



# Terrestrial Environment

Phase 2 Proposal

Final Hearing    Iqaluit and Pond Inlet    November 2019

# Presentation Overview

- Description of Assessment
- Mitigation and Monitoring
- Technical Review Summary
- Project Certificate Conditions
- Conclusions



# Description of Assessment

# Technical Supporting Document

Mary River Project | Phase 2 Proposal | FEIS Addendum | August 2018

## TSD 09 Vegetation Baseline and Impact Assessment



### Vegetation

- Abundance and Diversity
- Health
- Culturally Valued Vegetation

## TSD 10 Terrestrial Wildlife Baseline and Impact Assessment



### Wildlife

- Caribou
- Wolf

## TSD 12 Migratory Birds Baseline and Impact Assessment



### Birds

- Seabirds and Waterbirds (7)
- Species at Risk (5)
- Peregrine Falcon
- Lapland Longspur

## Select Examples — Additional Assessment Information

- Rail alignment summary report
- Noise Modelling for Train Passes
- Railway Embankment “Sensitivity” Analysis for Caribou Crossing Potential
- Risk Assessment Workshops
- Borrow Source Investigation Factual Data Report
- Consideration of Fine Materials and Soils in Railway Embankment Construction



# Study and Assessment Areas

- Potential Development Area
- Regional Study Area
- North Baffin Island Caribou Range
- Informed by Inuit Knowledge





# Learning and Knowledge

## Information at broad and site-specific scales

- Inuit Knowledge
- Historical regional surveys
- Baffinland study area surveys
- Project-based surveys

## Fourteen (14) years near-continuous monitoring

- Including six (6) years operational monitoring

## Collaboration

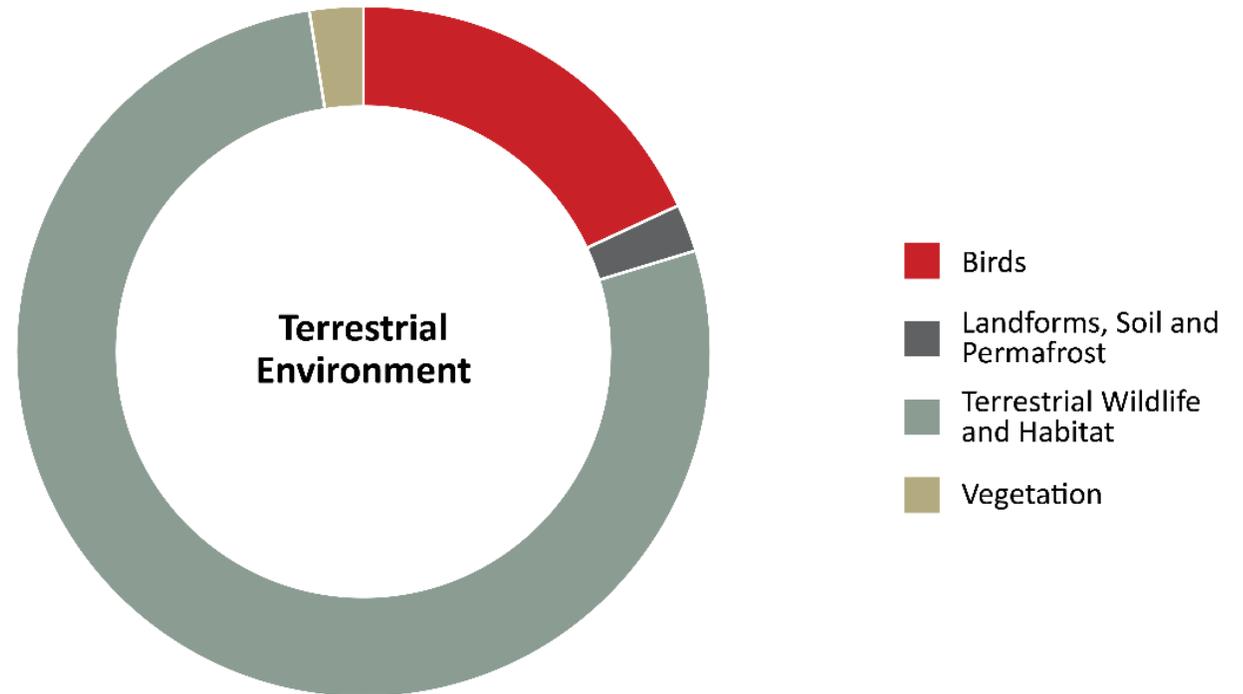
## Inuit Knowledge and Inuit Participation

