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# Transitioning to an Expeditionary Mindset for ADR Operations

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**TRANSITIONING TO AN EXPEDITIONARY MINDSET FOR ADR OPERATIONS**

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# TRANSITIONING TO AN EXPEDITIONARY MINDSET FOR ADR OPERATIONS

## AIM

1. This paper will inform Commander 1 Canadian Air Division (Comd 1 CAD) and Director A4 Construction Engineering (A4 CE) on the implications of maintaining the Airfield Damage Repair niche capability in its current format, specifically the Airfield Surface Assessment and Reconnaissance sub-activity, the imperative to transform force management and force development constructs in order to align the capability with the global operating environment, and to propose recommendations for implementation that will modernize the capability in order to holistically support Royal Canadian Air Force flying operations.

## INTRODUCTION

2. The operational environment within which the Canadian Armed Forces (CAF) interacts is changing, and with it comes a requirement to adopt modern and complete capabilities that are thrust into action by an operationalized culture that sees the institution adopt agile and innovative solutions focused on outcomes.<sup>1</sup> The assumption that deployed operating bases will be a sanctuary from attack is a dangerous assertion that will see personnel and material assets become subject to precise adversarial targeting that removes the Royal Canadian Air Force (RCAF) from the future fight.<sup>2</sup> To combat our adversary's actions, and in light of the CAF's inability to generate active base defences from air threats originating from the land, sea, or air domains, the RCAF must promote the use of agile basing that enables the rapid entry of air assets to austere and semi-prepared airfields in support of the pan-domain fight.

3. Canada's national defence policy – *Strong, Secure, Engaged* (SSE) – specifically identifies that the RCAF “will be able to operate from prepared or austere airfields anywhere in the world.”<sup>3</sup> Responsible for enabling the RCAF to live, move, and fight, Construction Engineer combat support plays a major role in the force beddown, sustainment, and redeployment of friendly forces.<sup>4</sup> In light of recent world events that have challenged the security environment due to Great Power Competition (Russian Federation's re-invasion of Ukraine, growing hostilities within the Indo-Pacific, nuclear force posturing by the Democratic People's Republic of Korea), this paper proposes a number of changes to the Airfield Damage Repair (ADR) capability required by the RCAF to meet the CAF's commitment to STANAG 2929 Part II. It does so by evaluating the Force Management and Force Development of the capability by contrasting current practices with that of our allies and nests them within the framework of a future operating environment.

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<sup>1</sup> Department of National Defence, *Pan-Domain Force Employment Concept: Prevailing in a Dangerous World* (Ottawa: DND Canada), 5.

<sup>2</sup> U.S. Air Force, Agile Combat Employment, Air Force Doctrine Note 1-21 (Washington, D.C.: U.S. Air Force, 2022), 1. [https://www.doctrine.af.mil/Portals/61/documents/AFDN\\_1-21/AFDN%201-21%20ACE.pdf](https://www.doctrine.af.mil/Portals/61/documents/AFDN_1-21/AFDN%201-21%20ACE.pdf).

<sup>3</sup> Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: DND Canada, 2017), 39.

<sup>4</sup> Department of National Defence, B-GA-403-114/FP-001, *Royal Canadian Air Force: Construction Engineering Force Employment Concept* (Ottawa: DND Canada, 2018), viii.

## BACKGROUND

4. The 2010 7.0M<sub>w</sub> earthquake that decimated Haiti served as a wake-up call for the RCAF. Ordered with transporting personnel, equipment, and humanitarian aid to the earthquake-stricken Haitian people was Comd 1 CAD, who was required to deploy a DND civilian to conduct an airfield assessment of the Jacmel airfield in the absence of any formally trained military personnel. The absence of trained Construction Engineering Officers (ironically formerly known as Airfield Engineers) gave light to a capability deficiency that was severe enough to warrant the development of collective training to meet the requirements of the niche capability.<sup>5</sup>

5. Director A4 Construction Engineering (CE) staff have sought to close this capability gap since 2010 by training teams of Construction Engineers located at 2 Wing Bagotville, 8 Wing Trenton, and 1 Canadian Air Division Headquarters to conduct contingency and deliberate assessments of domestic and foreign airfields, and by bolstering the body of knowledge among Construction Engineering Officers during Developmental Phase I training at the Canadian Forces School of Military Engineering in the form of the two week Airfield Pavement Evaluation Course. ASAR teams are now capable of conducting an assessment within 12-48 hours once in theatre, and can provide recommendations regarding airfield suitability within 96 hours once on ground.<sup>6</sup> The Repair of Airfield Operating Surfaces (RAOS) sub-activity, specifically the Airfield Light Repair, forms an important aspect of the ADR capability, but will not be discussed in this paper given it is assessed as outside the scope of the issue under review.

