



TENAS METALLURGICAL COAL PROJECT

TELKWA CARIBOU HERD

Vision, Effects Assessment, Mitigation Hierarchy

EAO Caribou Sub-Working Group
June 10, 2025

Agenda

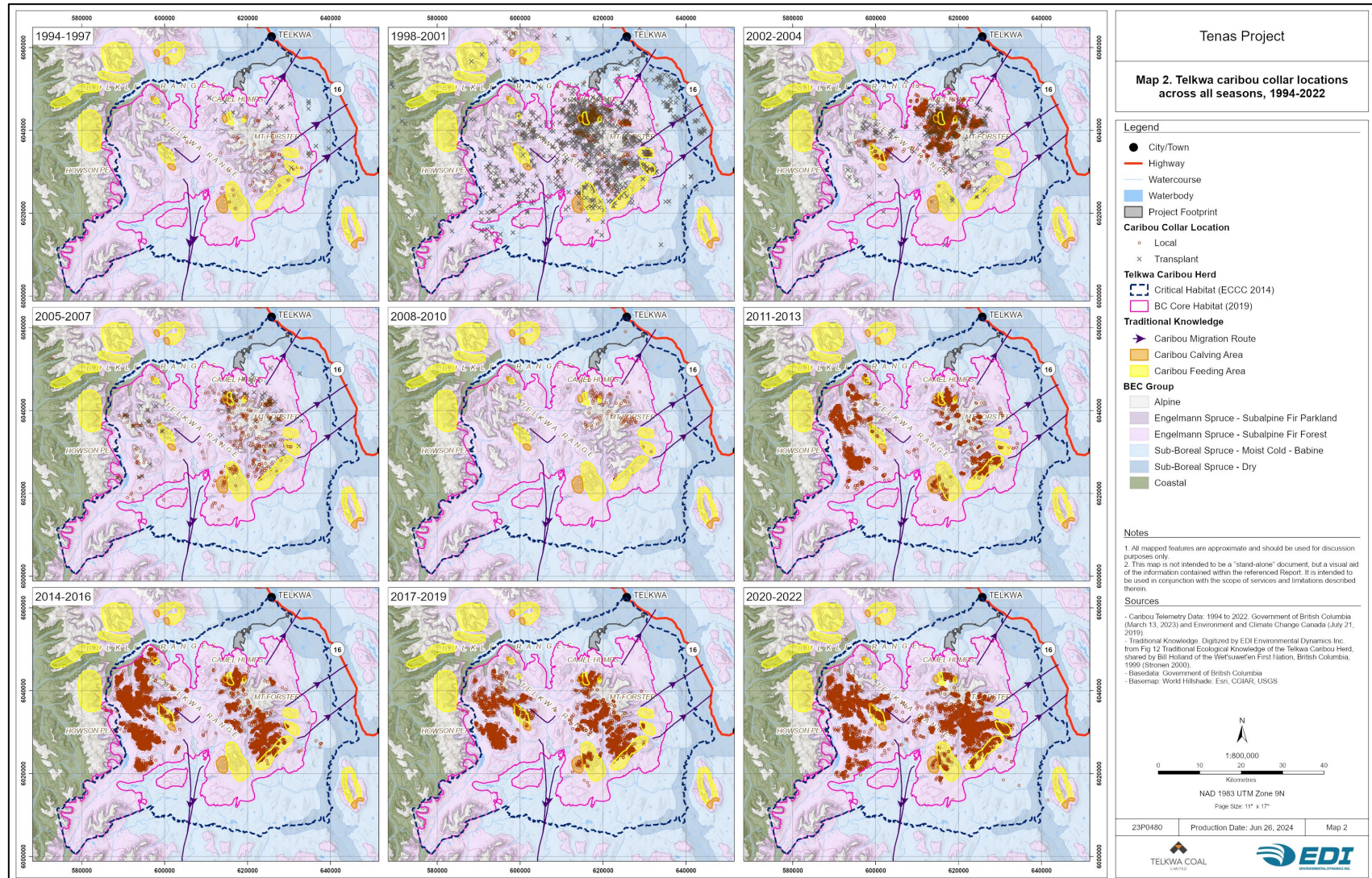
- Vision
- Effects Assessment
- Mitigation Hierarchy
- Acoustic Modelling
- Recreational Access

- GOAL = Self-Sustaining Caribou Population for Telkwa Range
- HOW?
 - High Elevation Winter/Summer Habitat
 - Minimal disturbance and avoidance of development in RSA2-Core
 - Reclamation of existing footprints
 - Management of sensory disturbance
 - Low Elevation Potential Winter and Movement Habitat
 - Limit early seral forage to mitigate predation pressure
 - 65% undisturbed/restored habitat target
 - Identify and retain/enhance capable low-elevation caribou winter range within the RSA1 outside the RSA2-core
 - Retain/improve caribou movement habitat

