



## **NIRB Application for Screening #125731**

### **DRDC - Northern Watch Technology Demonstration Project (NWTD)**

**Application Type:** New

**Project Type:** Scientific Research

**Application Date:** 7/19/2022 12:23:33 PM

**Period of operation:** from 0001-01-01 to 0001-01-01

**Proposed Authorization:** from 0001-01-01 to 0001-01-01

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## DETAILS

### Non-technical project proposal description

English: Executive Summary Mission and Objectives The mission of Op NANOOK 2022 is to conduct operations in Canada's North with Allies and other partners to ensure the Canadian Armed Forces' (CAF) readiness to operate in the North and improve interoperability with mission partners. The Operational Objectives are:

- Increase interoperability in the North with Joint Task Force North (JTFN);
- Overcome logistical challenges of the Northern operational area;
- Increased interoperability with allies (dealing with a common threat); and
- Support whole of government effort by supporting other governmental departments (OGD) and research and development (R & D).

OP NANOOK-NUNAKPUTOP NA-NU includes community engagement (COMREL), reconnaissance shore landings (RECCE) and four scientific trials. HDW, MAR and GBY each have a different program. JTFN activities involving CA and RCAF will also be taking place in the Arctic at this time, and the RCN supports JTFN by providing maritime surveillance, presence and sometimes interaction with CA personnel. The RCN is prepared to respond to any emergency situation in the Northwest Passage all the way to the border with Alaska. This could include a search and rescue, escort duties or a medical emergency. HDW and MAR plan to travel to Cambridge Bay as the point furthest west.

Research and Development During OP NA-NK, four scientific trials will be conducted.

1. Maritime Evaluation (ME) with Towed Reelable Active Passive Sonar Trial combined with a Behavioural Response Study a) TRAPS and EMATT Trial TRAPS is a portable, containerized system with active and passive sonar capability for detection, classification, tracking and localization of underwater targets. A crane is required to deploy and tow the 12 meter (m) long sonar array. The TRAPS will be located on the HDW and will be involved in a 2-part trial taking place in Baffin Bay. The TRAPS/EMATT trial will take place 15-18 August, 2022. The TRAPS will likely be operated using the trial plan from 2021, that is, active sonar pings every 10 kilometer (km) along the route between 10:00 – 15:00 local time. Each ping will be 11 seconds long, with a 1 second 1800 hertz (Hz) continuous tone, followed by a linear frequency sweep from 2000- 2600 Hz lasting 10 seconds. For 2022, it is possible that the trial will be done within a smaller area, and if so, the pings will occur every 45 minutes assuming a tow speed of 8 knots (kt). If the ping is modified, it will be shorter, but within the same frequency range. In any case, the ping source level will be 210 decibels (dB) re 1 micro Pascal ( $\mu\text{Pa}$ )<sup>2</sup>m<sup>2</sup>. In conjunction with the TRAPS trial, Expendable Mobile ASW Training Targets (EMATTs) will be tracked with TRAPS in a passive mode in order to evaluate the passive detection and tracking capability of TRAPS. During this activity 4 EMATTs will be used. b) TRAPS and Arctic BRS Trial TRAPS will be used as an active sonar source to conduct a Marine Mammal Arctic Behavioural Response Study (BRS) in Davis Strait/Baffin Bay 19-21 Aug. The trial will take place 250 km from the east shore of Baffin Island, at latitudes south of Clyde River and north of Pangnirtung. The BRS will involve a Controlled Exposure Experiment (CEE) which will provide information critical for supporting future use of active sonar in the Arctic, and ultimately contribute to improved marine mammal mitigations for the RCN as required by the Species at Risk Act. This trial will be undertaken in collaboration with Dalhousie University Large Whale Chair. The BRS will look solely at northern bottlenose and sperm whales, and will involve different activities. The HDW's rigid hull inflatable boat (RHIB) will be used by DRDC for the tagging and biopsy collection activities. Approval has been received from the Nunavut Wildlife Management Board to tag and biopsy the northern bottlenose and sperm whales. An animal care application has been submitted to the Dalhousie animal ethics committee. Marine mammal scientists from Dalhousie University and/or DFO will be on board to assist with the trial. Their expertise will be critical for monitoring the whales' behavioural state to avoid adversely affecting the whales. It is intended to supplement typical visual observation techniques with electro-optical/infra-red systems and drone usage to maximize the chances of knowing where the whales are at all times.
2. Maritime Autonomous and Remotely Piloted Systems Trial This DRDC trial is a demonstration of interoperability between mobile and stationary maritime autonomous and remotely piloted systems for the Above Surface Warfare "hold at risk scenario". A "hold at risk" scenario is the monitoring of a port or transit choke point with the intent of detecting submarines entering or exiting the area. This 2-day trial will be undertaken in shallow water near Pond Inlet, NU on 22-23 August 2022 with the support of MAR. The trial requires a location with depth of water under 100 m. One unmanned surface vessel (USV) will be deployed and recovered using a RHIB from MAR, and one recorder will be deployed prior to the experiment and recovered after completion. A crane will be required for the deployment and recovery of the equipment. The key objectives include: a. Testing the interoperability between mobile and stationary MARPS to demonstrate an ASW concept of employment in the Arctic environment; b. Evaluation of alignment performance and quality of a new inertial navigation system (INS), on board an autonomous underwater vehicle (AUV), following stationary and moving calibration at high arctic latitudes; c. Collection of high-frequency (450 kHz) sonar data from an USV to evaluate the performance characteristics of this sonar in the arctic ocean where the presence of freshwater layers affect the sound velocity profile; d. Development of safe and efficient procedures for arctic MARPS operation, including deployment and recovery from an RCN platform; and e. Provide DRDC personnel with Arctic training and experience for MARPS, onboard an RCN platform. The location of the trial is within the soon-to-be-established Tallurutiup Imanga National Marine Conservation Area (NMCA). The Government of Canada and the Qikiqtani Inuit Association signed an

