ROYAL CANADIAN NAVY MARINE ROYALE CANADIENNE

HARRY DEWOLF CLASS ARCTIC / OFFSHORE PATROL SHIP CONCEPT OF USE

NOVEMBER 2015

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FOREWORD

27 November 2015

This Arctic Offshore / Patrol Ship Concept of Use is issued under my authority as the Assistant Chief of Naval Staff (Operational Training and Readiness).

This Concept serves to establish how the RCN intends to utilize *Harry DeWolf* (HDW) class capabilities in support of specific missions and routine operations. This Concept will remain in effect for the duration of HDW class operational service life. Amendments are to be submitted through the Director Naval Force Readiness in accordance with the instructions contained within the Maritime Concept Development Guide.

J.F. Newton
Rear-Admiral
Assistant Chief of Naval Staff (Operational Training and Readiness)

CONCEPT OF USE FOR [PLATFORM]

DOCUMENT HISTORY

Version	RDIMS Number	Date	Remarks / Changes

Endorsed by	
ACNS (OT&R)	**Assistant Chief of Naval Staff (Operational Training and Readiness).**
Concept Owner	
DNFR	**Director Naval Force Readiness**
Concept and Doctrine Lead	
DDNFR	**Deputy Director , Naval Force Readiness**
Concept custodian	
NFR	**Naval Force Readiness**

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CONCEPT OF USE (CONUSE) FOR THE ARCTIC/OFFSHORE PATROL SHIP

SECTION 1

INTRODUCTION

1. The Concept of Employment (CONEMP) for the Arctic/Offshore Patrol Ship (HDW class)[1] articulated the need for a number of platforms optimised for the harsh, unforgiving environment of the Arctic which would also have wider use across other directed tasks that the RCN could be expected to conduct. The main drivers for this requirement came from the 2004 National Security Policy[2] six point plan to strengthen maritime security, Canada's Oceans Action Plan[3] for an integrated strategy for Canada's three oceans, the demands of sovereignty and security placed upon Defence through the Canada First Defence Strategy[4] and finally Canada's Northern Strategy[5].

2. After providing the higher level intent for the platform to meet requirements set by the Government of Canada (GoC), the CONEMP generated a Statement of Requirement (SOR) resulting in the contract to build the *Harry DeWolf* (HDW) class Arctic/Offshore Patrol Ship (AOPS). This CONUSE addresses changes, deletions, and additions of capabilities that have occurred during the progress of the HDW class Project, and provides a means to update and clarify the intentions for the platform.

AIM

3. The aim of this Concept of Use (CONUSE) is to provide guidance to operational planners, HDW class' officers and crew on the ship's inherent capabilities and intended areas of employment. It will identify, explain, and amplify capabilities that may differ from those envisioned in the CONEMP and SOR.

SCOPE

4. This CONUSE provides sufficient guidance to ensure the safe and effective employment of the HDW class to meet its envisioned tasks and missions. The CONUSE will not provide

[1] Concept of Employment HDW class– RDIMS# OTT 205098 or http://collaboration-navy.forces.mil.ca/sites/DNavStrat/Endorsed%20Concepts/Forms/AllItems.aspx?InitialTabId=Ribbon%2EDocument&VisibilityContext=WSSTabPersistence
[2] http://publications.gc.ca/site/eng/259263/publication.html
[3] http://www.dfo-mpo.gc.ca/oceans/publications/oap-pao/page01-eng.asp
[4] http://www.forces.gc.ca/en/about/canada-first-defence-strategy-summary.page
[5] http://www.northernstrategy.gc.ca/index-eng.asp

detailed plans on how the HDW class will operate within given environments or missions; these will be provided via Concepts of Operations (CONOPS), Operational Plans, and subsequent documents after the platforms enter service.

5. The authority for this CONUSE is the Director Naval Force Readiness (DNFR), who will review and amend it as necessary to ensure its currency. Feedback is critical to the success of the document and all comments are welcome.

PLATFORM OVERVIEW

6. As a large patrol vessel built to commercial standards, with icebreaking characteristics[6], and an organic aviation facility HDW class will conduct presence and surveillance operations in Canada's territorial waters, especially in the Arctic regions. Mission specialist will augment the crew and can be embarked to support wider GoC and Defence missions. The vessels will be capable of operating light and medium helicopters,[7] and a varied number of different watercraft, including Landing Craft Vehicle and Personnel (LCVPs), to provide sea-to-land interconnectors for LOTS,[8] and faster craft conduct small boat operations such as boarding operations and Search and Rescue (SAR). Up to six TEU[9] containers can be embarked for normal operations, with an additional two TEU containers on the flight deck.[10] The mix of cargo and containers will be mission-dependant, as defined through the operational planning process.

7. The ships have been optimized for operations in Canada's North and its coastal regions, and as such, HDW class is able to operate worldwide in support of Humanitarian Assistance Disaster Relief or capacity building operations dependent on logistical support and favorable environmental conditions.

8. HDW class High Level Requirements are found in the following table[11]:

Capability		**Performance**
Endurance	Range	6,800 nm at 14kts
	Logistical Endurance	120 days with 65 personnel
Maneuverability	Berthing	Unassisted in up to 25kts wind and 2kt current
	In Ice	Turn 180° in own channel of 1st year ice up to 1m thick
Speed	Maximum (Sustained)	17kts

[6] HDW class are patrol vessels capable of operating in the vicinity of ice and in ice however the RCN does not provide icebreaking services nor does the RCN train its officers to provide icebreaking services to ships or harbours
[7] The scope of rotary wing and unmanned aerial systems capability will be further developed based on operating experience.
[8] Logistics-over-the-shore: The loading and unloading of vessels where port facilities are non-existent, inadequate or inaccessible. LOTS include transport to and from vessels over unprepared shorelines or through existing quays and marshalling for movement inland. It is normally conducted in a permissive environment (DTB 7859). Note: Also known as Ship to Object Maneuver (STOM) in the US and UK.
[9] http://www.logisticsglossary.com/term/teu/ International description of a twenty foot shipping container.
[10] The addition of containers on the flight deck will limit flight operations to sling operations and vertical replenishment.
[11] This table will be amended once HDW class are delivered and trials have been completed

Capability		Performance
	Cruising (Sustained)	14kts
	Maximum (In 1 meter of ice)	3kts
Ice Strengthened Hull	Polar class 5	Year round operations in medium first year ice which may include old ice inclusions
RAS[12]	Number/Type of Stations	1 liquid replenishment
Aviation	Number/Type of Helicopter	Operate and maintain 1 light helicopter for up to 120 days. Land/launch/refuel/HIFR CH148
	Facilities	Hangar, Limited Maintenance Capability (Class1/Level1)
	Recovery Assist	Fitted for but not with
Sealift	Containers (20-foot ISO)	6 + 2 (on flight deck)
	Container Interfaces	3
Fitted Accommodations	Crew	Up to 65
	Mission Specialist Personnel	22
Medical		Echelon 1[13]
Operations	Command and Control	Command Management System
	Communications	Tactical UHF, VHF, HF Commercial/Military SATCOM
	Surveillance	Helo Control and Approach Radar, EO/IR
Weapon(s)	Primary Gun System	25 mm[14]
	Secondary Gun System	2 x .50 cal HMG
Boats/Craft	Landing Craft [15]	1
	Capable of embarking OGD RHIBs up to 12m in length	Up to 4
	Multi-Role Rescue Boats	2
	Enclosed Life Boats	2

[12] PRONOTES and CFCD 130 will be developed to articulate best practices for underway replenishment
[13]Normally ISO routine sick calls and the management of minor sick and injured personnel for immediate return to duty
[14] Capable of deploying armour piercing and high explosive rounds.
[15] Landing Craft design was not ratified before this edition was signed

Capability		Performance
	Inflatable Rescue/Diving Boat	1

Table 1 - AOPS General Capability / Performance

SECTION 2

POLICY GUIDANCE

9. Guiding the employment of the HDW class are the policies and directions of the GoC to the Canadian Armed Forces (CAF) and the requirements of the Canadian Joint Operations Command (CJOC) to meet those missions and tasks given to the military. The priority of Northern Maritime Operations (NMOs) to both the GoC and the CAF is to patrol and protect the territory through enhanced presence in the North, on and under the sea, and to support the surveillance of the skies of the North[16].

10. *Canada's Northern Strategy* (2009), expresses the GoC's commitment to helping the North realize its potential as a healthy, prosperous, and secure region within a strong and sovereign Canada. The strategy establishes four integrated, mutually reinforcing priorities focusing on exercising our sovereignty, protecting the environment, promoting social and economic development, and improving and devolving governance. The RCN will contribute directly to exercising Canadian sovereignty, and indirectly to the other three government priorities by conducting NMOs throughout the navigable season. Regarding Canada's Arctic foreign policy, the *Statement on Canada's Arctic Foreign Policy* (2013), provides the international focus from which to project Canadian interests in the world across the four priorities established in *Canada's Northern Strategy*, with exercising sovereignty being Canada's *top* Arctic foreign policy priority.

11. In the *Chief of Defence Staff / Deputy Minister Directive for the North* (2011), the DND/CAF strategic objectives for the North were identified. HDW class will be key to delivering on these strategic objectives, which include:

    a. Provide surveillance of Canadian territory and air and maritime approaches in the North;

    b. Exercise Canada's sovereignty in the North;

    c. Demonstrate a visible Canadian presence throughout the North;

    d. When directed, support Other Government Departments (OGDs) and agencies operating in the North including, but not limited to Fisheries and Oceans Canada, Canadian Coast Guard (CCG), Public Safety Canada, including the Royal Canadian Mounted Police, Aboriginal Affairs and Northern Development Canada , Transport Canada, Canada Border Services Agency, and Natural Resources Canada;

    e. Maintain 24/7 SAR capabilities;

    f. Continue continental defence, including through North American Air Defence (NORAD); and,

[16] CDS/DM Directive for the DND/CF in Canada's North, 2011, p. 6

g. Create new, and build upon existing, defence relationships in the region to strengthen operational links.

12. The RCN Arctic *Action Plan* considers all of these items in planning and in preparing HDW class for NMOs.

13. As the primary force employer and Supported Commander for all Northern operations by the CAF, CJOC produced their direction in the form of the *CJOC Plan for the North (2015).* There are three lines of operation: Operations and Exercises, Infrastructure and Capability Development, and Domestic and International Engagement. These three lines inform all military activities in the north and has been the keystone document guiding the production of the *RCN Arctic Action Plan*. Commander Canadian Atlantic Fleet (COMLANTFLT) is responsible for the planning and execution of RCN Force Generation (FG) operations in the Continental Atlantic (CONLANT) Area of Operations (AO) as described in Commander of the Royal Canadian Navy (CRCN) Standing Direction and Guidance, which includes the Canadian Arctic west to the eastern border of the US NORTHCOM Area of Responsibility (AOR). As such COMLANTFLT is designated as the RCN Supported Commander for RCN Ops in the Arctic.[17]

14. *Canada First Defence Strategy* (CFDS) confirmed the three traditional CAF roles as defending Canada, defending North America in cooperation with the United States, and contributing to international peace and security. The new defence strategy for Canada, as articulated in the Prime Minister's mandate letter to the Minister of National Defence (2015)[18] will replace the CFDS with a renewed focus on surveillance and control of Canadian territory and approaches, particularly in the Artic regions, while maintaining a strong commitment with the North American Defence Command (NORAD), the North Atlantic Treaty Organization (NATO) and the United Nations (UN).

[17] CRCN Standing Direction & Guidance (SD & G) pg. 11/13 para 14.d.(1)
[18] http://pm.gc.ca/eng/minister-national-defence-mandate-letter

SECTION 3

OPERATIONAL CONTEXT

15. The inherent flexibility of maritime platforms to conduct a multitude of tasks with minimum adaptation has always been of great benefit to the GoC, and the HDW class is no exception. While its primary role will be focussed on Arctic sovereignty and offshore patrols, the nature of its construction, operating range, and payloads will permit it to be employed in a variety of different environments, and in a variety of situations and compliment the efforts of OGDs providing services and support to Northern Maritime Communities. The North is defined as the area encompassing the Sub-Arctic Region[19] and the Arctic Region[20], including the Arctic Circle[21] and High Arctic[22]. Northern waters are defined as the waters, ice covered or not, in the North. The region also encompasses Canada's Arctic Archipelago, the territory, the islands and inlets of the region, which represent about 40 percent of Canada's landmass, and two-thirds of Canada's coastline.

Figure 1 – Northern Maritime Communities

16. The HDW class will be the RCN's primary platform to exercise Canada's sovereignty through NMOs and to contribute to the wider efforts of OGDs, GoC, and CAF objectives for the North. In doing so, the platform will often be the only military asset able to meet these objectives and it should be considered the primary operating environment for HDW class. When not on primary tasking in this region, the platforms can be considered for further tasking to meet the needs and requirements of the CAF and GoC objectives in other regions.

[19] South of the Arctic Region, between 55 and 60 degrees North latitude and Region includes large areas of British Columbia, Alberta, Saskatchewan, Manitoba, Ontario and Quebec where northern conditions prevail.
[20] This region includes the High Arctic and extends from Alaska in the West to Davis Strait in the East, from 60 degrees north to over 83 degrees north. This includes the Yukon, the Northwest Territories, Nunavut, Nunavik (northern Quebec), and all of Labrador.
[21] Defined as 66.5 degrees North latitude.
[22] The geographic area north of the Arctic Circle.

17. Though primarily engaged in operations in the North, HDW class will be capable of operating in a wide range of other environments. As per below and Figure 2, the intended operating areas for HDW class will be:

a. Arctic, Atlantic, and Pacific Coasts of continental North America;

b. Canada's economic exclusion zones, and middle and outer ocean approaches;

c. Great Lakes and St. Lawrence Seaway System;

d. Caribbean;

e. Coastal Central America;

f. International strategic engagements; and,

g. Wherever required to support counter-narcotic operations, HA/DR, and other tasks within the limitations of its inherent capabilities.

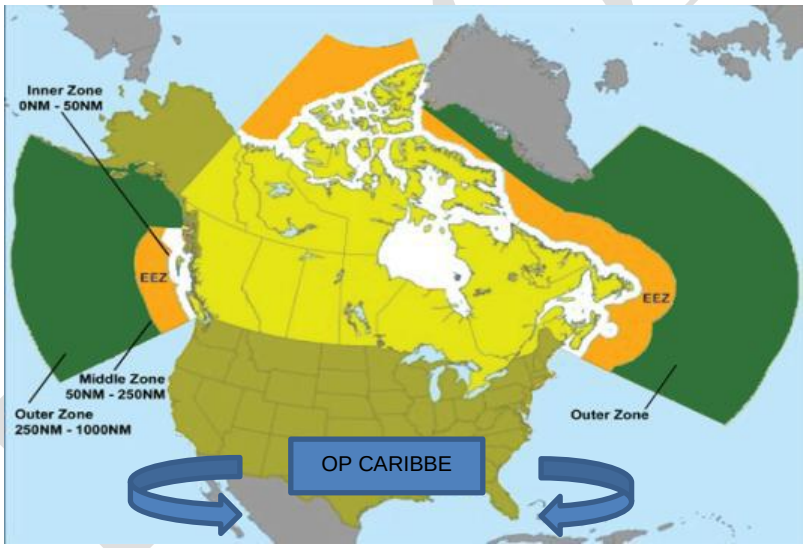

Figure 2 – AOPS Primary AORs

18. The stated operating areas are the most likely for HDW class but should not restrict consideration for their employment in other regions, including consideration as a part of the Naval Task Group (NTG).