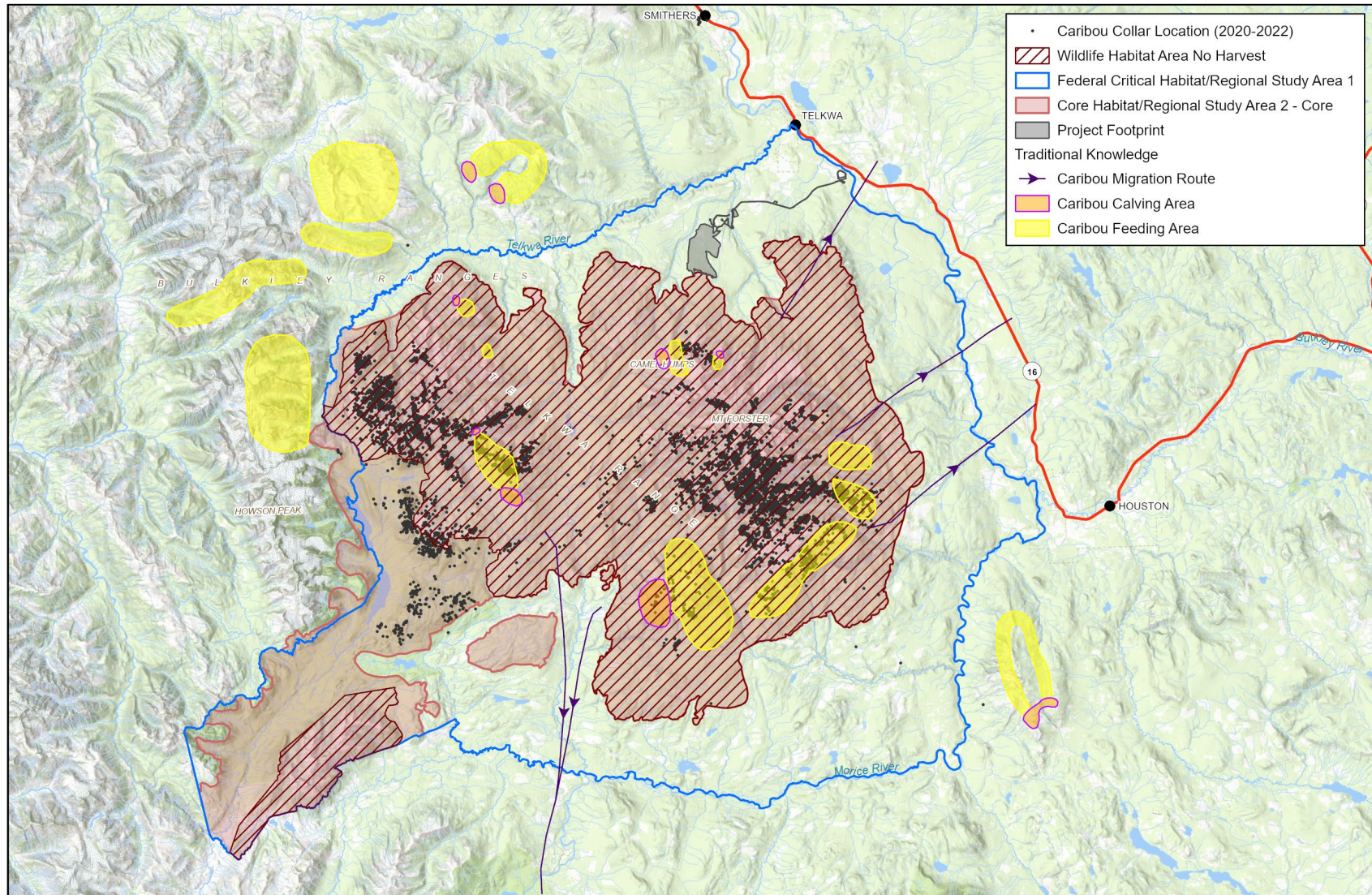
Vision – High Elevation Habitat

- Minimal disturbance and avoidance of development in RSA2-Core
- Reclamation of existing footprints, where practicable
- Management of sensory disturbance
 - Caribou telemetry data confirms that nearly all winter and summer habitat use (>95%) occurs in the ESSF and alpine
 - Transplanted rather than resident caribou were largely responsible for documented low-elevation habitat use in the past

Vision – Telemetry Data and Traditional Knowledge (OW)



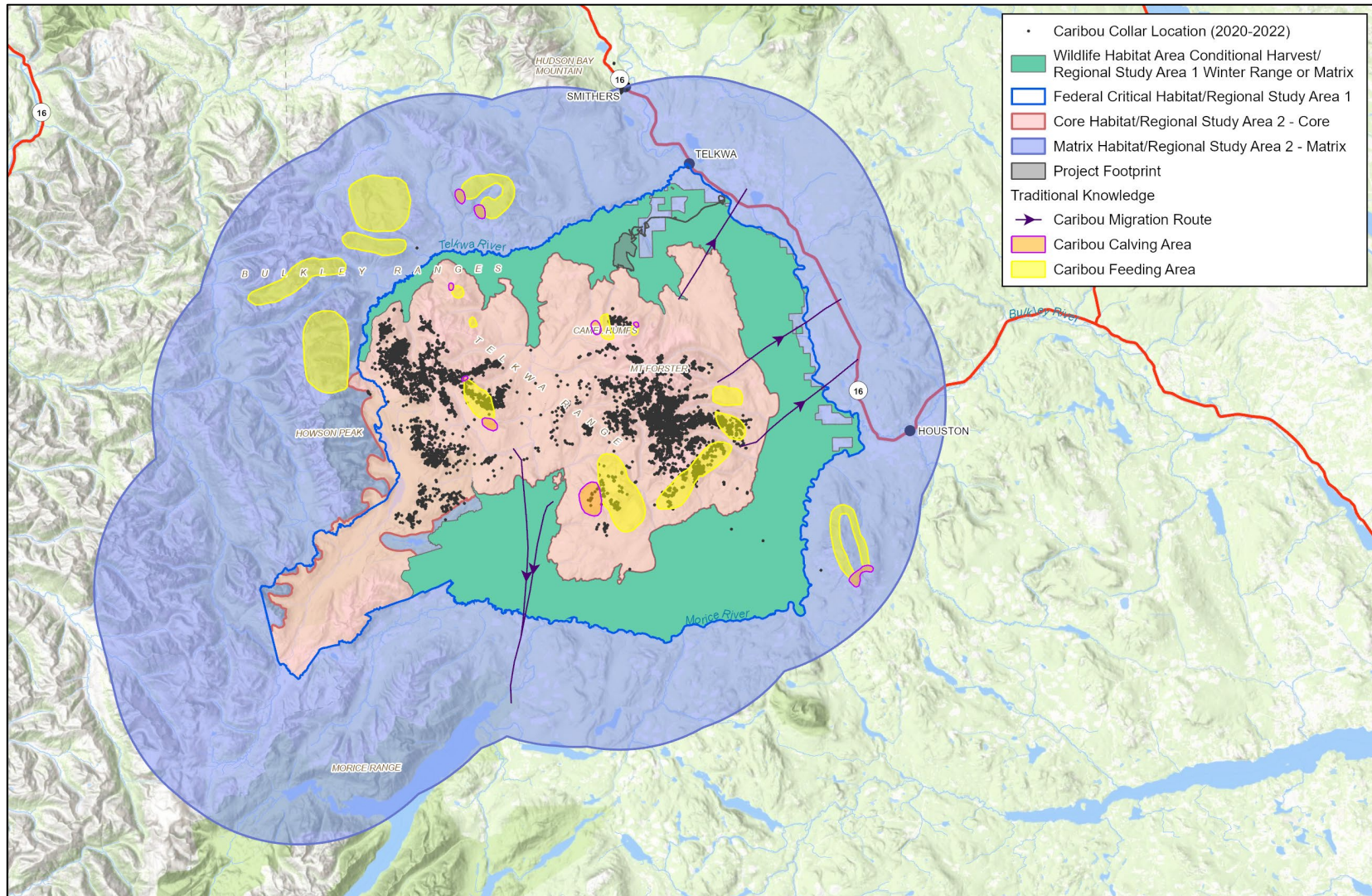
Vision – High Elevation Habitat



Vision – Low Elevation Habitat

- Limit early seral forage to mitigate predation pressure
- 65% undisturbed/restored habitat target
- Identify and retain/enhance capable existing low-elevation caribou winter range within the RSA1 outside the RSA2-core
- Restore habitat throughout the low-elevation area, but bias restoration towards potential caribou winter range
 - Habitat mapping suggests some potential low elevation winter range, the rest functioning as Type 1 matrix
 - More use by caribou likely dependent on favorable predator—prey conditions

Vision – Low Elevation Habitat



Effects Assessment

- Direct effects — loss of caribou biophysical attributes because of the Project Footprint
 - To be avoided, minimized, restored, and/or offset
- Indirect effects — sensory disturbance
 - Displacement due to noise and activity
 - Effects variable and confounded by migration patterns, seasonal variation, abundance
 - Directly proportional to footprint, except blasting noise (addressed separately)
- ECCC-defined 'disturbed' habitat
 - From the federal Southern Mountain Caribou Recovery Strategy
 - Ambiguous function; fit from boreal relationship of juvenile recruitment against aggregate buffered disturbance