## DISCUSSION

### Force Management

6. The current employment of the ASAR skillset sees Officers and Non-Commissioned Members (NCMs) selected to conduct “assessment(s) and evaluation(s) of an airfield to determine its suitability for air operations in a low to medium threat environment.”<sup>7</sup> Individuals are selected by 1 CAD A4 CE staff and undergo training at 4 Construction Engineer Squadron (4 CES) in Cold Lake, Alberta where they learn to assess numerous aspects of an aerodrome to include breaches in Obstacle Limitation Surfaces (OLS), pavement and soil strength, and Minimum Operating Strip (MOS) requirements. Trained teams then undergo a certification in a controlled environment and are observed by evaluators who generate a performance report that details the team’s success, which results in a letter of certification to Comd 1 CAD. The process of selecting personnel, conducting the training and certification, and declaring the team OPRED for deployment is sound, and does not require additional refinement.

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<sup>5</sup> Josh Van Tine and James Boone, “Construction Engineer Capabilities for Airfield Assessment and Repair,” *Flight Comment*, no. 1 (Spring 2014): 19, [https://publications.gc.ca/collections/collection\\_2015/mdn-dnd/DC2-2-2014-1-eng.pdf](https://publications.gc.ca/collections/collection_2015/mdn-dnd/DC2-2-2014-1-eng.pdf).

<sup>6</sup> Josh Van Tine and James Boone, “Construction Engineer Capabilities for Airfield Assessment and Repair,” *Flight Comment*, no. 1 (Spring 2014): 19, [https://publications.gc.ca/collections/collection\\_2015/mdn-dnd/DC2-2-2014-1-eng.pdf](https://publications.gc.ca/collections/collection_2015/mdn-dnd/DC2-2-2014-1-eng.pdf).

<sup>7</sup> Department of National Defence, *Airfield Surface Assessment & Reconnaissance (ASAR) Concept of Operations* (Ottawa: DND Canada, 2013), 3.

7. While the manner in which individuals and teams are tasked through 1 CAD Mission Support or 2 Air Expeditionary Wing is clear, the requirement for L3 formations and L4 units to maintain and support ASAR tasks is not. 1 CAD does not formally task subordinate formations/units with maintaining a readiness posture in support of ASAR tasks.<sup>8</sup> Doctrinally, there are three ASAR teams supported by 1 CAD A4 CE, 2 Air Expeditionary Squadron (2 AES), 4 CES, and 8 Mission Support Squadron (8 MSS), however none of the last three units are tasked by 1 CAD to provide said support. The RCAF Construction Engineering Force Employment Concept (B-GA-403-114/FP-001) tasks 8 MSS with ensuring Trenton-based equipment is prepared for deployment(s), but does not assign the task of doing so in the 8 Wing Business/Operations Plan. Additionally, the conduct of ASAR force generation activities is not tasked to non-2 Wing units, thereby presenting an opportunity for friction to arise between tactical units and their headquarters, who must deconflict priorities as their members may be otherwise employed to provide mission support at the Main Operating Base (MOB) or support force generation activities at Real Property Operations Units.

8. Readiness is a key element of ASAR deployments and is managed in varying manners. 1 CAD A4 CE has developed its own internal managed readiness program for Construction Engineers within the L1, but it only addresses the rotational cycle for members in support of recurring operations and forecasted exercises. As ASAR teams often serve in a force employment role, their readiness must coincide with Canadian Joint Operations Command (CJOC) levels, and has not been addressed by any ASAR doctrine, other than the brief mention that all teams will maintain a high readiness posture. The proverbial wishing-away of the requirement to maintain a physically/medically fit, technically current, and tactically sound force is partially the fault of the ASAR Concept of Operations handbook, whose content has been replicated within the Construction Engineering Force Employment Concept and ASAR Qualification Standard documents, and states teams will not be employed in high threat areas, which is counter to Director A4 CE's interpretation of how the capability is to be exercised by the RCAF.<sup>9</sup>

## **Force Development**

9. The immediacy of further developing and refining the ASAR capability so that it can be nested within the future operating environment is not as pronounced as when the capability was first established following the 2010 earthquake in Haiti. The management of ASAR tasks, airfield databases, centralized procurement of equipment, and life cycling of IT hardware is a secondary duty with 1 CAD A4 CE.<sup>10</sup> Current efforts are focused on maintaining contemporary capabilities, and not developing new tactics to reconnoiter airfields and keep pace with the changing operational environment. Of the various areas of development that could be considered for the ASAR capability, a few are presented below for consideration.

