

NUNAVUT IMPACT REVIEW BOARD
Date: January 29, 2021
Exhibit No: 9



Marine Environment ᐃນ▷᜵ ᐃ᜵ᜱ᜵ᜲ

Phase 2 Proposal / ഏരുവാടുക്ക് പദ്ധതി 2 പ്രകാരം

Public Hearing Iqaluit and Pond Inlet January 2021
ഡാക്ടർ ഓഫ് സൗഖ്യ അഭ്യന്തര മന്ത്രി
ജൂൺ 2021



Presentation Overview ഡാക്ടർ ഓഫ് സൗഖ്യ അഭ്യന്തര

- Assessment Approach and Overview
ഭൂമിക്ക് പരിശീലനം
- Construction & Operation at Milne Port
ഇൻഡസ്ട്രി പരിശീലനം
- Shipping
ബോർഡേൽ പരിശീലനം
- Assessment Conclusion
ഭൂമിക്ക് പരിശീലനം
- Technical Review Process Summary
പ്രകാരം പരിശീലനം
- Summary
ആകെ പരിശീലനം





Assessment Overview

ᖵិត្យលោកស្រីតម្រង
នូវការអនុញ្ញាត



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Assessment Approach – Operational Knowledge

ទិន្នន័យជាប្រភព
ដែលមានប្រសិទ្ធភាព

Building on past approvals

ការអនុញ្ញាតសារុបតាមចំណាំ
និងគេរកឃើញពាណិជ្ជកម្ម

- Multiple environmental impact review processes
ទិន្នន័យសារុបតាមចំណាំ
និងគេរកឃើញពាណិជ្ជកម្ម
- Deep understanding of key risks
ការអនុញ្ញាតសារុបតាមចំណាំ
និងគេរកឃើញពាណិជ្ជកម្ម



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Assessment Approach – Operational Knowledge ‘බ්‍රැෆ්නාංස් ජ්‍යෙම් තුරුක් අප්ලිකුත් ප්‍රාග්ධනය’

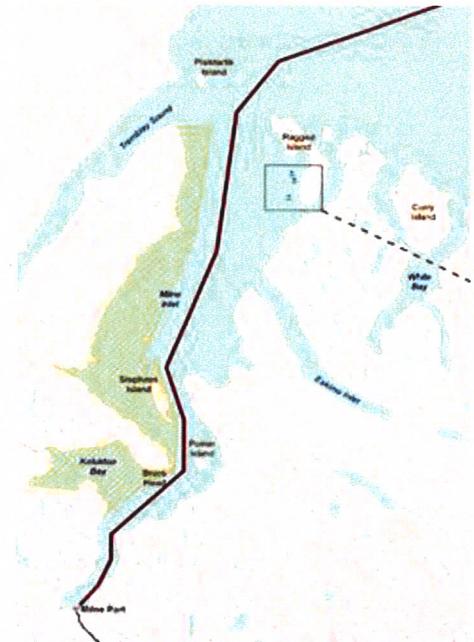
Integration of key learnings as operations grow / Δේරුවාදා දැනුවා මූල්‍ය හැකුම් ප්‍රාග්ධනය

- Implementation of mitigation and management measures over 6 years
අප්ලිකුත් ප්‍රාග්ධනය නොවා ඇත්තා ඇත්තා ඇත්තා



Assessment Approach – Inuit Knowledge ‘බ්‍රැෆ්නාංස් ජ්‍යෙම් තුරුක් ආයා බ්‍රැෆ්නාංස් ප්‍රාග්ධනය’

- Extensive sharing of Inuit knowledge through interviews, workshops, community meetings
ආයා ප්‍රාග්ධනය නොවා ඇත්තා නොවා ඇත්තා ඇත්තා ඇත්තා
- Integrated into baseline information, identification of valued ecosystem components, potential effects characterization and mitigation measures
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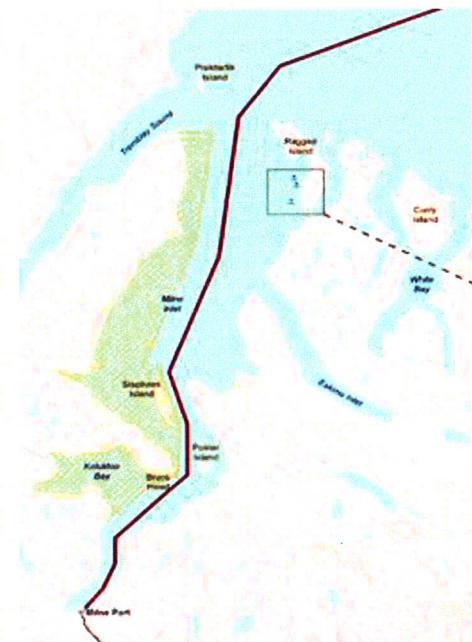


Assessment Approach – Inuit Knowledge

“**IQ** **is** **an** **asset** - **IQ**

“**IQ** **is** **not** **a** **constraint**”

- Inuit involvement and input into monitoring
- Continuous process leading to operational changes and adaptive management practices
- “No go” zones – Koluktoo Bay, western shore of Milne Inlet
- 40 km set back area from floe edge

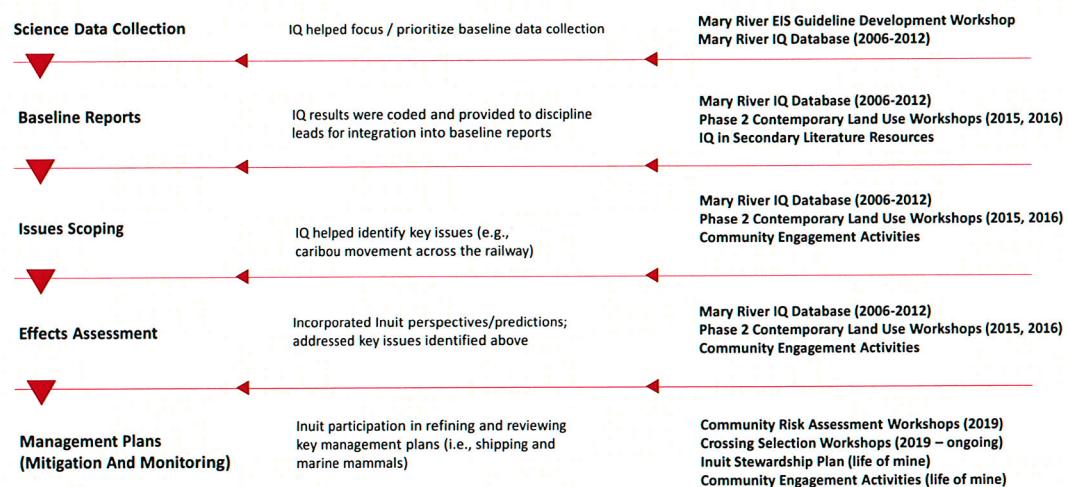


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Methods of Incorporating IQ into the EIS



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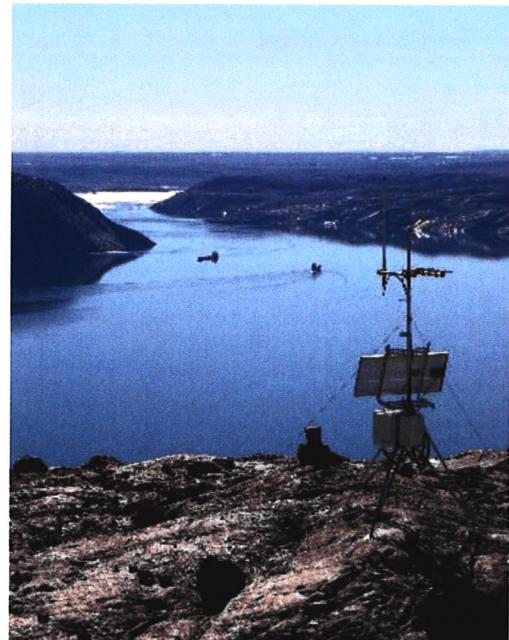
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Assessment Approach –
Thorough and Accurate
• Detailed Site Characterization –
• Risk Assessment –
• Mitigation Measures

- Empirical-based Modelling
• Detailed Site Characterization – Risk Assessment – Mitigation Measures
- Conservative model assumptions
• Detailed Site Characterization – Risk Assessment – Mitigation Measures
- Multiple, effective mitigation measures
• Detailed Site Characterization – Risk Assessment – Mitigation Measures





Assessment Approach – Thorough and Accurate 衚殖民地研究方法 - 衚殖民地研究方法

- 10+ years of data collected
10+ 年來收集資料
- Over 30 regional studies
超過 30 個地區研究
- Peer reviews
同行評審
- Adaptive management approach
適應管理方法