Inuit Impact and Benefit Agreement (IIBA) required for the establishment of the Tallurutiup Imanga NMCA on 1 August 2019. The IIBA acknowledges that DND conducts military related research in the Arctic, including Tallurutiup Imanga NMCA. In the agreement, DND commits to providing information to assess the environmental impact of its research programs on Tallurutiup Imanga NMCA, commits to providing unclassified summaries of the planned research within Tallurutiup Imanga NMCA and, where possible, will provide the information requested in the IIBA for research proposals. Upon completion of DND research, an unclassified summary of the results will be provided. The information is to be provided to the Aulattiqatigiit Board which is a joint Inuit and Canada management board. According to the IIBA, DND will be involved as appropriate for input to the proposed Tallurutiup Imanga NMCA Research and Monitoring Strategy before it is finalized.

**3. Long-Range Underwater Acoustic Communication Trial** This trial will take place with the participation of the GBY that will deploy both transmitter and recorders. The trial will take place 20 – 23 August in the area of Gascoyne Inlet Camp (GIC), which is located within the soon-to-be-established Tallurutiup Imanga NMCA in the Parry Channel (Barrow Strait and Lancaster Sound). The key objectives include:

- collection of acoustic and non-acoustic data;
- experiment new buoyancy and fairings; and
- achieve 50-to-100 km communication range by testing different communication schemes at relatively low active sonar frequencies.

The trial will be located within the Tallurutiup Imanga NMCA, and therefore DND must meet their commitments in the IIBA.

**4. Integrated Surveillance via Layered Arctic Networked Defence Sensors Trial** In this activity three (3) acoustic hydrophone recorders (1 on the bottom, 2 in the water column) will be deployed for period of one year. These are passive recorders, with no surface expression or noise emissions. The recorders contain lithium batteries, and are composed of mainly silicon and metal, encased in a glass sphere. The moorings are composed of plastic and metal. According to the trial project manager, it is unlikely that the recorders or moorings will be dragged away by ice due to their depth (300 m below surface), and the odds are low that the recorders would be accidentally released by their moorings. A crane will be required for the deployment and recovery of the recorders. The recorders are expected to be recovered in summer of 2023 (summer 2024 as backup). The recorders will each leave behind about 50 kg of iron anchor weight due to their moorings.

Arctic Bay and Pond Inlet are both located within the Tallurutiup Imanga NMCA, and therefore DND must meet their commitments in the IIBA.

**Territorial, Provincial and Municipal Government Involvement**

- Qikiqtani Inuit Association (QIA)
- Kitikmeot Inuit Association (KIA)
- Nunavut Tuungavik, Inc.

**Indigenous Community Engagement** An assessment using the Assistant Deputy Minister (Infrastructure and Environment) (ADM[IE]) Duty to Consult Determination guided template has been completed and territorial lands have been identified. Community engagement for the Arctic communities is being carried out by JTFN. JTFN is sending out annual notification letters to each of the affected communities and Nunavut Tuungavik, Inc. The first Indigenous Engagement Session took place on 12 May 2022 with representatives of Qikiqtani Inuit Association (QIA) and Kitikmeot Inuit Association (KIA). At that session, JTFN were informed that Pond Inlet will be in open water and prime harvesting season during the time RCN is there. QIA asked for more information regarding the activities at Pond Inlet for this time period, specifically what activities will be undertaken and where. Community engagement for Nain, NL and Hopedale, NL is being carried out by the CFB Goose Bay Real Property Operations Detachment. These communities are part of the Labrador Inuit Land Claims Agreement (LILCA). As discussed previously, the locations of 3 of the trials are within the soon-to-be-established Tallurutiup Imanga NMCA, and according to the IIBA, information about the trials is to be provided to the Aulattiqatigiit Board which is a joint Inuit and Canada management board. There will be written navigational warnings (NAVWARNs) and notices to mariners (NOTMARs) serve to warn vessel operators about training activity timing and location. These notices contain important information about activities which should remain in effect for the duration of the exercise. However, it remains uncertain how effective these systems are in warning Indigenous communities and those who may be undertaking traditional activities. There are no expected permanent changes to the current condition or use of land (including coastal and marine area), air, water and resources. The exercises are temporary and will only take place for a few days at each location. There are no expected significant adverse effects on air, land or water due to Op NA-NK 2022 after proposed mitigation measures are in place.

**French:** **Sommaire Mission et objectifs** La mission de l'Op NANOOK 2022 est de mener des opérations dans le Nord canadien avec les Alliés et d'autres partenaires afin d'assurer l'état de préparation des Forces armées canadiennes (FAC) à opérer dans le Nord et d'améliorer l'interopérabilité avec les partenaires de la mission. Les objectifs opérationnels sont les suivants :

- Accroître l'interopérabilité dans le Nord avec la Force opérationnelle interarmées du Nord (JTFN);
- Surmonter les défis logistiques de la zone opérationnelle du Nord;
- Interopérabilité accrue avec les alliés (faire face à une menace commune); et
- Soutenir l'ensemble de l'effort gouvernemental en soutenant d'autres ministères gouvernementaux (OGD) et la recherche et le développement (R & D).