Knowledgebase		Years														
		'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19
Vegetation	Traditional Knowledge			✓												
	Ecosystem Classification	✓	✓	✓	✓											
	Rare and Diversity	✓	✓	✓	✓						✓		✓	✓	✓	✓
	Soil and Plant Metals				✓				✓	✓	✓		✓	✓		✓
Wildlife	Traditional Knowledge			✓	✓							✓				✓
	Caribou-related surveys		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Wolf den surveys			✓	✓	✓	✓				✓					
	Helicopter flight heights											✓	✓	✓	✓	✓
	Snowbanks and tracks											✓	✓	✓	✓	✓
Birds	Shorebird and Songbird								✓	✓	✓				✓	✓
	Waterfowl								✓	✓	✓	✓				
	Active Nesting Birds									✓	✓	✓	✓	✓	✓	✓
	Cliff-nesting Raptors		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Collaboration	GN Caribou collars				✓	✓	✓	✓								
	CWS Seabirds and Shorebirds								✓	✓	✓	✓	✓	✓	✓	✓
	Arctic Raptors							✓	✓	✓	✓	✓	✓	✓	✓	✓

## Community Feedback

A total of 44 comments or questions related to the Terrestrial Environment.

- 1 related to Vegetation
- 8 related to Birds and Bird Habitat
- 34 related to Wildlife and Wildlife Habitat
- 1 related to Landforms, Soil, and Permafrost



# Inuit Knowledge



Traditional Knowledge Plants 2007



'Kajjuqtiklut' Arctic Bay Working Group 2008



Pond Inlet Caribou Focus Group 2008



Phase 2 Caribou Workshop 2015



Railway Workshop 2019

# Addressing Uncertainty

Collected data

Engage with Inuit knowledge holders

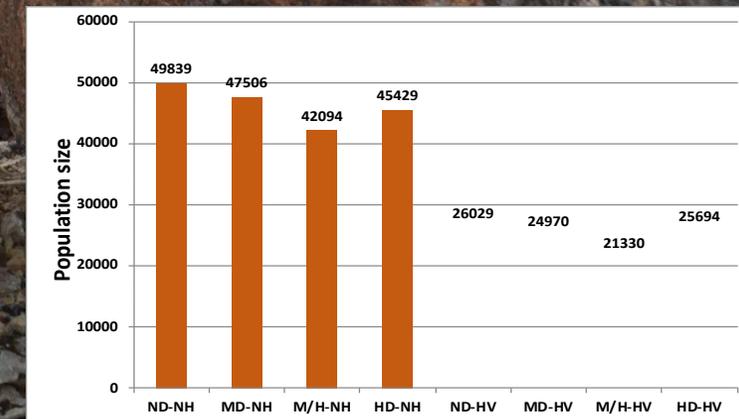
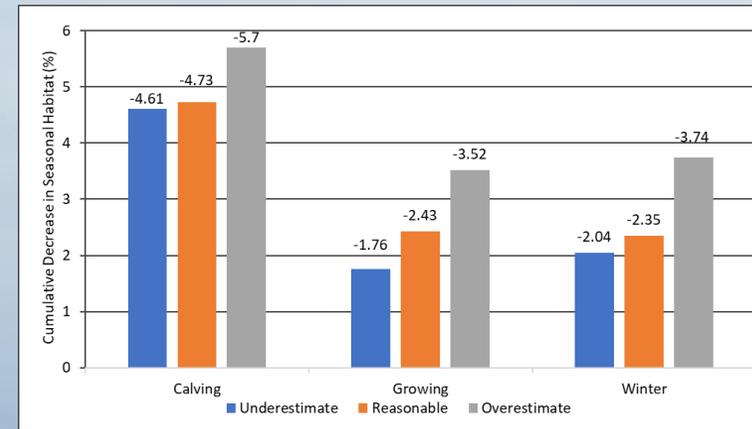
Multiple iterations of potential habitat impact models