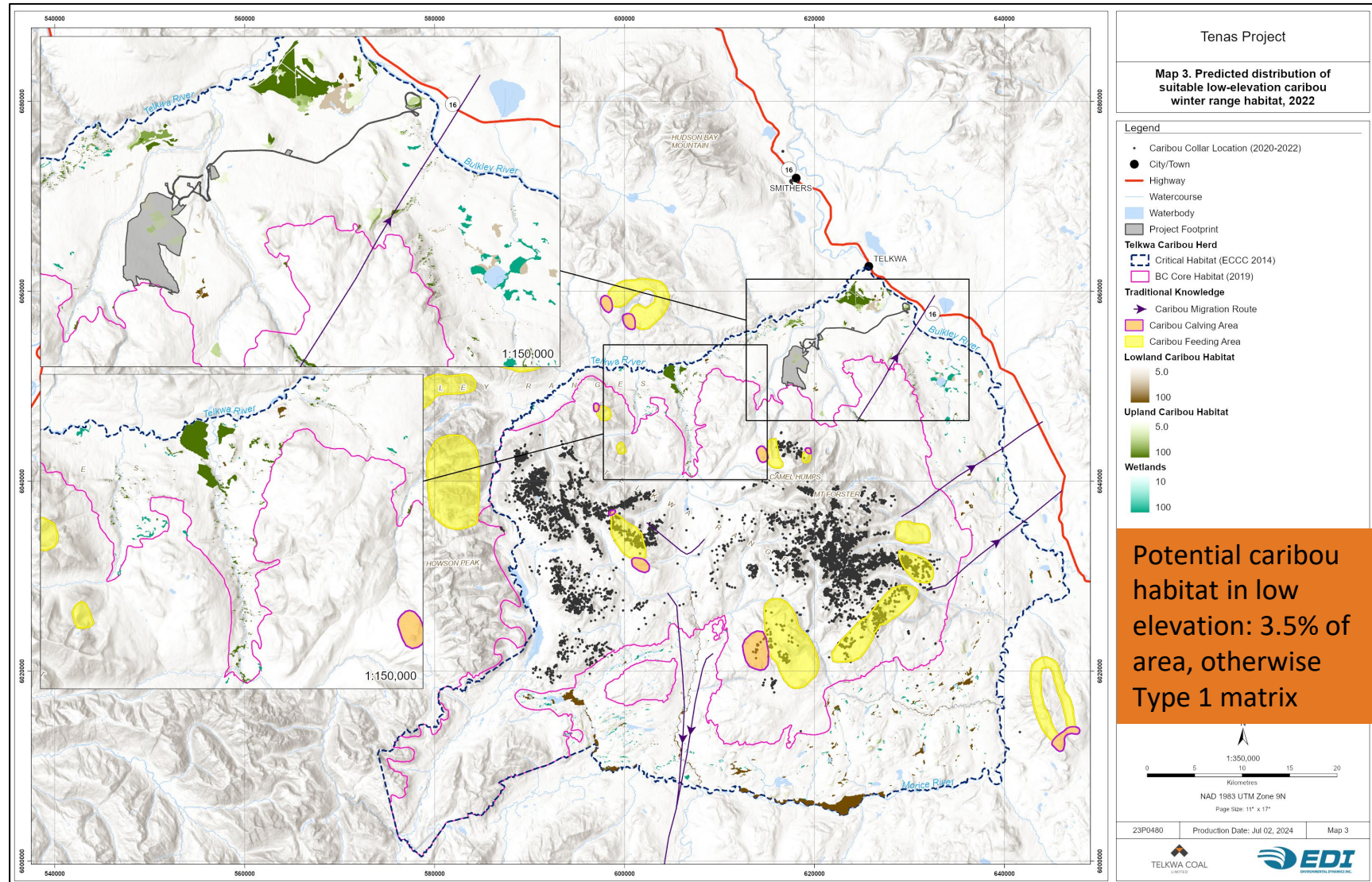
Effects Assessment – Potential Low Elevation Caribou Winter Range

Table 1: Reviewed Predictive Ecosystem Mapping/Terrestrial Ecosystem Mapping and classified units as either High or Moderate capability for wintering caribou

BEC Subzone	Habitat Type	Habitat Quality	Site Series and Map Code	Descriptions
SBSmc2	Upland	High	02PH	Pine - Kinnikinnick - <i>Cladonia</i>
		Moderate	03BM	Black spruce, pine - Feathermoss
	Lowland	High	12SS	Black spruce, hybrid spruce - Scrub birch - Sedge
		Moderate	07BF, 32LS, Wb01, Wb05	Hybrid spruce - Scrub birch – Feathermoss, non-forested fen/marsh, Black spruce – Creeping-snowberry – Peat-moss, Black spruce – Water sedge – Peat-moss
SBSdk	Upland	High	03LC	Pine - Feathermoss - <i>Cladina</i>
		Moderate	02LJ	Pine - Juniper - Ricegrass
	Lowland	High	09BS	Black spruce - Creeping-snowberry - <i>Sphagnum</i>
		Moderate	10SS, 32LS	Black spruce - Soft-leaved sedge – <i>Sphagnum</i> , non-forested fen/marsh

Each polygon was assigned an expected value 5-100 based on the deciled ecosystems, weighting high capability ecosystems by 100 and moderate capability ecosystems by 50.

Effects Assessment – Potential Low Elevation Caribou Winter Range with TK



Effects Assessment – Project Effects to Caribou Habitat

➤ BASELINE FOR ESTIMATING EFFECTS

- All cut blocks and burns regenerated
- All tertiary and quaternary roads restored
- Only current permanent disturbance considered in effects assessment
- Assumes the Project is the only source of future disturbance
- Most precautionary approach

Effects Assessment – Project Effects to Caribou Habitat

➤ DIRECT EFFECTS

- Direct loss of caribou biophysical attributes
- Project Footprint in high-elevation, core range
- Project Footprint in low-elevation, capable caribou winter habitat
- Project Footprint in Type 1 matrix, caribou movement
- Project will not result in enrichment of the prey-predator system, which is the most important proximal driver of caribou decline

Effects Assessment – Project Effects to Caribou Habitat

➤ INDIRECT EFFECTS

- Sensory disturbance effects on caribou
- Applied recommended 3.0 km to footprint of the open pit
- Applied recommended 1.8 km to other Project infrastructure
- These are largely arbitrary and precautionary buffers without clear empirical evidence