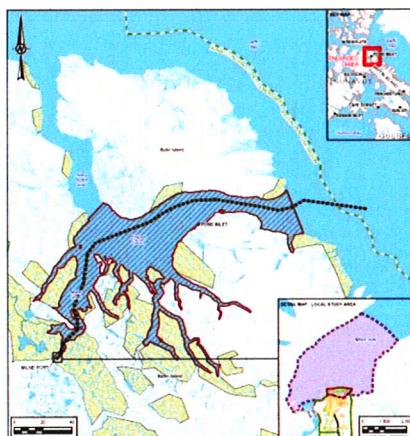


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Study Areas 衚殖民地研究方法



Marine Environment / ΔL



Marine Mammals / >ΔL

LEGEND
● COMMUNITY
■ SHIPPING ROUTE (APPROXIMATE)
▬ FDA/QIA COMMERCIAL LEASE
▬ WATERCOURSE
▬ EXISTING FREIGHT DOCK AND CAUSEWAY
▬ EXISTING ORE DOCK
▬ NEW ORE DOCK AND CAUSEWAYS
▢ LOCAL STUDY AREA
▢ REGIONAL STUDY AREA
▢ INAC FORESHORE LEASE
▢ NUNAVUT SETTLEMENT AREA BOUNDARY
▢ NUNAVUT LAND CLAIMS AGREEMENT - POND INLET INUIT OWNED LAND
▬ WATERBODY

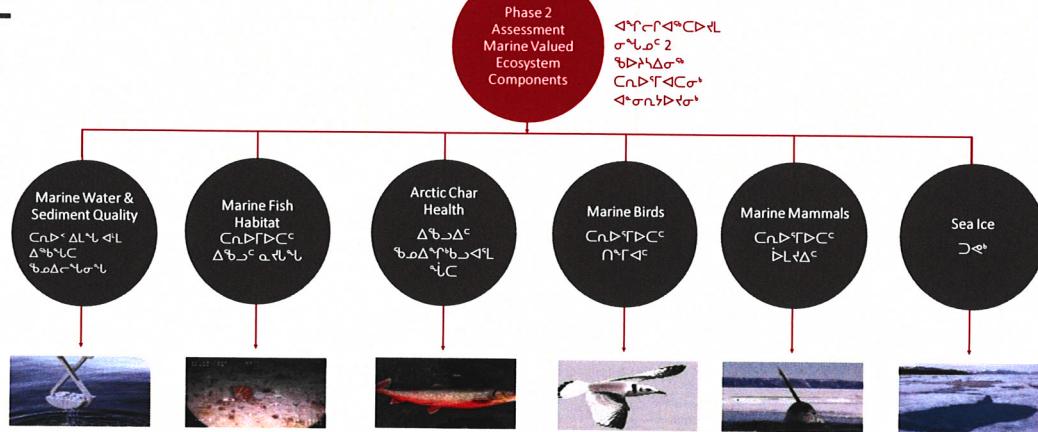


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Valued Ecosystem Components 有价值生态组件



Phase 2 Considerations 第二阶段考虑因素



Milne Port 米尔斯港

Structure Modifications
结构修改
Construction
建设
Wastewater and site water discharge
废水和现场水排放
Dust deposition, dispersion
尘埃沉积、扩散

Habitat Loss and Alteration
栖息地损失和改变
Changes in Sediment and Water Quality
沉积物和水质变化



Milne Port 米尔斯港

Increased Port Activity
增加港口活动
Wastewater and site water discharge
废水和现场水排放
Dust deposition, dispersion
尘埃沉积、扩散
Ballast water discharge
压载水排放

Habitat Loss and Alteration
栖息地损失和改变
Changes in Sediment and Water Quality
沉积物和水质变化
Risk Introduction of Invasive Species
入侵物种引入风险
Change to Temperature and Salinity
温度和盐度变化



Shipping 航运

Ship Wake, Propeller Wash
船尾浪, 桨洗
Increased Vessel Traffic
增加船舶交通

Icebreaking
破冰
▼

Sediment Resuspension
悬浮沉积物
Habitat Erosion
栖息地侵蚀
Vessel Strikes
船只碰撞
Acoustic Effects
声学效应
Entrapment
围困



Baffinland Approach to Mitigation

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- Underwater noise
ᑕ᜵᜷᜴᜵ ለ᜵᜷᜴᜵ ደ᜵᜷᜴᜵
- Ballast water management
▷᜵᜷᜴᜵ ት᜵᜷᜴᜵ ለ᜵᜷᜴᜵ ደ᜵᜷᜴᜵
- Impacts to Inuit culture and livelihood
ᐊ᜵᜷᜴᜵ ደ᜵᜷᜴᜵ ለ᜵᜷᜴᜵ ደ᜵᜷᜴᜵



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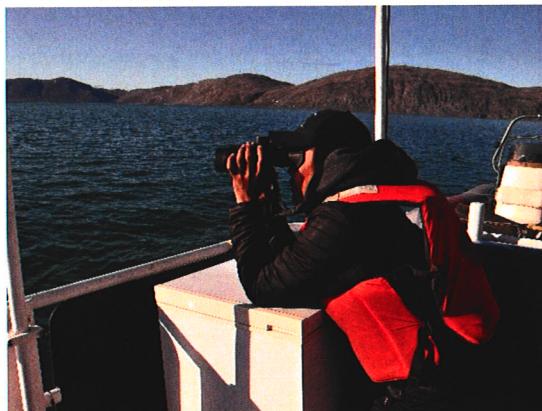
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Baffinland Approach to Mitigation

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- Includes additional measures asked for by community & regulators
Δ᜵᜷᜴᜵ እ᜵᜷᜴᜵ ለ᜵᜷᜴᜵ ለ᜵᜷᜴᜵
- Inuit at centre of adaptive management approach
Δ᜵᜷᜴᜵ ደ᜵᜷᜴᜵ ለ᜵᜷᜴᜵ ለ᜵᜷᜴᜵



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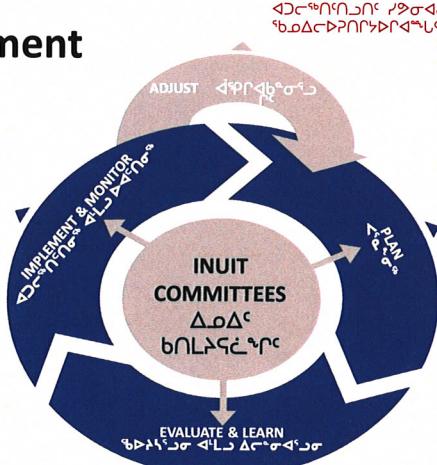
Baffinland Approach to Mitigation ! ! !

- Building on current operational experience
!
!
- Exceeds regulatory requirements for Canadian ports
!



Adaptive Management ! !

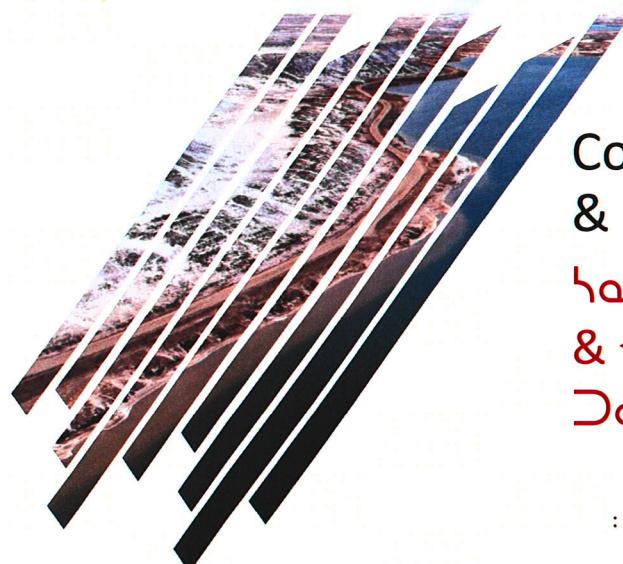
3. QIA Implements Inuit Stewardship Plan Monitoring Programs
!
3. !



4. Implement Predetermined Responses as Necessary
!

1. Baffinland and QIA Agree to Adaptive Management Plan; QIA Establishes Inuit Stewardship Plan
!
1. !

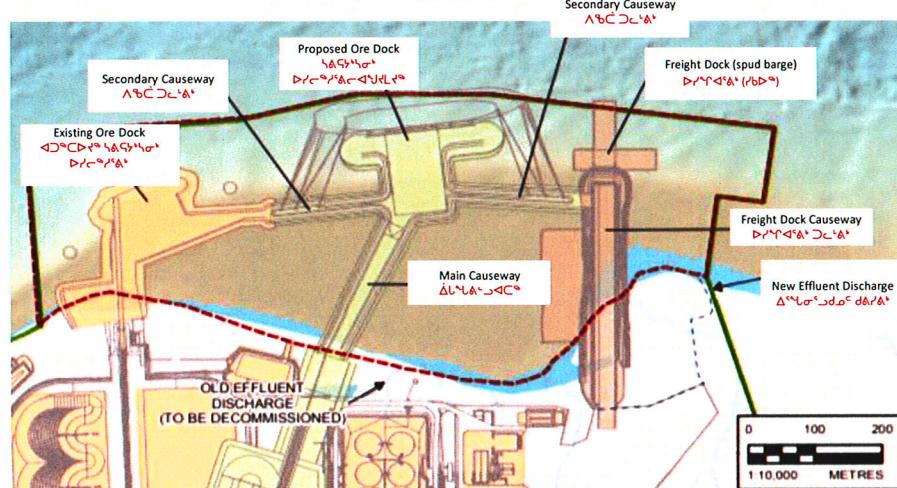
2. Review of Monitoring Program Results Against Predetermined Indicators and Thresholds
!
2. !