- Sensitivity analysis — underestimate, reasonable, overestimate
- Growing, winter and calving habitat impact predictions (9 potential outcomes)
- Caribou population scenarios (8 potential outcomes)

Monitoring

Oversight

Lessons learned





# Mitigation and Monitoring

# Project Mitigation

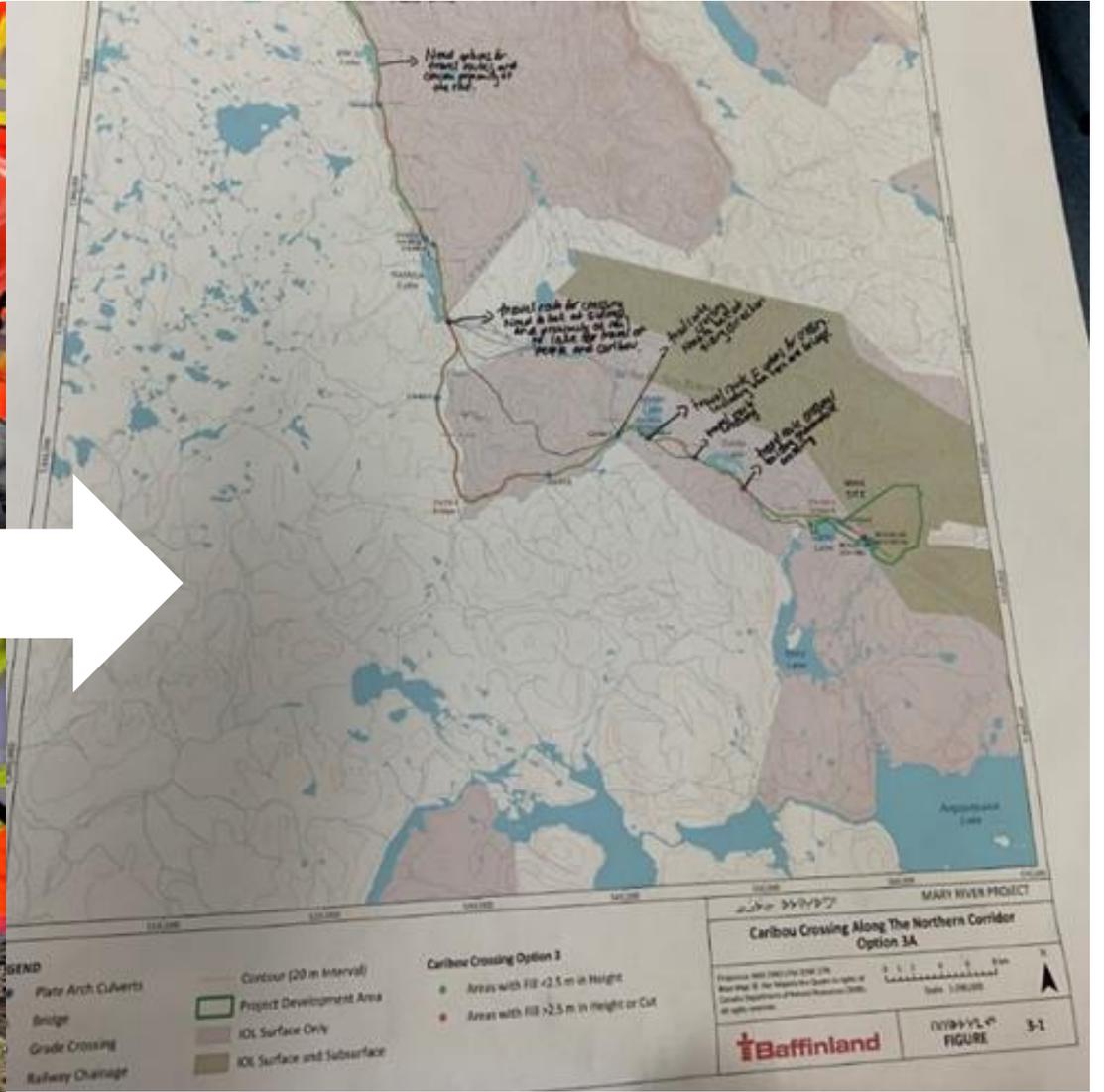
## Mitigation in Design

- Habitat: Minimize footprint
- Movement: Trains, embankment engineering and crossings

