



**PRAIRIE CREEK MINE
ALL SEASON ROAD
PUBLIC HEARING
Day 1 - April 26, 2017**



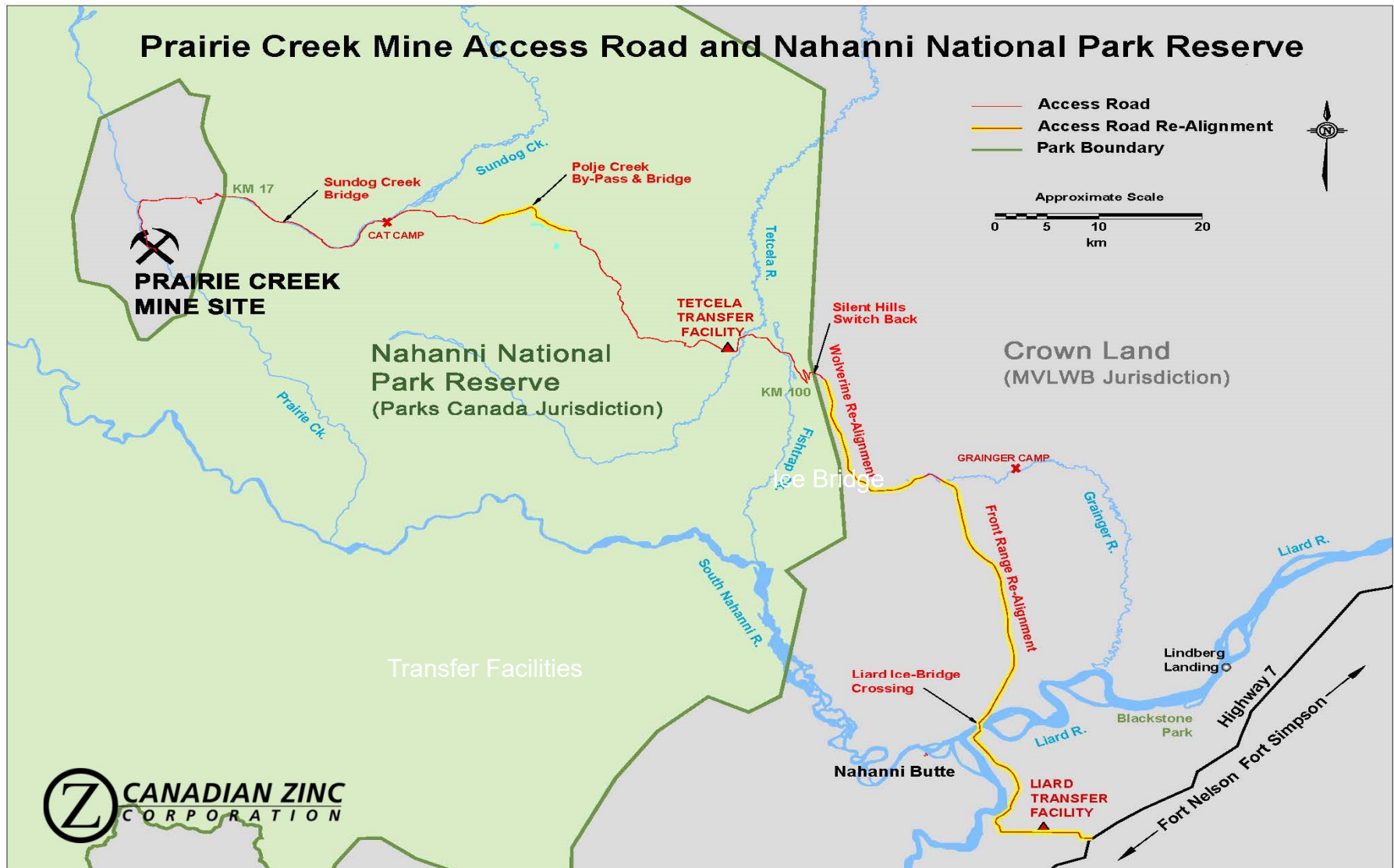
AGENDA

- Project Description
- Accidents and Malfunctions
- Permafrost, Soils and Terrain

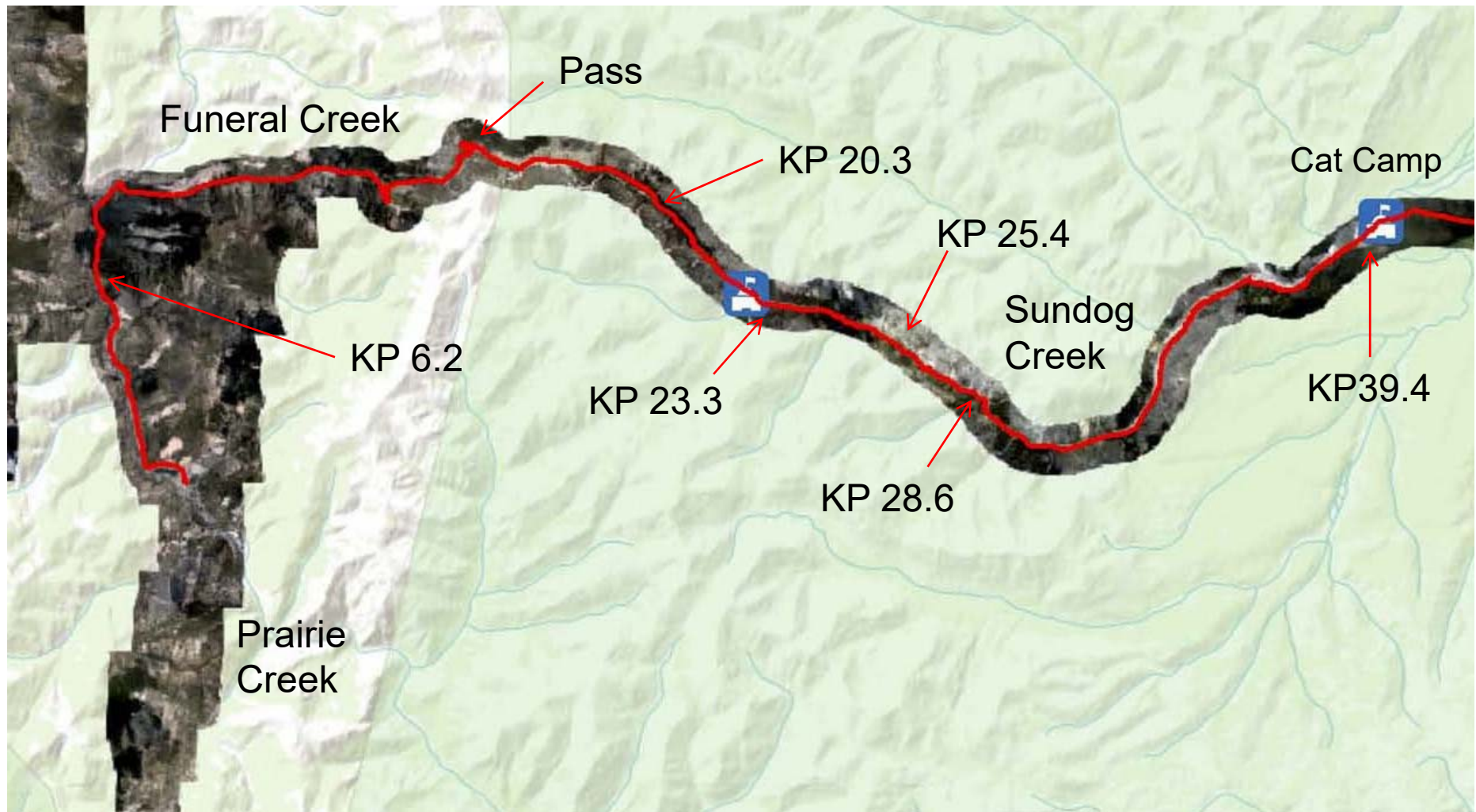
SUB-AGENDA

- Project Description
 - Road Alignment
 - Initial Use of Winter Alignment
 - Schedule and Timing of Road Construction
 - Infrastructure - Camps
 - Schedule and Timing of Road Operation and Closure