OP NANOOK-NUNAKPUT Le PO NA-NU comprend l'engagement communautaire (COMREL), les débarquements côtiers de reconnaissance (RECCE) et quatre essais scientifiques. HDW, MAR et GBY ont chacun un programme différent. Les activités de la JTFN impliquant l'AC et l'ARC auront également lieu dans l'Arctique en ce moment, et la MRC appuie la JTFN en assurant la surveillance maritime, la présence et parfois l'interaction avec le personnel de l'AC. La MRC est prête à intervenir en cas de situation d'urgence dans le passage du Nord-Ouest jusqu'à la

frontière avec l'Alaska. Cela pourrait inclure une recherche et un sauvetage, des tâches d'escorte ou une urgence médicale. HDW et MAR prévoient de se rendre à Cambridge Bay comme le point le plus à l'ouest. Recherche et développement

Au cours de l'OP NA-NK, quatre essais scientifiques seront menés. 1. Évaluation maritime (EM) avec l'essai de sonar passif actif remorqué combiné à une étude de réponse comportementale a) Essai TRAPS et EMATT TRAPS est un système portable conteneurisé doté d'une capacité de sonar active et passive pour la détection, la classification, le suivi et la localisation de cibles sous-marines. Une grue est nécessaire pour déployer et remorquer le réseau de sonars de 12 mètres (m) de long. Les TRAPS seront situés sur le HDW et participeront à un essai en 2 parties qui aura lieu dans la baie de Baffin. L'essai TRAPS/EMATT aura lieu du 15 au 18 août 2022. Les TRAPS seront probablement exploités en utilisant le plan d'essai à partir de 2021, c'est-à-dire des sonars actifs tous les 10 kilomètres (km) le long de la route entre 10h00 et 15h00 heure locale. Chaque ping durera 11 secondes, avec une tonalité continue de 1 seconde de 1800 hertz (Hz), suivie d'un balayage de fréquence linéaire de 2000 à 2600 Hz d'une durée de 10 secondes. Pour 2022, il est possible que l'essai soit effectué dans une zone plus petite, et si c'est le cas, les pings se produiront toutes les 45 minutes en supposant une vitesse de remorquage de 8 nœuds (kt). Si le ping est modifié, il sera plus court, mais dans la même plage de fréquences. Dans tous les cas, le niveau de la source ping sera de 210 décibels (dB) re 1 micro Pascal ( $\mu\text{Pa}$ )<sup>2</sup>m<sup>2</sup>. En conjonction avec l'essai TRAPS, les cibles d'entraînement EXPendable Mobile AS W (EMATT) seront suivies avec TRAPS en mode passif afin d'évaluer la détection passive et capacité de suivi de TRAPS. Au cours de cette activité, 4 EMATT seront utilisés. b) Essai TRAPS et BRS arctique TRAPS sera utilisé comme source active de sonar pour mener une étude d'intervention comportementale (BRS) des mammifères marins dans l'Arctique dans le détroit de Davis et la baie de Baffin du 19 au 21 août. L'essai aura lieu à 250 km de la rive est de l'île de Baffin, aux latitudes au sud de la rivière Clyde et au nord de Pangnirtung. Le BRS comprendra une expérience d'exposition contrôlée (ECE) qui fournira des renseignements essentiels pour appuyer l'utilisation future de sonars actifs dans l'Arctique et, en fin de compte, contribuera à améliorer les mesures d'atténuation des mammifères marins pour le RCN, comme l'exige la Loi sur les espèces en péril. Cet essai sera entrepris en collaboration avec la chaire Large Whale de l'Université Dalhousie. Le BRS se penchera uniquement sur les cachalots et les cachalots du Nord et comprendra différentes activités. Le bateau pneumatique à coque rigide (RHIB) du HDW sera utilisé par DRDC pour les activités de marquage et de collecte de biopsies. Le Conseil de gestion de la faune du Nunavut a approuvé l'étiquetage et la biopsie du grand lait et du cachalot du Nord. Une demande de soins aux animaux a été soumise au comité d'éthique animale de Dalhousie. Des scientifiques spécialistes des mammifères marins de l'Université Dalhousie et/ou du MPO seront à bord pour aider à l'essai. Leur expertise sera essentielle pour surveiller l'état comportemental des baleines afin d'éviter d'affecter les baleines. Il est destiné à compléter les techniques d'observation visuelle typiques avec des systèmes électro-optiques / infrarouges et l'utilisation de drones pour maximiser les chances de savoir où se trouvent les baleines à tout moment. 2. Essai de systèmes maritimes autonomes et télépilotes Cet essai DRDC est une démonstration de l'interopérabilité entre les systèmes autonomes et télépilotes maritimes mobiles et stationnaires pour le scénario de « maintien en péril » de la guerre aérienne ci-dessus. Un scénario de « retenue à risque » est la surveillance d'un port ou d'un point d'étranglement de transit dans le but de détecter les sous-marins entrant ou sortant de la zone. Cet essai de 2 jours sera entrepris en eau peu profonde près de Pond Inlet, AU Nord-Est, du 22 au 23 août 2022, avec le soutien de MAR. L'essai nécessite un emplacement avec une profondeur d'eau inférieure à 100 m. Un navire de surface sans pilote (USV) sera déployé et récupéré à l'aide d'un RHIB de MAR, et un enregistreur sera déployé avant l'expérience et récupéré après l'achèvement. Une grue sera nécessaire pour le déploiement et la récupération de l'équipement. Les principaux objectifs sont les suivants : a. Tester l'interopérabilité entre marps mobiles et stationnaires pour démontrer un concept d'emploi ASW dans l'environnement arctique ; b. Évaluation des performances d'alignement et de la qualité d'un nouveau système de navigation inertielle (INS), à bord d'un véhicule sous-marin autonome (AUV), après étalonnage stationnaire et mobile sur des latitudes de l'Extrême-Arctique ; c. Collecte de données de sonar à haute fréquence (450 kHz) à partir d'un USV afin d'évaluer les caractéristiques de performance de ce sonar dans l'océan Arctique où la présence de couches d'eau douce affecte le profil de vitesse du son ; d. Élaboration de procédures sûres et efficaces pour l'exploitation du MARPS dans l'Arctique, y compris le déploiement et le rétablissement à partir d'une plateforme de la MRC ; e. Fournir au personnel de DRDC une formation et une expérience dans l'Arctique pour MARPS, à bord d'une Plateforme de la MRC. L'essai se trouve dans l'aire marine nationale (AMNC) tallurutiup Imanga, qui sera bientôt établie. Le gouvernement du Canada et l'Association inuite Qikiqtani ont signé une entente sur l'impact et les avantages de l'Inuit IIBA) requise pour l'établissement de l'ACMN Tallurutiup Imanga le 1er août 2019. L'IIBA reconnaît que le MDN mène des recherches militaires dans l'Arctique, y compris l'AMNC tallurutiup Imanga. Dans l'entente, le MDN s'engage à fournir de l'information pour évaluer l'impact environnemental de ses programmes de recherche sur l'ACN tallurutiup Imanga, s'engage à fournir des résumés non classifiés des recherches prévues au sein de l'AMNC de Tallurutiup Imanga et, dans la mesure du possible, fournira les informations demandées dans l'IIBA pour les propositions de recherche. À la fin de la recherche du MDN, un résumé non classifié des résultats sera fourni. L'information doit être fournie au conseil d'administration d'Aulattiqatigiit, qui est un conseil de gestion conjoint des Inuits et du Canada. Selon l'IIBA, le MDN participera, s'il y a lieu, à la contribution à la stratégie de recherche et de surveillance