19. As per all HMC ships, HDW class will contribute to CRCN's stated Mission:[23] "To generate and maintain combat-capable, multi-purpose maritime forces to meet Canada's

[23] Part 6: Leadmark Mission, Vision, and Strategy for Canada's Navy

defense objectives". The following missions and tasks represent the primary operational focus for HDW class:

a. Sovereignty Patrols. When deployed, HDW class will monitor and facilitate control of maritime activity within Canada's EEZ[24] in order to affirm Canada's sovereign rights over its territorial waters. When operating in the Arctic the majority of tasks will be in support of ongoing operations, such as OP LIMPID and its subsets (OP QIMMIQ and NANOOK). The physical presence of HDW class will provide legitimacy to Canada's claims of sovereignty;

b. Ready Duty Ship. HDW class will contribute to the CRCN responsibility to maintain a ready duty ship on each coast and be capable of responding to national contingency or search and rescue operations;

c. Maritime Domain Awareness (MDA).[25] HDW class will contribute to MDA by providing tactical data, or its local Recognized Maritime Picture (RMP), to the more comprehensive Common Operating Picture (COP) located in the Maritime Security Operational Centres (MSOCs). HDW class' RMP shall also be provided to relevant authorities in support of their MDA requirements, such as the GoC COP and NORAD's Maritime Warning Mission. Operational planners are to ensure that OPLANS provide the necessary means to contribute to and receive MDA information;

d. Support to Joint Forces. As directed by CJOC and the relevant Joint Force Commanders, HDW class will provide the flexibility to help meet CAF assigned missions. Operational planners will tailor mission payloads, crew composition, and asset distribution to align with joint operational objectives;

e. Assistance to Law Enforcement. HDW class will provide inter-agency (IA) support to other government departments (OGDs) for enforcement of national and international mandates and laws in such areas as fisheries protection, drug interdiction, terrorist activities, movement of illegal CBRN[26] material, and illegal immigration. Maritime Interdiction Operations (MIO)[27] in support of law enforcement can be conducted by embarked OGD personnel and their assets. Operational planners will need to consider auxiliary support and resources such as supernumerary personnel, boats, and rules of engagement;

f. Search and Rescue. Responding to distress at sea is an area in which the RCN is well versed, and HDW class will enhance this capability especially in the North. In addition to traditional response to maritime distress by RCN ships:

    i. Beset Vessels - SOLAS. HDW class will conduct emergency ice breaking operations only. The Canadian Coast Guard is the primary agency for the

[24] Defence Terminology Bank Record 43294 and United Nations Convention on the Law of the Sea http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm
[25] Concept of Maritime Information Warfare para 28 – ISR definitions
[26] Chemical Biological Radioactive Nuclear. Notwithstanding this potential task, the ship has no CBRN defensive capabilities
[27] Defence Terminology Bank Record 31957

freeing of beset vessels and should, unless the situation is dire and to wait would endanger life or the environment, be the preferred platforms to carry out ice breaking services; and,

ii. Scene of Action Commander (SAC). The C2, aviation, medical, and logistical capabilities will enable HDW class to be a capable SAC platform.

g. Engagement. During operations in the North, HDW class will be able to provide community engagement to Northern inhabitants. Close cooperation with OGDs such as Aboriginal Affairs and Northern Development Canada (AANDC), local Mayors and Senior Administration Officers, and local RCMP Detachments in each Hamlet will allow ships to contribute to the wider efforts of the GoC;

i. Civil Military Cooperation. Whether in times of need or during routine engagement, HDW class can be of use to civilian authorities to help ensure a positive understanding of the benefits the RCN and GoC brings to the people of Canada;

ii. Aid of the Civil Power. Under direction from the relevant Joint Force Commander, HDW class could contribute to any requests for aid from provincial and territorial governments;

iii. Coordination with OGDs. The RCMP and Parks Canada have the responsibility to visit former Hudson Bay and RCMP outposts but lack the resources such as boats to effectively conduct their duties independently in Canada's Arctic. HDW class can provide support to these OGDs and assist in the function of their duties; and,

iv. Support to DND activities. If directed HDW class can provide assistance to DND for tasks not covered under Support to Joint Forces, such as delivery of logistic support to the North Warning System.

h. Humanitarian Assistance and Disaster Relief (HA/DR). HDW class will be able to contribute key enablers to CAF efforts in HA/DR when directed by CJOC. The mission fit and cargo plan will determine the level of support. Where HA/DR is considered the primary mission, HDW class will, along with the Joint Support Ship, provide a greatly enhanced capability to the CAF in such operations anywhere in the world; and,

i. Support Science Research and Development. HDW class shall be prepared to provide direct and indirect support to Defence Research and Development Canada (DRDC), CAF, and GoC efforts in scientific research and development. These efforts may be focused in support of Naval Force Development (FD), Science and Technology (S&T) and Experimentation requirements or more generalist support to government, academia and industry requests. By nature of the operations HDW class will conduct in the North, there is considerable data that can be collected to help further understanding of the environment. Unless the operational situation prevents such action, routine collection of data including dissemination is to be considered one

of the main requirements of HDW class. Contribution of environmental data is critical for the CAF to fully understand the operational space. To ensure the widest distribution, it should be the aim to have the information releasable as widely as possible. However, certain operations may require the data to be classified in order to prevent accidental disclosure of sensitive information.

i. Ice reporting. When operating in the North HDW class shall, whenever operationally feasible, report ice information to the Canadian Ice Service.

20. For generic planning, HDW class features and design is provided at Annex A. The information is based on the results from the design phase and more accurate data will be obtained during sea testing and subsequent operating experience. This data shall be maintained in the ship's Navigation Data Book.

21. The Concept of Employment indicated an average annual usage between 110 and 120 sea days per ship. This is based upon operational and maintenance cycles based on best available information at the time of writing. As the programme matures and data is compiled from first of class trials and subsequent operational use, these figures will be revised. Initial planning figures indicate no more than 180 days per year per ship.

22. As designed, HDW class has accommodation and stores to support a crew of 65 for up to 120 days. Though there are austere accommodations for an additional 22 mission specialist personnel, the embarkation of these additional personnel will impact the ship's endurance. Accordingly, planning factors such as fuel, resupply, and safety equipment must be considered to support the increase in mission personnel.

23. The Watch and Station Bill attached at Annex B reflect crew composition. Within this context, flexible manning options will be available, including using crew from ships in refit. Fleet Commanders will need to ensure that personnel tempo meets the needs of the mission whilst balancing the crews need to achieve leave, professional training and other requirements. This process will evolve as ships deploy and a better understanding of the need for specific skills and personnel develop. When ships sail with crew reductions, constraints must be considered during the operational planning process.

24. Qualified and Experienced Personnel. Annex C provides details of individual and collective proficiency levels needed for the safe and effective use of HDW class. As the RCN operates HDW class, these levels will be adjusted based on experience and operational need.

OPERATIONAL EMPLOYMENT

25. The following information presents the capabilities of HDW class in order to allow planners to make informed decisions on potential missions and tasks.

COMMAND

26. Unless otherwise ordered, Full Command will reside with the CDS at all times.

27. In most cases, CJOC will be the Force Employer for HDW class, and OPLANs, OPGENs or Operational Orders will detail the C2 structure. The following outlines the C2 and Transfer of Command Authority (TOCA) of HDW class in their different modes of Continental Operations[28].

a. Routine Domestic Operations. Routine operations are Force Employment (FE) activities that are predictable, recurring in nature, deliberately planned, and programmed. CDS has delegated standing authority to initiate CAF routine operations to Comd CJOC. Where FG activities will not be significantly affected and subject to legal restriction, Comd CJOC is authorized to delegate this authority to Regional Joint Task Force (RJTF) Commanders.

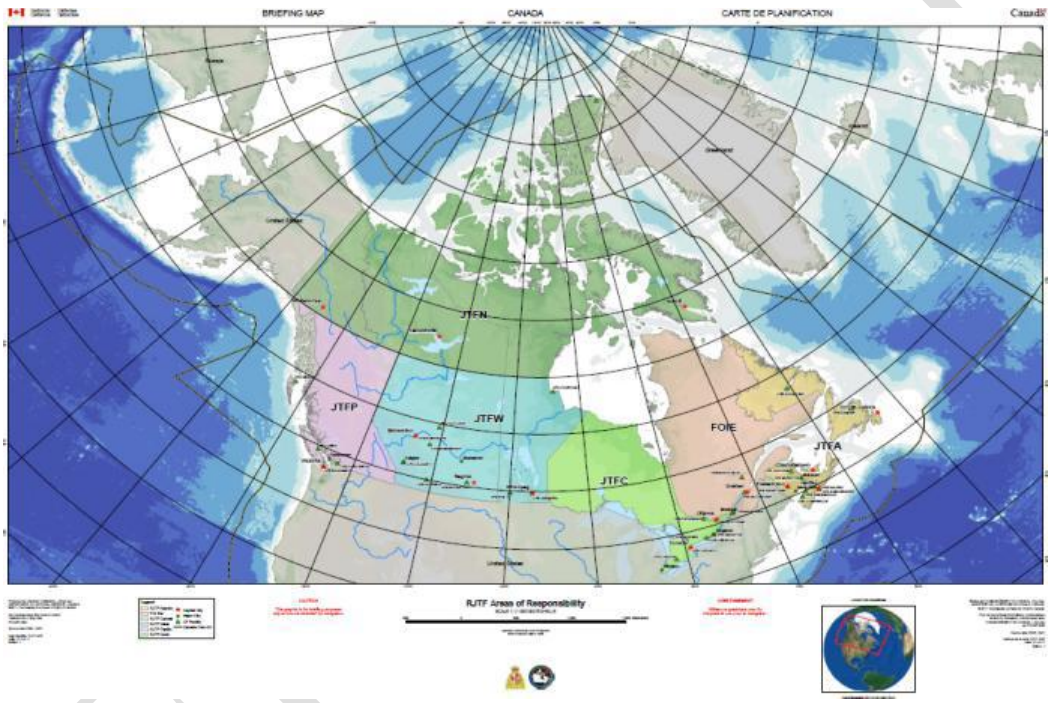

Figure 3 – Regional Task Force Commanders boundaries

b. Contingency Operations. Contingency operations deal with unique events for which the exact timing and location may be unknown, despite their likelihood. Delegation of Authority for initiating operations will flow from CDS to Comd CJOC and subsequently to JTF Commanders. The scope and nature of the operation being planned, legal and regulatory considerations, and GoC direction will determine the level of oversight for such operations.

c. Rapid Response Operations (RRO). RROs are FE activities requiring an immediate CAF action to save lives and property. Standing authority to initiate an RRO is delegated to Comd CJOC and is subject to legal authorities, constraints or limitations that may be prescribed by the CDS. Comd CJOC further delegates the authority to

[28] In theory all northern maritime operations will be directed by an Maritime Component Commander

declare a Regional RRO to the RJTF Commanders. The authority to declare a national RRO rests with the CDS or Comd CJOC.[29]

Note 1. If significant component forces are assigned to a RJTF Comd, a Component Command Element may be assigned by the CA (Land), Commander of Maritime Component (MCC), or Combined Force Air Component Commander (CFACC) to the RJTF Comd. The Component Command Element would have OPCON over the respective component forces.

Note 2. The Commander of Maritime Forces Atlantic is also the MCC under the Canadian Joint Operations Command (CJOC) in Ottawa. As such, the MCC provides routine planning, command and control, coordination, and logistical support to all Royal Canadian Navy warships not excluding HDW class or other assets deployed in the world on Canadian Armed Forces operations, such as Operations QIMMIQ, NANOOK, or OP CARIBBE.

d. Search and Rescue (SAR). SAR Operations are described in Standing Operations Order for Domestic Operations (SOODO)[30] and this publication is to be referred to in establishing SAR C2 structures.

28. In addition to standing CAF orders and directive, HDW class will also be governed by Ship's Standing Orders, Naval Orders, and all other administrative orders as prescribed by the CAF and RCN. Where direction governing HMC Ships omits HDW class, that direction will be followed as closely as practicable within the constraints of the capabilities of this class of ship. Where a deviation is required or amplification is needed, Commanding Officers of HDW class will articulate such deviation to the Ship's Company by means of a written order or direction. Orders and direction governing HMC Ships will be amended as this CONUSE is developed and refined.

29. HDW class communications and network capability is anticipated as follows[31]:

a. Dual Band SATCOM (X and Ku Bands) for 360 degree coverage;

b. 3 x HF Tx/Rx (2 x 1000W, 1 x 500W);

c. 4 x Military Band UHF Transceivers;

d. 2 x High Band UHF Transceivers (used by RCMP and Canadian and US Coast Guards (P25 Radios);

e. 4 x Marine Band VHF (3 on Bridge, 1 in CCR); and,

f. 2 x VHF/UHF Multi-band Air Control Radios (1 in MPOS, 1 in FDCR);

[29] SOODO 17 July 2014 Annex B
[30] CFJP 01 (Canadian Military Doctrine), CFJP 3.0 (Operations), and CJOC's CONPLAN JUPITER and 5Yr Plan for the North also contain important SAR references.
[31] Quality of Life telephones have not been added to current communications suite

g. Combat Net Radio ready;

h. L-3 Symphony System;

i. Iridium;

j. Command Management System (Lockheed Martin);

k. WECDIS;

l. Unclassified and Classified Data Network; and

m. IMIC 3[32].

Strategic Communications

30. Strategic Military Communication. INMARSAT is the main SATCOM bearer until protected military SATCOM (AEHF) "footprint" is confirmed as able to support operations in the North[33]. INMARSAT provides GEO SATCOM services only, and is generally reliable from 70 degrees north to 70 degrees south. Commercial SATCOM options, such as IRIDIUM Next, are capable of providing true global coverage. To support alternate and contingency communications, HF systems can be used for strategic communications where and when possible.

31. Strategic Commercial Communication. HDW class Commercial SATCOM will be Wideband Global SATCOM (WGS) certified. This will provide a global maritime data and voice strategic commercial communications capability alongside and at sea. With due consideration for Arctic operations it will include IP network-data transfer services to allow for inter-operability with OGDs.

Tactical Communications

32. Although not presently envisaged with tactical data link (TDL), HDW class will exploit data networks and tactical voice IP (VOIP) connections to communicate with CAF units, OGDs, Allies and air platforms across the UHF, VHF, and HF spectrum. A dedicated UHF LOS interface (Combat Net Radio System) can be installed as a mission fit in support of SOF and multi-band VHF/UHF in support of Land Forces. A tactical communications plan established using common VHF, UHF and HF channels will enable broad connectivity with CAF and non-military partners.

33. Both secure and unclassified telephone exchanges, including VoIP, will provide interoperability through wired and wireless commercial and military global telephone systems.

[32] IMIC 3 may not be on the ship as delivered. The capability will be delivered, however via the RCNs IMIC 3 project instead of through the AOPS project. This was to ensure commonality with the fleet. Installation date is not yet known.
[33] HDW class will not be fitted with PMSC prior to delivery

Safety of Life at Sea

34. Global Maritime Distress and Safety System (GMDSS), including all components for areas A1, A2, A3, and A4, will be fitted on the bridge and will comply with SOLAS regulations. Refer to the GMDSS manual for mapping and operating instructions.

