

# Dominion Diamond Corporation

Developer's Assessment  
Report – Technical  
Sessions, April 2015

Caribou



# Overview

- Review of DAR assessment approach and conclusions
- Common topics from Adequacy Review and Information Requests:
  - Sable Addendum and Diavik A21 Pit
  - Need for modelling of population trends in the Bathurst herd
  - Significance of development given the current decline of the Bathurst herd
  - Identification of ecological thresholds
  - Detailed information on traffic patterns and road, pipeline, and powerline designs
  - Wildlife Effects Monitoring Program and Wildlife and Wildlife Habitat Protection Plan



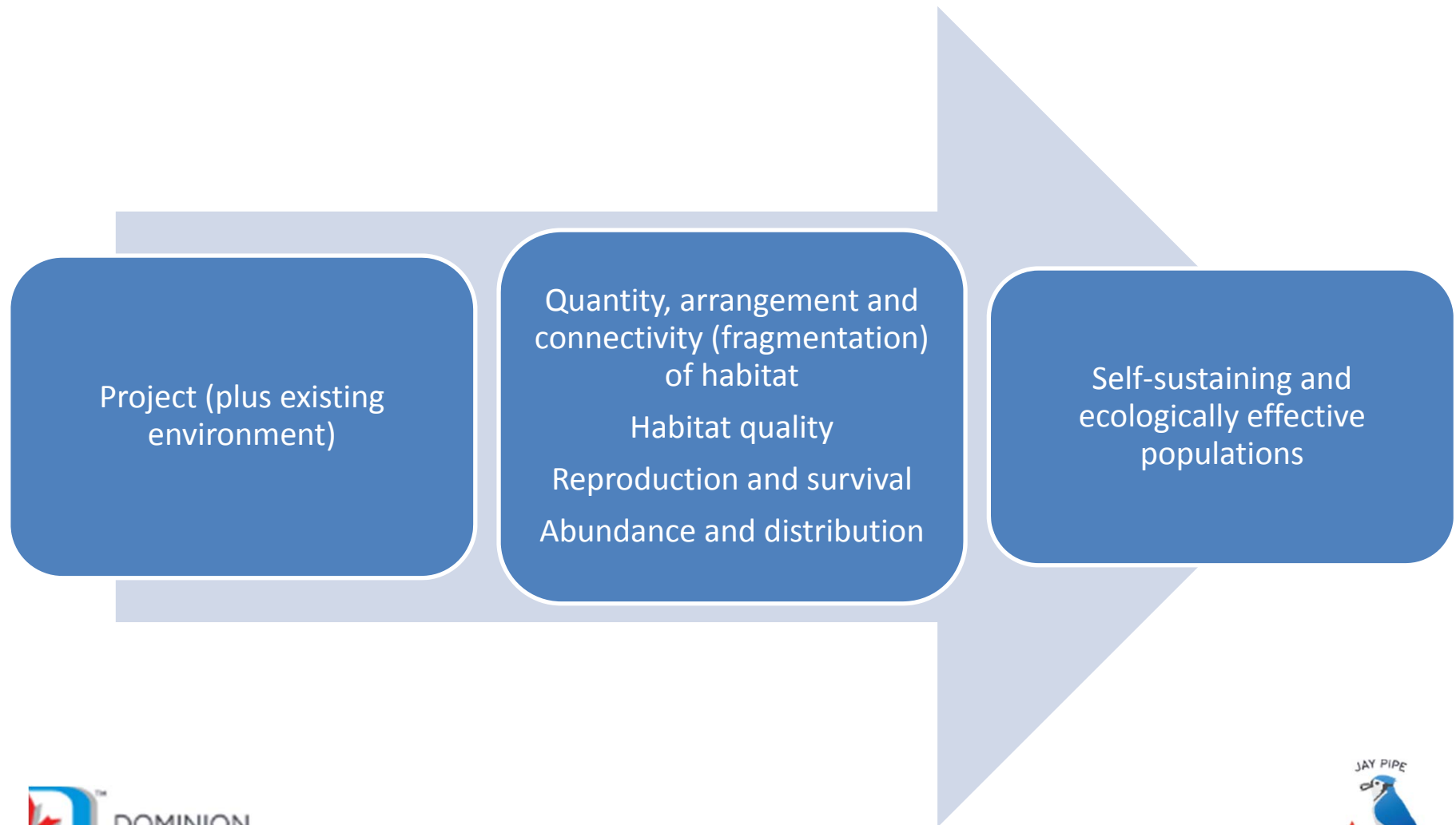
# Assessment Approach

## Assessment Endpoints and Measurement Indicators

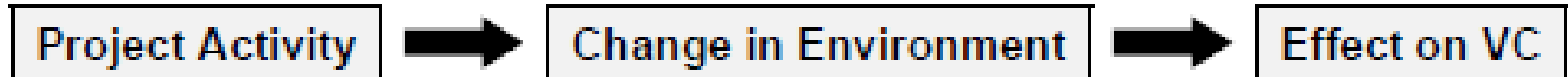
Valued Component	Assessment Endpoint	Measurement Indicator
Barren-ground Caribou	<ul style="list-style-type: none"><li>self-sustaining and ecologically effective populations</li></ul>	<ul style="list-style-type: none"><li>habitat quantity</li><li>habitat arrangement and connectivity (fragmentation)</li><li>habitat quality (occupancy, movement and behaviour)</li><li>survival and reproduction</li><li>abundance and distribution</li></ul>

# Assessment Approach

## Conceptual Approach to the Assessment



## Assessment Methods



- 17 potential pathways were assessed to examine the linkages between Jay Project components and the effects on barren-ground caribou and 14 were classified as either no linkage or secondary pathways
- 3 primary pathways were identified:
  - Direct loss and fragmentation of habitat from the Project footprint causes changes in caribou abundance and distribution.
  - Sensory disturbance (lights, smells, noise, dust, viewscape) and barriers to movement causes changes to caribou distribution and behaviour, and changes to energetics and reproduction.
  - Increased traffic on the Misery Road and Jay Road and the above-ground power line along these roads may create barriers to caribou movement, change migration routes, and reduce population connectivity.

# Determination of Significance

DAR used conservative assumptions to predict maximum effects

Measurement Indicator	Significance to Assessment Endpoint