Access Road Alignment

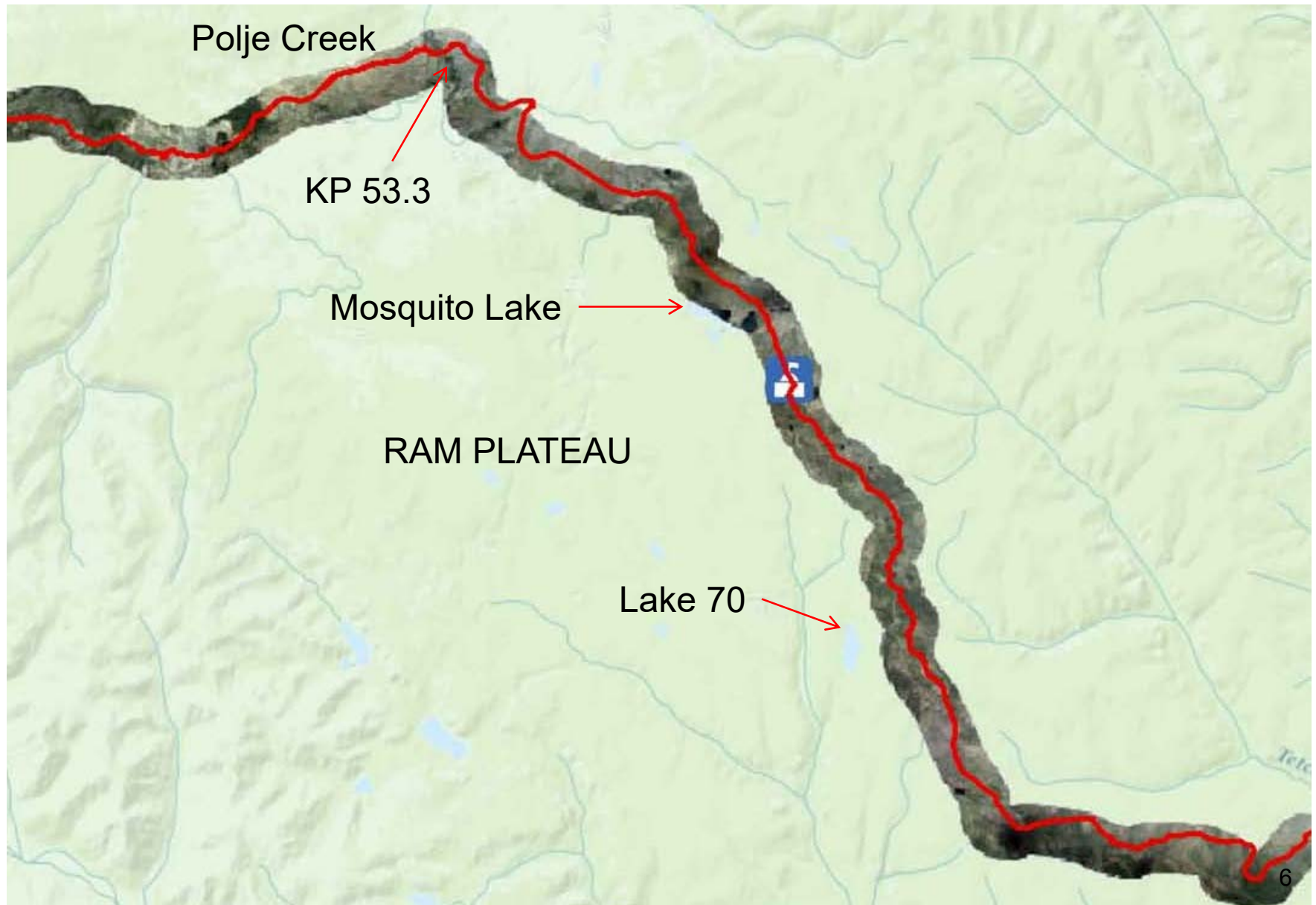


Major Waterbodies – Mountains

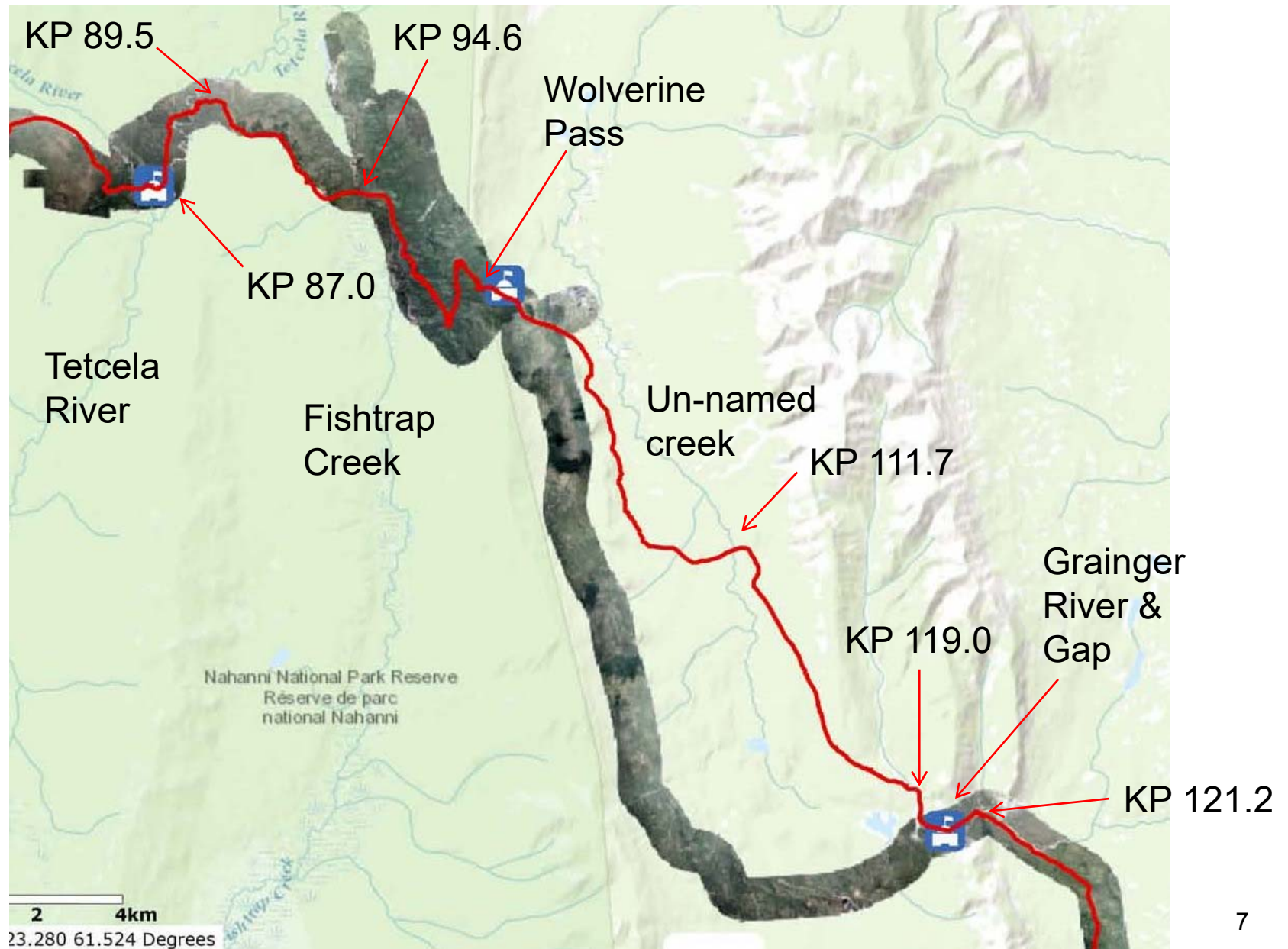


KP = Kilometre Point (KP 0 is the Mine)