Effects Assessment – Buffers for Indirect Effects

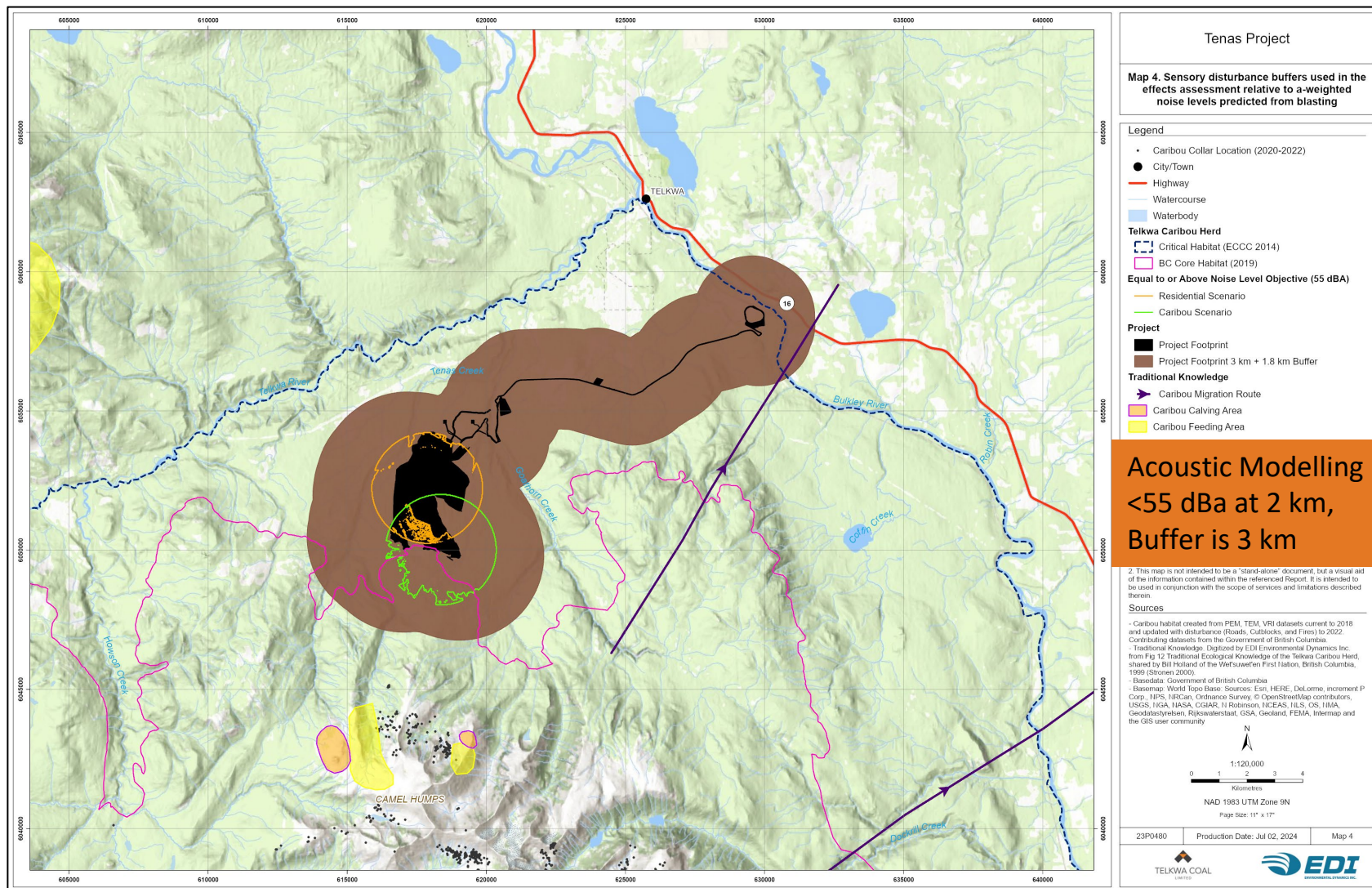
Table 2

The zone of influence (km) resulting from the avoidance response of woodland caribou to disturbance features during summer and winter, South Peace region, British Columbia, Canada. An asterisk (*) indicates a zone of influence that was confounded by more than one asymptote in the curve; a plus (+) indicates apparent selection by caribou for a disturbance; (ns) indicates a non-significant or non-applicable disturbance.

Covariate	Moberly/Burnt Pine		Quintette		Bearhole–Redwillow		Narraway	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Roads	1.75	1.75	1.50	1.25	+	1.00	+	1.75
Seismic and pipelines	+	2.00	+	+	2.50	0.50	13.50*	+
Cutblocks	+	+	+	0.50	3.00	+	+	5.50*
Non-linear oil and gas	4.25	+	+	+	12.50*	2.00	4.00	+
Mine	ns	ns	3.00	+	ns	ns	ns	ns
Fire	+	+	2.75	+	+	+	5.25	8.00

Johnson et al. (2015)