Construction & Operation at Milne Port

ନୂତର୍ନୀଶ
& ଉଚ୍ଚକାର୍ଯ୍ୟ ପାଇଁ କାମ

Construction & Operation ନୂତର୍ନୀଶ ଏବଂ ଉଚ୍ଚକାର୍ଯ୍ୟ



Port Construction – Habitat Alteration

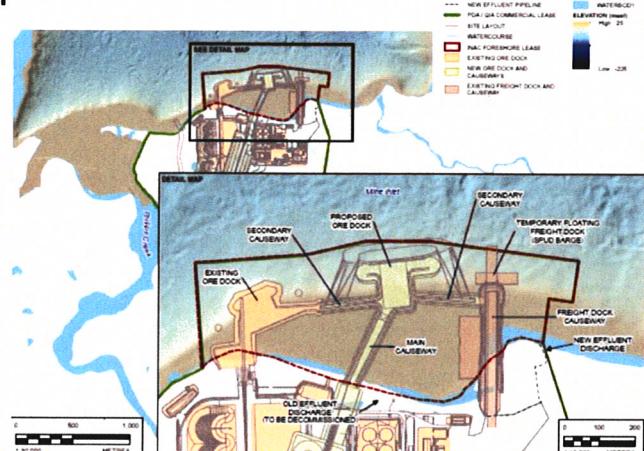
努凌图伊努伊特人
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Phase 2 Ore Dock Design Overview

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努凌图伊努伊特人

Phased approach to reduce impacts to marine environment

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努凌图伊努伊特人



Mitigation – Port Construction

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- Best management practices during in-water construction including:
努凌图伊努伊特人
努凌图伊努伊特人
- Silt curtains
努凌图伊努伊特人
- Underwater noise management plan
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- Following the guiding principles for offsetting
努凌图伊努伊特人



Port Operation – Ballast Water Impacts

▷ የፌዴራል ስራው እና በትክክል ማረጋገጫ
የሚከተሉ የፌዴራል ስራው እና በትክክል ማረጋገጫ

- 2017/2018 (TSD18)

- Co-developed advanced model with Danish Hydrographic Institute (DHI) Water & Environment
የሚከተሉ የፌዴራል ስራው እና በትክክል ማረጋገጫ
የሚከተሉ የፌዴራል ስራው እና በትክክል ማረጋገጫ
- Calibrated to 2014 data
2014 ደንብ እና የሚከተሉ የፌዴራል ስራው እና በትክክል ማረጋገጫ
- 3-month simulation
የሚከተሉ የፌዴራል ስራው እና በትክክል ማረጋገጫ
- Modelled Existing and Proposed conditions
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Port Operation – Ballast Water Impacts

▷ የፌዴራል ስራው እና በትክክል ማረጋገጫ
የሚከተሉ የፌዴራል ስራው እና በትክክል ማረጋገጫ

- 2019 Updated Modelling

- 2019 የፌዴራል ስራው እና በትክክል ማረጋገጫ
የሚከተሉ የፌዴራል ስራው እና በትክክል ማረጋገጫ
- Included 2018 Milne Inlet oceanographic and ballast water data
ለማስቀመጥ የፌዴራል ስራው እና በትክክል ማረጋገጫ
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- Assessed potential temperature and salinity changes in ambient water
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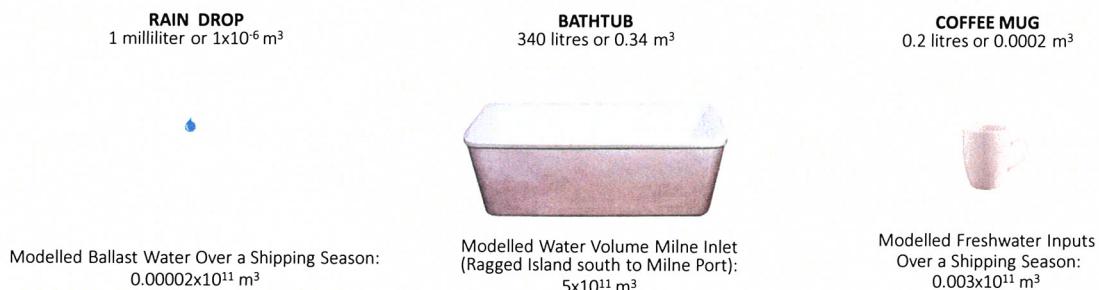


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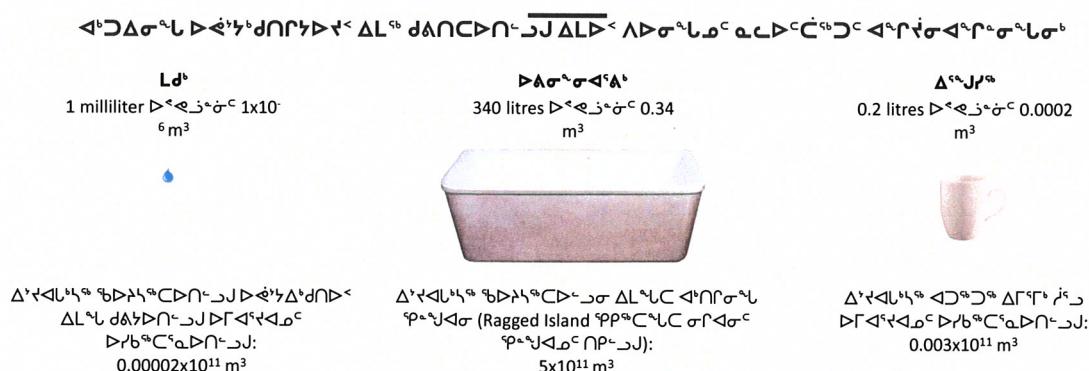


Port Operation – Ballast Water Modelling Results

Effects of ballast water discharge on water quality predicted to be not significant



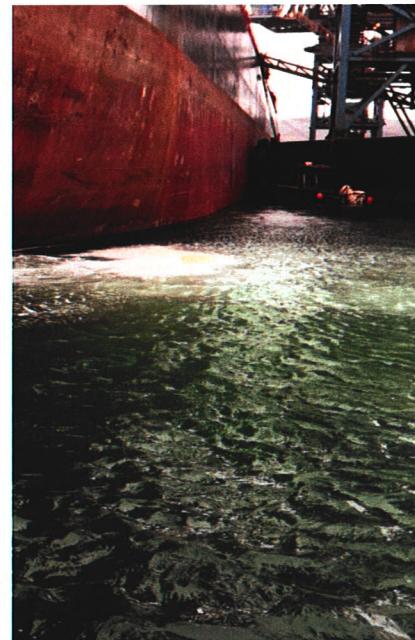
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Port Operation – Aquatic Invasive Species Monitoring & Mitigation

- Most stringent in Canada & Arctic
• Protocol exceeds regulatory requirements (International Maritime Organization & Transport Canada)
• Commitment to DFO-led risk-based approach to ballast water monitoring

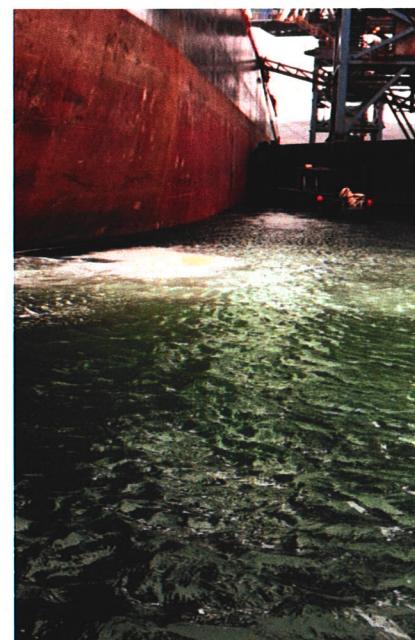


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Port Operation – Aquatic Invasive Species Monitoring & Mitigation

- Ballast water compliance testing (salinity and temperature) by Baffinland to verify exchange
• Commitment to DFO-led risk-based approach to ballast water monitoring



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Port Operation – Aquatic Invasive Species Monitoring & Mitigation

• Commitment to supporting the development of a trigger list of high biological risk species or groupings of species of concern and associated response plans

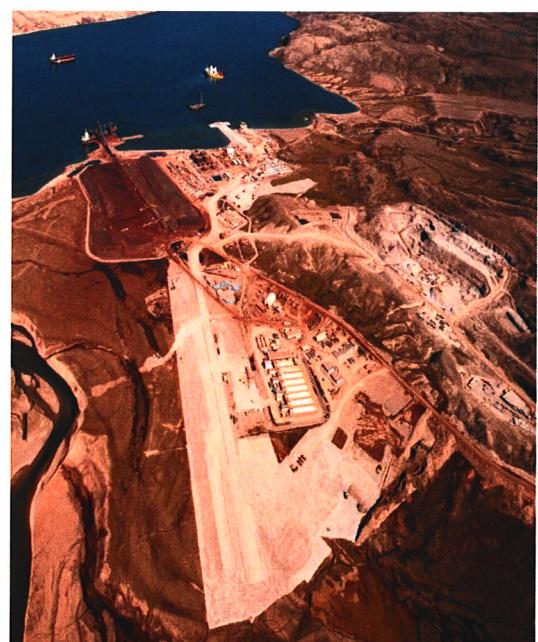
- △ხრმის დანართების სისტემის განვითარება