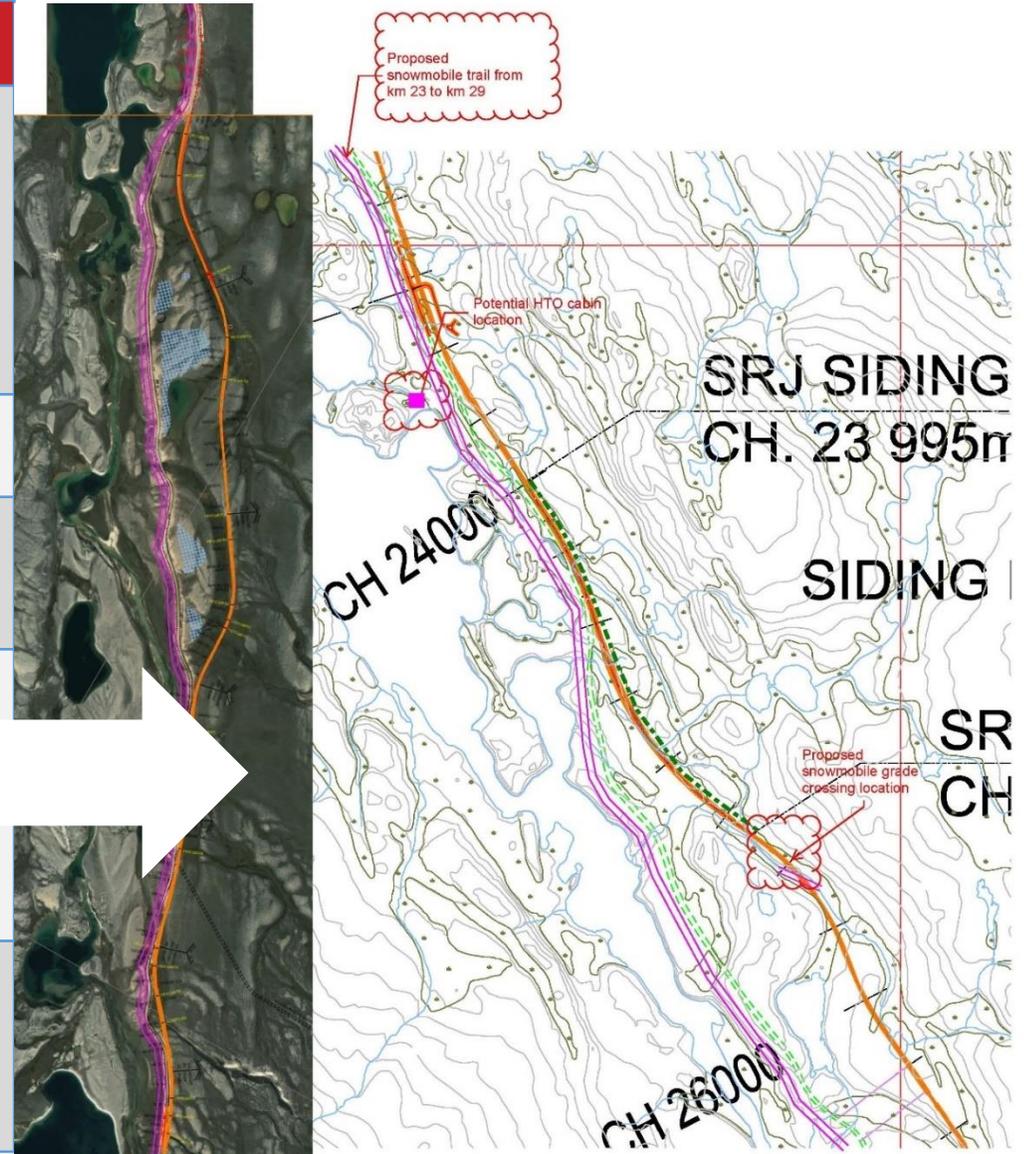
## Mitigation in Operation

- Habitat: Minimize footprint, reclaim unused areas, dust control measures
- Movement: Wildlife has right-of-way, let the leaders pass, snow management
- Mortality: Non-Inuit no hunting, speed limits, protecting nests, employee awareness training
- Health: Air and noise management