Effects Assessment – Buffers versus Acoustic Modelling with TK

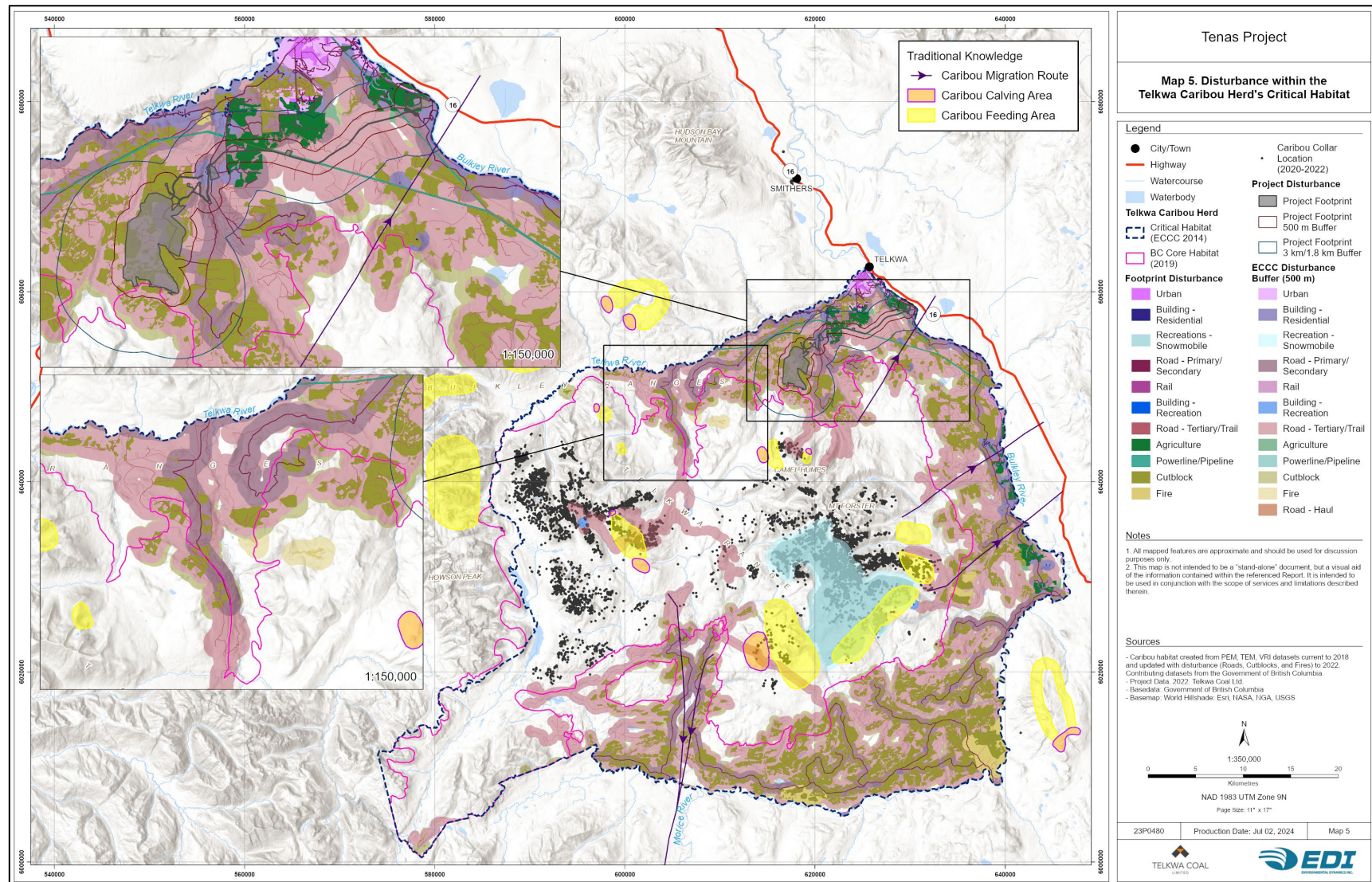


Effects Assessment – Project Effects to Caribou Habitat

ECCC Defined Disturbance Effects

- Increase in 'disturbed' habitat (federal recovery strategy)
 - Based on a statistical relationship between (buffered) disturbance and juvenile recruitment among boreal caribou subpopulations
 - All anthropogenic features and burns/cut blocks are buffered by 500 m
 - Net effect of Project occurs where the Project's footprint and buffers do not overlap existing disturbances
 - This is not a measure of indirect effects; it is treated as a separate disturbance measure
 - Applies in high elevation core range (target: minimal disturbance), low-elevation winter range and Type 1 matrix (target: <35% disturbed)

Effects Assessment – Project Effects to Caribou Habitat



Effects Assessment – Magnitude

Net Effects

- High elevation, caribou core range
 - 3.4 ha direct effect
 - 1,103.9 ha indirect effect
 - 79.0 ha ECCC-defined 'disturbed' habitat
- Low elevation, capable caribou winter range habitat
 - 116.6 ha direct effect
 - 66.9 ha indirect effect
 - 143.7 ha ECCC-defined 'disturbed' habitat
- Low elevation, Type 1 matrix caribou movement habitat
 - 780.8 ha direct effect
 - 2,853.3 ha indirect effect
 - 1,997.2 ha ECCC-defined 'disturbed' habitat

Effects Assessment – ECCC-defined 'Disturbed' Habitat

- Total area of Type 1 matrix habitat zone: 104,469.9 ha
- Total 'disturbed' area without the Project: 32,990.4 ha (31.6%)
 - Based on current permanent disturbance
- Total 'disturbed' area with the Project: 35,131.3 ha (33.6%)
 - Current permanent disturbance plus Project disturbance
- Both conditions achieve the federal recovery strategy target of >65% 'undisturbed' habitat for low-elevation winter range and Type 1 matrix habitat

Mitigation Hierarchy

- Avoid
- Minimize
- Reclaim on site
- Offsets (restore outside Project Area)
- In-lieu payments

Mitigation Hierarchy – Avoid/Minimize

➤ Avoid

- Footprint made as small as practical for recovery of coal resources
- Only recovering coal from the Tenas deposit
- Co-locating infrastructure near existing liner permanent disturbance features such as CN rail line and BC Hydro's 500 kV powerline

➤ Minimize

- 365-day operation, no option of timing windows
- Protocol in place if Caribou are within 700 meter of blasting operations, blasting will be postponed
- Monitoring of use for recreation and procedure in place to limit access if required
- Mining sequence from south to north to provide monitoring information from operation on caribou habitat prior to majority of high elevation disturbance
- *Caribou Monitoring and Management Plan* to be submitted as part of permitting

Mitigation Hierarchy – Reclaim on site

- Telkwa Mining will progressively reclaim the net direct disturbances in high and low elevation
- Will begin prior to the completion of construction with full reclamation after 25 years
- Restoration of caribou habitat attributes takes approximately 80 years
- Restoration of Type 1 matrix range takes approximately 40 years

Mitigation Hierarchy – Offsets

- Offset direct and indirect effects:
 - Identify the direct and indirect effects of the Project
 - Apply an acceptable offset ratio
 - Assess the offset potential of linear feature candidates identified in the *Telkwa Caribou Tactical Restoration Plan* (ERM 2019).
 - Restoration of linear features should decrease the facilitated predation of caribou by wolves
 - Determine how much of the Project's offset requirements can be met using the restoration candidates
 - Rank order (prioritize) restoration candidates to maximize direct/indirect offsets
 - Identify residual offsetting requirements

Mitigation Hierarchy - Offsets

Telkwa Caribou Tactical Restoration Plan (ERM 2019)

The goals of restoration:

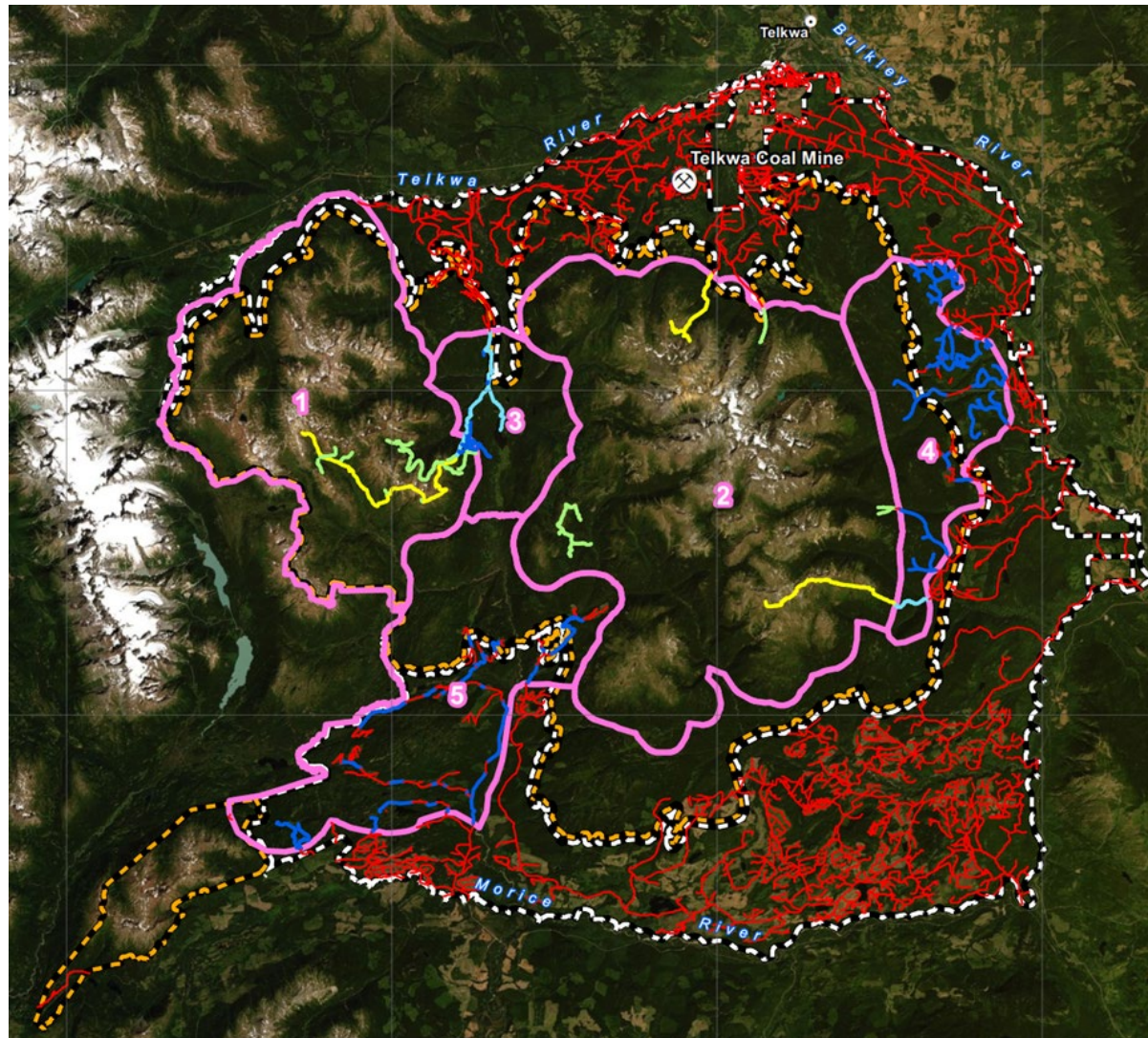
- Reduce predator access and efficiency
- Increase caribou habitat intactness and quality