Port Operation – Impact of Dust

• Results to-Date

- Increased stockpiling of ore at Milne Port may increase iron concentrations in the marine environment
- Baseline monitoring indicates that iron is already abundant in the receiving environment (pre-Project)





Port Operation – Dust Monitoring

▷ ᐈ ላᜒ ላᜒ ላᜒ

▷ ት ላᜒ ላᜒ ላᜒ

- Since start of operations (2015-2019), no significant increase in iron concentrations in sediment relative to baseline.
▷ ለ መ ላᜒ ላᜒ ላᜒ ላᜒ (2015-2019), እገልጻ ወጪ ለ መ ላᜒ ላᜒ ላᜒ ላᜒ ላᜒ ላᜒ ላᜒ ላᜒ.
- Metal concentrations in fish tissue have been relatively consistent between 2010 and 2019 and are aligned with expected natural variability.
ነጉ ላᜒ 2010 ቤታ እና 2019 ቤታ ላᜒ ላᜒ
- Notably, iron concentrations have tended to decrease in Arctic Char in recent years compared to pre-Project.
▷ ለ መ ላᜒ ላᜒ



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Shipping

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▷ ን ላᜒ ላᜒ



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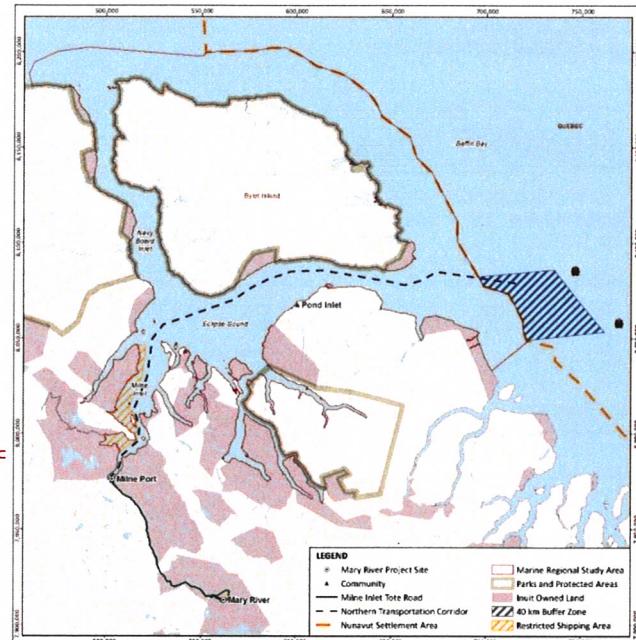
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Shipping Activity Overview – Route

► ΓΑΝΑΚ ΣΥΓΚΡΙΤΙΚΗΣ ΕΠΙΧΕΙΡΗΣΗΣ - ΕΙΔΟΥΣ

- Modified based on input from Pond Inlet
επιχείρησης που έχει συνδέσει την Καναδική θάλασσα με την Αρκτική
- Route & speed restrictions monitored by Baffinland using satellite technology
επιχείρησης & Διαχείρισης Καναδικών Αγορών Αναπτύξεως



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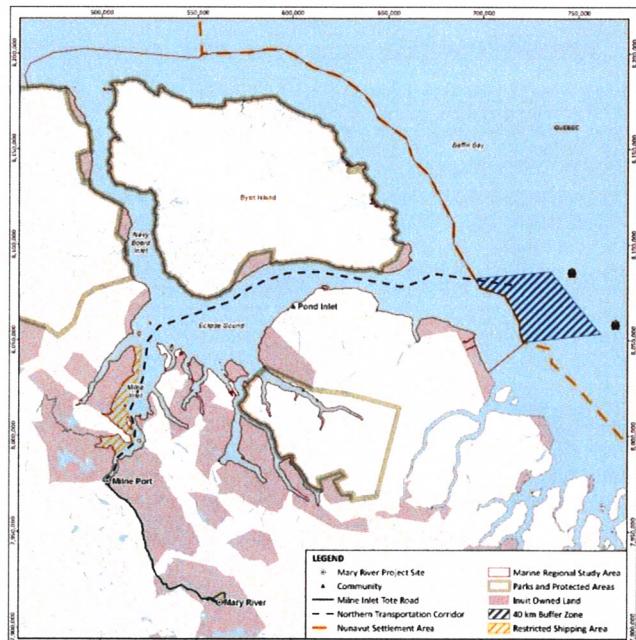
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Shipping Activity Overview – Route

► ΓΑΝΑΚ ΣΥΓΚΡΙΤΙΚΗΣ ΕΠΙΧΕΙΡΗΣΗΣ - ΕΙΔΟΥΣ

- Established set-back area 40km from Nunavut Settlement Area at start of shipping season
επιχείρησης από την Έπαυλη των Νοτιοανατολικών Ινουατού που ξεκινάει μετά από 40 χιλιόμετρα
- Notifications triggered when vessels:
• Deviate off route
• Speeds exceed voluntary 9 knots
επιχείρησης που ξεκινάει μετά από 40 χιλιόμετρα



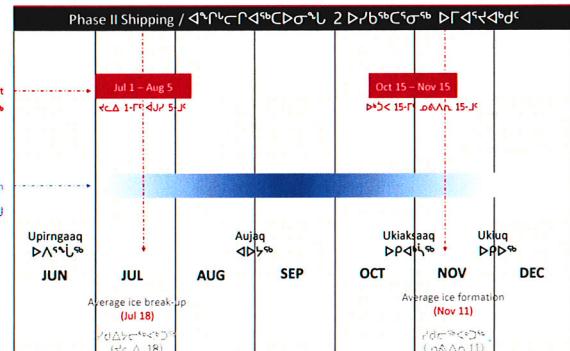
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Shipping Activity Overview – Selection of Shipping Season

▷ ΓΔΕΔΔΕΔ Λεπτοστού Βαθμοδιάσταση - ▷ ΓΔΕΔΔΕΔ Σύντομη Κατανόηση



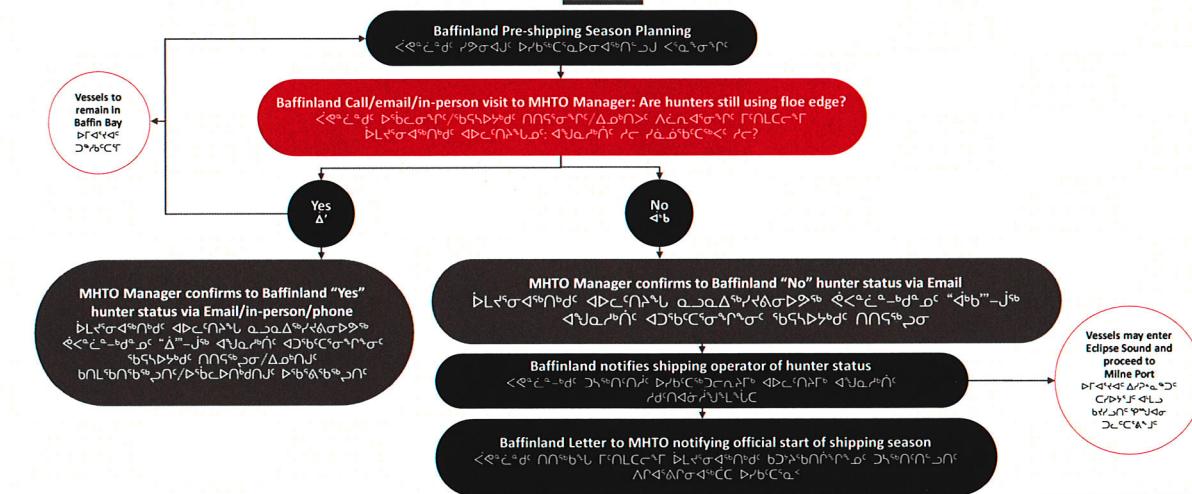
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Shipping Activity Overview – Start of Shipping Season

▷ Ρευματοστού Δεδομένων Διεύρυνση - Αρχή στον Ρευματοστού



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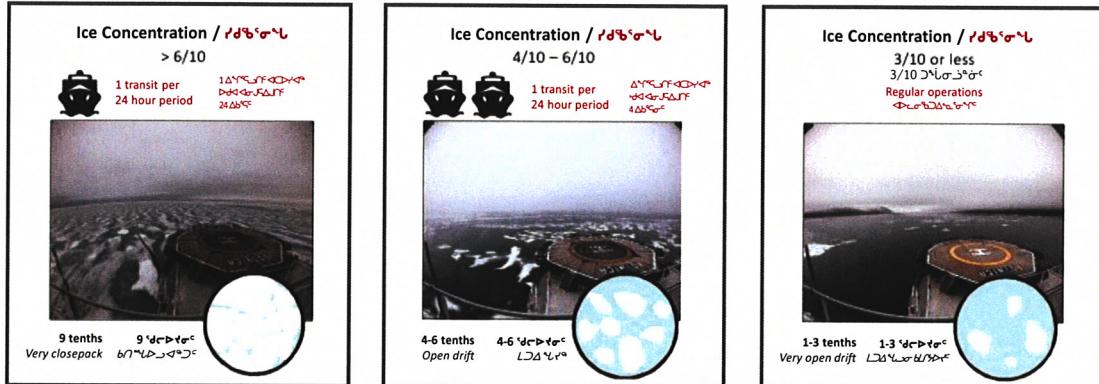
36