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Inuinnagut: Atannguyanin Naittuq Pinahuaqtait Pinahuaqtaillu Tamna hivunikhaq talvani Op NANOOK 2022mi aulatitiyaangat auladjutikharnik Talvani Kanatangit Tunnganirmi Allangit allatlu iliqatigiyaingit naunaiyaiaangat Kanaitian Armed Forcesngit (CAF) upalungaiyaivakhimayut auladjutikharnik auladjutikharnik Tunnganirmi ihuaqhaidjutikharnik auladjutikharnik iliqatigiiktukharnik. Auladjutikkut Pinahuarutit hamma:• Amigaigyuumilugit ilauqatigiingnirit Ukiuqtaqtumi Havaqatigiikhutik Havaktut Katimayiit Ukiuqtaqtumi (JTFN); • Avatqutugu naunaiyaqhimayut ayuqhautit Ukiuqtaqtumi auladjutikkut nayugait;• Angikliyuumiqlugit ihuangnikkut tamainun (pidjutainun qayangnautmun); unalu•Ikayuqlugit tamaat kavamatkut aghuurutait imaa ikayuqlugit aalat kavamat havagviit (OGD) uvalu ihivgiungnikkut uvalu development (R D). OP NANOOK-NUNAKPUTOP NA-NU ilauyut nunallaanun ilauqatigiingnirit (COMREL), naunaiyaiffaaqtut hinaani tulakviit (RECCE) uvalu hitamat nalunaqtuliginikkut uuktuutit. HDW, MAR unalu GBY tamarmik piqaqtut aadlatqiinik pinahuarut. JTFN hulipkaidjutikhat ilaujut CA unalu RCAF havaktauniaqtut Ukiuqtaqtumi tadj, ukuallu RCN-kut ikajuqpaktait JTFN-kut tunihilutik katuhiqhimajunik qun'ngiarnirmik, ilaani ilaanilu havaqatigiplugit CA havaktingit. RCN-kut upalungaiqhimajut kiujaami qujaginnanun amigarnarhijunun pidjutimun Uvani Northwest Passage-mi tamaita kikliqarutaani Alaska-mi. Una ilaqalaaqtuq qinihiayinik annaktuiyiniiku, aulauqatinik havaanik aaniaqtunikluniit qilamik. HDW unalu MAR upalungaiyaqtut tingmilutik lqaluktuutiamun amiqunmun uataani.Qauyihainirmut Pivallianirm Atuqtilugu OP NA-NK, hitamat nalunaqtuliginikkut uuktuutit havaktauniaqtut.1.Maritime Naunaiyainiq (ME) piqaqtuq Towed Reelable Aulayumik Pitjutimik Naunaiyainiq atauttikkut uumunnga lhuarninnganik Kiudjutinga Naunaiyainiq a)NANIGIAT uvalu EMATT TrialNANIGIAT nuutiqttaaqtut, puuqaqtut auladjutait aulayumik uvalunighitaaqhutik irninik piyaangnirmun naunaiyariangani, naunaiyautait, naunaiyainikkut uvalu nunamingni imap turaarutait . Tamna crane-guyug aturiaqaqtuq atuqtitaagani 12-miitamik (m)-mik takiyumik irniqaqtuq. NANIGIARUTIT inikhaqarniaqtuq talvani HDW-mi ilauniaqturlu 2-ilangani uuktuutikhami talvani Qikiqtaaluk Bay-miNANIGIAT/EMATT uuktuutit aulaniaqtuq 15-18 Niqiliqivik, 2022. Tamna NANIGIAT aulaniaqtun aturlutikuuktuutikharnik upalungairutikharnik talvanga 2021mi, taima, aulayut irningit 10nik kilaamitanik (km) aulavikhanga talvuuna 10:00mi - 15mun ubluqhiutitigun. Attautit pingniaqtut 11 secondsnik takitilaanganik, 1 tugliq 1800 hertz (Hz) aulahimaaqtumik, malikhugit tipait 200min0mun 2600 Hz 10 secondsnik. Talvuuna 2022mi, pigiaqaqtun taima uuktuutikhat havaktauniaqtun talvani mikiunik nayugaani, taimaitkumi, tamna pingsnik aulaniaqtun taima 45nik minutesnik taima kayumiktumik 8nik kilgaviit (kt). Taima pinghunik ihuaqhaqtaugumik, naituq, kihimi talvuuna aadjikiiktumik aulavikhangit. Kituniliqaa, ping-guyug pivigiyauyug 210-nik decibels-nik (dB) 1-mi micro Pascal-mik