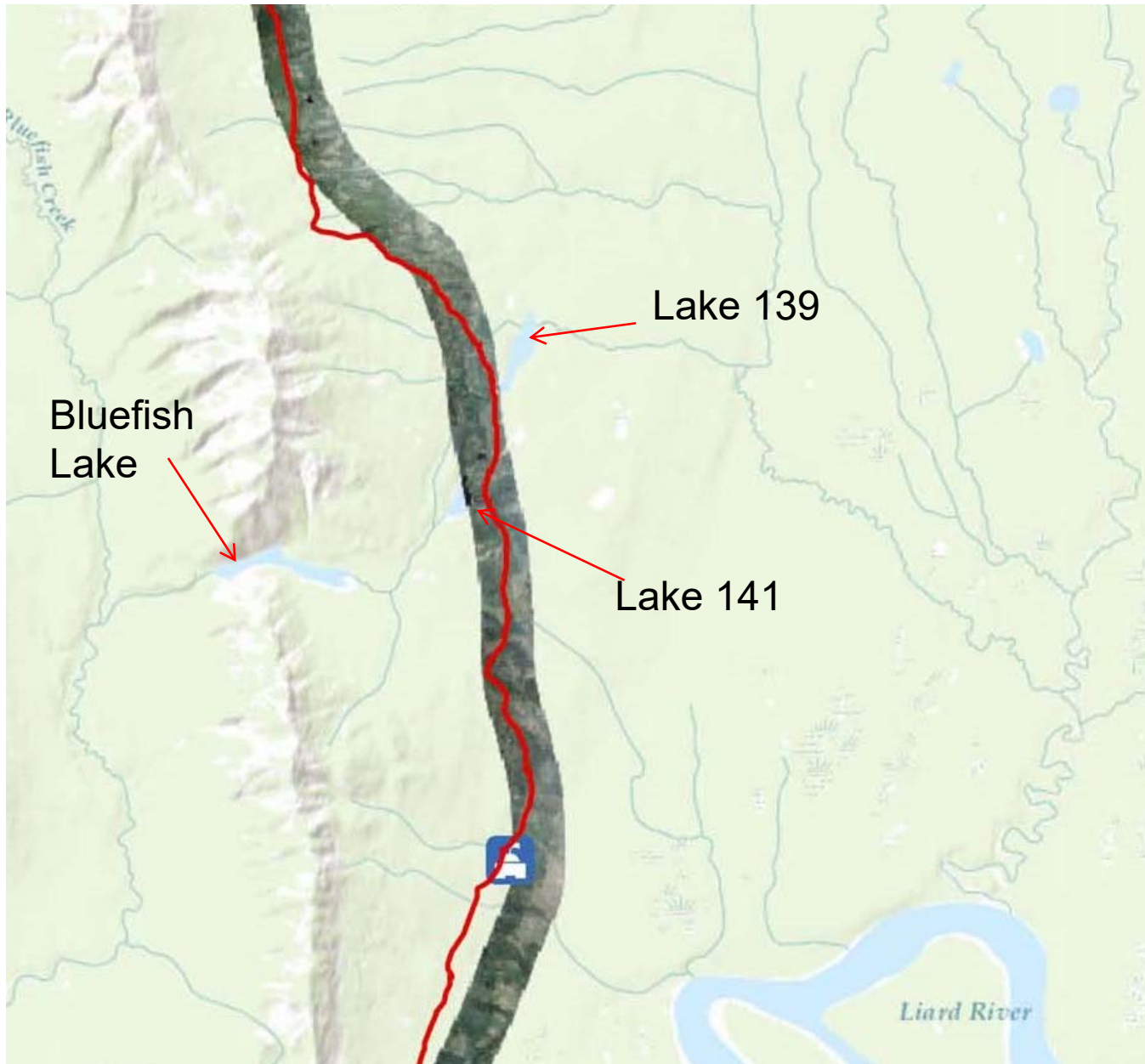
Major Waterbodies – Ram Plateau



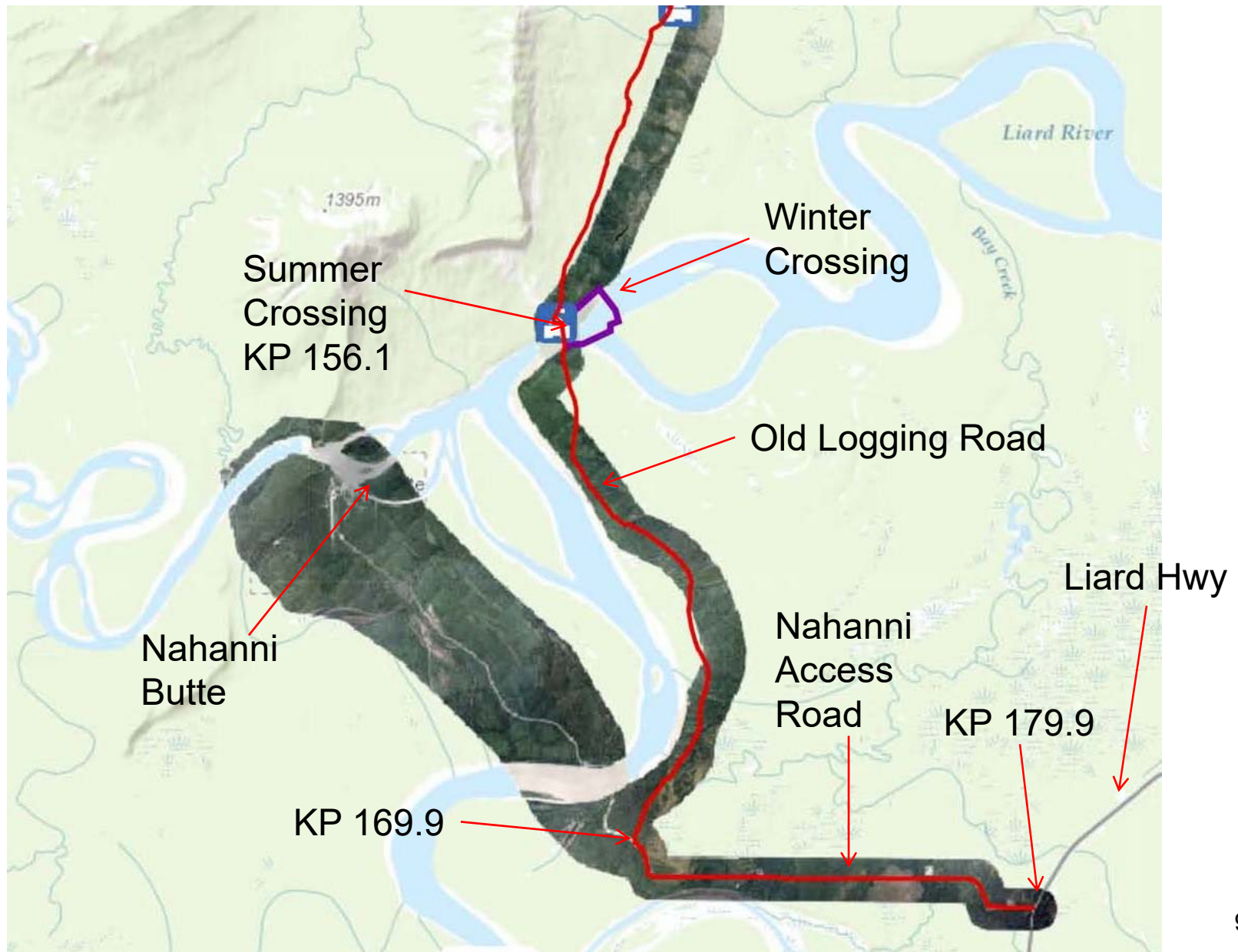
Major Waterbodies – Lowlands



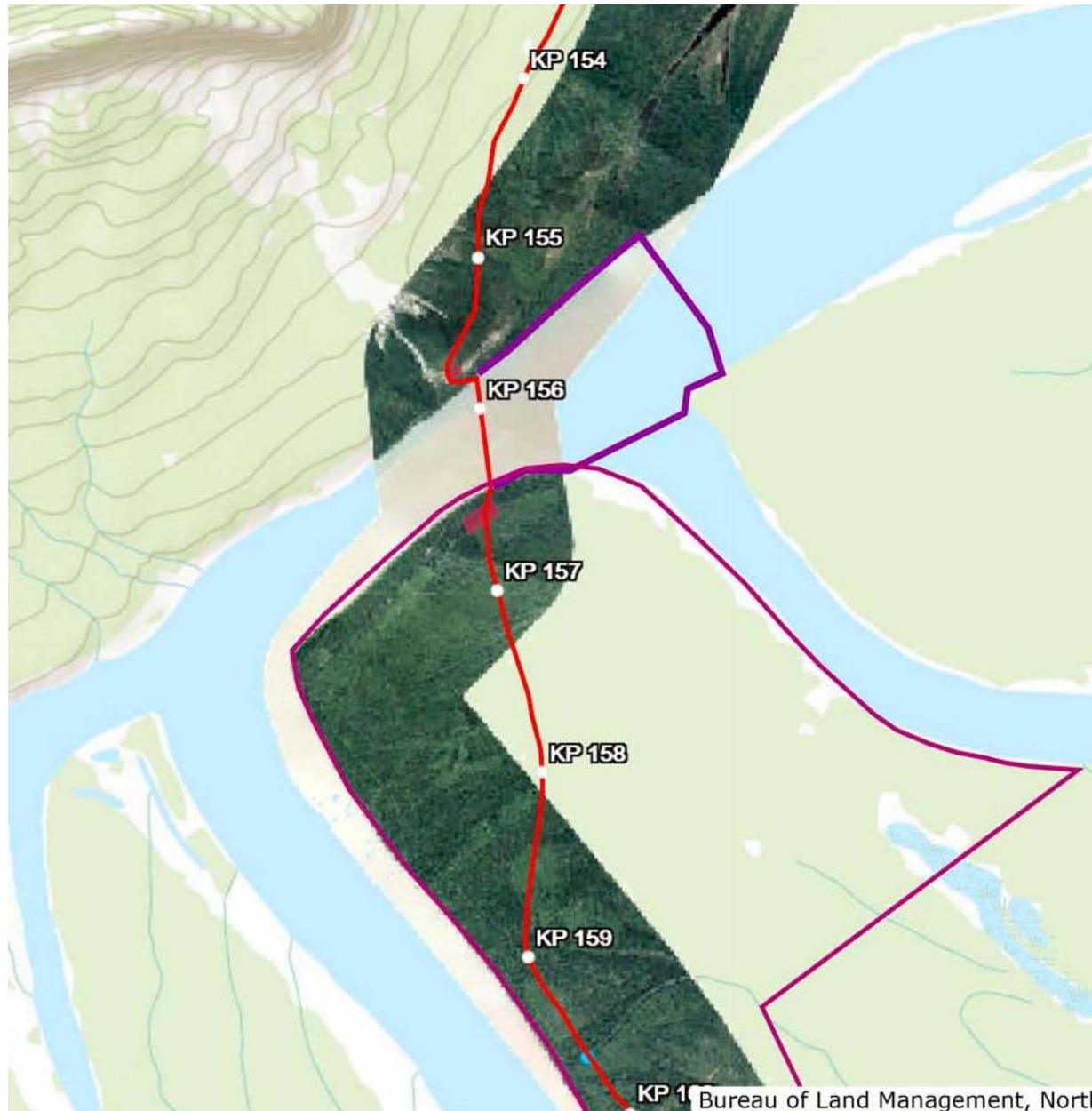
Major Waterbodies – Front Range



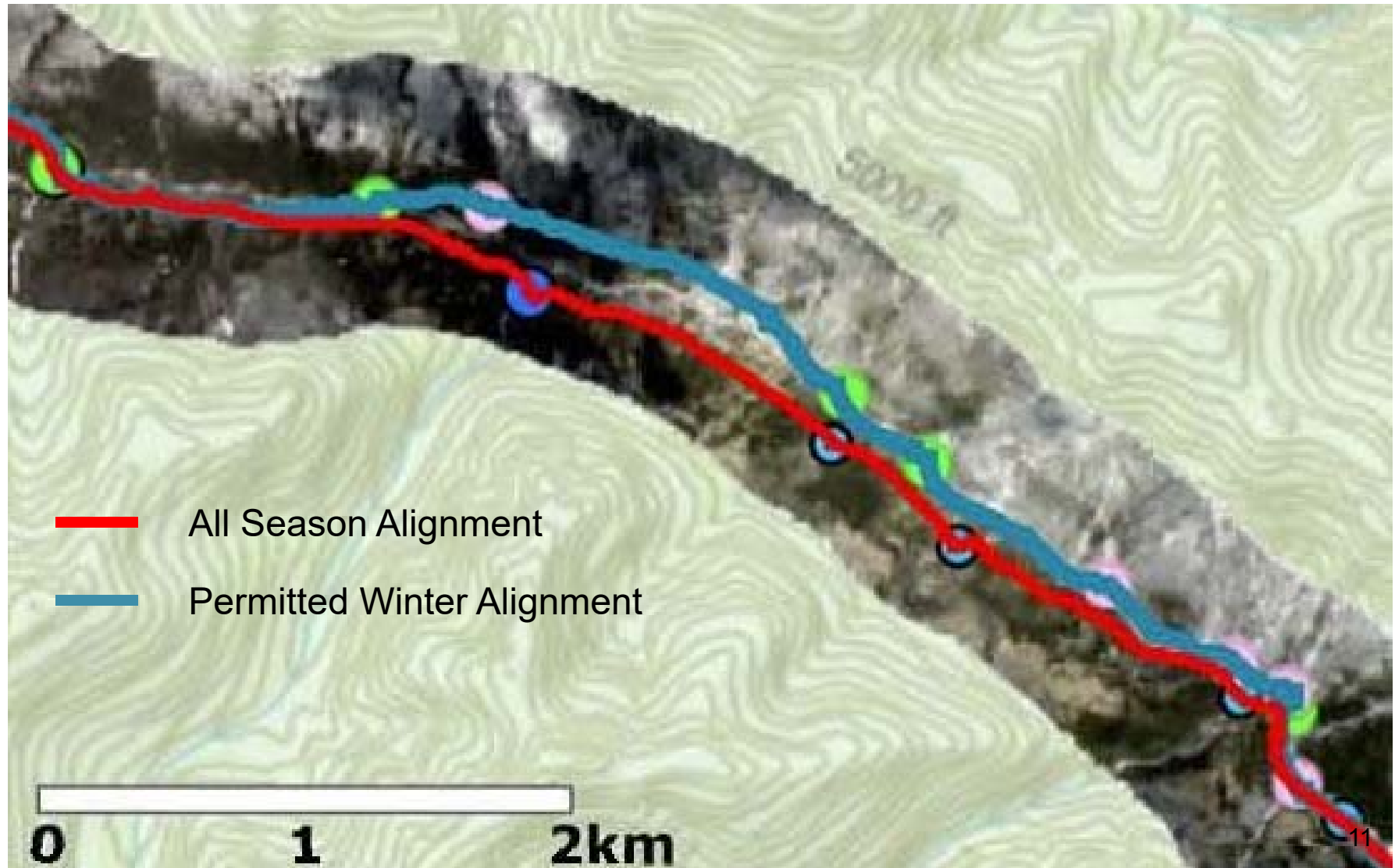
Major Watercourses – Liard River



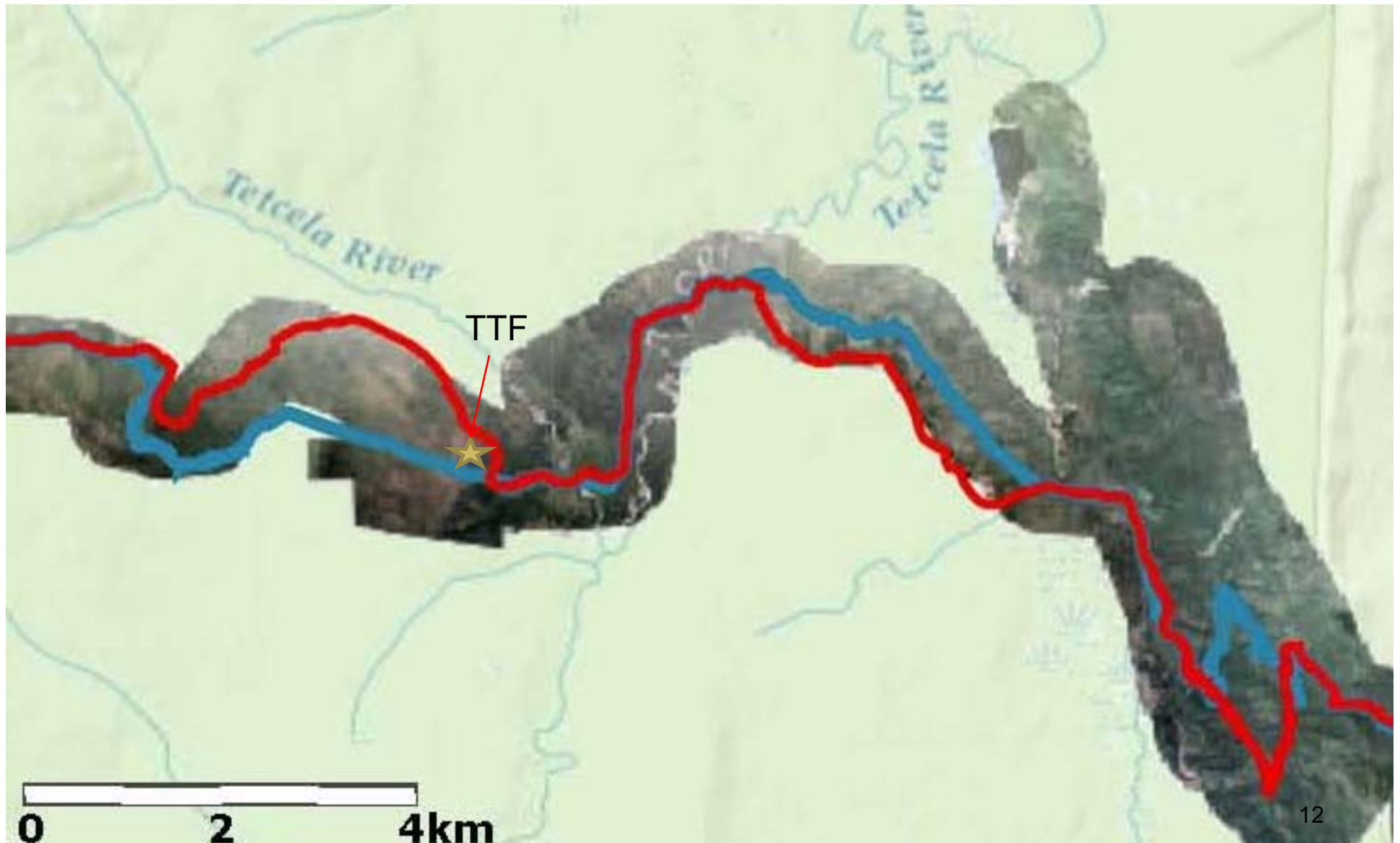
Access Control, Leases, IAB Lands



Initial Use of Winter Alignment Upper Sundog KP24-29



Initial Use of Winter Alignment Tetcela to Fishtrap, KP 90–95



Schedule and Timing

Road Construction

Year 1	Winter	Subgrade KP 170 to Liard R Liard R Ice Bridge, Barge Ramps Subgrade Liard R to Grainger G Surfacing KP 170 to Liard R Winter Road to Mine (Mine construction)
	Fall	Surfacing Liard R to Grainger G
Year 2	Winter	Liard R Ice Bridge Winter Road to Mine (equipment in) Subgrade Grainger G to KP 102 and KP 95-59 Install major crossings to KP 87

Schedule and Timing Construction

Year 2	Summer	Surfacing Grainger G to KP 102 Subgrade KP 28 to Mine, KP 102-95 Install KP 23.3 and 25.4 crossings
	Fall	Surfacing KP 102-86 Sundog Creek Realignment Mill Commissioning
Year 3	Winter	Liard R Ice Bridge Winter Road to Mine Subgrade KP 59-39 Install remaining major crossings
	Summer	Surfacing KP 86-39