The Plan identified priority areas within WHA 6-333 for restoration of linear features. Stakeholder engagement was included in the process.

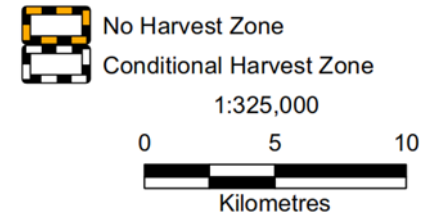
Prioritization Criteria:

- High use by caribou (radio-collars)
- High-elevation winter/summer range (BAFA and ESSFmcp); no harvest zones
- Potential low-elevation winter range (SBS)
- Linear features connecting low and high elevations

Mitigation Hierarchy - Offsets



- Community
 - Mining Project
 - Priority 1 Restoration Site
 - Priority 1 - Excluded for Recreation
 - Priority 2 Restoration Site
 - Priority 2 - Excluded for Recreation
 - Active Incursion
 - Restoration Polygon
- Telkwa Caribou Wildlife Habitat Area 6-333**



Limitations

The spatial data used to develop the Plan was not ground-truthed.

"Field review of candidate features and detailed landscape level planning with the Office of the Wet'suwet'en and with input from stakeholders is required prior to final site selection and implementation of restoration activities."

Mitigation Hierarchy - Offsets

Methodology

1. Acquired spatial data of linear feature candidates from the Tactical Restoration Plan.
2. Superimposed candidate features on the footprints (direct) and buffers (indirect, 1.8 km) of all permanent disturbances in Telkwa Caribou Critical Habitat
3. Calculated the net effect of restoring candidate features that do not overlap permanent disturbances
4. Assumed an indirect effects buffer of 500 m for restoration activities

Net Direct Offset Potential

- EXCLUDED candidate footprints that overlapped the footprints of permanent disturbances
- INCLUDED candidate footprints that overlapped the buffers of permanent disturbances

Net Indirect Offset Potential

- EXCLUDED candidate buffers that overlapped the buffers of permanent disturbances

Mitigation Hierarchy – Offsetting Opportunities

Core Habitat

- Net Direct Offset Potential = **57.0 ha**
- Net Indirect Offset Potential = **7,207.7 ha**

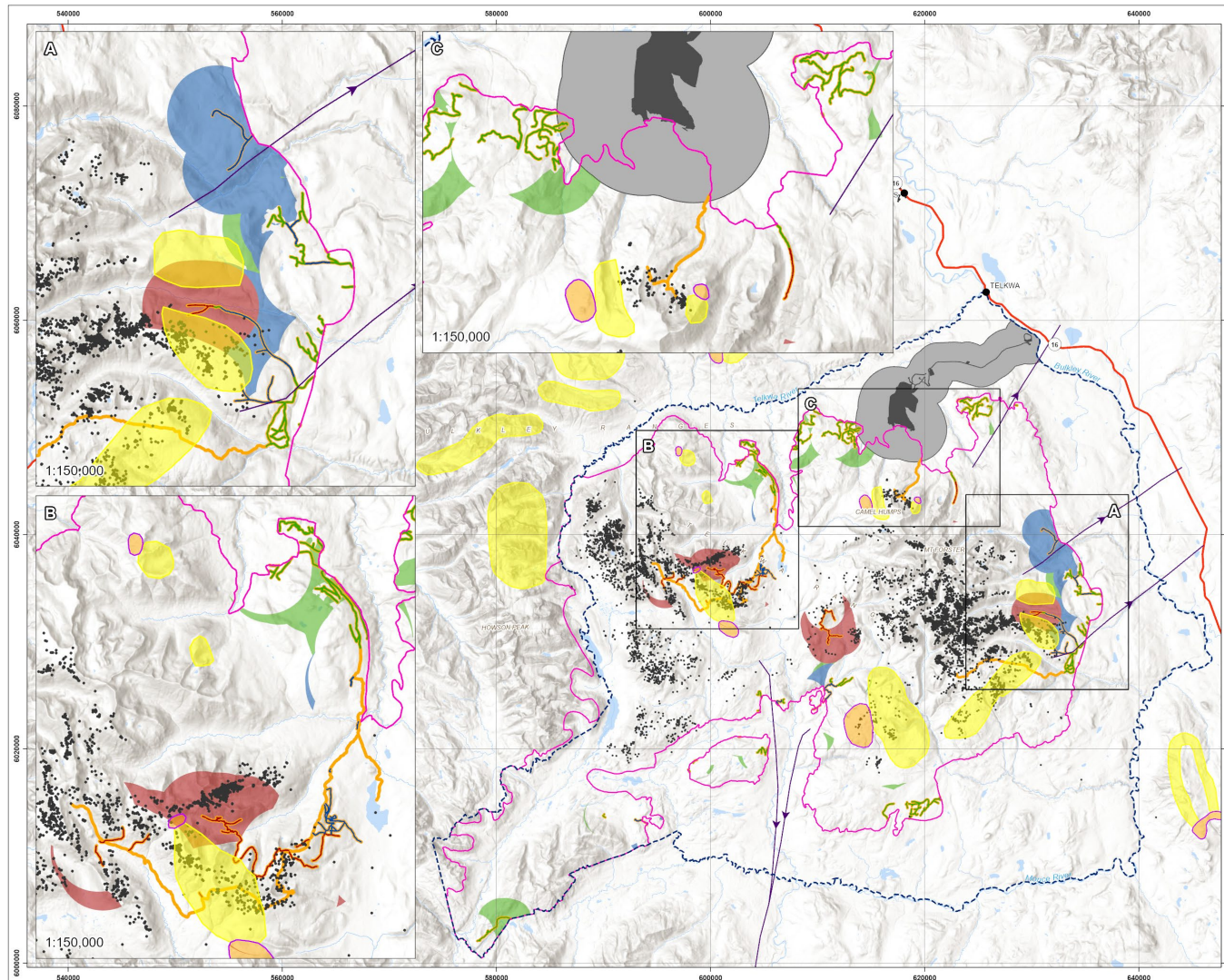
Type 1 Matrix Habitat (including capable caribou winter range habitat)