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<sup>8</sup> Ulpiano Honorio, Director A4 Construction Engineering, telephone conversation with author, 16 February 2023.

<sup>9</sup> Ulpiano Honorio, Director A4 Construction Engineering, telephone conversation with author, 16 February 2023.

<sup>10</sup> Renee-Anne Paquet, Infrastructure Support Officer, e-mail conversation with author, 24 February 2023.

10. The ability to conduct an assessment of an airfield within a number of hours does not exist, and should be considered if the ASAR capability is to mirror Commander (Comd) RCAF's intent to promote institutional agility, and have "the ability to detect and respond effectively to changes in the operational environment."<sup>11</sup> In order to employ agile combat power, the ASAR capability must be executed within threat timelines to increase the survivability of those conducting the survey, and generate the RCAF's combat power at forward basing locations. The lengthiest aspect of any ASAR task is the evaluation of roughness and slope of the airfield, to ensure the transverse and longitudinal slopes are within the specifications identified in Aerodromes Standards and Recommended Practices (TP 312 5<sup>th</sup> edition). When conducted, this aspect of the evaluation can take upward of 8-10 hours depending on the thoroughness of the reconnoiter task, which is not acceptable if the team is deployed to a hostile environment. The proliferation of uncrewed aircraft systems in the private sector has the potential to lessen the amount of time teams are required to remain on location, thus increasing their survivability. These systems employ artificial intelligence/machine learning technology and precise Light Detection and Ranging (LiDAR) sensors to assess an entire aerodrome in a matter of minutes. The purchase of these systems is further enabled by guidance provided by Comd RCAF, who has issued the interim uncrewed aircraft systems (UAS) Open Category Flight Rules direction that would enable A4 CE to procure and employ UAS to conduct airfield surveys, provided operators conform to the Transport Canada TP 15263E standard.<sup>12</sup> Enabling teams with this technology would rapidly expedite the conduct of ASAR tasks, and would enable team members to focus on other aspects of the mission while employed in (potentially) high threat environments.

11. The development of emerging threats will challenge the institution's abilities to conduct a deliberate and measured assessment of the situation, thereby degrading the CAF's abilities to respond to the threats posed in a traditional manner, necessitating the immediate apportionment and deployment of force elements into a theatre of operations.<sup>13</sup> The manner in which ASAR teams access aerodromes for evaluation is founded on the assumption that RCAF operations will not be conducted in contested or hostile environments, and that teams will have easy access to the mission's airfields. Ingress to hostile airfields must be conducted as quickly as possible, without advertising the presence of the team tasked to support follow-on ground or air operations. Mission sets that support the rapid establishment of austere airfields are found within the spectrum of tasks conducted by the RCAF's air mobility capability, and can include ground refueling in support of land or tactical aviation mission sets, and the delivery of materials to promote sustainment at forward locations.<sup>14</sup> In order to lessen the risk posed to tactical air mobility missions conducted by CC-130J aircraft, or any other tactical airlift performed by partners subscribing to the ATARES program, the RCAF must be able of utilizing smaller aircraft capable of conducting semi-prepared runway operations, or must train teams to airdrop equipment and personnel. The former would be difficult given the current diversity of the RCAF fleet, with the CC-138 Twin Otter acting as the only sound alternative to the CC-130J, albeit

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<sup>11</sup> Department of National Defence, *Royal Canadian Air Force Strategy: Agile, Integrated, Inclusive* (Ottawa: DND Canada, 2023), 9.

<sup>12</sup> Comd 1 CAD issued direction to subordinate formations to this effect on 14 April 2022.

<sup>13</sup> Department of National Defence, *Pan-Domain Force Employment Concept: Prevailing in a Dangerous World* (Ottawa: DND Canada), 39.