( $\mu\text{Pa}$ )<sup>2</sup>m<sup>2</sup>.-mik.Havaqatigiblugit NANigiat uuktuutit, Ayurnaigitaagani Aulayaaqtut AS W-mi Ayuiqhaniqmi Turaaqvikhat (EMATTs) naunaiyaqtauniaqtut TRAPS-mik aniguqhiyaagani naunairiagani aniguqhijutauniganik naunairiagani unalu naunaiyaqhugit piyaarnirit TRAPSkut. Atuqtilugu una hulidjut 4 EMATTs atuqtauniaqtut.b)TRAPS unalu Arctic BRS TrialNANIGIARUTIT atuqtauniaqtut aulayumik irninikkut pivighamik havagiami imakkut Huradjanun Ukiuqtaqtumi Idjuhikkut Kiudjutinun Naunaiyautit (BRS) uvani Davis Strait/Baffin Bay 19-21 Niqiliqivik. Uuktuutit piniaqtuq 250 km kivataanin hinaanin Qikiqtaaluup Qikiqtaani, uvani latitudes hivuraani Kangiqtugaapingmi tunungani Pangnirtungmi. Tamna BRSngit ilauqarniaqtun Munagidjutikharnik Akuktauyukharnik Ilauniaqtun (CEE) taima tuniniaqtun naunairutikharnik akhurnaqtunik ikayuutikharnik hivunirmi atuqtakharnik aulayunik nunami Ukiuktaqtuniitunik, unalu hivutunirmik aituihimaarniaqtun ihuaqhaidjutikharnik tariurmi huraadjat ihuaqhaidjutikharnik talvani RCmiNmi taima piqaqtukhat talvuuna Huraadjat Ayungnautiqaqtunik Maligaq.Una uuktuutikhaq havaktauniaqtuq havaqatigiyaangat Dalhousie Universitymi Angiyunik Qilalukkat Ikhivautalik. Tamna BRS-kut takuniaqtut tunungani hikuulianik imaalu qilalukkat, ilauniaqtullu aallatqiiktunik hulipkaidjutikhanik. Tamna HDWngit rigid hull mamaqhaqhimayut qainat (RHIB) atuqtauniaqtun tapkuninga DRDCkut katitigianganik niqiniklu katitiqhimayunik hulilukaaktunik. Angigutit tuniyayut hapkunanga Nunavunmi Hugadjatigut Munaqhiyut Katimayiit atataangani uvalu niqiliat ukiuqtaqtumi hikuliat uvalu qilalukkat. Huraadjanik munaqhaidjutikhanut uuktuutit tuyuutauhimayut taphumunga Dalhousie huradjanut pittiarahuarnirmut katimayiit.Tariumi huradjat nalunaqtuliqiyit hapkunanga Dalhousie Iliharvikyuanganin uvalu/uvaluuniin DFOkut katimaniaqtut ikayugiangani uuktuutit. Ayuittiagiikhimayuq akhurnaqtuq munagidjutikharnik qilalukkat idjuhingit qanuritmangaangit taima ayungnautiqarnaitumikqilalukkat. Piliurhimayuq aadlamik tautugiami qanuriliurutingit uumunnga electro-optical/infra-red timiqutigiyayut unalu aupayaaqtut aturninnga angikliyumiriami ilihimagiami talvani qilalukkat ubluq tamaat. 2.Maritime Autonomous unalu Unngahiktukkut Uuktulihaaqtaq Auladjutit UuktuutitUna DRDC-guyuuq uuktuut takuupkaiyuq nalaumainaqniganik ukua tigumiaqtut havakvilu katuhiqhimayut ahiqpanilu aulajutit QuuliuyuniQulaanit Hiniqataqtut pivalianiginik ihumaluknaqnigini. Qayangnautiqaqtuq qanugiliugut munagidjutiqaqtuq tulakvikmik uvaluuniin agyaqnikkut kumauyamik pidjutiqaqtumik naunaiyaqlugu imaq itiqiluni uvaluuniin anivikmun. Una 2-ublunik uuktuutit havaktauniaqtut imangmi haniani Mittimatalingmi, NU uvani 22-23 Niqiliqivik 2022 ikayuqtauluni MAR. Uuktuutit piyariaqaqtut nayugahaanik imangmik ataani 100 m. Atauhiq umiaq (USV) iliyauniaqtuq utiqtitaulunilu atuqluni RHIB-mik MAR-mit, atauhiqlu naunaipkuti iliuraqtauniaqtuq hivuanit utiqtitautinagu utiqilunilu iniqtaukpat. Tamna crane-guyuuq aturiaqaqniaqtuq atuliqnigagut utiqtifaaqniginiklu piqutit.Tamna naunaituq hivunikhangit ilauyut:a.Ihivriuhiniq nalauttaarninganik akkungangni aullaranginnaqtumik imaalu havagviujumi MARPS takupkailutik ASW-mik havaakhanik Ukiuqtaqtumi avataani;b.Naunaiyautikhat nallaumaninganik havauhiinik ihuarninganiklu nutaamik aallatqiiktunik aullavikhanik (INS), ikivikhanut akhaluutinut ataani imap akhaluutip (AUV), kinguagut nayugaat nuutpalliaplutiklu calibration-mik qulvahiktumi ukiuqtaqtumi latitudes-mi;c.Katitiriniq angiyumik-piqalluaqtunik (450 kHz) irnirnik naunaiyautinik USV-mit naunaiyariami havaamut qanurittaakhaanik uumannga irninga ukiuqtaqtumi tariuqmi talvani ittuq nutaamik imaq qaliriit ayurhaqtitait nipinganik naunaiyainiq;d.Pivalliadjutikharnik qayangnairutikharnik ihuaqtumiklu malikhautikharnik ukiuktaqtuni MARPSnik auladjutikharnik, ilauyut auladjutikharnik mamitirutikharnik talvanga RCNmin tunngaviani; unalu auladjutikharnik talvanga RCNmin tunngaviani; unalu e.Tuniyut DRDC-mik havakingit Ukiuqtaqtumi ayuirhainiq ayuitaminiklu MARPS-mik, umiakkuuqtuq RCN-guyuuq akmaijuhia.Tamna nayuganga uuktuutinga qilaminnuaq piliurhimayuq Tallurutiup Imanga Nunaryuaptikni Tariumi Tariukkut Tariunga annguhiqiyiit (NMCA). Kavamatkut Kanatami ukualu Qikiqtani Inuit Katimayiit atiliuqtaat Inuit Hulaqutit uvalu Ikayuutikkut Angirut (IIBA) piyakhat havaktauniitigut haffumani Tallurutiup Imanga