<ul style="list-style-type: none"><li>• habitat quantity</li><li>• habitat arrangement and connectivity (fragmentation)</li><li>• habitat quality (occupancy, movement and behaviour)</li><li>• survival and reproduction</li><li>• abundance and distribution</li></ul>	Not significant

- Considered the ability of caribou to absorb and adapt to cumulative effects given life history traits, and calculated and predicted changes in:
  - existing and future amount of available habitat
  - existing and future landscape connectivity
  - factors limiting calf production
  - key mortality agents
  - current and future population abundance and distribution



## Key Line of Inquiry: Barren-Ground Caribou – DAR Updates

Updated results since DAR October 2014 submission

### **Inclusion of Sable pit and road, and Diavik's A21 pit in RFD Case**

- Largest cumulative changes from reference condition to the RFD: rock association habitat reduced by between 5% and 16%
- Eskers habitat decreased by 0.9% to 1.6%
- Decrease in preferred habitat quality of 1.9% to 17.4% per seasonal range (with 2014 fires)

### **Concern expressed regarding the effects of pipelines on caribou movement (DAR-GNWT-IR-71, DAR-KIA-IR-18, DAR-KIA-IR-32)**

- Descriptions of caribou crossings provided (flatter slope and finer crushed rock)
- The main section of the Jay Road will be constructed with frequent and wide caribou crossings

## Key Line of Inquiry: Barren-Ground Caribou – DAR Updates

Updated results since DAR October 2014 submission

### **Additional analyses in response to MVEIRB Adequacy Review Requests:**

- Assessment of seasonal range shifts through time (DAR-MVEIRB-9)
- Addition of 2014 fires to winter range effects assessments (DAR-MVEIRB-14)
- Bathurst Herd population modelling (DAR-MVEIRB-15)

### **Results**

- Post-calving ranges and autumn ranges became smaller from 1996 to 2013
- Centre of autumn range has moved north through time and autumn migration occurs later
- Temporal trends in weather not supported by data
- Incremental loss of 11.5% of preferred winter habitat from 2014 fires
- Additional energetic costs of movement are not expected to decrease population resilience and increase risk to the Bathurst herd at any phase of the population cycle.

Does not change the residual impact classification and determination of no significant effects in the DAR.