35. HDW class will be equipped with emergency and distress communications compliant with SOLAS regulations and NAVORD 36-05 (Shipborne Emergency and Distress Communication Policy). HDW class will have Aviation Emergency Communications providing:

a. A dedicated aviation emergency VHF-AM circuit accessible from the Flying Coordinator (FLYCO), Landing Signal Officer (LSO) (if required) and Shipboard Air Controller (SAC) positions; and,

b. A dedicated aviation emergency UHF circuit accessible from the Flying Coordinator (FLYCO), Landing Signal Officer (LSO) (if required) and Shipboard Air Controller (SAC) positions.

Portable Communications

36. The portable LOS communications devices, common to the RCN, will augment the ship's communication suite. These devices will enhance applicable operations, safety and effectiveness of the Ship's crew in the conduct of operations on a 24/7 basis. HDW class portable communications are designed to support:

a. Shipboard emergencies;

b. Naval Boarding Parties;

c. Seamanship evolutions;

d. Force protection; and,

e. Ship's boats operations.

Data Network[34]

37. HDW class will have all reasonable collaborative tools to allow HDW class to plan and execute operations and to communicate with other CAF, Allied, and OGD at the classified or unclassified level, as required. Data Networks will provide high grade (military) messaging, e-mail, video, Air Tasking Orders (ATOs) and other large message files, imagery including maps and graphics, meteorological and oceanographic data, Indication and Warning (EW), Intelligence, Recognized Maritime Picture (RMP), National Maritime Picture (NMP), collaborative planning tools (e.g. chat, whiteboard, etc.), web browsing and voice. To do this, the HDW class Data Network can:

[34] Link 11, 16 and 22 have not been added to the initial communications package in HDW class

a. Provide a network centric, full information exchange between network applications (e.g. NMP, web services, Voice Over Internet Protocol (VOIP) etc.) and CMS;

b. Provide a scalable, flexible, and interoperable web-based network architecture that supports information sharing within maritime forces;

c. Provide shipboard classified Internet Protocol (IP)-based data dissemination and workstations for onboard access to the DND national classified operational network(s) (CSNI). Classified networks are capable of near real-time RMP (e.g. GCCS-M), military messaging, web browsing, email, file sharing, and online collaborative planning tools;

d. Provide shipboard unclassified IP-based data dissemination and workstations for access to the DND national designated administrative intranet (Designated Net (DNet)) and to OGD (IMIC 3), including access to the Internet through the firewall. The network includes near real-time NMP, military messaging, web browsing, e-mail, file sharing, and online collaborative tools; and,

e. Provide the network design that is capable of routing traffic over the lowest tier whenever possible in order to mitigate congestion at the higher tiers (e.g. INMARSAT) and make better use of available RF bandwidth.

Visual Communications

38. HDW class will be fitted with day/night lighting for RAS operations, directional day/night signal lamps for visual communication with other vessels, and navigation lights in accordance with the Canada Shipping Act. In addition HDW class navigation lights will facilitate typical naval operations, including a dimming feature to support tactical operations.

Command Management System (CMS)

39. The CMS will present the RMP in a centralized manner in order to allow crew to plan, monitor and direct the actions necessary to accomplish assigned tasks. Additional capabilities are:

a. Integration of all radars, EO/IR, and IFF;

b. Access and interface to the RMP and COP;

c. CMS workstations with complete functionality and displays to the Bridge and MPOS;

d. Access and interface to the unclassified data network(s) using a simplified version of HCM CMS, to include an integrated, secure KVM (Keyboard-Video-Mouse) switch, and a separate isolated display computer with interface via a Trusted Thin Client (TTC) computer to ensure network separation and connectivity to DNET and CSNI;

e. Interface with WECDIS, to underlay the tactical picture with common digital chart format and to support coastal / littoral operations;

f. CMS display (to include navigation interface) to the briefing room;

g. Integrated Automatic Identification System (AIS) receive capability for surveillance purposes; and,

h. Integrate video feeds from EO/IR and gun system for selectable display on all CMS consoles.

40. CMS will display the maximum gun coverage templates, safety firing templates, and gun blind arcs to allow Command oversight of weapons employment.

SENSE

41. MDA is the effective understanding of anything associated with the global maritime domain that could impact Canada and its Allies' security, safety, economy, or environment. To contribute to MDA, assist OGDs, and to achieve mission success in routine operations, HDW class must detect, identify, track, and report objects within its operating environment.

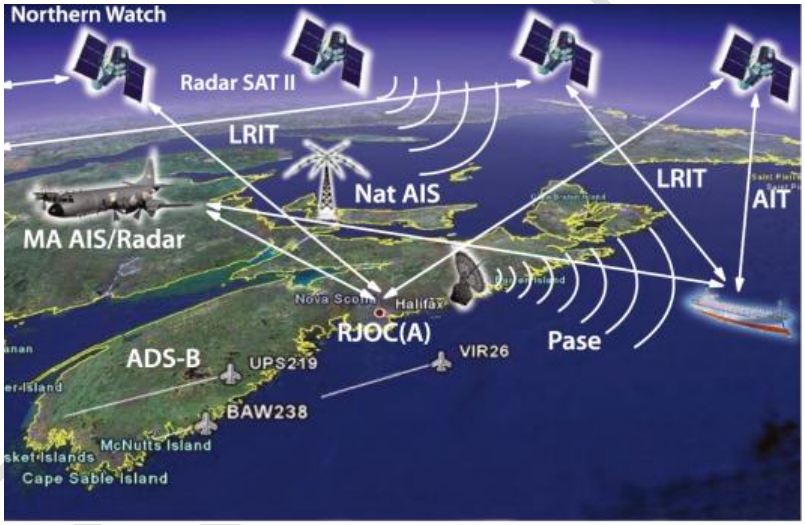

Figure 4 – Northern Watch Conceptual Infrastructure

42. Various departments and agencies will coordinate to identify threats as early and as distant from Canada as is possible, employing a number of systems including Consolidated Secret Network Infrastructure (CSNI) and Interdepartmental Maritime Integrated Command, Control and Communications (IMIC3).

43. IMIC 3 provides a national network of C3 nodes, integrated through a satellite communications network (IRIDIUM), to provide coverage of all areas of operation in Canada's EEZ, including the Arctic. This unclassified system will provide seamless near real-time sharing to aid in the consolidation of the classified maritime picture including contact data, messages, and geo-referenced map overlays between vessels and shore installations, and will contribute to national, bi-national (NORAD) and Allied MDA networks[35]. The greatest

[35] IMIC 3 will not receive information from classified networks

contribution to the NMP and RMP will occur when HDW class operate outside areas with persistent 24/7 surveillance. In many cases IMIC3 will also be able to provide a near real time picture where previously some areas would only receive intermittent coverage

44. Future projects such as the Trusted Situational Awareness Maritime (Trusted SAM) and Northern Watch will provide a high level of trusted maritime domain awareness information for use in the broader maritime community (DND, CCG, TC, RCMP, CBSA and NORAD).

45. When deployed on tasks other than in the North, HDW class will have reach-back capabilities to access the wide array of CAF information to complement its own self-sense capability. No matter the environment or assigned mission, HDW class must be able to access adequate bandwidth. To further generate situational awareness of its surroundings, HDW class is equipped with:

a. 1 x Helo Control and approach radar;

b. 1 x X-Band and 1 x S-Band Navigational radars;

c. Forward looking echo sounder;

d. Multi Band direction finder (limited to simple DF of IMM VHF communications transmissions);

e. EO/IR Sensor (VIGY Observer); and,

f. Unclassified and Classified data networks to process and display ISR data.

Navigation

46. HDW class navigation system has the following capabilities:

a. Positional Data. HDW class automatically detects own ship:

i. Speed through water (speed log);

ii. Speed over ground;

iii. Heading;

iv. Pitch, yaw, and roll;

v. Position using electronic fixing aids, such as GPS;

vi. Depth of the water below the lowest ship's appendage; and,

vii. Water space ahead of the bow to detect underwater navigation hazards at a minimum depth of 50m, out to a minimum range of 1000m.

b. Hydrographic Survey Capability Depth Sensing Payload Capability. When required, HDW class has been designed to support rudimentary multi-beam surveys using existing RCN containerized payload systems. This will be a mission fit as the ship has not been fitted with the required "dry-end" equipment. Future developments in Maritime Unmanned Systems may see more advance surveying capabilities added;

c. Warship Electronic Chart Display and Information System (WECDIS). HDW class will have WECDIS that complies with International Maritime Organization (IMO) Standards[36] and meeting STANAG 4564[37], to include:

i. Support for multiple electronic chart and overlay format standards;

ii. Configurable for certified paperless navigation;

iii. The latest version of application software supported by the RCN;

iv. High latitude navigation;

v. Integrated AIS to allow information to be overlaid onto the WECDIS picture, and to enable querying of the information through database access;

vi. Follow fleet-wide standards and processes for training;

vii. Be interoperable with all electronic chart formats and updates supported by the RCN and between internal and external agencies;

viii. Incorporate a Radar Image Overlay (RIO) for all navigation radars;

ix. Have a primary station in the Integrated Bridge System (IBS);

x. Have a secondary station on the Bridge for planning purposes that does not interfere with operations of the primary station;

xi. A mobile station(s) (i.e. laptop) with access to on board WECDIS and the ability to manipulate WECDIS for navigation planning purposes;

xii. Slave repeater displays fitted in the CO's cabin, day cabin, XO's cabin, and bridge wings as necessary;

xiii. Integrated ice detection capability (Sigma 6);

xiv. Interface with all means of determining HDW class position;

xv. Interface with an echo sounder for navigation purposes; and,

xvi. Interface with the gyro compass.

[36] IMO Resolution A.817 (19) – Performance Standards for Electronic Chart Displays and Information Systems.
[37] NATO STANAG 4564 (Ed2) – Warship Electronic Chart Display System (WECDIS)

d. Navigation Radars. HDW class is fitted with redundant, IMO-compliant[38] navigational radars (X and S band) that integrate into the WECDIS picture which includes the following capabilities:

i. High discrimination radar with good sensitivity and tracking performance;

ii. A separate radar to ensure redundancy, and provide target detection and tracking capabilities in varying and adverse conditions of fog, rain, and sea clutter; and,

iii. A Navigation System Automatic Radar Plotting Aid (ARPA) that complies with International Maritime Organization (IMO) Standards and Specifications.[39]

e. Surface Detection and Tracking. Radars and associated interfaces (Sigma 6) will provide HDW class with the following capabilities:

i. Detect contacts with 90 percent probability of detection and 10.0 e-4 probability of false alarm, in Sea State 4 in multi-path conditions;

ii. Detect ice, icebergs, and/or glacier fragments of height 1m or greater with a radar cross section of $1m^2$ with 90 percent probability of detection and 10.0 e-5 probability of false alarm, in sea state 4 in multi-path conditions at a range of no less than 2 nautical miles;

iii. Provide a combined uninterrupted 360 degree azimuth and a minimum 20-degree elevation coverage with a minimum of 225 degrees overlap in azimuth coverage from 247.5 degrees (relative) around the bow to 115.5 degrees (relative);

iv. Track at least 500 surface contacts simultaneously;

v. Integrate into the CMS; and,

vi. Allow for automatic track acquisition.

f. Automatic Identification System (AIS). The Automatic Identification System (AIS) employed in HDW class can assist in MDA and is:

i. Capable of automatically sending and receiving vessel information between ships at sea as well as to stations ashore;

ii. Integrate with the CMS and IMIC3(once fitted);

iii. Integrate with the WECDIS; and,

[38] IMO Resolution MSC 192(79) – Adoption of the Revised Performance Standards for Radar Equipment
[39] IMO Resolution A.823 (19) Annex – Recommendation on the Performance Standards for Automatic Radar Plotting Aids (APRA).

iv. Enable CMS operators to tactically control the AIS. System (GPS) receivers consisting of a military GPS element and a commercial Differential GPS (DGPS) element to assist in determining the ship's position.

g. Forward Looking Echo Sounder (FLES). The ability to detect underwater ice and sea bottom obstructions from a far is crucial. HDW class will be fitted with a FLES with the following characteristics:

i. A retractable FLES for improved shallow water detection of underwater objects such as ice in front of the ship. The FLES is located in the bottom at frame 21 on port side of the centerline; and,

ii. FLES can be retracted into the hull to reduce resistance when cruising on open sea without ice, and can be deployed as required when entering areas where ice or shoaling (pingos) are expected. The FLES is not designed to withstand impact with large ice pieces, and should be retracted during continuous icebreaking.

Organic Air Support

47. Both the CONEMP and SOR state the need for organic air support through the use of a light organic helicopter or Unmanned Air System, with the requirement to allow for limited support for a CH148 Cyclone. The importance of an organic air asset to HDW class cannot be overstated as the ship's own capabilities, mission success, and crew safety are intrinsically tied to the air support.

48. The full scope and potential of HDW class operations enabled through organic aviation support will be determined by a number of factors, including the types of aircraft that are physically able to operate from the platform, aircraft availability, support infrastructure, and level of ship-aircraft integration.[40] Ongoing operational test and evaluation will require this section to be amended as necessary to reflect new capabilities delivered through project delivery and certification processes.

Maritime Unmanned Systems (MUS)

49. Future developments in MUS will see an increase in capabilities available to HDW class. More than simple surveillance for picture compilation, MUS can offer tactical level support to aid ice navigation, SAR response, and underwater surveying. The RCN Concept on Maritime Unmanned Systems[41] provides an overview of the RCN's intent for future systems, and the ability to embark mission-specific payloads places HDW class in a strong position to develop these future capabilities.

50. The use of MUS in air, surface, or underwater environments requires full consideration of the inherent challenges of Northern operations. For example, the isolation and independent nature of operations requires MUS that will act independently or in conjunction with the host

[40] Determining aircraft operations from HDW class is aided through adherence to C-39-003-001/AG-001 Helicopter/Ship Interface Design Guidance and Clearance Criteria Manual. Expertise gained from HCM/Cyclone integration will also assist.
[41] Unmanned Air Systems – Concept for Maritime Unmanned Systems CAF JAE 2012/14 Lessons Learned.

platform, consorts, and other MUS. In addition, sufficient bandwidth/frequency is required for controlling the UxV and permitting data transfer. Construction of the MUS and its unmanned vehicles (UxV) must be robust enough to endure harsh climatic conditions. The MUS Concept is aided by a study of air assets in support of ice navigation[42] with specific reference to manned vs unmanned systems.

51. This section will be updated as other MUS are developed and introduced. HDW class has space and weight reservations in place to support communications equipment with future UxV capabilities.

ACT

52. As operating experience increases, a better understanding of HDW class capabilities will emerge. This will be captured in future versions of this CONUSE; however several lines of operations have been articulated within this edition. FG and FE commanders are responsible for further developing HDW class capabilities, and these will be outlined in OPLANS and CONOPS detailing specific missions.