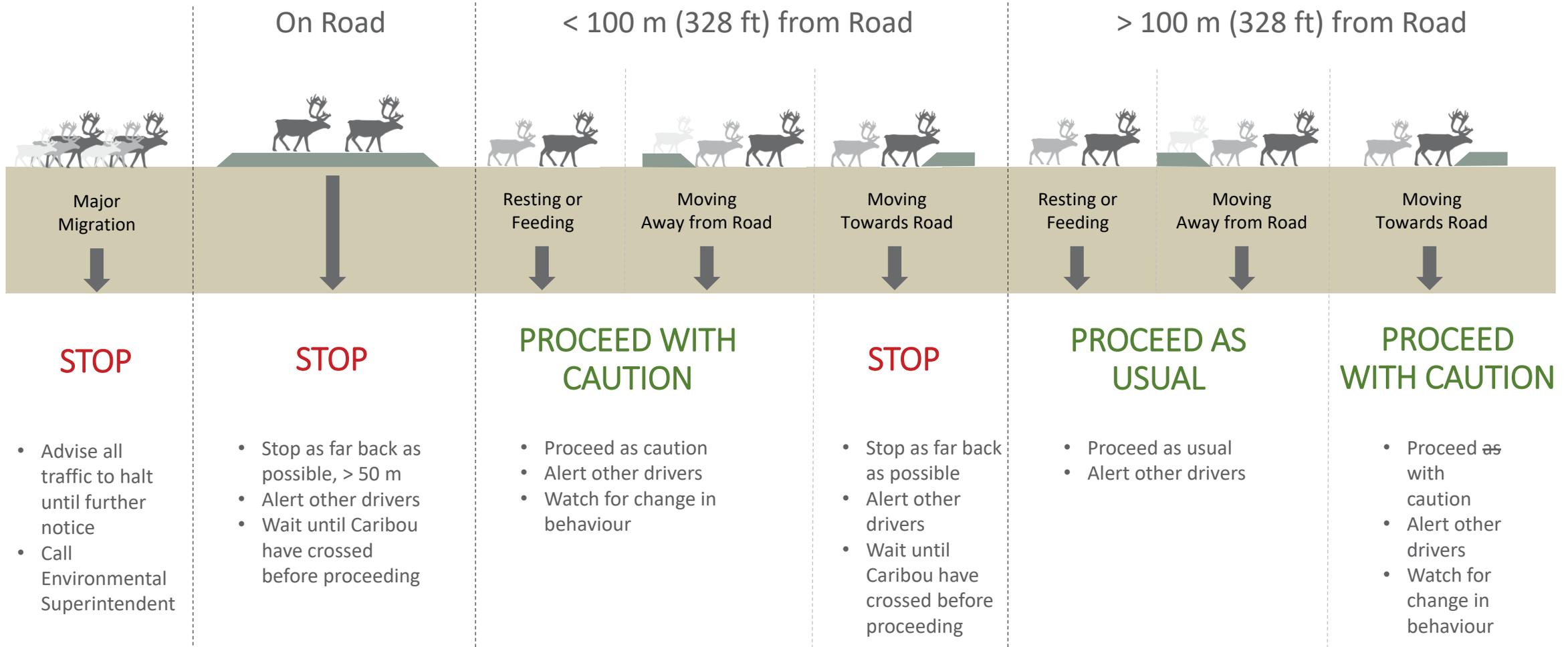


Rail Km	Point of Interest Note	Baffinland Mitigation Notes
Km 32	Identified caribou movement and human crossing.	Consider what can be proposed. There are two culvert underpasses at Km 34 and Km 34.5. Provide a snow mobile trail between Km 29–33. Propose a culvert underpass at Km 29.5
Km 29	MHTO requested a snow machine crossing.	Underpass proposed at Km 29.5
Km 26.5	MHTO recommends a snow machine crossing.	Build a snow machine crossing. Propose a snow mobile trail between Km 23 and Km 29
Km 25 – Km 24.8	MHTO requests a snow machine crossing — in the winter, snowbanks are too high here. Two underpasses would be required in this area.	Another corridor for movement and consider options for travel route. Propose an HTO cabin in this area
Km 12	Snow machine travel around the falls on Phillips Creek.	Baffinland consider alternatives to ensure safe travel, propose the provision of a snow mobile trail between Km 11.5 and 12.5