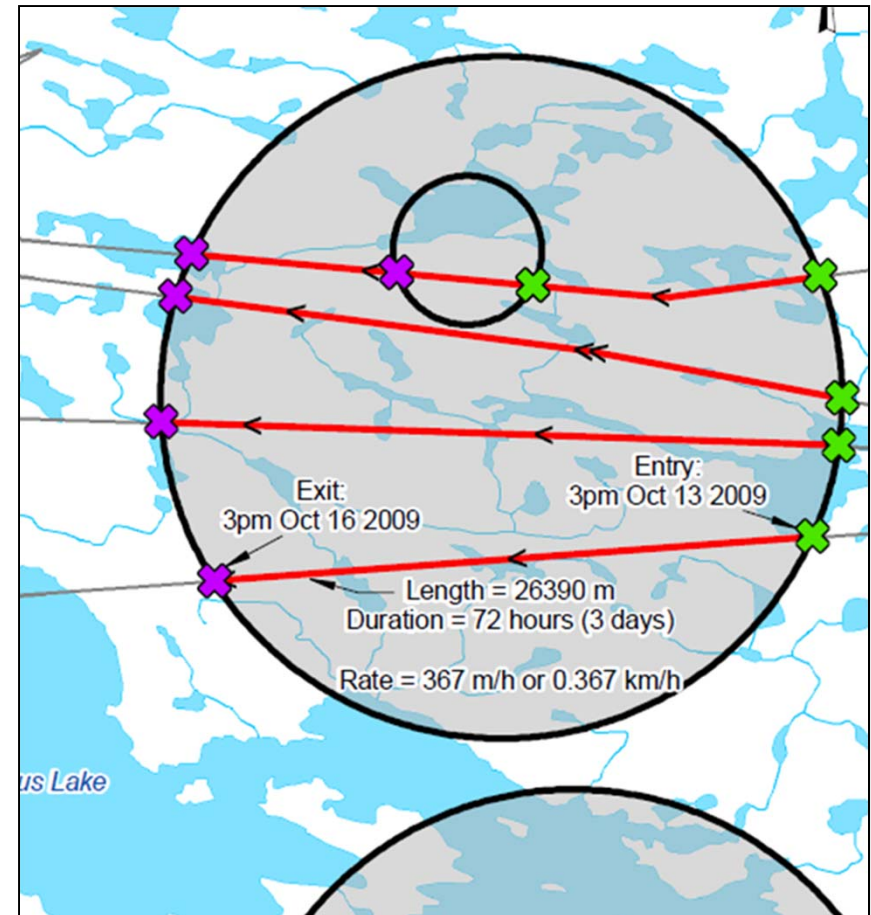


# Conservative Approach to Energetic Costs Modelling

Zone of Influence Residency and Encounters  
(1996 to 2014 collar data)

Development Case	DAR Maximum Predicted Effect	Mean Annual Encounters (95% CI)
Base	19	11 (8–13)
Application	21	14 (12–17)
RFD (Sable)	34	20 (17–23)

- Higher number of encounters (34) applied than historic data suggest will occur
- Body mass loss from encounters = 1.08 kg