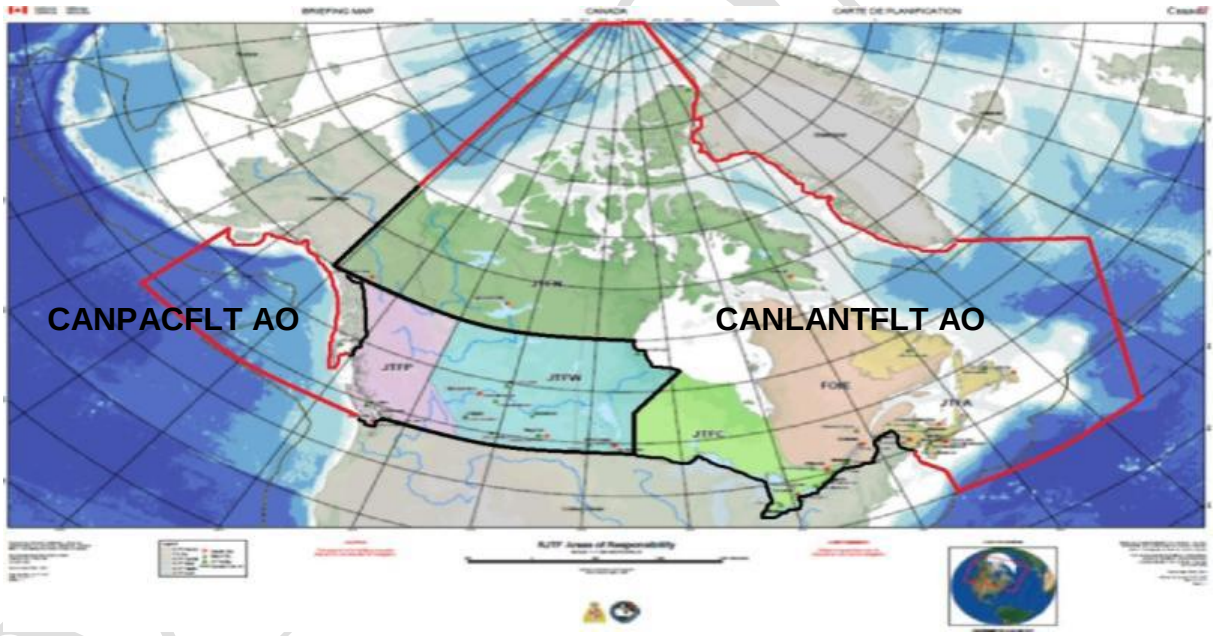

Figure 5 – Boundaries[43]

53. Home-basing of ships will be determined by operational need and circumstances. The initial plan envisions two ships on the West Coast and four on the East Coast to support objectives in CRCN Standing Direction and Guidance (SD & G) regarding the CANPACFLT/ CANLANTFLT areas of operations. However, this can be amended based upon operational readiness, ship availability, and mission requirements.

[42] D Nav Strat HDW class Organic Airborne Support for Safe Navigation in Ice, Feb 2015. Available on request
[43] CRCN SD & G A1A pg2

54. Director Naval Force Readiness will be responsible for the production of the operational cycle for HDW class in order to meet the requirements required by the Force Employer and Force Generator.

Contribution to Maritime Domain Awareness

55. The scale of MDA contribution from HDW class may vary from ship to ship depending on location, payloads and mission. In the surface and underwater domains HDW class may be capable of providing detailed and often unique information and data.

Sovereignty and Enforcement Patrols

56. Northern Maritime Operations. These operations will be both sovereignty and enforcement in nature and are to support the wider intent of the GoC and its Northern Strategy.

57. Specific operations, such as OP NANOOK, already have well established OPLANS. There needs to be production of a HDW class specific OPLAN for NMOs developed before the first deployment to the North.

58. In developing the OPLAN, detailed guidance on navigation in ice must be provided for ships to allow Commanding Officers to make safe decisions on employment. Use of the Arctic Ice Region Shipping System is mandatory by planners to ensure that HDW class are operated safely within ice conditions. HDW class will be certified by Lloyd's Registry with a Polar Class 5 (PC5) rating. Notwithstanding this PC5 rating, the ship does have additional structural enhancements at the bow and stern (PC4) to provide a greater measure of protection against inadvertent strikes against growlers or multi-year ice.

59. In the planning process when HDW class is assigned to operations in the North, planners must be cognisant of the Arctic Security Forces Round-table that occurs annually and staffed by CJOC representatives. It is designed to serve as a collaborative forum between the security forces of the eight Arctic states and four non-Arctic states in order to promote regional understanding, dialogue, and cooperation, enhance multilateral Arctic security and safety operations, and adapt to the changing environment and emerging missions. It is envisioned that HDW class will visit the Arctic Nations to enhance interoperability, conduct defence engagement and diplomacy, and rest the crew between patrols to further GoC objectives in this region.

60. OP CARIBBE. Deployments to the Caribbean in support of JIATF(S) and the counter drug operations in force are well suited to HDW class. The ship's range, capacity to carry a helicopter, sea-lift, boats, crew size, additional accommodations, briefing and ready rooms, small arms storage, general storage capacity, POL storage, weapons and sensors Command and Control (C2) are significantly superior to a *Kingston* class and proportionally a more appropriate response to counter illicit trafficking of narcotics than a *Halifax* class major Combatant. Like the *Halifax* class, HDW class will support intelligence fusion with its multiple sensors to correlate, detect, monitor, and target vessels suspected of illicit trafficking. HDW class Rosborough multi-role rescue boats will effectively support high speed pursuits and the rapid insertion of the United States Coast Guard Law Enforcement Detachment

(USCG LEDET) onboard a vessel of interest (VOI). With HDW class the RCN will continue to provide sustained support to JIATF(S) through OP CARIBBE. Pan-RCN coordination of sea days is to be executed through DNFR who will consider deploying AOPS for OP CARIBBE when appropriate.

61. HDW class are well placed to provide HA/DR support as directed by the GoC. Forward deploying of HA/DR stores into theatre should be considered. This will allow Commanding Officers to optimise for boarding or HA/DR operations based on environment conditions and the potential for natural disasters to occur.

62. Naval Force Development Support. DGNFD will be allocated dedicated days at sea, through the RCN Business Plan, for HDW class use in S&T research or experimentation for tactical development. The coordination and allocation of priorities for these sea days is through the Maritime Concept Development and Experimentation Coord Group (MCD&E CG). Where ships' programmes allow additional research and experimentation may take place. This will be coordinated by the MCD&E CG and managed through the Force Assignment Schedule (FAS) and FLTSCHEDs.

63. Support to Other Government Departments. Operations in support of OGDs are normally conducted under FE C2 where the RCN is in a supporting role. However, there are instances, either for the purpose of supporting an OGD's training activity or to provide capabilities to enhance an OGD's ability to execute its mandate, where the RCN will be required to directly support an OGD. Consequently, the RCN will continue to allocate sea days to support the following OGDs and applicable interdepartmental MOUs:

a. Department of Fisheries (DFO). Although specific sea day allocations are not described within the MOU between DND and DFO, MARLANT will likely continue to allocate up to 90 sea days per year for Fishery Patrols, maintaining the level of effort traditionally requested by DFO. MARPAC will likely continue to support the CCG with 25 days of SAR relief support. HDW class when available will embark DFO Officers to support Fishery Patrols in the MARLANT AOR and remain on station in the MARPAC AOR in designated SAR zones as required;

b. Public Safety Canada (PSC – RCMP Support). In accordance with the current MOU between the RCMP and DND, both Formations shall each be prepared to provide up to 10 sea days annually, if required. A further 10 sea days per Formation may be provided if requested by RCMP with recovery of actual incremental costs only. HDW class when available, and when the most appropriate platform, will embark RCMP and support staff to facilitate constabulary duties; and

c. It is expected that the RCN will conduct maritime security and sovereignty patrols as a secondary mission whenever at sea, if not otherwise specifically assigned as a primary mission. The intent is for RCN assets whenever possible to contribute to MDA and the RMP to support Canadian security and sovereignty efforts. While at sea HDW class will contribute to OP LIMPID and its maritime subsets OPs QIMMIQ, LEVIATHAN, and SEA LION.

SUSTAIN

64. Outside of Northern Maritime Operations, logistical requirements for HDW class are similar to other RCN requirements, scaled to fit the class of ship. Operations in the North present new challenges to sustain ships on task and this Force Support (FS) function must be well coordinated between D Nav Log, CJOC, and Formations.

65. The planning process to deploy an RCN vessel to the Arctic must take into account its classification, Type or Polar Code, the Arctic Zones in which the CAF is required to operate and the Ice Regime the vessel is expected to encounter. As a General Planning Tool, the Arctic Shipping Pollution Prevention Regulations provides Commanding Officers and planning staff with direction as to what access they will have to the Arctic utilizing the Zone / Date System as it applies to the classification of the RCN asset.

66. The Arctic Ice Regime Shipping System (AIRSS) involves comparing the actual ice conditions along a route to the structural capability of the ship. The basic definition of an ice regime is:

> *"Any mix or combination of ice types, including open water. An ice regime occurs as a region in navigable waters covered with generally consistent ice conditions; i.e. the distribution of ice types and concentrations does not change very much from point to point in this region."*[44]

67. As defined in AIRSS, the Arctic is divided into 16 zones, where Zone 1 is generally considered to have the most demanding conditions and Zone 16 the least. Figure 6 articulates the division of zones.

[44] User Assistance Package for the Implementation of Canada's Arctic Ice Regime Shipping System (AIRSS) May 1998; pg 9.

Figure 6 – Zone / Date System Chart

Access to each zone is based on historical data related to the probable ice permitted access to operate in the most stringent zones, while the most capable of vessels would never be denied access based on their hull design. For all ship classifications and zones allowable operating windows are defined. Hence the system is referred to as the Zone / Date System. Both the access dates and the zones for 'Arctic Class' ships and 'Type' ship classes are clearly identified together in the following table:

	Col. I	Col. II	Col. III	Col. IV	Col. V	Col. VI	Col. VII	Col. VIII	Col. IX	Col. X	Col. XI	Col. XII	Col. XIII	Col. XIV	Col. XV	Col. XVI	Col. XVII
Item	Category	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	Zone 12	Zone 13	Zone 14	Zone 15	Zone 16
1.	Arctic Class 10	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year
2.	Arctic Class 8	July 1 to Oct. 15	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year
3.	Arctic Class 7	Aug. 1 to Sept. 30	Aug. 1 to Nov. 30	July 1 to Dec. 31	July 1 to Dec. 15	July 1 to Dec. 15	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year	All Year
4.	Arctic Class 6	Aug. 15 to Sept. 15	Aug. 1 to Oct. 31	July 15 to Nov. 30	July 15 to Nov. 30	Aug. 1 to Oct. 15	July 15 to Feb. 28	July 1 to Mar. 31	July 1 to Mar. 31	All Year	All Year	July 1 to Mar. 31	All Year	All Year	All Year	All Year	All Year
5.	Arctic Class 4	Aug. 15 to Sept. 15	Aug. 15 to Oct. 15	July 15 to Oct. 31	July 15 to Nov. 15	Aug. 15 to Sept. 30	July 20 to Dec. 31	July 15 to Jan. 15	July 15 to Jan. 15	July 10 to Mar. 31	July 10 to Feb. 28	July 5 to Jan. 15	June 1 to Jan. 31	June 1 to Feb. 15	June 15 to Feb. 15	June 15 to Mar. 15	June 1 to Feb. 15
6.	Arctic Class 3	Aug. 20 to Sept. 15	Aug. 20 to Sept. 30	July 25 to Oct. 15	July 20 to Nov. 5	Aug. 20 to Sept. 25	Aug. 1 to Nov. 30	July 20 to Dec. 15	July 20 to Dec. 31	July 20 to Jan. 20	July 15 to Jan. 25	July 5 to Dec. 15	June 10 to Dec. 31	June 10 to Dec. 31	June 20 to Jan. 10	June 20 to Jan. 31	June 5 to Jan. 10
7.	Arctic Class 2	No Entry	No Entry	Aug. 15 to Sept. 30	Aug. 1 to Oct. 31	No Entry	Aug. 15 to Nov. 20	Aug. 1 to Nov. 20	Aug. 1 to Nov. 30	Aug. 1 to Dec. 20	July 25 to Dec. 20	July 10 to Nov. 20	June 15 to Dec. 5	June 25 to Nov. 22	June 25 to Dec. 10	June 25 to Dec. 20	June 10 to Dec. 10
8.	Arctic Class 1A	No Entry	No Entry	Aug. 20 to Sept. 15	Aug. 20 to Sept. 30	No Entry	Aug. 25 to Oct. 31	Aug. 10 to Nov. 5	Aug. 10 to Nov. 20	Aug. 10 to Dec. 10	Aug. 1 to Dec. 10	July 15 to Nov. 10	July 1 to Nov. 10	July 15 to Oct. 31	July 1 to Nov. 30	July 1 to Dec. 10	June 20 to Nov. 30
9.	Arctic Class 1	No Entry	No Entry	No Entry	No Entry	No Entry	Aug. 25 to Sept. 30	Aug. 10 to Oct. 15	Aug. 10 to Oct. 31	Aug. 10 to Oct. 31	Aug. 1 to Oct. 31	July 15 to Oct. 20	July 1 to Oct. 31	July 15 to Oct. 15	July 1 to Nov. 30	July 1 to Nov. 30	June 20 to Nov. 15
10.	Type A	No Entry	No Entry	Aug. 20 to Sept. 10	Aug. 20 to Sept. 20	No Entry	Aug. 15 to Oct. 15	Aug. 1 to Oct. 25	Aug. 1 to Nov. 10	Aug. 1 to Nov. 20	July 25 to Nov. 20	July 10 to Oct. 31	June 15 to Nov. 10	June 25 to Oct. 22	June 25 to Nov. 30	June 25 to Dec. 5	June 20 to Nov. 20
11.	Type B	No Entry	No Entry	Aug. 20 to Sept. 5	Aug. 20 to Sept. 15	No Entry	Aug. 25 to Sept. 30	Aug. 10 to Oct. 15	Aug. 10 to Oct. 31	Aug. 10 to Oct. 31	Aug. 1 to Oct. 31	July 15 to Oct. 20	July 1 to Oct. 25	July 15 to Oct. 15	July 1 to Nov. 30	July 1 to Nov. 30	June 20 to Nov. 10
12.	Type C	No Entry	No Entry	No Entry	No Entry	No Entry	Aug. 25 to Sept. 25	Aug. 10 to Oct. 10	Aug. 10 to Oct. 25	Aug. 10 to Oct. 25	Aug. 1 to Oct. 25	July 15 to Oct. 15	July 1 to Oct. 25	July 15 to Oct. 10	July 1 to Nov. 25	July 1 to Nov. 25	June 20 to Nov. 10
13.	Type D	No Entry	No Entry	No Entry	No Entry	No Entry	No Entry	Aug. 10 to Oct. 5	Aug. 15 to Oct. 20	Aug. 15 to Oct. 20	Aug. 5 to Oct. 20	July 15 to Oct. 10	July 1 to Oct. 20	July 30 to Sept. 30	July 10 to Nov. 10	July 5 to Nov. 10	July 1 to Oct. 31
14.	Type E	No Entry	No Entry	No Entry	No Entry	No Entry	No Entry	Aug. 10 to Sept. 30	Aug. 20 to Oct. 20	Aug. 20 to Oct. 15	Aug. 10 to Oct. 20	July 15 to Sept. 30	July 1 to Oct. 20	Aug. 15 to Sept. 20	July 20 to Oct. 31	July 20 to Nov. 5	July 1 to Oct. 31

Note: There are additional date restrictions contained in the regulations for certain ships. Please verify the actual allowed dates from Section 6 of the regulations.