NMCA uvani 1 Niqiliqivik 2019. Tapkuat Inuit Aktuani Ihuaqtitlu Angirutit (IIBA) ilitturiyai tapkuat DND-kut havat anguyaktit turangayut qauyihaqni Ukiurtaqtumi, ilautitlugit Tallurutiup Imanga NMCA. Angirutimi, DND-kut tuniqhimayut kangiqhidjutinik ihivriuriangini avatiinun hulaqutinun ihivriungnikkut pinahuarutit uvani Tallurutiup Imanga NMCA, aghuurutit tunihilutik naunaiyaqhimangitunik naittumikupalungaiyaqhimayut ihivgiugutait hapkunani Tallurutiup Imanga NMCA uvalu, humi piyaaqqat, tunihiniaqtut kangiqhidjutinik apiqhiyut uvani IIBAmi ihivgiungnikkut tughiutit. Iniqtaukpat DND-mik ilituqhainiq, nalunaiqtaugituq naitumik qanurilinigit pipkagauniaqtut. Kangiqhidjutit tuniyauyukhat hapkununga Aulattiqatigiit Katimayiit kitut havaqatigiiklutik Inuit uvalu Kanatami munaqhiyut katimayiit. Malikhugit ukua IIBA, DND ilauniaqtut ihuaqtunik uqagahainun tughiqtauyumun Tallurutiup Imanga NMCA Ihivriurutinun uvalu Munarinikkut Hanaqidjutit iniqtiqtinagu.

3. Hivituyumik-Range Ataani imap Acoustic Tuhaqtitinikkut UuktuutitUna uuktuutpiniaqtuq ilauluni GBYmi tapkua aulagtinitiaqtut tamangnun tuyuqvikhanik uvalu nipiliuqhimayunik. Uuktuutit piniaqtuq 20- 23 Niqiliqivik nayugaani Kasiliiliqtuqtut (GIC), kitut nayugaqaqtut qilamik-be-havaktauhimayut Tallurutiup Imanga NMCA uvani Parry Channelmi (Barrow Strait unalu Lancaster Sound). Tamna naunaituq hivunikhangit ilauyut:

- katitiriniq akhut uvalu pittianginikkut naunaiyautinik;
- pilihaaliqtuq nutaanik kumaktiriikhimayunik uvalu ihuaqtumik; unalu
- piyaangani 50min-100 km tuhaqtitinikkut aktilaangit imaa uuktuqhugit aalakiit tuhaqtitinikkut qanugiliugutit mikivalaangitut irniit.

Uuktuutit nayugaqangniaqtut iluani Tallurutiup Imanga NMCA, uvalu taimaali DNDkut pihimayukhat inmi angigutait uvani IIBAmi.