Shipping Activity Overview Transit Restrictions

►IBC Sections 319.6.2 & 319.6.3 - Baffinland Transit Restrictions

Vessel Management in Heavier Ice Conditions / ►IBC Sections 319.6.2 & 319.6.3 - Baffinland Transit Restrictions



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Shipping Activity Overview - # of Vessels

►IBC Sections 319.6.2 & 319.6.3 - Baffinland Transit Restrictions

Vessel (Phase 2) ►ΓΔεΔε (ΔεΓΓΔεΔεCΔεLσ~L 2-Γ)	July/RεΔ	August/AεR	September / RΠΛω	October / ΣεΔΛω	Total / 6Π~σ~ε
Ore Carriers ΛΔεσε Δεεσεσε	22	62	60	32	176
Other Project Vessels ΔεΓΓΔεΔε	12	6	6	8	32
Total 6Π~σ~ε	34	68	66	40	208
Daily Avg/Mth 6πCL~C~PCL~ Δδσ~σ~ε	2.3	2.2	2.2	1.3	1.7

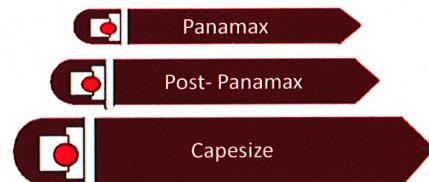


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Shipping Activity Overview – Vessel Size ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ



Similar size to Crystal Serenity cruise ship / Εικόνα για την Crystal Serenity ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ



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Shipping Activity Overview – Vessel Speeds ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ - ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ

- 9 knot restriction for all Project vessels in regional study area

9 knot - Τα διαδρομές που έχουν ταχύτητα μεταξύ 9 και 12 κόμβων στην περιοχή συγκαρασμού.

Vessel Type / ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ	% time under 9 knots (2019 data) / % άσπρης ζώσης σε 9 κόμβους (2019)
Project Ore Carriers ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ	99
Project Icebreaker ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ	99
Cruise Ships ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ	32
Coast Guard Icebreakers ▷ ΓΑΡΔΑΚ ΛΑΜΠΩΝ	35



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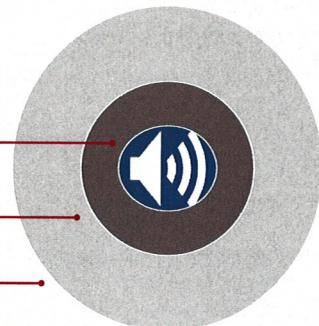
What makes Ragged Island a good anchorage location?

ΔΓΓ~σ ρ~L~ρ ~ρ~L~σ ~λ~σ~λ~σ

- Is within reasonable close proximity to Milne Port
‘ӕσ~C~d~z~l~r~r~J~d~σ~C~C~A~J~c
- Depth is less than 100 m
Δ~U~σ~A~C~S~C~C~C~1~0~0~G~C~
- Width allows for safe maneuverability
‘ӕσ~J~C~P~σ~A~S~C~A~G~C~G~A~H~A~J~A~
- Provides refuge during weather events
‘ӕC~b~L~D~U~C~J~D~d~d~σ~D~C~σ~
- Allows for 3 vessels to be safely anchored at the same time
Δ~A~σ~r~C~D~G~A~K~C~P~H~Y~L~W~U~J~A~C~
- Closest location to Milne (important particularly with ice mitigation measures in shoulder season)
‘ӕσ~C~A~R~J~d~σ~C~(Δ~I~L~n~D~A~G~Y~P~G~D~T~A~C~Δ~A~G~C~A~C~G~C~)
- Is not considered to be of heightened ecological importance (unlike Koluktoo Bay and Tremblay Sound)
Δ~L~G~n~D~A~G~C~D~L~G~A~G~G~C~C~A~G~C~G~C~(Δ~L~A~Δ~G~C~G~C~)
- Masters must be convinced of safe location prior to anchoring
Δ~d~G~C~Δ~L~C~n~A~C~C~A~G~C~G~C~G~σ~σ~

Potential Acoustic Effects on Marine Mammals

- σ~A~n~e~p~d~σ~J~c
 Δ~C~C~D~Y~A~G~B~P~A~σ~G~C~n~D~G~
 σ~A~G~C~
- Acoustic Injury**
 σ~A~n~d~n~d~m~c~Δ~C~A~L~Y~L~c
- Behavioural Disturbance**
 Δ~P~Y~n~L~n~σ~b~C~E~A~Δ~A~
- Masking**
 C~A~n~A~n~A~n~C~Δ~L~U~G~A~G~





Shipping –

No Acoustic Injury

▷ ΓΑΝΔΑΚ ΣΥΡΒΕΙΟΝ ΠΕΛΑΓΟΣ - ΔΓΑΝΤΩΣ ΜΑΡ
ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ

- No potential for acoustic injury (temporary or permanent), based on both modelling and field data
ΔΓΑΝΤΩΣ ΜΑΡ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ (ΔΓΑΝΤΩΣ ΜΑΡ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ),
▷ ΕΞΑΓΩΓΗΣ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ ΔΓΑΝΤΩΣ ΜΑΡ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ,
▷ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ ΚΛΙΜΑ ΔΓΑΝΤΩΣ ΜΑΡ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ ΔΓΑΝΤΩΣ ΜΑΡ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ
- Mitigation measures effectively reduce spatial and temporal overlap with vessel noise
▷ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ ΔΓΑΝΤΩΣ ΜΑΡ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ
▷ ΔΓΑΝΤΩΣ ΣΥΡΒΕΙΟΝ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ
▷ ΔΓΑΝΤΩΣ ΣΥΡΒΕΙΟΝ ΔΡΑΣΗΣ ΟΠΟΥΡΑΣ



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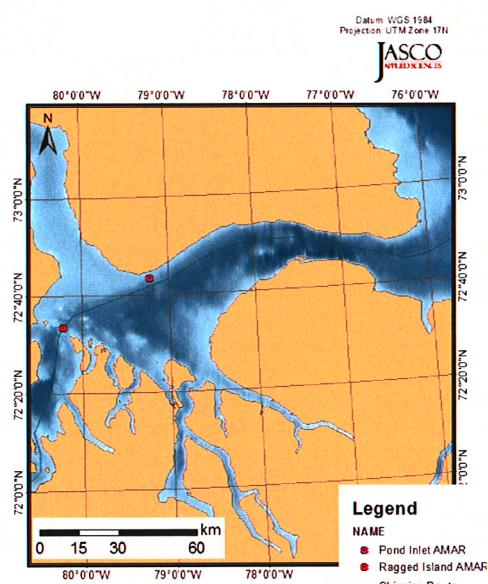


Shipping –

Behavioural Disturbance

▷ ΓΑΝΔΑΚ ΣΥΡΒΕΙΟΝ ΠΕΛΑΓΟΣ - ΣΥΓΧΡΟΝΗΣ
ΔΡΑΣΗΣ ΔΡΑΣΗΣ ΣΥΓΧΡΟΝΗΣ

- Multiple lines of evidence indicate narwhals will be disturbed by vessel-based sound
▷ ΔΡΑΣΗΣ ΔΡΑΣΗΣ ΣΥΓΧΡΟΝΗΣ ΔΡΑΣΗΣ ΔΡΑΣΗΣ ΣΥΓΧΡΟΝΗΣ
▷ ΔΡΑΣΗΣ ΔΡΑΣΗΣ ΣΥΓΧΡΟΝΗΣ ΔΡΑΣΗΣ ΔΡΑΣΗΣ ΣΥΓΧΡΟΝΗΣ
- Response is short-term and localised
γράμματα ΔΡΑΣΗΣ ΔΡΑΣΗΣ ΣΥΓΧΡΟΝΗΣ, ΣΥΓΧΡΟΝΗΣ ΔΡΑΣΗΣ ΔΡΑΣΗΣ

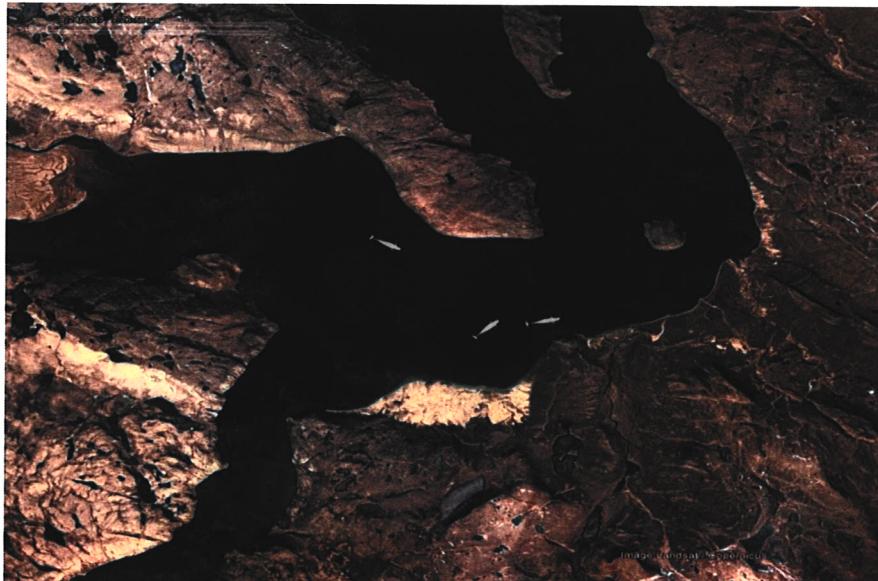


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Shipping – Behavioural Disturbance