Table 2 – Zone / Date System Historical data table

68. Although simple and predictable, this system has one major drawback - ice conditions vary significantly from year to year. So in a severe year, an inexperienced operator might attempt a voyage well beyond the capabilities of the ship. In a light ice year, the rigidity of the regulatory system may prevent ships from transiting areas which could be completely free of ice. AIRSS developed through the joint work of government and industry, is a more flexible and safe system and must be used by the RCN planning staff when developing Arctic deployments.

69. AIRSS and the Zone / Date System when used in conjunction provide the best planning tools for RCN ships proceeding north and keeping them north for as long as the Commanding Officer deems it operationally feasible to do so. While the AIRSS is not incomprehensible to the inexperienced, a deployment plan cannot be developed by an inexperienced planner who will have no responsibility for the vessel once deployed. There are some calculations required to be done by the Commanding Officer to make an operational risk assessment to operate safely in the Arctic. To better understand table 2, the Canadian Arctic Category (CAC) 4 will be used to provide planners a framework from which to work.

ASPRR	Equivalent Standards AIRSS	Polar Class	Area, type of ice
Arctic Class 10	CAC 1	PC 1	Unrestricted Date & Zone Navigation
Arctic Class 9			
Arctic Class 8	CAC 2	PC 2	Unrestricted Zone & Navigation – date & ice condition sensitive
Arctic Class 7			
Arctic Class 6	CAC 3	PC 3	Unrestricted Second Year Ice, occasional MY
Arctic Class 5			
Arctic Class 4			
Arctic Class 3	CAC 4	PC 4 PC 5 HDW class	PC 4 Unrestricted Thick FY, occasional MY. PC 5 (HDW) Medium FY ice which may include old ice inclusions
Arctic Class 2			
Arctic Class 1A			
Arctic Class 1			
Type A	Type A	PC 6	Summer / Autumn in Med 1yr, with old ice inclusions
Type B	Type B	PC 7	Summer / Autumn in thin 1yr, with old ice inclusions
Type C	Type C	Type C	Thin FY 0.5 – 06 metres thick
Type D	Type D	Type D	Grey – white 0.3 – 0.4 metres thick
Type E	Type E	Type E	Grey ice < 0.15 metres thick

Table 3[45] - Hull classification Systems

70. While conservative, the Class CAC 4 is seen as commercial cargo carrying ship which can trade in the Arctic where ice regimes permit. CAC 4 is capable of navigating in any thickness of First-Year ice found in the Canadian Arctic, including First-Year ridges. It would avoid Multi-Year ice but when this is not possible, it would push or ram Multi-Year ice at very slow speeds.

71. A HDW class vessel can be expected to be on station in the Eastern Arctic in the first part of navigable season. As the ice thaw progresses the first of HDW class to deploy north can be expected to operate in the vicinity of zone 13 and remain there until relieved on station. In the case of the Western Arctic a HDW class vessel can be expected to be on station in zone 12 by mid-July and zone 11 by end-July. A HDW class deployed west, given the distance, may be required to remain on station in the Western Arctic for up to 80 days[46] until relieved. It is

[45] User Assistance Package for the Implementation of Canada's Arctic Ice Regime Shipping System (AIRSS) May 1998.
[46] CCG layday period is six weeks when deployed to the Arctic

important to note that Lancaster Sound is rated at zone 2 and may not be navigable for a HDW class to transit to Nanisvik[47] for fuel. Like the CCG, HDW class will be required to contract a fuel barge for fuel to be delivered to Kugluktuk or Cambridge Bay[48]. It may also be required to arrange in advance, to take fuel from the CCG operating in the Western Arctic. Careful planning and coordination is required for fuel and stores requirements. At the height of the navigable season the RCN may have as many as four HDW class conducting patrols throughout the Canadian Arctic.

72. The total deployment time for one HDW class in the Eastern Arctic is 120 days and 80 days in the Western Arctic while maintaining presence in the Arctic for the full navigable season. This will translate into (potentially) no requirement for crew rotation east or west as a matter of routine but will allow for personnel to leave the Arctic for coursing, leave, medical or compassionate reasons. As HDW class reaches steady state and if the concept of crew swaps becomes a necessity, HDW class maintenance cycle (refit) will result in one full "downed" crew annually and two "downed" crews quinquennially. Instructions are to ensure they have the ability to execute crew rotation in a timely fashion and should endeavour to trial this as part of the class introduction.

73. Mission success depends upon two equally important components: operations and support. HDW class will be self-accounting in terms of maintenance and repair, finance, administration, medical, food services, non-public funds, supply, personnel administration, and overall sustainment. HDW class extended deployment construct, especially to the North during the Arctic navigable season, reinforces the importance of the ability to self-account. HDW class will depend primarily on the Nanisivik Naval Fueling Facility (NNF) when operating in the Eastern Arctic or on contracted support rendered from companies that specialize in northern supply operations when operating in the Western Arctic. Conversely, HDW class may be used to assist in the maintenance of Canadian Armed Forces Arctic Training Centre through the ships sea lift capability, provide supplies to the Northern Operation Hubs (NOHs) that are not land locked, and contribute to the maintenance and support of NOH Operations.

74. While deployed in the Arctic there may be the requirement to temporarily plan for shore-based support in the NNF or elsewhere out of a NOH with the In Service Support Contract (ISSC) Contractor for engineering and equipment maintenance. Additionally, support planning and operating cycles[49] will be implemented by HDW class Logisticians and Fleet Logistics Staff to facilitate the movement of crews, visiting personnel (e.g.OGDs), fresh food, mail and cargo to and from HDW class when deployed to the Arctic or outside Canada. The Sustainment Plan for Northern Maritime Operations (NMOs) will also include relief in place, provision of high priority parts, fuel and materials, and logistical support to and from other OGDs.

75. HDW class medical support plan for RCN Northern operations will address the health challenges associated with operating in the North for extended periods. Medical support staff must be cognizant of the medical support available in the Arctic and evacuation plans in case

[47] Planners should refer to NNF Concept of Operations / Use
[48] Contracting can be shared with the CCG
[49] Concept of Support is under development by D Nav Log

of medical emergencies. HDW class will be supported by one Physician's Assistant (PA) as permanent crew and one Medical Technician (Med Tech) embarked as part of the "mission" specialist augmented crew. The PA will have completed and passed the Canadian National Physician Assistant Certification Exam (Canadian Certified PA(CCPA), Advanced Trauma Life Support (ATLS), and Advanced Cardiac Life Support (ACLS). Both the PA and Med Tech will have completed and Advanced Military Trauma Resuscitation Program (AMTRP). In addition to this training it is recommended that the Medical Staff are trained in Basic Aviation Medicine, Basic Dive Medicine, and Rotary Wing Underwater Escape Training (RUET). All support staff will possess advanced first aid training.

76. Naval Force Readiness in consultation with CJOC, JTFN and OGD (CCG), will all contribute to the plan for achieving the objectives of a Sustainment Plan for NMOs. Specific FS items, as identified by Director Naval Logistics, will be captured and incorporated into the yearly deployment plans contained in the RCN Arctic Action Plan. Critical to the importance of operations in the Northern Communities is the relations with the peoples of the Canadian Arctic. JTFN sends an annual exercise letter early January / February to local communities to promote goodwill and build on positive relationships. JTFN also has a wealth of resources that JTFA and JTFP will profit from while operating in the JFTN AOR. Meteorological products, calendar intentions and events that may be of interest while operating north of latitude 60 which will assist in achieving most of HDW class primary and secondary tasks articulated herein. This planning cycle will begin September of each year to support clearing latitude 60 N annually by 1 June of the following year or earlier.

In-Service Support (ISS) Maintenance Requirements[50]

77. HDW class are supported by an In-Service Support Contract (ISSC) for planned and corrective maintenance. The ships will therefore need to be made available to the ISSC for a specified maintenance period in any given year. This maintenance period will be negotiated with ISSC Contractor periodically. The Fleet Maintenance Facilities will also provide maintenance support to HDW.

78. HDW class will be maintained in Class under Lloyd's Register of Ships Notation by the ISSC Contractor. The ISSC will act as Design Agent for HDW class while Design Authority responsibilities will rest with the Class Program Manager DMEPM (MWVA). The Class Program Manager will also be responsible for the management of the ISS Contract.

79. The ISSC Contractor[51]:

a. Provide second and third level maintenance support;

b. Provide technical support 24/7 and be capable of providing second level maintenance support wherever the ship is deployed;

c. Be responsible for maintaining configuration of HDW class; and

[50] HDW class will be maintained in Class with the use of a Classification Society
[51] Notionally as the contract is not yet ratified. Some second line maintenance may be required by the crew

d. Be responsible for maintaining HDW class technical data package including training information.

SHIELD

80. HDW class will operate primarily in North American waters, south to the Panama Canal and north through navigable Arctic waters. Patrols and deployments typically encompass Canadian internal waters (including the St. Lawrence Seaway and Great Lakes), Canadian territorial waters, the Canadian Exclusive Economic Zone and the coastal waters of North America. Units or groups of units may deploy to European waters and the Pacific Rim. HDW class will operate in the lower end of the conflict spectrum as determined by the assignment to the North American AOR and the roles and mission profiles established. Assignments in which HDW class operating alone or in small groups deployed from its principal operating bases, often to remote areas, for prolonged periods will characterize the operation profile. Mid-intensity combat operations are only intended as part of a larger NTG with the attendant support and protection of a major naval combatant.

Self Defence

81. HDW class is a patrol ship equipped with limited weapons and sensors, including a Force Protection Component that make it capable of carrying out surveillance operations and sovereignty patrols, counter narcotics operations, Non-combatant Evacuation Operations (NEO), FG, fleet support, and support to OGDs. Its weapons and sensors will afford the ship a limited self-defence capability that is consistent with its current intended employment and use. Self-defence capabilities include the following weapons and sensors:

a. BAE 25mm Close Range Gun System, Remote Controlled from the Bridge;

b. EO/IR fire control System;

c. 2 x .50 Cal HMG;

d. Underway Force Protection Component;

e. Ability to embark a Naval Boarding Party to support OGDs (RCMP) or conduct boarding operations outside of Canada's EEZ;

f. Ability to embark and deploy Enhanced/Advanced Naval Boarding Party;

g. ORCA Man Overboard System; and,

h. Ability to embark/support Naval Combat Support Units (NCSUs).

Survivability

82. Ice. HDW class is designed to operate in the Arctic in ambient temperatures down to -29 degrees Celsius with the means of protecting relevant equipment and systems against freezing. HDW class has ice breaking features such as an icebreaker stem, ice strengthened

propellers, ice knives aft, and the hull form itself. These features, together with the propulsion plant, are what enable the ship to survive while maneuvering in ice. In addition to survive in ice while going astern, ice knives are arranged behind each rudder to protect the rudders. Due to the depth of the ice knives, a draught of at least 5.85m is required in the aft end when operating in ice.[52]

83. Damage Control. HDW class are built to commercial standards and are designed with a high probability of surviving any reasonable peace time damage sustained through incidents such as collision, ice accretion, groundings and onboard fires. The damage control organisation and fitted systems will automatically, with manual redundancy, detect, suppress, and contain fire, smoke, toxic fumes, and flooding effects following the damage or loss of any space caused by accident, by small-calibre guns, man-portable weapons, collision with other ships or ice. With a crew of 65, all ship's crew will be required to be naval environmentally trained and complete Collective Training (CT) requirements led by Sea Training Group (STG) in order to assist in the combat of damage onboard.

GENERATE

84. FG is directed towards activities and processes that support the key elements required to generate maritime forces, material readiness, personnel readiness and combat readiness. Holistically, FG involves recruiting new personnel, assembling, equipping, training, certifying, and generally preparing naval forces, maintenance and repair of equipment and activities required to maintain naval forces in a defined state of readiness for FE.

Operational Crew Requirements

85. HDW class will be crewed by Regular Force (RegF) personnel and will be augmented by Primary Naval Reserves (PRes) on a case by case basis and when the opportunities arise. The Commanding Officer (Cdr) and Executive Officer (LCdr) are Command Part II qualified Officers possessing all the qualifications of a RegF Maritime Surface Warfare Officer (see annex C). The Coxswain (RegF Chief Petty Officer 1st class) is the senior NCM embarked in HDW class. The ship's crew will be supplemented by mission specific personnel consisting of military, government and civilian specialists as required by the assigned tasks. Additionally, contracted support may be required for ice observing, food services, and for helicopter support.

[52] CFCD 130 will need to be developed to include HDW class ship handling characteristics

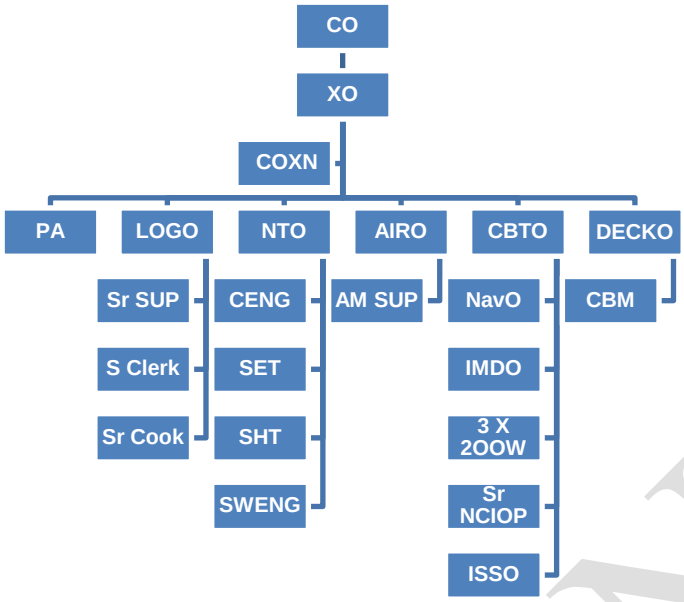

Figure 6 - Key Positions by Functional Organization

86. HDW class shall:

a. Be operated with a crew of up to 65 to operate, sustain, and maintain the ship while it performs its primary role of armed seaborne surveillance, and in all times when in remote northern waters;

b. Be augmented with mission specific personnel as required for missions such as air operations, boarding operations, and support to OGDs and Land Forces;

c. Require its personnel to perform watch and station bill duties not normally associated with their naval occupation;

d. Normally operate in a one-in-four watch rotation and be capable of surging to a one-in-two rotation, as operations require, for short periods of time;

e. Will support the management of additional trained personnel who will be scheduled to fly north to support personnel leave, coursing, and medical evacs in order to sustain operations north for at least four months or as long as the Arctic is navigable exists;

f. When embarking supernumerary personnel to support primary and secondary tasks, they will be embarked at the latest and disembarked at the earliest opportunity so as to limit their impact to consumables and contribution to waste; and,

g. All ship's crew shall have demonstrated practical and theoretical knowledge through know your ship training.

Training Requirements and Special Qualifications

87. The RCN Training system is primarily designed to deliver sailors to serve onboard the HAL class. When posted to HDW class, sailors will receive Delta Training package as required. Environmental training for key personnel will be required in order for the RCN to meet "as closely as practicable" the IMO requirements outlined the in the Polar Code. This training will be a blended solution utilizing Technology Enabled Learning in line with the RCN Future Naval Training System (FNTS) Strategy. By utilizing the latest in Educational Technology for HDW class training, HDW class crew will be trained to a higher standard and in a shorter amount of time than has been done previously. Outside of the occupation training, training for the ship's fitted equipment will be completed prior to joining. NPTG has identified additional training for new machinery equipment, light vehicles, ice observation, ice navigation, main armament, and sensors such as Forward Looking Sonar, ISAT 200 and IMIC 3.