<sup>14</sup> David Johnson, "Future Airpower: Trends and Implications for Canadian Special Operations Forces Command (CANSOFCOM)," *Canadian Military Journal* (Ottawa) 17, no. 4 (2017): 21. <http://www.journal.forces.gc.ca/Vol17/no4/PDF/CMJ174E.pdf>.

only for domestic missions. The latter is already employed by non-RCAF elements, who have adopted procedures that enable the sustainment of CAF operations using a lily-padding technique.<sup>15</sup> Albeit a foreign method of insertion for most RCAF missions (with the exception of Search and Rescue operations), the employment of a parachutist capability is represented in our Allies, who at the 435th Contingency Response Group located at Ramstein Air Base, Germany are capable of rapidly opening airbases and performing initial airfield operations to provide combat power within an area of operations. From a Canadian perspective, employing a parachutist capability to enhance ASAR missions could be accomplished from 8 Wing Trenton, where the heart of the RCAF's air mobility capability exists, the Center of Excellence of Canadian Parachuting resides, and a training airfield with drop zone is present (Canadian Forces Detachment Mountainview). The ability to rapidly jettison personnel and equipment from fixed-wing aircraft would enable ASAR teams to avoid detection and conduct aerodrome assessments to sustain temporary forward operating locations in support of tactical aviation activities, as larger platforms such as the CC-130J may suffer significant damage if landing at unknown airfields.<sup>16</sup>

12. Lastly, the ability to securely transfer data via level 2 networks for ASAR teams is absent. Teams deployed on expeditionary missions do not currently have an organic means to process or transmit reports at the CAN Secret level, and have no means of relaying their recommendation for aerodrome operations to the Operational Airworthiness Authority (i.e., Director A4 CE for operations with a risk level of low or Acceptable Level of Safety (ALOS)) while in a theatre of operations. Compounding the lack of secure means of communication is the difficulty encountered when attempting to use third party pavement engineering software on DWAN stations which are designed to expedite the analysis of airfields.<sup>17</sup> If the aim of theatre-level contingency operations is to rapidly process data and send it to the appropriate authorities in a timely manner, ASAR concept of operations should be reviewed to incorporate standing procedures that enable Joint Information and Intelligence Fusion Capability (JIIFC) staff the ability to transmit aerodrome data to level 2 networks so that ASAR teams can draft the report for 1 CAD staff.

## CONCLUSION

13. Deployments to Haiti, Nepal, and other locations have highlighted the demand for an agile expeditionary team that is maintained at a high level of readiness and can be deployed to contested environments with minimal service support. Internal DND reference documents such as the Pan-Domain Force Employment Concept highlight the requirement to be an adaptive organization focused on delivering effects across the domains, while United States Air Force doctrine notes such as Agile Combat Employment reaffirm the requirement for expeditionary and multi-capable aviators who are capable of operating in a contested, degraded, and

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<sup>15</sup> T.E. Murphy, "Aircraft Operating Surfaces Condition Evaluation and Reconnaissance in the Canadian Armed Forces" (Joint Command and Staff Program Course Paper, Canadian Forces College, 2016), 6.

<sup>16</sup> Canada. Department of National Defence, B-GA-402-005/FP-001, *Royal Canadian Air Force Doctrine: Expeditionary Air Operations* (Ottawa: DND Canada, 2020), 27.  
[https://publications.gc.ca/collections/collection\\_2022/mdn-dnd/D2-393-3-2020-eng.pdf](https://publications.gc.ca/collections/collection_2022/mdn-dnd/D2-393-3-2020-eng.pdf).

<sup>17</sup> Renee-Anne Paquet, Infrastructure Support Officer, e-mail conversation with author, 24 February 2023.

operationally limited environment.<sup>18</sup> Through the exploitation of UAS, alternative means of theatre insertion, and use of secured communications, the ASAR capability can continue to keep pace with the operational environment.

## RECOMMENDATIONS

14. The above noted research and observations have resulted in this service paper recommending the following actions:
  - a. Recommendation 1. Publish a section to Canadian Air Division Order Volume 3 – Operations, tasking formations/units with the maintenance of personnel and equipment to form ASAR team(s).
  - b. Recommendation 2. Conduct a feasibility study and trial the use of UAS for the evaluation of pavement roughness and slope.
  - c. Recommendation 3. Develop a parachutist capability for the Trenton-based ASAR team.
  - d. Recommendation 4. Resource ASAR teams with the requisite IT equipment to utilize third party applications, and transmit data via secure means.

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<sup>18</sup> U.S. Air Force, Agile Combat Employment, Air Force Doctrine Note 1-21 (Washington, D.C.: U.S. Air Force, 2022), 4. [https://www.doctrine.af.mil/Portals/61/documents/AFDN\\_1-21/AFDN%201-21%20ACE.pdf](https://www.doctrine.af.mil/Portals/61/documents/AFDN_1-21/AFDN%201-21%20ACE.pdf).



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