Infrastructure – Camps

- KP 23.2
- KP 40 Cat Camp*
- KP 65
- KP 87*
- KP 102 Wolverine Pass
- KP 120 Grainger Gap*
- KP 148 (alternate to KP 156)
- KP 156 Liard River

* Retain for Road Maintenance

Camps Grey & Brown Water

- Grey Water
 - Disposal off-site or in on-site sump after filtration
 - YTG Specifications
- Brown Water
 - Disposal off-site or in on-site treatment plant with effluent disposal to a sump
 - Camp KP 23.2 & 40 disposal off-site

Schedule and Timing Road Operations

Years 3-20 Mine Operations

Winter Liard R Ice Bridge construction
Haul period Jan 1 - Mar 31

Spring Break-up
Highway load restrictions

Summer Liard R Barge operation
Haul period Jun 15 – Nov 4

Schedule and Timing Road Closure

Years 20-22 Mine Reclamation

Years 23-24 Period of road reclamation

Years 25-28 Period of Monitoring for runoff,
stability and revegetation

Monitoring intensity decreases
after Year 26

SUB-AGENDA

- Accidents and Malfunctions
 - Concentrates and Supplies
 - Road Design
 - Road Operating Parameters
 - Risk Assessment
 - Spill Contingency

Accidents and Malfunctions

Concentrates

- Either in bags inside a truck box with solid lid, or
- in bulk in lockable containers

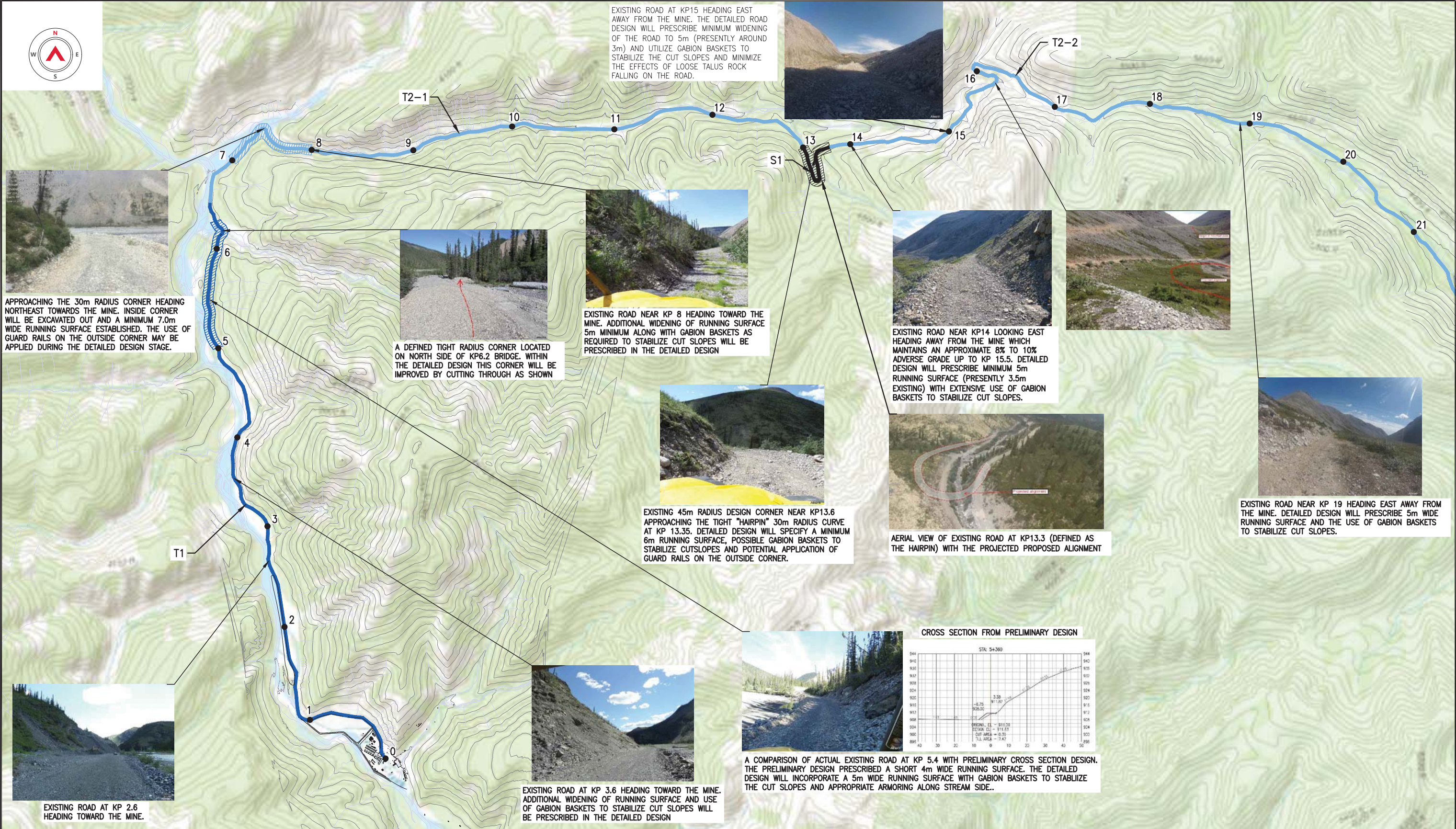
Supplies

- Diesel
- Reagents (sodium sulphide, acid)
- Explosives (ammonium nitrate)

Accidents and Malfunctions

Road Design

- MoF Guidelines
- 5 m width, except for 550 m in controlled rock-cut areas, 330 m of which are “cut-through’s”
- Straightening, improved corners and grade reduction of winter road
- Crossings and drainage management
- Signage (speed limits, bends, hazards)



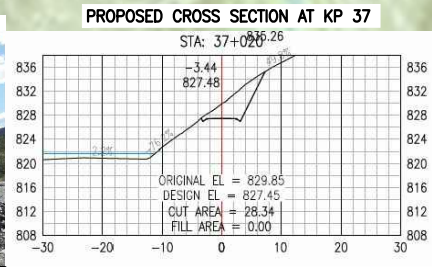
LEGEND		
	T1	T6
	T2	T7
	T3	T8
	T4	T9
	T5	T10
	SPECIAL SECTIONS	

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0	2017/01/10	ISSUED FOR REVIEW	TMM EK
REV	YY/MM/DD	DESCRIPTION	DRWN APVD

CLIENT:

TITLE: DESIGN SECTIONS. km 5+140 to km 6+260 km 7+000 to km 8+000 km 13+000 to km 13+500			
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PROJECT NO:	16-GP-0041	DSGN:	-
DRAWING SIZE:	ANSI "B"	CHKD:	EK
SCALE:	1:35000	APVD:	EK
		DATE:	17/01/09
		DATE:	17/01/09+

PROJECT: PRAIRIE CREEK MINE ROAD STRATIFICATION CODING km 0+000 to km 21+000	
DWG NO:	16GP0041-035-1000-001
REV:	0



MIDDLE PICTURE IS OF THE EXISTING ROAD NEAR KP5.2 WITH THE REPRESENTATIVE CROSS SECTION PRODUCED BY PRELIMINARY DESIGN. THIS PROVIDES AN ILLUSTRATION OF HOW THE ACTUAL ROAD (UPPER CUT SLOPES) WOULD APPEAR AT KP37, HOWEVER THE ROAD WOULD BE ELEVATED ABOVE THE STREAM FLOODPLAIN. THIS WILL BE PLACED AT KP 37.



EXAMPLE OF A ROCK "THROUGH CUT" WHICH IS PROPOSED ON THE APPROACHES AT KP 23.5 AND KP 25.4 CROSSINGS



EXAMPLE OF A COMPARABLE BRIDGE MULTI-SPAN PROPOSED AT KP 23.5 AND KP 25.4



AERIAL VIEW OF PROJECTED ALIGNMENT AND CROSSING AT KP 25.4.



AERIAL VIEW OF PROJECTED ALIGNMENT AT KP 26.



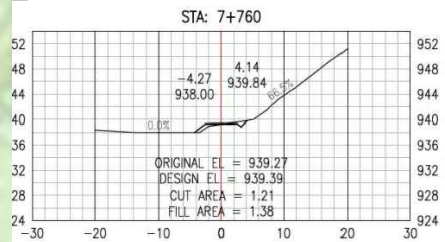
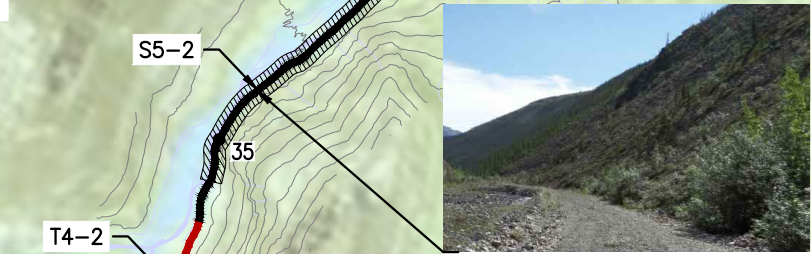
AERIAL VIEW OF PROJECTED ALIGNMENT AT KP 27.