▷ΓβCσb - Δc_bδr_b▷L_c < λ_aσ_aγ_c



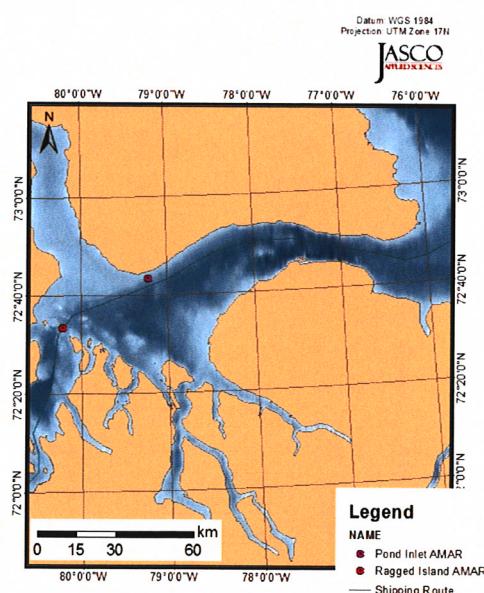
- Animation of tagged narwhal in relation to active shipping during open water season
- ḡbCσ_a
 σλ_aC_b▷L_c
 ▷Γβ_bC_a
 ▷ΓΔ_a▷L_c

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Shipping – Behavioural Disturbance

▷ΓΔ_a▷L_c - σ_aγ_c
Δc_bδr_bλ_aσ_a < λ_aΔσ_a

- Mitigation measures will reduce source levels (such as speed restrictions) and overlap (such as limiting # of transits in heavy ice)
- ▷ΓΔ_a▷L_c - σ_aγ_c
 < λ_aΔσ_a
 Δc_bδr_bλ_aσ_a < λ_aΔσ_a
- Residual effect characterised as not significant
- ▷ΓΔ_a▷L_c - σ_aγ_c



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Underwater Noise Assessment: Mary River Iron Mine | Created Feb 2019 by Melanie Austin | © Baffinland Iron Mines Corporation 2019. All rights reserved.



Shipping –

Temporary Acoustic Masking

▷ የበኩርና – ማለኩ በኩርና ተከራካሪውን አገልግሎት ይጠናል

የኩርናውን በኩርናውን ያገልግሎት

- Narwhal generally communicate at higher frequencies than vessel noise and may use natural anti-masking strategies
አነስተኛ የቃላት ድጋፍ የቃላት አገልግሎት የሚያደርግ ይችላል እና የቃላት ድጋፍ የሚያደርግ ይችላል
- Mitigation measures effectively reduce spatial and temporal overlap with vessel noise
አገልግሎት የቃላት ድጋፍ የሚያደርግ ይችላል እና የቃላት ድጋፍ የሚያደርግ ይችላል



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Shipping – No Ice Entrapment Caused By Shipping

▷ የበኩርና – ማለኩ በኩርና ተከራካሪውን አገልግሎት

የገዢ የተረጋገጠ ነገር

- Ice entrapment naturally occurring phenomenon, documented in Arctic for hundreds of years /
የሸፍት የሚያደርግ የሚመለከት የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ
የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ
የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ
የሚያደርግ የሚያደርግ የሚያደርግ
- Baffinland has committed to a post-season narwhal clearance survey and development of entrapment response framework with MHTO and DFO /
የሚያደርግ የሚያደርግ የሚያደርግ የሚያደርግ
የሚያደርግ የሚያደርግ የሚያደርግ
የሚያደርግ የሚያደርግ
የሚያደርግ የሚያደርግ



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Shipping – No Vessel Strikes

▷ ΓΙΕΝΔΕΝ ΔΥΡΦΗΣ ΚΑΘΕΙΓΡΩΣ - ▷ ΛΕΣΤΕΙ ΚΑΒΕΙΡΙΟΝΤΕΙΛ ΑΡΙΓΙΑ

- With mitigation, no strikes anticipated
▷ ΠΩΣ ΕΙΔΟΥΣ ΚΑΛΩΝ ΗΓΕΙΑΝ ΤΗΝ ΕΙΓΑΛΗΝ ΠΑΡΑΓΙΑΝ,
ΚΑΙ ΣΤΟΝ ΣΤΗΝ ΔΙΑΧΡΟΝΙΑΝ ΣΥΝΔΕΙΟΝΤΑΣ
- 13 knots considered speed threshold above which mortality is likely (based on literature)
13 knots - στην απόσταση της πλευράς της πλούτου περιοχής της Βόρειας Ατλαντικής φάλαινας της Λεωφόρου της Νότιας Λαζαρίδης
- 10 knot restrictions for endangered species based on DFO Annual Guidance to Mariners
10 knots - στην απόσταση της πλευράς της πλούτου περιοχής της Βόρειας Ατλαντικής φάλαινας της Λεωφόρου της Νότιας Λαζαρίδης
- 9 knot speed restriction in regional study area is more conservative, goes above and beyond existing precedent, and notably minimizes strike potential
9 knots - στην απόσταση της πλευράς της πλούτου περιοχής της Βόρειας Ατλαντικής φάλαινας της Λεωφόρου της Νότιας Λαζαρίδης
Λεγονται οι πλούτοι της Βόρειας Ατλαντικής φάλαινας της Λεωφόρου της Νότιας Λαζαρίδης
▷ ΣΤΗΝ ΑΠΟΣΤΑΣΗ ΤΗΣ ΠΛΕΥΡΑΣ ΤΗΣ ΠΛΟΥΤΟΥ ΤΗΣ ΒΟΡΕΙΑΣ ΑΤΛΑΝΤΙΚΗΣ ΦΑΛΑΙΝΑΣ ΤΗΣ ΛΕΩΦΟΡΟΥ ΤΗΣ ΝΟΤΙΑΣ ΛΑΖΑΡΙΔΗΣ
ΚΑΙ ΣΤΗΝ ΑΠΟΣΤΑΣΗ ΤΗΣ ΠΛΕΥΡΑΣ ΤΗΣ ΠΛΟΥΤΟΥ ΤΗΣ ΒΟΡΕΙΑΣ ΑΤΛΑΝΤΙΚΗΣ ΦΑΛΑΙΝΑΣ ΤΗΣ ΛΕΩΦΟΡΟΥ ΤΗΣ ΝΟΤΙΑΣ ΛΑΖΑΡΙΔΗΣ
- Compliance is diligently and transparently monitored – a notification system is in place that alerts Baffinland staff if a vessel exceeds the 9 knot speed limit for fast corrective action or investigation.
▷ ΟΙ ΚΟΙΝΟΙ ΕΠΙΧΕΙΡΗΣΕΙΣ ΤΗΣ ΛΕΩΦΟΡΟΥ ΤΗΣ ΝΟΤΙΑΣ ΛΑΖΑΡΙΔΗΣ ΔΙΑΤΗΡΟΥΝ ΤΗΝ ΕΠΙΦΕΡΟΥΣΑΝ ΤΗΝ ΑΠΟΣΤΑΣΗΝ ΤΗΣ ΠΛΕΥΡΑΣ ΤΗΣ ΠΛΟΥΤΟΥ ΤΗΣ ΒΟΡΕΙΑΣ ΑΤΛΑΝΤΙΚΗΣ ΦΑΛΑΙΝΑΣ ΤΗΣ ΛΕΩΦΟΡΟΥ ΤΗΣ ΝΟΤΙΑΣ ΛΑΖΑΡΙΔΗΣ 9 knots ▷ ΣΤΗΝ ΑΠΟΣΤΑΣΗ ΤΗΣ ΠΛΕΥΡΑΣ ΤΗΣ ΠΛΟΥΤΟΥ ΤΗΣ ΒΟΡΕΙΑΣ ΑΤΛΑΝΤΙΚΗΣ ΦΑΛΑΙΝΑΣ ΤΗΣ ΛΕΩΦΟΡΟΥ ΤΗΣ ΝΟΤΙΑΣ ΛΑΖΑΡΙΔΗΣ

Marine Monitoring
▷ ΜΕΤΡΙΚΕΣ ΕΠΙΧΕΙΡΗΣΕΙΣ

Objectives:

Measure the effects that the shipping is having on the marine environment

Assess the accuracy of predictions of effects

Determines if adaptive mitigation measures need to be developed



Aerial Survey
Monitor narwhal abundance and distribution (Eclipse Sound summer herd) and other marine mammal species in Project area

Bruce Head Shore-based Monitoring
Investigate narwhal response to shipping along the Northern Shipping Route by observing them from top of Bruce Head

Marine Environmental Effects and Aquatic Invasive Species/Habitat Offset
Ballast water and video monitoring of vessel hulls Water quality, sediment, metals Fish abundance and health Ongoing monitoring for the construction of ore and freight docks