88. Similar to the training given to personnel deploying to CFS Alert, there will be a need for personnel working ashore to have firearms training to deter wildlife from attack, utilizing appropriate calibre firearms and ammunitions, in order to deploy with weapons for use in the event of wildlife attack.

89. Annex C and its appendix provide further detail to proficiency requirements for key personnel.

Polar Code

90. The code covers the full range of design, construction, equipment, operations, training, search and rescue, and environmental protection matters relevant to ships operating in waters surrounding the two poles. The complete Polar Code, encompassing the safety-related and environment-related requirements, is expected to enter into force on January 1, 2017. It is therefore important that Formation Safety and Environment representatives as well as ship's officers and crew become familiar with the Polar Code and its application.

91. The code will apply to new ships constructed on or after January 1, 2017. Ships constructed before that date will be required to meet the relevant requirements of the code by the first intermediate or renewal survey, whichever occurs first, after January 1, 2018.

Readiness Profiles/Process and Collective Training

92. The Tiered Readiness Program (TRP) is normally 7-9 months, commencing when the shipyard turns the ship back to the crown and ending on completion of a STG led Work Up program. HDW class will spend the majority of the operational cycle at Normal Readiness 1 (NR1) as this represents the level of readiness deemed sufficient for most FG and FE activities. The actual duration of the NR1 period will vary by individual unit and schedule requirements. HDW class will sustain readiness in accordance with readiness requirements contained in CFCD 102 and direction contained in CFCD 129. For the purpose of this Concept of Use, High Readiness refers to a deployment of forces to an area of mid-intensity operations (deadly force may potentially be applied) or overseas where the nature of the employment is such that it is best suited to a more robustly manned, trained and technically capable ship other than HDW

class. It is difficult to envision HDW class being deployed in a HR role without the support of a major combatant; therefore HDW class will in almost all cases achieve a certification no higher than NR1. If however the transition were to occur for instance to support Non-combatant Evacuation Operations (NEO), it will require the appropriate Mission Specific Training (MST) to support the operation. HDW class will be generated to NR1 through the TRP and will remain at NR1 until designated to another Readiness State.

93. HDW class crews will be generated through the TRP to NR2, the Commanding Officer shall and the Executive Officer and Navigating Officer should generate through the TRP to NR1 in order to deploy in an ice regime of 4/10ths or greater ice. Until a unit achieves NR2 certification, it is by default Restricted Readiness 1(RR1) and will be restricted in its operational employment. In addition, until the Commanding Officer achieves NR1 certification, the unit by default remains NR2 and will be restricted in its employment to $3/10^{th}$ or less of very open drift ice and / or 1st year thin ice.

94. HDW class requires approximate 20 sea days to generate Force Element readiness. This translates into a 3 week work-up program that includes RR1 (3-5 days), NR2 (10 days) and Air Wups (3-5 days); the number of sea days required to sustain readiness is yet to be determined but will be approximately 60 sea days per year. NR1 applies primarily to the Commanding Officer who has accumulated a minimum of 60 sea days experience in the Arctic in 1/10 ice and greater. To achieve NR1 the Commanding Officer will receive mentorship in ice in the Gulf of St Lawrence or the St Lawrence Seaway in a HDW class for 3-5 days prior to deploying north in the June – July timeframe. If the opportunity to be mentored in ice in the St Lawrence Seaway or other appropriate operating area does not become available, the CO, XO and Navigator should be mentored in the Arctic with a qualified Commanding Officer in 5/10 to 10/10 first year ice in an HDW class for approximately 3-5 days.

Personnel Deployment Intent

95. To facilitate operations north in both Western and Eastern Arctic waters of Canada's EEZ, crew rotations from both coasts will be carefully coordinated to ensure personnel are deploying IAW CAF policy for domestic and expeditionary operations. It is envisioned that no matter which coast a sailor resides, when HDW class are deployed north and the requirement exists to replace a sailor temporarily or permanently for a particular deployment, HDW class will work with PCC Atlantic/Pacific (A/P) to draw from the establishment in HDW class Fleet first to avoid drawing from ships that require sailors who are required for expeditionary operations. Sailors requesting to sail in HDW class shall do so through their CoC who in turn will inform their respective Career Manager to take for action as the requirement exists.

Readiness

96. HDW class will fall within the RCN's "one" common Readiness and Sustainment Policy (RSP) Policy for all operational capabilities. As such, the readiness structure for RCN assets will apply to HDW class capabilities. HDW class will achieve a Normal Readiness (NR) profile through its RSP battle rhythm and like any NR ship will be crewed as a minimum, to the levels indicated in CFCD 129. This level of crewing is deemed sufficient to execute core naval training but may necessitate that Operational Commanders adjust traditional at-sea

Schedules of Events (SOEs) and/or accept reduced watch-standing capacity from HDW class. When HDW class is deployed on an operational mission, whether continental or expeditionary in nature, its crewing construct will be measured against mission requirements. Should it be assessed that a greater capability is required, additional equipment and personnel to operate that equipment will be sourced or the mission will be assigned to another unit. Every effort shall be made to exploit the technology onboard this Class of ship to reduce the requirement for additional personnel.

97. Following similar doctrine of our current TRP, it is envisioned the standard of readiness for local operations and those in the Arctic during the most austere of occasions will be the same. To this end CFCD 129 and 102 are developed and designed to reach a level of operational capability to meet any mission this vessel is designed to perform and required to execute within its readiness cycle.

HDW class Annual Deployment Cycle – Steady State

Month	HDW CLASS East	HDW CLASS East	HDW CLASS East	HDW CLASS East	HDW CLASS West	HDW CLASS West
Jan	NR2	SWP	NR2	NR2	NR2	NR2
Feb	NR2	NR2	SWP	NR2	NR2	SWP
Mar	NR2	NR2	NR2	SWP	NR2	NR2
Apr	NR2	NR2	NR2	NR2	NR2	NR2
May	NR2	NR2	NR2	NR2	NR2	NR2
Jun	NR2	NR2	NR2	NR2	NR2	NR2
Jul	Arctic	NR2	NR2	NR2	Arctic	NR2
Aug	Arctic	Arctic	NR2	NR2	Arctic	NR2
Sep	Arctic	Arctic	Arctic	NR2	Arctic	Arctic
Oct	Arctic	Arctic	Arctic	Arctic	Arctic	Arctic
Nov	PDL	Arctic	Arctic	Arctic	PDL	Arctic
Dec	SWP	PDL	PDL	PDL	SWP	PDL

Table 3 – Readiness / Deployment Cycle

98. Annually, HDW class will be available to deploy 11 of 12 months of the fiscal year without the requirement to reduce readiness in the 3yr cycle (Table 3). This is only valid if the crew change remains below 30% and the Command Team does not change. Any time a ship's compliment falls below 70% trained personnel (worked up), or when the Commanding Officer or Executive Officer are relieved within the 3yr cycle, a HDW class will require an Assisted Work-Up (AWUP) requested by the ship or Directed Work-Up (DWUP) as ordered by their respective Fleet Commander (Figure 8). MST to support operations such as OP CARIBBE or NEO are at the discretion of the Fleet Commander for a Commanding Officer deploying to that region for the first time (Figure 8).

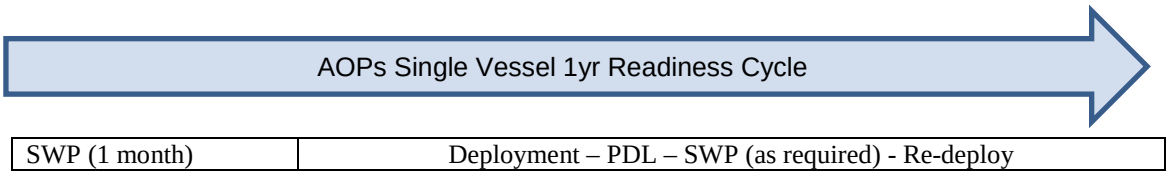

Figure 7 – Single 1yr Vessel Readiness Cycle

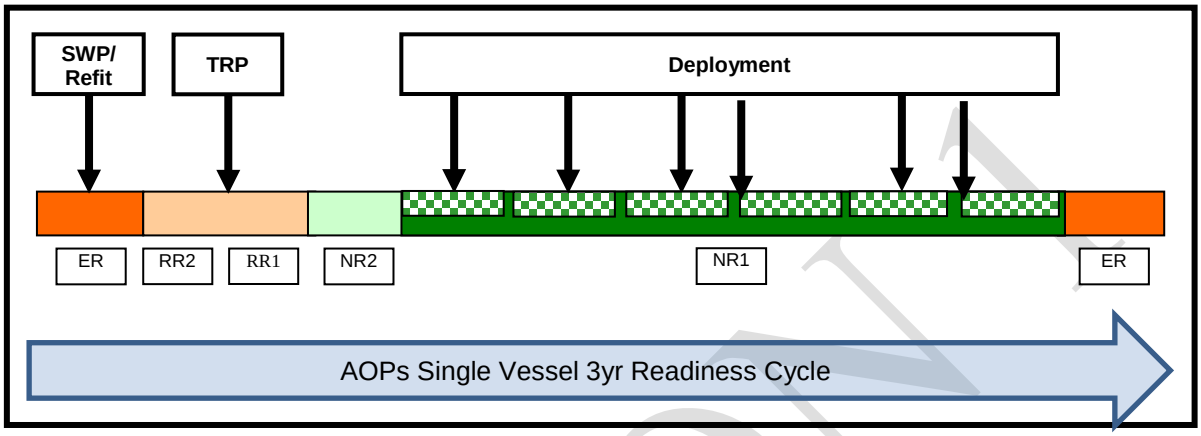

Figure 8 – Single Vessel 3yr Readiness Cycle

RR2 – Restricted Readiness (Alongside)

RR1 – Restricted Readiness (Trials – Safe at Sea)

NR2 – Normal Readiness (Continental Operations – Self-defence warfare – Operate Aircraft)

NR1 – Operate in greater than 4/10th ice

ER – Extended Readiness

<u>HDW class Rotation</u>

99. To allow for a reasonable personnel tempo for operations, as well as the requirement for training, maintenance and leave, this CONUSE prescribes HDW class Rotation (Table 4). As a general planning principle it balances deployments to support maintenance cycles over a 5 year period culminating into an extended work period to support ISSC requirements (Figure 12). KIN class will be considered for employment north to support NMOs at the height of the navigable season when one of the two HDW class in JTFP are in an ER cycle. This construct should continue to be appropriate well into the future. This cycle is theoretical with the actual program for HDW class delineated in the FAS based on vessel availability and operational requirements:

HDW class *Availability Cycle*

	2023	2024	2025	2026	2027	2028
HDW class 1						
HDW class 2						
HDW class 3						
HDW class 4						
HDW class 5						
HDW class 6						

Table 4– AOPS Maintenance Cycle

100. Table 4 is provided to demonstrate when one of six HDW class will be unavailable during ER to support an extended work period (EWP) or complete refit. It will assist future planners in determining which HDW class are most suitable for selection for assignment to JTFP to deploy to the Western Arctic and minimize the impact to surveillance, presence and sovereignty patrols. It is envisioned, when an HDW class is unavailable to deploy to the Western Arctic due to an EWP, NFR will coordinate with the CCG during the annual planning meetings to determine position and intended movement of assets.

FORCE DEVELOPMENT

101. The following section is concerned with PRICIE considerations based on the design chosen and early feedback during the build process and identifies areas for further study.

Personnel, Individual Training and Leadership

102. The challenge for the RCN in providing training specific for HDW class as a platform and for the personnel to operate in the extreme environment of the North will be one of volume and cost. All RCN personnel are trained to a baseline standard but will require specific training and enhancing skills to operate in the Arctic. The challenge will be two fold – the first requirement will be a bulk training plan (cadre training) to train the initial crews and then a follow on plan for a more limited number of personnel as replacements. It is recommended that a working group be formed with key stakeholders to establish both the initial bulk training requirement and then the follow on limited numbers.

103. To ensure value for money consideration should be given to contracted training delivery and utilisation of other CAF or GoC training courses and qualifications. Where this training is lacking, civilian training should be considered if it provides value for money against the cost of designing and delivering small training packages within the RCN.

104. Initial scoping of training requirements has highlighted the following immediate areas for development:

a. Sea-lift and crane operations (lifting sea containers, small and large vehicles from ship to shore and to landing craft);

b. Vehicle maintenance training (all vehicles and boats intended to operate and deploy with HDW class);

c. Vehicle operations training (all-terrain vehicle training, snow mobile training, and LCVP training);

d. Wild life awareness training (similar to the training given to personnel deploying to CFS Alert);

e. Arctic survival training (with particular focus on the time of year the ships will be operating in the Arctic, Jun – Nov and not winter months);

f. Main Armament - BAE 25mm System (weapons certification development and training);

g. Ice observation techniques, ice navigation, ice operations (CO, XO, 2nd tour NavO);

h. Arctic Operations Orientation (NTO, NLO, MAR-SS);

i. Seamanship (personnel transfers to and from beach landings via landing craft and small boats); and,

j. Marine High Voltage (HV) electrical system requirements training.

Research & Development (R&D) and Operational Research (OA)

105. Due to the nature of the operating environment there will be interest in using HDW class to further R&D in the Polar Regions. Dedicated S&T days will be allocated by Director Naval Operations and Plans (DNOP) in the FAS or Integrated Business Plan (IBP) Ops annex but the First of Class trials process may identify the need for extra time at sea to validate processes through operational research in the first few years of deployments.

Infrastructure and Environment

106. The expeditionary nature of Arctic operations, due to the extreme distances, the absence of supporting infrastructure, the limits of a navigable season and the need to be totally self-sustained directly influence primary and secondary tasks articulated herein. Jetty infrastructure enhancements will berth and support HDW class in Esquimalt and Halifax. HDW class will benefit from the added flexibility of fuel and limited support that is available at the NNF. Standing offers and contracts will be required to be in place to support all RCN NMOs; however this is of particular importance for Western Arctic operations where it is extremely difficult to plan access to Nanisivik from the west from season to season due to ice.

Urea

107. HDW class will be operating in the North American Emissions Control Area (ECA). HDW class will use urea in Selective Catalytic Reduction (SCR) systems to reduce Nitrogen Oxide (NOx) emissions to the Tier III levels that apply in this area. Essentially liquid urea is injected into the exhaust stream at the SCR where it reacts with the catalyst to convert NOx into harmless diatomic Nitrogen and Water. The use of urea is new to the RCN. The consumption of urea will have to be monitored and resupplied in the same way as fuel. Logisticians will need to plan to resupply locally in home ports and while deployed[53].

Doctrine and Collective Training

<u>Doctrine</u>

108. Most doctrine development will be focused on operations in the North both to support HDW class deployments and to inform ATP 17 Arctic Operations, for which Canada is the lead nation.

109. The pre-existing Knowledge Management System process sponsored by CFMWC will ensure that doctrine and tactics continue to develop as operational experience increases.