AERIAL VIEW OF PROJECTED ALIGNMENT AND CROSSING AT KP 23.5.



AERIAL VIEW NEAR KP 29 LOOKING UP VALLEY TOWARD THE MINE WITH PROJECTED VIEW OF THE PROPOSED ROAD.



A VIEW OF EXISTING ROAD NEAR KP 7.8 WITH ITS ASSOCIATED CROSS SECTION. THIS PROVIDES A GOOD ILLUSTRATION OF WHAT IS PROPOSED NEAR KM 35.3 WITH A ROAD BASE ELEVATED 1.5m HIGHER AND 5m (WIDER) RUNNING SURFACE.



PICTURE OF EXISTING ROAD NEAR KP4.5. PROVIDES A GOOD ILLUSTRATION OF THE TYPE OF CONDITIONS AND ROAD TO BE CONSTRUCTED WITHIN CONSTRUCTION TYPE 4 FROM ROUGHLY KP30 TO KP34.5.

LEGEND		
T1	T6	SPECIAL SECTIONS
T2	T7	
T3	T8	
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TITLE: DESIGN SECTIONS			
km 25+000 to km 26+000			
km 28+000 to km 28+800			
km 32+200 to km 34+200			
km 34+800 to km 39+000			
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PROJECT NO:	16-GP-0041	DSGN:	DATE:
DRAWING SIZE:	ANSI "B"	CHKD:	EK
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PROJECT:	
PRAIRIE CREEK MINE ROAD STRATIFICATION CODING km 21+000 to km 39+000	
DWG NO:	16GP0041-035-1000-002
REV:	0



AERIAL VIEW AND PROJECTION OF THE PROPOSED ROAD NEAR KP 45 LOOKING EAST HEADING AWAY FROM THE MINE. A COMPARABLE ROAD IN SIMILAR ROLLING TERRAIN TO HELP ILLUSTRATE WHAT THE OPERATIONAL ROAD MAY LOOK LIKE THROUGH THIS SECTION.



EXAMPLE OF AN EXISTING BRIDGE WITH SIMILAR CHARACTERISTICS TO BE ENCOUNTERED AT POLJIE CREEK CROSSING KP53.2



AN AERIAL VIEW OF THE PROPOSED LOCATION OF MINE ACCESS ROAD LOOKING EAST NEAR KP49 AND AN EXAMPLE OF A COMPARABLE EXISTING ROAD CONSTRUCTED IN SIMILAR TERRAIN.

LEGEND

T1	T6	SPECIAL SECTIONS
T2	T7	
T3	T8	
T4	T9	
T5	T10	

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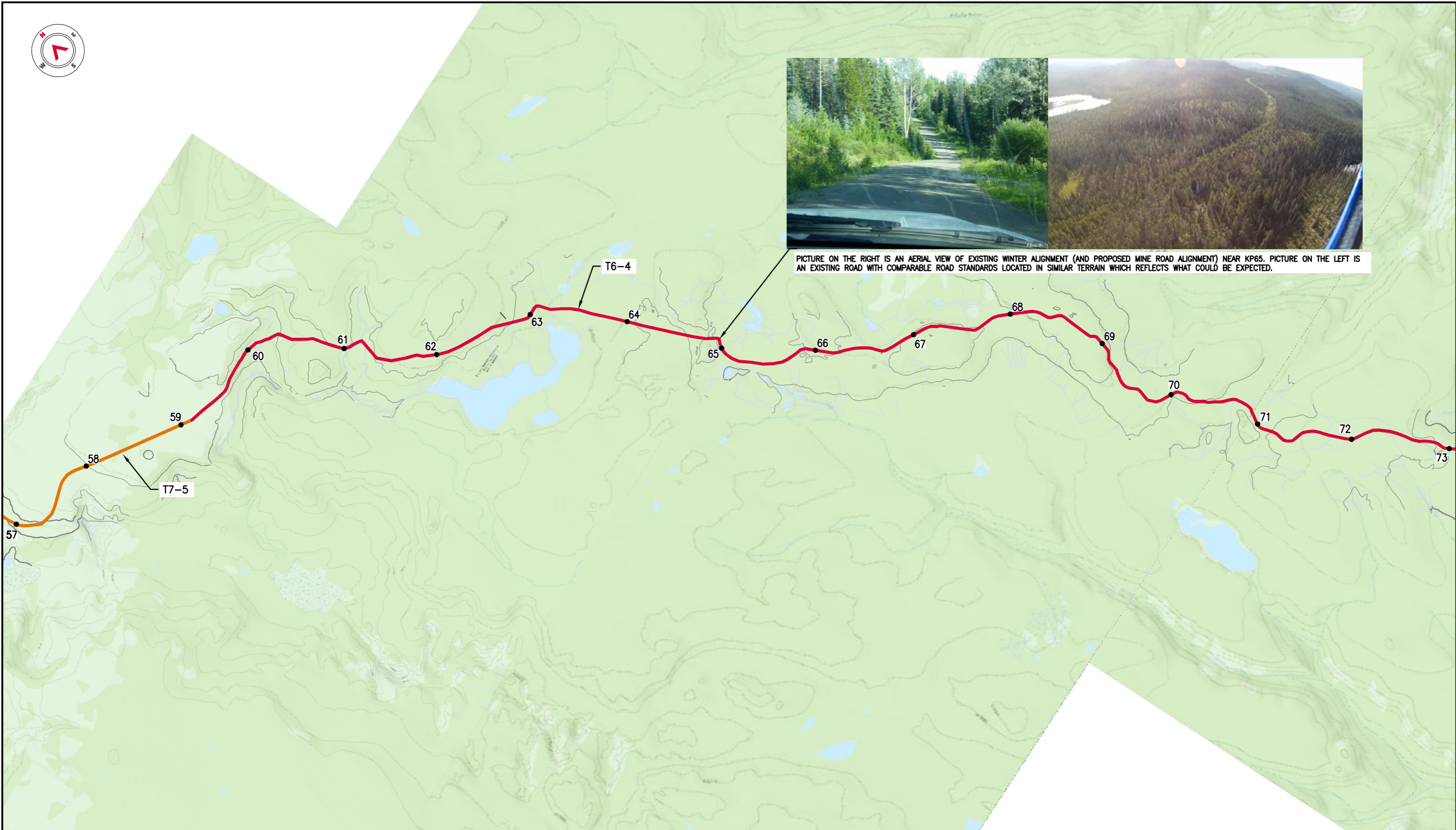
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CANADIAN ZINC CORPORATION


Allnorth

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LEGEND

T1	T6	SPECIAL SECTIONS	
T2	T7		
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PLAN VIEW
km 57+000 to km 73+000

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PROJECT:

PRAIRIE CREEK
MINE ROAD
STRATIFICATION CODING
km 57+000 to 73+000

DWG NO:	16GP0041-035-1000-004	REV:	0
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LEGEND

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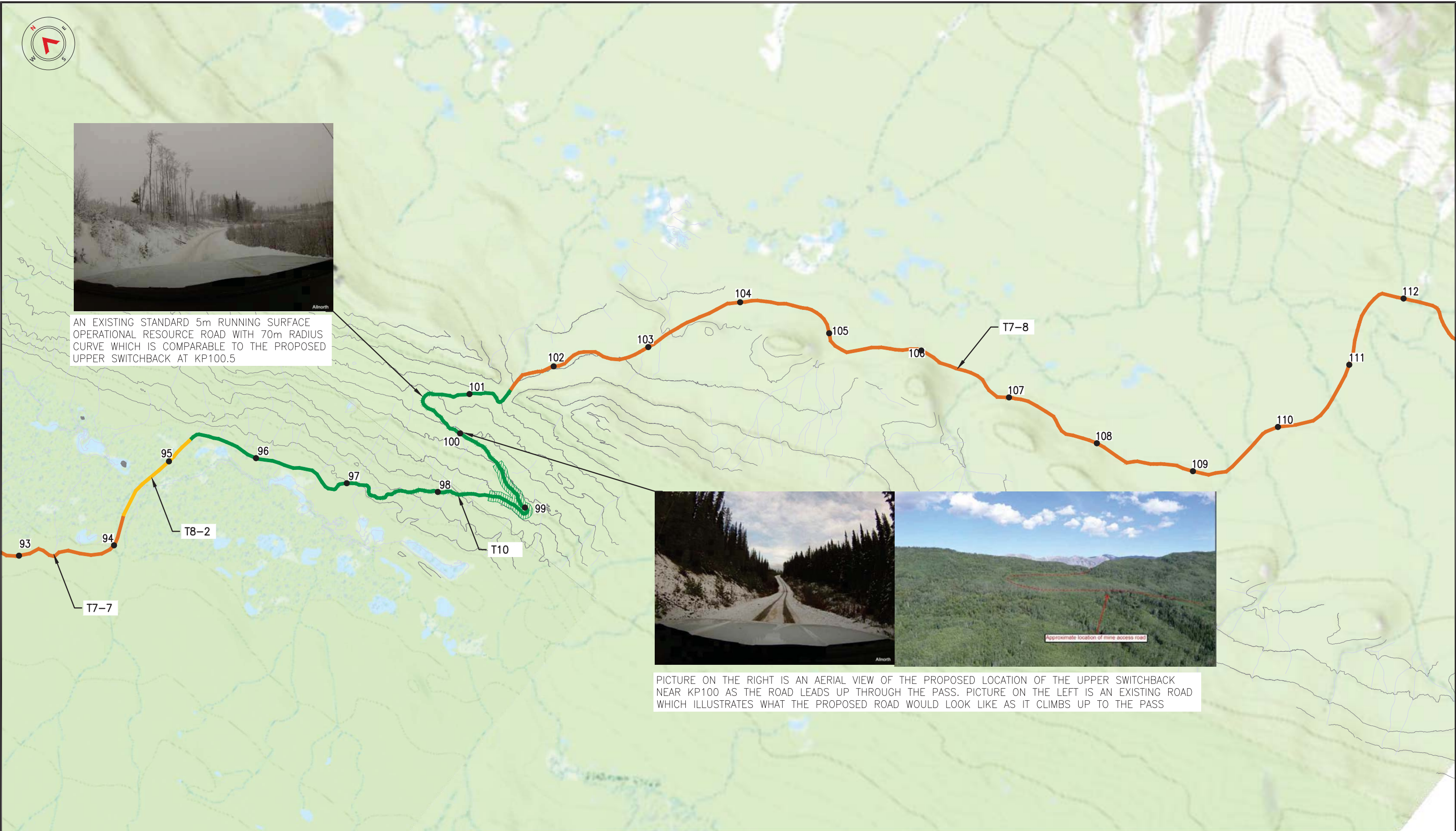
SPECIAL SECTIONS