Observer
Observe for potential ship strikes

Acoustic Monitoring
Confirm accuracy of noise modelling

Inuit Stewardship Plan

Marine Monitoring Cn>T>C< b>A>C>s>c

ʌ&v/>C>x:

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d>A>s>t>r<
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d>A>s>t>r<
c>A>s>t>r<



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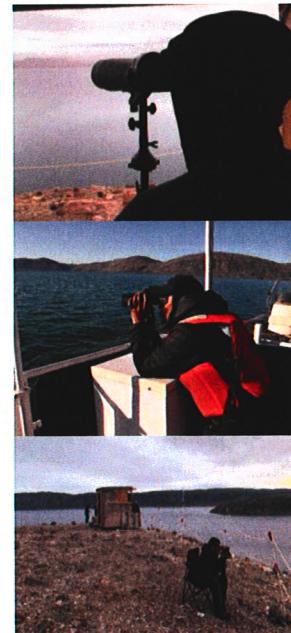
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Monitoring: Inuit Involvement e>c>U>n>A>b>s>: Δm>s> Δc>U>n>s>

- A total of 18 Inuit (some worked on multiple programs) in 2019 vs 14 non-Inuit personnel
b>C> 18->C Δm> (Δc>Y>A>D>C>Y>L>S>J>C>D>m>C>s>
d>A>s>t>r<) 2019->U>-J 14->C>y>L>C Δ>S>A>Y>N>Y>C>
- Lead Inuit Researchers identified on monitoring programs
r>C>U>C>Y>A>Y>C>Δm> Δ>A>Y>C>Δ>C>U>Y>A>b>s>
- Program-specific follow-up meetings in Pond Inlet with all Inuit researchers
λ>C>A>Y>C>Y>A>Y>C> b>U>L>S>C>Y>C>M>T>U>L>C>Y>Δ>L
b>U>L>Y>U>R>P>Y>C Δ>A>Y>C> Δ>A>Y>C>Y>U>Y>C





Monitoring: Inuit Involvement 监测：因纽特人参与

- Meetings with MHTO to discuss monitoring programs
与MHTO讨论监测项目
- Inuit monitors involved in data analysis and reporting
因纽特人监测员参与数据分析和报告
- Pond Inlet Shipping Monitors (Active Watch of Project Vessels)
Pond Inlet航运监测员（对项目船只的主动监视）

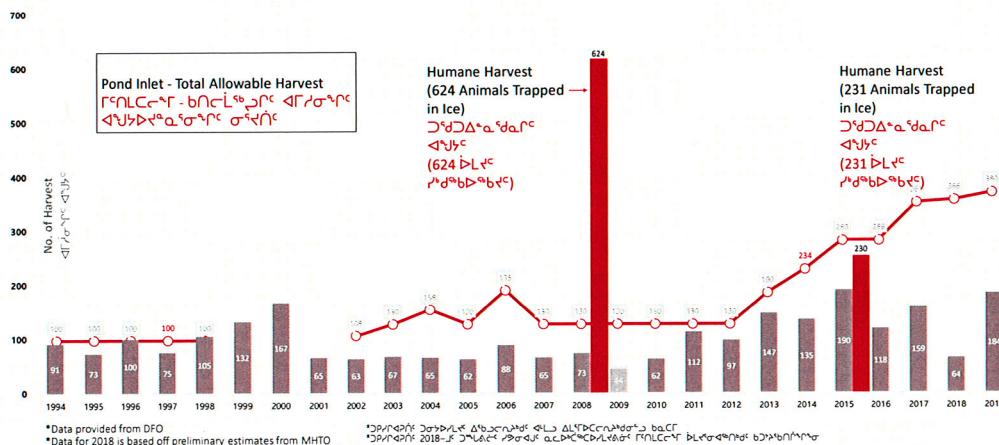


Marine Mammal Aerial Survey Program – Annual Comparisons
海洋哺乳动物航空调查计划 – 年度比较

	Year / 年份	Date / 日期	Abundance / 丰度	CV	95% CI	Source / 来源
Eclipse Sound C/PG	2004	August / 夏季	20,225	0.36	9,471 – 37,096	Richard et al. 2010 / 理查德等, 2010
Eclipse Sound C/PG	2013	18-19 August / 夏季	10,489	0.24	6,342 – 17,347	Doniol-Valcroze et al. 2015 / 唐尼奥-瓦克罗泽等, 2015
Eclipse Sound C/PG	2016	7-10 August / 夏季	12,039	0.23	7,768 – 18,660	Marcoux et al. 2019 / 马库斯等, 2019
Eclipse Sound C/PG	2016	15 August / 夏季	20,093	0.57	6,449 – 104,339	Golder 2018 (DFO data) / 戈尔德 2018 (加拿大渔业和海洋部数据) (△6月15日左右 ±15天 △9月15日左右 ±15天 ±15天)
Eclipse Sound C/PG	2016	21 August / 夏季	12,955	0.16	7,245 – 23,166	Golder 2018 (DFO data) / 戈尔德 2018 (加拿大渔业和海洋部数据) (△6月21日左右 ±15天 △9月21日左右 ±15天 ±15天)
Eclipse Sound C/PG	2019	22-21, 25-27 August / 夏季	9,931	0.05	9,009 – 10,946	Golder 2020 (Baffinland data) / 戈尔德 2020 (巴芬岛数据) (±15天)



Recorded Harvest Data σΛርናዕሪያዎች ደንብልጥር ሪፖርት



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Narwhal Early Warning Indicator Monitoring የሰራተኞች እኩልና ጠቅላላ ማረጋገጫ ቅጽ ፲፭

Requirement to Identify Marine Mammal EWIs in other Marin Development Projects in Canada

ለተጨማሪ የስራና የአገልግሎት መሆኑ ማረጋገጫ የሚፈጸም የሚከታተሉ ሁኔታ
በርጥታ

Requirement / ለተጨማሪ መሆኑ	Mary River / የስራና	Northern Gateway / የአገልግሎት መሆኑ	LNG Canada / LNG ዘርፍ	Trans-Mountain / የባርቴልት ስራው	Roberts Bank Terminal 2 / ልርድ የአገልግሎት መሆኑ	Agnico Eagle / ዲጂታል ዘርፍ Meliadine	Agnico Eagle / ዲጂታል ዘርፍ Amuraq Whale Tail
Early Warning Indicators የሰራተኞች እኩልና ጠቅላላ ማረጋገጫ	✓	X	X	X	X	X	X

Annual Proportion of Immature Narwhal Recorded during the Bruce Head-Shore-based Monitoring Program የሰራተኞች እኩልና ለዋሳኑ ጥሩ ቅጽ ፲፮

ለተጨማሪ መሆኑ

Year / ዓ.ም.	Proportion of Immature Narwhal / ለዋሳኑ ጥሩ ቅጽ ፲፯
2014	0.152
2015	0.163
2016	0.164
2017	0.163
2018	N/A / ቅጽ ፲፯ በታች
2019	0.156

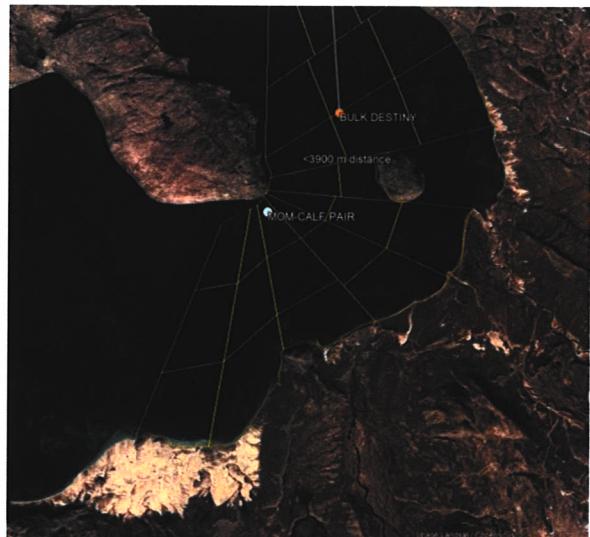
¹ Pilot vessel-based monitoring program replaced the Bruce Head shore-based monitoring program in 2018. The pilot program was not successful in yielding a comparable dataset for inclusion in this analysis.

2018-ዚና, የሰራተኞች እኩልና ጠቅላላ ማረጋገጫ የሚፈጸም የሚከታተሉ ሁኔታ
በርጥታ ስራው. የሰራተኞች እኩልና ጠቅላላ ማረጋገጫ የሚፈጸም የሚከታተሉ ሁኔታ
በርጥታ ስራው. የሰራተኞች እኩልና ጠቅላላ ማረጋገጫ የሚፈጸም የሚከታተሉ ሁኔታ
በርጥታ ስራው. የሰራተኞች እኩልና ጠቅላላ ማረጋገጫ የሚፈጸም የሚከታተሉ ሁኔታ
በርጥታ ስራው.