<u>Collective Training</u>

110. For HDW class to operate in the Arctic there is class specific training requirement that need further development in order to operate the machinery and equipment, weapons and

[53] The freezing properties of urea will present some challenges when storing in the NNF, knowledge, planning and infrastructure will assist in addressing this problem.

sensors. In addition to this there is environmental training required to manoeuvre in the vicinity of ice and in ice and to train and lead a crew to function onboard HDW class and, to a limited extent, personnel ashore. A list of specific training for this class of ship is contained in Appendix I of Annex C of this document. NPTG has compared the watch and station bill for HDW class and identified a level of proficiency of skills and knowledge to operate onboard HDW class and in the Arctic. An explanation of proficiencies is contained in Annex C.

111. A significant amount of work has been done to develop the professional skills and competencies for Officers and NCMs. Not all personnel require specialty training to support an operation in the Arctic even though the conditions are austere. The RCN continues to support CAF efforts to develop a Strategic Concept for Operations in the Arctic. Collective Training (CT) will evolve as HDW class capability is delivered to the RCN. Core naval FG will also encompass CAF joint and interagency training facilitated through exercises such as OP NANOOK to be capable of fulfilling primary and secondary tasks identified herein.

112. CT begins in the same manner as any major warship and once a HDW class achieves NR2 status, basic CT will cease and MST such as Air Work-ups will begin. HDW class vessel destined to proceed north will conduct alongside and at sea readiness training in the Halifax or Esquimalt AOR culminating in a Work-ups (WUPs) program consisting of:

a. Ship handling;

b. Seamanship;

c. Sealift;

d. Rescue Stations;

e. DC training and emergencies;

f. Casualty Clearing Training;

g. SAR;

h. Aid to OGDs, HA / DR, NEO, etc.; and,

i. Ice navigation activities (NR1) in RCN navigation simulators, the Gulf of St Lawrence, the St Lawrence Seaway and Canada's Arctic during the navigable season.

113. To accomplish this, CSTG, and HDW class first Command Team will work to develop a 20 day program at sea to generate and sustain the readiness for a HDW class vessel. HDW class readiness requirements will be developed to complement the expected primary and secondary tasks while maintaining NR2 (crew) and NR1 core skills outlined herein.

Information Management and Information Technology

114. Planners must ensure robust Information Management Plans are in place in order to prioritise information flow to meet mission objectives.

115. When operating in the North and supported by the next generation of Unmanned Underwater Systems there is the possibility of large amounts of data being collected. Future capability upgrades to HDW class will need to ensure bandwidth and storage meets future needs.

116. Due to the nature of operations to be undertaken by HDW class there will be greater integration and interoperability with OGDs and non-Government agencies that will see far greater reliance on unclassified networks and communications links. Much of these information flows will be outside of the CAF's control and present potential attack vectors such as cyber-attack or COMSEC breaches. Robust procedures and technical solutions will be critical in ensuring a robust information security plan is achievable.

117. Communication links in the Polar Regions are not as well developed as other RCN operational areas. Future development on polar specific bearer links and network nodes will be needed if the limited bandwidth available to HDW class is to grow.

118. HDW class will need to be able to accept and transmit intelligence support up to Top Secret Special Access. It will require the flexibility to accept mission specific intelligence equipment and personnel including SIGINT and ACINT capabilities as a mission fit utilizing specially fitted sea containers as the payload of choice. Where mission specific fits are embarked early liaison will be required to ensure sufficient bandwidth is available.

Equipment, Support and Sustainability

<u>Personal Clothing and Equipment</u>

119. The demanding environment of the North, especially in the maritime environment necessitates an augmentation to standard issued military clothing and equipment, which in itself is insufficient for RCN personnel operation in the Arctic. Liaison with the Canadian Coast Guard (CCG) should allow the RCN to leverage their experience and potential procurement chains.

120. Each crew member will require specific clothing and personal equipment outfits based around their expected tasks. Clothing for those working in small boats will be different to those required to work ashore or in the machinery spaces. Current RCN clothing is insufficient to protect sailors working in small boats or ashore in the Arctic. Prior to the first deployment in 2018 a consolidated equipment list, which is fit for purpose, sustainable and available for HDW class companies must be developed. Additionally, due to the remoteness of operations, sufficient reserves will need to be carried onboard.

121. With the limited numbers of personnel involved and the need to ensure clothing is of the best value for money, it may be better to look to the civilian market and procure industry recognised items. The offshore energy production and fishing industry that regularly operate

in these areas should be consulted. An overriding principle is to ensure the safety of our sailors and provide them protection so that they are comfortable and able to carry out their duties despite the conditions they are working in.

In Service Support Contracts (ISSC)

122. There will need to be a detailed reporting and measurements programme to allow for sufficient analysis of the ISSC in order to inform future contract negotiations and the establishment of any future Fleet ISSC, such as the Canadian Surface Combatant (CSC).

Mission-specific Personnel / Mission Specialists

123. HDW class will have the capacity to embark additional personnel in addition to the crew for mission specific reasons. These mission specialists could include CAF personnel, OGD authorities, medical specialists, scientists, community representatives, and naval personnel for training purposes. Planners will need to detail minimum fitness standards (civilians), readiness (military) and quantities for environmental specific clothing, personal and mission fit equipment.

Engineering and Technical Support

124. HDW class maintenance and repair will employ innovative approaches and will draw on commercial practices so as to provide a minimum of 250 days availability for sea each year. The length and remoteness of missions in the Arctic as well as the overall distances involved will dictate how often maintenance periods can be carried out, while still maintaining effectiveness and the ability to deploy. This may require an expeditionary consideration in terms of support in the overall planning process. The ships' maintenance cycles should allow for maximum employment during the Arctic navigable season. The capacity for self-sustaining services (power generation, potable water, waste, sewage) while alongside or at anchor is required. All self-sustaining services will meet Arctic environmental regulations.

SUMMARY

125. The coming in to service of HDW class will permit the CAF to address emerging GoC requirements for presence, surveillance and response inside Canadian territorial waters. HDW class will enhance the CAF ability to operate in the North, especially in waters traditionally inaccessible to RCN platforms due to ice.

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Figure A-1

System Description of HDW class

AOPS are fitted with a propulsion system that does not have a single point of failure. Diesel/Electric Propulsion - Propulsion: Two 4.5 megawatt main propulsion engines and four 3.6 megawatt generators.

Specifications:

a. Length: 103 metres;
b. Beam: 19 metres;
c. Displacement: 6,440 tonnes;
d. Draught 5.75m;
e. IPMS – Same look and feel as *Halifax* class;
f. 4 x 3600 kW DGs;

g. 2 x 4.5 MW Propulsion Motors
h. 1 x 1360 kW DG (Harbour/Emerg);
i. 2 x Fixed Pitch Props;
j. 2 x Rudders;
k. Bow Thruster; and,
l. Fin Stabilizers.

Tank Capacity Plan and Fuel Endurance Calculations:

a. 100% Capacity = 754.7cum;
b. 95% Capacity (fuel alongside) = 717.0cum; and,
c. 90% Capacity (RAS) = 706cum.

Fuel consumption and range based on ISO vs Arctic conditions at cruise speed of 14kt and SS3:

a. ISO:
   i. Consumption = 1.2cum/hr;
   ii. Useable Fuel = 702.6cum; and,
   iii. Range = 7537nm.

b. Arctic:
   i. Consumption = 1.28cum/hr;
   ii. Useable Fuel = 702.6cum; and,
   iii. Range = 7033nm.

Capability		**Performance**
Endurance	Range	6,800 nm at 14kts
	Logistical Endurance	120 days with 65 personnel
Maneuverability	Berthing	Unassisted in up to 25kts wind and 2kt current
	In Ice	Turn 180° in own channel of 1st year ice up to 1m thick
Speed	Maximum (Sustained)	17kts
	Cruising (Sustained)	14kts

Capability		**Performance**
	Maximum (In 1 meter of ice)	3kts
Ice Strengthened Hull	Polar Class 5	Year round operations in medium first year ice which may include old ice inclusions
RAS[54]	Number/Type of Stations	1 liquid replenishment
Aviation	Number/Type of Helicopter	Operate and maintain 1 light helicopter for up to 120 days. Land/launch/refuel/HIFR CH148
	Facilities	Hangar, Limited Maintenance Capability (Class1/Level1)
	Recovery Assist	Fitted for but not with
Sealift	Containers (20-foot ISO)	6 + 2 (on flight deck)
	Container Interfaces	3
Fitted Accommodations	Crew	Up to 65
	Mission Specialist Personnel	22
Medical		Echelon 1[55]
Operations	Command and Control	Command Management System
	Communications	Tactical UHF, VHF, HF Commercial/Military SATCOM
	Surveillance	Helo Control and Approach Radar, EO/IR
Weapon(s)	Primary Gun System	25 mm[56]
	Secondary Gun System	2 x .50 cal HMG
Boats/Craft	Landing Craft [57]	1

[54] PRONOTES and CFCD 130 will be developed to articulate best practices for underway replenishment
[55] Normally ISO routine sick call and the management of minor sick and injured personnel for immediate return to duty
[56] Capable of deploying armour piercing and high explosive rounds.
[57] Landing Craft design was not ratified before this edition was signed

Capability		**Performance**
	Capable of embarking OGD RHIBs up to 12m in length	Up to 4
	Multi-Role Rescue Boats	2
	Enclosed Life Boats	2
	Inflatable Rescue/Diving Boat	1