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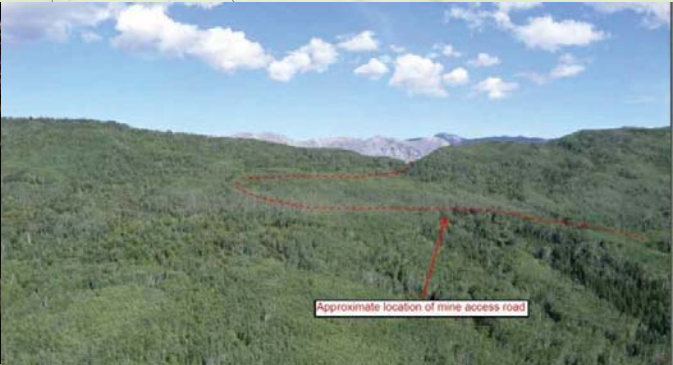
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DATE:	17/01/09	DATE:	17/01/09

PROJECT:	
PRAIRIE CREEK MINE ROAD STRATIFICATION CODING km 73+000 to km 93+000	
DWG NO:	16GP0041-035-1000-005
REV:	0



AN EXISTING STANDARD 5m RUNNING SURFACE OPERATIONAL RESOURCE ROAD WITH 70m RADIUS CURVE WHICH IS COMPARABLE TO THE PROPOSED UPPER SWITCHBACK AT KP100.5



PICTURE ON THE RIGHT IS AN AERIAL VIEW OF THE PROPOSED LOCATION OF THE UPPER SWITCHBACK NEAR KP100 AS THE ROAD LEADS UP THROUGH THE PASS. PICTURE ON THE LEFT IS AN EXISTING ROAD WHICH ILLUSTRATES WHAT THE PROPOSED ROAD WOULD LOOK LIKE AS IT CLIMBS UP TO THE PASS

LEGEND

T1	T6	SPECIAL SECTIONS
T2	T7	
T3	T8	
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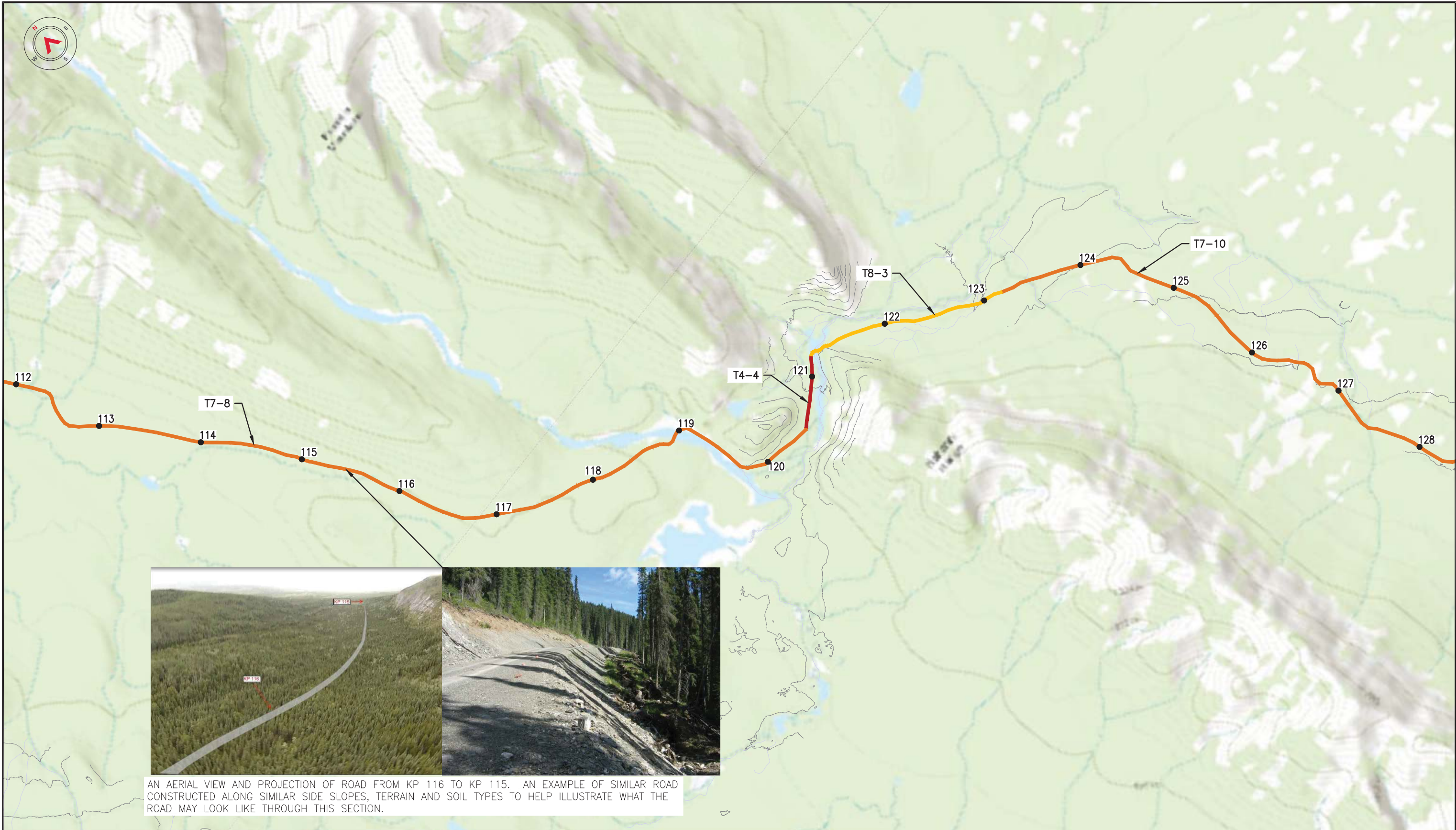
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REV	YY/MM/DD	DESCRIPTION	DRWN APVD

CLIENT:



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DRAWING SIZE:	ANSI "B"	CHKD:	EK
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DATE:	16/12/22	DATE:	17/01/09

PROJECT: PRAIRIE CREEK MINE ROAD STRATIFICATION CODING km 93+000 to km 112+000	
DWG NO: 16GP0041-035-1000-006	REV: 0



AN AERIAL VIEW AND PROJECTION OF ROAD FROM KP 116 TO KP 115. AN EXAMPLE OF SIMILAR ROAD CONSTRUCTED ALONG SIMILAR SIDE SLOPES, TERRAIN AND SOIL TYPES TO HELP ILLUSTRATE WHAT THE ROAD MAY LOOK LIKE THROUGH THIS SECTION.