4. Ilaliutihimajut Qun'ngiarniq talvuuna Qaritaujakkuuqhutik Ukiuqtaqtumi Qaritaujakkuurutit Ahikkuuqtittijut Sensors Trial Uvani hulidjutini pingahuni (3) aadjikkiktumik imakkut nipiliuqhimayut (atauhiq ataani, 2 imap titiraqviani) iliugaqtauniaqtuq atauhirmik ukiumik. Hapkuat nipiliuqpaktut, qanngittumik uqaqhimajut imaaluuniit nipiquqtujunik puyuinik. Tamna titiraqaqvik piqaqtuq lithium baatuliinik, piqaqaqhutiklu silicon-mik havikniklu, hikuliamik hikuliamik. Tapkuat moorings-guyut ilaqaqtut palastingnik havikniklu. Pidjutigiblugit uuktuutit havaatigut atanguyat, pilimaituq tapkua nipiliuqtit uvaluuniin tipait hikuqarniaqtut hikumik (300 m ataani qaangini), uvalu tipait ikitpalaat tapkua nipiliuqhimayut aaniqniaqtut nuviqtinin. Tamna cranenik piqaqtukhaq auladjutikharnik utiqtiffaagiananiklu ilitagidjutikharnik. Tapkuat nipiliuqtit naahuriyauyut utiqtitauini auyami 2023 (auyami 2024 tunuanit). Nipiliuqtiit tamarmik qimangniaqtait imaattut 50 kg haviimik kihaqpallialutik uqumailitaanik. Ikpiaryuk Mittimataliklu tamarmik ittut talvani Tallurutiup Imanga NMCA, talvani DND-milu piyukhaujut uqariijaqtamiknik IIBA-mi. Aviktuqhimayut, Aviktungniit uvalu Haamlat Kavamangit Ilaudjutait •Qikiqtani Inuit Katimayiit (QIA)•Kitikmeot Inuit Katimayiit (KIA)•Nunavut Tuungavit, Inc. Nunaqaqqaarhimayut Nunallaanut ilaupkainiqNaunaiyainiq aturhugu Ministaup Tugliata Ikayuqtinga (Aulapkaitjutikhanik Avatingalu) (ADM[IE]) Havaanga uumunnga Uqaqatigiikniqmut Ihumaliuqtamiknik naunaiyainiq iniqtiqtauyuq nunavunmilu nunangit ilitariyauyuq. Nunallaani ilauniq Ukiuqtaqtumi nunallaani piyaituumannga JTFN. JTFN tuyuqtut ukiuq tamaat tuhaqtitinikkut titiraqhimayunik attautinun hulaqutiyut nunallaanun ukualu Nunavut Tuungavik, Inc. Hivuliq Nunaqaqaaqtut Ilauqatigiingnikkut Katimadjutit katimayut uvani 12 Qiqaijaluarvia 2022mi tikuaqtauhimayut hapkununga Qikiqtani Inuit Katimayiit (QIA) ukualu Kitikmeot Inuit Katimayiit (KIA). Talvani katimanirmi, JTFN-kut ilitturipkaqtitaujun Mittimatalik angmaumaniaqtuq imarmik tuklirmilu anguniarnirnik talvani RCN-kut talvani. QIAkut apiqhiyut kangiqhidjutinik mikhaagun hulidjutit Mittimatalingmi tadj, kitut hulidjutit havaktauniaqtut uvalu humi. Nunalaani ilaulukaarniq Nain, NLmi Hopedalemilu, NLkut aulatitiliqtun talvanga CFB Goose Baymi Nanminiqaarnikkut Auladjutikharnik Detachmentmin. Hapkua nunallaat ilauyut hapkununga Labrador Inuit Nunataarnikkut Angiqatigiigutimi (LILCA). Uqautauyut kinguani, nayugait pingahut uuktuutit qilamik havaktauhimayut Tallurutiup Imanga NMCA, uvalu aadjiliuqhugithapkununga IIBAmun, kangiqhidjutit uuktuutit tuniyauyukhat hapkununga Aulattiqatigiit Katimayiit kitut

havaqatigiikhimayut Inuit Kanatamilu munaqhiyut katimayit. Titiraqhimaniaqtut naunaiyautikhanik qayagitjutinik (NAVWARNs) imaalu ilitturilutik tariukkut (NOTMARs) kivgaqtuiyut anguyaktinut umianut aulapkaiyinut ayuiqhautikhanut hulilukaarutikhat humiitpallu. Hapkuat naunaitkutat piqaqtuq akhuurutauyunik naunaitkutanik hulilukaarutinik atuqtauyukhaugaluq pitillugu aturninnganik. Kihimi, nalunaqtuq qanuq atuguminaqtut hapkua auladjutit qayangnautiqagtut Nunaqaqaqtunun nunallaanun uvalu tapkua kitut havangniaqtaitaanguqtingnikkut hulidjutit. Piqagituq nahuriyauyunik aalaguqniginik taja qanuriniganik atuqniganikluniit nuna (ukualu hinaani tariuqmilu), anurimi, immaqmi ihuaqutiniklu. Iqaiyautit tadjakaffuk atukaffungniaqtut ikituni ubluni attautini nayugaini. Nahuriyauyut agiyunik ihuilijutinik aktuqniginik tikmiamut, immaqmi, immaqmiluniit pijutauniganit Op NA-NK-mit 2022-mi kiguani atulirumayauniganit ihuaqhivalianiginik pigiarutit atuqtauniginik.

**Personnel**

Personnel on site: 7

Days on site: 16

Total Person days: 112

Operations Phase: from 2022-08-01 to 2022-09-30

## Activities

Location	Activity Type	Land Status	Site history	Site archaeological or paleontological value	Proximity to the nearest communities and any protected areas
DUSN node	Researching	Marine	N/A	N/A	Lancaster Sound/Baffin Bay
AAR1	Researching	Marine	N/A	N/A	Arctic Bay, NU
AAR2	Researching	Marine	N/A	N/A	Pond Inlet, NU
AAR3	Researching	Marine	N/A	N/A	Qikiqtaruaq, NU
GBY 100-km waypoint	Researching	Marine	N/A	N/A	Baffin Bay/Davis Strait
DUSN1	Researching	Marine	N/A	N/A	Pond Inlet, NU
DUSN2	Researching	Marine	N/A	N/A	Pond Inlet, NU

## Community Involvement & Regional Benefits

Community	Name	Organization	Date Contacted
Qikiqtarjuaq	QIA	QIA	2022-05-12

## Authorizations

Indicate the areas in which the project is located:

Transboundary  
North Baffin

### Authorizations

Regulatory Authority	Authorization Description	Current Status	Date Issued / Applied	Expiry Date
Nunavut Water Board	8WLC-NWT2223 – Approval for the Use of Waters and Deposit of Waste Without a Licence	Active	2022-07-15	2023-07-14
Nunavut Research Institute	Scientific Research Licence Application	Applied, Decision Pending		
Nunavut Tunngavik Inc	Request for information sent	Applied, Decision Pending		
Government of Nunavut, Department of Environment	Request for information sent	Applied, Decision Pending		
Qikiqtani Inuit Association	Request for information sent	Applied, Decision Pending		
Other	Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) Request for information sent	Applied, Decision Pending		