Table A-1 - AOPS General Capability / Performance

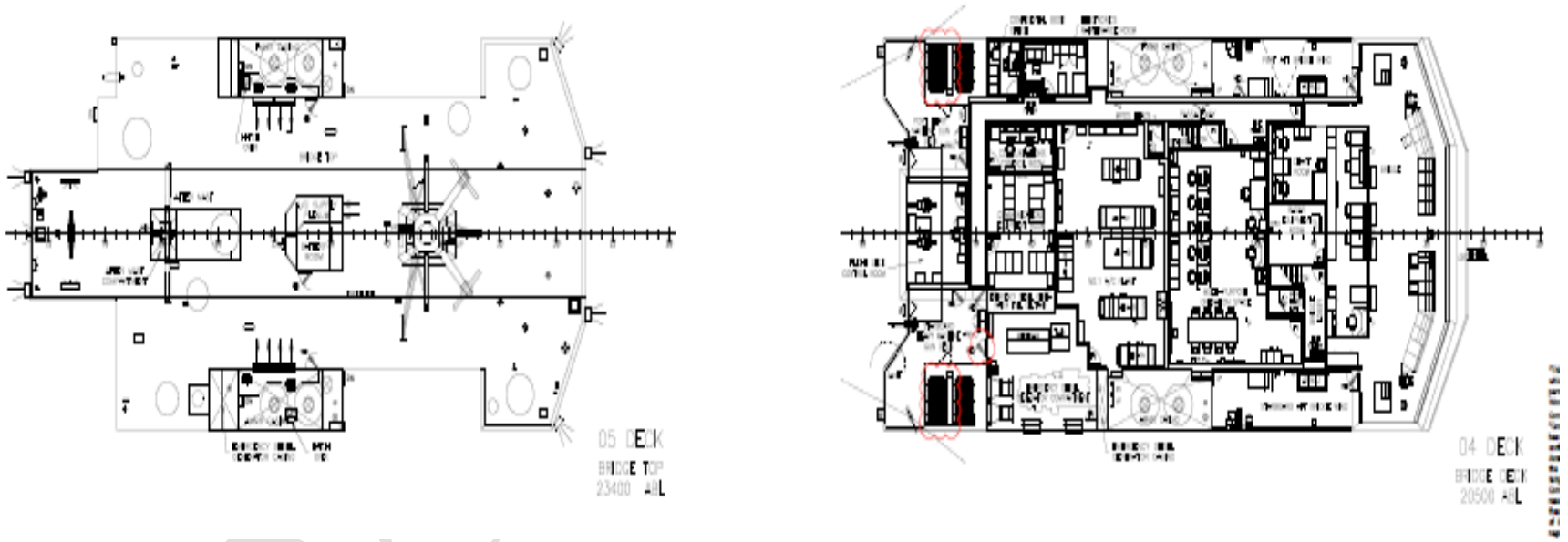

Figure A-2

ARCTIC OFFSHORE PATROL VESSEL
CONCEPT OF USE

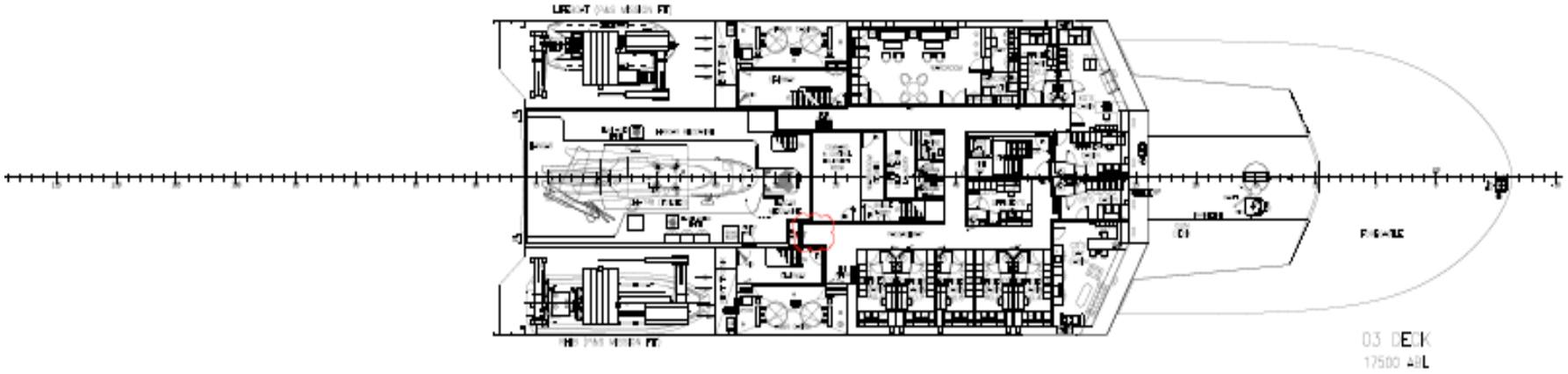

Figure A-3

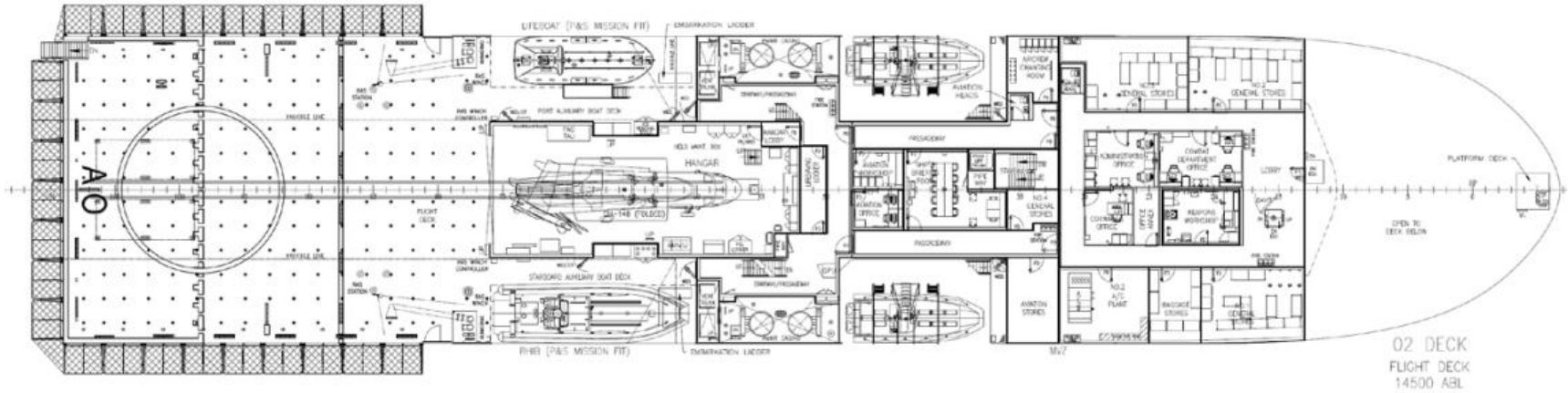

Figure A-4

Figure A-5

Figure A-6

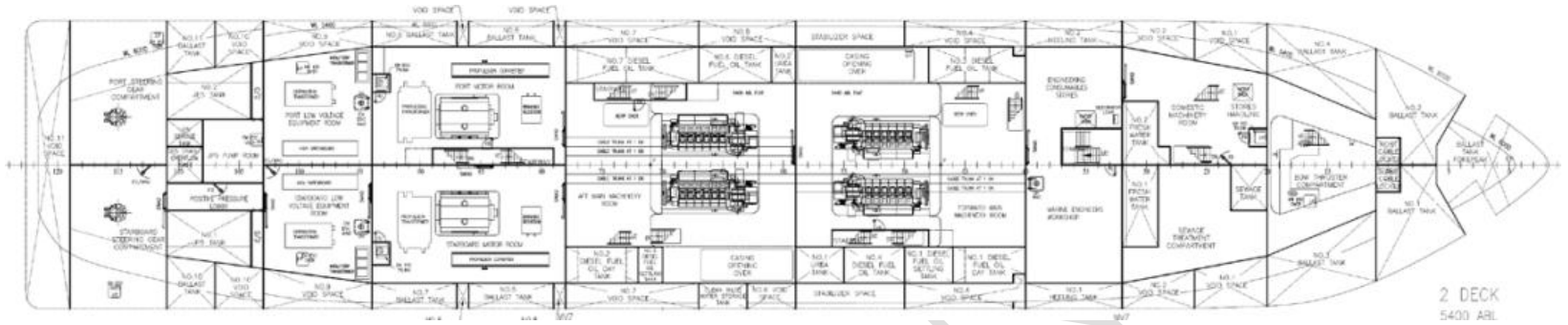

Figure A-7

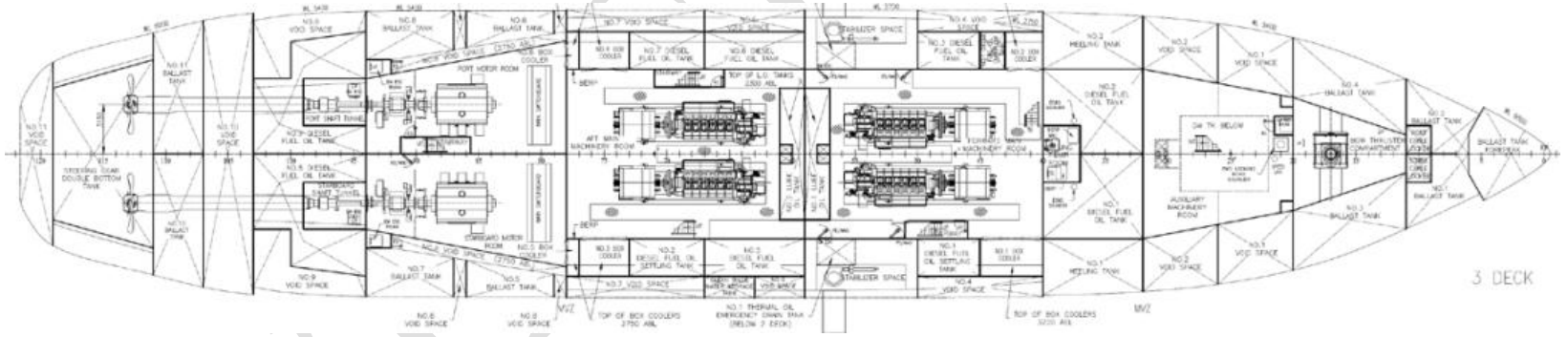

Figure A-8

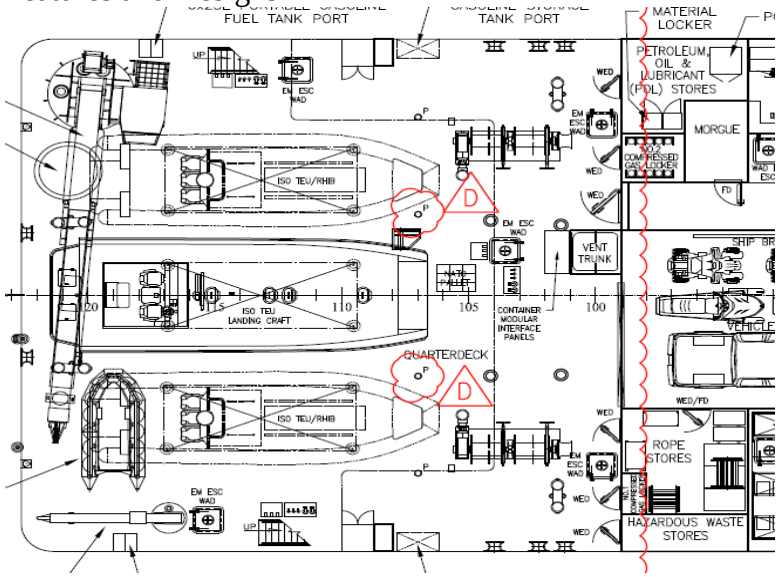

Figure A-9

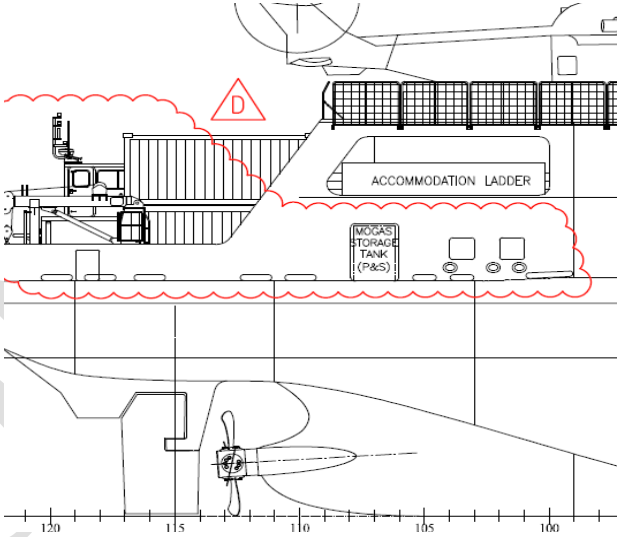

Figure A-10

ARCTIC OFFSHORE PATROL VESSEL
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Annex B - AOPS WSB
draft (1st degree con

ARCTIC OFFSHORE PATROL VESSEL
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1. Appendix I to this annex contains a list of specific training for this class of ship. NPTG has compared the watch and station bill for an AOP vessel and identified a level of proficiency for skills and knowledge to function onboard AOP ships and in the Arctic.

2. When reviewing the annex, careful consideration must be given to the master tab and the discipline in which the proficiency levels are assigned. For example, when reviewing the proficiency levels for the NTO one must observe the training listed in the MS-CS tab.

Note: 1. The assumption is that all the AOPS positions listed herein will already have all the necessary trades training to be employed in an HMC Ship at sea and will only require training specific to that vessel.

TASKS/SKILLS		KNOWLEDGE
DEFINITION	PROFICIENCY LEVELS	DEFINITION
The level of proficiency required to perform part or elements of duties and tasks under continuous supervision	1	An awareness of the basic definitions and concepts associated with a topic or a body of knowledge
The level of proficiency normally required to perform duties and tasks under supervision	2	The level of understanding of definitions and basic concepts which enables the relating of this knowledge to job requirements
The level of proficiency required to independently and correctly perform duties and tasks	3	The level of understanding of theory and principles of a topic or body of knowledge which enables critical thought and independent performance and is usually gained through formal training and job experience
The level of proficiency which usually can be acquired by considerable training and extensive practical job experience	4	The level of knowledge which enables the synthesis or integration of theory facts and practical lessons learned to support the identification of knowledge solutions to non-routine problems. This is gained from formal training and education and considerable job experience
The level of proficiency indicated by a mastery of technique and expert	5	A recognized level of expertise, which includes a mastery of theory and

application of procedures		application, related to a given body of knowledge

Table C-1

3. In the case of the Commanding Officer, Executive Officer, and Navigating Officer, the skill proficiency level 4 implies a body of work over a career to be selected to Command and operate an AOPS in the Arctic (see table C-2). Due to the complexity of operating in an ice regime additional training associated with ice navigation and Arctic operations are required in order to achieve the implied level of proficiency.

4. To succession plan an AOPS Executive Officer and gain the necessary proficiencies, it is necessary to provide a road map to Career Managers and RCN officers who aspire to Command an AOPS one day. The experience of an AOPS XO as 2nd in Command, should surpass the experience of AOPS Directors and AOPS ORO. The sea days outlined in Table C-2 are a prerequisite for an Officer to develop the proficiencies to become an Executive Officer (XO) in AOPS and the table provides the method in which this can be achieved. Utilizing table C-2 an appropriate level of proficiency will be accumulated through a natural career progression of a RegF Maritime Warfare Officer and assist Career Managers with a personnel management and planning tool to succession plan Officers at the ORO or Director levels (NavO, DeckO, IMDO) who aspire to Command AOPS. This planning tool will afford officers the opportunity to serve in AOPS but not restrict them to AOPS for the remainder of their career.

AOPS Officer Position	Experience Selection Criteria (Ice Operations)	Experience Selection Criteria (class of ship)	RCN Qualification Code Requirement
Commanding Officer	180 Days***	AOPS XO	Command Pt II (AEEG) Arctic Operations (AEFB) ORO (AEEU)
Executive Officer	120 Days **	AOPS ORO, NavO, DeckO, or IMDO	Command Pt II (AEEG) Arctic Operations (AEFB) ORO (AEEU)
Operations Room Officer	60 days *	Director Level (any class)	ORO (AEEU) Arctic Operation (AEFB)
Navigating Officer	60 days *	Major Warship FNO 2nd Tour	FNO (AEEA) Arctic Operations (AEFB)
Deck Officer	60 days *	NOPQ (any class)	DeckO Crse (AEDS)
Information Management Director Officer	60 days *	NOPQ (any class)	IMDO Crse (ALBT)

Table C-2

*An AOP Director or ORO will accumulate (at least) 60 days sea time in 3/10th or greater ice regimes on completion of a two year posting cycle prior to being selected and appointed XO.

**An AOPS XO will have accumulated (at least) 120 days sea time in 3/10th or greater ice regimes having previously served in AOPS as an ORO or Director and on completion of a two year posting cycle as XO prior to being selected and appointed CO.
***An AOPS CO will have accumulated (at least) 180 days sea time in 3/10th or greater ice regimes having previously served in AOPS as an XO who followed the career path of an AOPS ORO or Director and on completion of a two year posting cycle as CO.

Note: the accumulated sea days in 3/10th ice or greater articulated in the table above are considered the minimum while taking into account the possibility of a ship's maintenance cycle (major refit).

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Appendix I to Annex C TNA AOPS.xlsx

References for AOPS Concept of Use

A. Leadmark – The Navy's Strategy for 2020
B. Securing Canada's Ocean Frontiers: Charting the Course From Leadmark
C. Canada First Defence Strategy (CFDS)
D. The Future Security Environment (FSE)
E. Canadian Joint Operations Command's (CJOC) Plan for the North, 28 January 2014
F. MCC Arctic Plan
G. Arctic/Offshore Patrol Ship Concept of Employment
H. CFJP 1.0 Canadian Military Doctrine
I. Integrated Capstone Concept
J. Standing Operations Order for Domestic Operations (SOODO) 17 July 2014
K. Final Reporting From Fleet Mix Study II (FMS 11) 3553-1 (DRDC CORA) 8 September 2009
L. General Information – Northern Canada ARC 400, 401, 402, 403, 404
M. Memorandum of Understanding between the Canadian Armed Forces and Defence Command Denmark, 14 May 2010
N. Memorandum of Understanding between the Canadian Armed Forces and Fisheries and Oceans, 6 July 1994
O. RCN Arctic Action Plan – 20 Apr 2015 (Draft)
P. Commander's Guidance and Direction to the Royal Canadian Navy, Executive Plan 2013-2017
Q. Northern Employment and Support Plan, 12 April 2012
R. Naval Board Minutes 21-22 May 2014 RDIMS #3319
S. Statement on Canada's Arctic Foreign Policy, 2010
T. Arctic Integrating Concept, 23 August 2010
U. RCAF Arctic Action Plan (AAP) Update 2015, 13 July 2015
V. CJOC Arctic Experiment (CFJAE) 2014 – Lessons Learned
W. Maritime Command Concept of Employment for Maritime Uninhabited Aerial Vehicles, Ver 2.0, May 2007 (RDIMS 106699)
X. Minister of National Defence Mandate Letter 2015, http://pm.gc.ca/eng/minister-national-defence-mandate-letter
Y. 2015 CRCN Standing Direction and Guidance (Draft)

List of Abbreviations

AOPS	Arctic Offshore Patrol Ships
CAF	Canadian Armed Forces
CCG	Canadian Coast Guard
CDS	Chief of Defence Staff
CJOC	Canadian Joint Operations Command
CHS	Canadian Hydrographic Services
CIS	Canadian Ice Services
CJOC	Canadian Joint Operations Command
CONSUE	Concept of Use
CSC	Canadian Surface Combatant
DFO	Department of Fisheries and Oceans
DND	Department of National Defence
DGNFD	Director General Naval Force Development
DNFR	Director Naval Force Readiness
DRDC	Defence Research and Development Canada
EEZ	Economic Exclusion Zone
FD	Force Development
FE	Force Employment
FG	Force Generation
FM	Force Management
FS	Force Support
GoC	Government of Canada
HDW	HMCS HARRY DeWOLF
JTFN	Joint Task Force North
MSOC	Maritime Security Operations Centre
MCD&E CG	Maritime Concept Development and Experimentation Coord Group
MUS	Maritime Unmanned Systems
NFD	Naval Force Development
NMO	Northern Maritime Operations
NORAD	North America Air Defence
NTG	Naval Task Group
OGD	Other Government Departments
PCSP	Polar Continental Shelf Program
PRes	Primary Reserve
RSP	Readiness and Sustainment Policy
RegF	Regular Force
RCN	Royal Canadian Navy
SD&G	Standing Direction and Guidance
SAR	Search and Rescue
S&T	Science and Technology
UxV	Unmanned Vehicles
WSB	Watch and Station Bill

ANNEX F – AOPS CONUSE AMENDMENT PROPOSAL FORM

Requests for additions, deletions or amendments to AOPS are to be forwarded to DGNFR for review and staffing. The following amendment proposal form shall be used and reviewed by the ship's Commanding Officer prior to submission.

AOPS CONCEPT OF USE
AMENDMENT PROPOSAL

Location	Proposed Amendment	Reason for Amendment

Date	Position	Rank/Name/Initials	Phone

_____

Rank/Name/Initials of Signature Date Commanding Officer