- Net Direct Offset Potential = **184.4 ha**
- Net Indirect Offset Potential = **3,360.9 ha**

**** Only Based on Priority 2 restoration Type 1 Matrix Habitat candidates ****

Including **Non-Priority** linear features, the direct offset potential in Type 1 Matrix habitat increases to *approximately* 2,626.5 ha above the 184.4 ha for priority features only.

Mitigation Hierarchy – Offsetting Opportunities

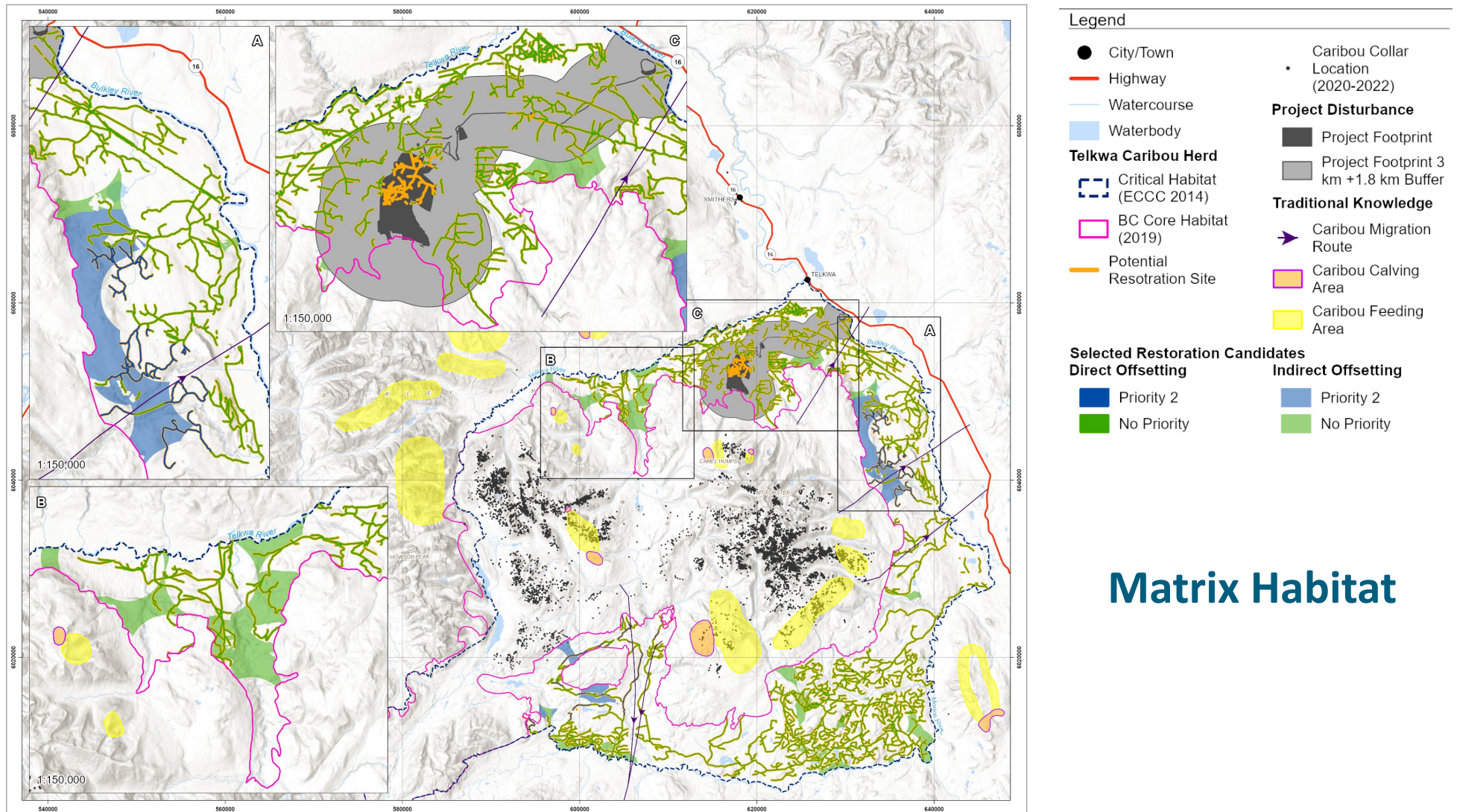


Legend

- City/Town
- Highway
- Watercourse
- Waterbody
- Telkwa Caribou Herd**
 - Critical Habitat (ECCC 2014)
 - BC Core Habitat (2019)
 - Potential Restoration Site
- Project Disturbance**
 - Project Footprint
 - Project Footprint 3 km + 1.8 km Buffer
- Traditional Knowledge**
 - Caribou Migration Route
 - Caribou Calving Area
 - Caribou Feeding Area
- Caribou Collar Location (2020-2022)**
 -
- Selected Restoration Candidates**
 - Direct Offsetting**
 - Priority 1
 - Priority 2
 - No Priority
 - Indirect Offsetting**
 - Priority 1
 - Priority 2
 - No Priority

Core Habitat

Mitigation Hierarchy – Offsetting Opportunities



Matrix Habitat

Mitigation Hierarchy – In-Lieu Payments

➤ Calculation assumptions:

- Highest offset ratio at 10 to 1 for high elevation core range due to current occupancy by caribou
 - \$12,000 per linear km or 100 ha (includes indirect buffer 500-m buffer)
- Lower ratio at 4 to 1 for low elevation capable habitat because of current and future probability of occupancy
 - \$12,000 per linear km or 100 ha (includes indirect buffer 500-m buffer)
- Lowest ratio at 2 to 1 for movement habitat because of probability of occupancy and broader acceptable habitat conditions
 - \$4,000 per linear km or 100 ha for (includes indirect buffer 500-m buffer)
- Inflated by 1.25 to accommodate indirect buffer overlaps

Mitigation Hierarchy – In-Lieu Payments

➤ Payment calculation

- High elevation core range mitigation: \$1,660,877
- Low elevation capable winter range mitigation: \$110,066
- Low elevation caribou movement habitat (Type 1 matrix): \$363,409
- Total in lieu payment: \$2,134,352
- Reporting: \$250,000

➤ On final Investment decision by Telkwa Mining Limited

- \$2.13 million payment spread 50/50 between Years 1 and 2 of Operation
- \$10,000 per year, every year of Construction, Operation, and Decommissioning and Reclamation phases roughly 25 years (\$0.25 million)
- Set up the Telkwa Caribou Stewardship Committee to decide and put in place other potential caribou management activities
 - Predator Control
 - Maternal Penning
 - Supplemental Feeding
 - Funds for recreation development on Hudson Bay Mountain for Snow Mobiles versus Star within High Elevation Core Caribou Habitat
 - Funds for recreation groups to better police members in Caribou habitats

Field Reconnaissance of Potential Restoration Sites

Linear restoration options in **high elevation** are limited because access would need to be upgraded and existing vegetation re-disturbed:



Leaving some/all linear features to recover naturally might be a better policy, even if recovery is very slow.