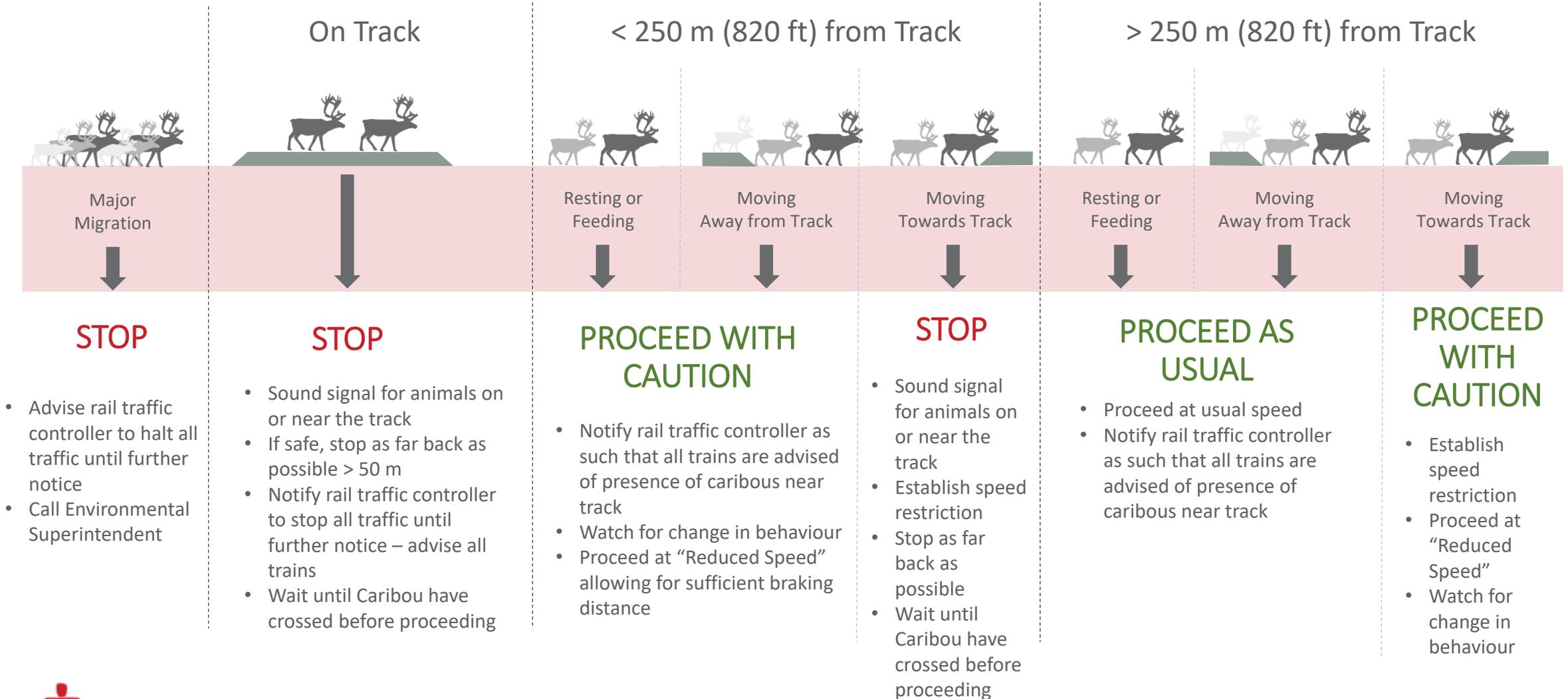




# Caribou Decision Framework — Road



# Caribou Decision Framework — Rail



- Advise rail traffic controller to halt all traffic until further notice
- Call Environmental Superintendent

- Sound signal for animals on or near the track
- If safe, stop as far back as possible > 50 m
- Notify rail traffic controller to stop all traffic until further notice – advise all trains
- Wait until Caribou have crossed before proceeding

- Notify rail traffic controller as such that all trains are advised of presence of caribous near track
- Watch for change in behaviour
- Proceed at “Reduced Speed” allowing for sufficient braking distance