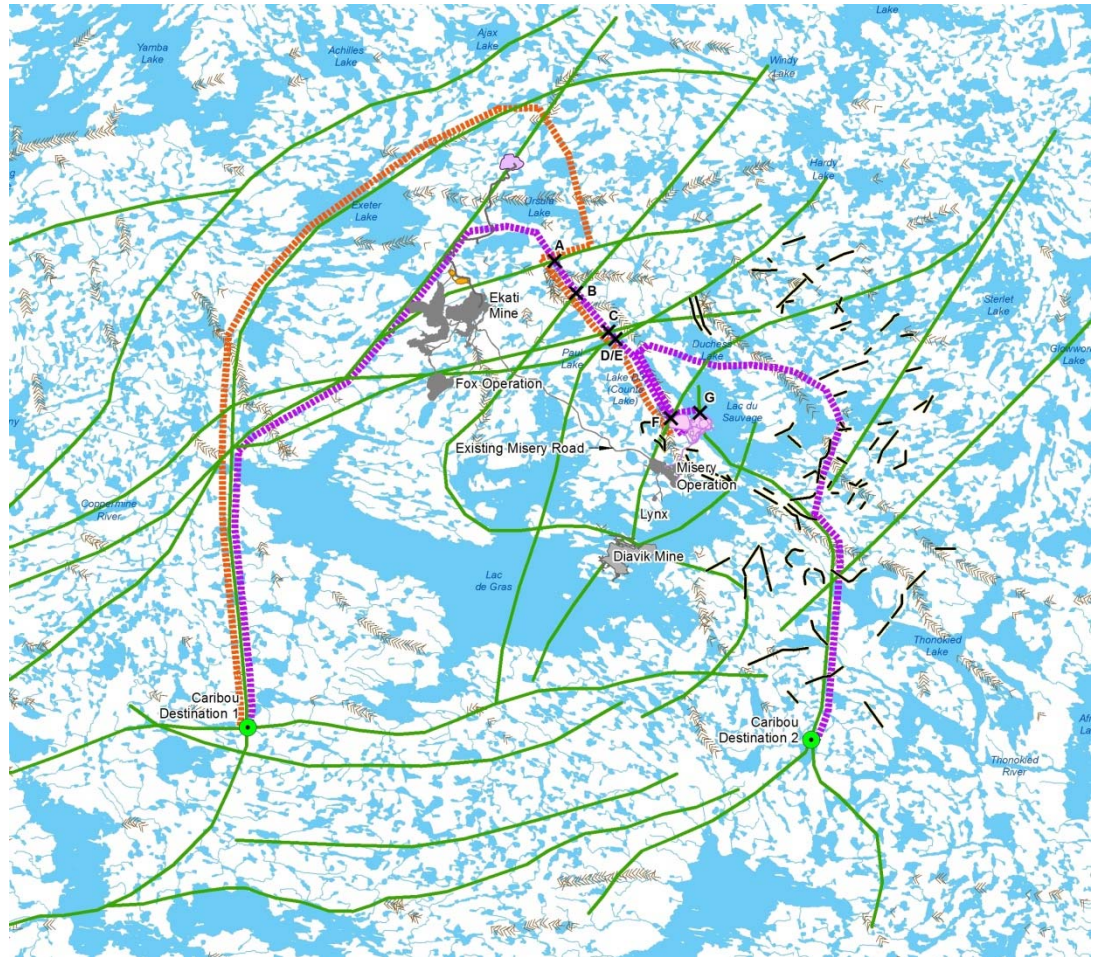




# Conservative Approach to Energetic Costs Modelling

## Barren-ground Caribou – Encounters and Energy Balance

- Incorporated caribou migration routes from TK (green routes)
- Animals encountering contiguous ZOI assumed to go around and follow migration routes
- Maximum deflection distance was 59.8 km (median = 41.8 km)
- Body mass loss from 59.8 km deflection = 0.44 kg
- Maximum number of insect harassment days at either weather station = 44
- Body mass loss from insect harassment (44 days) = 5.37 kg