### Project transportation types

Transportation Type	Proposed Use	Length of Use
Water	Royal Canadian Navy (RCN): •Her Majesty's Canadian Ship (HMCS) HARRY DEWOLF (HDW) (Harry Dewolf Class) •HMCS MARGARET BROOKE (MAR) (Harry Dewolf Class) •HMCS GOOSE BAY (GBY) (Kingston Class)	

### Project accommodation types

Temporary Camp

## Material Use

Equipment to be used (including drills, pumps, aircraft, vehicles, etc)

Equipment Type	Quantity	Size - Dimensions	Proposed Use
Sea Robotics USV-2600 (USV i.e. Uncrewed Surface Vessel)	1	1000 lbs	Collection of high-frequency (450 kHz) sonar data to evaluate the performance characteristics of this sonar in the arctic ocean where the presence of freshwater layers affect the sound velocity profile.
RF Float	1	70 lbs	For DUSN communications
DUSN	1	450 lbs	To record information
AUV	1	22.75”L x 3.89”H x 1.14”D	- IVER-3 (Klein UUV3500)- IxBlue C3 Inertial navigation system
CTD sensor	1	2.8”L x 8.0”H	- Conductivity / Temperature/ depth sensor
AIS TX	1	6.5” (W) × 4.3” (H) × 3.6” (D)	Portable automatic identification system transmitter
Slocum glider	1	1.79m L x 1.01m W x 0.49m H	Long range remote water observation
Acoustic recorders	3	74mm W x 101mm H x 28mm D	Biodiversity assessment
HMCS HDW (Navy ship)	1	105m X 19m	Transport
HMCS MAR (Navy Ship)	1	103m x 19m	Transport
HMCS GBY (Navy Ship)	1	55.3m x 11.3m	55.3m x 11.3m

### Detail Fuel and Hazardous Material Use

Detail fuel material use:	Fuel Type	Number of containers	Container Capacity	Total Amount	Units	Proposed Use
Information is not available						

### Water Consumption

Daily amount (m3)	Proposed water retrieval methods	Proposed water retrieval location
0		

# Waste

## Waste Management

Project Activity	Type of Waste	Projected Amount Generated	Method of Disposal	Additional treatment procedures
Information is not available				

### Environmental Impacts:

There will be written navigational warnings (NAVWARNs) and notices to mariners (NOTMARs) serve to warn vessel operators about training activity timing and location. These notices contain important information about activities which should remain in effect for the duration of the exercise. However, it remains uncertain how effective these systems are in warning Indigenous communities and those who may be undertaking traditional activities. There are no expected permanent changes to the current condition or use of land (including coastal and marine area), air, water and resources. The exercises are temporary and will only take place for a few days at each location. There are no expected significant adverse effects on air, land or water due to Op NA-NK 2022 after proposed mitigation measures (in the additional information and project documents) are in place.

# **Additional Information**

**SECTION A1: Project Info**

**SECTION A2: Allweather Road**

**SECTION A3: Winter Road**

**SECTION B1: Project Info**

**SECTION B2: Exploration Activity**

**SECTION B3: Geosciences**

**SECTION B4: Drilling**

**SECTION B5: Stripping**

**SECTION B6: Underground Activity**

**SECTION B7: Waste Rock**

**SECTION B8: Stockpiles**

**SECTION B9: Mine Development**

**SECTION B10: Geology**

**SECTION B11: Mine**

**SECTION B12: Mill**

**SECTION C1: Pits**

**SECTION D1: Facility**

**SECTION D2: Facility Construction**

**SECTION D3: Facility Operation**

**SECTION D4: Vessel Use**

**SECTION E1: Offshore Survey**

**SECTION E2: Nearshore Survey**

**SECTION E3: Vessel Use**



**SECTION F1: Site Cleanup**

**SECTION G1: Well Authorization**

**SECTION G2: Onland Exploration**

**SECTION G3: Offshore Exploration**

**SECTION G4: Rig**

**SECTION H1: Vessel Use**

**SECTION H2: Disposal At Sea**

**SECTION I1: Municipal Development**

**Description of Existing Environment: Physical Environment**

**Description of Existing Environment: Biological Environment**

**Description of Existing Environment: Socio-economic Environment**

**Miscellaneous Project Information**

**Identification of Impacts and Proposed Mitigation Measures**

**Cumulative Effects**

Impacts

Identification of Environmental Impacts

	PHYSICAL	Designated environmental areas	Ground stability	Permafrost	Hydrology / Limnology	Water quality	Climate conditions	Eschers and other unique or fragile landscapes	Surface and bedrock geology	Sediment and soil quality	Tidal processes and bathymetry	Air quality	Noise levels	BIOLOGICAL	Vegetation	Wildlife, including habitat and migration patterns	Birds, including habitat and migration patterns	Aquatic species, incl. habitat and migration/spawning	Wildlife protected areas	SOCIO-ECONOMIC	Archaeological and cultural historic sites	Employment	Community wellness	Community infrastructure	Human health
Construction	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operation		U	U	U	-	U	U	U	U	U	U	U	U		U	M	M	M	U		U	U	U	U	U
Decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(P = Positive, N = Negative and non-mitigatable, M = Negative and mitigatable, U = Unknown)

## Project Location



## List of Project Geometries

1	point	DUSN node
2	point	USV 2600 (North-West edge of box)
3	point	USV 2600 (South-East edge of box)
4	point	AAR1
5	point	AAR2
6	point	AAR3
7	point	DUSN1
8	point	DUSN2
9	point	GBY 100-km waypoint
10	point	BRS trial