- Sound signal for animals on or near the track
- Establish speed restriction
- Stop as far back as possible
- Wait until Caribou have crossed before proceeding

- Proceed at usual speed
- Notify rail traffic controller as such that all trains are advised of presence of caribous near track

- Establish speed restriction
- Proceed at “Reduced Speed”
- Watch for change in behaviour

# Project Mitigation

## Design

- 1:2 slopes  $\geq 2$  m (6.6 ft)  $\leq 4$  m (12.1 ft)
- Type 8 (< 6 in) embankment material
- Level crossings (humans and wildlife)
- Plate arch culverts (humans and wildlife)
- ~66% of rail passable by caribou without further mitigation
- Reduced disturbance compared to truck traffic

## Operation

- Constant vigilance for animals and people
- Slow speeds and reasonable stopping distances
- Wildlife monitors present
- Hi-rail car used for monitoring
- Let the leaders pass
- Modify embankment as necessary



# Monitoring and Follow-up Programs

## Terrestrial Environment Mitigation and Monitoring Plan

(TSD 28, Appendix U)

### Vegetation

- Dust fall
- Metal uptake
- Abundance and diversity

### Birds

- Active migratory bird nest survey
- Contribution to regional bird monitoring
- Cliff-nesting raptor research

### Caribou

- Project-specific monitoring (height of land, snow tracks, constant vigilance, harvester observation)
- Crossing structure monitoring
- Contribution to regional caribou monitoring

### Terrestrial Environment Working Group

### Culture, Resource and Land Use Monitoring



# Inuit Involved In Monitoring





# Phase 2 Terrestrial Impacts

The Phase 2 Project will have impacts that are not significant

Rail alignment deviation selection does not change outcome of assessment

## Vegetation

- Cumulative loss
- Forage (lichen) impacts
- Reclamation potential

## Wildlife

- Cumulative habitat impacts
- Caribou movement can be mitigated
- Population will increase over time

## Birds

- Cumulative habitat impacts



# Key Issues Summary

- Railway as a potential barrier to human and caribou movement
- Railway alignment alternatives
- Cumulative impacts on caribou habitat
- Inuit knowledge incorporated in determining impact significance
- Regional monitoring efforts by Baffinland



# Incorporating Lessons Learned

- Inuit participation and knowledge
- Dust
- Plants
- Birds
- Caribou
- Collaboration
- Lessons from other projects