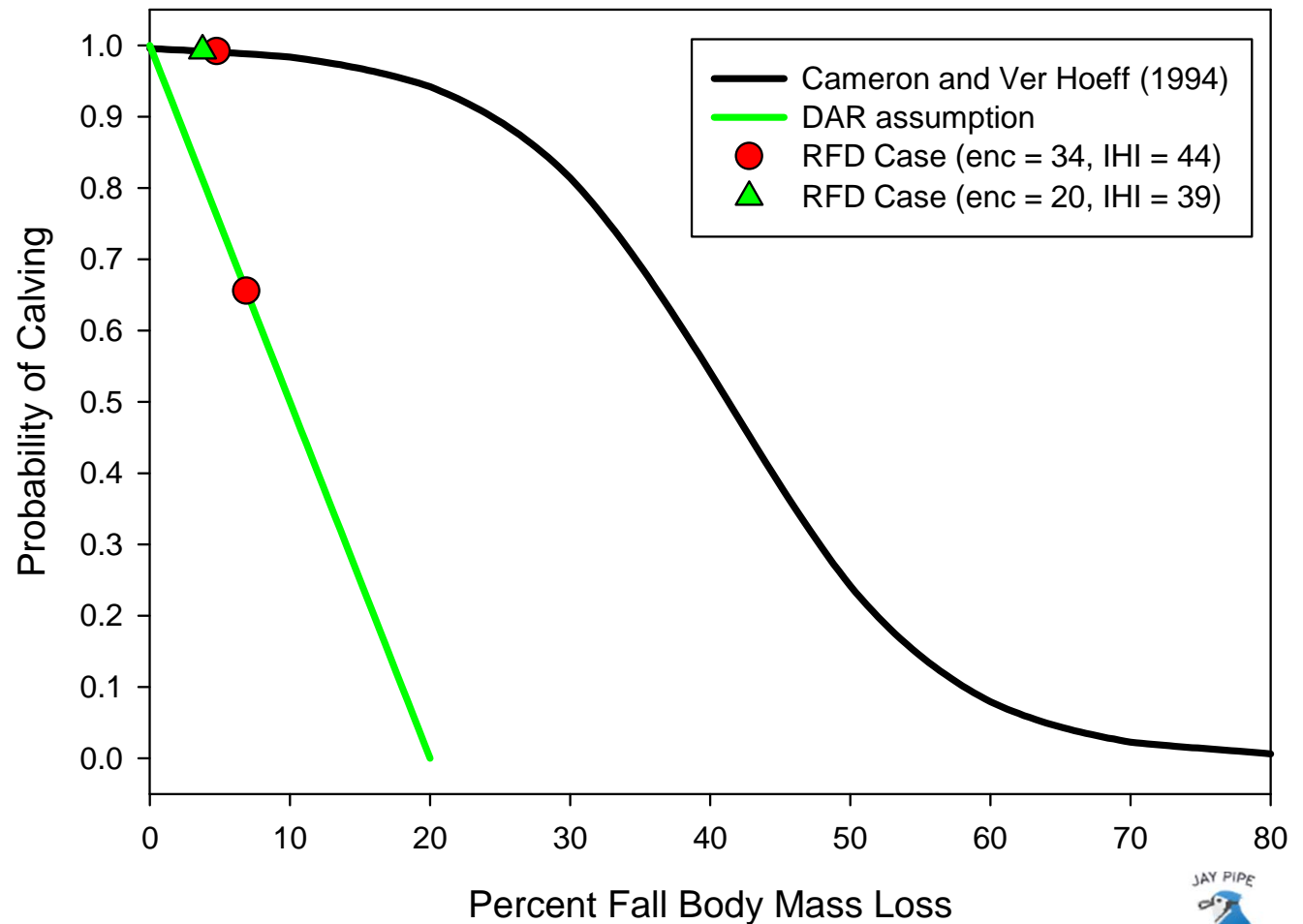


# Conservative Approach to Energetic Costs Modelling

## Models of Body Mass Loss and Calving

Total body mass  
loss assumed =  
6.88 kg

Extreme effect  
assumed on  
calving





# Mitigation Hierarchy for Jay and Misery Roads

## Avoidance

- Temporary road closures to avoid barrier effects of traffic on migration

## Minimization

- Engineered caribou crossings including where Jay road cuts through the esker
- Ore stockpiling and design of ore hauling
- Staged monitoring of Bathurst caribou herd to track migratory movements
  - Satellite radio-collars
  - Road surveys
- Adaptive management of monitoring, modification of traffic patterns, and road closures will reflect the number and group composition of caribou near the mine site



## Reclamation

- Reclamation of the esker following closure
- Pipeline and power line removal



(see also DAR-MVEIRB-IR-90 and DAR-IEMA-IR-27)



## Summary

The caribou ESA was based on the seasonal ranges of, and effects to, the Bathurst caribou herd as the Bathurst herd has a greater likelihood of being affected by the Project relative to the Ahiak and Beverly herds

- DAR used multiple approaches and best practices to provide confident and ecologically relevant impact predictions
- Caribou annual range remains intact so:
  - Habitat is not limiting now or during recovery; caribou have space to find food, avoid predators and maintain seasonal migrations
  - No fragmentation of populations
  - Traffic manipulation mitigation for Misery, Jay, and Sable roads
  - No strong mechanism causing a long-term or irreversible change in reproduction or survival rates





## Follow-up and Monitoring for the Terrestrial Environment

Existing Ekati Mine Wildlife Effects Monitoring Program (WEMP) will be applied to Project, including:

- Extent of direct disturbance to vegetation communities
- Mine-related wildlife mortalities and interactions with site (including roads)
- Pit-wall nesting by raptors
- Mitigation and waste management effectiveness
- Contribution to regional monitoring of cumulative effects

The current WEMP monitors caribou as well as grizzly bear, wolverine, gray wolf, fox, raptors, waterbirds, and upland birds

Wildlife and Wildlife Habitat Protection Plan will be provided to meet the requirements of the NWT Wildlife Act

Ekati Wildlife Road Mitigation Plan (which will be applied to Jay Project) is forthcoming





# Questions?