LEGEND

T1	T6	SPECIAL SECTIONS
T2	T7	
T3	T8	
T4	T9	
T5	T10	

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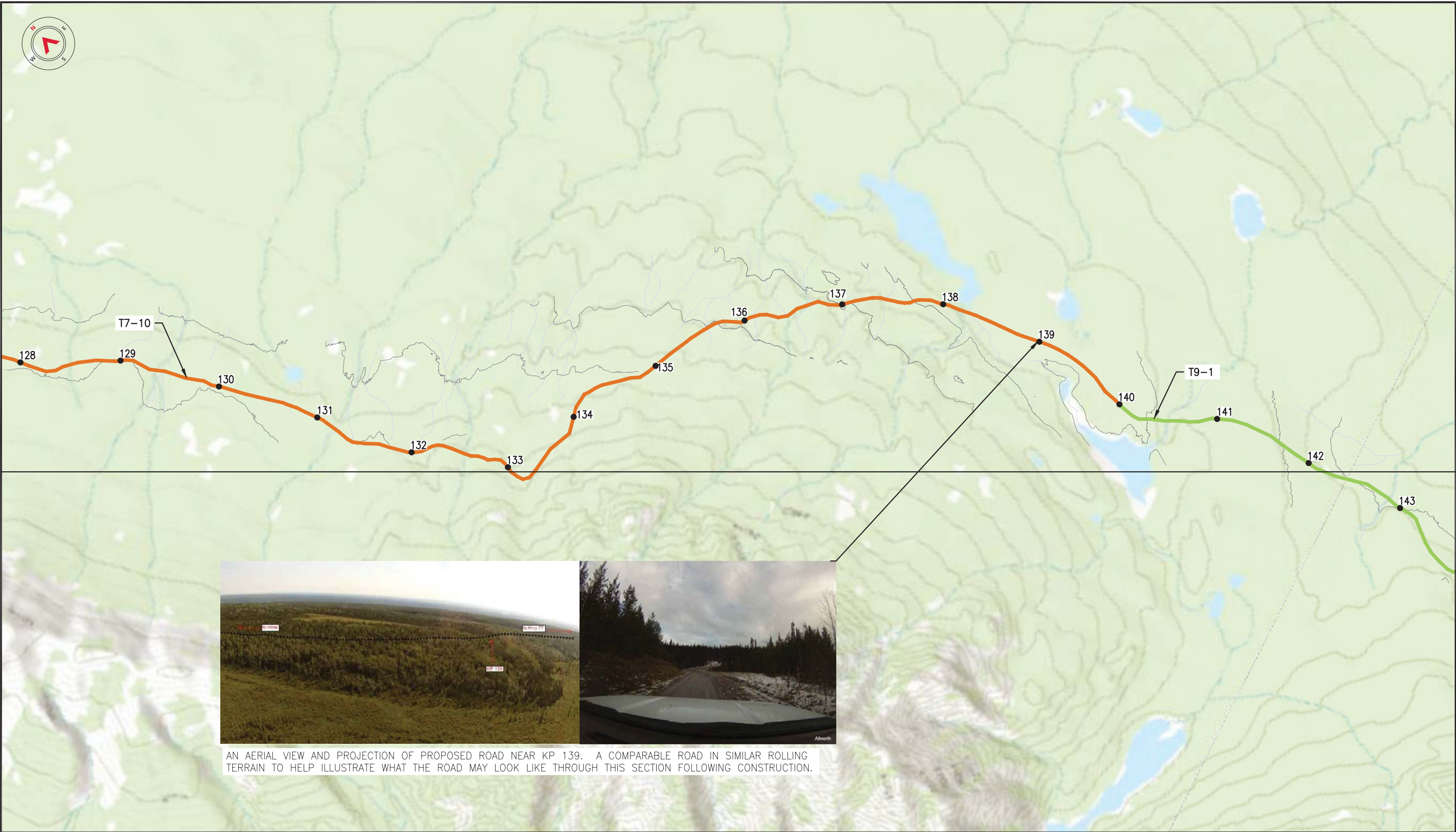
PLAN VIEW
km 112+000 to km 128+000

CLIENT NO:	-	DRWN:	TMM	DATE:	16/12/22
PROJECT NO:	16-GP-0041	DSGN:	-	DATE:	-
DRAWING SIZE:	ANSI "B"	CHKD:	EK	DATE:	17/01/09
SCALE:	1:35000	APVD:	EK	DATE:	17/01/09

PROJECT:

PRAIRIE CREEK
MINE ROAD
STRATIFICATION CODING
km 112+000 to km 128+000

DWG NO:	16GP0041-035-1000-007	REV:	0
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AN AERIAL VIEW AND PROJECTION OF PROPOSED ROAD NEAR KP 139. A COMPARABLE ROAD IN SIMILAR ROLLING TERRAIN TO HELP ILLUSTRATE WHAT THE ROAD MAY LOOK LIKE THROUGH THIS SECTION FOLLOWING CONSTRUCTION.

LEGEND

T1	T6	SPECIAL SECTIONS
T2	T7	
T3	T8	
T4	T9	
T5	T10	

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0	2017/01/10	ISSUED FOR REVIEW	TMM EK
REV	YY/MM/DD	DESCRIPTION	DRWN APVD

CLIENT:



TITLE: PLAN VIEW km 128+000 to km 143+000			
CLIENT NO:	-	DRWN:	TMM
PROJECT NO:	16-GP-0041	DSGN:	-
DRAWING SIZE:	ANSI "B"	CHKD:	EK
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DATE:	16/12/22	DATE:	17/01/09
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PROJECT: PRAIRIE CREEK MINE ROAD STRATIFICATION CODING km 128+000 to km 143+000	
DWG NO: 16GP0041-035-1000-008	REV: 0

Date: 2017/01/10 | User: Teena Major | File: P:\GP\2016\000\16GP0041 Canadian Zinc - LowerSundogRealignment\1000-Drawings\1011-Civil\01-Production_Risk Assessment Drawings\16GP0041-035-1000-010 | Layout: 009 | Paper Size: 558.8mm x 431.8mm



AN AERIAL VIEW AND PROJECTION OF PROPOSED ROAD NEAR KP 148 LOOKING NORTH TO KP 147. A COMPARABLE ROAD IN SIMILAR ROLLING TERRAIN TO HELP ILLUSTRATE WHAT THE ROAD MAY LOOK LIKE THROUGH THIS SECTION FOLLOWING CONSTRUCTION.

LEGEND

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SPECIAL SECTIONS

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REV	YY/MM/DD	DESCRIPTION	DRWN APVD

CLIENT:



TITLE: DESIGN SECTION km 147+000 to km 149+000			
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PROJECT NO:	16-GP-0041	DSGN:	-
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DATE:	17/01/09	DATE:	17/01/09

PROJECT: PRAIRIE CREEK MINE ROAD STRATIFICATION CODING km 143+000 to km 158+000	
DWG NO: 16GP0041-035-1000-009	REV: 0



LEGEND		
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0	2017/01/10	ISSUED FOR REVIEW	TMM EK
REV	YY/MM/DD	DESCRIPTION	DRWN APVD

CLIENT:

CANADIAN ZINC CORPORATION

Allnorth

TITLE:			
PLAN VIEW km 158+to km 180+000			
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PROJECT NO:	16-GP-0041	DSGN:	-
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DATE:	17/01/09	DATE:	17/01/09

PROJECT:	
PRAIRIE CREEK MINE ROAD STRATIFICATION CODING km 158+000 to km 180+000	
DWG NO:	16GP0041-035-1000-010
REV:	0

Accidents and Malfunctions

Road Operating Parameters

- Supervisor and Monitors
- Journey Management System
- Pre-trip checks and tail-gates
- Radio/GPS communication
- Convoys, road rules, speeds
- Access control

Accidents and Malfunctions

Risk Assessment

- Accident likelihood
 - All season lower risk than winter only
 - Road bed sloped in
 - 30 km/h average speed, speed reductions
 - Operating procedures/monitoring – no “seed”

Accidents and Malfunctions

Risk Assessment (cont.)

- Consequence
 - Cargo properties and effects
 - Fish bearing streams
 - Karst

Accidents and Malfunctions

Risk Assessment (cont.)

- Risk Matrix
 - Very high, Km 12-17.2
 - High, Km 7.4-12, 23.5-40.2, 95.8-102
- Mitigation
 - Road design/operation review
 - Spill Response

Accidents and Malfunctions

Risk Assessment (cont.)

- Oboni assessment
 - Inappropriate example comparisons
 - ORE results not transparent or explained
 - Off-road excursion estimates an order of magnitude greater than BC Forestry road statistics
 - Incorrect consequence assumptions
 - No constructive response to review, only defensive argument, unreliable opinions and unprofessional sarcasm and hyperbole

Accidents and Malfunctions

Revised Risk Assessment

- Additional mitigation
 - Cab safety belts
 - Cargo anchoring
 - Consider 0.5-1 m widening and/or perimeter barriers for high risk sections
 - Operations level risk assessment

Accidents and Malfunctions

Spill Contingency

- Spill kits and training
- Response teams
- Equipment and trailers
- Control points

Permafrost, Soils and Terrain

Permafrost

- Discontinuous presence in lowland soils expected
- Overland construction minimizes effects
- Investigation of suspect areas and borrows
- Mitigation and monitoring plans

Permafrost, Soils and Terrain

Soils

- Baseline metals concentrations
- Dustfall monitoring
- Operations Monitoring

Permafrost, Soils and Terrain

Terrain

- Mapping, hazard identification, mitigation
- No major slope stability issues
- Some rockfall protection may be required
- Monitoring for debris flows

Thank You