Field Reconnaissance of Potential Restoration Sites

Linear restoration options in **low elevation** are located mostly in Matrix habitat suitable for moose but not caribou, generating limited benefit:



Field Confirmation of Predicted Low-elevation Caribou Habitat

PEM/TEM generally **overestimated** suitable winter range habitat for caribou and therefore potential project effects are also likely overestimated:



Area incorrectly mapped as black spruce bog



Highly disturbed, evidence of recreational use

Field Confirmation of Predicted Low-elevation Caribou Habitat

Some suitable winter range caribou habitat and other areas that could be treated to improve habitat, but predator-prey system limiting:



Abundant ground lichens in open stand



Feathermoss cover in relatively closed stand

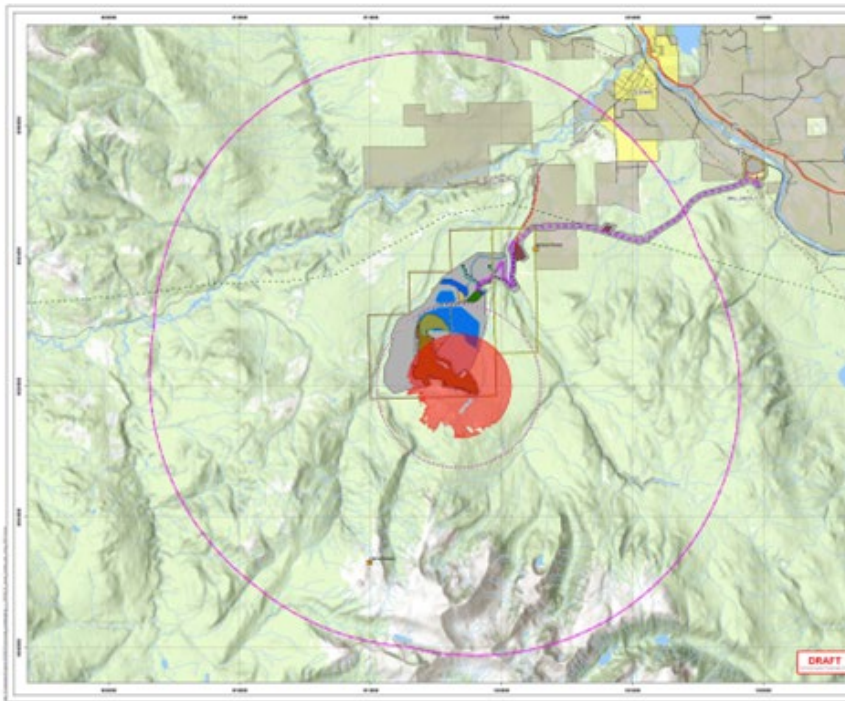
Acoustic Modelling

Ausenco was retained to conduct acoustic modelling from blasting activities in relation to residential and caribou receptors.

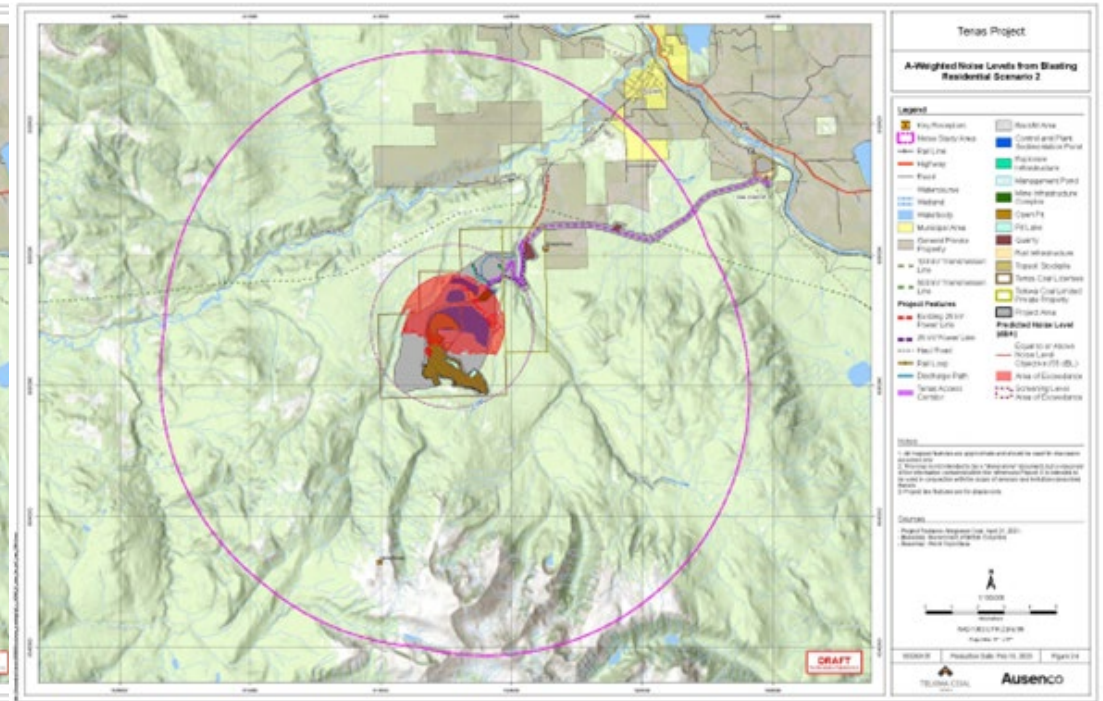
Model provided in the EA was conservative and estimated that 55 dBA would occur at approximately 4 km.

Acoustic Modelling

Incorporating the effects of terrain, weather and other aspects a maximum of 2km is expected to reach 55 dBA.



Caribou Receptors



Residential Receptors

Recreational Access

EDI assessed potential increased recreational access due to development of the Project.

Determined there would not be any significant adverse residual effects due to implementation of the following mitigations:

- Access will not recover to levels that were present prior to the bridge washed out
- TML will implement an educational program for users who wish to access recreational areas
- TML will escort users at specified times to recreational kick off spots which will dissuade users
- TML will have a Caribou Monitoring and Management Plan which will provide information on recreational use and potential effects
- TML can respond under direction of regulatory bodies to reduce access if observed effects do not agree with predicted



TENAS METALLURGICAL COAL PROJECT

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