# Terrestrial Environment Oversight

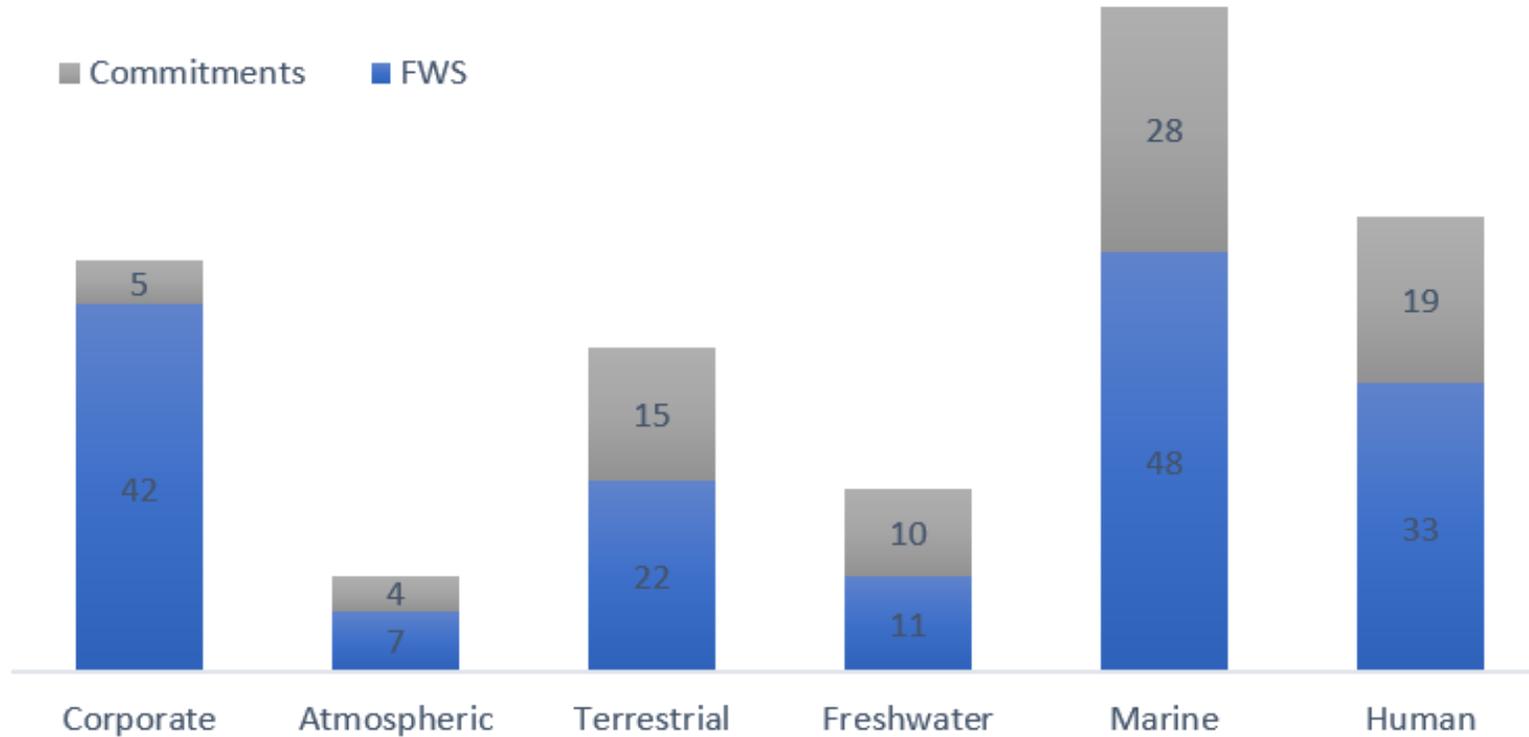
<b>Annual Monitoring Reports</b>	Feedback from Terrestrial Environment Working Group and Mittimatalik Hunters and Trappers Organization incorporated into program design and reports for the following year
<b>NIRB Annual Reports</b>	Summarizes annual operational activities, monitoring programs, trends, and compliance with regulatory permits
<b>Topic Specific Meetings</b>	Face-to-face meetings with Mittimatalik Hunters and Trappers Organization, Hamlets, and Qikiqtani Inuit Association representatives — discuss specific issues and concerns
<b>Project Update Meetings</b>	Annual meetings with Inuit and Qikiqtani Inuit Association representatives to update on ongoing operations or proposed Project changes
<b>Site Visits</b>	Mittimatalik Hunters and Trappers Organization and Hamlet site visits to see and discuss live operations
<b>Inspections and Audits</b>	Regulatory audits or inspections to ensure compliance with existing permits and approvals
<b>Inuit Participation</b>	Inuit Advisory Panel, community engagement and on the ground participation
<b>Adaptive Management</b>	Terrestrial Environment Working Group — submits technical comments/responses, face-to-face meetings to discuss proposed revisions or additions to existing mitigation measures



# Technical Review Summary

# Final Written Submissions

## Final Written Submissions and Commitments



## Select Examples – Commitments

- Regional caribou monitoring and railway design changes
- Study of snowbank heights and snow depth at representative locations along the North Railway
- Develop a mutually agreed upon caribou research agreement
- Modifications to North Railway Crossings
- Support a Harvester's Survey



# Project Certificate Conditions

# Project Certificate Conditions

- Existing 39 Terms and Conditions and 27 Commitments direct monitoring and mitigation
- Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) updated regularly based on “lessons learned”
- Existing monitoring and mitigation adequate to cover potential impacts of Approved Project and Phase 2 Proposal
- No new conditions required



Conclusion

# Conclusion

- The terrestrial environment, outside of the Project Development Area, is adequately protected from Project disturbance
- Community input to the Project Proposal has made improvements to the protection plans
- The Mittimatalik Hunters and Trappers Organization, the Qikiqtani Inuit Association and regulators continue to monitor the effectiveness of Baffinland's Terrestrial Environment Mitigation and Monitoring Plan



