comfortably accommodate two crewmembers, with redundant MFDs and controls ergonomically engineered to ensure full access, full controllability and visibility by each seated crewmember, provisioned with supplemental oxygen; and

f. Shall be a Commercial-Off-The-Shelf (COTS) system whose components consist of Non-Departmental Items (NDI).

PERSONNEL AND TRAINING REQUIREMENTS

Personnel

As previously described, the task of providing FWSAR services to Canadians is assigned to DND. The Air Force can maintain complete control of FWSAR with military personnel, as the ability of CF's command and control structure to manage and accept risk is well suited to the SAR role. Retaining military personnel for FWSAR also helps support other deployable DND tasks by helping to maintain a sustainable deployment ratio.

During FWSAR operations, there is a requirement for two crewmembers, other than the pilots and SAR Technicians, to dispatch equipment and para-flares from the cargo compartment after

the SAR Technicians have deployed. As a result, safetyman procedures during open-door operations require a minimum crew of six for the FWSAR aircraft.

Support Staff

Military. Military personnel will have successfully completed either CF AERE qualification training or Series 500 training, as well as appropriate aircraft specific training before conducting maintenance on the new FWSAR aircraft.

Civilian. Civilian personnel will have successfully completed accredited training and certification, as well as any necessary aircraft specific training, before conducting maintenance on the new FWSAR aircraft.

Training

The use of advanced synthetic environment technology is a critical requirement for operator and support personnel and shall be extensively employed. The use of enterprise systems, including the Air Force Integrated Information and Learning Environment (AFIILE) for Learning Management System (LMS), Learning Content Management System (LCMS), Document Management System (DMS) and Resource Management and Scheduling (RMS), and the Canadian Advanced Synthetic Environment (CASE) simulation architecture and components should be used wherever practical and appropriate.

Operational and Support Training. The infrastructure, support and manning requirements for the FWSAR aircraft training programme will be addressed in this project. All FWSAR aircraft training is to meet the applicable CF Individual Training and Education System (CFITES). It is currently proposed that the FWSAR training program will provide training to aircrew and maintenance personnel, using a learner-focused, blended electronic learning and simulation philosophy. The ultimate aim of the training program is force generation, which is to produce and maintain qualified aircrew and maintenance personnel to support the operational mandate of the FWSAR fleet. Overall, the Contractor will be responsible and accountable for doing the support work related to training in accordance with the Statement of Support Intent, while employing Air Force enterprise learning and simulation tools.

Simulation. In order to optimize operational availability of the FWSAR aircraft, minimize training costs, and optimize training effectiveness, the use of a blend of electronic training and simulation training devices shall be extensively employed. This will include training devices for all personnel involved in the operation and maintenance of the FWSAR aircraft and to be utilized, to the maximum extent possible, as the primary method for initial skills and follow-on training of all specified tasks. Enhanced training effectiveness is the greatest benefit to be gained from synthetic training.

The following blended electronic training approaches are examples of the type of equipment presently anticipated to be implemented on the CASE and tracked in the AFIILE LMS:

a. Aircraft systems trainers;

b. Part task trainers;

c. Cockpit procedures trainers;

d. Level D operational flight simulator(s); and

e. Fixed-Base Simulator(s) (FBS).

The numbers and types of training devices required to support the FWSAR aircraft will be determined upon selection of the platform and following the necessary a human factors studies and training needs analysis. To assist in this process, the training systems provider will have access to the training needs analysis study conducted by FWSAR project staff. It is anticipated that a working group will be established between the FWSAR project staff and the OEM to coordinate all training requirements. The selected training devices should ideally be in place six months prior to delivery of the first aircraft.

To ensure accuracy and fidelity of both flight and mission training, the operational flight simulation device selected for the FWSAR aircraft is anticipated to be Transport Canada Level D equivalent with enhanced visual capabilities to permit crew co-ordination and logging of currency training event qualifications. This will require IFR and out the window synthetic environments to support visual technology for day Visual Flight Rules (VFR), night (with illumination), Instrument Meteorological Conditions (IMC), and NVG training. In addition, the use and roles of FBS devices will also be considered. Regardless of the platforms selected, simulation systems selected following the human factors and training needs analysis study should be interoperable with CASE.

It is recognized that the chosen training devices will require support personnel and facilities. Once the simulation requirements have been identified, the overall training system/centre envisioned will include the training devices, infrastructure, support and manning requirements.

Operational Test and Evaluation (OT&E). Synthetic training devices, in addition to optimizing training, also contribute significantly to operational test and evaluation of aircraft systems modifications and procedural changes. Aircraft systems modifications or changes necessitate identical changes on affected training devices in a timely fashion.