Narwhal Monitoring – Behavioural Response ബൾക്ക് ഡാക്ടർസ് - ഡ്രോൺ സെറ്റ് ഡ്രോൺ സെറ്റ് ലൈറ്റ്

- Drone footage of narwhal nursing and resting while vessel is transiting southbound
ബൾക്ക് ഡാക്ടർസ് അനുഭവം
ബൾക്ക് ഡാക്ടർസ് അനുഭവം
ബൾക്ക് ഡാക്ടർസ് അനുഭവം
ബൾക്ക് ഡാക്ടർസ് അനുഭവം



Narwhal Monitoring – Behavioural Response ബൾക്ക് ഡാക്ടർസ് - ഡ്രോൺ സെറ്റ് ഡ്രോൺ സെറ്റ് ലൈറ്റ്

[video]

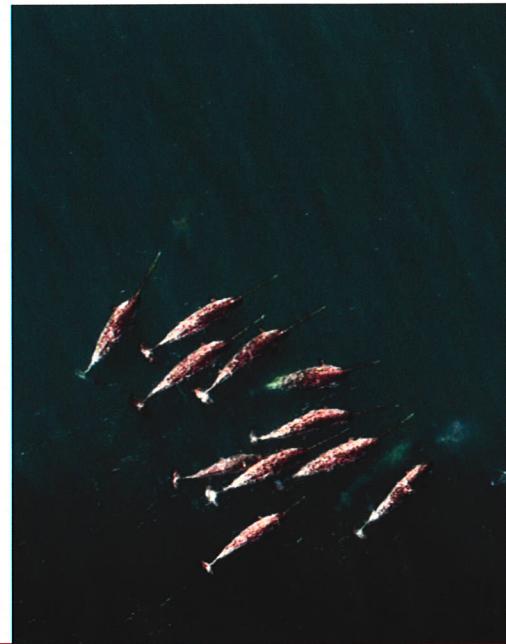
- Drone footage of narwhal nursing and resting while vessel is transiting southbound
ബൾക്ക് ഡാക്ടർസ് അനുഭവം
ബൾക്ക് ഡാക്ടർസ് അനുഭവം
ബൾക്ക് ഡാക്ടർസ് അനുഭവം
ബൾക്ക് ഡാക്ടർസ് അനുഭവം



Shipping - Summary

▷ɻb⁹C⁹σ⁹ - ɻΔɻ⁹yLσ⁹r⁹

- Assessment is conservative
ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹
- Narwhal continue to use regional study area in numbers consistent with past years in light of increased shipping activities
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹
▷ɻb⁹C⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹



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Shipping - Summary

▷ɻb⁹C⁹σ⁹ - ɻΔɻ⁹yLσ⁹r⁹

- Narwhal response to vessel-based underwater noise:
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹:
 - Is localised and temporary, across regional study area & for duration of shipping season
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹,
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹ & ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹
▷ɻb⁹C⁹ɻG⁹r⁹
 - Unlikely to compromise the integrity of the Baffin Bay Population or Eclipse Sound stock
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹
᜵᜶᜸᜸ ᖃ▷ɻb⁹C⁹CD⁹ɻG⁹r⁹ ɻΔɻ⁹yLσ⁹r⁹



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Shipping - Summary

▷ ᐃብ ሚርና - ዘመኑ የሚገኘው

- Mitigation is effective:
▷ በኩል አይደለም ጥሩ ስራውን አይችሉም
አብሔር ማስረጃዎች ማስፈጸም
• Managing transits in heavy ice;
◁ የሚገኘው ማስረጃዎች ማስፈጸም ማስፈጸም
• Vessel speed restrictions;
▷ የሚገኘው ማስረጃዎች ማስፈጸም
• 40 km buffer zone from Nunavut Settlement Area; and,
40 km ማስረጃዎች ማስፈጸም ማስፈጸም
የሚከተሉት ማስረጃዎች
• “No-go” zones in key calving areas
▷ የሚገኘው ማስረጃዎች ማስፈጸም
“የሚከተሉት ማስረጃዎች ማስፈጸም ማስፈጸም ማስፈጸም”



Shipping - Summary

▷ ፕሮፋሽን ሚርና - ዘመኑ የሚገኘው

- Follow-up monitoring, with community, to confirm assessment predictions
“የሚከተሉት ማስረጃዎች ማስፈጸም ማስፈጸም ማስፈጸም ማስፈጸም”,
የሚከተሉት ማስረጃዎች ማስፈጸም
• Marine Environmental Working Group, community members and regulators engaged on monitoring findings & adaptive measures
አልማት ማስረጃዎች ማስፈጸም ማስፈጸም ማስፈጸም
የሚከተሉት ማስረጃዎች ማስፈጸም ማስፈጸም
የሚከተሉት ማስረጃዎች ማስፈጸም ማስፈጸም
የሚከተሉት ማስረጃዎች ማስፈጸም





Outstanding and Under Review – Marine Environment

බලුව්දෙනාදේ රු පැහැදිලි ආර්ථික ප්‍රභාවයේ අංශය – අංශ පරිගණක

Comment Topic / මෙම නොවා ඇතුළු

Ballast Water / අංශ ප්‍රභාවයේ අංශ

Marine Environment / අංශ පරිගණක

Shipping / ආර්ථික ප්‍රභාවයේ අංශ

Related ID's / මෙම නොවා ඇතුළු අංශ

QIA-44, MHTO-5e

QIA-43, PCA-02, MHTO-5d

PCA-04c, PCA-04b, PCA-04a, MHTO-5b, MHTO-5a,
MHTO-4c, MHTO-4b, MHTO-4a, DFO 3.4.4 NEW



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Marine Environment Key Commitments සුදුන්ත පෙනෙනු ලැබු අංශ ප්‍රභාවයේ අංශ

- Transit Restrictions During Heavier Ice Conditions
දැඩ්දා අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ
- Establishment of Restricted Shipping Areas
දැඩ්දා අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ
- Strict Speed Restrictions
දැඩ්දා අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ
- Dust Suppressant and Mitigations at Milne Port and Stockpile
දැඩ්දා අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ
- End-of-season Narwhal Entrapment Aerial Surveys
දැඩ්දා අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ ප්‍රභාවයේ අංශ



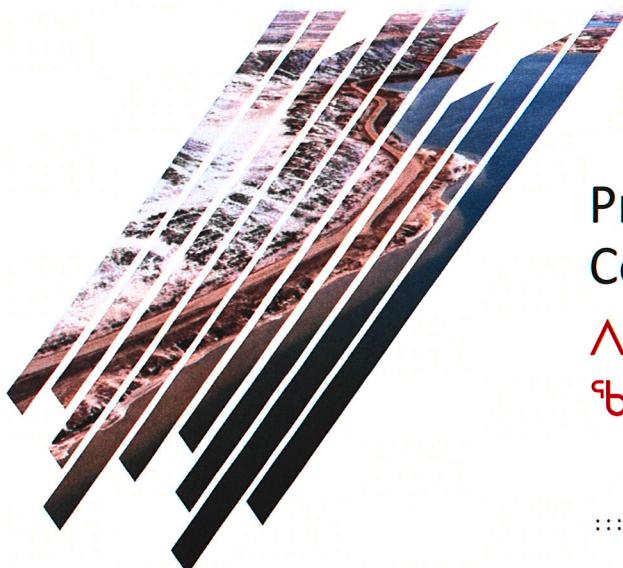
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Marine Environment Key Commitments ᓇᓱᐊ᳚ ᐊ᳚ᐅᓂ᳚ ላ᳚᳚᳚ ᒪ᳚᳚᳚

- Risk-Based Approach for Ballast Water Management and Monitoring
▷ ᓇ᳚ ᐅ᳚ ᐃ᳚ ᐃ᳚
- Monitoring for Early-Warning Indicator
▷ ᓇ᳚ ᐅ᳚ ᐃ᳚ ᐃ᳚
- Ringed Seal Monitoring
▷ ᓇ᳚ ᐅ᳚ ᐃ᳚ ᐃ᳚
- Avoidance of North Water Polynya
▷ ᓇ᳚ ᐅ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚
- Development of Inuit Stewardship Plan
▷ ᓇ᳚ ᐅ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚
- QIA approval of Adaptive Management
▷ ᓇ᳚ ᐅ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚ ᐃ᳚



Project Certificate Conditions

ᓇ᳚᳚ ላ᳚᳚ ላ᳚᳚
᳚᳚᳚ የ᳚᳚᳚ የ᳚᳚᳚

:::::::



Assessment Summary

ᓇᐅᑉ የጀመንት
ᓇጀመንት

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Assessment Conclusions

ᓇᐅᑉ የጀመንት ስጀመንት

- Phase 2 assessment on marine environment is robust, includes:
ᑭጀመንት ለጀመንት ማጀመንት እንደጀመንት ስጀመንት ስጀመንት
• Inuit knowledge & Science
Δጀጀ< የጀመንት &
የጀመንት ስጀመንት
• Conservatism
ጀጀ< የጀመንት
• Knowledge gained from current operations
ጀጀ< የጀመንት ስጀመንት
- Evidence from other Arctic operations
show shipping & marine mammals
successfully co-exist
ጀጀ< የጀመንት
ጀጀ< የጀመንት
ጀጀ< የጀመንት
ጀጀ< የጀመንት
• With mitigation, no significant residual effects to Marine Environment or Marine Mammals
ጀጀ< የጀመንት
• Comprehensive Phase 2 assessment with notable input from Inuit/communities
ጀጀ< የጀመንት
ጀጀ< የጀመንት
ጀጀ< የጀመንት
ጀጀ< የጀመንት



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Thank you
‘dl̄aqt̄’



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